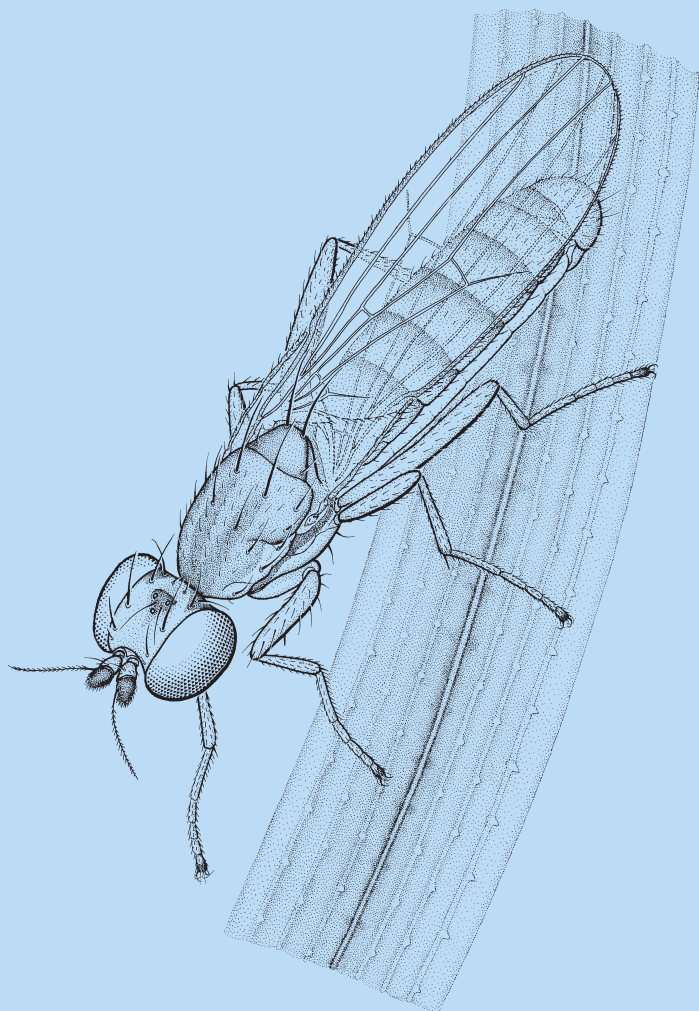




NÁRODNÍ
MUZEUM

ACTA ENTOMOLOGICA

MUSEI NATIONALIS PRAGAE



**Nearctic Anthomyzidae:
a monograph of *Anthomyza*
and allied genera (Diptera)**

Jindřich Roháček & Kevin N. Barber

56 (suppl.)
2016

Anthomyza dichroa



Acta Entomologica Musei Nationalis Pragae

Volume 56 (supplementum)

Date of issue: December 30, 2016

Chairman of the editorial board:

Josef Jelínek (Czech Republic)

Editor-in-chief:

Petr Kment (Czech Republic)

Associate editors:

Martin Fikáček (Czech Republic)

Jiří Hájek (Czech Republic)

Igor Malenovský (Czech Republic)

Lukáš Sekerka (Czech Republic)

Michal Tkoč (Czech Republic)

English language editors:

Jitka Aldhoun (United Kingdom)

Leonidas R. Davranoglou (United Kingdom)

Grey T. Gustafson (USA)

Advisory board:

Michael Balke (Germany)

Jan Bezděk (Czech Republic)

David S. Boukal (Czech Republic)

Freddy Bravo (Brazil)

Gregory R. Curler (USA)

Vladimir M. Gnezdilov (Russia)

Petr Kočárek (Czech Republic)

Zdeněk Laštůvka (Czech Republic)

Lubomír Masner (Canada)

Wolfram Mey (Germany)

Ricardo Palma (New Zealand)

Dávid Rédei (China)

Aleš Smetana (Canada)

Alexey Yu. Solodovnikov (Denmark)

Pavel Štys (Czech Republic)

Sonja Wedmann (Germany)

Published biannually by the National Museum, Václavské náměstí 68, CZ-115 79 Praha 1, Czech Republic.

Scope of the journal: *Acta Entomologica Musei Nationalis Pragae* (AEMNP) publishes entomological papers focused on taxonomy, nomenclature, morphology, bionomics and phylogeny as well as catalogues.

Manuscripts should be sent to: aemnp.editors@gmail.com (or to: Department of Entomology, National Museum, Cirkusová 1740, CZ-193 00 Praha 9 – Horní Počernice, Czech Republic).

Journal web page: <http://www.aemnp.eu>

Typeset & design: M. Tkoč & M. Fikáček.

Printed by Tiskárna Kleinwächter, Čajkovského 1511, 738 01 Frýdek-Místek, Czech Republic.

Distributed by the Department of Entomology, National Museum, Praha.

Indexed in Biological Abstracts, EBSCO, Entomology Abstracts, SCOPUS, Zoological Record and Scientific Citation Index Expanded and Web of Science.

ISI Impact Factor (2016): 0.617

ISSN 0374-1036 (Print)

© Národní muzeum, Praha – 2016

ISSN 1804-6487 (Online)

Cover: *Anthomyza dichroa* sp. nov. (Diptera: Anthomyzidae). Orig. by J. Roháček.

**Nearctic Anthomyzidae:
a monograph of *Anthomyza*
and allied genera (Diptera)**

Jindřich ROHÁČEK
Kevin N. BARBER

ACTA ENTOMOLOGICA MUSEI NATIONALIS PRAGAE
volume 56 (supplementum)

National Museum, Prague
2016

Nearctic Anthomyzidae: a monograph of *Anthomyza* and allied genera (Diptera)

Jindřich ROHÁČEK¹⁾ & Kevin N. BARBER²⁾

¹⁾ Slezské zemské muzeum, Nádražní okruh 31, CZ-746 01 Opava, Czech Republic; e-mail: rohacek@szm.cz

²⁾ Great Lakes Forestry Centre, Canadian Forest Service, Natural Resources Canada, 1219 Queen St. E., Sault Ste. Marie, Ontario, P6A 2E5, Canada; e-mail: kevin.barber@canada.ca

Abstract. Nearctic Anthomyzidae of the *Anthomyza* clade comprising the genera *Fungomyza* Roháček, 1999 (1 species), *Ischnomyia* Loew, 1863 (1 species), *Arganthomyza* Roháček, 2009 (7 species) and *Anthomyza* Fallén, 1810 (18 species) are monographed. A review of the history of taxonomic research of the Nearctic Anthomyzidae and of the adult morphology are given. All included taxa are treated systematically, with complete data on nomenclature, type material, taxonomy (diagnoses and (re)descriptions, keys, illustrations of taxonomically important structures), relationships, biology and distribution. The concept of *Ischnomyia* is redefined and its Nearctic species are revised and redescribed as are all those of *Anthomyza*; species of the remaining two genera are reviewed. *Ischnomyia spinosa* Hendel, 1911 syn. nov., is a new junior synonym of *Arganthomyza vittipennis* (Walker, 1857) comb. nov., the latter being resurrected from synonymy with *Ischnomyia albicosta* (Walker, 1849), transferred to *Arganthomyza* and redescribed. The E. Palaearctic species *I. barbarista* (Roháček, 2009) comb. nov. is excluded from the genus *Arganthomyza* and transferred to *Ischnomyia*. Fifteen new species of *Anthomyza* are described, viz. *A. oblonga*, *A. silvatica*, *A. pengellyi*, *A. mcalpinei*, *A. pullinotum*, *A. occidentalis*, *A. vockerothi*, *A. dichroa*, *A. gibbiger*, *A. orthogibbus*, *A. shewelli*, *A. gilviventris*, *A. furvifrons*, *A. vulgaris*, *A. equiseti* spp. nov. and remaining 3 species are redescribed, viz. *A. tenuis* (Loew, 1863), *A. variegata* (Loew, 1863) and *A. concolor* (Thomson, 1869). One neotype (of *I. albicosta*) and 5 lectotypes are designated. Species groups are redefined and rediagnosed within the genera *Arganthomyza* and *Anthomyza*, while the *Arganthomyza vittipennis* group and *Anthomyza tschirnhausi* group are newly established. The first modern key to all Nearctic genera of Anthomyzidae is provided. Distributional patterns of species studied are presented using a coarse measure of dissimilarity. Relationships of taxa under study are discussed following a new phylogenetic hypothesis based on cladistic analysis of morphological data of all known species in the *Anthomyza* clade.

Key words. Diptera, Anthomyzidae, biology, classification, distribution, morphology, new combination, new species, new synonym, nomenclature, phylogeny, taxonomy, Nearctic Region

Contents

Introduction	3
Material and methods	5
Codens and abbreviations	10
1. Codens of museums and collections	10
2. Abbreviations of morphological terms used in text and/or figures	11
Historical background of taxonomic investigations on the Nearctic Anthomyzidae	12
Notes on type material of species described as <i>Anthophilina</i> by LOEW (1863)	13
Morphology of adults	14
Taxonomy	26
Key to identification of Nearctic genera of Anthomyzidae	26
The Nearctic genera of the <i>Anthomyza</i> clade	29
Genus <i>Fungomyza</i> Roháček, 1999	30
Key to identification of <i>Fungomyza</i> species (world)	33
Genus <i>Ischnomyia</i> Loew, 1863	41
Key to identification of <i>Ischnomyia</i> species (world)	44
Genus <i>Arganthomyza</i> Roháček, 2009	56
Key to identification of <i>Arganthomyza</i> species (world)	59
The <i>Arganthomyza setiplanta</i> group	61
The <i>Arganthomyza vittipennis</i> group	66
The <i>Arganthomyza duplex</i> group	78
The <i>Arganthomyza socculata</i> group	95
Genus <i>Anthomyza</i> Fallén, 1810	105
Key to identification of species groups of Nearctic <i>Anthomyza</i>	110
The <i>Anthomyza macra</i> group	111
Key to identification of the Nearctic species of the <i>Anthomyza macra</i> group	111
The <i>Anthomyza pallida</i> group	141
Key to identification of the Nearctic species of the <i>Anthomyza pallida</i> group	142
The <i>Anthomyza neglecta</i> group	229
Key to identification of the Nearctic species of the <i>Anthomyza neglecta</i> group	230
The <i>Anthomyza tschirnhausi</i> group	277
Key to identification of the Nearctic species of the <i>Anthomyza tschirnhausi</i> group	278
The <i>Anthomyza gracilis</i> group	313
Key to identification of the Nearctic species of the <i>Anthomyza gracilis</i> group	314
Distributional patterns of the Nearctic species of the <i>Anthomyza</i> clade	358
Relationships of the Nearctic taxa of the <i>Anthomyza</i> clade	368
Acknowledgements	388
World bibliography of Anthomyzidae (updated)	390
Index 1 (names of insects)	410
Index 2 (names of plants)	412

Introduction

The family Anthomyzidae is a small acalyprate family of Diptera with 132 described species (including 12 fossil, see ROHÁČEK 2013a, 2014c) as of the end of 2015. The representatives of the family are usually delicate slender flies (Figs 1–3, 5) externally resembling Opomyzidae, which is considered its sister group within the superfamily Opomyzoidea (J. F. McALPINE 1989; ROHÁČEK 1998a, 2013a); for review of other classifications see ROHÁČEK (1998a, 2006a, 2013a). In the Nearctic Region a total of 29 species belonging to 7 genera of Anthomyzidae are currently known, mainly thanks to recent revisionary studies by ROHÁČEK & BARBER (2004, 2005, 2011, 2013). However, the Nearctic species of the genera *Mumetopia* Melander, 1913, *Ischnomyia* Loew, 1863 and, particularly the richest *Anthomyza* Fallén, 1810, remain to be revised. The present study is devoted to the *Anthomyza* clade, which is represented in this region by the two latter genera, *Anthomyza* and *Ischnomyia*, and by two genera already revised, *Fungomyza* Roháček, 1999 and *Arganthomyza* Roháček, 2009. Outside the Nearctic Region this clade includes the E. Palearctic genus *Epischnomyia* Roháček, 2006 and possibly also the insufficiently known genus *Receptrixia* Roháček, 2006, as suggested by ROHÁČEK (2009a). This study is therefore aimed not only at the revision of Nearctic *Anthomyza* and *Ischnomyia* species but also at a synthetic treatment of all the Nearctic genera and species of the whole *Anthomyza* clade including a detailed discussion of the phylogenetic relationships within this group.

The other genera represented in the Nearctic Region were either treated in previous revisions, viz. *Stiphrosoma* Czerny, 1928 (ROHÁČEK & BARBER 2005) and *Quametopia* Roháček & Barber, 2011 (ROHÁČEK & BARBER 2011), or remain unrevised: *Mumetopia* with two currently affiliated Nearctic species, *M. occipitalis* Melander, 1913 and *M. nigrimana* (Coquillett, 1900) but the latter belonging to an unnamed genus (cf. ROHÁČEK & BARBER 2009), *Carexomyza* Roháček, 2009 represented in the area by a few unnamed species, and an unnamed genus with a single species. All these groups are introduced here in the generic key below (p. 26) but will be treated in subsequent revisions.

The majority of Anthomyzidae are species predominantly associated with humid grassland habitats because the larvae of most species are known to develop in growths of graminoids (mainly Poaceae, and Cyperaceae but also in Typhaceae and Juncaceae) and often represent an important component of dipterous communities in meadows, bogs, fens, swamps and other open habitats. Others live in the undergrowth of deciduous, mixed and hardwood forest, where some species can also develop in other soft monocotyledons, dicotyledons, horsetails and (possibly) in ferns and even in macrofungi (ROHÁČEK 2009a; ROHÁČEK & BARBER 2011, 2013). The immature stages, life history and precise trophic demands are known in only a few species (cf. ROHÁČEK 1992, 2006a, 2009a; ROHÁČEK & BARBER 2011), but the information obtained revealed that the larvae are in fact microsaprophagous grazers largely feeding on (at least partly) rotten tissues of plants (rarely fungi) and on the micro-organisms causing their decay. Interestingly, all the above listed host-plant associations and trophic strategies (including mycetophagy) are known to be represented in the *Anthomyza* clade and its Nearctic representatives.

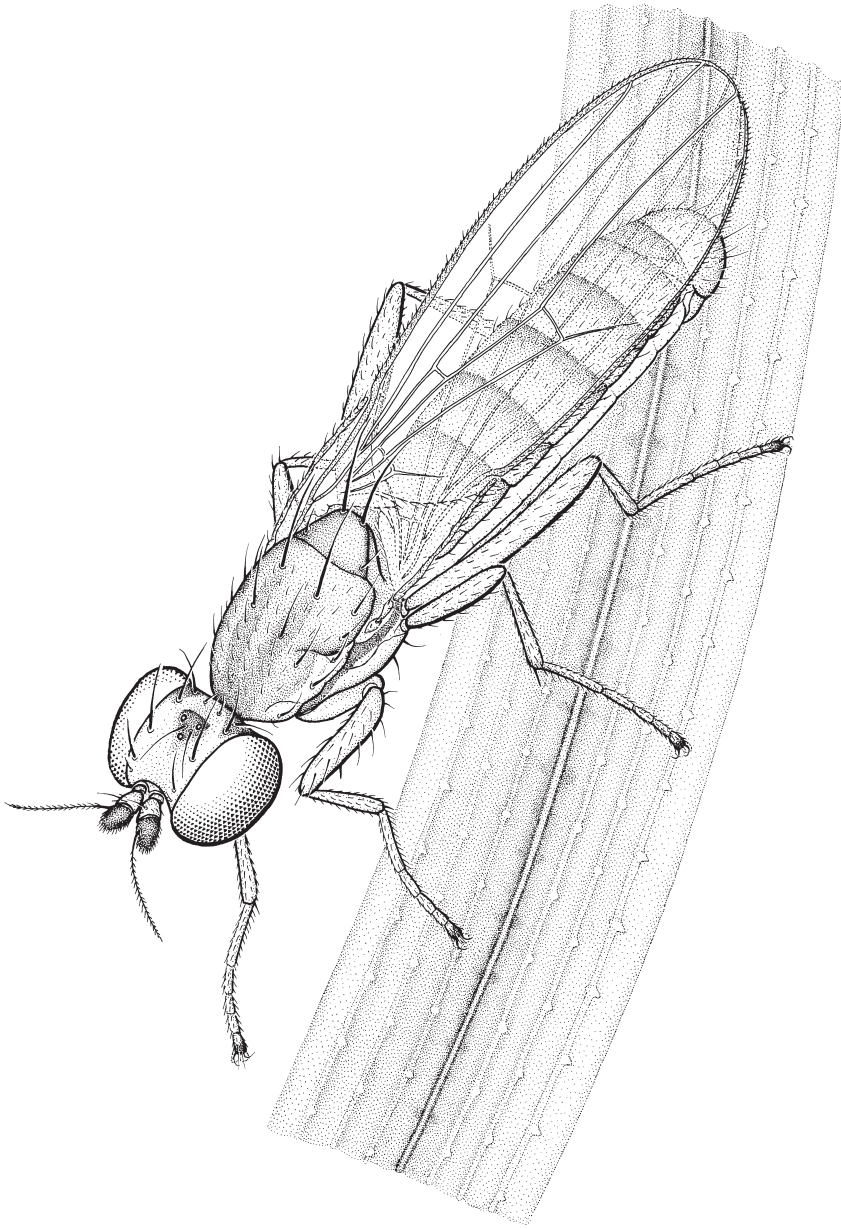


Fig. 1. *Anthomyza dichroa* sp. nov., male, general habitus (Canada: Ontario: Sault Ste. Marie, Bristol Place Park), body length ca. 2.5 mm. Based on photograph by J. Roháček.

In North America, the Anthomyzidae were given very limited attention in the past (see the historical review below), so their taxonomy, phylogeny, biology and biogeography have been poorly understood up to the 2000s. During the 19th century, the few known species were treated within only two genera (*Anthomyza*, *Ischnomyia*) and placed in “Geomyzidae” or “Heteroneuridae”, together with some other, often unrelated acalyptrates. In the beginning of the 20th century, an additional genus (*Mumetopia* Melander, 1913) was described and, although the family Anthomyzidae was established by CZERNY (1903a), the Nearctic anthomyzid species were generally treated as Opomyzidae until the 1950s in the American literature. There is no modern key to Nearctic genera of Anthomyzidae as currently recognized.

This monographic treatment of the Nearctic taxa of the *Anthomyza* clade is intended to fill a large gap in the knowledge of Nearctic Anthomyzidae. Results, which have developed over the past 20 years, are based on an extensive amount of material available from a number of collections, revealing a great deal of new taxonomic, phylogenetic, biological and biogeographical information. It is hoped that this study will not only provide an overdue identification guide to about half of the Nearctic Anthomyzidae, but will also promote subsequent research of these hitherto largely neglected acalyptrate flies, particularly as regards their immatures, life history, habitat, host-plant affinities and historical biogeography.

Material and methods

Material. The majority of the material examined (about 21,800 specimens) and the previously published material (about 2,300 specimens) originates from the junior author’s collecting efforts and from numerous collections retained in museums, research institutions and in private possession (see list of codens below). Material was studied with special emphasis on the revision of type specimens (all available primary types were examined) and specimens of uncommon, doubtful or confused species and specimens referred to in the literature.

Collecting methods. Besides regular sweeping over vegetation (mostly aimed at netting from growths of particular graminoid herbs) and direct collecting by pooter (aspirator) from among tufts of grasses and other vegetation and on rotting sporocarps of fungi, anthomyzid flies were also collected by means of various trapping methods, including Malaise traps, emergence traps, light traps, yellow pan traps and pitfall traps. Collected specimens were stored dry (minuten-pinned, or glued on small pinned triangular cards or directly on pins), in 75% ethanol, or dried from ethanol and subsequently mounted on pins or pinned cards.

Rearing methods. Attempts at rearing five species were made with various degrees of intensity and were met with a wide range of success spaced opportunistically over several years. The general techniques are summarized by ROHÁČEK & BARBER (2011, for *Quametopia*) and adapted to accommodate host plant, available time and rearing facilities.

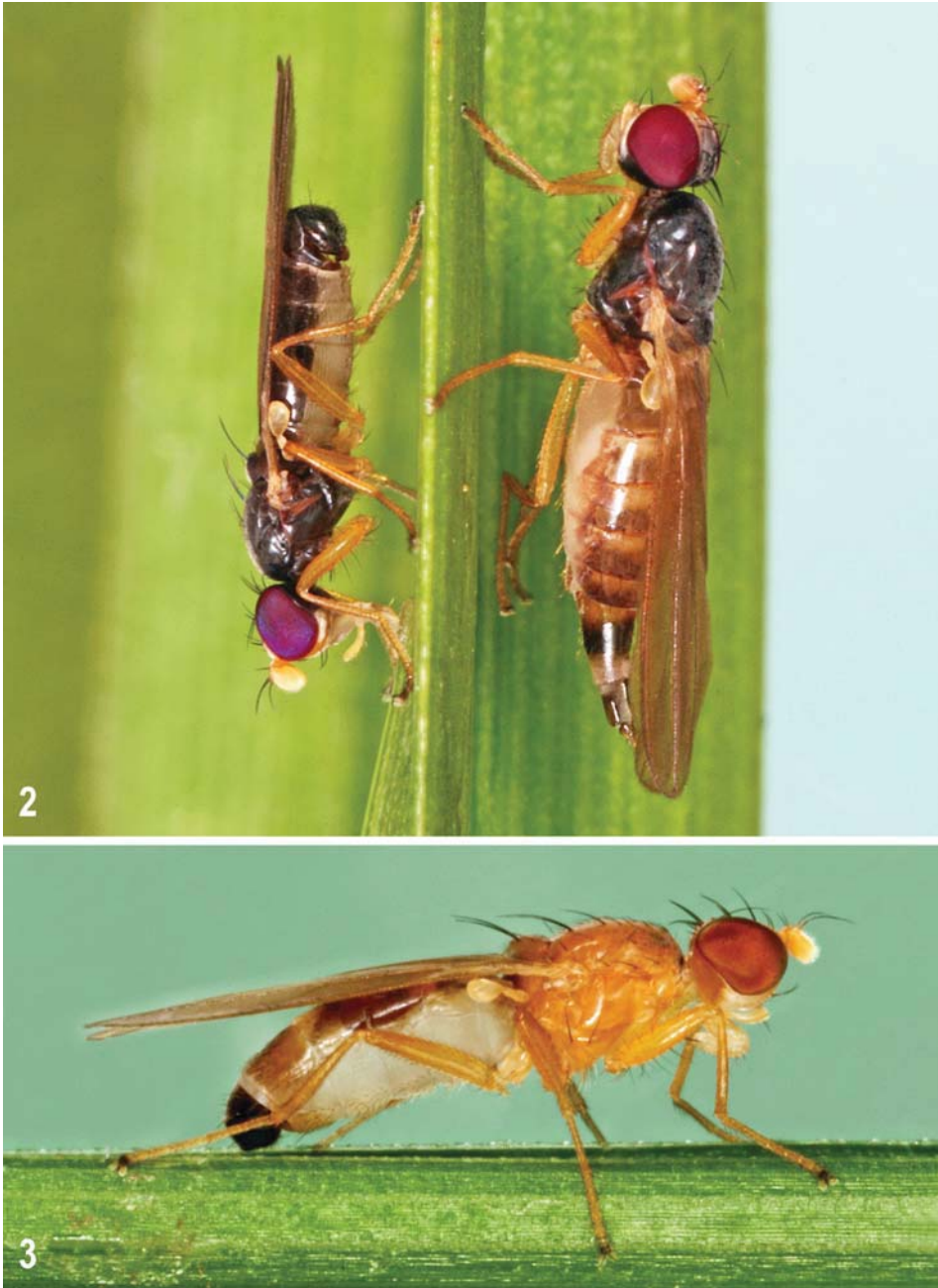
Field collections of adults and host plants. Live adults were collected by sweep net and carried in screened tubes. Prospective host plants were gathered from the collection site and often supplemented or replaced with plants collected in localities near the rearing laboratory (Great Lakes Forestry Centre, Sault Ste. Marie). Botanical nomenclature follows MEADES et al. (2004+) [<http://northernontarioflora.ca/>].

Rearing from eggs. Attempts were made with four species: *Arganthomyza vittipennis* (Ontario: Sault Ste. Marie – Finn Hill: *Eurybia macrophylla* (L.) Cass. (largeleaf aster)); *Arganthomyza bivittata* (Ontario: Sault Ste. Marie – Baseline Rd.: mixed offerings of *Dryopteris carthusiana* (Vill.) H. P. Fuchs (spinulose woodfern), *Equisetum arvense* L. (field horsetail), *Carex* sp. (sedge), *Thalictrum* sp. (meadowrue), *Doellingeria umbellata* (Mill.) Nees (flattop white aster)); *Anthomyza mcalpinei* (Ontario: Sault Ste. Marie – Algoma University: *Calamagrostis canadensis* (Michx.) P. Beauv. (bluejoint), *Phalaris arundinacea* L. (reed canary grass), *Carex aquatilis* Wahlenb. (water sedge)); and *Anthomyza equiseti* (Ontario: Echo Bay Marsh & Marathon: *Equisetum fluviatile* L. (water horsetail)).

Early trials (2002) with *Arganthomyza vittipennis* and *Anthomyza mcalpinei* used cup cages inverted on 9-cm plastic petri plates of wet sand with the plant material laying directly on this wet sand floor. Later, this was improved (as reported for *Quametopia*, see ROHÁČEK & BARBER 2011: Figs 1–3) to confine the wet sand to a smaller 3-cm petri plate on the 9-cm plate lined with filter paper for subsequent rearing attempts of *A. equiseti* and *A. bivittata*. The plant material to be used for oviposition and larval feeding was variously frozen/thawed, heated, or “seasoned” in water at 2–4°C for a few days to make it more acceptable to these presumed saprophagous larvae. The cup cages were held at 20°C to 25°C, a photoperiod of 16 hours light: 8 hours dark (16L:8D), 50–70% relative humidity (RH), and lightly misted daily.

Trials with *Arganthomyza vittipennis* and *Anthomyza mcalpinei* minimized handling of the eggs by simply replacing the 9-cm plates of wet sand and placing lids over the plates of sand with sections of plant with eggs. For *A. mcalpinei*, these plant sections with eggs and larvae were later transferred to smaller 3-cm plates without sand. In later trials with *A. bivittata* (2011) and *A. equiseti* (2008), eggs were transferred with a moistened artist’s brush to moistened filter paper in a closed 3-cm plastic dish. Hatched larvae were later transferred to a moistened section of host plant placed directly on a plastic plate. Plant (food) material was changed when needed with the transfer of all surviving larvae. Puparia were removed, cleaned with dilute bleach, rinsed, and then transferred to 4-dram plastic pill vials provided with a small piece of paper towel for traction for the emerging adult. All living immatures were maintained in conditions similar to those of adults except when a diapause was needed to complete development. Such larvae were stepped down in temperature and photoperiod over one to five weeks in order to achieve a 2–4°C overwintering condition in a darkened refrigerator for several months (with occasional maintenance). Pupariation period is reported in days as a mean \pm standard error or as raw numbers for small sample sizes.

Field collections of substrate and infested host plants. The marshy habitats of *Anthomyza equiseti* and *A. vockerothi* were predominated by *Equisetum fluviatile* and investigated more intensively at two sites in order to establish a previously undocumented host-plant association of anthomyzids with Pteridophyta: Equisetales. The Ontario: **Echo Bay Marsh** site (46°29.71'N 84°04.04'W; Fig. 577, 1 June 2007) was the first source of material for investigation where *A. equiseti* occurs. The Ontario: **Marathon** site (48°47.69'N 86°26.11'W; Fig. 360, 16 June 2007) supports populations of both *A. equiseti* and *A. vockerothi* and is discussed under *A. vockerothi*. Small numbers of specimens of an additional three species of *Anthomyza* (*A. orthogibbus*, *A. gibbiger*, *A. gilviventris*) emerged from field-collected material of *E. fluviatile* and will be mentioned under the respective Biology sections for those species.



Figs 2–3. Nearctic species of the genus *Anthomyza*. 2 – *A. shewelli* sp. nov., a pair (male on left) on leaf of *Carex* sp. (Canada: Ontario: Dubreuilville, Magpie River), body length ca. 2.4 mm (male) and 3.1 mm (female); 3 – *A. mc Alpinei* sp. nov., living male, laterally (Canada: Ontario: Sault Ste. Marie, Finn Hill), body length ca. 2.8 mm. Photo by J. Roháček.

Genitalia preparations. The complete abdomen was detached from the relaxed specimen, put into a vial with 10% solution of potassium hydroxide (KOH) in water and boiled for several minutes. KOH was neutralized by a 10% solution of acetic acid (CH_3COOH) in water and the abdomen washed in water and transferred to glycerine. It was examined and further dissected in a drop of glycerine on a slide under a binocular microscope. After examination, all parts of the abdomen were transferred to a small plastic tube (or microvial) containing glycerine, sealed with hot forceps (or closed by stopper) and pinned below the respective specimen.

Drawing techniques & photography. Larger structures (head, thorax, abdomen, legs) were drawn on squared paper using a binocular microscope with an ocular screen. Wings were photographed on a compound microscope with a digital camera. Details of the male and female genitalia were drawn by means of Abbe's drawing apparatus on a compound microscope at larger magnification (130–500 \times). Living specimens of Anthomyzidae were photographed in special boxes by means of digital cameras (Canon EOS 400D and 60D) with macro lens (Canon MP-E 65 mm 1–5 \times) and ring macro flashes (Sigma EM-140 DG, Canon MR-14EX).

Measurements. Five main characteristics of each species were measured: body length (measured from anterior margin of head to end of cercus, excluding the antenna), wing length (from wing base to wing tip), wing width (maximum width), index $\text{Cs}_3 : \text{Cs}_4$ (= ratio of length of 3rd costal sector : length of 4th costal sector) and index $\text{rm} \setminus \text{dm-cu} : \text{dm-cu}$ (= ratio of length of section between rm and dm-cu on dm cell : length of dm-cu). In common species, 10 males and 10 females (3 smallest, 4 medium and 3 largest examined specimens of each sex) were measured; in uncommon species with fewer specimens available, all were measured.

Presentation of faunistic data. Label data of primary-type specimens are presented strictly verbatim including information on form and colour of all associated labels. Data from other type specimens (paratypes) and also from non-type specimens are standardized and presented in full. Phenological and other biological information and distributional data obtained are subsequently summarized in the Biology and Distribution paragraphs, respectively, under each species. Specimen label data are listed by province (Canada) and state (U.S.A.) except for the province of Newfoundland and Labrador where mainland Labrador is reported separately from insular Newfoundland.

Morphological terminology. The adult terminology is described in detail in the chapter "Morphology of adults." It provides terminological continuity with all major papers on Anthomyzidae by Roháček and coauthors since 1996 (including the monograph of Palaearctic Anthomyzidae by Roháček 2006a, 2009a). This is also true for structures of the male terminalia, where the terms based on the "hinge" hypothesis of the origin of the eremoneuran hypopygium (proposed in ZATWARNICKI 1996) are followed as applied to Anthomyzidae by Roháček (2006a). Because this terminology differs from that emanating from other hypotheses (see GRIFFITHS 1972, WOOD 1991, CUMMING et al. 1995), the alternative terms most commonly used in the literature, including those in recent Diptera manuals (J. F. McALPINE 1981a; MERZ & HAENNI 2000; SINCLAIR 2000; CUMMING & WOOD 2009), are listed in parentheses in the chapter "Morphology of adults" and in "Abbreviations of morphological terms used in text and/or figures".

Phylogenetic reconstruction. Analyses of morphological data have been processed manually, with putative polarity assessed by analysis of the respective characters in the majority of global taxa (including all known representatives of the genera under study) and assuming the outgroups as assigned by ROHÁČEK (2009a), ROHÁČEK et al. (2009) and ROHÁČEK & TÓTHOVÁ (2014). Morphological characters with a high degree of homoplasy and/or parallelism have been intentionally eliminated, such as frons, fore leg and thorax chaetotaxies, head and thorax colouration, wing colouration and venation etc. Results of the new phylogenetic hypothesis are compared with the above morphological and molecular studies.

Preparation of maps and analysis of distributions. Maps showing the distributions of species were prepared using the SimpleMapper online tool (SHORTHOUSE 2010).

In order to uncover possible coarse patterns in geographical distribution, locality data were reduced to a matrix of presence data at the level of provinces (Labrador treated separate from Newfoundland) and territories of Canada and the continental states of the United States of America plus the District of Columbia. Those jurisdictions for which there were no records for any species were removed from further consideration. No attempt was made to control for differences in geographic areas of these jurisdictions – this is intended to be only a coarse application of this tool. A finer resolution of the individual locality data are more amenable to analysis within a geographic information system environment and well beyond the scope of this discussion. Visual sorting of the data was instructive but the grouping of some species was problematic, particularly those with few jurisdictional records. A hierarchical clustering procedure was chosen to provide a more objective way of interpreting the data using Jaccard distances as measures of dissimilarity. SAS software (2010) was used for the data analysis. Jaccard distances were calculated using PROC DISTANCE and the resulting matrix was analysed with PROC CLUSTER using the complete linkage method of clustering. The resulting output was inspected and the results at 10, 15, and 20 clusters are discussed.

Bibliography of Anthomyzidae. A new updated list of world literature on Anthomyzidae is provided including all references dealing with the Nearctic fauna. The original world bibliography by ROHÁČEK (2006a) has been supplemented by all papers published from 2005 to 2016 and also by older ones previously overlooked and, hence, not included by ROHÁČEK (2006a, 2009a). In addition, papers not dealing directly with Anthomyzidae but referred to in this monograph are included in the bibliography and marked by an asterisk.

Codens and abbreviations

1. Codens of museums and collections (largely based, with some additions, on ARNETT et al. 1993):

AMNH	American Museum of Natural History, Division of Invertebrate Zoology, New York, New York, U.S.A.;
BDUC	Museum of Zoology, Invertebrate Section, Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada;
BIOUG	Biodiversity Institute of Ontario, University of Guelph, Guelph, Ontario, Canada;
BMNH	The Natural History Museum (formerly British Museum of Natural History), London, England, U.K.;
BYUC	Monte L. Bean Life Science Museum, Arthropod Collection, Brigham Young University, Provo, Utah, U.S.A.;
CASC	California Academy of Sciences, Department of Entomology, San Francisco, California, U.S.A.;
CLEV	Cleveland Museum of Natural History, Cleveland, Ohio, U.S.A.;
CMNH	Carnegie Museum of Natural History, Section of Invertebrate Zoology, Pittsburg, Pennsylvania, U.S.A.;
CNCI	Canadian National Collection of Insects, Arachnids & Nematodes, Ottawa, Ontario, Canada;
CSCA	California State Collection of Arthropods, California Department of Food and Agriculture, Sacramento, California, U.S.A.;
CSUC	Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, Colorado, U.S.A.;
DEBU	University of Guelph Insect Collection, School of Environmental Sciences, University of Guelph, Guelph, Ontario, Canada;
EMEC	Essig Museum of Entomology, University of California – Berkeley, Berkeley, California, U.S.A.;
GAFC	Collection of George A. Foster, Columbia, Maryland, U.S.A.;
INHS	Illinois Natural History Survey, Insect Collection, Champagne, Illinois, U.S.A.;
KNWR	Kenai National Wildlife Refuge, Soldotna, Alaska, U.S.A.;
LACM	Natural History Museum of Los Angeles County, Los Angeles, California, U.S.A.;
LEMQ	Lyman Entomological Museum, McGill University, Macdonald Campus, Ste.-Anne-de-Bellevue, Quebec, Canada;
MBPC	Collection of M. Barták, Praha, Czech Republic;
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.;
MEMU	Mississippi Entomological Museum, Mississippi State, Mississippi, U.S.A.;
MTEC	Montana Entomology Collection, Montana State University, Bozeman, Montana, U.S.A.;
MZLU	Museum of Zoology, Lund University, Lund, Sweden;
NFRC	Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada, Edmonton, Alberta, Canada;
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden;
NMPC	National Museum, Praha, Czech Republic;
OSAC	Oregon State Arthropod Collection, Department of Zoology, Oregon State University, Corvallis, Oregon, U.S.A.;
PMAE	Royal Alberta Museum, Invertebrate Zoology, Edmonton, Alberta, Canada;
RBCM	Royal British Columbia Museum, Natural History Section, Victoria, British Columbia, Canada;
SEMC	Snow Entomological Museum, University of Kansas, Lawrence, Kansas, U.S.A.;
SMOC	Silesian Museum, Opava, Czech Republic;
TAUI	National Collection of Insects, Tel Aviv University, Tel Aviv, Israel;
UAMF	University of Alaska Museum, Department of Entomology, Fairbanks, Alaska, U.S.A.;
UBCZ	Spencer Entomological Museum, Department of Zoology, University of British Columbia, Vancouver, British Columbia, Canada;
UCRC	Entomology Research Museum, Department of Entomology, University of California – Riverside, Riverside, California, U.S.A.;
UGCA	Georgia Museum of Natural History – Entomological Collections, University of Georgia, Athens, Georgia, U.S.A.;
USNM	National Museum of Natural History, Smithsonian Institution, Department of Entomology, Washington, District of Columbia, U.S.A.;

WFBM William F. Barr Museum, Entomology Division, University of Idaho, Moscow, Idaho, U.S.A.;
 ZMHB Museum für Naturkunde der Humboldt-Universität zu Berlin, Berlin, Germany;
 ZSMC Zoologische Staatssammlung München, München, Germany.

2. Abbreviations of morphological terms used in text and/or figures:

A_1 – anal vein
 ac – acrostichal (seta)
 afa – aedeagal part of folding apparatus
 ag – accessory gland
 ar – arista
 bm – basal medial cell
 bm-cu – basal medial-cubital cross-vein
 bme – basal membrane
 C – costa
 ce – cercus
 cp – caudal process of transandrium
 cs – connecting sclerite
 Cs_3, Cs_4 – 3rd, 4th costal sector
 ct – ctenidial spine
 Cu A_1 – cubitus
 Cx_1, Cx_2, Cx_3 – fore, mid, hind coxa
 dc – dorsocentral (seta)
 dm – discal medial cell
 dm-cu – discal medial-cubital (= posterior, tp) cross-vein
 ea – ejacapodeme (= ejaculatory apodeme)
 ep – epandrium (= periandrium)
 epp – epiphallus
 f – filum of distiphallus
 f_1, f_2, f_3 – fore, mid, hind femur
 fc – fulcrum of phallapodeme
 gs – gonostylus (= surstylus)
 ha – haltere
 hl – hypandrial lobe
 hu – humeral (= postpronotal) (seta)
 hy – hypandrium
 is – internal sclerite(s)
 M – media
 ma – medandrium (= subepandrial sclerite, intraperiandrial sclerite)
 mspl – mesopleural (= anepisternal) (seta)
 npl – notopleural (seta)
 oc – ocellar (seta)
 ors – orbital (= fronto-orbital) (seta)
 pa – postalar (seta)
 pg – postgonite (paramere)
 pha – phallapodeme (aedeagal apodeme)
 pk – preapical kink on Sc
 poc – postocular (setulae)
 pp – phallopore (basiphallus)
 ppl – propleural (= proepisternal) (seta)
 prg – pregonite
 prs – presutural (seta)
 psc – postscutellum (= subscutellum)
 pvt – postvertical (seta)
 R_1 – 1st branch of radius
 R_{2+3} – 2nd branch of radius
 R_{4+5} – 3rd branch of radius
 r-m – radial-medial (= anterior, ta) cross-vein
 s – saccus of distiphallus
 S1–S10 – abdominal sterna
 sa – supraalar (seta)
 sc – scutellar (seta)
 Sc – subcosta
 sp – spermatheca
 stpl – sternopleural (= katepisternal) (seta)
 svi – subvibrissa
 T1–T10 – abdominal terga
 t_1, t_2, t_3 – fore, mid, hind tibia
 ta – transandrium (= posterior hypandrial bridge)
 va – ventroapical (seta)
 vi – vibrissa
 vr – ventral receptacle
 vte – outer vertical (seta)
 vti – inner vertical (seta)

Historical background of taxonomic investigations on the Nearctic Anthomyzidae

The first Nearctic species of the family Anthomyzidae was described in the middle of the 19th century. However, this species, now known as *Ischnomyia albicosta* (Walker, 1849), had not been affiliated with the Anthomyzidae (the family was not established until CZERNY 1903a), nor with any other genus now belonging to this family. WALKER (1849) described it as a possible species of *Diastata* Meigen, 1830, which he treated as Geomyzidae. LOEW (1863) was the next to describe additional species of the family (a total of four) in the well-known monographic work “Diptera Americae septentrionalis indigena” on the basis of specimens provided to him by C. R. Osten Sacken. One of these was *Ischnomyia vittula* Loew, 1863 (*Ischnomyia* Loew, 1863 is the oldest generic name proposed for Nearctic Anthomyzidae), which CZERNY (1902) later discovered to be a junior synonym of Walker’s *Diastata albicosta*, correctly recognizing it as *Ischnomyia*. LOEW’S (1863) other three species were described as *Anthophilina* (*Anthophilina tenuis*, *Anthophilina variegata*, *Anthophilina terminalis*), following ZETTERSTEDT (1837), who unnecessarily introduced it as a new name for *Anthomyza* Fallén, 1810 because he erroneously considered it to be preoccupied by *Anthomyia* Meigen, 1803. All four of Loew’s species were listed under Heteroneuridae by OSTEN SACKEN (1878) in the second edition of the “Catalogue of the described Diptera of North America” – one of them, *I. vittula*, under the misspelled name *I. vittata*. Three other species of Anthomyzidae known at that time from North America were not included under Heteroneuridae. Besides “*Diastata*” *albicosta* Walker, 1849 (see above), “*Piophila*” *concolor* Thomson, 1869 (currently in *Anthomyza*) remained unrecognized as Anthomyzidae (*Anthophilina* of the day) and continued to be listed under Piophilidae (OSTEN SACKEN 1878) or “Geomyzidae” (THOMSON 1869). *Tachydromia vittipennis* Walker, 1857 was described by WALKER (1857) as Empididae (apparently overlooked by OSTEN SACKEN (1878) along with “*Diastata*” *albicosta*); affiliation of this species with the Anthomyzidae was revealed only by SMITH (1971) who, however, incorrectly synonymized it with *I. albicosta*. Up to the end of the 19th century, no further study on Nearctic Anthomyzidae was published – only WILLISTON (1896) included the genera *Anthomyza* and *Ischnomyia* in his table to genera of Geomyzidae.

Since the beginning of the 20th century, knowledge of the Nearctic Anthomyzidae can be seen accumulating. COQUILLET (1900) described *Anthomyza nigrimana* from Puerto Rico, a species currently known as *Mumetopia nigrimana* (Coquillett, 1900) that was later also recorded from the southern United States of America. ALDRICH (1905) catalogued North American anthomyzid genera (*Ischnomyia* and *Anthomyza*, the latter already with the synonyms *Leptomysza* Macquart, 1835 and *Anthophilina* Zetterstedt, 1837) and their species again within “Geomyzidae” but included in *Anthomyza* several species now belonging to Canacidae (Tethininae). However, he did not catalogue the three species described by WALKER (1849, 1857) and THOMSON (1869), see above. WILLISTON (1908) included the two above genera in his generic key of Geomyzidae and HENDEL (1911) described an additional species of *Ischnomyia*, viz. *I. spinosa* Hendel, 1911, but also in the “Subfam. Geomyzinae”. The most important study of this period is the “Synopsis of the dipterous groups Agromyzinae, Milichiinae, Ochthiphilinae and Geomyzinae” by MELANDER (1913). He reviewed all Nearctic Anthomyzidae (within “Geomyzidae”) and described an additional genus *Mumetopia* Melander, 1913 with

a new species, *M. occipitalis* Melander, 1913, and transferred to it two other species from *Anthomyza*, viz. *M. terminalis* (Loew, 1863) and *M. nigrimana* (Coquillett, 1900).

Since MELANDER (1913), the Anthomyzidae remained unexplored for several dozens of years. CURRAN (1934) did not recognize that CZERNY (1903a, 1928) established the family Anthomyzidae and treated *Anthomyza*, *Ischnomyia* and *Mumetopia* together with a number of unrelated taxa under Opomyzidae in his key to genera. The family Anthomyzidae was first accepted (in North American literature) by STURTEVANT (1954), who followed COLLIN'S (1944) definition of the family and prepared a new key to anthomyzid genera; the key also included the genera *Mutilloptera* Coquillett, 1908, *Stenomicro* Coquillett, 1900 and *Cyamops* Melander, 1913, which do not belong to the family as currently understood. Interestingly, in the second edition of his book, CURRAN (1965) did not accept these changes and retained his former broad concept of the family Opomyzidae (also supported by CRAMPTON 1944), despite being aware of the fact that it included genera of three families already recognized at that time (i.e. Opomyzidae, Anthomyzidae and Tethinidae). STURTEVANT'S (1954) paper was then generally followed by SABROSKY (1965), who catalogued species of all the above genera and added useful information about their distribution. SABROSKY (1965) was also the first to recognize *Piophilina concolor* as a species of *Anthomyza*. Sturtevant's concept of the Anthomyzidae and its genera was also adopted by COLE (1969) and ARNETT (1993). In the "Manual of Nearctic Diptera", VOCKEROTH (1987) restricted the Anthomyzidae to only three genera in the Nearctic Region, viz. *Anthomyza*, *Ischnomyia* and *Mumetopia*, which was followed by ARNETT (2000). However, up to the end of the last millenium, no important taxonomic contribution to the knowledge of the North American species of the family was published, while in Europe, revisionary studies had been in progress since ANDERSSON (1976).

The Nearctic Anthomyzidae began to be studied in more detail relatively recently by the authors of the present contribution. Collecting efforts of several generations of North American dipterists, and specific targeting of the family by the junior author, has resulted in an extensive and very valuable mass of material from all over the Nearctic Region. Its examination resulted in a series of taxonomic or revisionary studies and in the description of a number of new species (see ROHÁČEK & BARBER 2004, 2005, 2009, 2011, 2013). The present monograph is a continuation of these papers, covering some previously unrevised genera and their relatives with a synthesis of taxonomic, phylogenetic, biological and distributional information.

Notes on type material of species described as *Anthophilina* by LOEW (1863)

Examination of specimens designated as types of LOEW'S (1863) three *Anthophilina* species and one *Ischnomyia* species in the collections of MCZC and CNCI found that not all are conspecific and that some cannot be syntypes for reasons given below. There is no problem with *Anthophilina variegata* Loew, 1863 where both preserved specimens are conspecific and clearly belong to the type series (see type material under *Anthomyza variegata*, p. 231). Only a minor discrepancy was found in *Ischnomyia vittula* Loew, 1863 where both syntypes are conspecific but the female is labelled by H. Loew as "vittata m." (see type material under *Ischnomyia albicosta*, p. 45), i.e. by a name not used in the original description (LOEW 1863: 325). However, there are more serious discrepancies in the "type" specimens of the other two species.

Anthophilina terminalis Loew, 1863 = *Quametopia terminalis* (Loew, 1863)

In a revision of the (new) genus *Quametopia*, where we designated a lectotype of this species (ROHÁČEK & BARBER 2011: 306), the type locality for *Q. terminalis* was reported as “Carolina” following LOEW’s (1863) original description. However, we overlooked the correction made by OSTEN SACKEN (1878: 198) where “White Mts., N. H., (erroneously “Carolina” in the Centuries)” was stipulated, a correction that was repeated by SABROSKY (1965). Three purported syntypes (MCZC) were mentioned at that time (ROHÁČEK & BARBER 2011: 306) as obviously not belonging to the type series. We have since found a fourth putative syntype in CNCI, and recognized that none of them are conspecific with *Q. terminalis* but belong to *Arganthomyza* and/or *Anthomyza*. Therefore, we report all four here and formally assign them to *Arganthomyza duplex* Roháček & Barber, 2013 (1 ♀, additional records, p. 90), *Anthomyza oblonga* sp. nov. (1 ♀, headless, other material examined, p. 125) and *Anthomyza pengellyi* sp. nov. (1 ♂ 1 ♀, paratypes, p. 152). It is our suspicion that someone included these additional specimens in the “type” series after LOEW’s (1863) description – a possible explanation for such a wide variety of external appearance and different (in most cases) sex of these specimens, none of which look remotely like the very black and shining *Q. terminalis* for which only a male was described by LOEW (1863).

Anthophilina tenuis Loew, 1863 = *Anthomyza tenuis* (Loew, 1863)

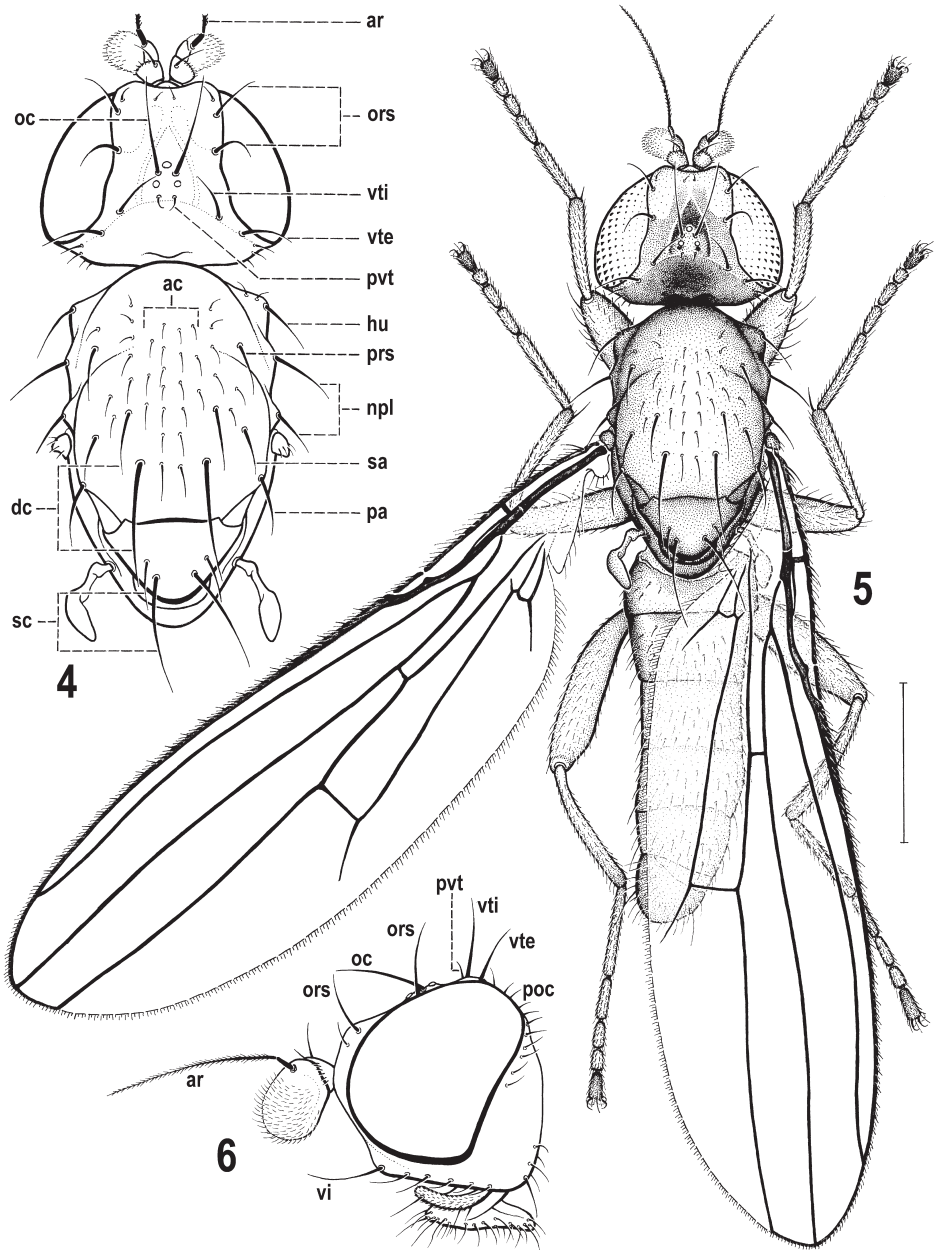
Examination of both specimens purportedly in the type series revealed that only one is a male, which is here designated as the lectotype (see p. 112) because LOEW’s (1863) description only deals with the male sex. The other specimen is a female (and most probably is not a syntype because the end of the female abdomen is markedly different from that of the male in this species) and, moreover, belongs to the closely related *Anthomyza oblonga* sp. nov., where it is listed under other material examined because of the lack of locality data (see p. 125).

Morphology of adults

The external morphology of adult Anthomyzidae is relatively well known and extensively used in the taxonomy of the family; morphology of the male genitalia became better understood only after ANDERSSON (1976) and the female internal genitalia have been studied more recently. Illustrations used in this chapter are based on the Palaearctic *A. gracilis* Fallén, 1823, the type species of *Anthomyza* Fallén, 1810 (being the type genus of the family Anthomyzidae), as adapted from ROHÁČEK (2006a). The morphological terminology follows that adopted in the monograph by ROHÁČEK (2006a) with most common synonymous terms used in recent Diptera manuals (J. F. McALPINE 1981a; MERZ & HAENNI 2000; SINCLAIR 2000; CUMMING & WOOD 2009) given in parentheses, see also “Material and methods” above.

Small, very slender-bodied flies (Figs 1–3, 5, 33, 48, 88, 147), usually with long narrow wings and relatively short legs. Body 1.3–4.5 mm long, yellow to black, sometimes with dark stripes or spots, shining to distinctly microtomentose.

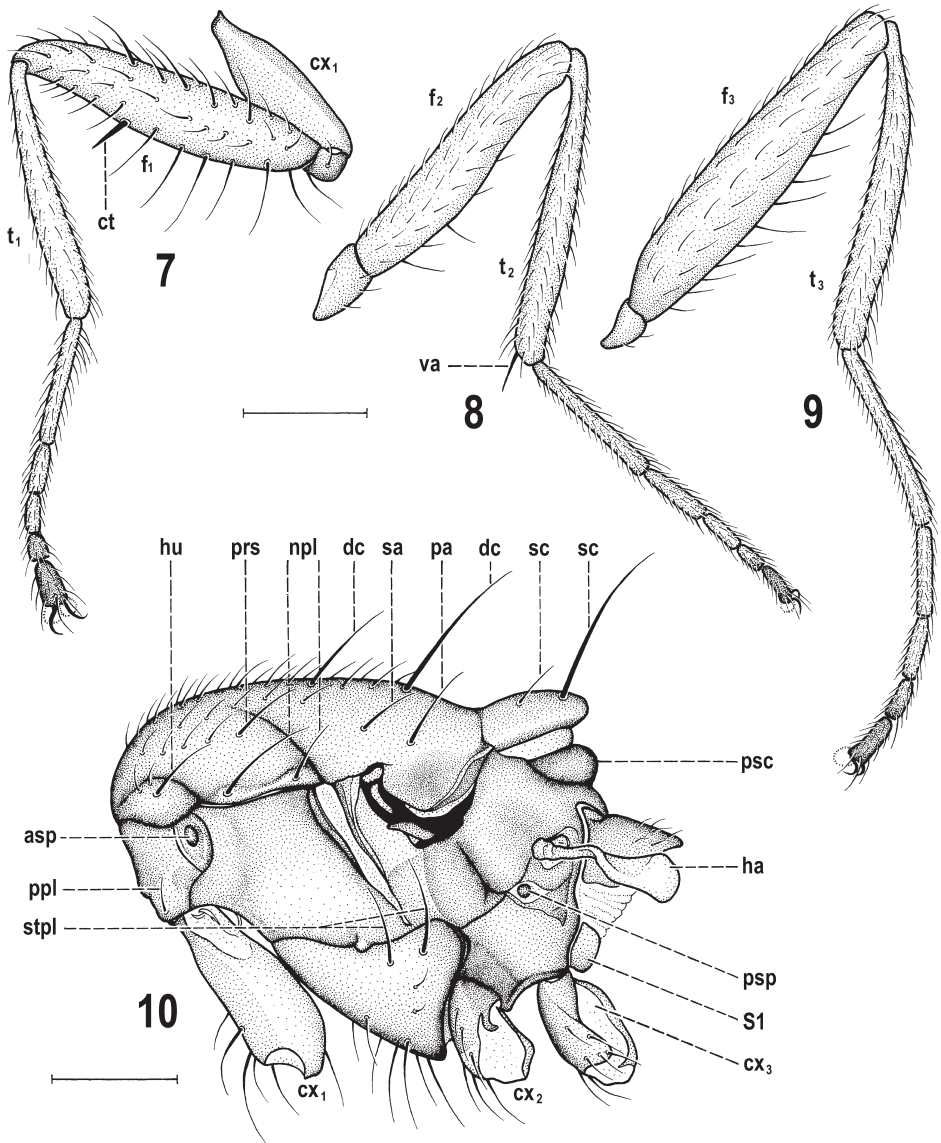
Head (Figs 4, 6, 35, 47) as broad as or broader than thorax, rounded to distinctly angular (with face receding) in profile. Frons usually relatively broad and slightly tapered anteriorly, narrower in some genera with enlarged eyes; interfrontal area usually slightly depressed;



Figs 4–6. *Anthomyza gracilis* Fallén, 1823, morphology of male (Czech Republic). 4 – chaetotaxy of head and thorax, dorsally; 5 – general habitus, dorsally; 6 – chaetotaxy of head, laterally. Scale = 0.5 mm. Adapted from ROHÁČEK (2006a: Figs 26–28). For abbreviations see p. 11.

orbits and ocellar triangle well defined; frontal triangle more or less distinct. Frontal lunule small, or reduced and concealed. Occiput (postcranium) slightly to strongly concave dorsally. Face (prefrons) medially often depressed, concave and weakly sclerotized; parafacialia narrow. Gena low (short), at most one-fifth of shortest eye diameter but usually much lower (shorter), only higher in *Fungomyza buccata* Roháček & Barber, 2004 and some *Anthomyza* species; clypeus small. Cephalic chaetotaxy (Figs 4, 6, 35): pvt small, convergent or crossed, rarely absent; vte, vti and oc usually strong; 1–3 long reclinate ors (anterior often shorter, sometimes reduced to setula but always longer than orbital or medial microsetulae) and 0–2 microsetulae (1 anterior usually most reduced) in front of anterior ors; frons anteromedially often with 1–4 pairs of microsetae; 1 small setula behind vte; a single row of short postocular setulae (only in fossil *Protanthomyza* Hennig, 1965 dorsally duplicated, see ROHÁČEK 2013a); 1 long vi and 1 usually shorter (or reduced to setula) subvibrissa; peristomal setulae small and sparse; ventrolateral part of occiput and postgena with scattered setulae, the latter usually with 2 setae in posteroventral corner. Eye large, usually almost bare (distinctly finely pilose in *Zealantha* Roháček, 2007), oval to irregularly ovoid, with longest diameter usually oblique, rarely almost vertical. Antenna short, more or less geniculate (decumbent) with first flagellomere usually turned downward (but almost porrect in the fossil *Protanthomyza* and some Afrotropical genera, see ROHÁČEK 1993, 1998a), laterally flattened and usually with rounded apex and distinct marginal pubescence (strongly enlarged and setiform in the Afrotropical genus *Scelomyza* Ségué, 1938, see ROHÁČEK 2014a); arista short-haired to long-pectinate, inserted dorsoproximally, with short thick basal segment. Palpus small, slender, usually with distinct preapical seta and some other setulae. Proboscis short, labella of moderate size, fleshy.

Thorax (Figs 4, 10). Humeral (postpronotal) lobe well defined; notopleuron distinct. Mesonotum with large scutum and subtriangular scutellum having flat or convex dorsal surface; transverse suture on scutum laterally distinct. Postscutellum (subscutellum) and postnotum (mediotergite + laterotergite) also well developed. Propleuron (proepimeron + proepisternum) distinctly delimited but undivided. Mesopleuron (anepisternum) large and usually bare. Sternopleuron (katepisternum) setose; pteropleuron (anepimeron) large and bare. Metapleuron (laterotergite) undivided; also hypopleuron (meron) simple. Thoracic chaetotaxy: 1 hu; 2 npl (anterior shorter); 0–1 prs (intra-alar); 0–1 sa; 1–2 pa; usually 1–3 dc, all postsutural (4 dc, with 1 being presutural, are only known in an unnamed Neotropical genus, and 5 postsutural dc in the fossil species *Protanthomyza meunieri* Roháček, 2013 from Baltic amber) becoming shorter anteriorly; 2–8 rows of ac microsetae on suture, fewer or absent posteriorly, rarely ac microsetae entirely absent, e.g. in *Arganthomyza vittipennis* (Walker, 1857) and *Scelomyza hirticornis* Ségué, 1938; 2 sc, a short laterobasal, a long apical (3 sc occur in an unnamed African genus), rarely with a few additional scutellar setulae (some *Arganthomyza*, *Anthomyza*); 1–2 very small ppl (proepisternal) setulae above fore coxa; mesopleuron usually bare – long mspl (anepisternal) setae are known only in the fossil subfamily Protanthomyzinae and mesopleural microsetulae only in the Nearctic *Stiphrosoma setipleurum* Roháček & Barber, 2005 and in the African *Apterosepsis basilewskyi* Richards, 1962); 1–2 long stpl (katepisternal) setae and several additional setulae on sternopleuron apart from a cluster of longer setae on ventral corner. Prosternum bare, broadened anteriorly, not fused with propleuron.



Figs 7–10. *Anthomyza gracilis* Fallén, 1823, morphology of male (Czech Republic). 7 – fore leg posteriorly; 8 – mid leg without coxa, anteriorly; 9 – hind leg without coxa, anteriorly; 10 – thorax laterally. Scales = 0.2 mm. Adapted from Roháček (2006a: Figs 29–32). For abbreviations see p. 11.

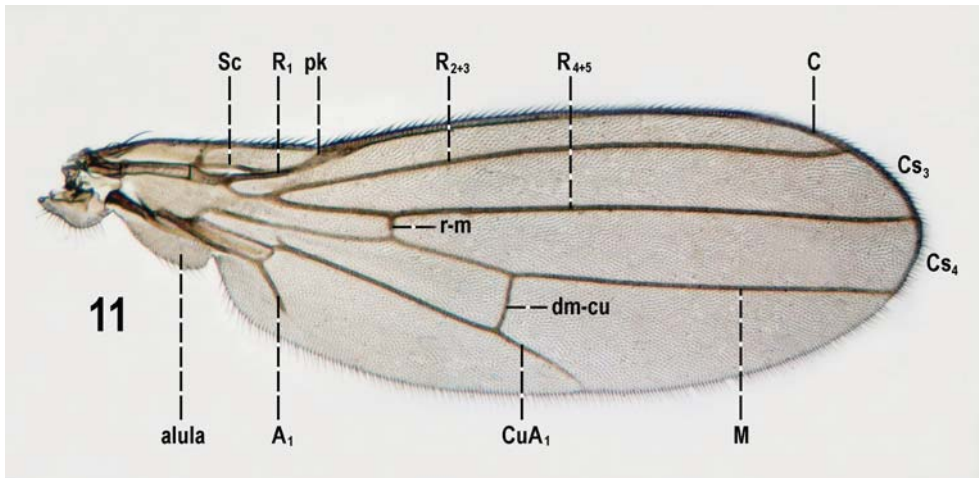


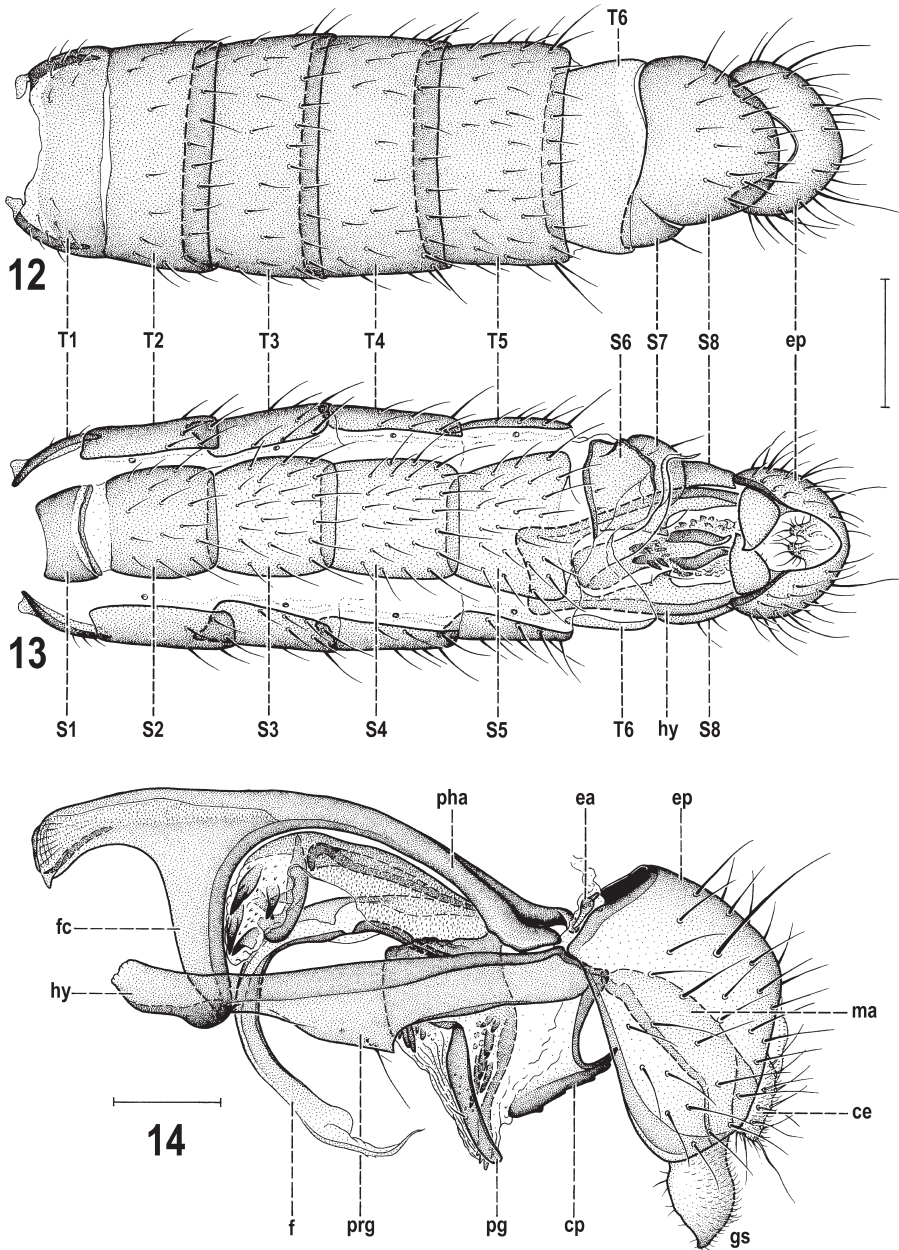
Fig. 11. *Anthomyza gracilis* Fallén, 1823, male (Czech Republic), wing, length 2.6 mm. Photo by J. Roháček. Adapted from ROHÁČEK (2006a: Fig. 36). For abbreviations see p. 11.

Legs (Figs 7–9) relatively short and slender, most often yellow, sometimes partly darkened or variegated. f_1 often with posteroventral ctenidial spine (Fig. 7) in addition to usual posteroventral and posterodorsal rows of longer setae. Male f_2 sometimes with posteroventral row of longer curved setae. Male f_3 often with posteroventral row of shortened and thickened setae (Fig. 3). Tibiae without dorsopreapical setae; t_2 always with distinct (Fig. 8), t_1 and t_3 sometimes with a short ventroapical seta; hind basitarsus sometimes with 1–3 short thicker proximoventral setae; fore and mid basitarsus rarely with enlarged ventral setulae.

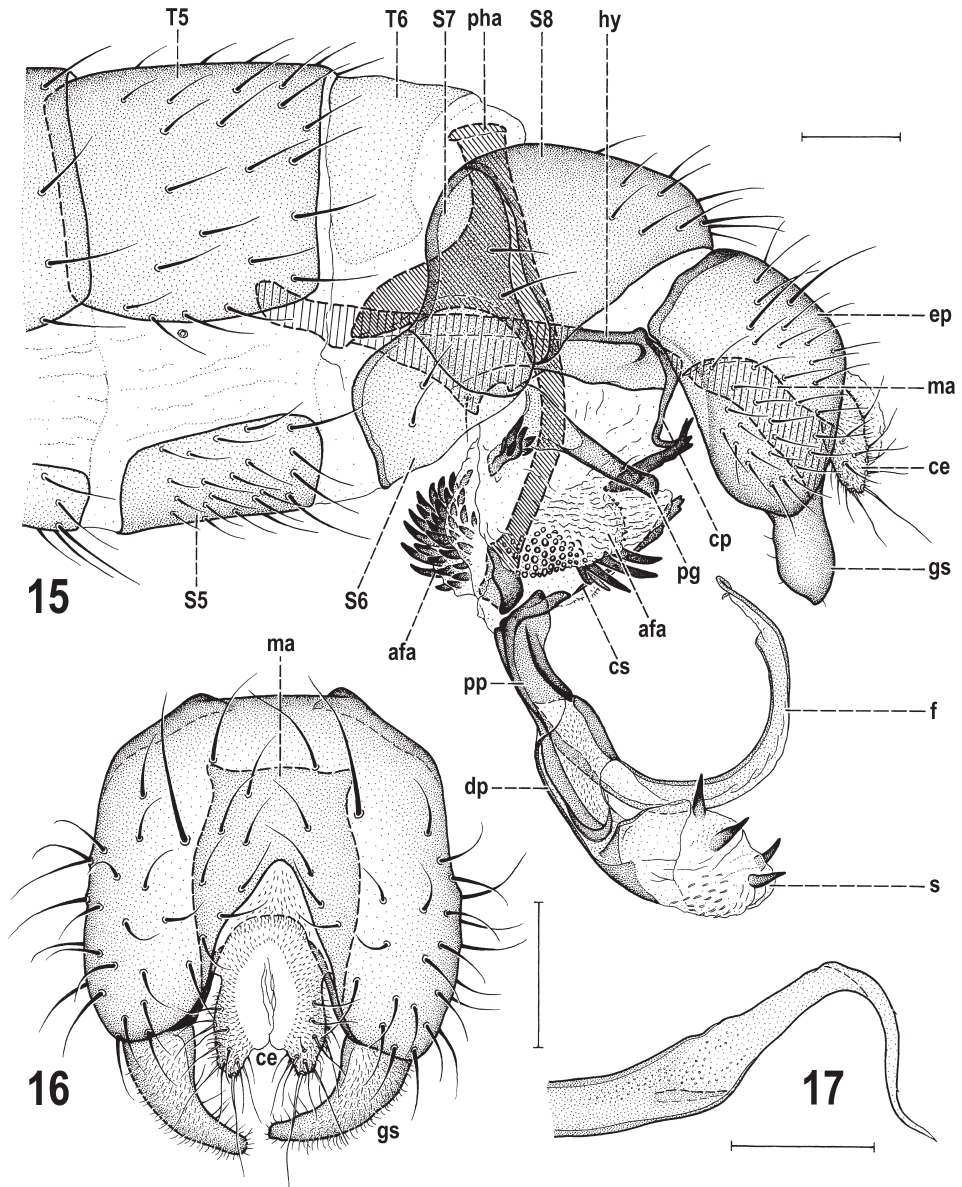
Wing long and narrow (Figs 11, 49, 222–224), rarely shortened and narrowed (e.g. in some species of *Stiphrosoma*, see ROHÁČEK & BARBER 2005) and with reduced venation, or entirely absent (in the African *A. basilewskyi*, see ROHÁČEK 1998a). Wing membrane usually unicolourous but with dark or whitish hyaline markings in some genera (*Typhamyza* Roháček, 1992, *Amygdalops* Lamb, 1914, some *Ischnomyia* and *Arganthomyza* – Figs 49, 85, many tropical genera). C reaching to apex of M, normally with only subcostal break (or attenuation in *Protanthomyza*) and with an attenuation apical to humeral cross-vein and usually with small sparse spinulae mixed with hairs between apices of R_1 and R_{2+3} ; Sc weak, obsolete in apical third, fused with R_1 and forming on it a characteristic preapical kink near subcostal break (Fig. 11, pk). R_{2+3} always long; M subparallel with R_{4+5} . Basal medial (bm) and discal medial (dm) cells sometimes incompletely separated (cross-vein bm-cu shortened); cell cup usually closed (open in *Cercagnota* Roháček & Freidberg, 1993 and some *Stiphrosoma*); A_1 , sometimes also CuA_1 shortened, not reaching wing margin. Alula small, narrow. Venation of brachypterous forms strongly reduced; rarely (some *Stiphrosoma*, *Cercagnota*) also normal wing with incomplete veins (dm-cu absent and/or R_{2+3} shortened). Haltere well developed and usually pale; rudimentary only in brachypterous specimens (some *Stiphrosoma*), entirely absent in apterous species (*Apterosepsis*).

Male abdomen (Figs 12, 13). Preabdominal terga always large, broad and often extended onto ventral side of abdomen, usually distinctly darker than associated sterna. T1 separate from or partly fused with T2, T1 usually shorter than T2, T2–T5 subequal in size. Preabdominal sterna much smaller, narrow, often becoming progressively wider posteriorly. S1 bare and smaller (shorter), often differently pigmented from others; S2 also sometimes darker than S3–S5. Spiracles 1–5 normally situated in membrane below lateral margin of terga (Fig. 13); embedded in tergal margins only in the Afrotropical *Apterosepsis* which has abdomen excessively modified. Postabdomen (Figs 12, 13, 15, 50). T6 (Fig. 15) more or less reduced, shortly transverse, bare, sometimes medially desclerotized and unpigmented or divided into 2 sclerites or completely membranous (seemingly absent); S6 short, asymmetrical, produced dorsally on left side, anteriorly with darker marginal ledge projecting onto ventral side of abdomen and dorsally fused with S7, the latter also asymmetrical, on left side of postabdomen, both normally having only few (most often 2) setae. S8 dorsal, slightly asymmetrical and more setulose, sometimes fused with S7. Left spiracle 6 normally situated in membrane or in anterior margin of S6; left spiracle 7 in anterior margin of S7; right spiracle 7 situated in membrane right ventrally (see Fig. 50); all postabdominal spiracles often poorly visible (not illustrated in Fig. 15).

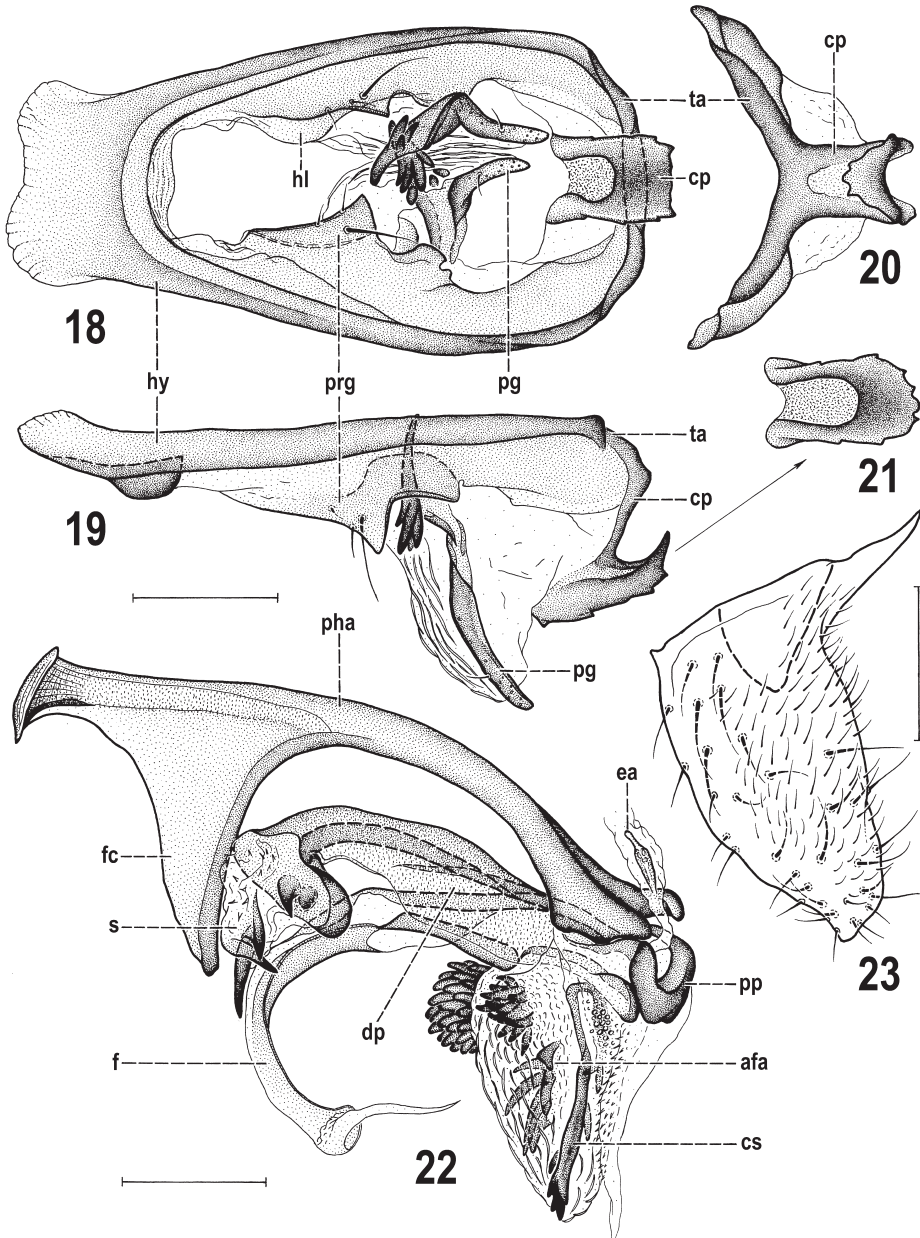
Male genitalia. Epandrium (Figs 14–16) semiglobular, usually deeply and broadly or narrowly excavated posteroventrally to form anal fissure (Fig. 16), setose and often with 1–3 enlarged dorsolateral setae. Cerci discrete, usually rather small and weakly sclerotized, projecting medially below anal fissure, finely setose, rarely modified and enlarged (e.g. in *Cercagnota* or in African *Margdalops* Roháček & Barraclough, 2003). Medandrium (subepandrial, intraperiandrial sclerites) usually well developed, ventrally connected with gonostyli (surstyli), dorsally often with projecting corners; medandrium bare, its ventral arms rarely with a few setae (some *Anthomyza*, *Quametopia* spp.) or with anterior side densely setulose (*Reliquantha variipes* Roháček, 2013). Gonostylus (surstylus, telomere) discrete (Figs 14–16, 23) (partly fused with epandrium only in the Neotropical *Chamaebosca* Speiser, 1903), setose mainly on inner surface, variable in shape and micropubescence pattern, with posterior inner margin confluent with ventral corner/arm of medandrium. Hypandrium (Figs 14, 18, 19) posteriorly closed by transandrium (posterior hypandrial bridge) and forming with it a shallow frame-like structure surrounding base of aedeagus; anteriorly it may have flat leaf-like lobes (Fig. 18, hl), sometimes enlarged and projecting dorsally. Aedeagal complex connected with hypandrium and transandrium in two parts. Anterior connection (Figs 14, 15) is formed by robust unpaired ventral fulcrum (a modified aedeagal guide) of phallapodeme. Posterior connection, called the “folding apparatus”, is a highly complex structure composed of anterolateral aedeagal part (= lateral lobe of paramere of VOCKEROTH 1987) (Figs 15, 22) often provided with various sculptures (spines, warts, tubercles etc.) on outer and inner sides, of sclerotized caudal process (= epiphallus of ANDERSSON 1976) derived from transandrium (Figs 19, 20, 55) and of connecting basal membrane (Figs 19–21, 40, 54, 55, 131–132) usually also provided with various sculptures; all these parts may be modified, reduced, membranous or strengthened with additional connecting sclerites (Fig. 22) but a functional folding apparatus is always present. Both ventral fulcrum of phallapodeme and folding apparatus are involved in copulation; in the erected position the folding apparatus is turned inside out to expose



Figs 12–14. *Anthomyza gracilis* Fallén, 1823, morphology of male (Czech Republic). 12 – abdomen dorsally; 13 – abdomen ventrally; 14 – genitalia laterally, rest position. Scales = 0.1 mm (Fig. 14) and 0.2 mm (others). Adapted from ROHÁČEK (2006a: Figs 37–39). For abbreviations see p. 11.



Figs 15–17. *Anthomyza gracilis* Fallén, 1823, morphology of male (Czech Republic). 15 – postabdomen with erect genitalia, laterally; 16 – external genitalia, caudally; 17 – apex of filum of distiphallus, ventrally. Scales = 0.05 mm (Fig. 17) and 0.1 mm (others). Adapted from ROHÁČEK (2006a: Figs 40–42). For abbreviations see p. 11.

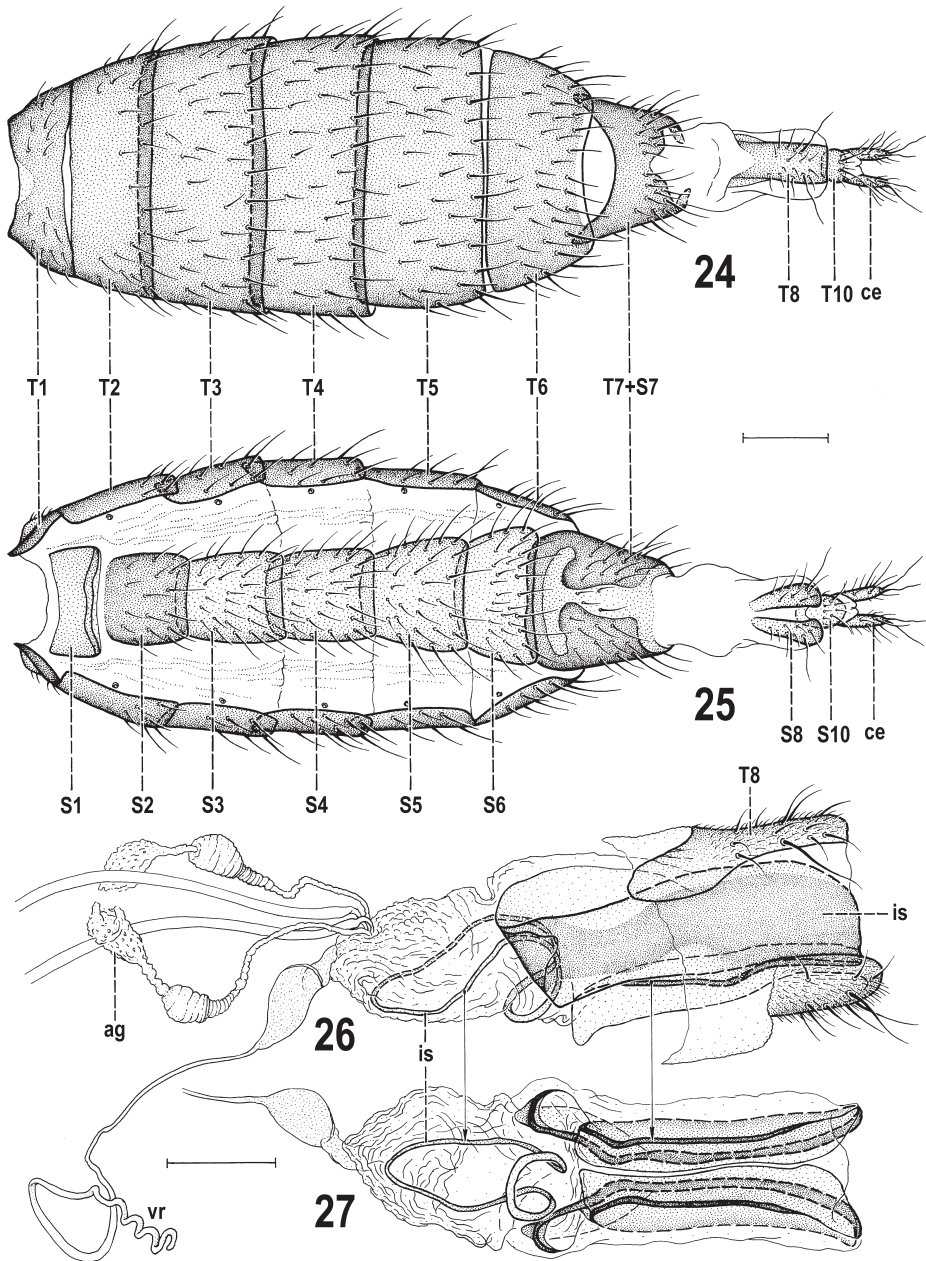


Figs 18–23. *Anthomyza gracilis* Fallén, 1823, morphology of male (Czech Republic). 18 – hypandrial complex, ventrally; 19 – the same, laterally; 20 – transandrium, caudally; 21 – ventral appendage of caudal process, ventrally; 22 – aedeagal complex, laterally; 23 – gonostylus, widest extension view. Scales = 0.05 mm (Fig. 23) and 0.1 mm (others). Adapted from ROHÁČEK (2006a: Figs 43–48). For abbreviations see p. 11.

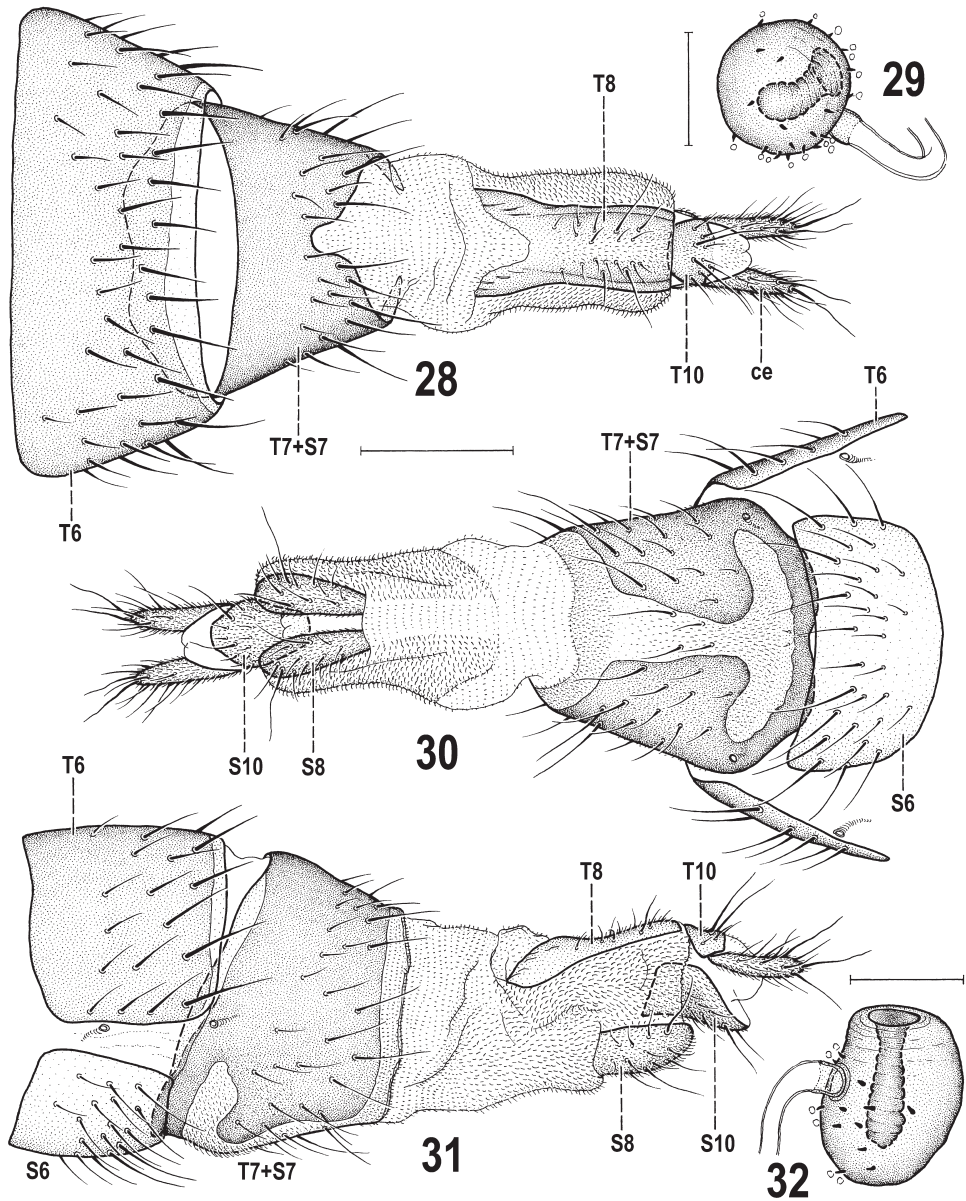
internal armature of its aedeagal part (see Fig. 15). Pregonite (Figs 14, 18, 19) more or less fused with hypandrium, usually forming a low lobe or process with apical setulae; postgonite (Figs 14, 15, 18, 19) usually strap-like, sometimes enlarged or widened (*Santhomyza* Roháček, 1984), normally with a single anterior seta. There is an additional sclerite at the base of the postgonite (dorsal to it, Figs 19, 364) that is variously developed/sclerotized (it can be membranous or absent in some taxa). Phallapodeme (aedeagal apodeme) strong, long, provided with robust ventral fulcrum and often with modified apex or base (flattened, forked, asymmetrical). Aedeagus (Figs 15 [exposed], 22 [at rest]) asymmetrical, consisting of short, often frame-like phallopore and complex bifid distiphallus; phallopore rarely enlarged and projecting as posterior epiphallus (in E. Palaearctic *Epischnomyia* spp.). Distiphallus formed by larger, sometimes voluminous and mostly membranous saccus (often with heavy spines or similar armature) and by slender more sclerotized filum formed by ribbon-like or tube-like sclerite(s) with variously modified apex (e.g. Fig. 17). Ejacapodeme small, often with digitiform process (Fig. 22).

Female abdomen (Figs 24–25) usually with terga broader and sterna narrower than in male. Preabdominal sterna often paler than associated terga and more finely setose. S1 usually modified and bare, dissimilar to following sterna; S2 sometimes darkened or differently patterned.

Female postabdomen (Figs 28, 30, 31) with segment 6 normally unmodified, usually T6 smaller and S6 larger than preceding sclerites; spiracle 6 situated below margin of T6 (except in *Apterosepsis*). T7 and S7 separate or fused to form a ring-shaped tergo sternum being completely sclerotized or ventrally weakened (Fig. 30), sometimes also dorsomedially non-sclerotized or divided (*Stiphrosoma*). Spiracle 7 situated below T7 or enclosed in tergo sternum T7+S7. T8 small, of various shape and chaetotaxy, sometimes weakly sclerotized, less often markedly narrowed and elongate (some *Anthomyza* spp.). S8 either short and transverse or longer, often divided medially or with posteromedial cleft, sometimes with posterior margin partly to deeply invaginated (e.g. in *Fungomyza* – Fig. 44, *Arganthomyza* – Fig. 139). Genital chamber (Figs 26–27) usually with posterior internal sclerites (up to 3 pairs) and 1 anterior medial annular sclerite (often modified into elongate or transverse loop) but they, or some of them, may be reduced or absent in some genera. Anterior part of uterus provided with unpaired ventral receptacle, reduced or membranous (but of various form) in most genera (sclerotized and enlarged in *Epischnomyia* and particularly *Receptrixia*, but in the *Anthomyza* clade it is membranous, elongate-tubular and often with twisted vermicular apex – Figs 26, 141) and a pair of accessory glands on usually ringed ducts. Spermathecae (1+1) on separate ducts (Figs 29, 32, 139), globular to elongately pyriform, strongly sclerotized, often with surface spines or small blunt processes, or transversely striated or ribbed, sometimes with internal invagination. Spermathecal duct sometimes ending in more or less sclerotized collar termed cervix (Figs 29, 81, 435) and its insertion can be eccentric (Figs 32, 61, 540). T10 (epiproct) small, often shortened (Fig. 28) or membranous, usually with only 1 pair of medial setae, less frequently with additional setulae (Figs 28, 306). S10 (hypoproct) normally larger than T10, convex ventrally (Figs 30, 31), rarely divided into anterior and posterior parts (*Typhamyza*) or otherwise modified (*Paranthomyza nitida* (Meigen, 1838)). Cerci (Figs 28, 31) slender and elongate or shortened and robust, rarely fused together (*Receptrixia*), each with a number of long to short hairs.



Figs 24–27. *Anthomyza gracilis* Fallén, 1823, morphology of female (Czech Republic). 24 – abdomen dorsally; 25 – the same, ventrally; 26 – genital chamber (uterus), laterally; 27 – the same, ventrally. Scales = 0.2 mm (Figs 24, 25) and 0.1 mm (others). Adapted from ROHÁČEK (2006a: Figs 49–52). For abbreviations see p. 11.



Figs 28–32. *Anthomyza gracilis* Fallén, 1823, morphology of female (Czech Republic). 28 – postabdomen dorsally; 29 – spermatheca; 30 – postabdomen ventrally; 31 – postabdomen laterally; 32 – spermatheca. Scales = 0.05 mm (Figs 29, 32) and 0.2 mm (others). Adapted from ROHÁČEK (2006a: Figs 53–57). For abbreviations see p. 11.

Taxonomy

Because modern taxonomic research of Nearctic Anthomyzidae started only with the beginning of the third millenium (see above), some of the recent taxonomic and nomenclatural changes have not been applied to the Nearctic fauna up to the present. There are two groups for which the genus has yet to be established, one genus not yet formally recorded from North America (i.e. *Carexomyza* Roháček, 2009) because it is represented by unnamed species, and a few other generic concepts which are to be (re)defined. For these reasons the Nearctic genera of Anthomyzidae have not been keyed up to the present. To redress this situation, a first modern key to genera occurring in the Nearctic Region is presented below albeit without the names of the hitherto undescribed genera and some other tentative groupings.

Key to identification of Nearctic genera of Anthomyzidae

- 1 f_1 lacking ctenidial spine posteroventrally, with only a row of long fine setae. 2
- f_1 with distinct (although sometimes short) posteroventral ctenidial spine (Figs 7, 51) in addition to a row of long setae. 3
- 2(1) Wing abbreviated and narrowed or with incomplete venation (at least dm-cu absent, see ROHÁČEK & BARBER 2005: Figs 183–185); maximum eye diameter distinctly oblique. *Stiphrosoma* Czerny, 1928, in part
- Wing normal, with complete venation; maximum eye diameter nearly vertical. **undescribed genus**
- 3(1) Wing with distinct longitudinal infuscation, especially along R_{4+5} (Figs 49, 85). 4
- Wing hyaline or with only indistinct infuscation, never with discrete contrasting markings (Figs 11, 34). 5
- 4(3) Head markedly longer than high, depressed and anteriorly angular; eye elongate, with maximum diameter oblique to almost horizontal (Fig. 47); frontal triangle small and narrow, hardly reaching midpoint of frons; f_1 with ctenidial spine small (Fig. 51); gonostylus simple, with 2 denticles on apex (Fig. 59); transandrium with distinctively forked caudal process having its arms projecting and dilated anteroventrally (Fig. 55); postgonite slightly sinuous and without setulae (Fig. 56); spermatheca with eccentric duct insertion (Fig. 61) and spermathecal duct very long. *Ischnomyia* Loew, 1863 [only *I. albicosta* (Walker, 1849)] (p. 41)
- Head slightly shorter than high, anteriorly rounded; eye broad, maximum diameter of eye nearly vertical (Fig. 89); frontal triangle large and broad, reaching at least to anterior fifth of frons; f_1 with ctenidial spine long (Fig. 87); gonostylus with attenuated apex but without denticles (Fig. 91); transandrium with caudal process simple (Fig. 94); postgonite sickle-shaped, with distinct anteroproximal setula (Fig. 92); spermatheca with normal duct insertion (Fig. 99) and spermathecal duct short (Fig. 105). *Arganthomyza* Roháček, 2009, in part [*A. vittipennis* (Walker, 1857)] (p. 66)
- 5(3) Maximum diameter of eye nearly vertical (Fig. 35); 3 strong ors, anterior ors subequal to or slightly shorter than middle seta and with additional microsetula in front of anterior ors; subvibrissa reduced (Fig. 35); all femora distinctly variegated brown and

- yellow; anal fissure very small, narrowly rounded triangular and medandrium abruptly narrowed dorsally (Fig. 36); internal structures of female genital chamber weak, annular sclerite reduced, almost indistinct (Fig. 45).
 *Fungomyza* Roháček, 1999 [only *F. buccata* Roháček & Barber, 2004]) (p. 30)
- Maximum eye diameter more or less oblique; 1–3 strong ors, if 3 ors then the anterior distinctly shorter; 0–2 microsetulae in front of anterior ors; subvibrissa more or less distinct (longer than anterior peristomal setula); femora usually unicolourous (yellow or ochreous-orange), sometimes partly ochreous-brown; anal fissure larger and medandrium different; internal structures of female genital chamber usually well sclerotized and annular sclerite well developed. 6
- 6(5) A single long ors (see VOCKEROTH 1987: Fig. 75.2), at most with a small microsetula anterior to this (no more than one-eighth length of ors); frontal triangle large and shining black. 7
- At least 2 ors long (if two, the anterior at least one-third length of posterior ors and with additional short anterior microsetula present) (Figs 1, 6; ROHÁČEK & BARBER 2011: Fig. 11); frontal triangle rarely shining black. 8
- 7(6) Fore legs unicolourous yellow to pale brown; silvery white tomentum above occipital foramen in a single medial patch; 1st antennal flagellomere nearly orbicular, with apex rounded; longest arisal hairs shorter than half width of 1st flagellomere; postgena with pale ventral border confluent with pale gena; palpus entirely pale; female abdomen entirely brown or sometimes slightly pale lateral to midline; T7 not divided medially.
 *Mumetopia* Melander, 1913 [only *M. occipitalis* Melander, 1913]
- t_1 and basal tarsal segments black with apical segments white; no white tomentum above occipital foramen; 1st antennal flagellomere longer than wide, apically obliquely rounded; longest arisal hairs as long as width of 1st flagellomere; postgena entirely dark, contrasting with pale gena; palpus apically darkened; female T2–T5 usually contrastingly pale with medial brown stripe; T7 longitudinally medially divided.
 **undescribed genus** [only *Mumetopia nigrimana* (Coquillett, 1900)]
- 8(6) Wing generally shorter than body length (sometimes much shorter), cross-vein r-m arising in basal third of dm cell; arista distinctly (shortly to long) pectinate (ROHÁČEK & BARBER 2005: Figs 1, 32, 42); prs usually small or absent; female T7+S7 dorsomedially divided or unpigmented (ROHÁČEK & BARBER 2005: Figs 13, 27); annular sclerite in female genital chamber strongly transversely compressed (ROHÁČEK & BARBER 2005: Figs 31, 179); spermathecae pyriform with entire surface strongly spinose (ROHÁČEK & BARBER 2005: Figs 17, 46, 80). *Stiphrosoma* Czerny, 1928, in part
- Wing generally longer than body length; cross-vein r-m arising beyond basal third towards the middle of dm cell; arista ciliate (Figs 6, 35, 395; ROHÁČEK & BARBER 2011: 12); prs present and usually long; female T7+S7 dorsomedially undivided, but if unpigmented, then spermathecae not spinose on entire surface and annular sclerite not transversely compressed. 9
- 9(8) Contrasting silvery grey tomentose stripes present between frontal triangle and posterior part of orbits and join broadly across the front of the frontal triangle leaving only the ocellar triangle shiny; filum of distiphallus slender and formed by two ribbon-shaped

- sclerites (see ROHÁČEK 2006a: Figs 502, 505, as *Paranthomyza caricis*); spermatheca spherical to subspherical with only sparse tubercles or spines and without striations or apical invagination (see ROHÁČEK 2006a: Fig 510). *Carexomyza* Roháček, 2009
- Contrasting silvery grey tomentose stripes between frontal triangle and posterior part of orbits either absent, or if present then short and not joining anteriorly; filum of distiphallus of various composition; spermatheca of various shape and vestiture usually with at least incomplete striations (Figs 117, 215, 288, 480), but if without striations then with apical invagination (Figs 267, 399, 540) or irregularly pyriform to spindle-shaped (ROHÁČEK & BARBER 2011: Figs 26, 119). 10
- 10(9) Body shiny black, sparsely tomentose (ROHÁČEK & BARBER 2011: Fig. 10); two strong ors with additional microsetula anterior to these no stronger than the medial frontal microsetulae; face of female darker than that of male (ROHÁČEK & BARBER 2011: Figs 8, 9); male gonostylus deeply bilobed (ROHÁČEK & BARBER 2011: Figs 13, 15); filum of distiphallus formed by two very slender ribbon-shaped sclerites, apically simple (ROHÁČEK & BARBER 2011: Fig. 18); female T7+S7 dorsomedially divided but S8 not divided (ROHÁČEK & BARBER 2011: Figs 23, 24); spermatheca elongately spindle-shaped with distal end rugged and provided with small blunt processes, never apically invaginated (ROHÁČEK & BARBER 2011: Figs 26, 119). *Quametopia* Roháček & Barber, 2011
- Body ranging from yellow to shiny brown or black, with sparse to dense grey tomentum; 2 or 3 strong ors, if only 2 strong ors then additional microsetula anterior to these may be as strong as or stronger than the medial frontal microsetulae; face of female never darker than that of male but the reverse may occur; male gonostylus never bilobed; filum of distiphallus of various construction but if composed of 2 (partly fused) sclerites they are thicker and terminate in distinctly dilated apex (Figs 155, 174); female T7+S7 not divided dorsally but S8 longitudinally divided (Figs 79, 178, 253, 393, 475); spermatheca distally simple, often apically invaginated. 11
- 11(9) Only 2 strong ors with additional microsetula anterior to these usually weaker (only very rarely stronger) than medial frontal microsetulae; contrasting silvery grey tomentose stripes present between frontal triangle and posterior part of orbits; if lower part of thoracic pleurae yellow and contrasting with the dark notum (*A. duplex*, Figs 146, 147) then gonostylus narrowing toward apex (Fig. 156) and female with S7 fused with T7 to form syntergosternum (Fig. 159); thorax never with dense grey tomentum; males always with short thickened ventral setae in distal part of f_3 ; filum of distiphallus formed by two thicker, more or less fused sclerites, apically dilated and complex and saccus at most with small rounded tubercles ((Figs 75, 135, 174); spermathecal ducts short (Figs 80, 124, 199). *Arganthomyza* Roháček, 2009, in part (p. 56)
- Two or 3 strong ors, if only 2 strong ors then additional microsetula anterior to these always stronger than medial frontal microsetulae; contrasting silvery grey tomentose stripes usually absent between frontal triangle and posterior part of orbits, these stripes present only when at least lower half of thoracic pleurae is yellow and contrasting with brown notum (*A. macra* group, Figs 205, 206) where gonostylus is broad and spatulate (Figs 208, 231) and the female S7 is separate from T7 (Fig. 238); thorax often with

dense grey microtomentum; males with or without modified ventral setae in distal part of f_3 ; filum of distiphallus formed by single sclerite, apically simple and saccus with (usually robust) spines (Figs 212, 285, 390, 465, 556); spermathecal ducts very long (3 times or more as long as those in Fig. 199). *Anthomyza* Fallén, 1810 (p. 105)

The Nearctic genera of the *Anthomyza* clade

The *Anthomyza* clade as characterized by ROHÁČEK (2009a: 106–107, Fig. 137) is supported by two synapomorphies, viz. the ventral receptacle prolonged and tube-like and the female S8 longitudinally divided medially. According to ROHÁČEK (2009a), this clade embraces five (or possibly six) genera, viz. *Fungomyza* Roháček, 1999, *Arganthomyza* Roháček, 2009, *Ischnomyia* Loew, 1863, *Anthomyza* Fallén, 1810, *Epischnomyia* Roháček, 2006, and probably also *Receptrix* Roháček, 2006. However, the most recent phylogenetic hypothesis based on multigene analysis of seven combined mitochondrial and nuclear gene markers by ROHÁČEK & TÓTHOVÁ (2014: Fig. 1) suggests a different relationship of some of these genera, although only *Fungomyza*, *Arganthomyza*, *Epischnomyia* and *Anthomyza* were treated. Based on the results of this study, these genera (except for *Epischnomyia* which proved to be related to *Anthomyza*) were not derived from a common ancestor but branched off separately from the common stock of Anthomyzidae: *Fungomyza* most basally (forming the sister group to all other analysed genera of Anthomyzidae), *Anthomyza* with *Epischnomyia* subsequently as a second branch, and only then *Arganthomyza* which was postulated as the sister group to all ten remaining analysed genera of Anthomyzidae. Because this new topology seems to be rather well supported (see ROHÁČEK & TÓTHOVÁ 2014: 169–170) and inconsistent with a previous hypothesis based on morphological data, additional phylogenetic analyses are needed in the future to test whether the above-discussed genera are related or not.

Except for *Epischnomyia* and *Receptrix*, all other genera of the *Anthomyza* clade are represented in the Nearctic Region, with only *Fungomyza* and *Arganthomyza* previously treated taxonomically (ROHÁČEK & BARBER 2004, 2013). The revision of the genus *Ischnomyia* and its two species resulted in a surprising finding where a senior synonym was uncovered for *I. spinosa* and this species transferred to *Arganthomyza* while *Arganthomyza barbarista* Roháček, 2009 (E. Palaearctic) was transferred to *Ischnomyia*. The most speciose genus, *Anthomyza*, was found to be represented in the region largely by unnamed species, including the most common ones, because the species formerly considered to be Holarctic, viz. *Anthomyza gracilis* Fallén, 1823 and *A. pallida* (Zetterstedt, 1838), have not been confirmed to occur in the Nearctic Region inasmuch as their previous records from the area are based on misidentifications. Except for the recently revised genus *Arganthomyza* (see ROHÁČEK & BARBER 2013), all other genera of the *Anthomyza* clade recognized in the Nearctic are treated in a monographic manner below.

Genus *Fungomyza* Roháček, 1999

Fungomyza Roháček, 1999d: 391 [feminine]; ROHÁČEK & BARBER (2004): 132–133 (redefinition); ROHÁČEK (2006a): 214–215 (redescription); ROHÁČEK (2009): 84–93, 110–111 (redescription, phylogeny); ROHÁČEK & TÓTHOVÁ (2014): 169–170 (phylogeny).

Type species. *Opomyza albimana* Meigen, 1830: 107 (original designation).

Diagnosis. (1) *Head* distinctly higher than long. (2) Eye large, broadly oval, with longest diameter almost vertical. (3) Frons moderately broad; frontal triangle variable in length, shining or sparsely microtomentose. (4) Frontal lunule small but always distinct. (5) Antenna geniculate between pedicel and 1st flagellomere, the latter strongly compressed laterally. (6) Arista short-ciliate. (7) Palpus yellow, slender but somewhat clavate, with 1 longer subapical seta. Cephalic chaetotaxy: (8) pvt relatively long, crossed or strongly convergent; (9) vte, vti and oc long; (10) 3 ors, anterior slightly or distinctly shorter; 1 microsetula in front of anterior ors; (11) postocular setulae short, in single row; (12) 1 relatively short vi, subvibrissa indistinguishable from peristomal setulae; (13) peristomal setulae small and variable in number. (14) *Thorax* slightly narrower than head, more or less shining, despite some microtomentum. Thoracic chaetotaxy: (15) 1 hu, 2 npl (anterior longer); (16) 1 medium-sized sa, 1 longer pa; (17) 1 distinct, relatively long prs; (18) 2 postsutural dc, both long and strong; (19) ac microsetae small and numerous, in 4 rows, ending in front of level of posterior dc; (20) 2 sc (apical strong, laterobasal short); (21) 1 minute upcurved ppl; (22) 2 distinct stpl (anterior shorter) and a few setulae in dorsal half of sternopleuron. (23) At least one pair of femora variegated (yellow and brown); (24) f_1 with relatively short ctenidial spine; (25) t_2 with distinct ventroapical seta; (26) male f_3 with posteroventral row of setae, distal of which are short and thick. (27) Wing long, moderately narrow; (28) wing membrane unicolourous. (29) C with inconspicuous spinulae among fine setulae on Cs_2 ; (30) R_{2+3} long, parallel to C, ending nearer than or at the same distance from apex of R_{4+5} as M; (31) R_{4+5} slightly bent to sinuate; (32) cell dm relatively long; cross-vein r-m situated distal to middle of dm cell. (33) CuA_1 ending near, A_1 far from wing margin. (34) Anal lobe and alula well developed, relatively large.

Male abdomen. (35) T1 separate from T2, at least dorsally; (36) T2–T5 large and broad. (37) S1–S5 of variable width, dark but slightly paler than associated terga. Male postabdomen: (38) T6 short, transverse, bare and well sclerotized although paler-pigmented than S6–S8. (39) S6 and S7 strongly asymmetrical, partly fused and situated laterally, each with a few setulae. (40) S8 unusually long, less asymmetrical, more setose and situated dorsally.

Male genitalia. (41) Epandrium large, relatively densely setose, with 2–3 pairs longer. (42) Anal fissure very small, narrowly rounded triangular. (43) Medandrium high, slightly to conspicuously narrowed dorsally. (44) Cercus simple in shape, variable in size. (45) Gonostylus with 2–3 denticles on apex, and with external micropubescence partly or entirely reduced. (46) Hypandrium with anterior flat lobes not or slightly projecting dorsally; (47) transandrium with a forked or medially divided caudal process. (48) Pregonite large, flat, fused to hypandrium, with 2 groups of setae. (49) Postgonite simple, slender, long and relatively straight. (50) Phallopodeme with normal apex and shortly bifurcate symmetrical base. (51) Phallopore short, with more or less distinct ventral process; (52) distiphallus composed of

distally membranous saccus and slender sclerotized filum. (53) Saccus with relatively small membranous part, distinct basal and internal sclerites, and unarmed or with adpressed spinulae and/or setulae on surface; (54) filum formed by 2 long, dark, band-like sclerites fused basally and apically, with simple apex. (55) Aedeagal part of folding apparatus with reduced connecting sclerite and its external wall provided with small grains, tubercles or short spines combined with dark striae. (56) Basal membrane below caudal process with dense small teeth or spines. (57) Ejacapodeme small to medium-sized, with subterminal digitiform process or modified (in some species).

(58) **Female abdomen** relatively shining, with broader terga (T2–T6) and narrower sterna (S2–S5). (59) Postabdomen long, basally broad, caudally strongly tapered, telescopically retractable from 7th segment, with less sclerotized and paler T8, S8, T10 and S10. (60) T6 broad, S6 relatively small, narrow. (61) T7 and S7 separate, S7 small, narrow, paler than T7. (62) T8 simple, relatively flat, pale-pigmented; (63) S8 narrow, medially longitudinally divided; its posterior bare parts dorsally curved and far invaginated into 8th segment. (64) Internal sclerites of female genital chamber (uterus) weakly sclerotized and reduced, formed by 1–2 pairs of partly fused posterior plates and (65) 1 anteroventral, broad but thin, incomplete and unpigmented annular sclerite. (66) Anterior part of uterus provided with an elongate, vesicular, weakly sclerotized ventral receptacle terminating in short projecting apex of various ending. (67) Accessory glands relatively small, on slightly dilated ringed ducts. (68) Spermathecae (1+1) roughly cup-like to pyriform, characterized by deep terminal invagination and narrowed basal part covered by fine spinulae; spermathecal ducts short. (69) T10 long and narrow, bare except for 1 pair of dorsal setae; (70) S10, simple, pale, slightly longer than T10, almost without micropubescence. (71) Cercus long and very slender, with a number of longer fine setae.

Discussion. The above generic diagnosis follows ROHÁČEK (2009a), including the most ancestral E. Palaearctic relative, *F. cercata* Roháček, 2009. Although outer appearance and several other features indicate the superficial similarity of *Fungomyza* to *Paranthomyza* Czerny, 1902, *Carexomyza* or *Quametopia* (e.g. 1, 14, 53, 54, 58), previous morphological (ROHÁČEK 2009a) and molecular (ROHÁČEK et al. 2009) phylogenetic analyses confirmed its association with the *Anthomyza* clade (see Fig. 137 in ROHÁČEK 2009a). Based on these phylogenetic hypotheses, there is support for a sister-group relationship between *Fungomyza* and a lineage consisting of *Arganthomyza* and *Ischnomyia* as here redefined. The relationship of *Fungomyza* to this sister pair seems to be supported by the following synapomorphies: caudal process of transandrium forked or medially desclerotized; female S8 longitudinally divided but with posterior bare parts recurved and deeply invaginated into 8th abdominal segment (strongest synapomorphy); spermathecal ducts markedly shortened (only in *Arganthomyza*, not in *Ischnomyia*); well-sclerotized abdominal sterna; similar construction of ventral receptacle (see ROHÁČEK 2009a). The sister clade of *Arganthomyza* + *Ischnomyia* is supported by modification of the filum of the distiphallus (sclerites expanded and attached or partly fused) and partial to complete coalescence of the female T7 and S7 to form a compact syntergosternite. The poorly known genus *Receptrixia* could also be a candidate for a closer

(but highly modified) relative of all the above-discussed genera (shared features: short spermathecal ducts, distally positioned cross-vein r-m), but because the male of its only species is unknown this hypothesis cannot be properly tested.

The most recent hypothesis of phylogenetic relationships of anthomyzid genera based on multigene analyses (ROHÁČEK & TÓTHOVÁ 2014) surprisingly separated *Fungomyza* (represented by its type species, the European *F. albimana* (Meigen, 1830)) as a sister group to all remaining analysed taxa of the family, thus excluding it from the *Anthomyza* clade. This relatively well-supported finding contradicts the earlier molecular study of ROHÁČEK et al. (2009) and, particularly, the current morphological knowledge (see above). Hitherto, we do not know of any morphological synapomorphy supporting the monophyly of the clade with all these (remaining) taxa. They, however, differ from *Fungomyza* in having microsaprophagous larvae, feeding on at least partly rotten tissues of plants, while those of *Fungomyza* species are mycophagous, developing in sporocarps of macrofungi (see DELY-DRASKOVITS 1972, CHANDLER 1978, ROHÁČEK 2009a). The other possibility is that *Fungomyza* actually diverged basally from the common stem of the Anthomyzinae as the results of ROHÁČEK & TÓTHOVÁ (2014) indicate; in this case, however, the former hypotheses based on morphological data would have to be incorrect (probably due to misinterpreted polarity of some characters).

The most diagnostic characters of *Fungomyza* (those apomorphic are marked “A” in parentheses) are: (1) eye with longest diameter almost vertical; (12) subvibrissa not developed (A); (17) 1 long prs; (23) at least one pair of femora variegated (bicolourous) (A); (32) cross-vein r-m situated distal to middle of cell dm; (38) male T6 short but well sclerotized; (40) male S8 unusually long (A); (42) anal fissure very small, narrowly rounded triangular (A); (43) medandrium high, more or less narrowed dorsally; (51) phalophore short, with more or less distinct ventral process; (53) saccus of distiphallus with membranous part having adpressed surface spinulae (A); (63) S8 narrow, longitudinally divided and invaginated into 8th segment (A); (64) internal paired sclerites of female genital chamber (uterus) weakly developed; (65) internal looped structure (homologous to annular sclerite) fine, non-sclerotized (?A); (68) spermatheca with terminal invagination (A). Most of the apomorphic features listed above are not unique for this genus – some of them are shared with related genera of the *Anthomyza* clade, especially *Arganthomyza*. The larval mycophagy of *Fungomyza* (though unconfirmed in *F. cercata*) can be considered a non-morphological autapotypic feature of this genus (ROHÁČEK 2006a).

Fungomyza species can appear externally similar to other darkly coloured and relatively shining Anthomyzidae, including some *Arganthomyza* and *Anthomyza* species, *Receptrix receptrix* (Roháček & Freidberg, 1993), *Paranthomyza nitida* and *Carexomyza* and *Quametopia* species. *Fungomyza* can be differentiated from these taxa by having more or less variegated legs, a distinctively reduced subvibrissa, sparse ac microsetae and a distally positioned r-m (the latter only known in *Receptrix*). The recently described *Reliquantha variipes* most closely resembles *Fungomyza* species, especially *F. buccata* (including similar variegation of legs) but *R. variipes* lacks a ctenidial spine on f_1 and has a distinct subvibrissa, in addition to many other structural differences in the male and female terminalia (see ROHÁČEK 2013c and discussion under *F. buccata* below).

Three species included: *Fungomyza cercata* Roháček, 2009 from the Far East of Russia is considered a sister species of the remaining two, viz. *F. albimana* (Meigen, 1830) (W. Palearctic) and *F. buccata* Roháček & Barber, 2004 (E. Nearctic). The latter two species are distributed on opposite sides of the Atlantic Ocean. This is a clear example of a sister-pair transatlantic distribution, where the more ancestral species is Nearctic (ROHÁČEK 2009a).

Key to identification of *Fungomyza* species (world)

- 1 Fore femur and tibia uniformly yellow. Gonostylus small, externally without micropubescence, and apex with 3 denticles (ROHÁČEK 2009a: Fig. 125); male cercus large and with thick dark setae (ROHÁČEK 2009a: Fig. 123). Aedeagal part of folding apparatus with dense dark-pigmented spines and striae (ROHÁČEK 2009a: Fig. 127). Female unknown. *F. cercata* Roháček, 2009 (Russia: Far East)
- Fore femur and tibia yellow and dark brown variegated (ROHÁČEK 2006a: Fig. 466; ROHÁČEK 2009a: Fig. 147). Gonostylus larger, externally at least partly micropubescent, and tapered apex with 2 denticles (Fig. 37; ROHÁČEK 2006a: Fig. 468); male cercus small, finely and pale setose (Fig. 36; ROHÁČEK 2006a: Fig. 467). Armature of aedeagal part of folding apparatus pale-pigmented, inconspicuous. 2
- 2(1) Anterior ors long and gena unusually high (Fig. 35); frons, including most of frontal triangle, microtomentose and dull. Mid and hind femora darkened on distal half. Gonostylus with posteromedially projecting apex (Fig. 37) and pregonite without posterior projection (Fig. 38). Female T8 short and transverse (Fig. 42); spermathecae more rounded (Fig. 46). *F. buccata* Roháček & Barber, 2004 (eastern USA)
- Anterior ors short and gena very low (ROHÁČEK 2009a: Fig. 147); frontal triangle and posterior part of orbit bare and shining. Mid and hind femora uniformly yellow (ROHÁČEK 2009a: Fig. 147). Gonostylus apically narrowed but not projecting and pregonite with distinct posterior projection (ROHÁČEK 2006a: Figs 468, 471). Female T8 longer than broad; spermathecae roughly pyriform with narrowed basal part (ROHÁČEK 2006a: Figs 474, 476). *F. albimana* (Meigen, 1830) (Europe, Turkey)

Fungomyza buccata Roháček & Barber, 2004

(Figs 33–46)

Fungomyza buccata Roháček & Barber, 2004: 135; ROHÁČEK (2009a): 88 (key), 110–111 (phylogeny).

Type material. HOLOTYPE: ♂, “Stone Mt., DeKalb Co., Ga. XI-II-1953, Dodge”, “♂”, “HOLOTYPUS ♂ *Fungomyza buccata* sp. n., J. Roháček & K. N. Barber det. 2004” (red), deposited in USNM (intact). PARATYPES: 5 ♂♂ 6 ♀♀ (DEBU, LEMQ, SMOG, USNM) (details in ROHÁČEK & BARBER 2004).

Other material examined (not included in type series). 1 spec. (USNM, only wing preserved, see ROHÁČEK & BARBER 2004).

Additional records. UNITED STATES OF AMERICA: ALABAMA: Baldwin Co., Silverhill, 30.53°N 87.74°W, (Site 9), Malaise trap, 15.xii.2004, 3 ♀♀, E. Benton leg. (DEBU, O. Lonsdale det., K. N. Barber rev.).

Redescription. Male. Total body length 2.22–2.94 mm; general colour blackish brown, relatively shiny despite sparse greyish microtomentum, only extremities and head partly yellow or ochreous (Fig. 33). Head distinctly higher than long (Fig. 35); dorsal part of occiput slightly

concave. Frons moderately broad, blackish brown posteriorly but becoming gradually paler anteriorly, orange ochreous in anterior third (lightest medially behind lunule), microtomentose and dull except for basal scars of ors and spots lateral to ocellar triangle. Orbits whitish microtomentose. Frontal triangle short, at most reaching half of frons. Frontal lunule orange, well developed. Occiput entirely blackish brown, shiny despite sparse greyish microtomentum, best developed in 2 bands behind ocellar triangle. Face (preafrons), parafacialia and gena whitish yellow to dark yellow, white microtomentose except for narrow and darker (pale brown) margin bordering parafacialia and gena; postgena orange ochreous ventrally, brown dorsally; mouthparts dark yellow. Cephalic chaetotaxy: pvt unusually long, strongly convergent or crossed; vte, vti and oc longest of cephalic setae, subequal or vte sometimes slightly longer than vti; 3 strong but relatively short ors, becoming shorter anteriorly, and 1 inclinate orbital microsetula in front of the foremost ors; 3–4 medial pairs of proclinate microsetulae in anterior half of frons; postocular setulae well developed but not longer than peristomals, in a single row; postgena with 1 longer ventral seta (as usual) and several shorter setulae; vi rather short (as long as anterior ors); subvibrissa reduced, unrecognizable from peristomal setulae that are all directed anterolaterally. Eye broadly suboval with longest diameter very slightly oblique and 1.2–1.3 times as long as shortest. Gena unusually high, with smallest height 0.20–0.23 times as long as shortest eye diameter. Palpus slender but clavate, with several black setulae ventrally, the subapical of which is distinctly longer. Antenna geniculate, orange, only 1st flagellomere brown in anterior half and shortly ciliate on anterior margin. Arista brown, about 1.7 times as long as antenna, very shortly ciliate.

Thorax slightly narrower than head, dark to blackish brown, relatively shining despite sparse grey microtomentum; humeral and notopleural areas duller, with denser microtomentum; scutellum microtomentose on margins but bare and more shining on disc. Thoracic chaetotaxy: 1 minute but distinct ppl; 1 hu, 2 npl (anterior longer); 1 sa and 1 pa (longer) strong but not long; 1 prs, well developed, as long as hu or longer; 2 dc (both postsutural), anterior strong but markedly shorter than the very long posterior dc; a number (more than 5) of dc microsetae in front of anterior dc; ac microsetae fine, in 4 rows at suture, in 2 behind anterior dc, not reaching behind posterior dc; 2 sc, laterobasal as long as or slightly shorter than anterior dc, apical as long as posterior dc; 2 stpl (anterior markedly shorter) and 1 microseta in front of anterior stpl; 1–2 other microsetae in dorsal half of sternopleuron but more and longer setae ventrally. Scutellum relatively long, rounded triangular, with convex disc.

Legs variegated, yellow and brown. Coxae ochreous yellow, trochanters paler. f_1 brown with yellow base and apex; t_1 dark brown except for yellow knee; fore tarsus with pale brown basitarsus, 2nd and 3rd segment yellowish ochreous, two apical segments brown. f_2 and f_3 pale ochreous basally and gradually darkened towards distal end but knee yellow; t_2 and t_3 brown but usually lighter than t_1 and with both ends yellow; mid and hind tarsi yellow, with 2 terminal segments brown (or apical segment dark brown). f_1 with ctenidial spine shorter than maximum width of t_1 and with posterodorsal and posteroventral setae thin and relatively short. t_2 with usual ventroapical seta. f_2 simply setulose. f_3 with posteroventral row of setae, 8–10 in apical two-thirds shortened and thickened. t_3 and hind basitarsus simply, finely setulose.

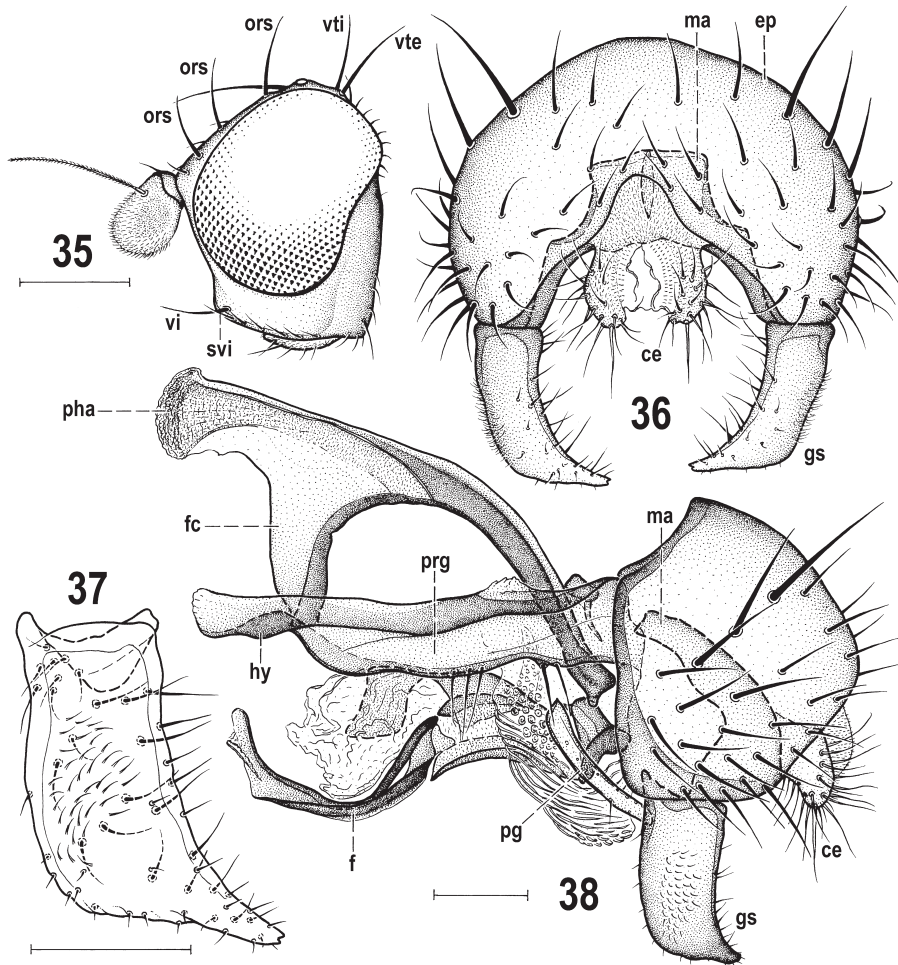
Wing (Fig. 34) long and relatively broad, with membrane and veins pale ochreous. C with minute spinulae not longer than other fine setulae between apices of R_1 and R_{2+3} . R_{2+3}



Figs 33–34. *Fungomyza buccata* Roháček & Barber, 2004, paratypes. 33 – paratype male sitting on fungus, body length ca. 2.6 mm; 34 – wing, paratype female, wing length 2.9 mm. Photo by S. A. Marshall (Fig. 33) and K. N. Barber (Fig. 34). Adapted from ROHÁČEK & BARBER (2004: Figs 13, 14).

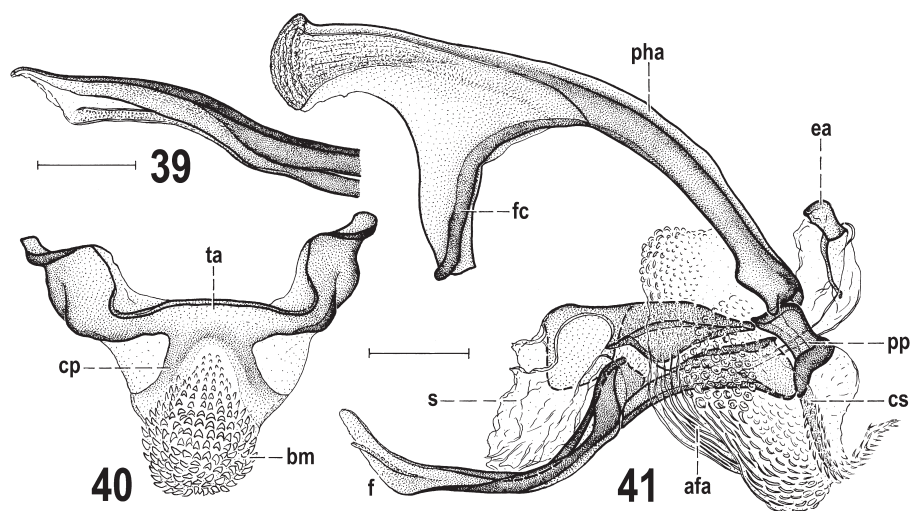
very long, bent parallel to C and ending usually nearer apex of R_{4+5} than does M. R_{4+5} very slightly bent; M long and almost straight. Discal cell (dm) medium-sized, strongly widened distally; r-m situated distally to middle of dm cell. CuA_1 slightly bent and ending near, A_1 ending far, from wing margin. Anal lobe large; alula also well developed, relatively broad. Wing measurements: length 2.38–2.82 mm, width 0.79–0.99 mm, $Cs_3 : Cs_4 = 0.76–1.00$, r-m\ dm-cu : dm-cu = 1.67–2.09. Haltere yellow, with large pale yellow knob.

Abdomen dark to blackish brown; terga more shining; sterna also dark brown but more densely greyish brown microtomentose and duller. Also T1 and T2 more microtomentose and



Figs 35–38. *Fungomyza buccata* Roháček & Barber, 2004, male. 35 – head, laterally; 36 – external genitalia, caudally; 37 – gonostylus, posterolaterally (widest extension); 38 – whole genitalia, laterally. Fig. 35 based on holotype, others on paratype. Scales = 0.3 mm (Fig. 35) and 0.1 mm (others). Adapted from ROHÁČEK & BARBER (2004: Figs 1–4). For abbreviations see p. 11.

less lustrous than other preabdominal terga. T3–T5 large, subequal in length and reaching far on ventral side of abdomen, all shortly setose. Preabdominal sterna narrow, becoming wider posteriorly, S5 largest and widest posteriorly. Postabdomen strongly sclerotized, shining blackish brown; T6 well developed, well sclerotized, forming brown, bare, transversely band-like sclerite. S6, S7 and S8 partly fused. S6 almost as long as S7, dark-margined anteriorly and usually both with 2 small setae; S8 long (as typical for *Fungomyza*), situated dorsally and more setose on posterior half.



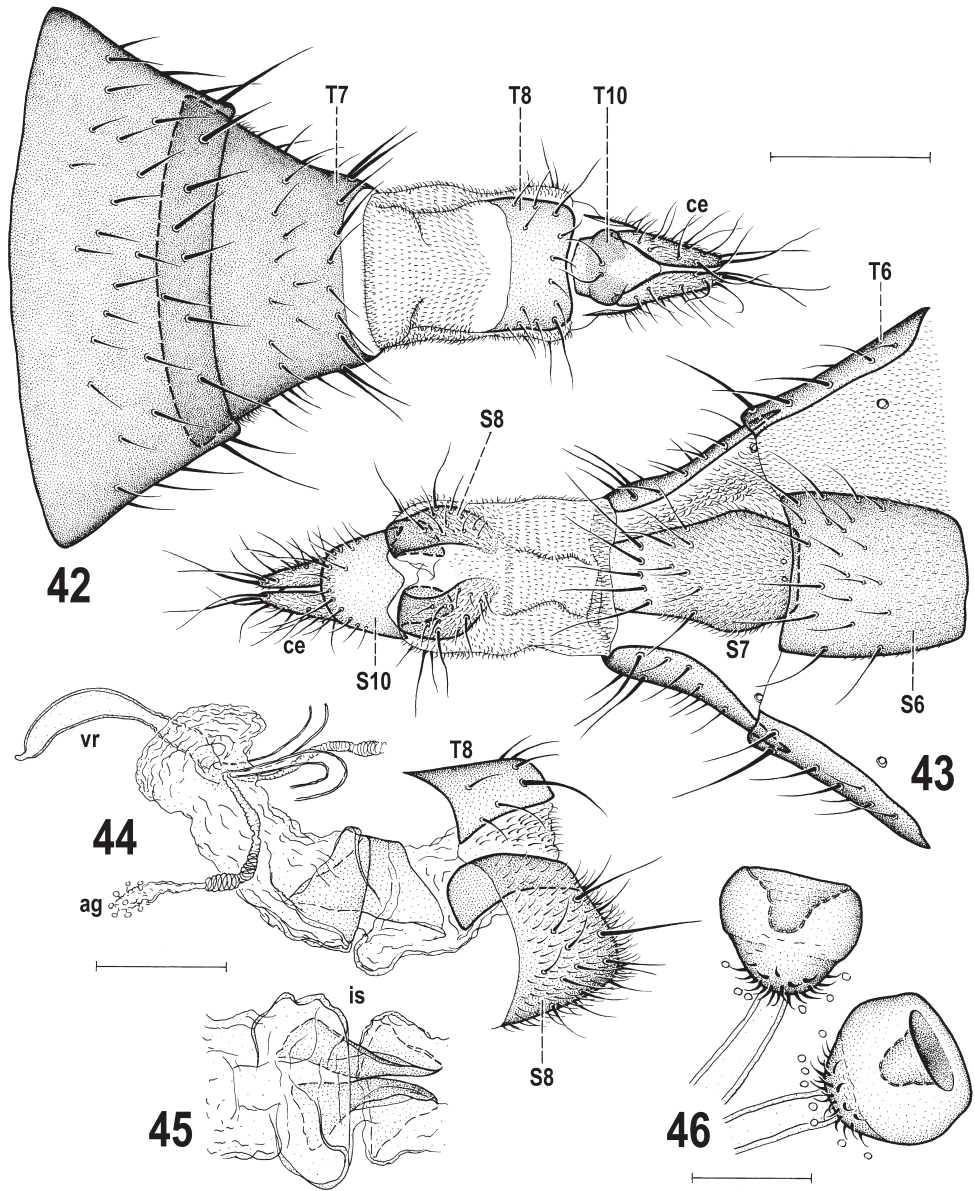
Figs 39–41. *Fungomyza buccata* Roháček & Barber, 2004, paratype male. 39 – apex of filum of distiphallus, ventrally; 40 – transandrium and basal membrane, caudally; 41 – aedeagal complex, laterally. Scales = 0.05 mm (Fig. 39) and 0.1 mm (others). Adapted from ROHÁČEK & BARBER (2004: Figs 5–7). For abbreviations see p. 11.

Genitalia. Epandrium (Figs 36, 38) dark brown, higher and wider than long, with more and stronger setae than in *F. albimana*, 3 pairs of laterodorsal setae longer and thicker than others. Anal fissure small, roundly triangular (Fig. 36); cerci below it also relatively small, each with a number of rather small setae including 2 longer ones and with microtomentum restricted only to posterior side (cercus laterally without microtomentum). Medandrium high, broad ventrally and strongly narrowed dorsally (Fig. 36) although less than in *F. albimana*. Gonostylus (Figs 36–38) elongate suboblong but with strongly projecting and incurved posteroventral corner bearing 2 small teeth on apex and with microtomentum restricted to a central area of outer side and setae mainly arising on inner side at posterior margin. Hypandrium (Fig. 38) relatively robust, well sclerotized but without anterior flat, dorsally projecting lobes. Pregonite (Fig. 38) large, flat, fused to hypandrium, ventrally thickened and dark but, in contrast to *F. albimana*, without posterior projection, and with 3 setae in anterior and 2 in posterior group. Postgonite (Fig. 38) simple, slender, pale, slightly bent, distinctly shorter than in *F. albimana*, with anterior setula in distal third, several grain-like sensillae on outer side and blunt apex. Transandrium well sclerotized, straight medially, with dorsally bent lateral parts and ventromedially carrying distinct (though pale-pigmented) forked caudal process (Fig. 40); basal membrane below caudal process with numerous dense short spines. Aedeagal complex (Fig. 41) with short phallosome having somewhat projecting anteroventral corner. Distiphallus bifid and large, composed of largely membranous saccus and heavily sclerotized filum. Saccus proximally sclerotized but these sclerites asymmetrical, enlarged distally on right side; membranous part of saccus relatively small and unarmed, without distinct spines or setulae. Filum formed by 2 dark band-like sclerites being closely attached in the middle and

fused apically; apex of filum (Fig. 39) slender, flattened and pointed but structurally similar to that of *F. albimana*. Aedeagal part of folding apparatus (Fig. 41) provided with elongate striae and grain-like tubercles in outer wall. Connecting sclerite (Fig. 41, cs) poorly delimited and weakly sclerotized. Phallapodeme (Figs 38, 41) medium-sized, similar to that of *F. albimana*, with shortly forked base, robust apical part and large ventral fulcrum. Ejacapodeme (Fig. 41) small, suboblong, with slender ventral projection lying in wall of ejaculatory duct.

Female. Similar to male unless mentioned otherwise. Total body length 2.58–3.18 mm. Face, parafacialia and gena darker, orange yellow to orange ochreous; clypeus darker, brown. Antenna sometimes (North Carolina: Raleigh) more extensively darkened on the lateral surface, reaching ventral margin in apical half. Legs less distinctly variegated. Ctenidial spine on f_1 slightly shorter than in male. f_3 without posteroventral thickened setae. Wing measurements: length 2.58–3.30 mm, width 0.87–1.17 mm, $Cs_3 : Cs_4 = 0.81–0.97$, $r-m/dm-cu : dm-cu = 1.53–2.19$. Preabdominal terga broader and more transverse, far reaching on ventral side of abdomen. T2–T4 shortly setose; T5 somewhat tapered posteriorly and with distinctly longer setae at posterior margin. Preabdominal sterna slightly narrower than in male, with short and fine setae.

Postabdomen (Figs 42, 43) telescopically retractible and strongly tapered caudally. T6 broadly transverse but very tapered posteriorly, dark, shortly setose. S6 narrow, distinctly longer than broad, setose in posterior half, relatively dark. 6th spiracle situated at anterior corner of T6 (Fig. 43). T7 not fused with S7, markedly narrower than T6 and conically narrowed posteriorly, dark and heavily sclerotized, with longer setae only at posterior margin. S7 as long as S6 but distinctly narrower, with longer and denser microtomentum and long fine setae (more than in *F. albimana*) on posterior half, brown except for pale posterior fourth. 7th spiracle situated in front of anterior corner of T7. Intersegmental membrane (also dorsally) between 7th and 8th segment with long distinct pubescence. T8 (Fig. 42) markedly shorter than in *F. albimana*, distinctly transverse, lighter than T7, without microtomentum and finely setose. S8 (Fig. 43) more or less divided medially, posteriorly curved dorsally and deeply invaginated into 8th segment (see also Fig. 44), strongly microtomentose apart from bare invaginated posterodorsal parts. Internal structures of the female genital chamber (uterus) better sclerotized than in *F. albimana*, with 2 pairs of partly fused posterior sclerites attached to invaginated parts of S8 (Figs 44, 45) and 1 poorly visible (seemingly incomplete), unpigmented, anterior looped structure; ducts of accessory glands slender, transversely ringed; accessory gland small; ventral receptacle (Fig. 44) large, hyaline membranous, elongate vesicular and similar to that of *F. albimana* except for terminal projection being short and blunt apically. Spermathecae (1+1) cup-like (not pyriform), with narrower base covered with fine spinulae terminated with usual stalked globuli; distal part broader and provided with broad, deep apical invagination (Fig. 46); spermathecal ducts short, without terminal cervix, hyaline near insertion into body of spermatheca. T10 (Fig. 42) narrowly pentagonal with somewhat bulging sides, and bare apart from usual pair of dorsal setae; apical portion depigmented leaving pigmented basal two-thirds medially and narrowly emarginate between bulging sides to near level of setal pair. S10 (Fig. 43) larger than T10, relatively flat with doubly emarginate anterior margin, also bare except for setae and sparse microtomentum at posterior margin. Cerci long and slender (more robust than in *F. albimana*), with rich setae that are longest apically.



Figs 42–46. *Fungomyza buccata* Roháček & Barber, 2004, paratype female. 42 – postabdomen, dorsally; 43 – the same, ventrally; 44 – female genital chamber and 8th segment, laterally; 45 – internal sclerites of female genital chamber, ventrally; 46 – spermathecae. Scales = 0.2 mm (Figs 42, 43), 0.1 mm (Figs 44, 45) and 0.05 mm (Fig. 46). Adapted from ROHÁČEK & BARBER (2004: Figs 8–12). For abbreviations see p. 11.

Discussion. *Fungomyza buccata* is the only Nearctic representative of *Fungomyza*. It closely resembles the W. Palaearctic *F. albimana* both as regards structures of the male genitalia (eg. form of epandrium, small cercus, dorsally tapered medandrium, robust pregonite, simple slender postgonite, forked caudal process of transandrium, relatively small saccus; similar filum of distiphallus and ejacapodeme) and the female postabdomen (eg. T6, T7, S6, S7, S8, intersegmental pubescence, T10, ventral receptacle, terminal invagination of spermatheca). Most of these shared features are synapomorphic and four of them were used to demonstrate the sister-species relationships of these taxa, see ROHÁČEK (2009a: Fig. 139).

Fungomyza buccata differs distinctly from *F. albimana* in a number of external and genitalic features, however, including the following: anterior ors longer; frontal triangle short; eye less oval; gena unusually high (probably the highest in all described Anthomyzidae); legs differently variegated (e.g. f_1 brown except for both ends, 2 apical segments of all tarsi darkened, f_2 and f_3 darkened in distal half, etc.); gonostylus with projecting posteroventral corner and reduced microtomentum; pregonite without posterior projection; saccus of distiphallus without spinulae or setulae; filum shorter, with narrower apex; female T8 short and transverse; internal sclerites of female genital chamber distinct and spermathecae more rounded. It is also more robust and has longer wings on the average than *F. albimana*.

It is to be remarked that an additional species, *Reliquantha variipes* from Great Britain, is externally strikingly similar to *F. buccata* (including the variegated legs and cephalic chaetotaxy). It differs from *F. buccata* very distinctly in the male and female postabdominal structures (see ROHÁČEK 2013c) and also in lacking the ctenidial spine on f_1 and in having a well-developed subvibrissa, short prs and only 2 setae on the ventral corner of the sternopleuron.

Biology. A male specimen collected by Steve Marshall in Florida was caught on the sporocarp of a white fungus (Fig. 33) growing on a well-rotted, partially buried log in a sandy, partly wooded, habitat. It is therefore probable that *F. buccata* also develops in fungi like its European sister species. Adults were mainly obtained in autumn (in October – 5 specimens, November – 4 specimens, December – 4 specimens); only one female was captured in May. Together this suggests an association with sporocarps of fungi which mainly grow in autumn (ROHÁČEK & BARBER 2004).

Distribution. This uncommon species is widespread in the eastern United States of America: Alabama (new record), District of Columbia, Florida, Georgia, Maryland, New York, North Carolina, South Carolina, Virginia (ROHÁČEK & BARBER 2004, and Table 2, Figs 600, 603).

Genus *Ischnomyia* Loew, 1863

Ischnomyia Loew, 1863: 325 [feminine]; OSTEN SACKEN (1878): 198 (catalogue); WILLISTON (1896): 105 (key); CZERNY (1902): 255 (redescription); ALDRICH (1905): 644 (catalogue); WILLISTON (1908): 80 (wing illustration), 298 (key); COQUILLETT (1910): 556 (catalogue); MELANDER (1913): 285, 292 (key); CURRAN (1934): 329 (key); STURTEVANT (1954): 557 (key); FREY (1958): 31 (key); CURRAN (1965): 329 (key); SABROSKY (1965): 819 (catalogue); COLE (1969): 435 (key); VOCKEROTH (1987): 75 (key); ARNETT (1993): 689 (list); ROHÁČEK (1998a): 174 (checklist); ARNETT (2000): 896 (list); ROHÁČEK (2009a): 106 (relationships).

Type species. *Ischnomyia vittula* Loew, 1863: 325 (monotypy) [= *I. albicosta* (Walker, 1849)].

Diagnosis. (1) *Head* distinctly longer than high, angular in profile. (2) Eye large, subovoid, with longest diameter longitudinally oblique. (3) Frons moderately broad, anteriorly projecting in front of eye; (4) frontal triangle short (at most reaching to anterior two-fifths of frons), subshining to dull, microtomentose. (5) Frontal lunule small but always distinct. (6) Occiput distinctly concave. (7) Vertex with silvery microtomentose stripes lateral to ocellar triangle or orbits also with silver microtomentum. (8) Antenna geniculate, pedicel simple, 1st flagellomere strongly compressed laterally. (9) Arista densely to very densely (particularly basally) haired. (10) Palpus yellow, with 1 longer subapical seta and some ventral setulae. Cephalic chaetotaxy: (11) pvt relatively long, with apices crossed; (12) vti, oc and posterior ors longest of cephalic setae; (13) 3 ors but only 2 strong (middle ors shorter than posterior) with anterior ors reduced to setula; 1 microsetula in front of anterior ors; (14) postocular setulae short, in single row; (15) 1 long but slender vi, subvibrissa well developed (at least two-thirds of vi); (16) peristomal setulae small and sparse. (17) Posterior corner of head rounded. (18) Antenna and face with same colouring in both sexes.

(19) *Thorax* slightly narrower than head, subshining, despite microtomentum. Thoracic chaetotaxy: (20) 1 hu, 2 npl (anterior longer); (21) 1 long prs; (22) 1 long sa, 1 somewhat shorter pa; (23) 2 postsutural dc, both long and strong; (24) ac microsetae reduced, usually in only 2 medial rows, ending in front of level of posterior dc; (25) 2 sc (apical strong, laterobasal short and weak); (26) 1 minute upcurved ppl; (27) 2 distinct spl (posterior somewhat longer) and a few setulae in dorsal half of sternopleuron. (28) Legs unicolourous yellow, at most distal half of apical tarsal segments somewhat darkened. (29) f_1 with short ctenidial spine; (30) t_2 with short ventroapical seta; (31) male f_3 with posteroventral row of setae that are short and thickened distally. (32) Wing relatively long and narrow; (33) wing membrane unicolourous or with brown and whitish hyaline longitudinal pattern. (34) C with distinct spinulae among fine hairs on Cs_2 ; (35) R_{2+3} long, sinuate to subparallel to C, ending farther from apex of R_{4+5} than R_{4+5} ends from apex of M; (36) R_{4+5} slightly bent (recurved) and somewhat converging with M apically; (37) cell dm moderately long and rather narrow; cross-vein r-m situated in front of middle of cell dm; (38) distal part of CuA_1 longer than dm-cu, reaching (with its colourless end only) wing margin, A_1 ending far from it. (39) Anal lobe and alula small, the latter narrow.

Male abdomen. (40) T1 separate from T2, only laterally fused; (41) T2–T5 large and broad, all uniformly dark-pigmented. (42) S2–S5 narrow, brown or (secondarily) pale-pigmented. Male postabdomen: (43) T6 short, transverse, bare, pale brown laterally, unpigmented medially.

(44) S6 and S7 strongly asymmetrical, partly fused and situated laterally, S6 with 2–4, S7 with 2 setulae. (45) S8 relatively long, less asymmetrical, setose on posterior half.

Male genitalia. (46) Epandrium medium-sized, somewhat wider than high, with a number of setae, 2 pairs of setae distinctly longer. (47) Anal fissure medium-sized, relatively broadly rounded, triangular. (48) Medandrium relatively broad, widened ventrally, with dorsal corners slightly projecting, without setae. (49) Cercus relatively large but weakly sclerotized and pale-pigmented, with pale setae. (50) Gonostylus simple, medium-sized (shorter and paler than epandrium), with 2 denticles on apex, micropubescent externally and setose internally. (51) Hypandrium medium-sized, with anterior flat lobes reduced, incurved and fused with anterior part of postgonites; (52) transandrium with a very distinctive, forked caudal process, having its distal arms anteroventrally projecting and dilated. (53) Pregonite low, flat, fused to hypandrium, with small but distinct posterior lobe and 2 (anterior and posterior) groups of setae. (54) Postgonite simple, slender, relatively straight to slightly S-shaped, without distinct setula. (55) Phallapodeme robust, with large bicuspidate apex, basally broad fulcrum and shortly bifurcate base. (56) Phallophore short, simple, without ventral process; (57) distiphallus composed of distally membranous saccus and slender sclerotized filum. (58) Saccus with medium-sized to small membranous part, sclerotized narrower proximal part and provided with several larger cup-like tubercles, otherwise unarmed; (59) filum short, formed by 2 broad, closely attached to partly fused ribbon-like sclerites, ventral shorter and dilated, dorsal longer, attenuated and ending in membranous but finely spinulose and denticulate apex. (60) Aedeagal part of folding apparatus with slender, weakly sclerotized but spinulose connecting sclerite and its external wall with relatively robust, dark and dense lenticular to tooth-like excrescences. (61) Basal membrane below caudal process with dense and dark spine-like tubercles. (62) Ejacapodeme relatively long, with dark clubbed projection medially.

(63) **Female abdomen** relatively shining, with broader terga (T2–T6) and narrower sterna (S2–S5). (64) Postabdomen relatively short and wide, basally broad, caudally tapered, telescopically retractable, with all terga dark-pigmented. (65) T6 very large and broad, S6 relatively small, much narrower but transverse. (66) T7 and S7 either fused to form synsclerite T7+S7 with pale sternal part, or separate, with S7 large and dark, and pleural membrane between T7 and S7 very narrow, reduced. (67) T8 simple, flat, all dark-pigmented or with pale margins; (68) S8 relatively short, medially longitudinally divided, with posterior bare parts dorsally recurved and invaginated into 8th segment. (69) Internal structures of female genital chamber (uterus) formed by several fused anterior sclerites (situated unusually distally in female genital chamber) and by (70) 1 posterior, elongate, very fine, pale or unpigmented annular sclerite. (71) Ventral receptacle hyaline, elongate and slender, with weakly sclerotized and ringed distal end bent apically and either conical or projecting. (72) Accessory glands very small, on distally dilated and partly ringed ducts. (73) Spermathecae (1+1) broadly ovoid, each with finely ringed surface, plain basal part with minute spinulae, small terminal invagination, eccentric duct insertion and short cervix; spermathecal duct very long. (74) T10 small and transverse, brownish, sparsely microtomentose and with 1 pair of very long setae; (75) S10 larger than T10, rounded triangular, micropubescent, with long fine setae at posterior margin. (76) Cercus relatively short, with a number of fine setae, apical and dorsopreapical longest.

Discussion. A thorough revision of both species formerly assigned to the genus *Ischnomyia* Loew, 1863, viz. *I. albicosta* (Walker, 1849) and *I. spinosa* Hendel, 1911 and its synonyms revealed that these two species are not closely related in spite of their surprisingly similar wing pattern. *Ischnomyia albicosta* (the type species of *Ischnomyia*) proved to be the nearest relative of the East Palaearctic *Arganthomyza barbarista* Roháček, 2009 (the most enigmatic species of *Arganthomyza*), while *I. spinosa* (which has an older synonym, viz. *Arganthomyza vittipennis*) is most closely allied to species of the clade *A. duplex* group + *A. socculata* group of the genus *Arganthomyza* (as defined by ROHÁČEK & BARBER 2013). Because the affiliation of *A. barbarista* with *Arganthomyza* causes distinct heterogeneity of this genus (for its relationships see ROHÁČEK & BARBER 2013: Fig. 173), this species is here transferred to the genus *Ischnomyia* as *Ischnomyia barbarista* (Roháček, 2009) comb. nov. and *I. spinosa* Hendel, 1911 is transferred to the genus *Arganthomyza* Roháček, 2009 under its older name, thus as *Arganthomyza vittipennis* (Walker, 1857) comb. nov., see below.

These systematic actions however necessitate redefinitions of taxonomic limits of both involved genera. The genus *Ischnomyia* is redescribed above. It is postulated as sister group of the genus *Arganthomyza*. Both these genera share the following synapomorphies (numbered as in above diagnosis): (7) vertex (top of head) with silvery microtomentose spots or stripes between frontal triangle and posterior part of orbits; (24) ac microsetae in reduced number, at most in 2 rows, sometimes entirely absent; (49) male cercus relatively large but weakly sclerotized and pale-pigmented; (58) saccus with reduced armature, with only some blunt tubercles; (59) filum short and robust, formed by two broad closely appressed to partly or completely fused sclerites terminating in somewhat dilated and finely spinulose or denticulate apex; (64) female postabdomen relatively short; (66) female T7 and S7 normally forming complete tergosternal ring (in some species with S7 secondarily separate); (69) annular sclerite in the female genital chamber elongate; (74) female T10 small, dark and transverse, markedly shorter than S10 and with a pair of very long medial setae.

The genus *Ischnomyia* is best characterized (in contrast to *Arganthomyza*) in having (1) head longer than high and angular in profile, (2) eye with longest diameter longitudinally oblique, (4) frontal triangle short, (9) arista densely to very densely (particularly basally) haired, (29) f_1 with ctenidial spine shortened, (50) gonostylus with 2 denticles on apex, (52) transandrium with a distinctively forked caudal process having its arms anteroventrally projecting and dilated, (54) postgonite without distinct setula, (55) phallapodeme robust, with large apex and broad fulcrum at base, (58) saccus with a few larger, pigmented, cup-like tubercles, (60) aedeagal part of folding apparatus provided with relatively robust, dark excrescences, (61) basal membrane with dense dark spine-like tubercles, (64) female postabdomen with all terga dark-pigmented, (69) female genital chamber with several fused anterior sclerites situated unusually distally (far from genital opening), (73) spermatheca with eccentric duct insertion and spermathecal duct very long. Most of these characters are apomorphic compared to *Arganthomyza* (1, 2, 9, 29, 50, 52, 54, 58, 60, 61, 69); the eccentric insertion of the spermathecal duct is probably apomorphic although the long duct is obviously a plesiomorphic character state. In conclusion, *Ischnomyia*, as delimited above, seems to be a distinct group, the monophyly of which is well supported.

The parallel evolution of highly similar wing ornamentation in three lineages, i.e. in one species of *Ischnomyia* (*I. albicosta*), one species of *Arganthomyza* (*A. vittipennis*) and two species of the East Palaearctic genus *Epischnomyia* (see ROHÁČEK 2006a, 2009a), certainly is an interesting phenomenon. An observation worth mentioning is that at one site (Ontario: Sault Ste. Marie – Baseline Rd.), *A. vittipennis* was found along with the leafhopper, *Eupteryx flavoscuta* Gillette, 1898 (Cicadellidae), which has a strikingly similar wing pattern. The two patterns share a medial longitudinal dark band that abruptly widens apically (Fig. 88). The hosts of *E. flavoscuta* are ferns which we have suspected might be implicated as hosts for some woodland *Arganthomyza* and *Anthomyza* species. No other species of Anthomyzidae sharing these habitats has such a pattern and these ferns are lacking in some sites where *A. vittipennis* is present (e.g. Ontario: Moosonee). The two sites where *I. albicosta* has been collected by the junior author (see Biology under *I. albicosta* below) have also yielded *A. vittipennis* but ferns were a noticeable component only at Massachusetts: Farley and the presence of *E. flavoscuta* was not noted. Though aposematism and an associated mimicry may be operating here, we suggest that this represents a more generalized example of disruptive colouration. This wing pattern may make the differentiation between anterior and posterior ends of the animal more difficult for predators, possibly reducing the rate of successful attacks. A similar gross body silhouette and colouration is shared between some *Stiphrosoma* species and nymphs of certain fulgoroid planthoppers (Hemiptera) (K. N. Barber, unpublished) associated with the thatch below graminoids.

Two species included: *Ischnomyia albicosta* (Walker, 1849) and *I. barbarista* (Roháček, 2009) that are widely separated on different continents – *I. albicosta* in the eastern Nearctic and *I. barbarista* in the East Palaearctic (ROHÁČEK 2009a, as *Arganthomyza*).

Key to identification of *Ischnomyia* species (world)

- 1 Wing longitudinally brown-banded (Fig. 49). Arista relatively sparsely haired (Fig. 48). Frons with broad medial longitudinal band dull blackish brown. Mesonotum brown to blackish brown, with 3 narrow orange yellow vittae between dorsocentral lines (Fig. 48). Preabdominal sterna brown. Male S5 brown, with large posteromedial subtriangular area unpigmented and distinctively micropubescent (Fig. 50). Saccus more slender; ejacapodeme with long projection (Fig. 58); apex of filum with a few denticles (Fig. 57). Female T7 and T8 longer (Fig. 60); S7 separate, large and brown-pigmented (Fig. 64). Distal end of ventral receptacle shortly conical (Fig. 63); spermathecae shortly oval, basally with reduced spinulae and its terminal impression shallow (Fig. 61).
.....*I. albicosta* (Walker, 1849) (Canada, USA)
- Wing with unicolourous hyaline membrane (ROHÁČEK 2009a: Fig. 88). Arista very densely (particularly in basal third) hirsute (ROHÁČEK 2009a: Fig. 73). Frons largely yellow to orange, only ocellar triangle brown. Mesonotum largely yellow, only brownish lateral to dc lines (ROHÁČEK 2009a: Fig. 73). Preabdominal sterna pale ochreous. Male S5 simple, entirely pale-pigmented. Saccus more voluminous, dilated distally; ejacapodeme with short projection (ROHÁČEK 2009a: Fig. 79); apex of filum with more denticles (ROHÁČEK 2009a: Fig. 80). Female T7 and T8 shorter (ROHÁČEK 2009a: Fig.

81); S7 pale ochreous and coalesced with T8 (ROHÁČEK 2009a: Fig. 84). Distal end of ventral receptacle longer conical with apex curved (ROHÁČEK 2009a: Fig. 83); spermathecae longer, ovoid, basally with numerous spinulae and its terminal invagination conical (ROHÁČEK 2009a: Figs 82, 87).
 *I. barbarista* (Roháček, 2009) (Korea, Russia: Far East)

Ischnomyia albicosta (Walker, 1849)

(Figs 47–65)

?*Diastata albicosta* Walker, 1849: 1113.

Ischnomyia albicosta: CZERNY (1902): 255 (generic combination); HENDEL (1911): 46 (diagnosis); MELANDER (1913): 293 (key); SABROSKY (1965): 819 (catalogue); ROHÁČEK (1998a): 174 (checklist).

Ischnomyia vittula Loew, 1863: 325; CZERNY (1902): 255 (synonymy); ALDRICH (1905): 644 (catalogue).

Ischnomyia vittata: OSTEN SACKEN (1878): 198 (misspelling, catalogue).

Tachydromia vittipennis: SMITH (1971): 367 (incorrect synonymy with *I. albicosta*).

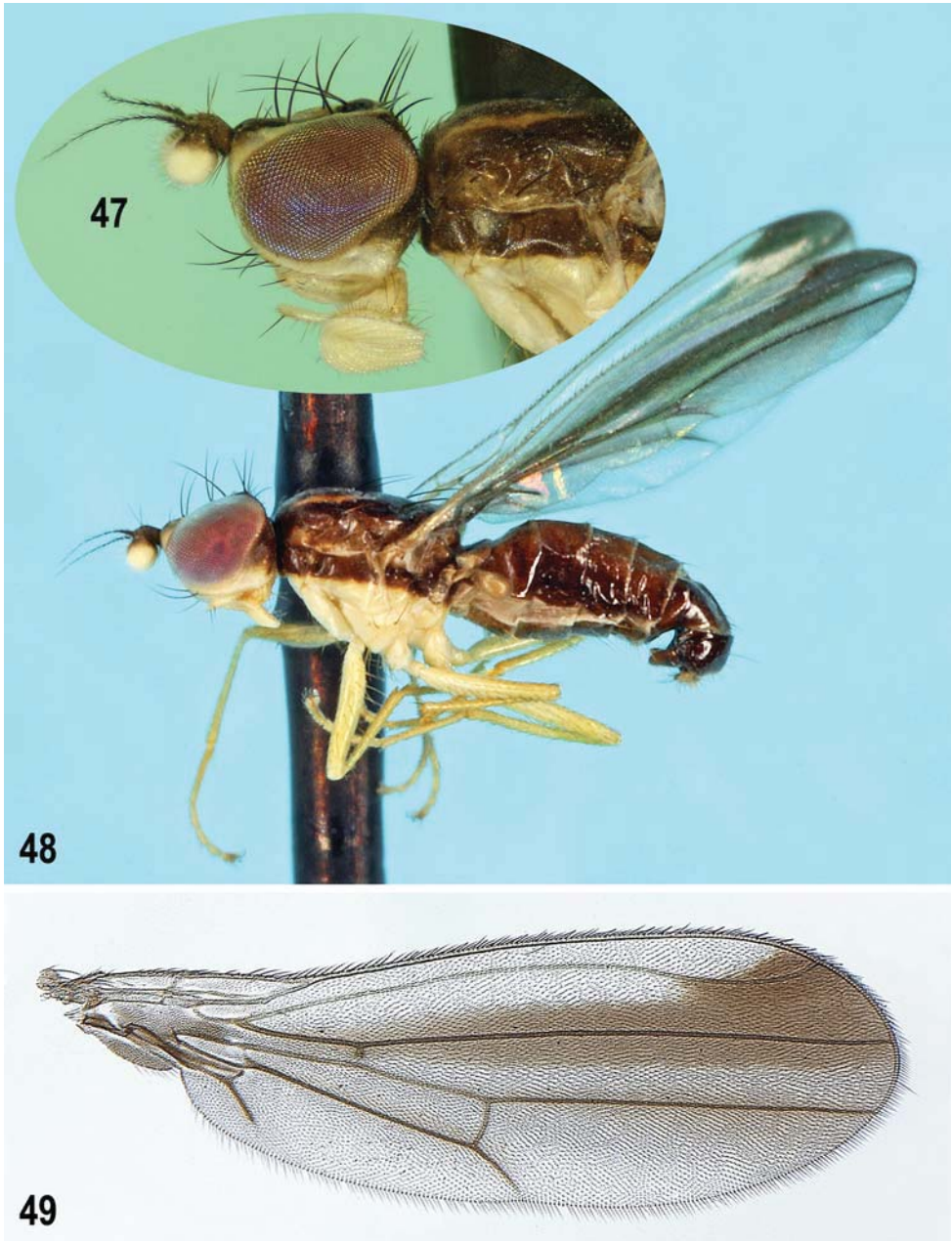
Type material. *Diastata albicosta* Walker: NEOTYPE: ♂ (designated herewith) labelled: “ONT: Burlington, Royal Botanical Gdn, 15.vii.2002, KNBarber, sweeps, trailside vegetation in mixed hardwood 48°17.8'N 79°52.6'W”, “NEOTYPUS ♂, *Diastata albicosta* Walker, J. Roháček & K. N. Barber des. 2013” (red) and “*Ischnomyia albicosta* (Walker) ♂, J. Roháček & K. N. Barber det. 2013” (BMNH, in perfect condition, intact, see Fig. 48).

Ischnomyia vittula Loew: LECTOTYPE: ♂ (designated herewith) labelled: “Penn.”, “Loew Coll”, “Type 13426” (red), “LECTOTYPUS ♂, *Ischnomyia vittula* Loew, J. Roháček & K. N. Barber des. 2013” (red) and “*Ischnomyia albicosta* (Walker) ♂, J. Roháček & K. N. Barber det. 2013”. PARALECTOTYPE: ♀ labelled: “Loew Coll”, “vittata m.” (Loew’s handwriting), “Type 13426” (red), “PARALECTOTYPUS ♀, *Ischnomyia vittula* Loew, J. Roháček & K. N. Barber des. 2013” (red) and “*Ischnomyia albicosta* (Walker) ♀, J. Roháček & K. N. Barber det. 2013”. Both specimens are in rather good condition, in the lectotype the left wing is lost, in the paralectotype both antennae are missing (MCZC, intact).

Other material examined. CANADA: ONTARIO: Burlington, Royal Botanical Gardens, 43°17.8'N 79°52.6'W, sweeps, trailside vegetation in mixed hardwood, 14.vii.2002, 3 ♂♂ 2 ♀♀ (DEBU 2 ♂♂ 1 ♀, 1 ♀ genit. prep., SMOG 1 ♂ 1 ♀, both genit. prep.), 15.vii.2002, 2 ♂♂ 1 ♀ (CNCI, ♀ genit. prep.), 16.vii.2002, 1 ♂ 4 ♀♀ (CASC 1 ♂ 1 ♀, CNCI 3 ♀♀), 18.vii.2002, 2 ♂♂ 2 ♀♀ (CNCI, 1 ♂ wing illustration); same locality but 43°17.79'N 79°52.61'W, trailside sweeps, mostly *Carex*, *Frageria*, *Solidago*, 27.vii.2003, 6 ♂♂ 3 ♀♀ (AMNH 2 ♂♂ 1 ♀, DEBU 2 ♂♂, SMOG 2 ♂♂ 2 ♀♀), all K. N. Barber leg.; Russell Co., Cumberland, [-].vii.1975, 1 ♀, L. Ling leg.; Guelph, new orchard, 25.vii.1981, 1 ♂, Mark Eymann leg.; Guelph, 23.vii.1982, 1 ♀, K. Barber leg. (all DEBU); Ottawa, MacKay Lake Outlet, 6.viii.2006, 1 ♂, J. R. Vockeroth leg. (CNCI, Diptera #58950); Point Pelee, 17.vii.1978, 1 ♀? (DEBU 00006171, legs and abdomen missing), 1 ♂ 1 ♀ (♀ with DEBU 00006172), W. A. Attwater leg., 18.vii.1978, 1 ♂ (DEBU 00006170), 20.vii.1978, 1 ♀, D. Morris leg. (DEBU 00006173). QUEBEC: Terrasse-Vaudreuil Molson Nature Reserve, 45°23.57'N 73°58.81'W, sweep path in forest, 1.vii.1999, 1 ♀, T. A. Wheeler leg. (LEMQ). UNITED STATES OF AMERICA: DISTRICT OF COLUMBIA: Washington, [-].viii.[18]97, 1 ♀, F. C. Pratt leg. (USNM); Washington, Deanwood, nr. brook, 9.vi.1991, 1 ♀, M. Barták leg. (MBPC). GEORGIA: Rabun Co., Pine Mountain, 1400', 14.v.1957, 1 ♀, W. R. M. Mason leg.; Rabun Co., Warwoman Creek, 1500', 26.vii.1957, 1 ♂ (genit. prep., only right wing remaining on pin), J. G. Chillcott leg. (both CNCI). ILLINOIS: Union Co., Shawnee National Forest, Pine Hills Campground, #83039-042, 9.vi.1983, 1 ♂ 1 ♀, I. S. Askevold leg. (DEBU). INDIANA: Jefferson Co., Henslers Woods nr. Hanover, 16.vi.1921, 1 ♂ 1 ♀, C. P. Alexander leg.; Lafayette, 11.vi.1916, 1 ♂ (missing head and 1 wing), 7.vii.1916, 1 ♀, 13.vii.1916, 1 ♂ (headless), J. M. Aldrich leg., 4.viii.1914, 1 ♂, A. L. Melander leg.; Turkey Run, 27.vi.1933, 1 ♂ (headless), A. L. Melander leg. (all USNM). MARYLAND: Cabin John, 20.vi.1931, 1 ♂, A. L. Melander leg.; Cabin John Br., 21.vi.[-], 1 ♂, J. M. Aldrich leg.; Montgomery Co., Carderock Park, 13.vi.1970, 1 ♂, L. V. Knutson leg.; Glen Echo, 18.vi.1922, 1 ♂, J. R. Malloch leg. (BYUC); Glen Echo, 8.viii.1921, 1 ♀, 21.viii.1921, 2 ♀♀, 11.vi.1922, 1 ♂ 1 ♀, 18.vi.1922, 1 ♀, 1.vii.1923, 1 ♀, J. R. Malloch leg., 22.viii.1922, 1 ♂, W. L. McAtee leg.; Plummers Island, 27.viii.1913, 1 ♀, H. S. Barber leg., 17.viii.1906, 1 ♀, Barber & Schwarz leg., 17.vi.1913, 2 ♂♂ (1 ♂ with only abdomen and 2 wings remaining), J. D. Hood leg., 21.vii.1907, 1 ♂, 7.vi.1914, 2 ♀♀, 4.vii.1914, 1

♂, 26.vii.1914, 1 ♂, W. L. McAtee leg., 19.vi.1913, 1 ♀, R. C. Shannon leg.; Plummers Island, at light, 13.vi.1914, 1 ♀, 3.viii.1915, 1 ♂ 2 ♀♀, R. C. Shannon leg., 8.vi.1914, 1 ♂, Schwarz & Shannon leg.; Sligo, 27.vi.1928, 1 ♂, J. M. Aldrich leg. (all USNM). MASSACHUSETTS: Catocin, Mt. Park, Owen's Creek, 15.vi.1991, 1 ♀ (genit. prep.); Catocin, Mt. Park (Lantz), 15.vi.1991, edge of wood, 1 ♂, meadow nr. pond, 1 ♂ (genit. prep.), all M. Barták leg. (all MBPC); Franklin Co., ~0.5 km E Farley, 42°36.16'N 72°25.94'W, sweeps, asters, ferns, *Impatiens*, *Rubus*, under canopy, 26.vii.2006, 4 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI 2 ♂♂ 1 ♀, LACM 2 ♂♂ 2 ♀♀); Middlesex Co., Lincoln, Malaise trap, 7.vii.1982, 1 ♀, E. T. Armstrong leg. (USNM). MICHIGAN: Ingham Co., East Lansing, 9.vii.1971, 1 ♂, D. D. Wilder leg.; Newaygo Co., 27.vi.1953, 1 ♀, R. R. Dreisbach leg. (both USNM). MINNESOTA: Olmsted Co., [no date], 1 ♀, C. N. Ainslie leg. (CNCI, headless). NEW YORK: [no further data], 1 ♂, A. H. Sturtevant leg. (USNM); Ithaca, Six Mile, 24.vii.1958, 2 ♂♂, D. F. Beneway leg. (SEMC, 1 headless); Poughkeepsie, 7.vii.1936, 1 ♂ 1 ♀, H. K. Townes leg. (USNM, triple mount (single pin) with 1 ♀ *Arganthomyza vittipennis*). NORTH CAROLINA: Transylvania Co., Cove Creek Campground, Davidson River, 35.2814°N 82.8142°W, 780 m, sweep path by river, 17.vi.2008, 1 ♀, J. Mlynarek leg. (LEMQ); Mitchell Co., Penland, 3000', 19.vi.1957, 1 ♂ 2 ♀♀, G. Steyskal leg. (USNM); Wayah Bald, 10.viii.1957, 1 ♀, L. A. Kelton leg. (CNCI, headless). OHIO: 3.0 mi N Kent, Herrick Fen, 16.vi.1986, 1 ♂, B. A. Foote leg. (CNCI). PENNSYLVANIA: Bradford Co., Wilawana, 21.vii.1991, 1 ♀, R. H. Crandall leg. (LACM ENT329118); Natrona, [date illegible], 1 ♂, [no collector] (USNM). TENNESSEE: Blount Co., GSMNP [Great Smoky Mountains National Park], Cades Cove, Forge Creek Rd., 35°35'03"N 83°50'17"W, ex. forest, 14.vi.2008, 1 ♂, B. J. Sinclair leg. (CNCI); Cades Cove, GSMNP, sweeps, 5.vi.1979, 6 ♂♂ 3 ♀♀, M. J. Sharkey leg. (DEBU, 2 ♂♂ 1 ♀ genit. prep., all in generally poor condition); Sevier Co., Great Smoky Mtns. Nat. Pk., Elkmont Campground, ex. yellow pan traps, 14–16.vi.1990, 1 ♀, B. J. Sinclair leg.; Great Smoky Mt. National Park, Greenbrier Cove, 2000', 18.vi.1957, 1 ♀, J. R. Vockeroth leg. (both CNCI). VIRGINIA: Bon Air, 16.viii.1936, 1 ♀, [no collector]; Chain Bridge, 20.viii.1922, 1 ♀, J. R. Malloch leg.; Alexandria Co., Maywood, 4.vi.1922, 1 ♀, J. R. Malloch leg. (all USNM); Washington Co., Mt. Rogers N. R. A. [National Recreation Area], Beartree, 36.65626°N 81.68957°W, sweep forest at reservoir, 16.viii.2007, 1 ♂, J. Mlynarek leg. (LEMQ 0040775); Veitch, 9.vi.1912, 1 ♀, J. R. Malloch leg. (USNM). WEST VIRGINIA: Lost River State Park, 2.vii.1941, 1 ♀, A. Stone leg. (USNM). WISCONSIN: Polk Co., [-].vii.[-], 1 ♂, Baker leg. (LACM ENT329104).

Redescription. Male. Total body length 2.18–2.80 mm; largely dark brown with yellow to white pattern (Fig. 48), sparsely grey microtomentose and relatively shining. Head distinctly longer than high and angular in profile (Fig. 47), with frons somewhat projecting anteriorly, dark brown and yellowish white. Occiput dorsomedially concave, largely dark brown, but with a pair of medial yellow stripes originating above the foramen and running vertically to connect with the pale orbits; also ventrolateral corners of occiput (and postgena) yellow. Most of occiput sparsely light grey microtomentose and subshining but medial yellow stripes silvery white microtomentose (particularly dense above foramen) and connected with silvery stripes on head vertex and orbits. Frons with broad medial area (band) dark brown to blackish, microtomentose and dull, only frontal and ocellar triangle less dark grey microtomentose and slightly shining. Orbits broadly white to whitish yellow and silvery white microtomentose, most densely so anteriorly at frontal margin and posteriorly between posterior ors and vti; this silvery microtomentose stripe reaching posteroventrally far onto occiput (see above). Frontal triangle small, short and narrow, slightly broader than ocellar triangle and reaching to half (or less) of frons. Ocellar triangle darker, almost black, somewhat elevated and ocelli relatively large. Frontal lunule blackish brown (in contrast to *I. barbarista*), relatively long but transverse. Face very narrow, weakly sclerotized medially and concave, largely brownish grey but dorsally and ventrally often paler to dirty yellowish white, all microtomentose and dull, laterally distinctly dark brown-margined. Parafacialia and gena whitish yellow and silvery white microtomentose; the dark brown and wider marginal stripe bordering parafaci-

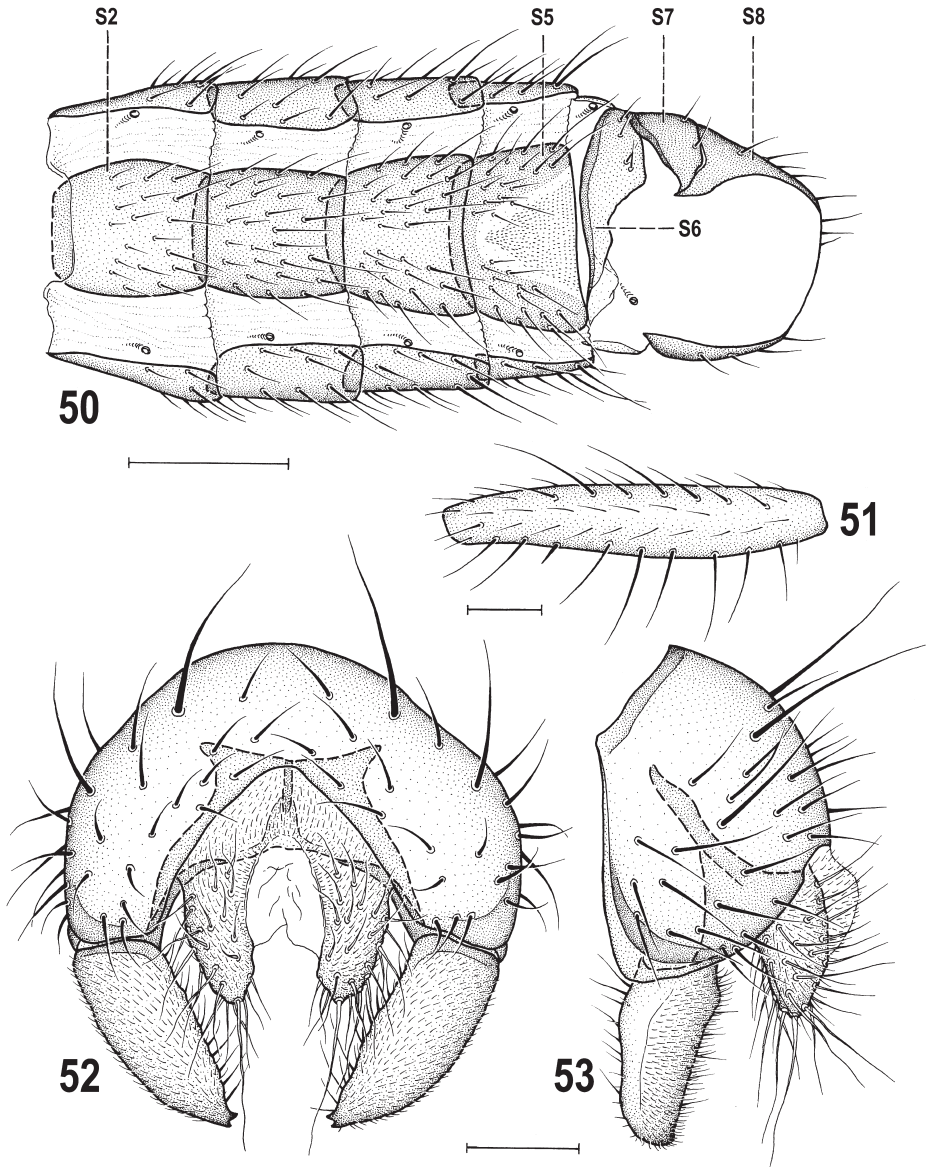


Figs 47–49. *Ischnomyia albicosta* (Walker, 1849), male. 47 – head and anterior part of thorax, laterally; 48 – neotype laterally; 49 – wing, length 2.6 mm. Figs 47 and 49 based on specimens from Canada: Ontario. Photo by M. Deml (Fig. 47), J. Roháček (Fig. 48) and K. N. Barber (Fig. 49).

alia continued on ventral margin of gena but gradually faded and narrowed, posteriorly pale ochreous. Postgena and ventrolateral corner of occiput whitish yellow and sparsely whitish microtomentose. Mouthparts whitish yellow including palpus and clypeus. Cephalic chaetotaxy: pvt fine but comparatively long and strongly crossed; oc longest of cephalic setae but vti and posterior ors also very long; oc slightly divergent; vte slightly to hardly shorter than vti; 3 ors, posterior and middle both long with the middle slightly shorter than posterior, and the anterior ors reduced to a setula; 1 microsetula (about as long as medial microsetulae) in front of anterior ors; usually only 1 pair of minute medial microsetulae in front of anterior corner of frontal triangle; 1–2 setulae behind vte reduced; postocular setulae sparse (only 6–7), in single row; lateroventral corner of occiput and postgena with a few scattered setulae and 2 (1 longer) posteroventral fine setae; 1 long vi (about as long as but weaker than middle ors); subvibrissa well developed, up to three-fourths of vi; 5–6 very fine peristomal setulae. Palpus slender, whitish yellow, with 1 fine dark ventral preapical seta (shorter than subvibrissa) and more (up to 12) paler ventral and ventrolateral setulae. Eye large, elongately subovoid, with longest diameter longitudinally oblique and about 1.4 times as long as shortest. Smallest genal height about 0.11 times as long as shortest eye diameter. Antenna geniculate; scape and pedicel brown, the latter paler brown on inner side; 1st flagellomere (Fig. 47) flattened, bicolourous, largely whitish but dark brown in narrower dorsal half; its anterior margin with very long white pilosity (longer than cilia on arista). Arista dark brown, with thickened basal segment, about 1.7–1.8 times as long as antenna, with relatively dense and long brown cilia, being most dense but shorter in front of basal segment.

Thorax slightly narrower than head, bicolourous, dark brown dorsally, yellowish white ventrally (Fig. 48), with greyish microtomentum, duller dorsally, more shining laterally. Mesonotum brown to dark brown, with 3 narrow, yellow to orange ochreous vittae, 2 on dc lines (reaching slightly beyond anterior dc seta) and 1 similar but usually shorter and narrower medial stripe; humeral callus and notopleural area also paler, orange ochreous. Pleural part of thorax with longitudinal dark brown band across the whole thorax and as wide as half of mesopleuron (Fig. 48). Ventral (larger) area of pleural part yellowish white. Mesonotum with reduced number of microsetae; all macrosetae long. Thoracic chaetotaxy: 1 hu (slightly shorter than anterior npl); 2 npl (posterior distinctly shorter and weaker); 1 long prs (as long as anterior npl); 1 long sa (as long as prs); 1 pa (shorter than sa); 2 very long postsutural dc (posterior longest of thoracic setae, anterior shorter but also very long, longer than prs) and 5–6 dc microsetae in front of them; ac microsetae sparse and small, in 2 medial rows only (at most with single lateral ac microseta in front of suture) and reaching to level of anterior dc; 2 sc, laterobasal small and weak (shorter than posterior sa), apical very long, almost as long as posterior dc (apical sc pair with apices usually meeting or crossed); 1 ppl, reduced to microseta; 2 relatively long but thin stpl, anterior somewhat shorter and weaker, and 3–4 upcurved dark setulae below, 1 between and 1 in front of stpl; ventral part of sternopleuron with 4 longer pale setae. Scutellum rounded triangular, slightly convex dorsally.

Legs whitish yellow, only distal half of apical tarsal segments darker yellow to ochreous (Fig. 48). f_1 with ctenidial spine reduced (Fig. 51), much shorter than maximum width of t_1 , and with a row of very long posteroventral setae (usually longer than those in posterodorsal row). f_3 with a row of sparse (12–14) posteroventral setae along entire length, 6–7 of which

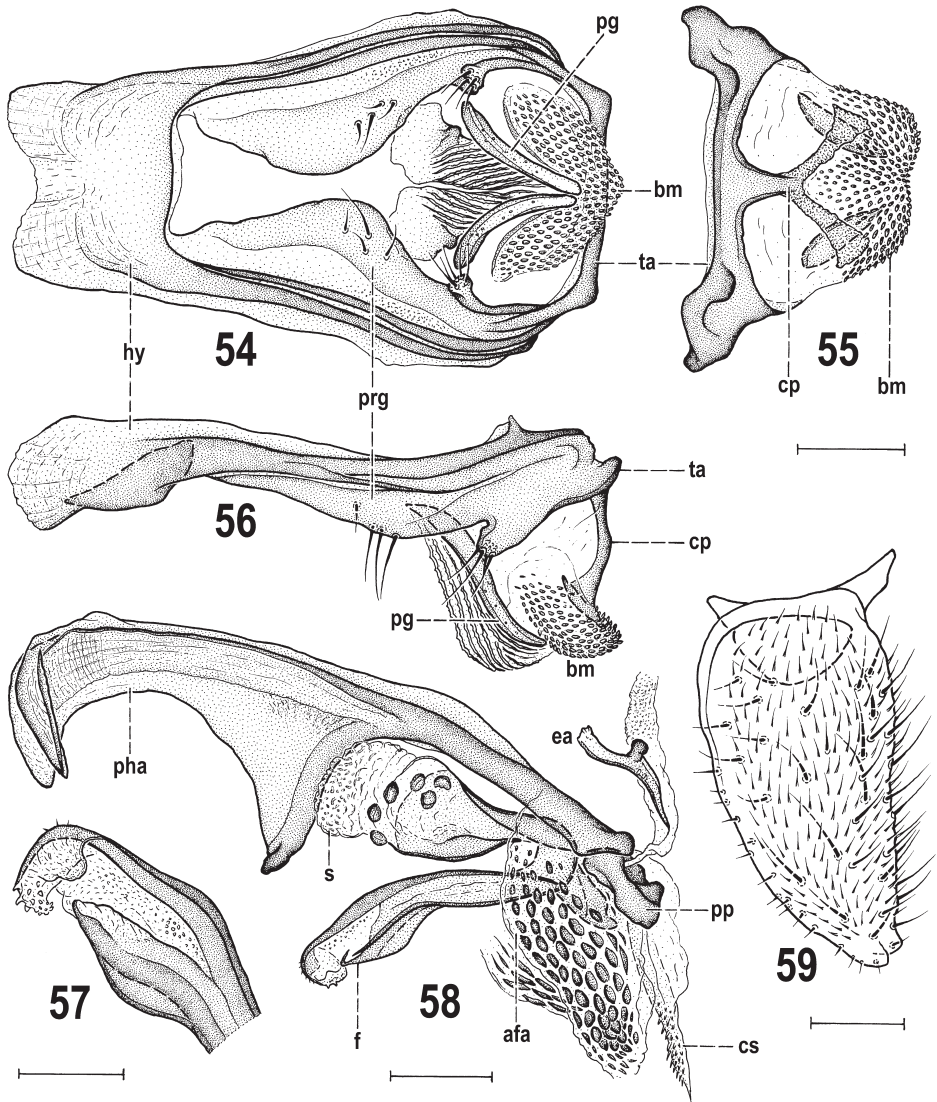


Figs 50–53. *Ischnomyia albicosta* (Walker, 1849), male (Canada: Ontario). 50 – abdomen, ventrally; 51 – f₁, posteriorly; 52 – external genitalia, caudally; 53 – the same, laterally. Scales = 0.3 mm (Fig. 50) and 0.1 mm (others). For abbreviations see p. 11.

in distal third are shortened and thickened; t_2 with relatively short ventroapical seta; mid basitarsus uniformly setulose; fore and hind basitarsus with slightly prolonged proximoventral hair-like setula (thus without thickened setae). f_2 , t_1 and t_3 simply setulose. Wing (Fig. 49) relatively narrow and long, widest in distal fourth, with pale ochreous to brown veins and distinctively patterned membrane. Wing pattern strikingly similar to those of *Arganthomyza vittipennis* and *Epischnomyia* species in having whitish hyaline band along C and R_{2+3} , dark brown, distally dilated middle band along R_{4+5} , and paler brown area at posterior margin of wing, but differs by having distinct additional longitudinal pale stripe between R_{4+5} and M and very narrowly dark-bordered veins M and CuA_1 . C with distinct spinulae between apices of R_1 and R_{2+3} . R_{2+3} long, distinctly sinuate (more than in *Epischnomyia* species), not wholly parallel to C and with apex distinctly upcurved to C; R_{4+5} slightly bent (recurved) and apically very slightly divergent from M. Discal (dm) cell narrow, with r-m situated (usually distinctly) in front of the middle of dm cell. Apical portion of CuA_1 longer than dm-cu, and reaching (with its colourless end) wing margin; A_1 short, ending far from it. Alula small, narrow; anal lobe relatively small. Wing measurements: length 2.34–2.82 mm, width 0.69–0.93 mm, Cs_3 : Cs_4 = 1.52–1.96, $rm/dm-cu$: $dm-cu$ = 2.36–3.67. Haltere with brown to dark brown knob and paler brown stem.

Abdomen dorsally (T1–T5, S8) dark brown, moderately setose, sparsely greyish microtomentose and relatively shining. Preabdominal terga with microtomentum reduced and more lustrous laterally. T1 and T2 distinctly dorsally separate, laterally fused. T3–T5 subequal in length but T5 slightly narrower, all broad and bent onto ventral side of abdomen. Preabdominal sterna (Fig. 50) relatively broad, well sclerotized and brown-pigmented. S1 short, transverse, about twice as wide as long, bare, with darker-pigmented transverse stripe at posterior margin; S2 about as large as S3 but paler, setose in only posterior two-thirds; S3–S5 becoming larger and wider posteriorly; S3 narrowest, longer than broad, S4 as long as broad, widest posteriorly, both more setose than S2; S5 largest and widest, transverse, with distinctive pattern (Fig. 50): brown-pigmented only at anterior and lateral margins, with large subtriangular posteromedial area unpigmented and with distinctive microtomentum. T6 very short, transversely band-like, slightly wider than T5, pale ochreous brown only laterally, otherwise largely faded to unpigmented, bare. S6–S8 dorsally fused together. S6 largely pale brown, with only anterior margin dark brown; S7 darker (almost as is S8), more shining, and also with blackish brown anterior margin; both S6 and S7 asymmetrical; S6 with 3–4, S7 with 2 setae; S8 long (markedly longer than epandrium) and distinctly tapered posteriorly, dark brown as epandrium and with a number of setae in posterior two-thirds.

Genitalia. Epandrium (Figs 52, 53) blackish brown, moderately long but relatively broad and long setose, with 2 pairs of thicker and long setae (1 dorsomedial longest); anal fissure very broadly subtriangular (though less than in *I. barbarista*). Cercus large and robust, pale brown-pigmented, densely and long setose, with apical seta very long. Medandrium (Fig. 52) rather low but broad, dorsally tapered, with dorsolateral corners angular and more projecting than those of *I. barbarista*. Gonostylus (Figs 52, 53, 59) lighter brown than epandrium, narrow in lateral view (see Fig. 53), slightly bent medially, elongate oval, apically narrowed in outline (in widest extension view – Fig. 59) and terminating in 2 blunt teeth (very similar to that of *I. barbarista* but slightly broader); outer side largely micropubescent (in *I. barbarista* gonostylus

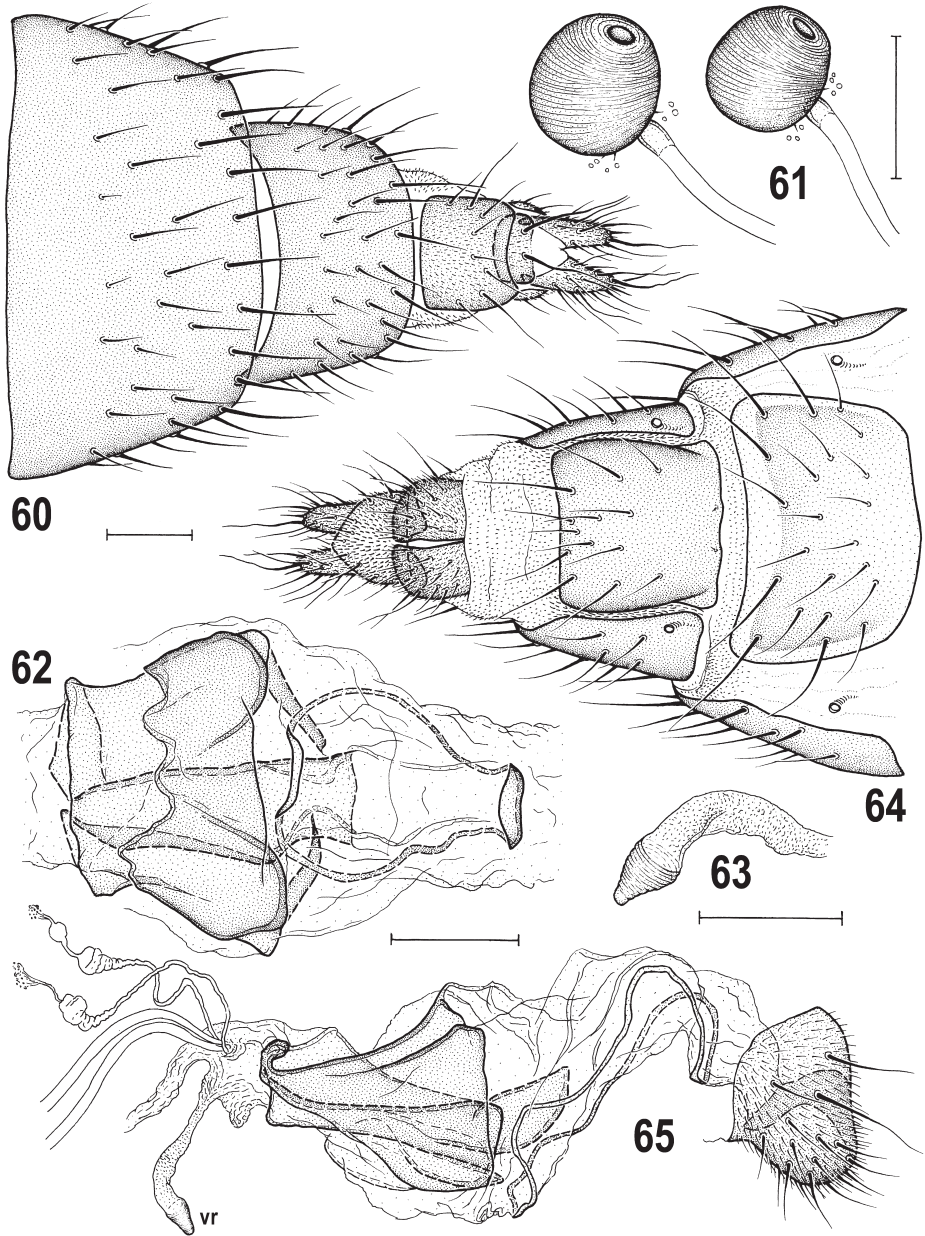


Figs 54–59. *Ischnomyia albicosta* (Walker, 1849), male (Canada: Ontario). 54 – hypandrial complex, ventrally; 55 – transandrium, caudally; 56 – hypandrial complex, laterally; 57 – apex of filum, subventrally; 58 – aedeagal complex, laterally; 59 – gonostylus, lateroventrocaudally (widest extension). Scales = 0.05 mm (Figs 57, 59) and 0.1 mm (others). For abbreviations see p. 11.

is bare in distal third) while setae are mainly situated on inner side and at posterior margin. Hypandrium (Figs 54, 56) relatively robust (including anterior part), with reduced anterior internal lobes. Transandrium (Fig. 55) simple, band-like, medially projecting in distinctive caudal process similar to that of *I. barbarista*, i.e. well sclerotized and pigmented, and forming a forked sclerite with strikingly dilated apical (internally) arms. Pregonite (Figs 54, 56) low, fused to hypandrium; anterior part shallowly bulging (in contrast to that of *I. barbarista*) and with 4 setae (1–2 shorter), posterior part with relatively robust blunt process with 4–5 apical setae (1 longer). Postgonite (Figs 54, 56) simple, slender, slightly elongate, S-shaped in lateral view (longer than in *I. barbarista*), with tapered apex and several minute sensillae externally but without distinct setula (also absent in *I. barbarista*). Basal membrane (Figs 54–56) with dark, dense spine-like tubercles below caudal process (also ventromedially in contrast to *I. barbarista*). Aedeagal part of folding apparatus (Fig. 58) with dark-pigmented striae (visible in Figs 54, 56) and relatively robust, dark and dense lenticular to tooth-like excrescences (including those more internal). Connecting sclerite very slender, weakly sclerotized and pale, distally armed with fine spinulae (Fig. 58). Phallapodeme long and robust, with basal part somewhat forked, fulcrum robust and apex very enlarged (more than in *I. barbarista*), laterally widened and bicuspidate (Fig. 58). Aedeagus with short, compact, frame-like phallosphore. Distiphallus (Fig. 58) relatively small (compared to phallapodeme), with short basal sclerites. Saccus proximally narrow and well sclerotized, distally dilated (less than that of *I. barbarista*) and membranous and provided with several larger cup-like tubercles, otherwise unarmed (as in *I. barbarista*). Filum short as in *I. barbarista* but more slender; formed by a pair of broad, closely-attached to partly-fused ribbon-like sclerites, ventral shorter and distally dilated, dorsal one attenuate, distally curved and ending in largely membranous, very finely spinulose and denticulate apex (Fig. 57). Ejacapodeme relatively large and elongate, with dark, clubbed medial projection (Fig. 58).

Female. Similar to male unless mentioned otherwise. Total body length 2.65–3.45 mm. Face sometimes paler-pigmented; palpus often with slightly darkened tip. Orange yellow vittae on mesonotum usually longer including the medial one. f_3 posteroventrally simply setulose. Wing measurements: length 2.85–3.38 mm, width 0.81–1.13 mm, $Cs_3 : Cs_4 = 1.52–1.80$, $rm \setminus dm-cu : dm-cu = 2.68–3.25$. Abdomen with preabdominal terga distinctly shorter and more transverse. T1 and T2 slightly narrower than T3–T5; T1 narrowest, shortest and very shortly setulose. T3 usually shorter than T4 and T5 which are subequal in length, all sparsely setose. Preabdominal sterna somewhat narrower than in male, becoming slightly wider posteriorly, all finely setose. S3 longer than broad; S2, S4 and S5 about as long as broad; S5 largest and as wide as S6 which is markedly shorter and more transverse than S5.

Postabdomen (Figs 60, 64) relatively short and wide (but more elongate than in *I. barbarista*). T6 large, dark brown, broad anteriorly and narrower posteriorly, distinctly longer than in *I. barbarista* and setose in posterior two-thirds. S6 less transverse than that of *I. barbarista*, brown but with pale-pigmented margins (Fig. 64) and sparsely setose. Contrary to the situation in *I. barbarista*, T7 and S7 are not fused but separate (Fig. 64) though only narrowly separated along lateral margins. T7 semicylindrical, reaching far ventrally, markedly narrower and longer than tergosternum T7+S7 of *I. barbarista*, yet darker than T6 and rather densely setose in posterior two-thirds (Fig. 60). S7 flat and dark brown (Fig. 64), relatively large (as



Figs 60–65. *Ischnomyia albicosta* (Walker, 1849), female (Canada: Ontario, Figs 60, 64; USA: Tennessee, Figs 61–63, 65). 60 – postabdomen, dorsally; 61 – spermathecae; 62 – female internal sclerites, ventrally; 63 – ventral receptacle, sublaterally; 64 – postabdomen, ventrally; 65 – female genital chamber and S8, laterally. Scales = 0.05 mm (Figs 61, 63) and 0.1 mm (others). For abbreviation see p. 11.

long as wide), with sparse but long setae, particularly at posterior and lateral margins. T8 small, flat, almost as long as wide, slightly emarginate posteriorly, brown-pigmented, with fine setae at posterior and lateral margins. S8 slightly shorter but wider than T8, medially divided to form 2 finely setose sclerites having posterior bare, recurved and invaginated parts (eversible during oviposition). Genital chamber (uterus) with complex and brown-pigmented internal sclerotization (Figs 62, 65) being anteriorly formed by several fused sclerites (this part somewhat resembling that in *I. barbarista*) and posteriorly by 1 very fine, pale-pigmented, elongate (in ventral view of pyriform outline), strongly bent annular sclerite. [Note: The structure, considered to be a modified annular sclerite in *I. barbarista* (see ROHÁČEK 2009a: Fig. 85) is in fact only the ventral part of the anterior complex of sclerites, while the true annular sclerite is apparently unpigmented and has therefore been overlooked in the latter species]. Ventral receptacle (Fig. 65) hyaline, simple, slender proximally and somewhat dilated distally, not very long, bent ventrally, with distal conical end very finely ringed and with blunt tip (Fig. 63); accessory gland hyaline, poorly visible, on slender but distally dilated (sometimes doubly) and partly ringed duct. Spermathecae (1+1) very similar to those of *I. barbarista*, broadly ovoid, one somewhat larger than other, with finely ringed surface except for basal fifth being provided with a very few (2–4) minute spinulae; each with small terminal invagination, eccentric duct insertion (see Figs 61) and very pale-pigmented and short cervix; duct of spermatheca very long (as in *Anthomyza* species). T10 small, transverse, very sparsely micropubescent and pale brown, with 1 pair of very long medial setae (see Fig. 60). S10 markedly larger than T10, rounded triangular, largely micropubescent (differing in this from partly micropubescent S10 of *I. barbarista*) and long fine setae at posterior margin (Fig. 64). Cercus relatively short, more slender than in *I. barbarista*, with fine setae, apical and dorsopreapical being longest (Figs 60, 64).

Discussion. The species was described by WALKER (1849) with uncertain generic placement (in ?*Diastata*). CZERNY (1902) recognized it as an older synonym of *Ischnomyia vittula* Loew, 1863, the type species of the genus *Ischnomyia*. Because the type specimens of *I. albicosta* are absent in the F. Walker Collection (BMNH) and have not been traced to other collections and museums, they are considered lost. Therefore, a neotype (a male from Canada) is designated here to fix the concept of the species following the redescription by CZERNY (1902). To confirm its synonymy with *I. vittula* Loew, all available syntypes of the latter were examined and the lectotype (male) designated. The incorrect spelling “*vittata*” (first used by OSTEN SACKEN 1878) originates from the name used on Loew’s original label which remains on one of the type specimens despite the name being changed in the publication (LOEW 1863) to “*vittula*”. *Tachydromia vittipennis* Walker, 1857 was incorrectly synonymized by SMITH (1971) under *I. albicosta* but this species is, in fact, an older synonym of *Ischnomyia spinosa* Hendel, 1911 which is here transferred to the genus *Arganthomyza* Roháček, 2009 (see p. 66).

Ischnomyia albicosta strikingly resembles *Arganthomyza vittipennis* in wing pattern (cf. Figs 49, 85). Because of this similarity these two species (the latter as *Ischnomyia spinosa*, junior synonym, see under *Arganthomyza*) have formerly been grouped under the same genus *Ischnomyia*. However, these two species differ significantly in other characters, including shape and structures of the head, pedal chaetotaxy, and, particularly, structures of the male and female terminalia; actually, the nearest relative of *I. albicosta* proved to be the East Palearctic

species *I. barbarista* (Roháček, 2009), which has unpatterned hyaline wings. *Ischnomyia barbarista* was originally placed in *Arganthomyza* as the most aberrant member of this genus, forming a sister group to all other *Arganthomyza* species (see ROHÁČEK & BARBER 2013) and leaving the genus somewhat heterogeneous because its close relationship to *I. albicosta* had not been recognized. Inasmuch as the clade with these two species is well supported by a number of autapomorphies, it is separated as a distinct monophyletic genus using the name *Ischnomyia* (see above under genus).

Ischnomyia albicosta differs from *A. vittipennis* in having an angular head with projecting frons, elongately ovoid eyes, entirely whitish yellow orbits, a very short frontal triangle, a mesonotum with 3 longitudinal orange yellow vittae, a much narrower dorsal dark band on the pleuron (covering only half of mesopleuron), a more strongly sinuate R_{2+3} , an additional longitudinal pale stripe between R_{4+5} and M and very narrowly dark-bordered veins M and CuA_1 , as well as further distinctive features in the male and female genitalia.

From its only congener, *I. barbarista* which has surprisingly similar male genitalia, *I. albicosta* can be easily distinguished by external characters and also by structures of the male and female terminalia (see description and above key).

Biology. We have very limited data on the biology of *I. albicosta*, which is derived almost exclusively from the only two localities where the junior author has ever encountered more than a single specimen of this species. Of note, both sites included collections of *Arganthomyza vittipennis*, although in lower numbers. One locality (Massachusetts: Farley – visited for less than an hour) was a small roadside site just above a river floodplain with scrubby canopy and an undergrowth somewhat reminiscent (though weedier) of several habitats in Ontario: Sault Ste. Marie yielding *A. vittipennis* (*I. albicosta* does not occur that far north). The other site (Ontario: Burlington – Royal Botanical Gardens) was even more limited in that the productive area appeared to be restricted to a clump of vegetation growing in and around a wet depression in an open trail through mixed hardwood. Several visits were made to this site in 2002 and attempts to expand out from this focus were unsuccessful both along the trail and into the neighbouring shrubby and canopied habitat. The primary “hotspot” seemed to reduce to a patch of an unidentified sedge (*Carex* sp.) that yielded good numbers of *Anthomyza variegata* (Loew) and *Anthomyza dichroa* sp. nov., both of which are often collected from *Carex* spp. elsewhere. This small habitat patch seems to have subsequently degraded, possibly from drought, and after several years a short visit in 2014 yielded only a single specimen of *A. variegata*. FOOTE (2002) reported a single specimen taken from *Carex*. Adults have been collected from 14 May (Georgia: Pine Mountain) to 27 August (Maryland: Plummers Island).

Distribution. This species is very seldom collected so its distribution is likely under-estimated here. It is a decidedly eastern species known from southern Ontario and Quebec in the northeast, southeast to Georgia and North Carolina and northwest to southern Minnesota and northwestern Wisconsin (Canada: Ontario, Quebec; United States of America: District of Columbia, Georgia, Illinois, Indiana, Maryland, Massachusetts, Michigan, Minnesota, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin) (see Table 2, Fig. 597). Previously it was recorded from New Jersey (ALDRICH 1905, MELANDER 1913), Pennsylvania (OSTEN SACKEN 1878, ALDRICH 1905, MELANDER 1913, SABROSKY 1965), and

Wisconsin (MELANDER 1913, SABROSKY 1965), and SABROSKY's (1965) distributional range also explicitly references North Carolina and New York. The previously published record from New Jersey (see above) has not been confirmed by the material examined here but is likely based on a misidentification of *Arganthomyza vittipennis* (previously *Ischnomyia spinosa*) as listed below under that species.

Genus *Arganthomyza* Roháček, 2009

Arganthomyza Roháček, 2009a: 59 [feminine]; ROHÁČEK & BARBER (2013, partim): 7–9, 42–43 (redescription, phylogeny); ROHÁČEK & TÓTHOVÁ (2014): 173–174 (in-group phylogeny of the genus).

Type species. *Geomyza socculata* Zetterstedt, 1847: 2534 (original designation).

Diagnosis. (1) *Head* slightly higher than long, anteriorly rounded (rarely slightly angular). (2) Eye large, suboval to ovoid, with longest diameter slightly oblique subvertically. (3) Frontal triangle subshining to shining, relatively to very long. (4) Frontal lunule small but distinct. (5) Occiput slightly to distinctly concave. (6) Vertex (top of head) usually with silvery microtomentose spots or stripes between frontal triangle and posterior part of orbits. (7) Antenna geniculate, pedicel simple; (8) arista with sparse and relatively short ciliation. (9) Palpus yellow to brown, with 1 subapical seta and a few ventral setulae. Cephalic chaetotaxy: (10) pvt weak, convergent to crossed; (11) vti usually longest, vte, oc and posterior ors also long; (12) 2 long ors, anterior more or less shorter, 1–2 microsetulae in front of anterior ors; (13) a single row of small postocular setulae; (14) 1 long vi; subvibrissa weak, slightly to distinctly longer than peristomals; (15) peristomal setulae small and sparse. (16) Posterior corner of head rounded. (17) Antenna and face similarly coloured in both sexes.

(18) *Thorax* slightly narrower than head. Thoracic chaetotaxy: (19) 1 hu; 2 npl (anterior longer); (20) 1 very long prs (longer than anterior npl); (21) 1 very long sa, 1 long pa; (22) 2 very long (postsutural) dc, posterior dc longest of thoracic setae; (23) ac microsetae in reduced number, at most in 2 short rows, sometimes completely absent; (24) 2 sc, basal short and weak; (25) 1 minute ppl; (26) 2 stpl, posterior usually longer. (27) Legs unicolourous yellow, only apical tarsal segments with distal part contrastingly dark. (28) f_1 with strong posteroventral ctenidial spine. (29) t_2 with relatively short ventroapical seta. (30) Male f_3 with a posteroventral row of setae, having those in distal part shortened and thickened. (31) Wing relatively narrow and not very long; (32) wing membrane unicolourous or with longitudinal brown pattern. (33) C with small spinulae between apices of R_1 and R_{2+3} ; (34) R_{2+3} long, slightly to distinctly sinuate, subparallel with C; (35) R_{4+5} slightly bent (recurved), subparallel with M apically; (36) discal (dm) cell long, widened distally, with r-m situated near its middle or slightly in front of it; (37) distal part of CuA_1 longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. (38) Alula small and narrow.

Male abdomen. (39) T1 and T2 usually only laterally fused (completely fused in *A. setiplanta* group only). (40) T2–T5 large and broad, all uniformly dark-pigmented. (41) S2–S5 narrow, as dark as terga or (secondarily) paler. Male postabdomen: (42) T6 reduced, short transverse, pigmented, submedially attenuated or unpigmented, bare. (43) S6 and S7 strongly asymmetrical, with 1–2 setulae each. (44) S8 less asymmetrical, long, setose in posterior half to two-thirds.

Male genitalia. (45) Epandrium of moderate size, as wide as high, with 1–2 pairs of longer dorsolateral setae in addition to shorter setosity. (46) Medandrium relatively broad, distinctly widened ventrally and narrower dorsally. (47) Cercus relatively large but weakly sclerotized and pale-pigmented, with pale setosity. (48) Gonostylus medium-sized to large, broader proximally and tapered distally, micropubescent on outer side, setose on inner side, with apex simple. (49) Hypandrium relatively robust, symmetrical and well sclerotized, with anterior inner lobes small and incurved, never projecting dorsally; (50) transandrium simple and slender, with more or less distinct caudal process that is flat and sometimes medially desclerotized. (51) Pregonite fused with hypandrial frame, shallow, usually with 2 (anterior and posterior) groups of setae and posteriorly with small to distinct ventrally projecting lobe; (52) postgonite slender, with distal part dilated and bent posteriorly, with 1 anterior setula, usually in proximal half. (53) Phallapodeme of moderate size, shallowly forked basally, bicuspidate apically. Aedeagus with (54) small, short and rather simple phallosophore. (55) Distiphallus composed of distally membranous saccus and elongate sclerotized filum. (56) Saccus with reduced armature, with only small unsclerotized tubercles; (57) filum relatively short and robust, formed by two sclerites that are partly to largely fused and terminating in widened spinulose or denticulate apex. (58) Aedeagal part of folding apparatus finely tuberculate and always striated; connecting sclerite narrow to very slender, finely tuberculate or spinulose. (59) Basal membrane densely (usually pale) spinose. (60) Ejacapodeme relatively large, with slender digitiform projection.

(61) **Female abdomen** with broader, more transverse preabdominal terga and narrower sterna than in male; T1–T5 uniformly dark-pigmented. (62) Postabdomen relatively short, strongly tapered, partly telescopic. (63) T6 large, similar to T5, usually trapezoidal; S6 largest sternum and usually paler than T6. (64) T7+S7 fused, forming complete tergo-sternal subconical ring (only sometimes pale-pigmented ventrally, very rarely with S7 secondarily separated); (65) T8 about as long as broad, flat. (66) S8 rather short, longitudinally divided into 2 sclerites, having posterior bare parts bent dorsally, recurved and strongly invaginated. (67) Female genital chamber with only 1 pair of curved flat internal sclerites and with (68) one elongate (never transverse) annular sclerite lying below them; (69) ventral receptacle long, tubular and hyaline, with apex slender, straight or twisted; (70) accessory gland small, hyaline, at most with some fine grains on surface, and borne on slender, subterminally somewhat widened, duct. (71) Spermathecae (1+1) on short, basally inserted ducts (cervix present but weakly sclerotized to indistinct), pyriform to ovoid, with transversely ringed surface, basally with spine-like or bell-shaped appendages, rarely also with terminal invagination. (72) T10 very small, slightly transverse, dark, shorter than S10, with 1 medial pair of very long setae. (73) S10 simple, pentagonal, longer and slightly wider than T10. (74) Cercus medium-sized, usually pale (in contrast to dark-pigmented T10), with numerous fine setae (apical and dorsoapical longest).

Discussion. This genus was established by ROHÁČEK (2009a) to accommodate four species including the enigmatic East Palearctic *Arganthomyza barbarista* Roháček, 2009. This concept was maintained by ROHÁČEK & BARBER (2013) who expanded its diagnosis with the addition of 5 Nearctic species. However, because *A. barbarista* is transferred here (see p. 43) to the genus *Ischnomyia* Loew, 1863 and, in turn, *Ischnomyia spinosa* Hendel, 1911

proved to belong to *Arganthomyza*, see under *A. vittipennis* (Walker, 1857) below, the genus *Arganthomyza* had to be redefined accordingly above. This new taxonomic concept renders the genus more compact but less distinctly defined by apomorphic characters because the majority of apomorphies previously used to characterize *Arganthomyza* now proved to be synapomorphies demonstrating a sister-group relationship of *Ischnomyia* + *Arganthomyza* (see discussion under *Ischnomyia*).

Arganthomyza can be best characterized as follows: (1) head slightly higher than long and anteriorly rounded; (2) eye with longest diameter (subvertically) oblique; (3) frontal triangle relatively to very long; (6) vertex with silvery microtomentose spots or short stripes between frontal triangle and posterior part of orbits; (8) arista with sparse and relatively short ciliation; (20) 1 very long prs (longer than anterior npl); (21) 1 very long sa; (23) ac microsetae in reduced number, at most in 2 short rows, sometimes absent; (28) f_1 with strong posteroventral ctenidial spine; (47) male cercus relatively large but weakly sclerotized and pale-pigmented; (48) gonostylus broader proximally and tapered distally, with apex simple; (52) postgonite slender but with distal part dilated and bent posteriorly, with 1 anterior setula; (56) saccus with reduced armature, with only small non-sclerotized tubercles; (57) filum relatively short and robust, formed by two, partly to largely fused sclerites terminating in widened spinulose or denticulate apex; (58) aedeagal part of folding apparatus finely tuberculate; (64) T7 and S7 forming complete tergosternal ring (but can be pale-pigmented ventrally and very rarely with S7 secondarily separated); (67) female genital chamber with only 1 pair of curved flat internal sclerites and with (68) one elongate (never transverse) annular sclerite lying below them; (71) spermathecae on short ducts, pyriform to ovoid, basally with spine-like or bell-shaped appendages; (72) female T10 very small, transverse, dark, much shorter than S10; (74) female cercus usually pale-pigmented.

Most of the characters in which *Arganthomyza* differs from *Ischnomyia* are apparently plesiomorphic or of unclear polarity (viz. 1, 2, 8, 20, 21, 28, 48, 58, 67, 68), and, consequently, only the following apomorphies seem to support the monophyly of *Arganthomyza*: (3) frontal triangle prolonged to very long, (52) postgonite with distal part dilated and bent posteriorly (but with 1 anterior setula present – this being the plesiomorphic state), (56) saccus with only small non-sclerotized tubercles, (57) filum formed by two partly to largely fused sclerites, (71) spermathecae basally with spine-like or bell-shaped appendages and spermathecal ducts short. However, it should be noted that the shortened spermathecal ducts represent a rather weak synapomorphy because it also occurs as a homoplasy in the genera *Fungomyza*, *Receptrixia* and *Reliquantha*, and in a less pronounced form in some other groups (cf. ROHÁČEK 2013c).

The phylogenetic hypothesis of interrelationships of *Arganthomyza* species inferred from the analysis by ROHÁČEK & BARBER (2013), of course excluding *I. barbarista*, seems to be supported by molecular data (ROHÁČEK & TÓTHOVÁ 2014). It is modified only by the addition of *A. vittipennis* which seems to belong to a separate clade forming a sister group to the clade with *A. duplex* group + *A. socculata* group (see discussion under *A. vittipennis*).

Nine species included: *A. setiplanta* (Roháček, 1987) (Oriental), *A. versitheca* Roháček, 2009 (E. Palearctic) and *A. carbo* Roháček & Barber, 2013 (Nearctic) belonging to the *A. setiplanta* group; *A. vittipennis* (Walker, 1857) (Nearctic) forming the *A. vittipennis* group; *A. acuticuspis* Roháček & Barber, 2013, *A. bivittata* Roháček & Barber, 2013 and *A. duplex*

Roháček & Barber, 2013 (all Nearctic) of the *A. duplex* group; *A. disjuncta* Roháček & Barber, 2013 (Nearctic) and *A. socculata* (Zetterstedt, 1847) (Holarctic) forming the *A. socculata* group. Only the Nearctic species are treated below – those fully described or redescribed previously by ROHÁČEK & BARBER (2013) are provided with only abbreviated diagnoses and condensed listings of the material examined; additional, previously unpublished material is presented with complete data. For other species of *Arganthomyza*, see ROHÁČEK (1987, 2009a) and ROHÁČEK & BARBER (2013).

Key to identification of *Arganthomyza* species (world)

- 1 Wing with longitudinal brown pattern (Fig. 85). Silvery microtomentose spots between frontal triangle and posterior part of orbits reduced to fine, often indistinct lines. No ac microsetae on mesonotum. Gonostylus with finger-like attenuated apical part (Figs 91, 97); pregonite projecting ventrally and with single group of several setae (Fig. 92), basal membrane (Figs 92, 94) with large group of dense, pale, digitiform excrescences and connecting sclerite (Fig. 96) dark, well sclerotized. Spermathecae mushroom-shaped (Figs 99, 100); female cerci brownish (Figs 98, 101). *A. vittipennis* (Walker, 1857) (Canada, USA)
- Wing hyaline, unicolourous (Figs 84, 125). Silvery microtomentose spots between frontal triangle and posterior part of orbits distinct. At least some ac microsetae present. Gonostylus never digitiform terminally; pregonite flat, with small posterior process and two groups (anterior and posterior) of fewer setae each (Figs 72, 133), basal membrane with small group of short spine-like tubercles (Figs 73, 132, 172) and connecting sclerite (Figs 75, 135) very thin and membranous. Spermathecae differently shaped; female cerci pale ochreous to yellow. 2
- 2(1) Frontal triangle long, reaching anterior fifth to anterior margin of frons; pvt small, convergent but not crossed. Thorax and abdominal sclerites largely brown to blackish brown. Hind basitarsus with distinct thickened ventrobasal setae. Spermathecae finely densely ringed (Fig. 81). Ventral receptacle broadly duct-like, suddenly attenuated to slender projection at apex (Fig. 77). 3
- Frontal triangle shorter, at most reaching anterior third of frons; pvt small to distinct, always crossed. Thorax and abdominal sclerites of various colours (dark brown to yellow). Hind basitarsus without thickened ventrobasal setae. Spermathecae with robust transverse striae (Figs 140, 143, 176). Ventral receptacle gradually attenuated towards apex (Figs 141, 142, 202). 5
- 3(2) Head in profile anteriorly somewhat angular. Frontal triangle not reaching anterior margin of frons. Thorax dark brown but with humeral and notopleural areas ochreous and scutellum medially pale brown. f_1 with ctenidial spine long and robust, as long as width of f_1 at its insertion (ROHÁČEK & BARBER 2013: Fig. 9). Mid basitarsus proximoventrally with all setulae short. Male unknown. Female S6 broader (ROHÁČEK & BARBER 2013: Fig. 28). Spermathecae regularly ovoid and both of the same size (ROHÁČEK & BARBER 2013: Fig. 29). Annular sclerite in female genital chamber slender (ROHÁČEK & BARBER 2013: Fig. 31). *A. setiplanta* (Roháček, 1987) (Nepal)

- Head in profile anteriorly rounded (Figs 67, 164). Frontal triangle reaching anterior margin of frons. Thorax entirely blackish brown, or only ventral corner of sternopleuron ochreous to yellow. f_1 with ctenidial spine distinctly shorter than width of f_1 at its insertion. Mid basitarsus proximoventrally with 1–2 setulae enlarged and thickened. Female S6 narrower (Fig. 79). Spermathecae narrower, irregular and one often larger than the other (Fig. 81). Annular sclerite in female genital chamber robust (Fig. 82). 4
- 4(3) Face yellow (male) to dark orange (female); female palpus pale yellow. Pleural part of thorax unicolourous dark brown. Abdominal T1 and T2 only laterally fused. Gonostylus (ROHÁČEK & BARBER 2013: Figs 33, 38) as long as epandrium is high, distally narrower; postgonite (ROHÁČEK & BARBER 2013: Fig. 34) not prolonged and less curved; filum shorter and robust (ROHÁČEK & BARBER 2013: Fig. 37). Female T8 subquadrate (ROHÁČEK & BARBER 2013: Fig. 39); spermathecae (ROHÁČEK & BARBER 2013: Figs 41, 42) with small basal spine-like appendages; internal annular sclerite flat and very robust (ROHÁČEK & BARBER 2013: Fig. 46). *A. versitheca* Roháček, 2009 (Korea)
- Face dark, greyish brown in both sexes (Fig. 68); female palpus brown. Sternopleuron with ventral corner ochreous to yellow (Figs 67, 164). T1 and T2 completely fused. Gonostylus shorter than height of epandrium, distally broader (Figs 71, 76); postgonite prolonged and strongly curved, sickle-shaped (Fig. 72); filum longer and more slender (Fig. 75). Female T8 anteriorly rounded (Fig. 78); spermathecae with more robust basal appendages (Fig. 81); annular sclerite less robust (Fig. 82).
..... *A. carbo* Roháček & Barber, 2013 (Canada, USA)
- 5(2) Thorax yellow, except mesonotum (Fig. 109) with a pair of narrow longitudinal brown vittae (rarely missing) and sometimes also dorsal margin of pleuron darkened. Medial rows of ac microsetae long (reaching to posterior dc); scutellum with several microsetulae in addition to 2 sc setae. All preabdominal sclerites yellow to pale yellow (except for lateral darkening of terga caused by internal reddish to brown tissue) and with long and dense setae. Gonostylus (Figs 128, 130) simple, with acute apex, strongly incurved (Fig. 129). Female postabdomen with T6 and S6 yellow (Figs 136–138); tergo sternum T7+S7 also pale, darkened only laterodorsally and on transverse anteroventral submarginal ledge-like band (Figs 136, 137); spermathecae broadly ovoid (Figs 140, 143).
..... *A. bivittata* Roháček & Barber, 2013 (Canada, USA)
- Thorax brown to dark brown, at most with ventral half of pleuron paler. Medial rows of ac microsetae short, reduced, in at most 3 pairs; scutellum bare except for sc setae. At least preabdominal terga (usually also sterna) dark brown to brown, with setae shorter. Male genitalia and female postabdominal structures different. 6
- 6(5) Thoracic pleuron bicolourous (brown dorsally, ochreous to yellow ventrally, see Figs 108, 146). Preabdominal sterna sexually dichroic (brown in male, pale yellow in female). Gonostylus relatively small, bent posteriorly (Figs 151, 156) and medially (Fig. 150). Female T6, S6 and ventral portion of T7+S7 pale-pigmented (Figs 158, 159). Spermathecae (Fig. 157) pyriform, with basal appendages adpressed to surface.
..... *A. duplex* Roháček & Barber, 2013 (Canada, USA)
- Thoracic pleuron unicolourous brown to dark brown. Preabdominal sterna brown or

- pale brown, unicolourous in both sexes (thus dark also in female). Male genitalic and female postabdominal structures different from above. 7
- 7(6) Gonostylus basally wider, strongly tapered distally and with apex acute (Figs 111, 116). Pregonite with posterior pair of setae arising on membrane behind posterior process; postgonite distally prolonged posteriorly and very narrow (Fig. 112). Filum of distiphallus with longitudinal sclerites only partly fused, basally dilated (Fig. 115) and its apex almost without spinulae (Fig. 114). Spermathecae with small spiniform basal appendages (Figs 117, 120). Female genital chamber with a flattened sclerite near base of ventral receptacle in addition to usual annular and paired internal sclerites (Fig. 124); ventral receptacle with apex twisted (Fig. 121).
 *A. acuticuspis* Roháček & Barber, 2013 (USA)
- Gonostylus basally narrower, gently tapered distally and with apex rounded (Figs 170, 175, 189, 194). Pregonite with posterior pair of setae arising on tip of posterior process; postgonite distally dilated (Figs 171, 190). Filum of distiphallus with sclerites fused and basally narrow (Figs 174, 193) and its apex distinctly spinulose (Figs 173, 192). Spermathecae with large bell-shaped appendages (Figs 176, 196, 200). Female genital chamber with only the usual annular and paired internal sclerites (Figs 180, 183, 198); ventral receptacle with apex bent (Figs 179, 202). 8
- 8(7) Gonostylus more slender and longer, with longer apex distinguished also by anterior concavity (Fig. 175). Hyandrium anterior to pregonite hardly excavated and pregonite with posterior process larger (Fig. 171)*. Female S7 separate from T7 (Fig. 178); each spermatheca (Fig. 176) with only 3 bell-shaped appendages (some can be doubled); annular sclerite very elongated, particularly posteriorly (Figs 180, 181).
 *A. disjuncta* Roháček & Barber, 2013 (Canada, USA)
- Gonostylus more robust and shorter, subapically concave only posteriorly (Fig. 194). Hyandrium anterior to pregonite with distinct excavation (Fig. 190) and pregonite with posterior process small, slightly projecting*. Female S7 integrated into tergosternum T7+S7 (Fig. 201); each spermatheca (Figs 196, 200) with 5–6 bell-shaped appendages (some can be doubled in Nearctic specimens); annular sclerite markedly shorter (Figs 197, 198).
 *A. socculata* (Zetterstedt, 1847) (Palaeartic, USA: Alaska)

* Characters given for males are for “typical” specimens of each species; some (intermediate) males are not identifiable (see discussion below).

The *Arganthomyza setiplanta* group

The *A. setiplanta* group is diagnosed by several apomorphies supporting its monophyly, viz. frontal triangle very long; hind basitarsus basally with 1–3 short thickened ventral setae; ventral receptacle abruptly attenuated distally to form a finger-like apical projection. In addition, the reduced submembranous caudal process of the transandrium and the construction of the distal part of the saccus with reduced tubercles are probably (the male of *A. setiplanta* remains unknown) further synapomorphies of this group according to ROHÁČEK & BARBER (2013). The monophyly of this group has also been recently confirmed by ROHÁČEK & TÓTHOVÁ

(2014) by analysis of molecular data. Three species are included: *A. setiplanta*, *A. versitheca* and *A. carbo*, but only the latter occurs in the Nearctic Region.

Arganthomyza carbo Roháček & Barber, 2013

(Figs 66–68, 70–84, 164)

Arganthomyza carbo Roháček & Barber, 2013: 13.

Type material. HOLOTYPE: ♂, “CAN:ON: SSMarie, Base-line Rd., 26.vi.2005, KNBarber, sweeps, *Aster*, *Rubus*, *Equisetum*, *Carex*, ferns, under aspen 46°31.40'N 84°24.40'W” and “HOLOTYPE ♂, *Arganthomyza carbo* sp.n., J. Roháček & K. N. Barber det. 2011” [red label] (DEBU, intact, see Fig. 164). PARATYPES: 121 ♂♂ 126 ♀♀ (AMNH, CASC, CNCI, DEBU, LACM, LEMQ, SEMC, SMOG, USNM) (details in ROHÁČEK & BARBER 2013).

Other material examined (not included in type series). 1 ♀ (used for molecular analysis, details in ROHÁČEK & BARBER 2013).

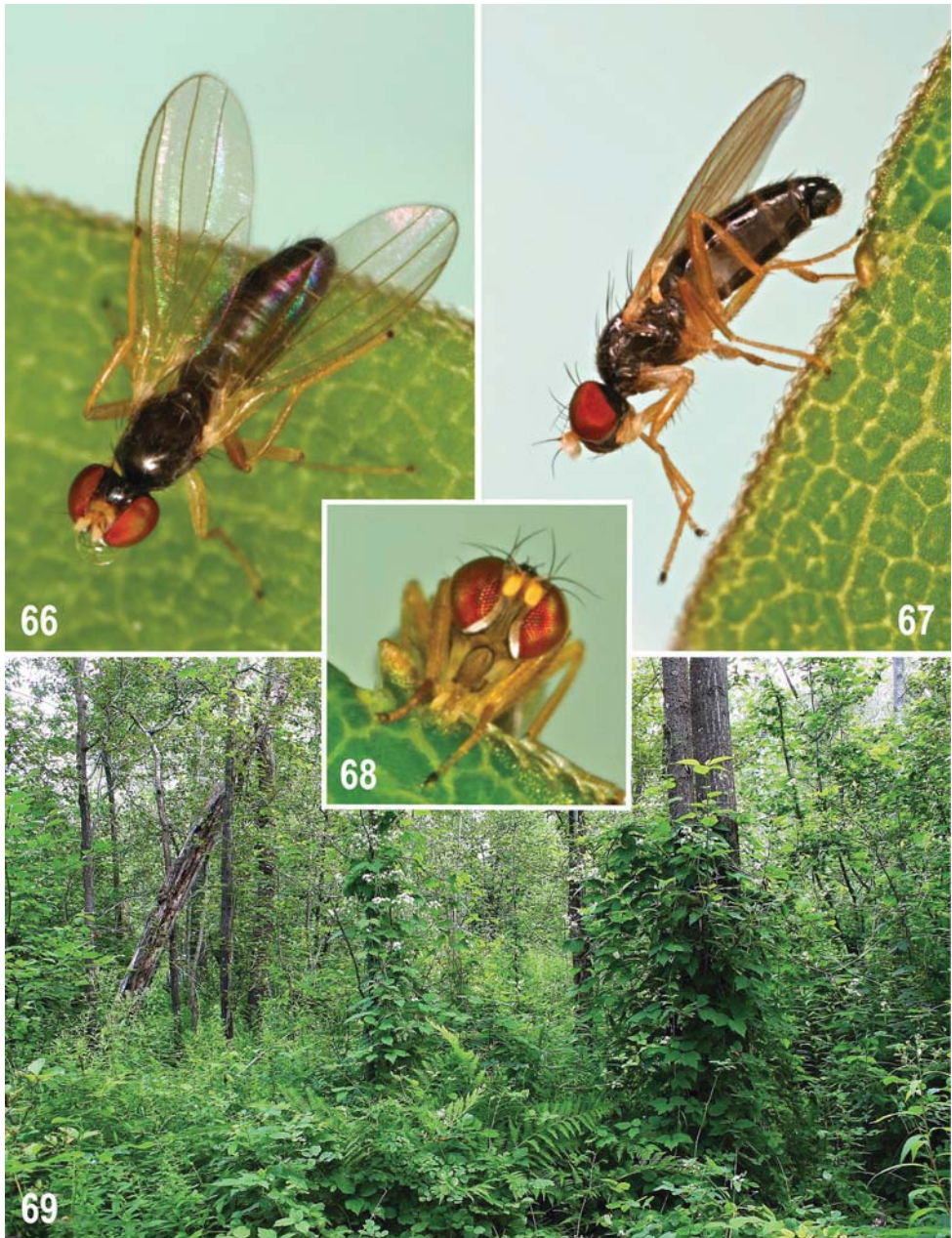
Additional records. CANADA: ONTARIO: Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 10.vii.2014, 1 ♀; Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 1 ♀, 11.vii.2014, 1 ♂, all K. N. Barber leg. (all CNCI); [S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, mostly ferns under aspen, 27.vii.2012, 1 ♂ 1 ♀, sweeps, *Aster*, *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 24.viii.2013, 1 ♂, K. N. Barber leg. (INHS). QUEBEC: Mt. Orford, 1200–2000', 21.vii.1968, 1 ♀, J. R. Vockeroth leg. (CNCI); Ste.-Anne-de-Bellevue, 19.vi.1973, 1 ♀, W. Boyle leg. (LEMQ). UNITED STATES OF AMERICA: NORTH CAROLINA: Spruce Mt., Smoky Park [GSMNP], 10.vi.1970, 1 ♀, FFS & JEW leg. (UGCA).

Diagnosis. Male 2.06–3.14 mm, female 2.32–3.55 mm. Primarily blackish brown to black species (Figs 66–68, 164), very sparsely dark grey microtomentose and distinctly shining; postgena, ventral margin of gena and of occiput entirely blackish; face greyish brown; haltere, parafacialia entirely and anterior portion of frons, ventral corner of sternopleuron and large portions of antennae, mouthparts, gena, legs contrasting ochreous, yellow or whitish yellow; in female, mouthparts with clypeus distinctly darker and palpus brown and first antennal flagellomere dorsobasally darker. Frontal triangle very long, reaching anterior margin of frons. Mid basitarsus with 1–2 short dark setae and hind basitarsus with 2–3 (1–2 longer and thicker) short thickened setae. T1 and T2 completely fused to form syntergum T1+2, with only fusion line indicated. Wing hyaline (Fig. 84).

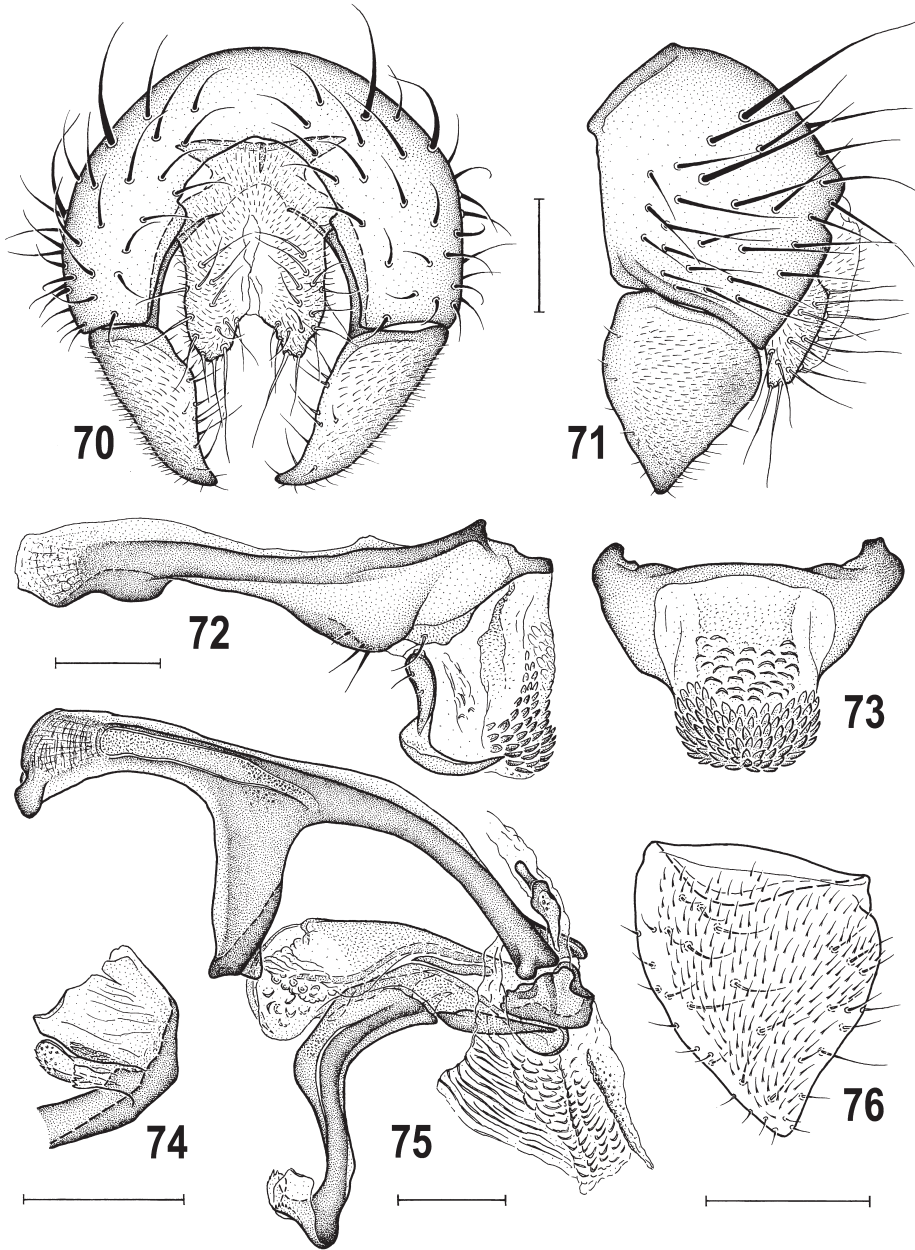
Male genitalia (Figs 70–76). Epandrium (Figs 70, 71) blackish brown, slightly higher than long. Gonostylus (Figs 70, 71, 76) broad and flat, brown, of ham-shaped outline. Postgonite prolonged and strongly curved, sickle-shaped (Fig. 72); caudal process of transandrium reduced (Fig. 73).

Female postabdomen and genitalia (see Figs 77–83 for details). T7 and S7 completely fused into dark brown ring-shaped tergo sternum (Figs 78, 79). Ventral receptacle (Fig. 77) arched, wrinkled with distal fourth or fifth smooth with slender finger-like projection at apex (similar to that in other members of the *A. setiplanta* group). Spermathecae (1+1) irregularly ovoid (slightly bent), both of similar size or one slightly larger (Fig. 81), with finely ringed surface except for plain basal fourth and 7–8 spine-like appendages around duct insertion; cervix pale-pigmented, separate. For detailed description see ROHÁČEK & BARBER (2013).

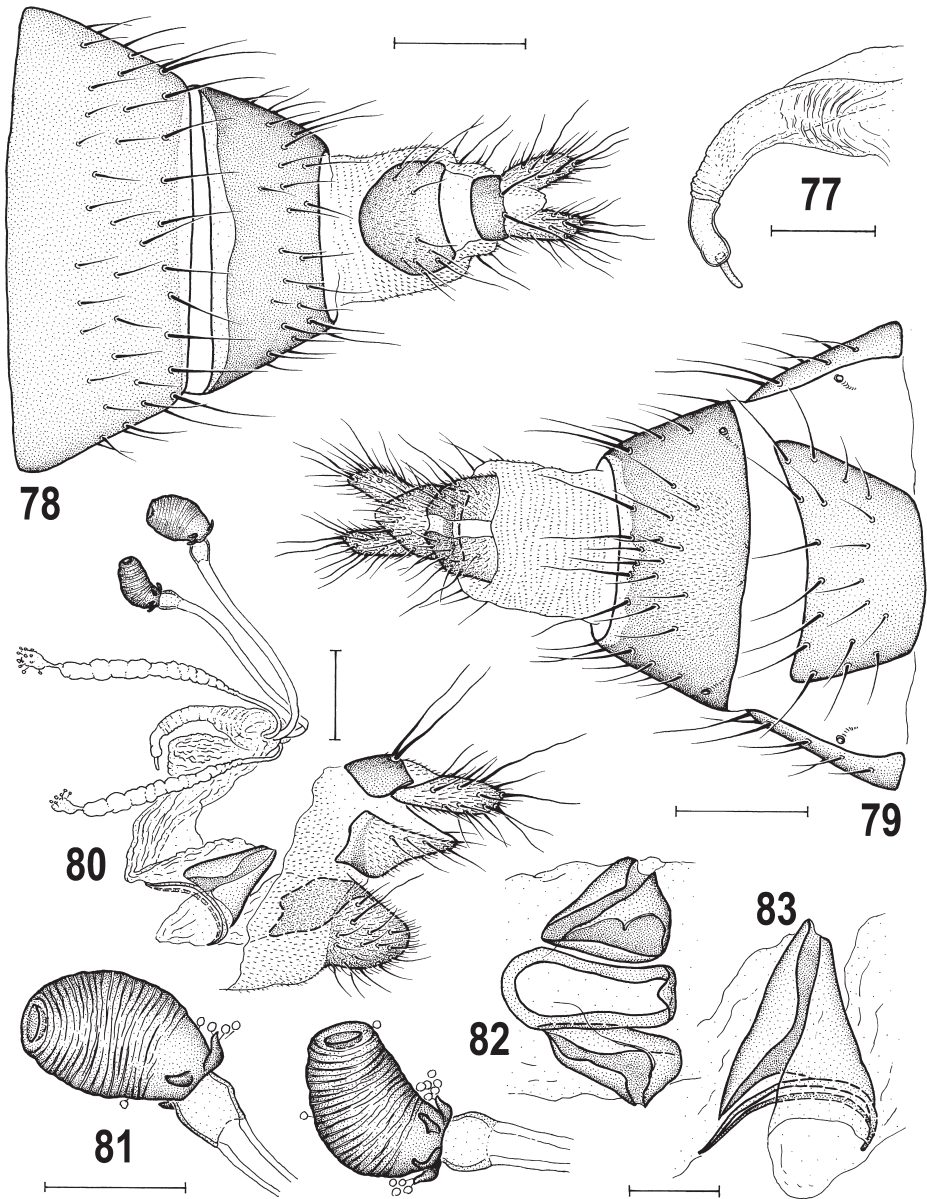
Discussion. *Arganthomyza carbo* is the only Nearctic representative of the *A. setiplanta* group which otherwise includes *A. setiplanta* from Nepal and *A. versitheca* from Korea. Based on genitalic and postabdominal characters, *A. carbo* seems to be most closely allied to the Korean species *A. versitheca* (cf. ROHÁČEK & BARBER 2013). *Arganthomyza carbo* can be



Figs 66–69. Living *Arganthomyza carbo* Roháček & Barber, 2013 and its habitat. 66 – *A. carbo*, male dorsally, body length ca. 2.7 mm; 67 – same specimen, laterally (Canada: Ontario: Sault Ste. Marie); 68 – same, enlarged, frontally; 69 – undergrowth of humid aspen forest at Baseline Rd. in Sault Ste. Marie, habitat of *A. carbo*, *A. vittipennis*, *A. bivittata*, and *A. duplex*. Photo by J. Roháček. Adapted from ROHÁČEK & BARBER (2013: Figs 48–51).



Figs 70–76. *Arganthomyza carbo* Roháček & Barber, 2013, paratype male (Canada: Ontario). 70 – external genitalia, caudally; 71 – the same, laterally; 72 – hypandrial complex, laterally; 73 – transandrium, caudally; 74 – apex of filum of distiphallus, anteroventrally (widest extension); 75 – aedeagal complex, laterally; 76 – gonostylus, ventrolaterally (widest extension). Scales = 0.1 mm. Adapted from ROHÁČEK & BARBER (2013: Figs 53–59).



Figs 77–83. *Arganthomyza carbo* Roháček & Barber, 2013, paratype female (Canada: Ontario). 77 – ventral receptacle, laterally; 78 – postabdomen, dorsally; 79 – the same, ventrally; 80 – apex of postabdomen and female genital chamber, laterally; 81 – spermathecae; 82 – internal sclerites, ventrally; 83 – the same, laterally. Scales = 0.2 mm (Figs 78, 79), 0.1 mm (Fig. 80) and 0.05 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 60–66).

safely distinguished from most other Nearctic congeners (except *A. vittipennis* with patterned wings) by its completely black occiput and postgena, its hind and mid basitarsus with 1–2 short proximoventral dark setae, abdominal T1 and T2 completely fused, and many genitalic characters of which the most salient are mentioned in the key and in the above diagnosis.

Biology. Like all other species of the genus, little is known about the biology of *A. carbo*. Habitats where this species has been collected can be generally described as mesic mixed woodland (often dominated by trembling aspen, *Populus tremuloides* Michx. in Ontario, see Fig. 69) in openings or edges of trails where thick and diverse undergrowth communities thrive. It is our suspicion that ferns are at least indicators of suitable habitat for *A. carbo* and possibly also more generally for *A. vittipennis*, *A. bivittata* and *A. duplex*, which can also co-occur with *A. carbo*, especially the more common *A. vittipennis* and *A. duplex* (see Biology section of latter species and comments about ferns above in discussion of wing pattern and its significance). Collections of adults have been made as early as 1 June (Quebec: Magog) and as late as 18 September (Ontario: Sault Ste. Marie).

Distribution. Generally distributed in northeastern North America (Canada: Newfoundland, Nova Scotia, Ontario, Quebec; United States of America: Maine, Massachusetts, New Hampshire, New York, North Carolina, Tennessee, Virginia, West Virginia) with two specimens from western Canada (Alberta: Edmonton) (ROHÁČEK & BARBER 2013, see Table 2, Figs 599, 604).

The *Arganthomyza vittipennis* group

This group is established here for the single Nearctic species, *A. vittipennis* (Walker, 1857). It can be diagnosed by (1) the reduced silvery spots between the frontal triangle and posterior part of the orbits, (2) the lack of ac microsetae, (3) the brown longitudinal wing pattern, (4) the pregonite projecting ventrally and with a single group of setae, (5) the basal membrane with a group of dense digitiform excrescences, (6) the dark, strongly sclerotized connecting sclerite and (7) the mushroom-shaped spermathecae. Following the phylogenetic hypothesis of ROHÁČEK & TÓTHOVÁ 2014 (as *Ischnomyia spinosa*) and morphological analysis of mainly male genitalic and female postabdominal characters, the group represents a separate clade of *Arganthomyza* (for more detail see discussion below).

Arganthomyza vittipennis (Walker, 1857) comb. nov.

(Figs 85–105)

Tachydromia vittipennis Walker, 1857: 149; SMITH (1971): 367 (as synonym of *Ischnomyia albicosta*).

Ischnomyia spinosa Hendel, 1911: 45 **syn. nov.**; MELANDER (1913): 292 (key); SABROSKY (1965): 819 (catalogue);

ROHÁČEK (1998a): 174 (checklist); MARSHALL (2006): 501; MARSHALL (2012): 495 (photograph, adult); ROHÁČEK & TÓTHOVÁ (2014): 173–174 (relationships, photograph).

Ischnomyia vittata: CURRAN (1934): 330 (misidentification); CURRAN (1965): 330 (the same, wing, head illustration).

Type material. *Tachydromia vittipennis* Walker: LECTOTYPE: ♀ (designated herewith) labelled: “68,4”, “V.S” (? Saunder’s handwriting), “vittipennis Wlk” (Walker’s handwriting, twice-folded label), “Ischnomyia albicosta Walker, det. B. H. Cogan 1967, Type of Tachypeza [sic] vittipennis Walk.”, “LECTOTYPUS ♀ *Tachydromia vittipennis* Walker, J. Roháček & K. N. Barber des. 2013” (red) and “*Arganthomyza vittipennis* (Walker) ♀, J. Roháček & K. N. Barber det. 2013”. The specimen is somewhat mouldy (head in particular), with right wing twisted, torn and damaged, partly covering legs (BMNH, intact, see Fig. 86).

Ischnomyia spinosa Hendel: HOLOTYPE: ♀ labelled: "Battle Creek, Mich.", "COTYPE *Ischnomyia spinosa* Hendel" (red, handwritten except for printed COTYPE), "Ischnomyia spinosa Hend., Typ" (? Hendel's handwriting), "ALMelander Collection 1961" and "HOLOTYPUS ♀ *Ischnomyia spinosa* Hendel, J. Roháček & K. N. Barber des. 2013" (red) and "Arganthomyza vittipennis (Walker) ♀, J. Roháček & K. N. Barber det. 2013". The specimen is in good condition, with only 1st flagellomere of right antenna lost (USNM, intact, see Fig. 87).

Other material examined. CANADA: NOVA SCOTIA: Jordan Falls, 9.viii.1958, 1 ♂; Truro, 14.vii.1983, 1 ♂, both J. R. Vockeroth leg. (both CNCI). ONTARIO: Belfountain, 5.ix.1982, 1 ♀, 11.ix.1982, 1 ♀, K. N. Barber leg. (DEBU); Bothwell, 13.vii.1962, 1 ♀, S. M. Clark leg. (CNCI); Bruce Co., Dunks Bay, 45°14.8'N 81°38.5'W, sweeps, trailside veg. in hardwood forest, 30.vii.1997, 1 ♂; same locality but sweeps, trailside veg. in mixed forest, 45°14.8'N 81°38.5'W, 31.vii.1997, 2 ♀♀, 45°14.8'N 81°33.5'W, 4.vii.1998, 1 ♀, 45°14.8'N 81°38.1'W, 3.vii.1999, 1 ♀; Bruce Peninsula Nat. Pk., Cameron Lake Rd., 45°12.5'N 81°33.5'W, sweeps, grasses in trail, 30.vii.1997, 1 ♀, sweeps, trailside veg./grasses, mixed forest, 4.vii.1998, 1 ♂; same locality but 45°12.7'N 81°33.0'W, sweeps, roadside vegetation, 5.vii.1998, 1 ♂ 1 ♀; Bruce Peninsula Nat. Pk., Emmett Lake, 45°13.5'N 81°28.2'W, sweeps, mostly graminoids, open area under *Acer/Quercus*, 2.vii.1999, 9 ♂♂ 8 ♀♀, all K. N. Barber leg.; Bruce Peninsula Nat. Pk., Emmett Lake Rd., 45°13'N 81°28'W, clearing, hardwoods, 2.vii.1999, 3 ♀♀, S. A. Marshall leg. (all DEBU); Bruce Co., Scone, North Saugeen River, riparian sweep, 17.vii.2004, 1 ♀, M. Buck leg. (DEBU 00298430); Burlington, Royal Botanical Gardens, sweeps, trailside vegetation in mixed hardwood, 43°17.8'N 79°52.6'W, 16.vii.2002, 2 ♂♂ 1 ♀ (DEBU); same locality and data but 43°17.78'N 79°52.61'W, 6.ix.2005, 1 ♀, 10.vi.2007, 1 ♀; same locality but 43°17.79'N 79°52.61'W, trailside sweeps, mostly *Carex*, *Fragaria*, *Solidago*, 27.vii.2003, 1 ♂ 1 ♀ (all CNCI), all K. N. Barber leg.; Calabogie, "shde" sweeps, 27.vi.2001, 1 ♀, P. Dollin leg. (DEBU); Cootes Paradise nr. Dundas, sweeping undergrowth of deciduous forest, 20.viii.1994, 4 ♂♂ 3 ♀♀, J. Roháček leg. (SMOC); Dundas, 25.vi.1980, 1 ♂, D. L. Krailo leg., 7.vii.1983, 1 ♀, K. N. Barber leg. (DEBU); ~4 km E Echo Bay, Hwy #638, 46°29.2'N 84°01.0'W, sweeps, mostly *Aster [Eurybia]* in mixed forest, 24.viii.2002, 7 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Fairbank P. Pk., Wa-shai-ga-mog Trail, 46°28.11'N 81°26.19'W, sweeps, *Clintonia*, ferns, *Maianthemum*, under *Acer/Abies*, 5.ix.2009, 1 ♀, K. N. Barber leg. (DEBU 01502394); 7 mi E Griffith, 11.vii.1990, 2 ♂♂, J. R. Vockeroth leg. (CNCI); University of Guelph, dairy bush, on leaves, 2.viii.1996, 2 ♀♀, S. Marshall leg. (DEBU); Kelly Lake, 21.viii.1923, 1 ♀, Parish leg. (USNM); Manitoulin Is., 0.7 km N, Michael's Bay Pk., 45°36.4'N 82°06.1'W, sweeps, low veg. in mixed wood, 5.vii.1998, 3 ♀♀, 4.vii.1999, 2 ♂♂ 2 ♀♀ (1 ♀ genit. prep.); Manitoulin Is., Carter Bay, 45°36.3'N 82°08.5'W, sweeps, Pearly Everlasting [*Anaphalis margaritacea*], 30.vi.1999, 2 ♂♂, all K. N. Barber leg. (all CNCI); Marmora, 18.viii.1952, 1 ♀, J. F. McAlpine leg.; Merivale, 22.viii.1932, 1 ♀ (genit. prep.), L. J. Milne leg., 20.vi.1957, 1 ♂, J. G. Chillcott leg.; 2 mi N Metcalfe, 22.ix.1982, 1 ♀, B. E. Cooper leg. (all CNCI); Ottawa, 22.vi.1963, 1 ♀, 13.vii.1963, 1 ♀, 6.vii.1963, 1 ♂; Ottawa, Black Rapids, 28.vi.1958, 1 ♀, 28.vi.1959, 1 ♂; Ottawa, Mer Bleue, 25.vi.1964, 1 ♂, all J. R. Vockeroth leg.; 5 mi E Ottawa, Mer Bleue, Malaise trap, 2.ix.1963, 1 ♂, D. D. Munroe (all CNCI); Pinery Prov. Pk., Grand Bend, 6.vii.1983, 1 ♀, K. N. Barber leg. (DEBU); Lambton Co., Port Franks, Watson property near L-lake, 13.vi.1996, 1 ♂ 1 ♀, J. Skevington leg. (DEBU, ♂ missing abdomen); Ridgeway, "9-5".1908, 1 ♀, M. C. Van Duzee leg. (CASC); Rondeau Pk., 29.vi.1962, 1 ♀, S. M. Clark leg. (CNCI); Rondeau Prov. Pk., sweeps, mature forest, 31.viii.1979, 2 ♂♂ 1 ♀, 1.ix.1979, 4 ♂♂ 1 ♀, L. Masner leg., 26.vi.1985, 3 ♀♀, S. A. Marshall leg.; Rondeau Prov. Pk., South Point Trail, 26.vi.1985, 11 ♂♂ 14 ♀♀, K. N. Barber leg. (all DEBU); S[ault] S[ainte] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Calamagrostis canadensis* under *Populus/Betula*, 23.vii.1997, 1 ♂, sweeps, low veg. under *Populus/Betula*, 3.viii.1997, 1 ♀, sweeps, graminoids under *Populus/Betula*, 11.vii.1997, 1 ♀; same locality but 46°29.82'N 84°17.17'W, sweeps, mostly graminoids/*Impatiens* under canopy, 21.viii.2004, 2 ♂♂, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, *Aster [Doellingeria]*, *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 22.vi.2005, 3 ♂♂ 4 ♀♀ (LACM), 25.vi.2005, 2 ♂♂ 1 ♀ (CNCI), 26.vi.2005, 3 ♂♂ 6 ♀♀ (USNM), 8.vii.2005, 1 ♀, 10.vii.2005, 2 ♂♂ 1 ♀, 14.vii.2005, 2 ♂♂ 1 ♀, 16.vii.2005, 10 ♂♂ 7 ♀♀ (1 ♂ wing illustration), 18.vii.2005, 2 ♂♂ 1 ♀, 22.vii.2005, 2 ♂♂ 1 ♀, 27.vii.2005, 2 ♂♂, 29.vii.2005, 3 ♂♂, 6.viii.2005, 1 ♂ 3 ♀♀, 8.viii.2005, 1 ♀, 23.viii.2011, 3 ♂♂ 1 ♀, 28.viii.2011, 1 ♂, 5.ix.2011, 1 ♀ (CNCI), 27.vii.2012, 2 ♂♂ 3 ♀♀ (CASC), 29.vii.2012, 5 ♂♂ 2 ♀♀ (AMNH), 24.viii.2013, 2 ♀♀, 28.vi.2014, 1 ♂, sweeps, *Thalictrum*, *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 16.vii.2005, 1 ♂ 1 ♀, sweeps, *Aster [Doellingeria]*, *Rubus*, graminoids under aspen, 19.vii.2006, 1 ♀, sweeps, mostly ferns under aspen, 27.vii.2012, 1 ♂ 2 ♀♀ (CNCI), 28.vii.2012, 2 ♂♂ 3 ♀♀ (NMPF), 29.vii.2012, 4 ♂♂ 2 ♀♀ (LEMQ), all K. N. Barber leg.; same locality but sweeping, *Aster [Doellingeria]*, *Rubus*, *Equisetum*, *Carex*,

Clematis, ferns under aspen (*Populus*), 7.vii.2010, 4 ♂♂ 3 ♀♀ (1 ♂ 1 ♀ genit. prep.), 12.vii.2010, 5 ♂♂, J. Roháček leg. (SMOC); [Sault] [S[te.] Marie, Birchwood Pk., mixed forest, 28.vi.1986, 2 ♀♀, 1.vii.1986, 3 ♂♂ 5 ♀♀, 5.vii.1986, 3 ♂♂ 3 ♀♀, 6.vii.1986, 4 ♂♂ 3 ♀♀, 26.vii.1986, 1 ♂ 1 ♀, 27.vii.1986, 2 ♂♂ 3 ♀♀, 19.ix.1986, 1 ♂; same locality but 46°30.7'N 84°15.6'W, sweeps, mostly fern, *Aralia*, *Impatiens*, dewberry, grass under *Betula/Acer*, 30.viii.1997, 1 ♂, 1.ix.1997, 1 ♂ 2 ♀♀, sweeps, mostly *Aralia*, fern, *Impatiens*, dewberry, grass, under *Betula/Acer*, 30.viii.1997, 1 ♂ 1 ♀, sweeps, low veg. under *Betula/Acer*, 1.ix.1997, 4 ♂♂ 2 ♀♀, 4.ix.1997, 3 ♂♂, sweeps, trail-side *Impatiens*, fern, raspberry, grass under *Betula/Acer*, 1.ix.1997, 5 ♂♂ 2 ♀♀ (1 ♂ genit. prep.), 4.ix.1997, 2 ♂♂ 1 ♀, sweeps, mostly *Impatiens*, under *Betula/Acer*, 19.vi.1998, 2 ♀♀, 20.vi.1998, 1 ♂, sweeps, including *Impatiens*, under *Betula/Acer*, 19.vi.1998, 1 ♂ 2 ♀♀, 20.vi.1998, 1 ♂ 1 ♀, sweeps, graminoids, *Impatiens* [*Doellingeria*], ferns, under *Betula/Acer*, 15.ix.2004, 1 ♀, sweeps, mostly *Rubus* under *Betula/Acer*, 19.vi.2005, 1 ♂; same locality but 46°30.67'N 84°15.63'W, sweeps, *Impatiens*, *Aster* [*Doellingeria*], under *Betula/Acer*, 11.ix.2011, 1 ♂, sweeps, *Rubus*, *Aralia*, graminoids, ferns, under *Betula/Acer*, 29.vi.2008, 2 ♀♀, all K. N. Barber leg. (all CNCI); [Sault] [S[te.] Marie, Bristol Pl[ace] Pk., 46°30.8'N 84°16.6'W, sweeps, pathside *Impatiens*/sedge under *Betula/Populus*, 16.vii.1998, 1 ♀, sweeps, veg. under *Betula/Populus*, 26.vi.2002, 1 ♀, sweeps, *Rubus*, graminoids, ferns under *Populus*, 23.vii.2005, 3 ♀♀, sweeps, *Phalaris*, *Carex*, *Impatiens* under *Populus*, 12.vii.2006, 1 ♂ 1 ♀; same locality but 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 29.vi.2008, 1 ♂, 4.vii.2008, 1 ♂, 9.vii.2008, 1 ♂, 8.ix.2009, 1 ♀ (all CNCI), 27.vii.2009, 3 ♂♂ 2 ♀♀ (INHS), sweeps, trailside vegetation, 25.ix.2008, 1 ♂ (CNCI), all K. N. Barber leg.; same locality but sweeping *Impatiens* mixed with *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 7.vii.2010, 10 ♂♂ 8 ♀♀, J. Roháček leg. (SMOC, some photographed, 3 ♂♂ 2 ♀♀ used for molecular work); [Sault] [S[ainte] Marie, Centennial Dr[ive] Pk., 46°30.2'N 84°16.0'W, sweeps, low veg. under *Populus/Betula*, 1.ix.1997, 1 ♀; [Sault] [S[te.] Marie, Finn Hill, 46°31.6'N 84°17.4'W, sweeps, graminoids in wet area under *Populus*, 1.vii.2002, 1 ♀, sweeps, *Rubus*, *Ribes*, ferns, under *Populus*, 6.vii.2002, 1 ♂; same locality but 46°31.9'N 84°17.6'W, sweeps, *Aster* [*Eurybia*], *Rubus*, *Ribes*, ferns, graminoids, 7.vii.2002, 3 ♂♂ 3 ♀♀ (incl. pair in copula), 11.vii.2002, 1 ♂, 10.viii.2002, 2 ♂♂ 1 ♀; same locality but sweeps, mostly *Aster* [*Eurybia macrophyllum*], used in lab-rearing [various dates of death in culture], 10–15.viii.2002, 8 ♂♂ 7 ♀♀; Lab-reared, *Aster* [*Eurybia macrophyllum*], from 8 ♂♂ 7 ♀♀ [collection data from above plus additional rearing data], 1 ♂ 2 ♀♀ [each with empty puparium in gelatin capsule], lab-reared, *Carex/Phalaris*, from 8 ♂♂ 7 ♀♀ [collection data from above plus additional rearing data], 1 ♂ [with empty puparium in gelatin capsule], all K. N. Barber leg. (all CNCI); [Sault] [S[te.] Marie, Finn Hill, 46°31.63'N 84°17.43'W, sweeps, *Impatiens*, ferns, *Carex gynandra*, 8.vii.2006, 1 ♀, 15.vii.2006, 1 ♂; same locality but 46°31.64'N 84°17.40'W, sweeps, mostly *Calamagrostis*, *Rubus*, *Aster* [*Eurybia*] under *Populus*, 17.viii.2003, 3 ♂♂; same locality but 46°31.57'N 84°17.41'W, sweeps, mostly *Aster* [*Eurybia*], ferns, graminoids under canopy, 19.ix.2004, 1 ♀, all K. N. Barber leg. (all CNCI); [Sault] [S[te.] Marie, Ft. Creek Conservation] Area, 46°32.5'N 84°20.8'W, sweeps, low veg. in mixed forest, 9.viii.1997, 1 ♂ 2 ♀♀, sweeps, low veg. under mixed canopy, 8.vii.1998, 1 ♀; [Sault] [S[te.] Marie, Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, mostly *Impatiens* under *Acer/Betula*, 18.vi.1998, 1 ♂ 2 ♀♀, sweeps, low veg. under *Acer/Betula*, 18.vi.1998, 1 ♂, all K. N. Barber leg. (all CNCI); Stittsville, 19.viii.1968, 1 ♂ 2 ♀♀, J. R. Vockeroth leg. (CNCI 1 ♂ 1 ♀, SMOC 1 ♀). **QUEBEC:** Bouchette, Lac Roddick, 12.ix.1982, 2 ♂♂, L. Huggert leg. (MZLU); Gatineau Park, 45°34'N 75°57'W, 28.vi.1995, 1 ♂, E. Ikeda leg. (LEMQ); Knowlton Ldg., 18.vii.1968, 1 ♀, J. R. Vockeroth leg. (CNCI); Lac Roddick, 16 km S Maniwaki, 22.vi.1991, 3 ♂♂ 6 ♀♀, M. Barták leg. (MBPC, 1 ♂ 1 ♀ headless, genit. prep.); Masham Twp., 21.vii.1995, 1 ♂, B. Ikeda leg.; Meach [sic Meech] Lake, 30.vi.1950, 1 ♂, G. E. Shewell leg. (both CNCI); Mont-St.-Hilaire Biosphere Reserve, Pain de Sucre Trail, sweep at brook, 27.vi.2001, 1 ♀, M. Pollet leg. (LEMQ 0040537); Old Chelsea, 21.vii.1959, 1 ♀ (SMOC), 5.ix.1963, 1 ♂ (CNCI), J. R. Vockeroth leg.; Old Chelsea, King Mt., 21.v.1963, 1 ♂, J. G. Chillcott leg. (CNCI); Roddick Lake, pan traps, 1–15.viii.1982, 1 ♀, L. Huggert leg. (MZLU); Vaudreuil Co., 1 ♀, [no date, no collector] (BMNH); Wakefield, 26.vi.1946, 2 ♂♂ (1 ♂ genit. prep.), 9.vii.1946, 1 ♂ 1 ♀ (♀ missing abdomen, 1 wing, hind legs), G. E. Shewell leg. (CNCI); ZEC [Zone d'Exploitation Contrôlée] de Rapides-des-Joachims, 46°15.41'N 77°42.38'W, sweeps, riparian ferns, graminoids, 30.vii.2006, 1 ♀, K. N. Barber leg. (CNCI). **UNITED STATES OF AMERICA:** **INDIANA:** Lafayette, 17.vi.1922, 1 ♂, E. W. Stafford leg. (MEMU); Turkey Run, 27.vi.1933, 1 ♀, A. L. Melander leg. (USNM). **MARYLAND:** Cabin John, 20.vi.1931, 2 ♀♀, A. L. Melander leg. (USNM); Glen Echo, 22.viii.1922, 1 ♂, [no collector] (USNM, headless). **MASSACHUSETTS:** Catoclin, Mt. Park, Owen's Creek, 15.vi.1991, 1 ♂ 5 ♀♀, M. Barták leg. (MBPC); Franklin Co., ~0.5 km E Farley, 42°36.16'N 72°25.94'W, sweeps, asters, ferns, *Impatiens*, *Rubus*, under canopy, 26.vii.2006, 2 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); Petersham, 30.vii.1926, 1 ♂, A. L. Melander leg. (USNM). **MICHIGAN:** Battle

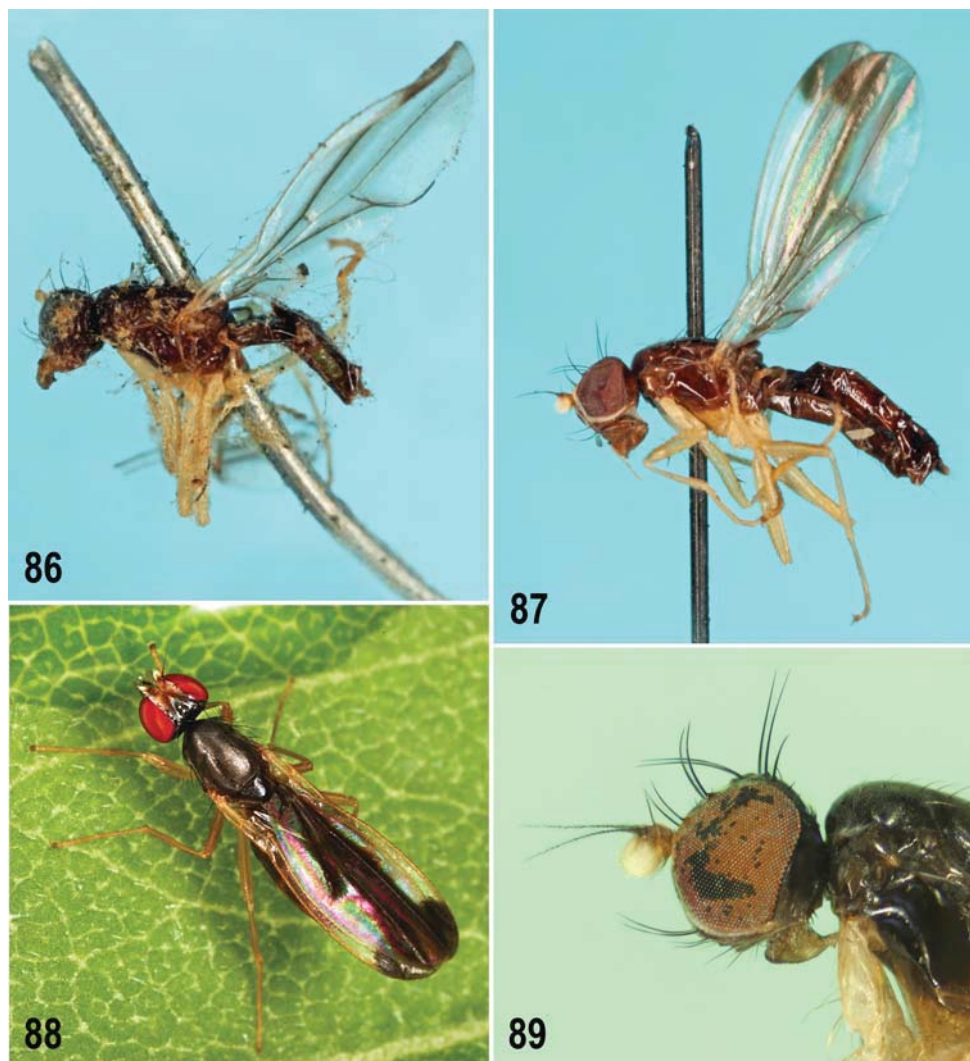
Creek, [no date], 1 ♀, J. M. Aldrich leg. (USNM); Cheboygan Co., 10.vii.1941, 2 ♀♀ (SEMC 1 ♀, USNM 1 ♀), 24.vii.1941, 1 ♀ (SEMC), R. Sailer leg., 18.vii.1943, 1 ♀, C. W. Sabrosky leg. (USNM); Lapeer Co., Deerfield Twp., 4.vii.1937, 1 ♀; Detroit, 20.vi.1940, 1 ♂, 7.vii.1944, 1 ♀, all G. Steyskal leg.; Saginaw Co., 18.vi.1952, 1 ♂; Midland Co., 15.vii.1952, 1 ♀, both R. R. Dreisbach leg. (all USNM). **MINNESOTA:** Itasca State Park, 3.vii.1952, 1 ♂, H. Spieth leg. (AMNH); Olmsted Co., [no date], 1 ♂ 1 ♀, C. N. Ainslie leg. (CNCI, single pin). **NEW HAMPSHIRE:** Franconia, [no date], 1 ♂ 1 ♀, Mrs. A. T. Slosson leg. (AMNH Ac.26266, ♂ with det. as *Ischnomyia vittula*), 1 ♀, Mrs. Slosson leg., 1 ♀ (with det. as *Ischnomyia vittula*), [Mrs. Slosson leg.?] (USNM). **NEW JERSEY:** Dover, 4.viii.1926, 1 ♀, A. H. Sturtevant leg. (USNM). **NEW YORK:** Bear Mt., 8.vi.1918, 1 ♀, A. H. Sturtevant leg. (USNM); Gowanda, 8.vi.1913, 1 ♂ (genit. prep.), 13.vi.1913, 1 ♀ (headless), 14.vi.1913, 1 ♀; Hamburg, 10.viii.1912, 1 ♀ (missing abdomen, with det. as *Ischnomyia albicosta*), all M. C. Van Duzee leg. (all CASC); Ithaca, [-].vii.1902, 1 ♀, [no collector] (AMNH); Ithaca, Six Mile, 24.vii.1958, 1 ♂ 1 ♀, D. F. Beneway leg. (SEMC); Millwood, 21.vi.1936, 2 ♀♀ (single pin); Poughkeepsie, 6.vii.1936, 2 ♀♀ (single pin), 7.vii.1936, 1 ♀ (triple mount (single pin) with 1 ♂ 1 ♀ *Ischnomyia albicosta*), all H. K. Townes leg. (all USNM); Tompkins Co., Salmon Creek, 16.vi.1981, 1 ♂, D. J. Bickel leg. (CNCI); Tuxedo, [-].viii.1928, 1 ♀, F. W. Edwards leg. (BMNH). **NORTH CAROLINA:** Haywood Co., GSMNP [Great Smoky Mountains National Park], Purchase Knob, 17S 312178E 3939620N, 1463 m, forest edge, hillside between house & Ferguson Cabin, 11.vi.2008, 1 ♂, B. J. Sinclair leg.; Jackson, Co., Cherokee, 2000', 25.vii.1957, 1 ♂, J. G. Chillcott leg. (both CNCI); Cherokee, 2000', 24.v.1957, 2 ♂♂ 2 ♀♀, W. R. M. Mason leg. (CNCI 1 ♂ 2 ♀♀, SMOC 1 ♂); Highlands, 3800', 3.vi.1957, 1 ♂, J. R. Vockeroth leg. (CNCI, genit. prep.); Mitchell Co., Penland, 3000', 19.vi.1957, 1 ♂, G. Steyskal leg. (USNM). **OHIO:** Franklin Co., "O[hi]o.", 5.vii.1952, 1 ♀, H. V. Weems, Jr. leg. (USNM). **PENNSYLVANIA:** Dubois, 3.ix.1927, 2 ♂♂ 2 ♀♀, A. L. Melander leg. (USNM 1 ♂ 1 ♀, SMOC 1 ♂ 1 ♀); Spring Br., DDT experiment, 27.vi.1945, 3 ♀♀, [no collector] (USNM, 1 ♀ with det. as *Ischnomyia vittata*). **TENNESSEE:** Great Smoky Mts. Nat. Pk., Chimneys, 20.vi.1941, 1 ♀ (headless), 30.vi.1941, 1 ♀, A. L. Melander leg.; same locality but Chimneys Camp, 11.vi.1946, 1 ♂, G. Steyskal leg. (all USNM); Great Smoky Mts. Nat. Pk., Whiteoak Sink near Schoolhouse Gap, 35°38'04"N 83°44'51"W, 2.vi.2001, 3 ♀♀, J. M. Cumming leg. (CNCI). **VIRGINIA:** Giles Co., Cold Spring, #114, Va. hwy. 700, 3450', 2.vii.1975, 1 ♂, G. W. Byers leg. (SEMC); Shenandoah Nat. Pk., Big Meadows, 30–31.vii.1980, 1 ♂, A. E. Stubbs leg. (BMNH), 14.vi.1982, 1 ♂, H. Goulet leg. (DEBU); Shenandoah Nat. Pk., mi.65–100, sweeps, 29.v.1979, 1 ♀, M. J. Sharkey leg. (DEBU); Shenandoah Nat. Pk., Thornton Gap, 28.vii.1980, 1 ♀, A. E. Stubbs leg. (BMNH). **WEST VIRGINIA:** Greenbrier Co., #2, 1 mi S Organ Cave, 2200', 1.vii.1967, 1 ♀, G. W. Byers leg. (SEMC, right wing on point). **WISCONSIN:** Polk Co., [-].vii.[-], Baker leg., 1 ♀ (USNM), 2 ♀♀ (LACM ENT329105, -06 headless).

Redescription. Male. Total body length 2.48–3.18 mm; body largely blackish brown and sparsely grey microtomentose, subshining to shining, with only small parts of head, thorax and all extremities yellow (Figs 87–89). Head blackish brown with only anterior parts yellow to ochreous, slightly higher than long, rounded anteriorly in profile (Fig. 89). Occiput dorso-medially concave, blackish brown except for brown ventral marginal area, sparsely grey microtomentose and, particularly in dorsal half, shining. Frons largely microtomentose, subshining to dull, bicolourous, yellow to ochreous in anterior half, blackish brown posteriorly, including ocellar triangle and most of frontal triangle. Frontal triangle with anterior corner tapered, acute and yellowish ochreous; its silvery glittering side-lines surrounded by narrow dull brown stripes meeting anteriorly; posterior corners of frontal triangle bare and lustrous. Orbit anteriorly (up to posterior ors) yellow to ochreous and sparsely silvery white microtomentose; its posterior part blackish brown and polished. A silvery white microtomentose spot or stripe (characteristic of *Arganthomyza* spp.) between posterior part of orbit and frontal triangle very reduced, forming only a fine line and often hardly visible. Rest of frons (between anterior corner of frontal triangle and orbits) yellow to orange ochreous (posteriorly) and dull. Frontal triangle longer than in most relatives, reaching to anterior sixth of frons. Frontal lunule reduced, very narrow, dirty yellow. Face narrow, medially concave, dirty yellowish white, whitish microtomentose and dull; border line separating it from parafacialia pale brown to

brown (ventrally). Parafacialia and gena white, densely silvery white microtomentose; ventral marginal stripe of gena brown and fine. Postgena pale brown to brown. Mouthparts dirty yellowish white but palpus, clypeus and prementum yellowish brown to brown. Cephalic chaetotaxy: pvt fine but comparatively long (subequal to anterior ors) and strongly crossed; vti and oc very long, longest of cephalic setae; vte and posterior ors distinctly shorter; 2 ors (situated relatively close each to other), anterior distinctly shorter (often less than half) than posterior; only 1 microsetula in front of the anterior ors; 2 pairs of medial microsetulae in anterior part of frons; 1(–2) proclinate setula(e) behind vte; postocular setulae (about 6) relatively short, in single row; 1 fine but long vi (about as long as posterior ors); subvibrissa distinct but weak, markedly finer and shorter (often less than half) than vi; 6–7 fine peristomal setulae, the foremost usually longer. Palpus very slender, ochreous to pale brown, with 1 fine dark preapical seta (shorter and finer than subvibrissa) and 7–8 brownish ventral setulae. Eye large, broadly subovoid, with longest diameter slightly oblique, less than 1.2 times as long as



Figs 84–85. Wings of the Nearctic species of *Arganthomyza*. 84 – *A. carbo* Roháček & Barber, 2013, paratype male, wing length 2.8 mm; 85 – *A. vittipennis* (Walker, 1857), male, wing length 2.6 mm (both Canada: Ontario). Photo by K. N. Barber. Fig. 84 adapted from ROHÁČEK & BARBER (2013: Fig. 166).

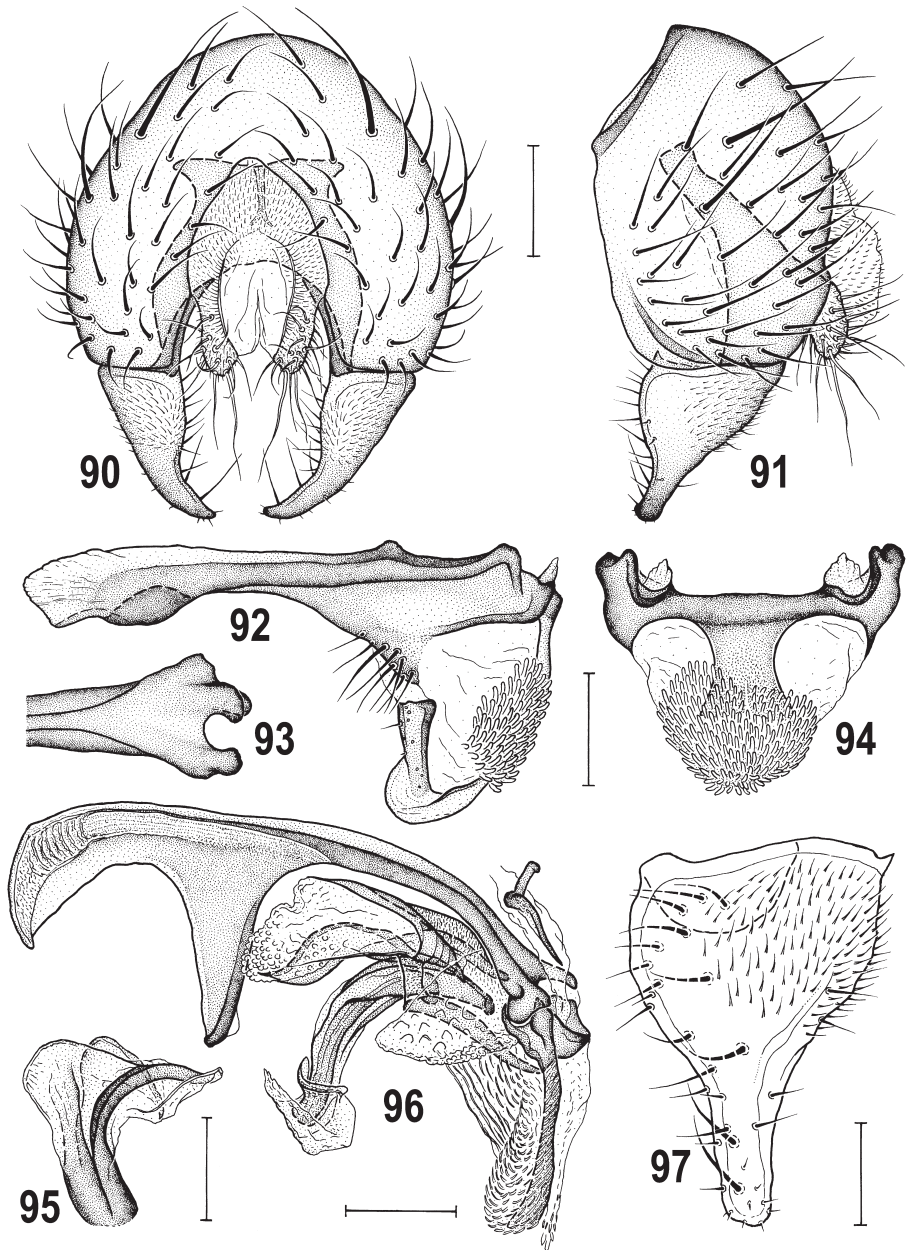


Figs 86–89. *Arganthomyza vittipennis* (Walker, 1857). 86 – *A. vittipennis*, lectotype female, laterally; 87 – holotype female of *Ischnomyia spinosa* Hendel, 1911, laterally; 88 – living male of *A. vittipennis* on a leaf, body length ca. 2.8 mm; 89 – head and anterior part of thorax of male (both from Canada: Ontario: Sault Ste. Marie). Photo by J. Roháček (Figs 86–88) and M. Deml (Fig. 89).

shortest. Genal shortest height about 0.09 times as long as shortest eye diameter. Antenna with scape and pedicel yellow; 1st flagellomere (Fig. 89) yellowish white to white, but brownish around base of arista (particularly dorsally), with moderately long white pilosity. Arista dark brown, with thickened basal segment, about 1.8 times as long as antenna, with cilia brown, relatively sparse and as long as those on apex of 1st flagellomere.

Thorax slightly narrower than head, largely blackish brown to brown, only sternopleuron ventrally to stpl setae ochreous to yellow. Most of thorax distinctly grey microtomentose and subshining, only mesopleuron and partly also pteropleuron bare and lustrous (Fig. 87). Thoracic chaetotaxy: 1 hu (slightly longer than posterior npl); 2 npl (anterior longer, but shorter than prs); 1 long prs (about as long as or shorter than anterior dc); 1 long sa (as long as prs); 1 pa (markedly shorter than sa); 2 very long postsutural dc (posterior longest of thoracic setae, anterior usually slightly longer than prs) and 4–5 dc microsetae in front of them; ac microsetae entirely lacking; 2 sc, laterobasal reduced, hair-like and markedly shorter than posterior npl, apical long and robust, almost as long as posterior dc; 1 ppl reduced to microseta; 2 long stpl, anterior distinctly shorter, weaker and pale-pigmented, posterior shorter than prs; 4–5 upcurved pale setulae below them and regularly 1 additional setula in front of anterior stpl; ventral part of sternopleuron with 3–4 longer pale setae. Scutellum rounded triangular, slightly convex dorsally. Legs yellow to light yellow, only terminal segments of tarsi or their distal half brown or pale brown (darkest on fore, lightest on hind tarsi). f_1 with strong black ctenidial spine distinctly longer than maximum width of t_1 , with a posteroventral row of paler long fine setae proximally to the latter and with yet longer row of posterodorsal (somewhat shorter) setae. f_3 with usual row of posteroventral setae, 10–13 on distal half (in distal third markedly denser) short, spine-like and thickened; t_2 with rather short (slightly longer than maximum width of tibia) ventroapical seta. Fore basitarsus with 2 longer pale hair-like proximoventral setulae; mid basitarsus with 2, hind basitarsus with 2–3 short, thick and dark setae. f_2 , t_1 and t_3 simply setulose. Wing (Fig. 85) with pattern similar to that of *Ischnomyia albicosta* (Walker, 1849), thus having a broad whitish hyaline band along C and R_{2+3} , a dark brown distally dilated middle band, and a pale (whitish ochreous) posterior marginal area widely bordering all remaining posterior veins (not including bm), and posterodistal margin behind apex of vein M. However, its wing is differently shaped (widest more proximally), it lacks the longitudinal pale narrow stripe between R_{4+5} and M, and it has cell dm and the surrounding area completely brown. C with short but distinct spinulae between hairs; R_{2+3} long, sinuous but less strongly than that of *I. albicosta*, thus more parallel to C although subterminally somewhat removed from C and apically upcurved to it. Vein r-m situated in about the middle of dm cell; distal portion of CuA_1 shorter than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula small and narrow but anal lobe larger than in *I. albicosta*. Wing measurements: length 2.38–2.90 mm, width 0.67–0.91 mm, $Cs_3 : Cs_4 = 1.25–1.38$, $rm/dm-cu : dm-cu = 2.38–2.68$. Haltere brown, stem usually paler than knob.

Abdomen with terga and sterna largely dark brown, sparsely pale grey microtomentose and relatively shining; lateral part of T2–T5 almost lustrous because of reduced microtomentum. T1 (distinctly paler brown) and T2 almost separate, only laterally partly fused. T3–T5 subequal, broad, bent onto ventral side of abdomen and sparsely setose. Preabdominal sterna (except for S1) well sclerotized, finely setose, relatively large and broad, becoming larger (and wider) posteriorly; S1 short, transverse, bare, pale brown but with posterior dark brown transverse stripe. S2 as long as wide, S3 and S4 subequal in length, slightly transverse but S4 wider; S5 largest, widest and distinctly transverse, posteromedially with narrow shallow emargination surrounded (on both sides) by several longer setae. T6 short, transversely band-like and bare but with large submedial part desclerotized and unpigmented so only small lateral

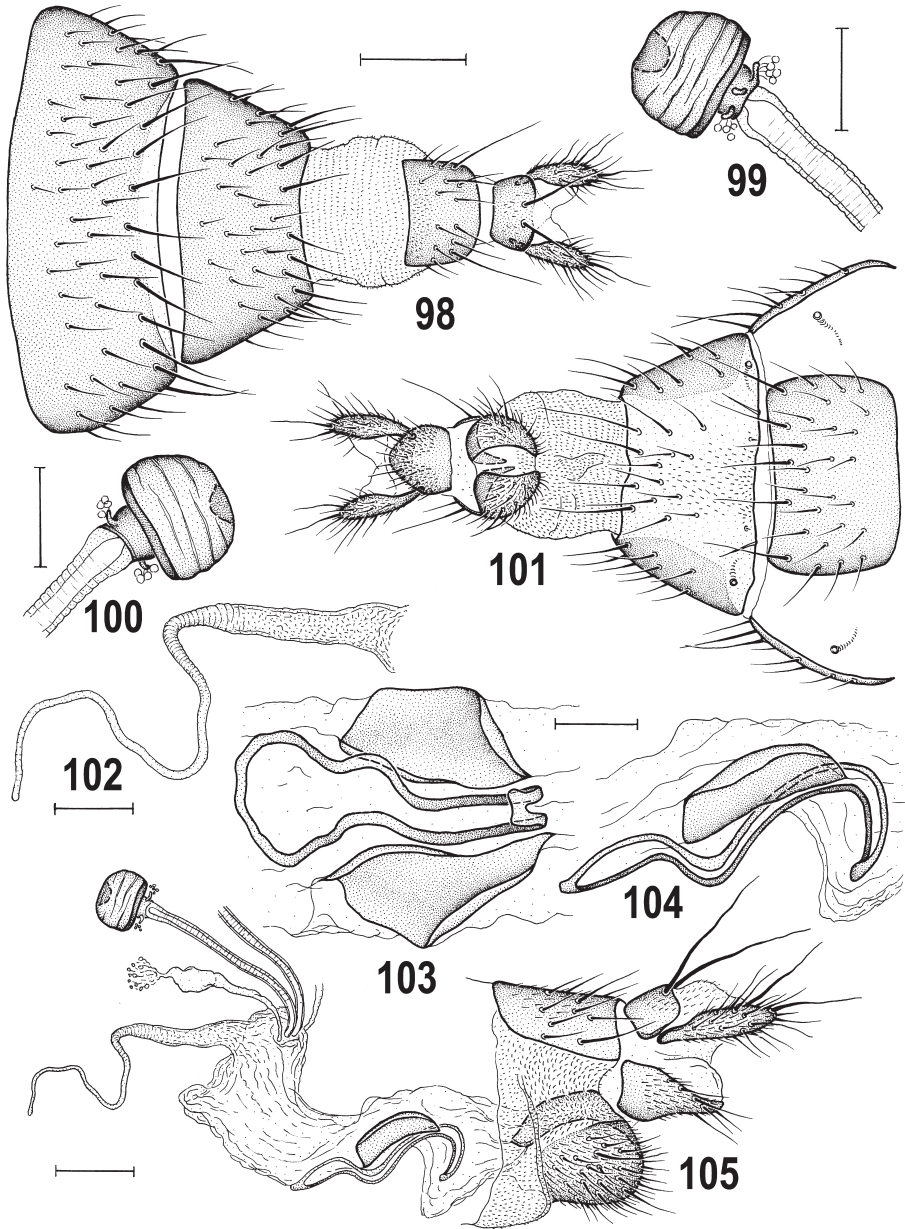


Figs 90–97. *Arganthomyza vittipennis* (Walker, 1857), male (Canada: Ontario). 90 – external genitalia, caudally; 91 – the same, laterally; 92 – hypandrial complex, laterally; 93 – base of phallapodeme, dorsally; 94 – transandrium, caudally; 95 – apex of filum, anteroventrally (widest extension); 96 – aedeagal complex, laterally; 97 – gonostylus, lateroventrally (widest extension). Scales = 0.05 mm (Figs 95, 97) and 0.1 mm (others).

pieces remain brown-pigmented. S6–S8 dark brown, dorsally fused. S6 and S7 as in other *Arganthomyza* species, each with 2 distinct setae; S8 long (as long as epandrium), setose in posterior two-thirds, similarly microtomentose to dorsomedial parts of preabdomina terga. S7 with microtomentum partly reduced and more shining.

Genitalia generally similar to those of species of the *Arganthomyza duplex* group. Epandrium (Figs 90, 91) dark brown, shape similar to that of *A. bivittata* but narrower dorsally, densely setose, with 2 dorsolateral setae longer and more robust than others; basal and dorso-medial parts of epandrium glossy, devoid of microtomentum; anal fissure (dorsally) relatively narrow, often slightly asymmetrical and dorsally narrowed (Fig. 90), with only small lateral notch (cf. Fig. 91). Cercus smaller than in relatives, pale-pigmented and finely setose, with 2–3 longer apical and subapical setae. Medandrium (Fig. 90) about as high as wide, dorsally narrowed and with well-developed dorsolateral corners. Gonostylus (Figs 91, 97) paler brown than epandrium but with ochreous yellow apical part, distinctly different from that of all known *Arganthomyza* species due to tapered, almost digitiform (terminally blunt) and medially curved (Fig. 90) apex, with micropubescence restricted to posterobasal half of outer side (Fig. 97) and with most of long fine macrosetae on anterior inner side. Hypandrium (Fig. 92) somewhat more slender than in relatives. Transandrium (Fig. 94) and caudal process most similar to those of *A. duplex*; caudal process simple, broad, flat and distally widened, becoming membranous and merged with basal membrane. Pregonite (Fig. 92) distinctly different from those in relatives, more projecting ventrally, indistinctly separated (by desclerotized area) from hypandrium, carrying a single group of more (8–10) setae. Postgonite (Fig. 92) relatively robust, sickle-shaped in lateral view, with only proximal narrow part darker, distal part pale, dilated and strongly posteriorly curved; proximal part of postgonite anteriorly with 1 small subbasal seta and 1 microseta in the middle; several grain-like sensilla are on its outer side. Basal membrane (Figs 92, 94) differing from relatives by its large group of dense, pale, digitiform excrescences. Aedeagal part of folding apparatus with reduced armature (Fig. 96), dorsally only with some flat, pale (almost unpigmented) tubercles, ventrally with usual fine striae. Connecting sclerite unusually strongly developed, heavily sclerotized and dark-pigmented and associated with membranous lobe covered by fine pale spine-like excrescences (Fig. 96). Phallopodeme with basal part dilated and relatively shortly forked (Fig. 93), fulcrum as in relatives, and apex relatively large, bicuspidate with projecting corners. Aedeagus with small phallopore as in relatives (Fig. 96) and larger distiphallus basally with internal elongate sclerites. Ventral sclerite connecting phallopore with ventrobasal sclerite of distiphallus of similar structure to that in *A. duplex*. Saccus of distiphallus distinctly smaller than in relatives, distally with rather numerous but very small hyaline rounded tubercles in membranous part; ventral and posterodorsal parts of saccus more or less sclerotized. Filum relatively robust, not dilated proximally, formed by 2 overlapping and partly fused ribbon-like sclerites ending in widened, several times curved and flat submembranous apex being distally split into 2 flat bent projections (Figs 95, 96), without microspinulae. Ejacapodeme closely resembling that of *A. duplex*, with its digitiform projection with distinctly clubbed apex (Fig. 96).

Female. Similar to male unless mentioned otherwise. Total body length 2.78–3.65 mm. Face somewhat darker, pale ochreous brown; the dark brown marginal stripe on parafacialia and gena wider. Palpus, clypeus and prementum darker brown. 1st flagellomere more



Figs 98–105. *Arganthomyza vittipennis* (Walker, 1857), female (Canada: Ontario). 98 – postabdomen, dorsally; 99, 100 – spermathecae; 101 – postabdomen, ventrally; 102 – ventral receptacle, laterally; 103 – female internal sclerites, ventrally; 104 – the same, laterally; 105 – female genital chamber and apex of postabdomen, laterally. Scales = 0.2 mm (Figs 98, 101), 0.1 mm (Fig. 105) and 0.05 mm (others).

extensively brown-darkened, almost covering dorsal third of segment and also extended on its inner side. f_1 with ctenidial spine as in male but f_3 posteroventrally simply setulose. Wing measurements: length 2.98–3.50 mm, width 0.87–1.11 mm, $Cs_3 : Cs_4 = 1.40\text{--}1.56$, $rm/dm\text{-}cu : dm\text{-}cu = 2.04\text{--}2.72$. Abdomen with preabdominal terga more transverse. T1 distinctly shorter and narrower than T2. T2–T5 subequal in length, all sparsely and relatively shortly setose. Preabdominal sterna markedly narrower and slightly lighter brown than in male, finely setose. S1 short, transverse, somewhat narrower than in male but with the same dark brown posterior transverse stripe; S2 square or slightly longer than broad; S3–S5 becoming larger and wider posteriorly, S3 and S4 about as long as wide or slightly longer than broad, of similar shape to S2, S5 largest, widest, slightly transverse (almost as wide as S6); S6 concolourous with preabdominal sterna.

Postabdomen (Figs 98, 101) of medium length, basally wide, distally tapered, similar to that of *A. duplex*. T6 large and dark brown, concolourous with dorsal part of T7+S7, more densely setose than in relatives. S6 distinctly narrower than that in related species, narrower than T7+S7, as brown as S5, with longest setae at posterior margin. T7 and S7 completely fused to form annular tergo sternum T7+S7; dorsally and laterally uniformly blackish brown and shining (as in relatives, cf. *A. duplex* but without pale anterior marginal band), and ventrally (Fig. 101) somewhat longer, ochreous yellow with narrow medial microtomentose area and (in contrast to situation in relatives) without dark ledge-like anterior submarginal band; T7+S7 with longest setae ventrally at posterior margin. Membrane of 8th segment densely micropubescent. T8 brown, slightly transversely oblong (thus darker and wider than in relatives), with rounded posterior corners and some inconspicuous micropubescence in anterior third. S8 slightly shorter but not wider than T8, medially divided and forming 2 posterodorsally recurved and invaginated sclerites (see Figs 101, 105). Genital chamber (Fig. 105) distally without additional sclerotization; proximally with usual internal sclerotization formed by 1 pair of simple, flat, crooked sclerites and 1 narrow, relatively long flattened annular sclerite (Figs 103, 104) with posterior end strongly curved ventrally and anterior part distinctly widened. Ventral receptacle (Fig. 102) slender and elongate, similar to those of relatives, with middle part curved and distinctly ringed, long terminal part slender, plain and sinuously curved but with apex simple, not twisted. Accessory gland hyaline, relatively small, on simple, distally widened duct. Spermathecae (1+1) of distinctive semispherical mushroom shape (Figs 99, 100); its main part transversely striated with terminal invagination and narrow cylindrical base provided with a few blunt spines; spermathecal duct with cervix poorly differentiated. T10 small but dark-pigmented, rounded trapezoid, with reduced micropubescence and 1 pair of very long medial setae (Figs 98, 105). S10 also small and relatively dark, not wider than T10, rounded pentagonal (Fig. 101) and micropubescent in posterior two-thirds. Cercus brownish, of moderate length and relatively slender, with a number of fine setae, dorsopreapical and apical longest (Fig. 105).

Discussion. Nomenclature and synonymy. SMITH (1971) incorrectly synonymized *Tachydromia vittipennis* Walker, 1857 with *Ischnomyia albicosta* (Walker, 1849) on the basis of the misidentification of B. H. Cogan (see type material above), who probably did not know *I. spinosa* Hendel, 1911, and overlooked the distinct ctenidial spines on the fore femora that are not visible (in lateral view) in the type of *T. vittipennis*. Moreover, SMITH (1971: 367)

treated this type specimen as the holotype male although it is a female (abdomen well preserved) and is to be considered a syntype because the number of specimens (and their sex) are not given in the very brief original description (WALKER 1857). Therefore, the identity of *T. vittipennis* is fixed by the lectotype designation here, the species is removed from the synonymy of *I. albicosta* and placed in the genus *Arganthomyza* as the senior synonym of *Ischnomyia spinosa* Hendel, 1911.

Because of the brown-patterned wings, *A. vittipennis* is an easily recognizable species of *Arganthomyza*. On the other hand, the wing ornamentation was the main reason why this species was considered a member of the genus *Ischnomyia* – the similarity of its wing pattern to that of *Ischnomyia albicosta* (the type species of the genus) is so great that nobody has hitherto doubted this generic affiliation. Only recently have analyses of molecular sequence data (ROHÁČEK & TÓTHOVÁ 2014: 173) and genitalic structures revealed that *A. vittipennis* (formerly usually treated as *I. spinosa*) belongs to *Arganthomyza* and is probably allied to the clade formed by the *A. duplex* + *A. socculata* groups (sensu ROHÁČEK & BARBER 2013). All three groups are characterized by robust transverse striae of the spermatheca (cf. ROHÁČEK & BARBER 2013), and the *A. duplex* + *A. socculata* groups share the two synapomorphies of the aedeagal part of the folding apparatus with dark grain-like tubercles dorsally, and the female T7+S7 ventrally with a dark transverse ledge-like band. Interestingly, *A. vittipennis* shares two additional apomorphies with the *A. duplex* group, viz. the similarly formed (plain and flat) caudal process of the transandrium and the female spermatheca with the smaller basal and the larger terminal parts separated by a more or less distinct dark ring (reduced only in *A. bivittata*). Two other apomorphies are also shared with the *A. setiplanta* group – the long frontal triangle and the short thickened setae on the hind basitarsus. Due to these (non-genitalic) characters, *A. vittipennis* seems to be intermediate between the *A. setiplanta* group and the clade *A. duplex* group + *A. socculata* group, but the molecular analysis (ROHÁČEK & TÓTHOVÁ 2014) clustered it unambiguously with the latter. This is further supported by dissimilar structures of the distiphallus and female internal genitalia (spermathecae, ventral receptacle, internal sclerites) in the *A. setiplanta* group and *A. vittipennis*.

Biology. As in other species of *Arganthomyza*, little is known of the biology of *A. vittipennis*. It has been collected at several of the same sites as the other three eastern species of *Arganthomyza* (*A. carbo*, *A. bivittata*, and *A. duplex*) as described above (*A. carbo* – Biology), and particularly in Ontario: Sault Ste. Marie (Baseline Rd., Birchwood Pk., and Bristol Place Pk. sites), where all four species have been taken in close proximity to each other.

Attempts at rearing this species from >400 eggs oviposited in the lab (8 ♂♂ 7 ♀♀) on leaves of *Eurybia macrophylla* from 12 August to 7 September 2002 were generally unsuccessful. A single male emerged 1 November (pupariation date not determined) while two females were obtained after a cold treatment of larvae at 2°C from 9 December 2002 to 17 March 2003. Pupariation time for the two females was 17 days each at 20°C. The larval plates of wet sand and rotting leaves became infested with nematodes which may have contributed to the poor results. Concurrent rearings of lauxaniid flies (*Homoneura* sp., unpublished data using similar techniques to those used for *A. vittipennis*) from eggs found on field-collected leaves of *E. macrophylla* yielded a single adult *A. vittipennis* which could represent a true field collection and rearing of a wild *A. vittipennis* egg or an inadvertent transfer within the laboratory (see below).

This adult male emerged 1 November 2002 at 20°C but the pupariation date was confounded. An additional puparium found within a larval plate of concurrent rearings of *Stiphrosoma balteatum* Roháček & Barber, 2005 that yielded an adult of *A. vittipennis* clearly represents an inadvertent transfer (larval *A. vittipennis* were found outside the large petri plates). This larva had been potentially exposed to three graminoids (*Phalaris*, *Calamagrostis*, *Carex*) and had pupariated 11 November during a holding period at 10°C since 4 November 2002. It was returned to 20°C on 21 November and the adult male emerged 5 December for a minimum pupariation period of 14 days (not knowing how much development might have taken place over 10 days at 10°C). *Eurybia macrophylla* was chosen as a candidate host because it was the dominant plant that the adults were swept from at the collection site (Ontario: Sault Ste. Marie – Finn Hill). Subsequent field collections and observations over several years suggest that preferred host plants are more likely to be some other plant(s) growing under the canopy, including such candidates as ferns, horsetails or various angiosperms.

The capacity to develop from egg to adult on either a composite or a graminoid indicates at least a limited physiological adaptability that cautions against attempts to identify a specific host from field associations of adults alone. There may be a more generalized association with a microhabitat defined more by moisture and temperature (light exposure), which includes a relatively wide acceptance of plant stems or leaves(?) in the established and decomposing thatch layer. A more direct approach would include the collection of plant material from the field (mid to late season) in an attempt to intercept larvae feeding in these components and rear them to adults (as did ROHÁČEK 2009a; also see below under *Anthomyza vockerothi* sp. nov. and *Anthomyza equiseti* sp. nov.). Adults have been collected from 21 May (Quebec: Old Chelsea – King Mt.) to 22 September (Ontario: 2 mi N Metcalfe).

Distribution. *Arganthomyza vittipennis* is primarily a northeastern species. It is known from Nova Scotia to North Carolina in the east and Ontario to Minnesota in the north and west (Canada: Nova Scotia, Ontario, Quebec; United States of America: Indiana, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin) (see Table 2). Previously, the species was recorded (all as *I. spinosa*) from Canada: Ontario (MARSHALL et al. 2001) and USA: Massachusetts (JOHNSON 1925), Michigan (HENDEL 1911, MELANDER 1913, SABROSKY 1965), and Vermont (JOHNSON 1925; this record not confirmed by the material examined). SABROSKY'S (1965) distributional range also explicitly references North Carolina, New Hampshire, and Wisconsin. As a visually distinctive species with spotty occurrences in collections, it is likely infrequently encountered in the field.

The *Arganthomyza duplex* group

The group was established by ROHÁČEK & BARBER (2013) and diagnosed by two apomorphic features: (1) the filum of the distiphallus basally widened and (2) the apex of the ventral receptacle vermicularly twisted. The latter character is reminiscent of the structure of the ventral receptacle of the majority of *Anthomyza* species (see below). This homoplasy probably evolved independently in the *A. duplex* group from the distinctly ancestral form with a simple apex of the ventral receptacle occurring in the *A. socculata* group which is the sister group of

the *A. duplex* group as demonstrated by both the morphological (ROHÁČEK & BARBER 2013: Fig. 173) and the molecular (ROHÁČEK & TÓTHOVÁ 2014: Fig. 1) data analyses. The group comprises three Nearctic species: *A. acuticuspis*, *A. bivittata* and *A. duplex*.

Arganthomyza acuticuspis Roháček & Barber, 2013

(Figs 106, 110–125)

Arganthomyza acuticuspis Roháček & Barber, 2013: 18.

Type material. HOLOTYPE: ♂, “USA: NM: Torrance Co., Manzano Mts, 12 mi W Manzano [34°37.4'N 106°24.8'W], Red Canyon Cmpgd, 8000', 27–30.viii.1993, J. E. O'Hara, malaise trap” and “HOLOTYPUS ♂, *Arganthomyza acuticuspis* sp.n., J. Roháček & K. N. Barber det. 2011” [red label] (CNCI, intact, see Fig. 106). PARATYPES: 2 ♂♂ 9 ♀♀ (AMNH, CASC, CNCI, DEBU, LEMQ, OSAC, UCRC, WFBM) (details in ROHÁČEK & BARBER 2013).

Diagnosis. Male 2.24–2.78 mm, female 2.30–3.05 mm. Mostly blackish brown (Fig. 106), sparsely grey microtomentose and distinctly shining; face, parafacialia, gena, postgena, ventral margin of occiput, mouthparts, haltere entirely and frons, antennae, legs largely contrasting ochreous, yellow or whitish yellow. Frontal triangle relatively short and narrow, reaching anterior third (its brown part only half) of frons. Mid and hind basitarsus without short thickened setae. T1 and T2 almost separate, only laterally partly fused. T3–T5 subequal, broad, bent onto ventral side of abdomen. Wing hyaline (Fig. 125). Reference to the genitalia is necessary to confidently distinguish this species from *A. disjuncta* and *A. socculata*, although colour characters can differentiate taxa in its own species group.

Male genitalia (see Figs 110–116 for details). Epandrium (Figs 110, 111) brown to blackish brown, higher than long and relatively broad. Gonostylus (Figs 111, 116) flat, ochreous yellow, of elongate subtriangular lateral outline (in maximum extension view) with acute apex; very slightly bent medially (Fig. 110), markedly less than in *A. bivittata* and *A. duplex*. Postgonite narrow, long, with apex bent posteriorly (Fig. 112); filum of distiphallus with longitudinal sclerites only partly fused and basally dilated (Fig. 115).

Female postabdomen and genitalia (see Figs 117–124 for details). T7 and S7 completely fused into largely dark brown ring-shaped tergosternum T7+S7 (Figs 118, 119), antero-ventrally with long, dark, finely sinuate transverse ledge-like band and spiracles situated at its lateral ends (Fig. 119). Ventral receptacle (Fig. 121) slender and elongate, of the same general form as in *A. bivittata* and *A. duplex*, with middle part curved and somewhat ringed, and long terminal part simply tubular and apex vermicularly twisted. Spermathecae (1+1) short-pyriform to subcylindrical (Figs 117, 120), both of the same size, each more or less constricted in proximal third, with dark transversely striated (striae interrupted) surface in distal two-thirds, and with a number of small dark spines in narrower basal part around duct insertion; duct with cervix distinct but weakly sclerotized.

Discussion. *Arganthomyza acuticuspis* is supported as basal in the *A. duplex* group, which also includes *A. bivittata* and *A. duplex* (ROHÁČEK & BARBER 2013: Fig. 173; ROHÁČEK & TÓTHOVÁ 2014: Fig. 1).

Arganthomyza acuticuspis differs distinctly from both of its closest relatives by its uniformly dark brown pleuron, among many other internal characteristics. However, it is more similar externally to both *A. disjuncta* and *A. socculata*. The key above is necessary for



106



107

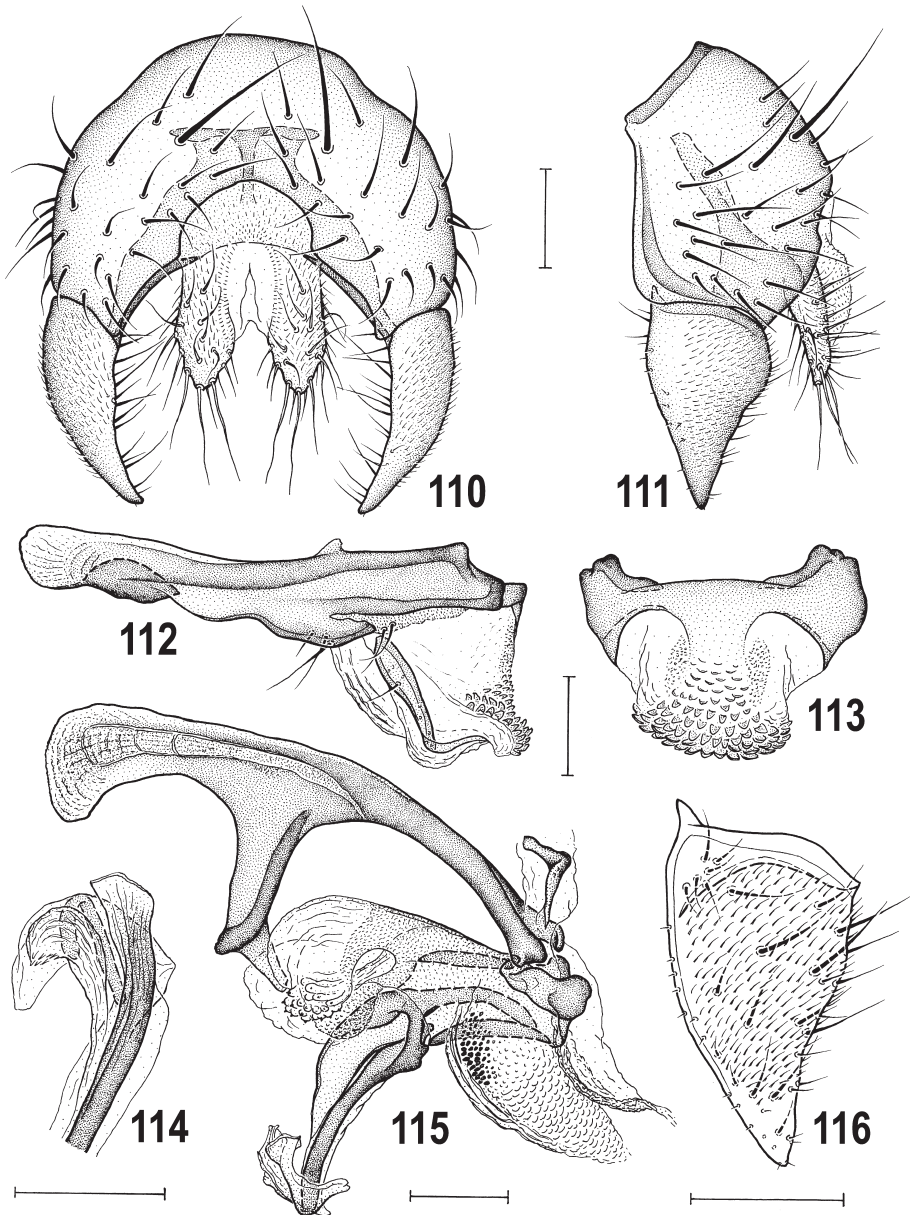


108

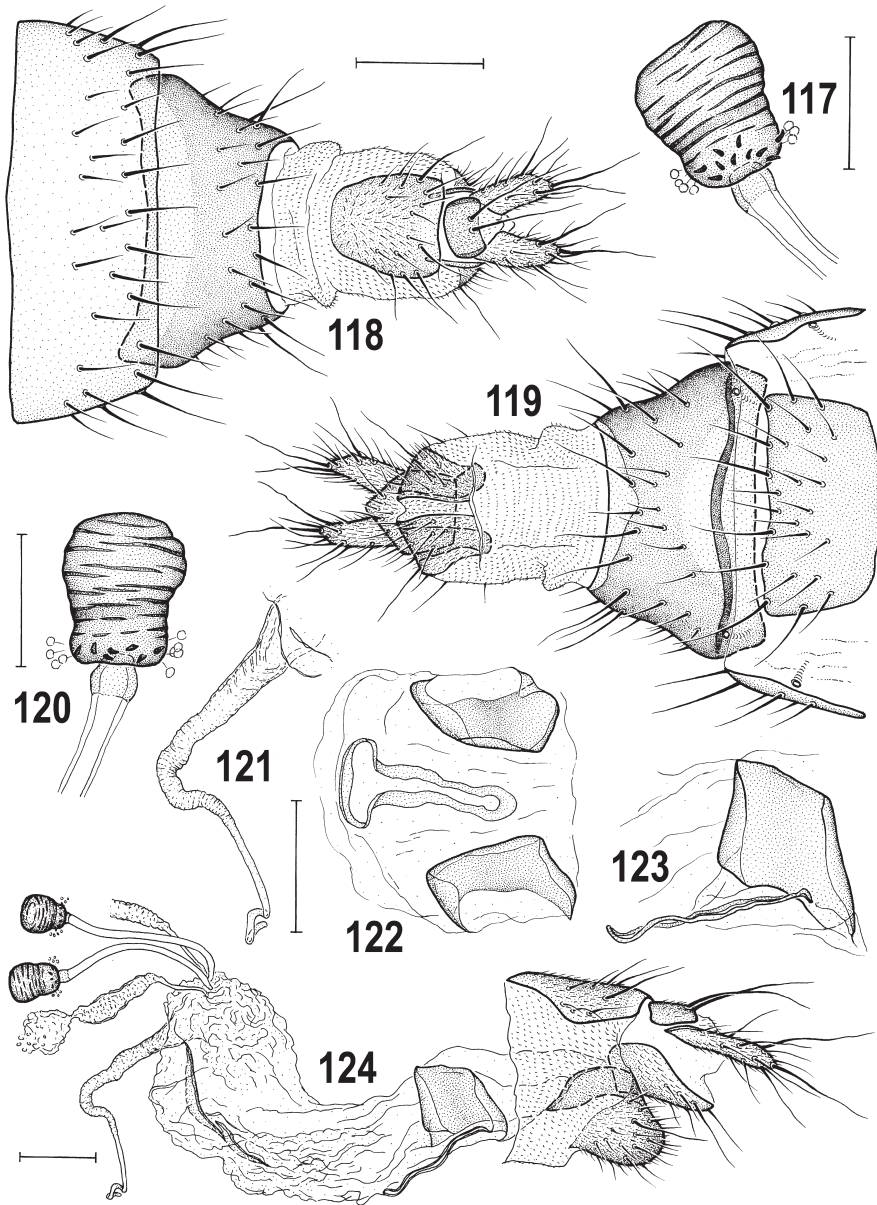


109

Figs 106–109. Holotype males of the Nearctic species of the *Arganthomyza duplex* group. 106 – *A. acuticuspis* Roháček & Barber, 2013; 107 – *A. bivittata* Roháček & Barber, 2013; 108 – *A. duplex* Roháček & Barber, 2013 (all laterally); 109 – *A. bivittata*, head and thorax dorsally. Photo by J. Roháček. Adapted from ROHÁČEK & BARBER (2013: Figs 1, 3, 5, 6).



Figs 110–116. *Arganthomyza acuticuspis* Roháček & Barber, 2013, paratype male (USA: New Mexico). 110 – external genitalia, caudally; 111 – the same, laterally; 112 – hypandrial complex, laterally; 113 – transandrium, caudally; 114 – apex of filum, subventrally (widest extension); 115 – aedeagal complex, laterally; 116 – gonostylus, sublaterally (widest extension). Scales = 0.1 mm. Adapted from ROHÁČEK & BARBER (2013: Figs 67–73).



Figs 117–124. *Arganthomyza acuticuspis* Roháček & Barber, 2013, paratype female (USA: New Mexico). 117 – spermatheca; 118 – postabdomen, dorsally; 119 – the same, ventrally; 120 – spermatheca; 121 – ventral receptacle, laterally; 122 – internal sclerites, ventrally; 123 – the same, laterally; 124 – female genital chamber and apex of postabdomen, laterally. Scales = 0.2 mm (Figs 118, 119), 0.1 mm (Figs 121–124) and 0.05 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 74–81).

absolute separation of these three species but because *A. acuticuspis* appears to be restricted to the southwestern United States (Arizona, New Mexico), it is distantly allopatric with the northwestern *A. socculata* (Alaska), and these two species should not be confused. In contrast, the female of *A. acuticuspis* can be readily distinguished from that of *A. disjuncta* which has the S7 separated from T7 (fused in *A. acuticuspis*) while the shape of the gonostylus is usually enough to separate the males of these two (narrowly sympatric?) species.

Biology. Virtually nothing is known about the biology of this species. Generally, habitats are open meadows dominated by grasses and wildflowers bordering and surrounded by coniferous forests (based on photographic information from Dr. James O'Hara, CNCI). This generalized habitat is more reminiscent of the open "grassy" habitat of *A. disjuncta* than of other members of the *A. duplex* group that are associated with a more mesic mixed forest with dense herbaceous undergrowth (at least in eastern North America). Flight period runs minimally from 15 June (Arizona: Rustler Park) to 27–30 August (New Mexico: 12 mi W Manzano) but this short period is probably an artifact of insufficient data.

Distribution. This poorly collected species is known only from elevated sites (7100' to 8950' = 2164 to 2728 m) in Arizona and New Mexico in the southwestern United States of America (see Table 2, Fig. 600).

Arganthomyza bivittata Roháček & Barber, 2013

(Figs 107, 109, 126, 128–145)

Arganthomyza bivittata Roháček & Barber, 2013: 21.

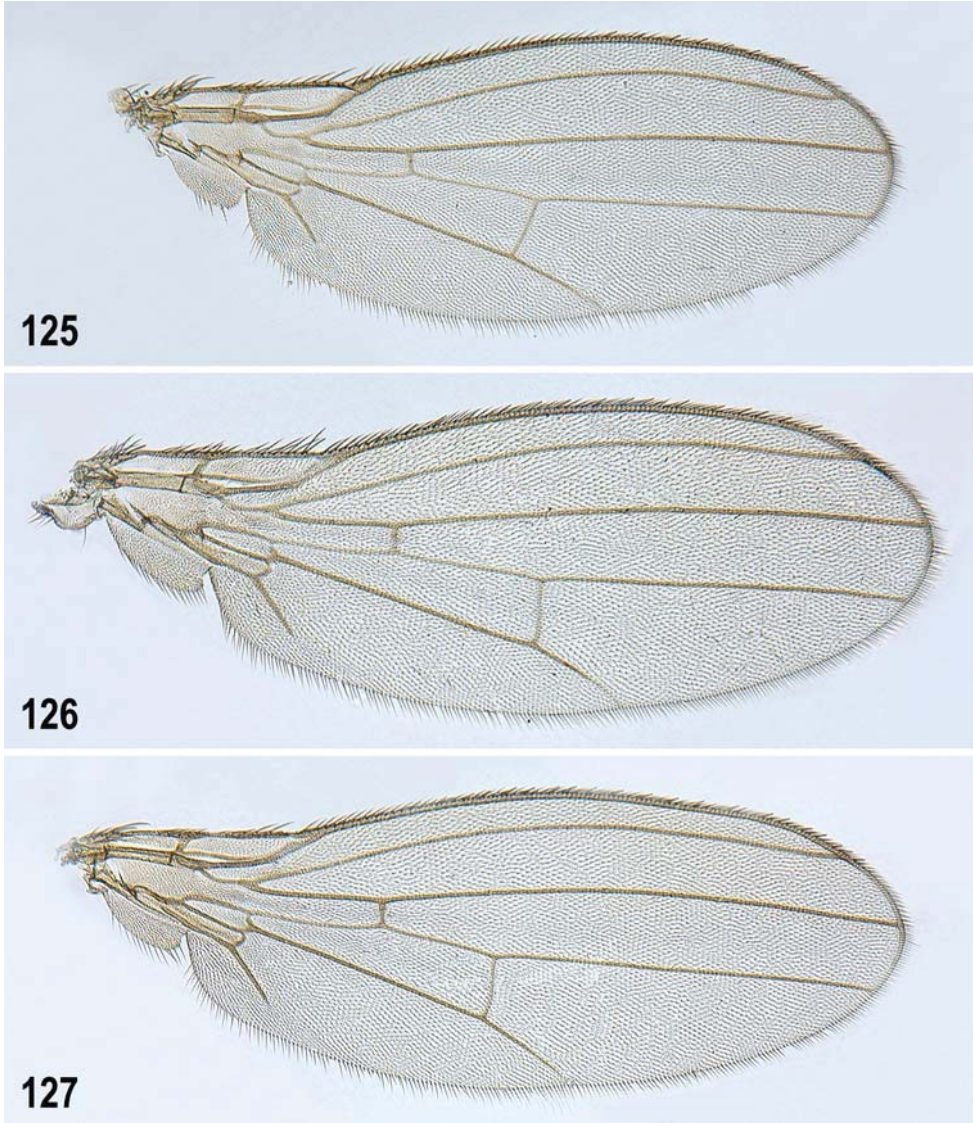
Type material. HOLOTYPE: ♂, "CAN:ON: SSMarie, Base-line Rd., 22.vi.2005, KNBarber, sweeps, *Aster*, *Rubus*, *Equisetum*, *Carex*, ferns, under aspen 46°31.40'N 84°24.40'W" and "HOLOTYPUS ♂, *Arganthomyza bivittata* sp.n., J. Roháček & K. N. Barber det. 2011" [red label] (DEBU, intact, see Fig. 107). PARATYPES: 173 ♂♂ 156 ♀♀ (AMNH, CASC, CNCI, DEBU, INHS, LACM, LEMQ, RBCM, SMOC, USNM) (details in ROHÁČEK & BARBER 2013). **Other material examined (not included in type series).** 1 ♂ 4 ♀♀ (CNCI, LEMQ, RBCM, damaged, see ROHÁČEK & BARBER 2013).

Additional records. CANADA: ONTARIO: Fergus nr. Guelph, Grand River, riverside vegetation, 30.vii.1994, 2 ♂♂, J. Roháček leg. (SMOC, 1 ♂ genit. prep.); Moosonee, 51°14.75'N 80°40.33'W, sweeps, mostly *Rubus*, *Ribes*, under *Populus*, 9.vii.2014, 1 ♀; Moosonee, 51°14.79'N 80°40.35'W, sweeps, mostly *Solidago*, *Calamagrostis*, 9.vii.2014, 1 ♀; Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 4 ♂♂ 1 ♀, 11.vii.2014, 2 ♀♀; Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 10.vii.2014, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, lab-reared from 1 ♀ [with following field collection data] sweeps, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 26.vi.2005, [plus additional rearing data], 3 ♂♂ 2 ♀♀ [each with empty puparium in gelatin capsule], K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Birchwood Pk., mixed forest, 27.vii.1986, 1 ♀; S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 27.vii.2009, 1 ♂, both K. N. Barber leg. (both INHS). **QUEBEC:** Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 1 ♀, M. Barták leg. (MBPC); Roddic Lake, pan traps, 1–15.viii.1982, 2 ♂♂, L. Huggert leg. (MZLU, 1 ♂ genit. prep.).

Material of *Arganthomyza cf. bivittata* (questionable status). CANADA: NOVA SCOTIA: Lockeport, 25.vii.1958, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.).

Diagnosis. Male 2.12–2.94 mm, female 2.77–3.73 mm. Largely yellow, with some brown pattern on head, thorax and abdomen (Figs 107, 109), sparsely light grey microtomentose and relatively shining. Except for dorsal pale stripes, occiput darkened in dorsal half extending

medially onto ocellar triangle and laterally around bases of vertical setae; dark notal stripes in dorsocentral lines usually well developed and extending onto scutellum; apical tarsomeres and epandrium dark brown. pvt setae unusually (uniquely) long. Scutellum uniquely with



Figs 125–127. Wings of the Nearctic species of *Arganthomyza*. 125 – *A. acuticuspis* Roháček & Barber, 2013, paratype male, wing length 2.5 mm (USA: New Mexico); 126 – *A. bivittata* Roháček & Barber, 2013, paratype male, wing length 2.8 mm; 127 – *A. duplex* Roháček & Barber, 2013, paratype male, wing length 2.6 mm (both Canada: Ontario). Photo by K. N. Barber. Adapted from ROHÁČEK & BARBER (2013: Figs 167–169).

small setulae in addition to marginal setae. Frontal triangle short and very narrow, reaching only midpoint of frons. Mid and hind basitarsus without short thickened setae. T1 and T2 dorsally separate, only laterally fused. Wing hyaline (Fig. 126).

Male genitalia (see Figs 128–135 for details). Genitalia generally resembling those of *A. acuticuspis* and *A. duplex*. Epandrium (Figs 128, 129) brown, slightly higher than long. Gonostylus (Figs 128–130) yellow, flat, in sublateral (widest extension) view subtriangular and hence most similar to that of *A. acuticuspis*, but broader, with less acute tip, and more bent medially (cf. Fig. 129).

Female postabdomen and genitalia (see Figs 136–145 for details). Postabdomen (Figs 136–138) at 6th segment wider than in *A. acuticuspis* and *A. duplex*. T7 and S7 completely fused to form ring-shaped tergo sternum T7+S7 (Figs 137, 138); anteroventrally with long, dark, finely sinuate transverse ledge-like band, spiracles situated posterior to its lateral ends (contrasting with its two nearest relatives). Ventral receptacle (Fig. 141) elongate, slender, similar to that of above species but its proximal part wider. Spermathecae (1+1) broadly ovoid (Figs 140, 143), subequal in size, with dark transversely striated (striae usually interrupted) surface except for very basal part carrying a few (4–5) short, blunt and curved spines on bulges around duct insertion; duct without distinct cervix.

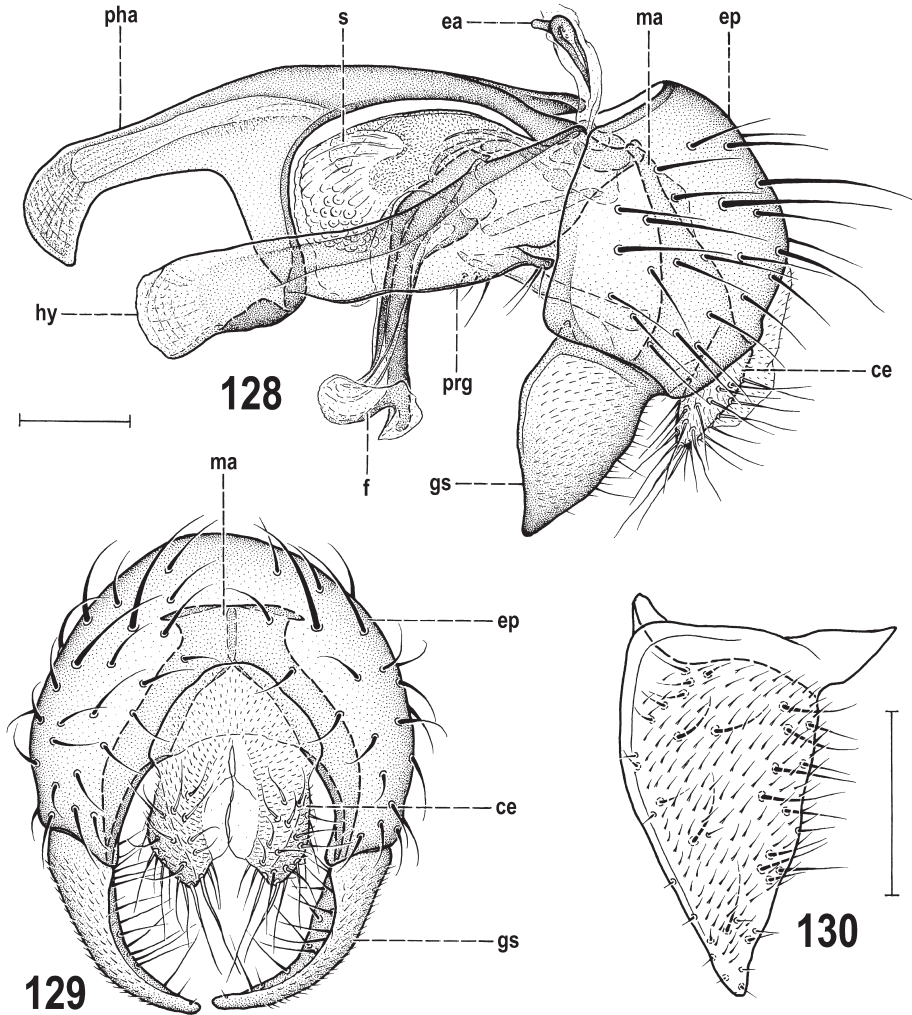
Discussion. *Arganthomyza bivittata* belongs to the *A. duplex* group (see above) and is the sister species of *A. duplex* as demonstrated by both ROHÁČEK & BARBER (2013) and ROHÁČEK & TÓTHOVÁ (2014). *Arganthomyza bivittata* can be easily distinguished from congeners by the largely yellow body (mesonotum with only a pair of narrow longitudinal brown vittae which can sometimes be absent, particularly in females; abdomen with yellow preabdominal terga and sterna), unusually long pvt setae, long medial rows of ac microsetae, uniquely setose scutellum with several microsetulae in addition to 2 usual pairs of long sc setae, and densely setose abdominal sclerites.

An unusually dark female specimen was reported and discussed by ROHÁČEK & BARBER (2013) and listed separately above. No similar specimens have yet been found.

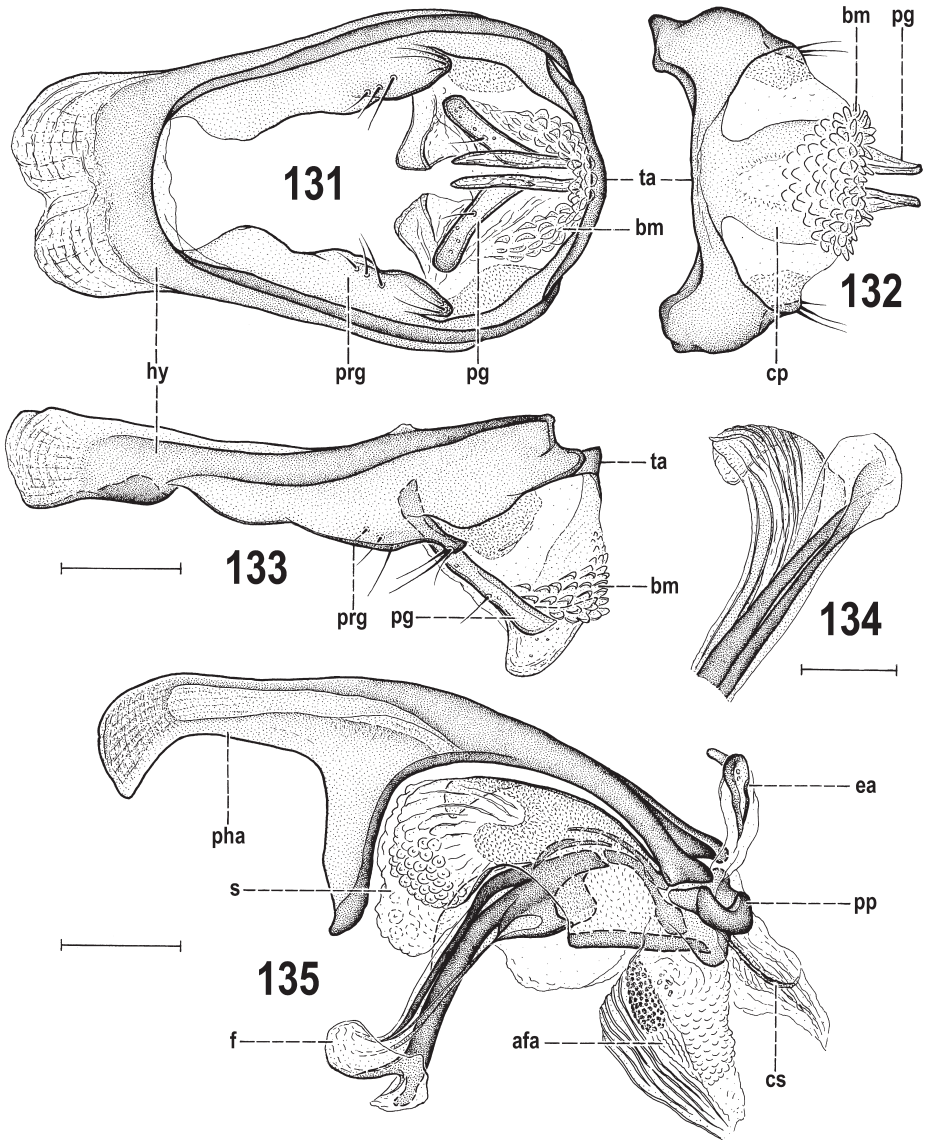
Biology. The habitat of this species can be generally described as mesic mixed or deciduous forest with relatively dense undergrowth of various components in Ontario (see Biology under *A. duplex*). It is still not clear which components of this undergrowth are being used by the larvae (see account of rearing attempt below). This eastern habitat can be contrasted with some of the western Canadian collection sites where open areas dominated by grasses yielded specimens (Alberta: Dunvegan and Cadomin). Adults have been collected from 14 June (Quebec: Hull) to 22 September (Ontario: Sault Ste. Marie).

The attempt at rearing this species was based on a single female ovipositing from 28 July to 4 September 2011 at 25°C. A choice of oviposition substrate was represented by five species of plants on which a total of 39 eggs was laid (*Dryopteris carthusiana* – 18, *Equisetum arvense* – 10, *Thalictrum* sp. – 6, *Doellingeria umbellata* – 4, and *Carex* sp. – 1). The stems of *Thalictrum* sp. and *D. umbellata* were judged to be too dry and coarse and were not being used by the larvae so subsequent larval maintenance relied on the other three species as a mixture. Anecdotally, the rachises of *D. carthusiana* were judged to be more acceptable as a rearing substrate. They were presented after being split lengthwise to provide more ready access for the larvae but in so doing provided tight crevices within a fibrous matrix not offered by the

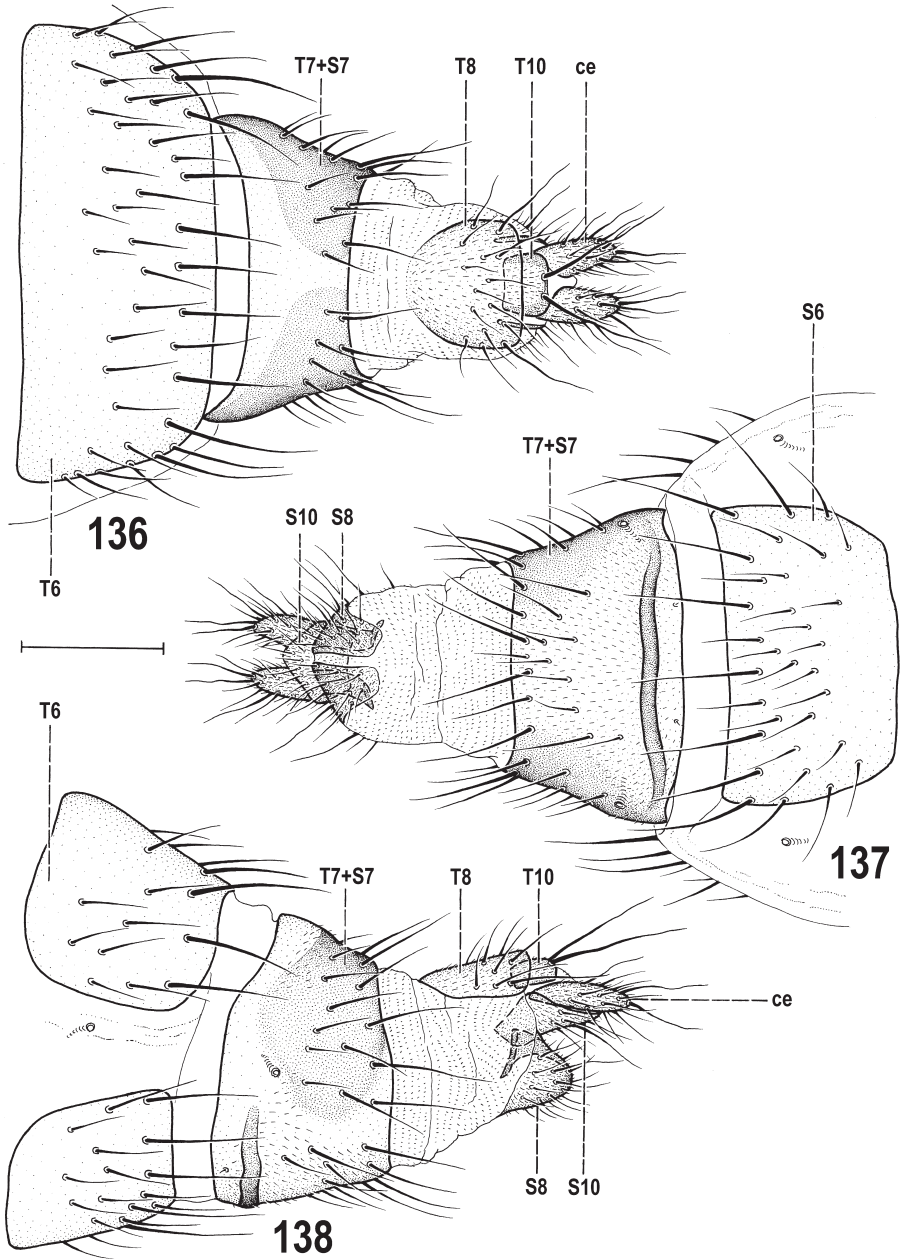
other two plants. The overwintering period imposed on the surviving 24 larvae at 4°C from 17 December 2011 to 26 March 2012 eventually produced a total of nine puparia yielding five adults distributed across the three plants as: *D. carthusiana* – 5 larvae yielding 2 puparia, *E. arvense* – 2 yielding 2, and *Carex* sp. – 2 yielding 1. The pupariation periods for the three males were 14, 15, and 15 days at 22°C while those for the two females were 14 and 15 days.



Figs 128–130. *Arganthomyza bivittata* Roháček & Barber, 2013, paratype male (Canada: Ontario). 128 – genitalia, laterally; 129 – external genitalia, caudally; 130 – gonostylus, lateroventrally (widest extension). Scales = 0.1 mm. For abbreviations see p. 11. Adapted from ROHÁČEK & BARBER (2013: Figs 82–84).

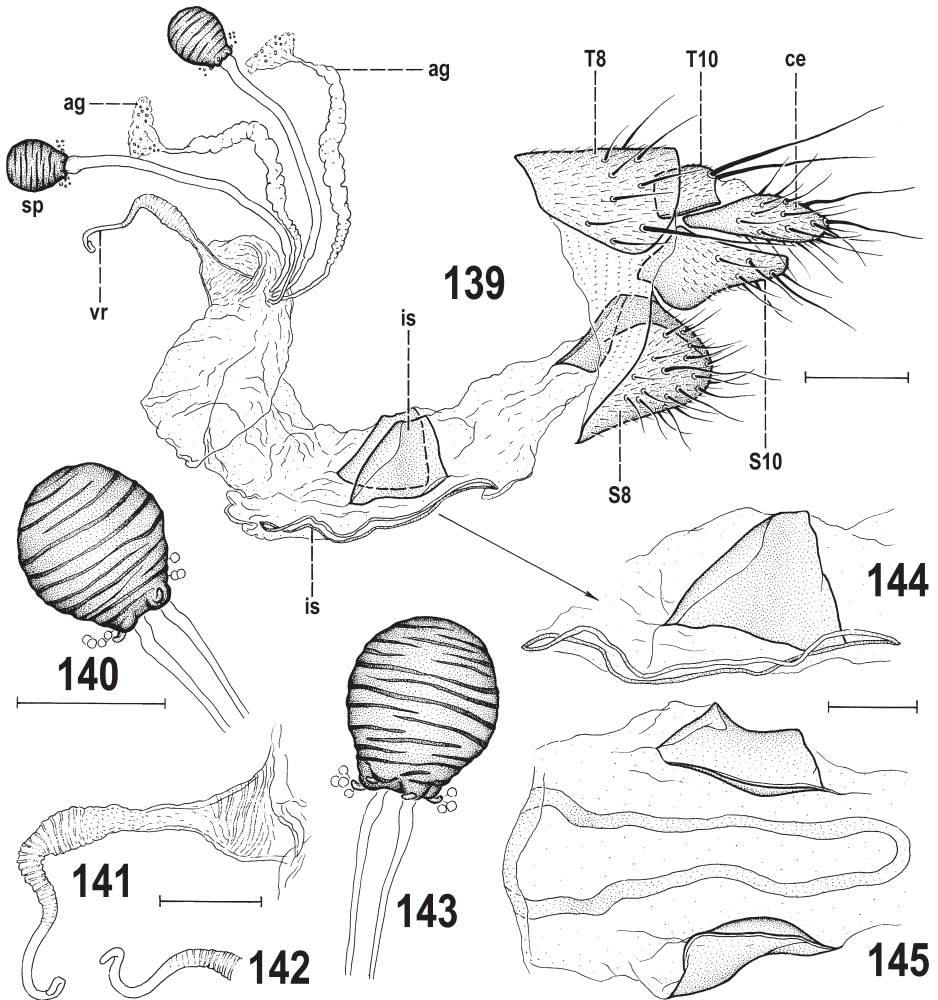


Figs 131–135. *Arganthomyza bivittata* Roháček & Barber, 2013, paratype male (Canada: Ontario). 131 – hypandrial complex, ventrally; 132 – transandrium, caudally; 133 – hypandrium, laterally; 134 – apex of filum, subventrally (widest extension); 135 – aedeagal complex, laterally. Scales = 0.05 mm (Fig. 134) and 0.1 mm (others). For abbreviations see p. 11. Adapted from ROHÁČEK & BARBER (2013: Figs 85–89).



Figs 136–138. *Arganthomyza bivittata* Roháček & Barber, 2013, paratype female (Canada: Ontario). 136 – postabdomen, dorsally; 137 – the same, ventrally; 138 – the same, laterally. Scale = 0.2 mm. For abbreviations see p. 11. Adapted from ROHÁČEK & BARBER (2013: Figs 90–92).

Distribution. Transcontinental in Canada from British Columbia to Nova Scotia (Alberta, British Columbia, Manitoba, Nova Scotia, Ontario, Quebec, Saskatchewan) with a single record from the United States of America (Michigan: Carp Lake) (ROHÁČEK & BARBER 2013, see Table 2).



Figs 139–145. *Arganthomyza bivittata* Roháček & Barber, 2013, paratype female (Canada: Ontario). 139 – female genital chamber and apex of postabdomen, laterally; 140 – spermatheca; 141, 142 – ventral receptacle, whole laterally (141) and apex ventrally (142); 143 – spermatheca; 144 – internal sclerites, laterally; 145 – the same, ventrally. Scales = 0.1 mm (Fig. 139) and 0.05 mm (others). For abbreviations see p. 11. Adapted from ROHÁČEK & BARBER (2013: Figs 93–99).

***Arganthomyza duplex* Roháček & Barber, 2013**

(Figs 108, 127, 146–148, 150–163)

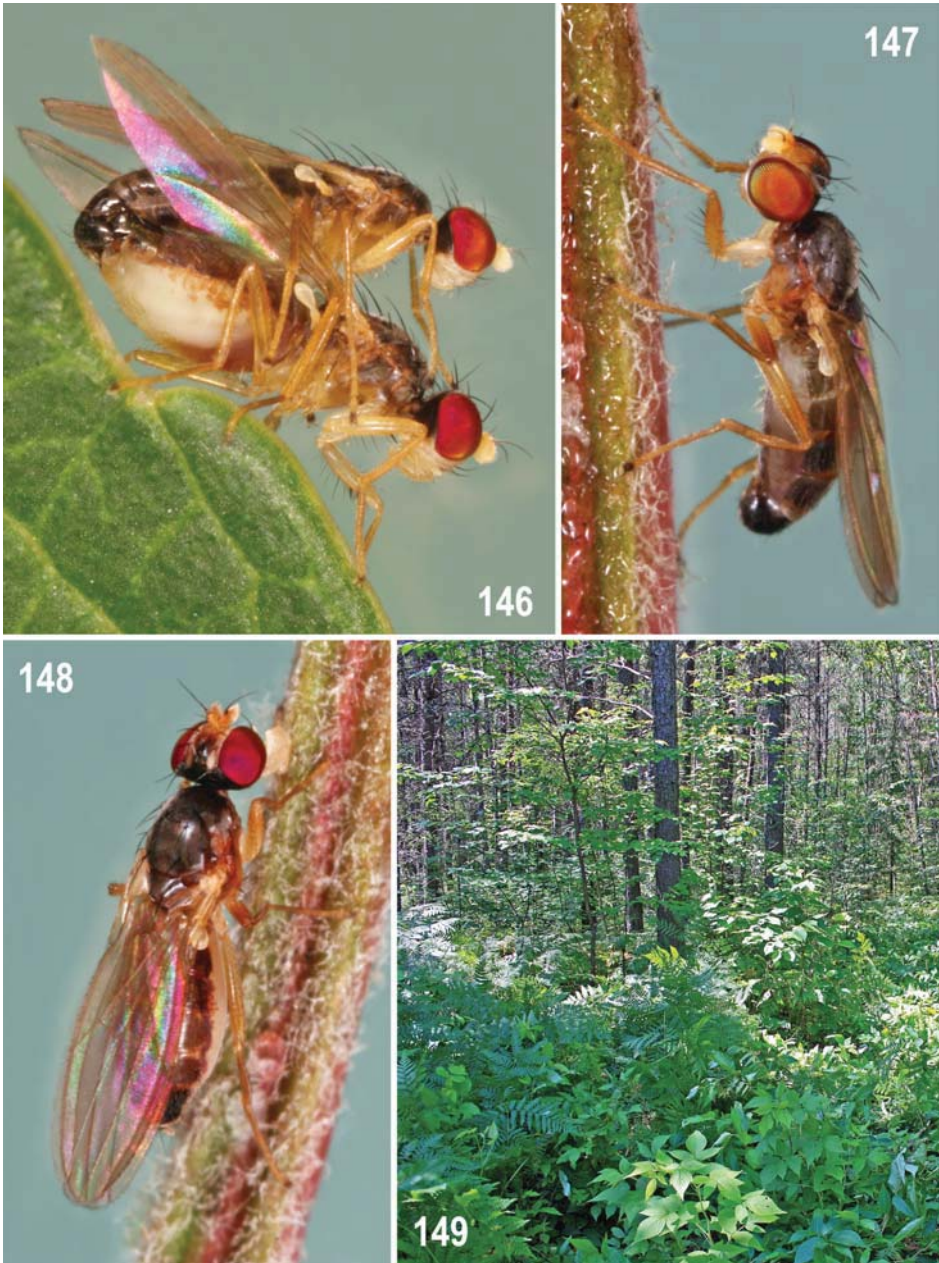
Arganthomyza duplex Roháček & Barber, 2013: 26.

Type material. HOLOTYPE: ♂, “CAN: ON: ~20kmE Nipi-gon, Hwy#17, rest area, 31.vii.2008, KNBarber, sweeps, *Aster*, *Rubus*, *Aralia*, *Diervilla* 48°58.00'N 87°59.09'W” and “HOLOTYPE ♂, *Arganthomyza duplex* sp.n., J. Roháček & K. N. Barber det. 2011” [red label] (DEBU, intact, see Fig. 108). PARATYPES: 670 ♂♂ 707 ♀♀ (AMNH, BDUC, BIOUG, CASC, CMNH, CNCI, CSUC, DEBU, INHS, KNWR, LACM, LEMQ, MCZC, PMAE, RBCM, SMOC, UBCZ, USNM, ZSMC) (details in ROHÁČEK & BARBER 2013).

Other material examined (not included in type series). 6 ♂♂ 4 ♀♀ (CASC, DEBU, LACM, LEMQ, SMOC, damaged) (details in ROHÁČEK & BARBER 2013).

Additional records. CANADA: ALBERTA: S. Alberta, Cypress Hills, 25.vi.1966, 1 ♂, K. A. Spencer leg. (BMNH); Dunvegan, 55°55.39'N 118°35.74'W, sweep south facing slope at dusk, 19.vii.2003, 1 ♂ 1 ♀, S. Boucher leg. (LEMQ 0040438, -40); N. Alberta, George Lake, 6.vi.1966, 1 ♀; Jasper, 16.vi.1966, 1 ♂, both K. A. Spencer leg. (both BMNH, both genit. prep.); Sheep Creek Prov. Pk., 54°03.6'N 119°00.7'W, sweep at campground, 22.vii.2003, 2 ♂♂ 1 ♀, S. Boucher leg. (LEMQ 0040456, -58, -59); Kananaskis, Sheep River Prov. Pk., Sandy McNabb camp, sweep open forest and grasses, 28.vii.2003, 50°38.27'N 114°31.7'W, 9 ♂♂ 5 ♀♀, S. Boucher leg. (LEMQ 0040385, -386, -394-396, -398-406), 6 ♂♂ 3 ♀♀, V. Dion leg. (LEMQ 0040446-54), 50°38.25'N 114°31.9'W, 1 ♂, S. Boucher leg. (LEMQ 0040384); same locality but 7 km W Sandy McNabb camp, 50°38.9'N 114°37'W, sweep open forest and field, 28.vii.2003, 1 ♂ 1 ♀, S. Boucher leg. (LEMQ 0040408, -09); same locality but Blue Rock campground, 50°36.6'N 114°43.4'W, sweep, 29.vii.2003, 1 ♂, S. Boucher leg. (LEMQ 0040411); St. Albert nr. Edmonton, 1.vi.1966, 1 ♀, K. A. Spencer leg. (BMNH, genit. prep.); 10 km N Whitecourt, Sakwatamau R., 54°12'03"N 115°46'40"W, sweep edges and grass at upper beach, 18.vii.2003, 1 ♀, T. A. Wheeler leg. (LEMQ 0040391). BRITISH COLUMBIA: Kaslo, 25.vi.[-], 1 ♂ 1 ♀, R. P. Currie leg. (SMOC, both genit prep.). ONTARIO: ~26 km SSE Chappleau, Island Lake Biomass, 47°38.23'N 83°14.78'W, jack pine forest (~80yr), pitfall traps (1N), 22.vii.–6.viii.2013, 1 ♂; ~33 km ESE Hawk Jct., Island Lake Biomass, Ripple Lk, 3-yr post-wildfire, 23.vii.–8.viii.2013, 47°56.11'N 84°09.36'W, pitfall traps (3R), 1 ♂ 3 ♀♀; same locality but 47°55.86'N 84°09.41'W, pitfall traps (5R), 1 ♂, all L. Venier leg. (all INHS); n. Hurkett, km 46.3 Black Sturgeon Rd., 49°11'15"N 88°42'30"W, mixed forest, pitfall trap, Stand 1, Site 4, Trap 2, 23.viii.–8.ix.1993, 1 ♂, Site 4, Trap 9, 1 ♀, Site 1A, Trap 9, 1 ♂ 1 ♀, all K. N. Barber leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 2 ♀♀, K. N. Barber leg. (CNCI). QUEBEC: Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 1 ♀, M. Barták leg. (MBPC); Laurentide Pk., 7.viii.1956, 1 ♂ 1 ♀, A. H. Sturtevant leg. (USNM). UNITED STATES OF AMERICA: MONTANA: Lincoln Co., Ross Creek, Giant Cedars Rec. Area, 48°12'N 115°54'W, mature forest, 26.vi.1996, 1 ♀, H. Goulet leg. (CNCI). NEW HAMPSHIRE: “N.H.”, “205”, “Loew Coll.”, “Type 14558” (red label), 1 ♀ (MCZC, double mount (single pin) with a headless ♀ of *Anthomyza oblonga* on the same pinned bracket, erroneously labelled as type specimens of *Anthophilina terminalis* Loew); White Mts. Nat. For., 4 mi S of North Woodstock, Pemigewasset River, 1–4.viii.1980, 1 ♀, A. E. Stubbs leg. (BMNH, genit. prep.). PENNSYLVANIA: Dubois, 3.ix.1920, 1 ♀, A. L. Melander leg. (SMOC, genit. prep., Sabrosky det. as *A. tenuis*).

Diagnosis. Male 2.10–2.70 mm, female 2.38–3.18 mm. Bicolourous (Figs 108, 146–148), dark brown and yellow, sparsely grey microtomentose and distinctly shining. Head dark brown with face, parafacialia, gena, postgena, ventral margin of occiput, mouthparts, entire haltere, frons and antennae and all legs largely contrasting ochreous, yellow or whitish yellow. Pleural area of thorax also extensively ochreous to yellow, at least on ventral half; notopleuron and humerus may also be paler than surrounding notum; preabdominal sterna brown in male, pale yellow in female. Frontal triangle reaching anterior fourth of frons. Mid and hind basitarsus without short thickened setae. T1 (usually paler) and T2 almost separate, only laterally partly fused. Wing hyaline (Fig. 127).



Figs 146–149. Living *Arganthomyza duplex* Roháček & Barber, 2013 and its habitat. 146 – mating pair of *A. duplex*, laterally, body length ca. 2.3–2.9 mm; 147 – male, laterally, body length 2.5 mm; 148 – female, laterally, body length ca. 3 mm; 149 – fern-dominated undergrowth of mixed forest, habitat of *A. duplex* and *A. carbo* (all photos from Canada: Ontario: Dubreuilville). Photo by J. Roháček. Fig. 146 adapted from ROHÁČEK & BARBER (2013: Fig. 100).

Male genitalia (see Figs 150–156 for details). Epandrium (Figs 150, 151) blackish brown, higher than long. Gonostylus (Figs 150, 151, 156) ochreous to yellow, markedly different from that of both *A. acuticuspis* and *A. bivittata*, small, relatively narrow and posteriorly bent in lateral view, with broadly rounded apex, somewhat also bent medially (Fig. 150).

Female postabdomen and genitalia (see Figs 157–163 for details). T7 and S7 completely fused to form annular tergosternum T7+S7 (Figs 158, 159); anteroventrally with a long, dark, transverse ledge-like anterior submarginal band (Fig. 159). Ventral receptacle (Figs 162, 163) slender and elongate, similar to those of close relatives, with middle part curved and distinctly ringed, long terminal part slender, plain and straighter but its apex twisted. Spermathecae (1+1) pyriform (Fig. 157), most resembling those of *A. acuticuspis* including darker constriction in proximal third and surface structure in distal two-thirds, but more elongate and with spines in basal part more transversely arranged; duct with cervix as in the latter species.

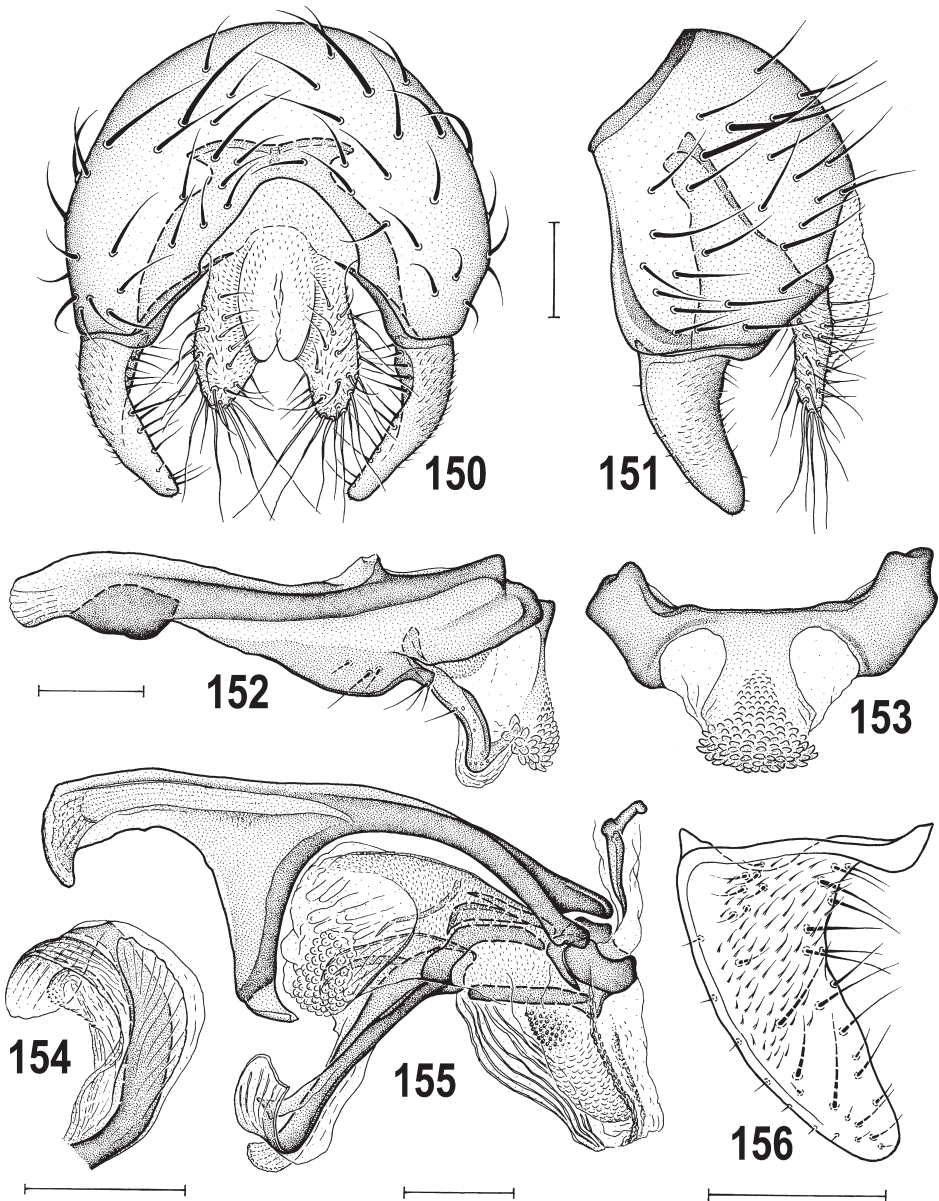
Discussion. Although more externally resembling *Arganthomyza acuticuspis*, *A. duplex* appears to be a sister species of *A. bivittata* despite a marked colour dissimilarity, demonstrated by molecular data (ROHÁČEK & TÓTHOVÁ 2014: Fig. 1) and two synapomorphies: the pale-pigmented female S2–S6; the gonostylus with the apex bent medially (cf. ROHÁČEK & BARBER 2013: Fig. 173).

Among *Arganthomyza* species, *A. duplex* is readily distinguished by its bicolourous pleura (dark dorsally, pale ventrally), characteristic gonostylus (bent posteriorly) and sexually dichroic colouration of the preabdominal sterna (brown in male, pale yellow in female) (see also the key above). However, there is externally a very similar species of the *Anthomyza macra* group in North America, viz. *A. silvatica* sp. nov. This species usually differs from *A. duplex* by the reduced subvibrissa, the short setula in front of the anterior orbital seta, and paler pigmentation of the apical tarsal segments, but it is recommended always to verify its identification by examining male and female genitalic characters.

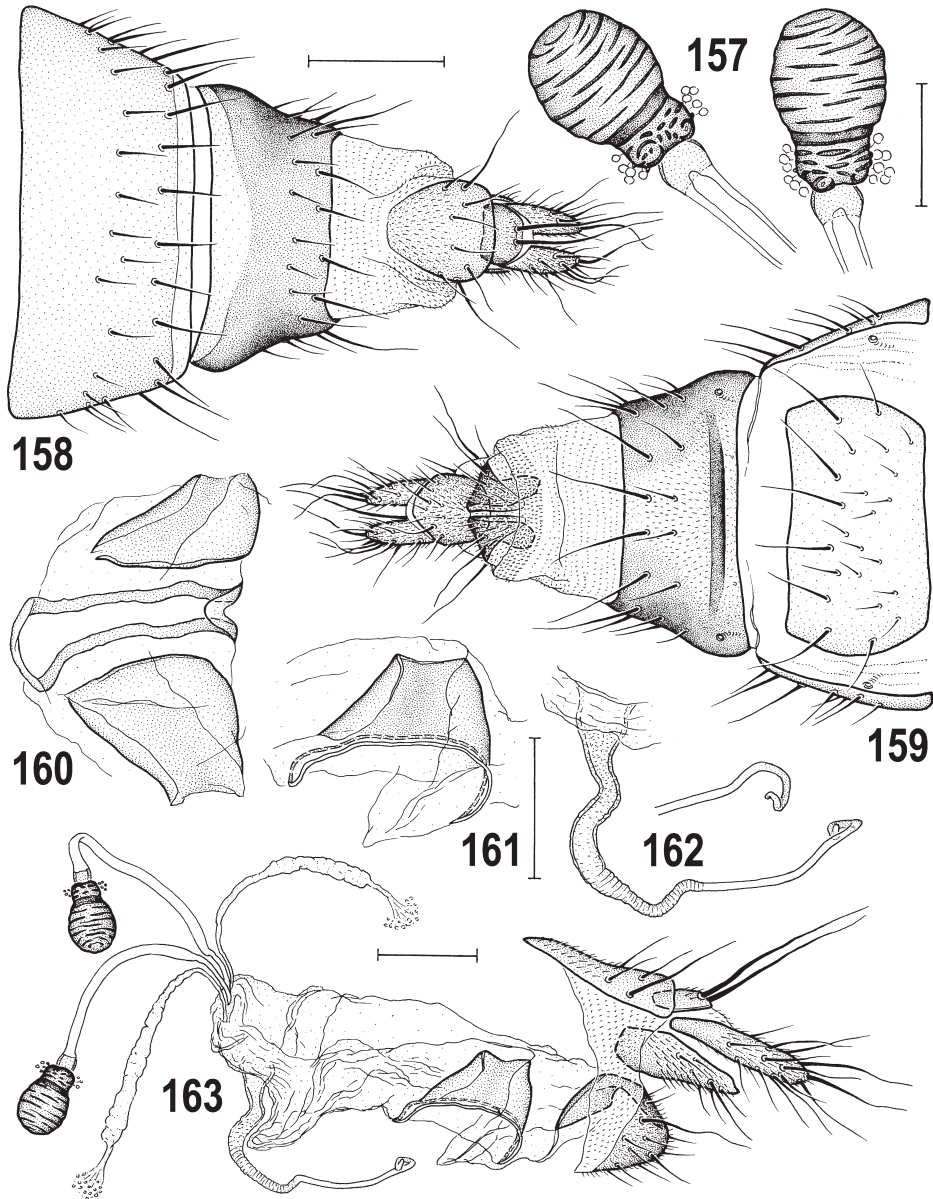
Biology. Four Nearctic species of *Arganthomyza* are often found together in eastern North America in at least pairs of species usually involving the more common *A. duplex* and *A. vittipennis*. Three sites in Ontario: Sault Ste. Marie are known to have yielded all four species (Baseline Rd., Birchwood Pk., and Bristol Place Pk.) while two other localities (viz., Ontario: Icewater Creek watershed and Moosonee) have yielded all but *A. vittipennis*.

Most eastern collections of *Arganthomyza duplex* with habitat data suggest relatively mesic mixed forest (often dominated by aspen, *Populus tremuloides* Michx., in Ontario) with thick and diverse ground vegetation (Fig. 69). This understory usually includes a wide variety of plant species and can be variously dominated by a few. The authors have suspected that ferns (Fig. 149) may be at least an indicator of potential habitat but their role as host plants has not been evaluated. Northwestern records suggest a preference for more open habitat such as grasses (Alberta: Dunvegan and Cadomin) and also pine forest (Yukon: Carcross), while some collections have been made in habitats not including ferns in the immediate vicinity (Alberta: Westlock Co.; Ontario: Moosonee). Adult flies have been collected from 9 April (British Columbia: Robson) to 21–28 September (Utah: Tony Grove Jct.).

Distribution. This is the most commonly collected and widely distributed species of *Arganthomyza* in North America and is transcontinental in both Canada and the northern United States – in Canada, from British Columbia and Yukon to Newfoundland and Nova Scotia



Figs 150–156. *Arganthomyza duplex* Roháček & Barber, 2013, paratype male (Canada: Ontario). 150 – external genitalia, caudally; 151 – the same, laterally; 152 – hypandrial complex, laterally; 153 – transandrium, caudally; 154 – apex of filum, anteroventrally (widest extension); 155 – aedeagal complex, laterally; 156 – gonostylus, lateroventrocaudally (widest extension). Scales = 0.1 mm. Adapted from ROHÁČEK & BARBER (2013: Figs 106–112).



Figs 157–163. *Arganthomyza duplex* Roháček & Barber, 2013, paratype female (Canada: Ontario). 157 – spermathecae; 158 – postabdomen, dorsally; 159 – the same, ventrally; 160 – internal sclerites, ventrally; 161 – the same, laterally; 162 – ventral receptacle, whole laterally and apex ventrally; 163 – female genital chamber and apex of postabdomen, laterally. Scales = 0.05 mm (Fig. 157), 0.2 mm (Figs 158, 159) and 0.1 mm (others). Adapted from ROHÁČEK & BARBER (2013: 113–120).

(Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Quebec, Saskatchewan, Yukon) and the United States of America, from Alaska, Washington and Idaho to New Mexico, New Hampshire and New York (Alaska, Colorado, Idaho, Michigan, Minnesota, Montana, New Hampshire, New Mexico, New York, Pennsylvania, Utah, Vermont, West Virginia, Wyoming), (ROHÁČEK & BARBER 2013, see Table 2). At least some of the most southwestern specimens have been taken at altitudes above 9000 feet [= 2743 m] (Colorado, New Mexico, Utah).

The *Arganthomyza socculata* group

The *A. socculata* group was characterized by ROHÁČEK & BARBER (2013). Its monophyly is considered to be well supported by the following apomorphies: (1) filum of distiphallus seemingly with single sclerite (with two original sclerites completely fused); (2) apex of filum spinulose; (3) spermathecae with unique bell-shaped appendages. The *A. socculata* group is hypothesized to be the sister group to the *A. duplex* group by ROHÁČEK & BARBER (2013; Fig. 173), confirmed by molecular data analysis (ROHÁČEK & TÓTHOVÁ 2014). Two species are included: *A. socculata* (Holarctic), *A. disjuncta* (Nearctic).

Arganthomyza disjuncta Roháček & Barber, 2013

(Figs 165, 168–184)

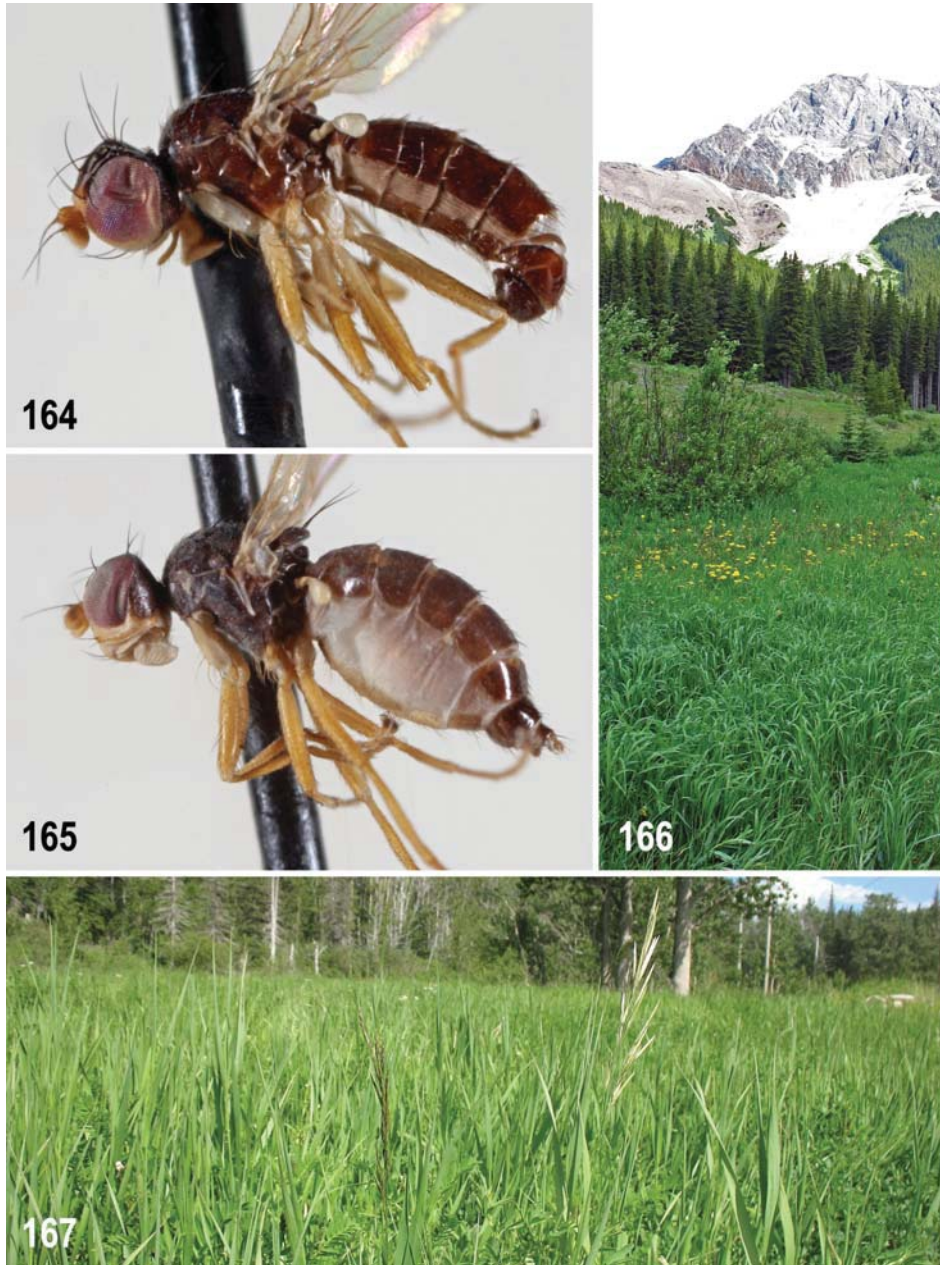
Arganthomyza disjuncta Roháček & Barber, 2013: 34.

Type material. HOLOTYPE: ♀, “CAN: AB: ~1.2kmS Cadom-in, entrance to Whitehorse Wildland PPK., 23.vii.2008, KNBarber, sweeps, *Bromus inermis*, *Hedysarum boreale* 53°00.70'N 117°20.05'W” and “HOLOTYPE ♀, *Arganthomyza disjuncta* sp.n., J. Roháček & K. N. Barber det. 2011” [red label] (DEBU, intact, see Fig. 165). PARATYPES: 120 ♂♂ 94 ♀♀ (AMNH, BIOUG, CASC, CNCI, DEBU, INHS, LACM, LEMQ, RBCM, SEMC, SMOC, UAMF, UBCZ, USNM, ZSMC) (details in ROHÁČEK & BARBER 2013).

Other material examined (not included in type series). 2 ♀♀ (DEBU, RBCM, damaged) (details in ROHÁČEK & BARBER 2013).

Additional records. CANADA: ALBERTA: Banff, 28.vi.1966, 1 ♀; Edmonton, 14.vi.1966, 1 ♂, both K. A. Spencer leg. (both BMNH, both genit. prep.); Sheep Creek Prov. Pk., 54°03.6'N 119°00.7'W, sweep at campground, 22.vii.2003, 1 ♂ 1 ♀, S. Boucher leg. (LEMQ 0040460, -61). UNITED STATES OF AMERICA: UTAH: Cache Co., Tony Grove Canyon, Malaise trap, 19–27.vii.1983, 1 ♀, W. J. Hanson leg. (LACM, ENT329102).

Diagnosis. Male 1.94–2.38 mm, female 2.10–3.02 mm. Virtually identical externally to *A. socculata*. Reference to the genitalia is necessary to confidently distinguish typical members of this species (see discussion regarding separation of males of *A. disjuncta* and *A. socculata* below). Male genitalia (see Figs 168–175 for details). Epandrium (Figs 168, 170) blackish brown, distinctly higher than long. Gonostylus (Figs 168, 170, 175) ochreous to yellow, flat, slightly bent medially, more elongate than in *A. socculata*, tapered distally, with rounded apex, largely micropubescent on outer side and largely setose on inner side. Its anterior margin with more or less distinct concavity in the middle and posterior margin less concave than in *A. socculata* (in largest extension view). Hypandrium anterior to pregonite hardly or little excavated (Fig. 171). Pregonite with posterior lobe more robust and somewhat projecting (Fig. 171). Aedeagal part of folding apparatus with dark granulose tubercles on proximal part (Fig. 174) reduced both in number and size in contrast to those of *A. socculata*.



Figs 164–167. Primary types of *Arganthomyza* species and habitat of *A. disjuncta* Roháček & Barber, 2013. 164 – *A. carbo* Roháček & Barber, 2013, holotype male, laterally; 165 – *A. disjuncta*, holotype female, laterally; 166 – roadside grasses with predominant *Bromus inermis* near Little Highwood Pass (Canada: Alberta), habitat of *A. disjuncta*; 167 – detail of the habitat growth with *Bromus inermis* at Cadomin (both Canada: Alberta). Photo by J. Roháček (Figs 164, 165) and K. N. Barber (Figs 166, 167). Adapted from ROHÁČEK & BARBER (2013: Figs 2, 4, 104, 105).

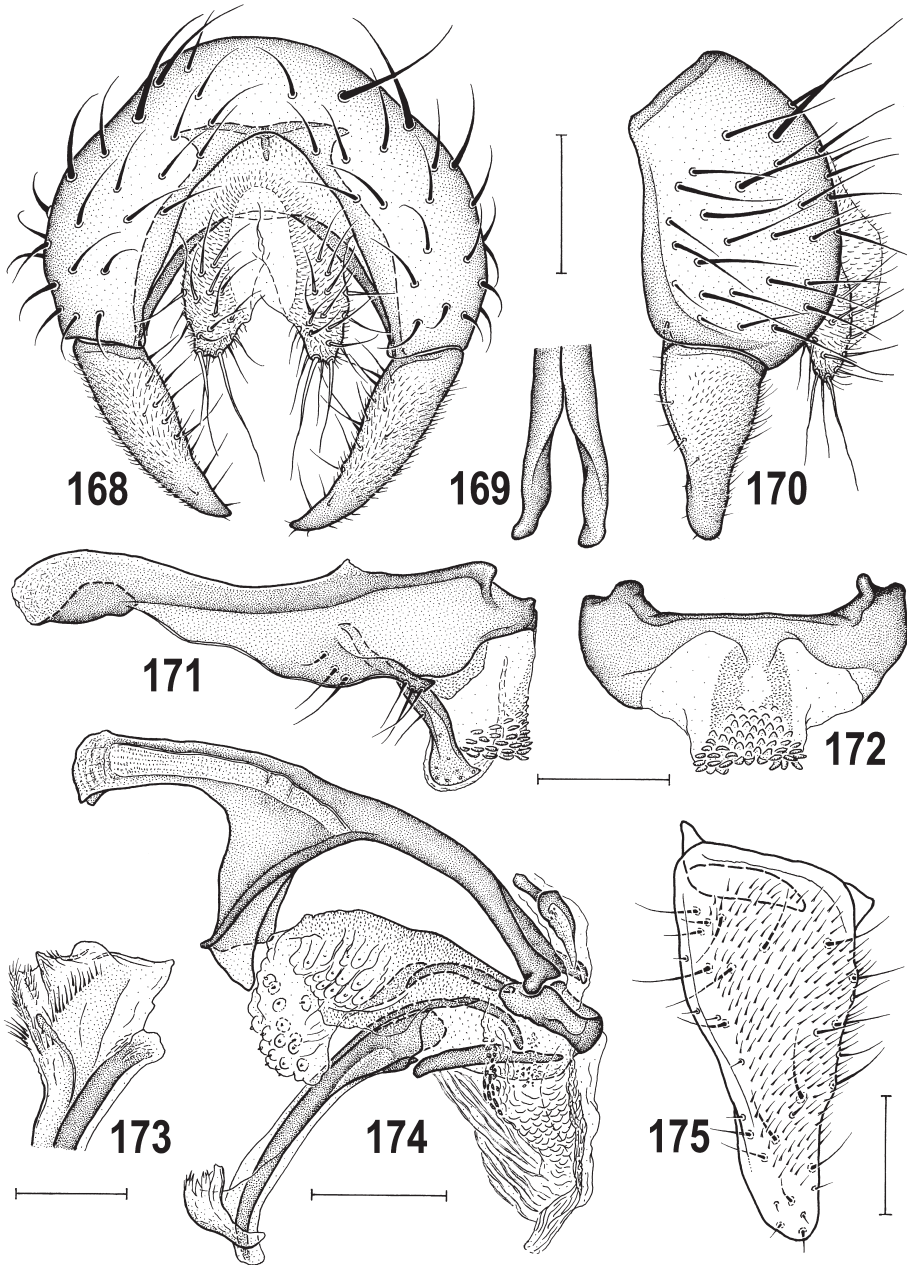
Female postabdomen and genitalia (see Figs 176–183 for details). Sclerites of 7th abdominal segment markedly different from those of *A. socculata*: T7 and S7 clearly separate though closely appressed. T7 larger and longer than in *A. socculata*, extended far onto ventral side and with spiracles embedded near its anteroventral corners (Fig. 178). S7 large, wide and pale anteriorly, tapered, darker and with rounded corners posteriorly, entirely and distinctly micropubescent, with dark-pigmented transverse stripe near anterior margin and with 6 long setae at posterior to posterolateral margin (Fig. 178). Ventral receptacle (Fig. 179) hyaline, slender, relatively long, proximally wider tubular, distally tapered to form sinuate slender apical part with blunt tip. Spermathecae (1+1) resembling those of *A. socculata*, short-pyriform, with dark transversely striated surface, but slender bases provided with rosette of only 3 bell-shaped appendages (see Fig. 176), some of which have doubled apex.

Discussion. *Arganthomyza disjuncta* is closely related and extremely similar to the Holarctic *A. socculata*. The species is peculiar for the large and separate female S7 (see Fig. 178), a character unknown in all other congeners where S7 is fused with T7 to form a compact annular tergosternum T7+S7. Although the separate S7 surely is a plesiomorphic condition, it is considered by ROHÁČEK & BARBER (2013: Fig. 173) to have evolved secondarily in this species, as a reversal of the S7 integrated into the tergosternal sclerite T7+S7 which otherwise is a distinct synapomorphy of the genus *Arganthomyza*.

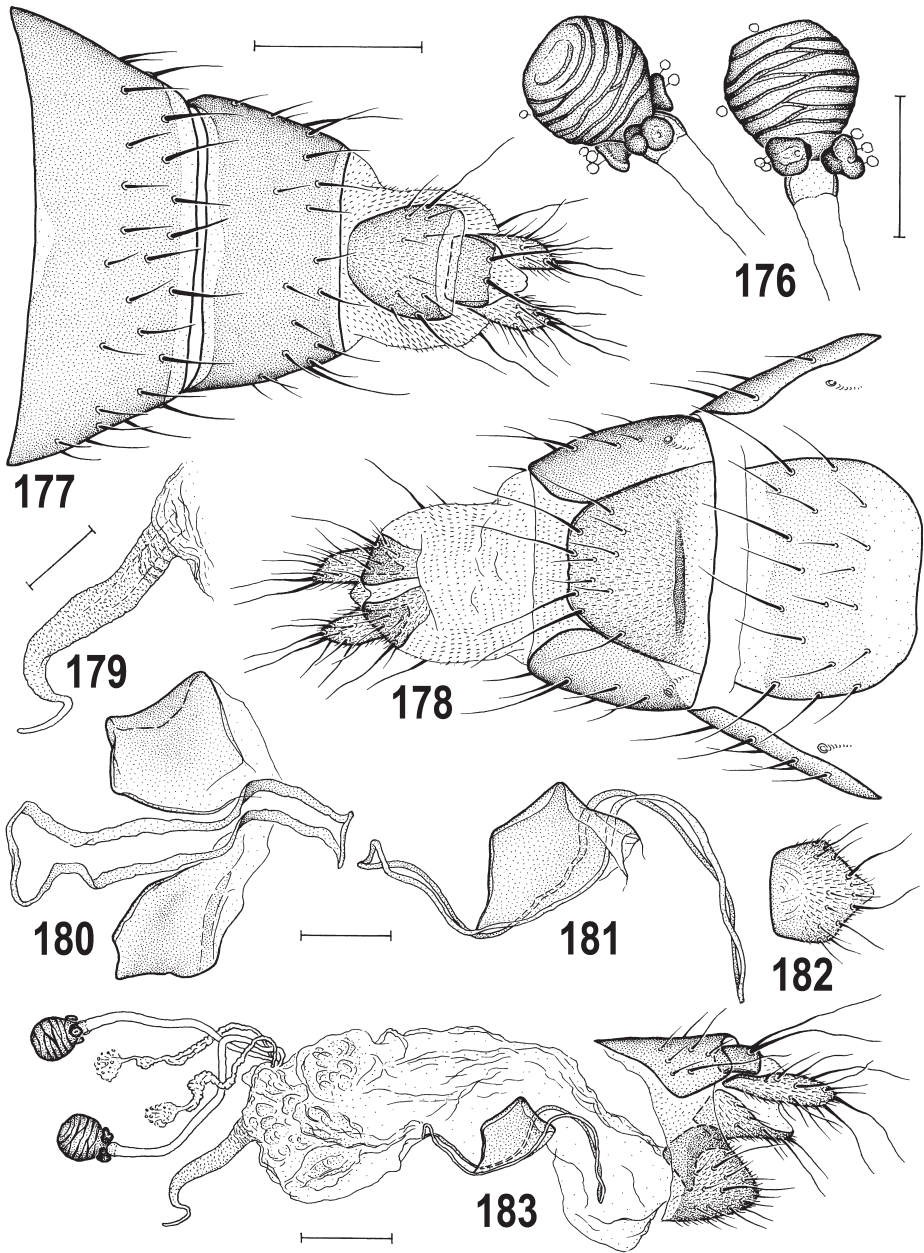
While the female of *A. disjuncta* can be easily identified by the separate S7, only 3 bell-shaped appendages on the spermatheca and the very elongate annular sclerite in the genital chamber, differentiating males of *A. disjuncta* from those of *A. socculata* is sometimes difficult. There are slight differences in the form of the gonostylus, hypandrium and pregonite (see the key and description above), but usage of these characters requires careful comparison and observation at various angles. The separation of males of these two species is further complicated by great variability of the gonostylus in both *A. socculata* and *A. disjuncta*, and the occurrence of unidentifiable specimens (those not possessing typical shapes of gonostylus, hypandrium and pregonite in combination) in localities where both species occur together (confirmed in Alaska).

Biology. Very little is known of the biology of *A. disjuncta* except for preferred habitats that, at least in western North America, appear to be open and dominated by graminoids (Figs 166, 167), most often by grasses including the introduced weedy *Bromus inermis* Leyss (ROHÁČEK & BARBER 2013). Riparian habitats have also been mentioned while “mouse runs” directs attention to the thatch layer (although most specimens have been swept from vegetation). This species co-occurs with *A. socculata* in some sites in Alaska. A single specimen of *A. bivittata* and two specimens of *A. duplex* (Alberta: Cadomin) were taken with a series of *A. disjuncta* while a single specimen of *A. disjuncta* was taken with a series of *A. duplex* (Alberta: Dunvegan). Adults have been collected from 2 June (British Columbia: south of Atlin) to 1–7 September (Utah: Tony Grove Jct.).

Distribution. Widely distributed in Canada (Alberta, British Columbia, Labrador, Manitoba, Northwest Territories, Quebec, Saskatchewan, Yukon) especially in montane areas of Alberta and British Columbia. Transcontinental, though collected infrequently and mostly in northerly sites east of Saskatchewan – notably with old records from south-central Saskatchewan and no records from Ontario. Also known in the United States of America (Alaska, Colorado, Montana, Utah) with at least some Utah records from high elevations (ROHÁČEK & BARBER 2013, see Table 2).



Figs 168–175. *Arganthomyza disjuncta* Roháček & Barber, 2013, paratype male (Canada: Alberta). 168 – external genitalia, caudally; 169 – base of phallapodeme, dorsally; 170 – external genitalia, laterally; 171 – hypandrial complex, laterally; 172 – transandrium, caudally; 173 – apex of filum of distiphallus, anteroventrally (widest extension); 174 – aedeagal complex, laterally; 175 – gonostylus, lateroventrally (widest extension). Scales = 0.05 mm (Figs 173, 175) and 0.1 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 122–128).



Figs 176–183. *Arganthomyza disjuncta* Roháček & Barber, 2013, paratype female (Canada: Alberta). 176 – spermathecae; 177 – postabdomen, dorsally; 178 – the same, ventrally; 179 – ventral receptacle, laterally; 180 – internal sclerites, ventrally; 181 – the same, laterally; 182 – S10, ventrally; 183 – female genital chamber and apex of postabdomen, laterally. Scales = 0.2 mm (Figs 177, 178), 0.1 mm (Fig. 183) and 0.05 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 129–136).

***Arganthomyza socculata* (Zetterstedt, 1847)**

(Figs 185–202)

Geomyza socculata Zetterstedt, 1847: 2534.*Anthomyza socculata*: ANDERSSON (1976): 50–51 (redescription, generic combination); Soós (1981): 111 (key); ANDERSSON (1984b): 53 (catalogue); ROHÁČEK (1984a): 393 (key), ROHÁČEK (1987a): 55–57 (diagnosis), ROHÁČEK (1998a): 173 (world checklist); ROHÁČEK (2006a): 191–196 (redescription and synonymy).*Arganthomyza socculata*: ROHÁČEK (2009a): 63, 74 (key, generic combination); ROHÁČEK & BARBER (2013): 39–41 (redescription, relationship).*Anthomyza ungulata* Loew, 1873: 301; CZERNY (1902): 252; CZERNY (1928): 5; COLLIN (1944): 267 (key); TROJAN (1962): 39; STACKELBERG (1970): 326 (key); ANDERSSON (1984b): 53 (catalogue); ROHÁČEK (1984a): 392 (synonymy).

Type material. *Geomyza socculata* Zetterstedt: HOLOTYPE: ♂, “G. socculata ♂. Ostrog. Stenh.”, “Lectotypus *Geomyza socculata* Zett., design. 1974 H. Andersson” [red label], “1969, 925” [green label], “Type No. 2095:1, Zool. Mus. Lund Sweden, Anthomyzidae”, “Holotypus ♂ *Geomyza socculata* Zett., J. Roháček des. 2005” [red label] and “*Anthomyza socculata* (Zett., 1847) ♂, J. Roháček det. 2005” (MZLU, genit. prep., examined). This type specimen was incorrectly designated as lectotype by ANDERSSON (1976: 45) but it is a holotype because only this male from Östergötland: Häradsdamm, collected by Stenhammar, was listed in the original description.

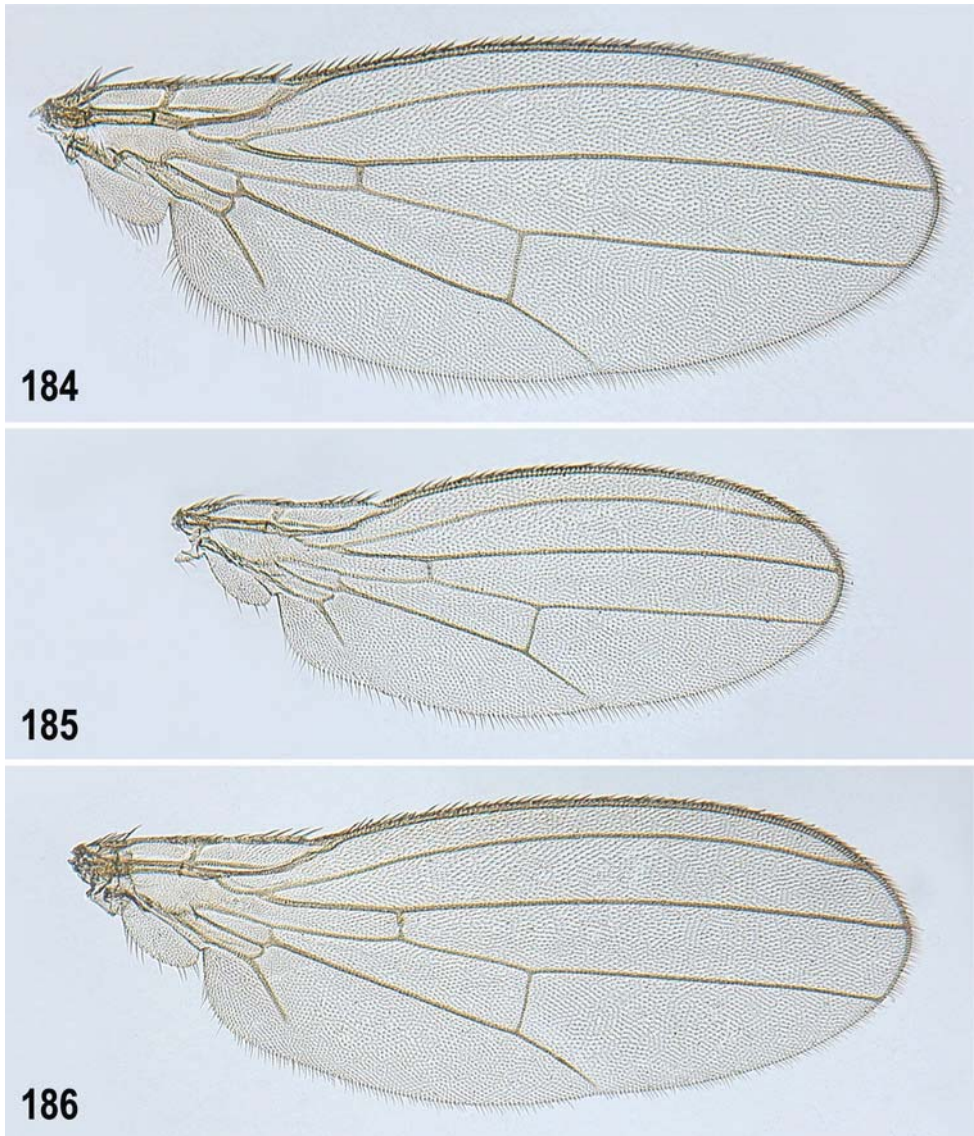
Anthomyza ungulata Loew: LECTOTYPE: ♂ (designated by ROHÁČEK 1984a: 392): “Kultuk, v. Maak”, “Coll. H. Loew”, “*Anthomyza ungulata* Lw” (Loew’s handwriting), “Type” [orange red label], “Zool. Mus. Berlin” [yellow label], “Lectotypus, *Anthomyza ungulata* Loew ♂, J. Roháček des. 1983” [label with red margin and the word “Lectotypus”] and “*Anthomyza socculata* (Zett.) ♂, J. Roháček det. 1983”. The specimen is in good condition (ZMHB, genit. prep., examined). PARALECTOTYPES: 2 ♀♀, with the same labels as the lectotype except for Loew’s determination label (ZMHB, examined).

Other material examined. Palaearctic specimens, 311 ♂♂ 232 ♀♀ (see ROHÁČEK 2006a, 2009a). Nearctic specimens, 35 ♂♂ 42 ♀♀ (CASC, CNCI, DEBU, SMOC, USNM) (details in ROHÁČEK & BARBER 2013).

Diagnosis. Male 1.90–2.42 mm, female 1.98–2.94 mm. Brown to blackish brown, distinctly though rather sparsely pale grey microtomentose and relatively shining; face, parafacialia, gena, postgena, mouthparts, haltere entirely and frons, antennae, legs largely contrasting ochreous, yellow or whitish yellow. Frontal triangle reaching up to anterior third of frons. Mid and hind basitarsus without short thickened setae. T1 and T2 almost separate, only laterally fused. Wing hyaline (Figs 185–186). Reference to the genitalia is necessary to differentiate confidently this species from *A. disjuncta* and *A. acuticuspis*.

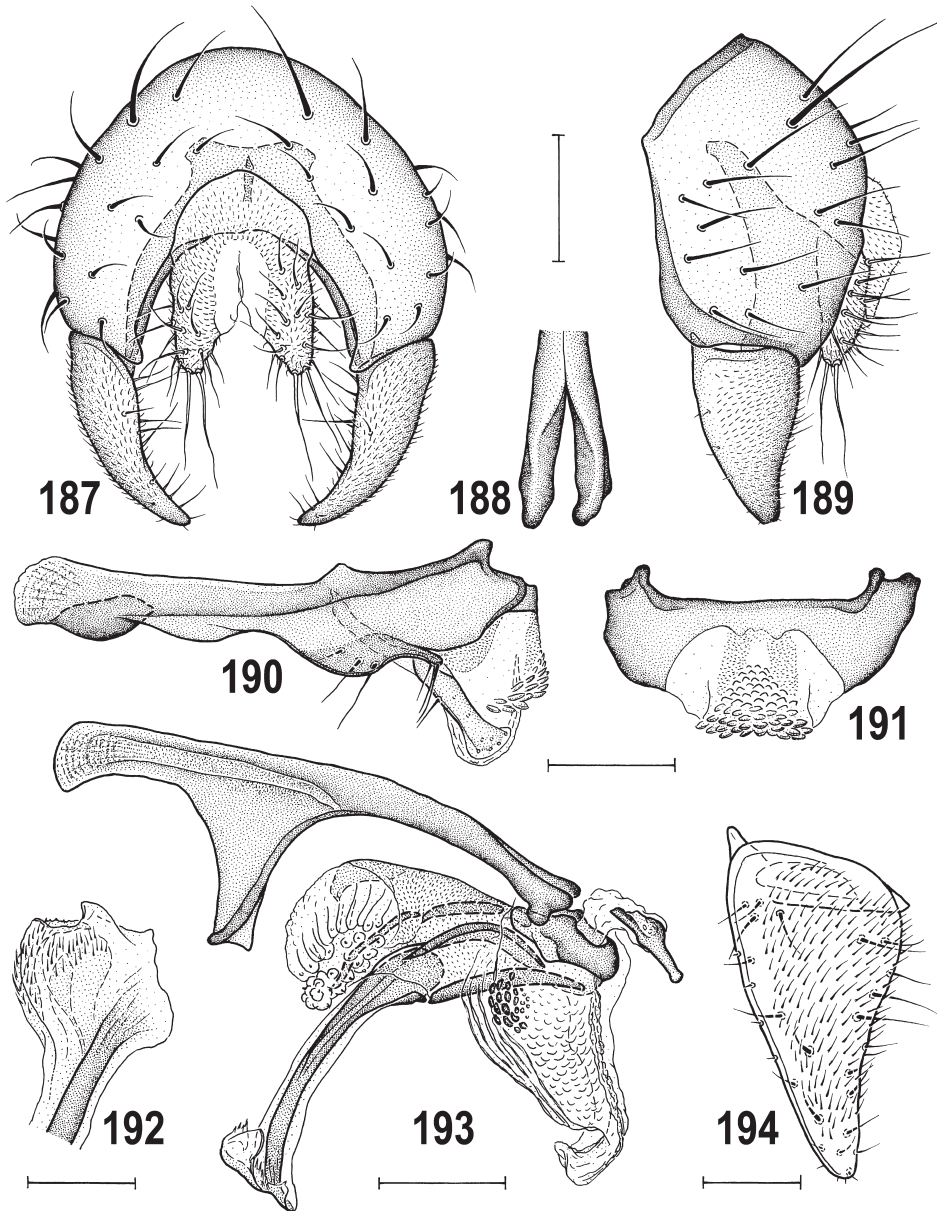
Male genitalia (see Figs 187–194 for details). Epandrium (Figs 187, 189) dark brown, distinctly higher than long. Gonostylus (Figs 187, 189, 194) ochreous to yellow, flat, slightly bent medially, of elongately subtriangular shape, with tapered but narrowly rounded apex, largely micropubescent on outer side and setose mostly on inner side; its shape variable: in Nearctic and E. Palaearctic specimens more slender and apically more acute (see Fig. 194) on average than in European specimens but always with anterior margin convex and posterior margin concave (in largest extension view). Hypandrium (Fig. 190) relatively robust, with anterior internal lobes small, ventrally (anterior to pregonite) more distinctly excavated than in *A. disjuncta*; posterior wide parts of hypandrium fused with transandrium. Pregonite (Fig. 190) fused to hypandrium, low, slightly projecting, with 2–3 posterior (1–2 longer on a tubercle-like process) and 3 anterior (all internal) setae. Aedeagal part of folding apparatus with dark granulate tubercles on proximal part (covering larger area on right side than on left) and usual fine striae (Fig. 193).

Female postabdomen and genitalia (see Figs 195–202 for details). T7 and S7 completely fused into dark brown ring-shaped tergosternum, Nearctic and E. Palaearctic specimens dorsally often with distinctly paler posterior and sometimes also anterior band (Fig. 195),

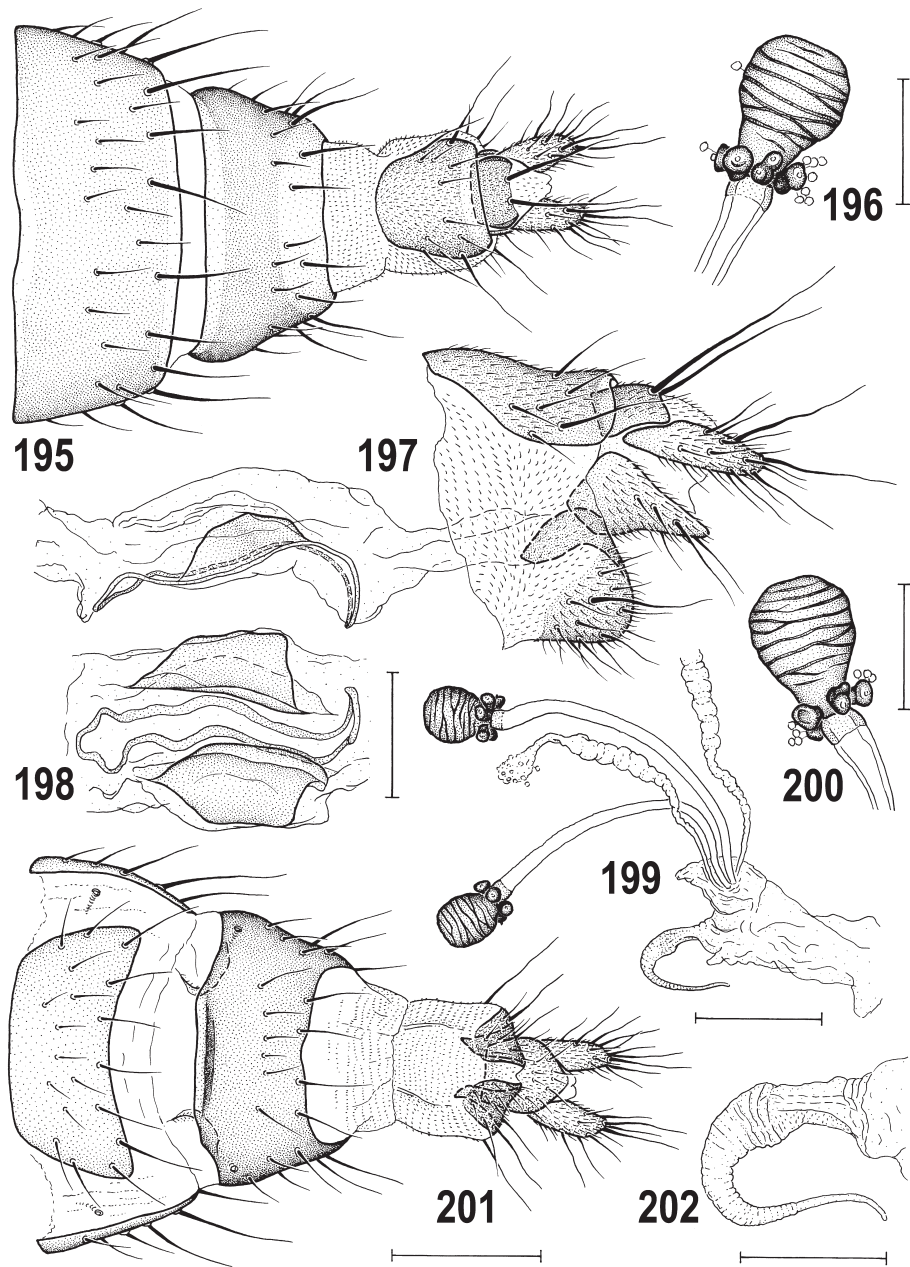


Figs 184–186. Wings of the Nearctic species of *Arganthomyza*. 184 – *A. disjuncta* Roháček & Barber, 2013, paratype male, wing length 2.3 mm (Canada: Alberta); 185, 186 – *A. socculata* (Zetterstedt, 1847), males, wing length 1.75 mm and 2.2 mm (both USA: Alaska). Photo by K. N. Barber. Adapted from ROHÁČEK & BARBER (2013: Figs 170–172).

ventrally usually with dark, transverse anteromedial stripe (Fig. 201) which is sometimes reduced, and with long setae at posterior margin. Anterior margin of original S7 sometimes with a pair of small appendages (cf. Fig. 201). Ventral receptacle (Fig. 202) hyaline, slender, long, strongly curved, gradually tapering towards blunt apex (somewhat thicker and shorter in Nearctic specimens). Spermathecae (1+1) short-pyriform, with dark transversely striated



Figs 187–194. *Arganthomyza socculata* (Zetterstedt, 1847), male (USA: Alaska). 187 – external genitalia, caudally; 188 – base of phallapodeme, dorsally; 189 – external genitalia, laterally; 190 – hypandrial complex, laterally; 191 – transandrium, caudally; 192 – apex of filum of distiphallus, ventrally (widest extension); 193 – aedeagal complex, laterally; 194 – gonostylus, lateroventrally (widest extension). Scales = 0.05 mm (Figs 192, 194) and 0.1 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 137–144).



Figs 195–202. *Arganthomyza socculata* (Zetterstedt, 1847), female (USA: Alaska). 195 – postabdomen, dorsally; 196 – spermatheca; 197 – internal sclerites and apex of postabdomen, laterally; 198 – internal sclerites, ventrally; 199 – distal part of female genital chamber, laterally; 200 – spermatheca; 201 – postabdomen, ventrally; 202 – ventral receptacle, laterally. Scales = 0.2 mm (Figs 195, 201), 0.1 mm (Figs 197–199) and 0.05 mm (others). Adapted from ROHÁČEK & BARBER (2013: Figs 152–159).

surface and slender base provided with rosette of 5–6 characteristic bell-shaped appendages (see Figs 196, 200) some of which can have doubled apex in Nearctic specimens; duct with cervix developed but weakly sclerotized.

Variability. This widespread Holarctic species displays remarkable variability in the postabdominal characters. The Nearctic specimens closely resemble those from eastern Asia (Mongolia, Russia: Far East), and compared to European specimens they seem to be generally smaller. The male gonostylus is narrower and more acute, the female T7+S7 is often anteriorly and/or posteriorly pale-margined, the female T8 is narrower, the ventral receptacle is thicker, and the spermathecae often have doubled bell-shaped appendages.

Discussion. *Arganthomyza socculata* is very closely allied to *A. disjuncta* and forms with it a distinctive sister pair distinguished by the apomorphies diagnosing the *A. socculata* group (see ROHÁČEK & BARBER 2013, and above). *Arganthomyza socculata* and *A. disjuncta* are distinct in the female sex but their males are very similar even in the genitalic structures (for differences see the key and in the description and discussion under *A. disjuncta*).

The geographical variability discussed above, particularly the differences between European and E. Palaearctic + Nearctic specimens, will need future study to evaluate the differences between the populations in these areas. Future molecular studies may help to elucidate this problem, but for the time being these populations are considered conspecific. However, we do not rule out the possibility that the Nearctic populations of *A. socculata* (hitherto known only from Alaska) interbreed in Alaska with the sympatric and closely allied *A. disjuncta*, because a few males found in some localities there could not be assigned to one or the other species. However, we cannot be sure that *A. socculata* is really restricted to Alaska in North America because much of the boreal component of the Nearctic Region has not been sufficiently sampled for Anthomyzidae.

Biology. Old World habitats are varied but a common thread appears to be graminoids (both grasses and sedges) in open areas, sometimes along water bodies but also under birch canopy (see ROHÁČEK & BARBER 2013 for details). Unfortunately no data on habitat and/or plant association are available for the Nearctic (Alaska) specimens, except for one specimen swept in tundra and one from vegetation on the edge of a lake. The habitat is nonetheless assumed to be similar to that of *A. disjuncta* (see above), at least in Alaska, where the two species co-occur at a few sites. Adults were recorded here in 15 June to 4 August.

Distribution. A Boreo-alpine circumpolar species widespread in the northern belt of the Palaearctic Region ranging from Iceland to Kamchatka but also occurring in montane ranges of more southern latitudes. Its Palaearctic distribution is summarized by ROHÁČEK (2006a, 2009a) as follows: Austria, Czech Republic (Bohemia), Estonia, Finland, Great Britain (Scotland), Iceland, Kazakhstan, Kirghizia, Lithuania, Mongolia, North Korea, Norway, Poland, Russia (Central and North European Territory, W. and E. Siberia, Far East), Slovakia, Sweden, Switzerland, Ukraine. It was recorded for the first time from the Nearctic Region from Alaska (United States of America) by ROHÁČEK & BARBER (2013) (see Table 2, Fig. 600).

Arganthomyza socculata/*disjuncta*

Male specimens not distinctly referable to either of the two species. UNITED STATES OF AMERICA: ALASKA:
10 ♂♂ (CNCI, USNM) (details in ROHÁČEK & BARBER 2013).

Genus *Anthomyza* Fallén, 1810

Anthomyza Fallén, 1810: 20 [feminine]. Type species: *Anthomyza gracilis* Fallén, 1823: 8 (designated by WESTWOOD 1840: 152).

Anthomyza: WILLISTON (1896): 105 (key); CZERNY (1902): 250 (diagnosis); ALDRICH (1905): 645 (catalogue); BECKER (1905): 230 (catalogue); WILLISTON (1908): 298 (key); COQUILLET (1910): 507 (catalogue); MELANDER (1913): 286 (key); CZERNY (1928): 2 (redescription); CURRAN (1934): 329 (key); SÉGUY (1934): 301 (key); COLLIN (1944): 265 (key); STURTEVANT (1954): 557 (key); FREY (1958): 32 (key); TROJAN (1962): 37 (diagnosis); CURRAN (1965): 329 (key); SABROSKY (1965): 819 (catalogue); COLE (1969): 435 (key); DOSKOČIL (1977): 257 (key); VOCKEROTH (1977): 241 (catalogue); SOÓS (1981): 109 (diagnosis); ANDERSSON (1984b): 50 (catalogue); VOCKEROTH (1987): 890 (key); ROHÁČEK & FREIDBERG (1993): 64 (key); ROHÁČEK (1998a): 172 (world checklist); ROHÁČEK (1998b): 276 (key); ROHÁČEK (2006a): 83–89 (diagnosis, key); ROHÁČEK (2009a): 24–31, 106–114 (diagnosis, key, phylogeny).

Leptomyza Macquart, 1835: 580 [feminine] (unnecessary new name for *Anthomyza* Fallén, 1810 assumed preoccupied by *Anthomyia* Meigen, 1803). Type species: *Anthomyza gracilis* Fallén, 1823: 8 (designated by COQUILLET 1910: 560).

Leptomyza: SCHINER (1864): 281 (diagnosis).

Anthophilina Zetterstedt, 1837: 55 [feminine] (unnecessary new name for *Anthomyza* Fallén, 1810 assumed preoccupied by *Anthomyia* Meigen, 1803). Type species: *Anthomyza gracilis* Fallén, 1823: 8 (by monotypy).

Anthophilina: RONDANI (1875): 186 (checklist, key); OSTEN SACKEN (1878): 198 (catalogue).

Diagnosis. (1) *Head* longer than high to slightly higher than long. (2) Eye large, suboval to ovoid, with longest diameter oblique. (3) Frons mostly dull, frontal triangle medium-sized or narrow, reaching to anterior half to third of frons. (4) Frontal lunule small but distinct. (5) Occiput slightly to distinctly concave. (6) Vertex (= top of head) usually without silvery microtomentose spots between frontal triangle and posterior part of orbits. (7) Antenna geniculate, pedicel simple; (8) arista short-ciliate to distinctly plumose. (9) Palpus usually yellow, with 1 subapical seta. Cephalic chaetotaxy: (10) pvt small, convergent to crossed; (11) vti usually longest, vte and oc also long; (12) 3 (aberrantly 4 due to duplication) ors, but the anterior short and/or reduced to a setula, 0–1 microsetulae in front of the latter; (13) a single row of small postocular setulae; (14) 1 long vi; subvibrissa usually small, somewhat longer than peristomals; (15) peristomal setulae small and sparse. (16) Posterior corner of head rounded. (17) Antenna often with darker 1st flagellomere in female; face usually with same colouring in both sexes.

(18) *Thorax* as wide as or narrower than head. Thoracic chaetotaxy: (19) 1 hu; 2 npl (anterior longer); (20) 1 distinct prs; (21) 1 short sa, 1 pa; (22) 2–3 long dc (if 3 then anterior markedly shorter), posterior dc longer than apical sc; (23) ac microsetae in 4 (rarely 2) rows on suture, in 2 more posteriorly; (24) 2 sc, basal very short and weak; (25) 1 minute ppl; (26) 2 spl, posterior usually longer. (27) Legs mostly yellow, often with dark apical tarsal segments, rarely with darkened femora. (28) f_1 with posteroventral ctenidial spine. (29) t_2 with usual ventroapical seta (rarely duplicated). (30) Male f_3 simply setulose or with a posteroventral row of dense, short and thickened setae. (31) Wing long and relatively narrow; (32) wing membrane unicolourous, at most darkened at anterior margin. (33) C usually with distinct spinulae between apices of R_1 and R_{2+3} ; (34) R_{2+3} , long, slightly sinuate, subparallel with C; (35) R_{4+5} straight, very slightly bent or sinuous, subparallel with M apically; (36) cell dm long, widened distally, with r-m situated near (usually in front of) its middle; (37) distal part of CuA_1 usually longer than dm-cu and almost reaching wing margin; A_1 short, not reaching wing margin. (38) Alula small and narrow.

Male abdomen. (39) T1 and T2 partly fused. (40) T2–T5 large and broad, usually all uniformly pigmented, more rarely dark transversely banded or spotted. (41) S1–S5 narrow and usually paler than terga (S1 shortest and bare). Male postabdomen: (42) T6 reduced, short transverse, pigmented, medially unpigmented or entirely unpigmented, and bare. (43) S6 and S7 strongly asymmetrical, with 0–4 setulae each. (44) S8 less asymmetrical, long, setose in posterior half.

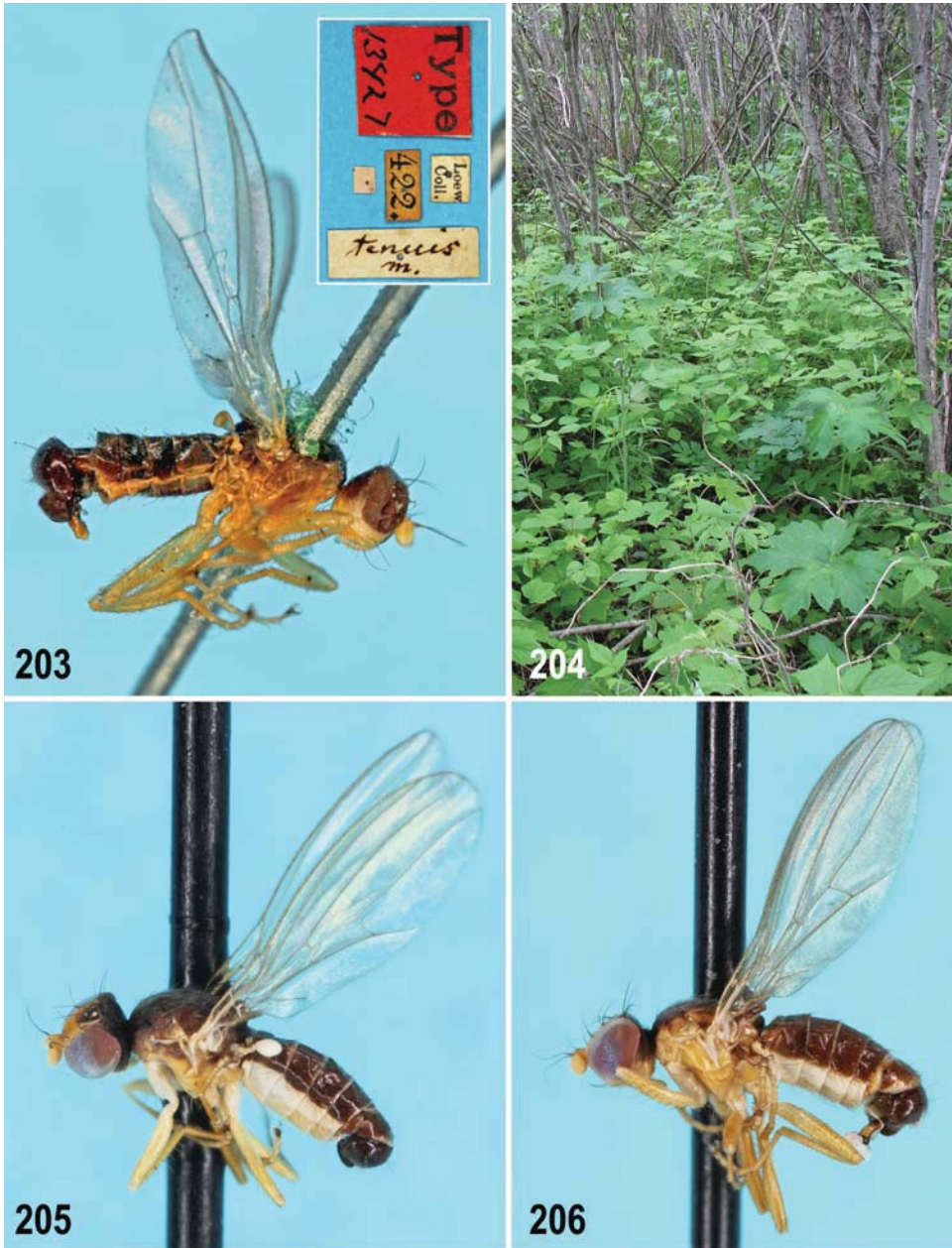
Male genitalia. (45) Epandrium as wide as high to strongly wider than high, with 1–2 pairs of longer setae in addition to short setae. (46) Medandrium of various form, usually broader ventrally and narrower dorsally. (47) Cercus small to medium long, weakly sclerotized, usually with fine pale setae. (48) Gonostylus of various size, usually relatively broad, with micropubescence on outer side, setose on inner side. (49) Hypandrium relatively robust, symmetrical and well sclerotized, with anterior inner lobes more or less developed; (50) transandrium of various form, without or with (sometimes extremely robust) caudal process. (51) Pregonite fused with hypandrial frame, low, often with 1 ventrally projecting lobe and with 2 (anterior and posterior) groups of setae; (52) postgonite slender, strap-like, with 1 anterior or lateral setula, usually in proximal half. (53) Phallapodeme slender to robust, basally (sometimes asymmetrically) bifurcate, apex usually bicuspidate. (54) Aedeagus with short and rather simple phallopore. (55) Distiphallus composed of largely membranous saccus and usually long, slender and sclerotized filum. (56) Saccus armed with robust to small and short spines; (57) filum sclerotized, formed by single sclerite, usually slender and distally attenuated but its apex may be secondarily widened and terminated in more projections. (58) Aedeagal part of folding apparatus with various structures externally and internally, usually spinose or tuberculate and striated; connecting sclerite usually distinct, rarely membranous. (59) Basal membrane usually densely spinose, unarmed when caudal process enlarged. (60) Ejacapodeme very small, usually with slender digitiform projection.

(61) **Female abdomen** with broader, more transverse preabdominal terga and narrower sterna than in male; T1–T5 usually uniformly pigmented dark brown to yellow. (62) Postabdomen long, tapered, telescopic. (63) T6 large, similar to T5, usually more trapezoidal in outline (seen dorsally); S6 largest sternum and usually paler than T6. (64) T7 and S7 forming or tending to form tergosternal ring-shaped cone, original S7 usually discernible by pale pigmentation; if S7 separate, it is reduced or (rarely) widened and overlapping lateral margins of T7; (65) T8 usually narrow, elongate, sometimes strongly tapered posteriorly. (66) S8 longitudinally divided, in 2 often elongate sclerites, having posterior part more or less bent dorsally and recurved internally. (67) Female genital chamber with 1 to 3 pairs of internal sclerites (often fused together, rarely asymmetrical) and with (68) one curved and usually elongate (never transverse) annular sclerite; (69) ventral receptacle very long, tubular and hyaline, with apex slender and curved, vermicular or helicoid; (70) accessory gland small, hyaline, at most with finely granular structure and with minute stalked globulae on surface, on slender, subterminally slightly widened duct. (71) Spermathecae (1+1) on very long ducts, subspherical to elongately pyriform, usually with transversely ringed surface and minute spinulae, often also with terminal invagination. (72) T10 small, variable in shape, usually shorter and narrower than S10, with 1 medial pair of long setae and (sometimes) with 1–4 pairs of additional setulae.

(73) S10 usually longer and wider than T10. (74) Cercus long and slender, rarely more robust, with numerous fine setae (apical and dorsoprealongest).

Discussion. As stated by ROHÁČEK (2006a, 2009a), this is likely the largest genus of Anthomyzidae and displays considerable morphological diversity in external as well as in male and female genitalic characters. This continues to be true after the revision of the Nearctic species with a number of species described as new below. The addition of these new species to *Anthomyza* required an update of the generic diagnosis (originally provided by ROHÁČEK 2009a) and preparation of a key to the identification of all the species now known in this region. Although the genus *Anthomyza* can be identified by external characters (see the generic key above), it is always necessary to verify the placement of unknown species by checking the male genitalic and female postabdominal characters stressed below.

The monophyly of *Anthomyza* is only supported by several apomorphic characters in the male and female genitalia, the most important of which are the following: (56) saccus armed by spines; (57) filum of distiphallus compact, formed by a single sclerite; (60) ejacapodeme very small; (64) female T7 and S7 forming (or tending to form) a tergo-sternal ring; (66) female S8 longitudinally divided into 2 sclerites which are posteriorly partly invaginated; (68) annular sclerite more or less curved and elongate; (69) ventral receptacle very long, tubular, with apex attenuated and curved or twisted. None of these apomorphies is unique within the family Anthomyzidae and some (64, 66, 68) are shared with relatives of *Anthomyza*, viz., *Arganthomyza*, *Ischnomyia* and *Fungomyza*. In addition, the genus *Epischnomyia* Roháček, 2006 has recently been hypothesized as being the closest relative of *Anthomyza* in a multigene molecular analysis (ROHÁČEK & TÓTHOVÁ 2014). This relationship also seems to be supported by the internal structures of the male and female genitalia, as some peculiar (and highly modified) characters of *Epischnomyia* could probably be derived from those of a common ancestor of these two genera or even from a basal clade of *Anthomyza* (as results of ROHÁČEK & TÓTHOVÁ 2014 indicate), e.g. the enormously enlarged spines in the saccus of the distiphallus or the sclerotized curved apex of the otherwise tubular ventral receptacle of the female. Nevertheless, the genus *Anthomyza* in the present concept (without *Epischnomyia*) seems to be a monophyletic group as was also demonstrated by molecular data analysis of (only) the 12S + 16S mitochondrial gene markers (ROHÁČEK et al. 2009). However, the hypothesis based on analysis of seven combined mitochondrial and nuclear gene markers (ROHÁČEK & TÓTHOVÁ 2014: Fig. 1) placed *Epischnomyia* within *Anthomyza* as a sister group of the *Anthomyza macra* group (albeit with low support), thus rendering *Anthomyza* paraphyletic. Because the apomorphic aedeagal characters 56, 57 (although modified in *Epischnomyia*) are shared by these two genera, their close (sister-group) relationship is highly plausible; moreover, even the possibility that *Epischnomyia* species belong, in fact, to *Anthomyza* cannot be rejected and this hypothesis is to be tested in future phylogenetic studies. Besides the apomorphic features in the male aedeagal complex (56, 57) shared with *Epischnomyia*, all being clearly derived states with respect to those found in other genera of the *Anthomyza* clade, the monophyly of *Anthomyza* is further demonstrated by the very reduced ejacapodeme (60) and by the membranous elongate tubular ventral receptacle (69), with a slender and twisted to coiled apex. The latter character is considered to be the most derived state of



Figs 203–206. Primary types of the Nearctic species of the *Anthomyza macra* group and their habitat. 203 – *A. tenuis* (Loew, 1863), lectotype male, laterally and its type labels, body length 2.74 mm; 204 – habitat of the Nearctic species of the *A. macra* group in Moosonee (Canada: Ontario); 205 – *A. silvatica* sp. nov., holotype male, laterally, body length 2.50 mm; 206 – *A. oblonga* sp. nov., holotype male, laterally, body length 2.65 mm. Photo by K. N. Barber (Fig. 204) and J. Roháček (others).

a transformation series where the more ancestral, but also still apomorphic, states (relative to taxa outside the *Anthomyza* clade) of this character occur in *Fungomyza*, *Ischnomyia* and *Arganthomyza* species; the plesiomorphic state, viz. the short membranous ventral receptacle, is known e.g. in the genus *Amygdalops* Lamb, 1914. In *Epischnomyia*, as expected, the ventral receptacle is peculiarly modified: although not terminally tapered (plesiomorphic) it has a short and robust U-curved sclerotized apex (apomorphic). The dissimilarity of *Epischnomyia* and *Anthomyza* is further demonstrated by the female S8 which is not longitudinally divided medially in *Epischnomyia* (in contrast to all other taxa of the *Anthomyza* clade) but broad and only posteromedially incised.

According to ROHÁČEK (2009a), the sister pair *Fungomyza* + *Arganthomyza* could form a sister clade to *Anthomyza*. Although this hypothesis disagrees with results of the most recent molecular study by ROHÁČEK & TÓTHOVÁ (2014), particularly regarding the placement of *Fungomyza*, the morphological data suggest that these genera plus *Ischnomyia* and *Epischnomyia* (see above) are related. The poorly known monotypic genus *Receptrix* Roháček, 2006 from the Asian Near East also resembles this group of genera in having the female S8 divided and the tergosternum T7+S7 well developed, and, like *Fungomyza* + *Arganthomyza*, it also has shortened spermathecal ducts. The genus differs, however, in having a strongly modified female genital chamber with an extremely enlarged and sclerotized ventral receptacle (see ROHÁČEK 2006a: Figs 516, 517), reduced spermathecae and fused female cerci.

Species included: At present the genus *Anthomyza* includes 20 species in the Palaearctic Region plus one species in the Oriental Region. ROHÁČEK (2009a) divided these species among groups delimited by synapomorphic features as revealed by cladistic analysis of morphological characters. These species [and species groups] are as follows: *A. macra* Czerny, 1928, *A. pleuralis* Czerny, 1928, *A. decolorata* Roháček, 2009 [*A. macra* group]; *A. umbrosa* Roháček, 2006, *A. baezi* Roháček, 1999, *A. clara* Roháček, 2006 [*A. umbrosa* group]; *A. pallida* (Zetterstedt, 1838), *A. dissors* Collin, 1944 [*A. pallida* group]; *A. neglecta* Collin, 1944, *A. paraneglecta* Elberg, 1968, *A. orineglecta* Roháček, 2006 [*A. neglecta* group]; *A. collini* Andersson, 1976, *A. anderssoni* Roháček, 1984 [*A. collini* group]; *A. drachma* Sueyoshi & Roháček, 2003 [ungrouped]; *A. flavosterna* Sueyoshi & Roháček, 2003 [ungrouped, possibly related to *A. bellatrix* group]; *A. bellatrix* Roháček, 1984, *A. trifurca* Sueyoshi & Roháček, 2003, *A. cuneata* Roháček, 1987 [*A. bellatrix* group]; *A. tschirnhausi* Roháček, 2009 [originally tentatively placed in *A. collini* group, now in *A. tschirnhausi* group, established here]; *A. gracilis* (Fallén, 1823) and *A. elbergi* Andersson, 1976 [*A. gracilis* group].

In the Nearctic Region, 18 species of *Anthomyza* (including 15 new) are recognized here and assigned to species groups as follows: *A. tenuis* (Loew, 1863), *A. oblonga* sp. nov., *A. silvatica* sp. nov. [*A. macra* group]; *A. pengellyi* sp. nov., *A. mcalpinei* sp. nov., *A. pullinotum* sp. nov., *A. concolor* (Thomson, 1869), *A. occidentalis* sp. nov., *A. vockerothi* sp. nov. [*A. pallida* group]; *A. variegata* (Loew, 1863), *A. dichroa* sp. nov., *A. gibbiger* sp. nov., *A. orthogibbus* sp. nov. [*A. neglecta* group]; *A. shewelli* sp. nov., *A. gilviventris* sp. nov. [*A. tschirnhausi* group, established here]; *A. vulgaris* sp. nov., *A. furvifrons* sp. nov., *A. equiseti* sp. nov. [*A. gracilis* group].

The Nearctic species of *Anthomyza* are treated below following their presumed phylogenetic relationships. Diagnoses of the particular species groups of *Anthomyza* are updated as

a consequence of the inclusion of the Nearctic species; this is done in separate paragraphs in front of the treatment of the first species of each group. The species groups represented in the Nearctic Region are keyed below. Keys to the identification of the species within groups are given under the diagnosis of each group.

Key to identification of species groups of Nearctic *Anthomyza*

- 1 Silvery white microtomentum above occipital foramen in a large medially divided patch (best observed obliquely from above in pale species, Figs 294, 297, 319, 320, 357, 401) almost reaching to bases of pvt; occiput dark, yellow, or variegated; male f_3 with or without shortened and thickened setae posteroventrally on distal part. 2
 - No large silvery white microtomentose patch between occipital foramen and ocellar triangle, or small microtomentose areas restricted to dorsolateral margins of foramen (*A. gracilis* group, Figs 521, 523); occiput otherwise entirely dark; male f_3 simply setose posteroventrally. 3
- 2(1) Primarily yellow species; pleura yellow with narrow brown band on dorsal margin of mesopleuron (least developed in *Anthomyza gibbiger*) and including greater ampulla of pteropleuron (Fig. 382); male epandrium invariably completely yellow (Figs 384, 402); male often with face darkened medially (Fig. 405), always yellow in female (cf. Fig. 404); 1st antennal flagellomere long-ciliate on anteroventral margin (Fig. 395); male f_3 simply setose; filum of distiphallus with short, digitiform curved apex (Figs 410, 447); female T7+S7 with ventrolateral, usually distinctly pouch-like lobes (Figs 393, 415). ***A. neglecta* group** (p. 229; key to species on p. 230)
 - Overall colouring wide-ranging; pleura dark brown, yellow, or both but if yellow, never with brown dorsal margin on mesopleuron and greater ampulla (Figs 295, 342); male epandrium usually at least partly darkened (Figs 294, 295), sometimes yellow in two variably coloured species (*Anthomyza concolor*, *A. vockerothi*); face yellow in both sexes; 1st antennal flagellomere short-ciliate on anteroventral margin; male f_3 with shortened and thickened setae posteroventrally in distal part; filum of distiphallus with slender, curved, gradually attenuate and pointed apex (Figs 266, 362); female T7+S7 ventrolaterally without pouch-like lobes (Figs 270, 289, 331, 374). ***A. pallida* group** (p. 141; key to species on p. 142)
- 3(1) Pleura pale (yellow) usually with dorsal brown band; male surstylus distally broad, spatulate (Figs 214, 231); female T7 and S7 separate (Figs 217, 238); paired internal sclerites of female genital chamber short (Figs 218–219). ***A. macra* group** (p. 111; key to species on p. 111)
 - Pleura entirely dark as in notum; male gonostylus narrowing to apex (Figs 466, 535); female T7 and S7 fused to form conical ring-shaped tergo sternum (Figs 474, 475, 536–538); paired internal sclerites of female genital chamber very elongate (Figs 477, 478, 571, 573). 4
- 4(3) Thorax densely brownish to bluish-grey microtomentose and dull (Figs 518, 522, 547); epandrium small, round-quadrate in lateral profile (Figs 518, 520); gonostylus small (cf. Fig. 552) and short with more or less acute apex (Figs 535, 559); caudal process

- with peculiar dentate ventral appendage (Figs 530–532, 582–584); female S7+T7 not elongate or obviously flattened (Figs 566–568); female 8th abdominal segment with sclerites shorter (Figs 536–538), setose and microtomentose; spermathecae with deep invagination (Figs 569, 572). ***A. gracilis* group** (p. 313; key to species on p. 314)
- Thorax less microtomentose, more shining (Figs 458, 481); epandrium large, ovoid in lateral profile (Figs 457, 483); gonostylus long, slender, elongate (Figs 508–511); caudal process of transandrium simple (Figs 463, 464); female S7+T7 elongate, laterally flattened (with incomplete posteromedial split or desclerotization, Figs 474, 502); female 8th abdominal segment with sclerites extremely elongate (Figs 506, 507), with reduced setosity and microtomentum; spermathecae without invagination (Fig. 479).
..... ***A. tschirnhausi* group** (p. 277; key to species on p. 278)

The *Anthomyza macra* group

The *Anthomyza macra* group comprises species with the most plesiomorphic formation of the male and female genitalia (cf. simple apex of filum, small spines in saccus, presence of setae on medandrium (see Fig. 240), separate female S7, simple internal sclerites in the female genital chamber and curved (not twisted) apex of ventral receptacle) and therefore is considered to be the sister group to all remaining *Anthomyza* species (cf. ROHÁČEK 2009a, ROHÁČEK et al. 2009). On the other hand, the group is also distinguished by several apomorphies: (1) very broad epandrium; (2) distally dilated gonostylus; (3) saccus of distiphallus with internal coiled strip-like sclerite; (4) very elongate spermathecae. Three Palaearctic species, viz. *A. macra* Czerny, 1928, *A. pleuralis* Czerny, 1928 and *A. decolorata* Roháček, 2009, and three Nearctic species, viz. *A. tenuis* (Loew, 1863), *A. oblonga* sp. nov. and *A. silvatica* sp. nov. are currently assigned to the group. Because of their very similar habitus and male and female genitalia, the identification of some of these species can be difficult. This also causes problems in recognizing interrelationships of all its members, but hypotheses of the affinities of the Nearctic species are presented in the discussions of each species below.

Key to identification of the Nearctic species of the *Anthomyza macra* group

- 1 Male. 2
– Female. 4
- 2(1) Gonostylus suboblong in widest extension outline (Fig. 231); apex of filum bluntly truncate (Fig. 229); scutellum often medially pale brown to yellow.
..... ***A. oblonga* sp. nov.**
- Gonostylus distally strongly widened in widest extension outline (Figs 214, 242); apex of filum lanceolate (Figs 211, 246); scutellum usually brown (sometimes medially pale brown in *A. tenuis*). 3
- 3(2) Epandrium very large and broad (largest dorsal width of epandrium more than 1.1 times as long as longest eye diameter), with anal fissure small and low (Fig. 207). Gonostylus laterally as large as epandrium (Fig. 208), distally more widened and with small acutely projecting posteroventral corner (Figs 207, 214). Posterior process of

- pregonite with more (4–5) setae (Fig. 209). Saccus with numerous spines (Fig. 212). Humeral callus usually yellow. *A. tenuis* (Loew, 1863)
- Epandrium smaller, less broad (largest dorsal width of epandrium less than 0.9 times as long as longest eye diameter), with anal fissure larger and higher (Fig. 239). Gonostylus laterally smaller than epandrium (Fig. 248), distally less widened and with more robust, less pointed posteroventral corner (Figs 241–243). Posterior process of pregonite with only 2 setae (Fig. 244). Saccus with only a few spines (Fig. 247). Humeral callus light brown to brown. *A. silvatica* sp. nov.
- 4(1) Preabdominal terga (T2–T5) entirely brown. Pleural part of thorax with dorsal longitudinal brown band wider, usually covering dorsal one-third or more of mesopleuron; humeral callus light brown to brown; scutellum always brown. T7 dorsomedially shortened (Fig. 249), with anterior emargination; T8 transverse and pale (Fig. 249); S8 short, usually with a few setae (Fig. 253). *A. silvatica* sp. nov.
- T2–T5 dorsally largely yellow or at least distinctly paler brown than laterally. Pleural part of thorax either entirely yellow or only narrowly brown at dorsal margin of mesopleuron; humeral callus yellow or brownish; scutellum may be medially light brown in *A. tenuis* to distinctly yellow in *A. oblonga*. T7 dorsomedially longer, shallowly emarginate (Figs 216, 234); T8 as long as wide or slightly transverse, narrower posteriorly and darker (Figs 216, 234); S8 elongate, with more setae (Figs 217, 238). 5
- 5(4) Large dorsal yellow parts of T2–T5 usually contrasting with brown lateral parts (Fig. 232). T7 usually shorter and wider and with sides convex to straight (Fig. 234). Annular sclerite strongly bent in profile (Fig. 233). Spermathecae with basal part markedly narrower, more distinct from wider terminal part which is more densely, finely ringed (Figs 235, 237). *A. oblonga* sp. nov.
- Dorsal yellow to pale brown parts of T2–T5 continuously transitioning to brown lateral parts. T7 usually longer and narrower and with sides concave (Fig. 216). Annular sclerite slightly bent in profile (Fig. 218). Spermathecae with basal part markedly broader, less distinct from wider terminal part which is less densely, coarsely ringed (Figs 215, 221). *A. tenuis* (Loew, 1863)

Anthomyza tenuis (Loew, 1863)

(Figs 203, 207–222)

Anthophilina tenuis Loew, 1863: 324; OSTEN SACKEN (1878): 198 (catalogue).

Anthomyza tenuis: CZERNY (1902): 250 (key), 252 (list); ALDRICH (1905): 645 (catalogue); WILLISTON (1908): 297 (illustr.: wing, head, fore leg); MELANDER (1913): 293 (key, distribution); SABROSKY (1965): 819 (catalogue); COLE (1969): 436 (distribution); ROHÁČEK (1998a): 173 (checklist).

Type material. LECTOTYPE: ♂ (designated herewith): “Loew Coll.”, “422”, “tenuis m.” (Loew’s handwriting), “Type 13427” (red label), “LECTOTYPUS ♂ *Anthophilina tenuis* Loew, J. Roháček & K. N. Barber des. 2013” (red) and “*Anthomyza tenuis* (Loew) ♂, J. Roháček & K. N. Barber det. 2013”. The specimen is in good condition, with clearly visible, exposed genitalia (see Fig. 203) (MCZC, intact). According to the original description (LOEW 1863), it was collected by Sahlberg in Sitka (USA: Alaska). The lectotype is designated inasmuch as LOEW (1836) did not mention the number of specimens used for the description and owing to the necessity to fix the status of the species because of the existence of two closely allied Nearctic species hitherto confounded under the name *A. tenuis*.

Other material examined. CANADA: ALBERTA: Cypress Co., 6 km SW Onefour, 49°03'58"N, 110°30'20"W, sand

pit, YPT [yellow pan trap], 16–18.viii.2014, 1 ♂, Buck & Cobb leg. (PMAE 00132692, genit. prep.); Dunvegan, N. side Peace River, pan traps in grasses, 19–28.vi.1995, 9 ♂♂ 4 ♀♀ (1 ♂ wing illustration), 28.vi.–11.vii.1995, 7 ♂♂ 2 ♀♀ (2 ♂♂ 1 ♀ genit. prep.), 11–25.vii.1995, 1 ♂ 2 ♀♀ (1 ♂ 1 ♀ genit. prep.), S. Boucher leg. (LEMQ). **BRITISH COLUMBIA:** Chetwynd, 615 m, 25.vi.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Hixon, 21.vi.1976, 1 ♂, E. Dyer leg. (CNCI); Kinbasket Lake, BC Hydro drawdown study, Malaise trap (02MLRT15), 12.vi.2010, 1 ♀, (84MLRT01), 4.vii.2010, 1 ♀, (84MTRTb01), 4.vii.2010, 1 ♀, (87MTRTb01), 10.vii.2010, 1 ♀ (headless), (91MCOT15), 10–11.viii.2009, 1 ♀, Cooper Beauchesne & Assoc. Ltd. leg. (RBCM, all genit. prep.); Liard Hot Springs, Alaska Hwy., mi. 486, 1500', 9–10.vii.1959, 1 ♂, E. E. MacDougall leg. (CNCI); Liard River Hot Springs Park, Alaska Highway DC-496.5, 30.vi.1978, 1 ♀, P. H. Arnaud Jr. leg. (CASC); Likely, 7.vii.1935, 1 ♂, G. S. Walley leg.; Robson, 24.v.1950, 1 ♂, 26.v.1950, 1 ♂, H. R. Foxlee leg.; Qualicum, 15.vi.1955, 1 ♂, G. E. Shewell leg. (all CNCI); Silver & Skagit Rd., 49°14'N 121°23'W to 49°08'N 121°15'W, 450–600 m, clover & flowers, 22.vi.2000, 1 ♀, Goulet & Gillespie leg. (DEBU 00278892, genit. prep.); Smithers, 450–500 m, 22.vi.1978, 1 ♀, N. L. H. Krauss leg. (AMNH, genit. prep.); Terrace, 13.vii.1960, 1 ♂, 15.vii.1960, 1 ♀, W. R. Richards leg.; 32 mi SW Terrace, 17.vii.1960, 1 ♀ (wings missing), wet poplar cedar bush (river flats), 6.vi.1960, 1 ♂, wet, thick poplar cedar forest, 6.vi.1960, 1 ♂; 50 mi SW Terrace, 24.vi.1960, 1 ♂ 3 ♀♀, all J. G. Chillcott leg.; Gagnon Rd., 6 mi W Terrace, 29.vi.1960, 1 ♀; Kleanza Ck., 14 mi E Terrace, 4.vii.1960, 1 ♂, both C. H. Mann leg.; Lakelse Lk. nr. Terrace, 300', 14.vi.1960, 1 ♀, R. Pilfrey leg.; Shames, 18 mi SW Terrace, 23.vi.1960, 1 ♂ 1 ♀, C. H. Mann leg.; Spring Ck., Terrace, 1.viii.1960, 1 ♀, C. H. Mann leg.; same locality but 220', 3.vi.1960, 1 ♂ 1 ♀ (♀ genit. prep.), R. Pilfrey leg. (all CNCI); Victoria, 10.vii.1924, 2 ♂♂, A. L. Melander leg. (USNM); Yoho N. P., EMAN site 1, 51°13'26"N 116°36'49"W, aspen, pitfall, 21–28.vii.1999, 1 ♂, A. Duguay, W. Fitch, R. Longair & C. Ma leg. (BDUC). **NEWFOUNDLAND:** Pasadena, sweeping low[?] veg[etation], 19.vii.1984, 1 ♂, L. Hollett leg. (CNCI). **NORTHWEST TERRITORIES:** Fort Liard, 9.vi.1969, 1 ♂, G. E. Shewell leg. (CNCI). **NOVA SCOTIA:** C[ape] B[retton] H[ighlands] Nat. Pk., PG932924, mixed wood with small stream, 21.vi.1983, 1 ♂; same locality but Lone Shieling, PG732859, over small stream in maple forest, 22.vi.1983, 1 ♀ (genit. prep.); same locality but North Mt., 400 m, PG788880, alder thicket with small stream, 20.vi.1983, 1 ♂, all J. R. Vockeroth leg. (all CNCI); same locality but North Mt., 400 m, PG766864, PT/FIT [pan trap/flight interception trap] in forest & ferns, 11–19.vii.1983, 5 ♂♂ 2 ♀♀, L. Masner leg. (LEMQ). **ONTARIO:** Icewater Creek WS [watershed], 46°53.7'N 84°03.4'W, sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 1 ♂, sweeps, *Thalictrum*, *Eupatorium* [*Eutrochium*], sedges in mixed forest, 17.vii.1998, 1 ♀, K. N. Barber leg. (CNCI, both genit. prep.); Moosonee, 51.24622°N 80.67281°W, Repl. 1 mesic, Malaise trap, 18–21.vi.2010, 1 ♀, NBP Field Party leg. (LEMQ); Moosonee, 51°15.17'N 80°39.88'W, sweeps, mostly *Equisetum*, *Rubus*, under *Populus*, 9.vii.2014, 1 ♀ (CNCI); Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 4 ♂♂ 5 ♀♀ (DEBU 2 ♂♂ 3 ♀♀, SMOC 2 ♂♂ 2 ♀♀), 11.vii.2014, 1 ♂ (CNCI); Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 8.vii.2014, 5 ♂♂ (CNCI 3 ♂♂, SMOC 2 ♂♂ used for molecular work); Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 10.vii.2014, 2 ♂♂ (CNCI), 11.vii.2014, 1 ♂ (DEBU), all K. N. Barber leg.; ~20 km E Nipigon, Hwy. #17, rest area, 48°58.00'N 87°59.09'W, sweeps, *Aster* [*Eurybia*], *Rubus*, *Aralia*, *Dierivilla*, 31.vii.2008, 1 ♂; Otter Rapids, 50°11.08'N 81°38.37'W, sweeps, *Eurybia*, *Equisetum* under *Populus*, 19.vii.2009, 1 ♀, 20.vii.2009, 1 ♂, all K. N. Barber leg. (both CNCI); Pukaskwa N. P., Coastal Trail, Hattie Cove–Playter Harbour, sweep, 21.vii.2001, 1 ♀, M. Buck leg. (DEBU 00183038); ~2 km E Rosspoint, Hwy #17 picnic area, 48°50.3'N 87°29.4'W, 9.vii.1999, sweeps of graminoids, 1 ♂, K. N. Barber leg. (genit. prep.); 27 km SSW White River, boreal mixedwood, 48°21.1'N 85°20.7'W, opaque sticky trap, B1 S4 IO, 16.vii.–7.viii.2002, 1 ♀, S. B. Holmes leg. (genit. prep.); 40 km SSW White River, boreal mixedwood, B6 S3, multi-colour sticky trap, 48°14.06'N 85°21.97'W, #12, 16–26.vi.2003, 1 ♀, 10–23.vii.2003, 1 ♀ (genit. prep.); same locality but 48°14.05'N 85°21.99'W, #8, 16–26.vi.2003, 1 ♀, #9, 10–23.vii.2003, 1 ♂, all K. N. Barber leg. (all CNCI). **QUEBEC:** Lanoraie Bog, 45°59'N 73°17'W, Malaise trap, 2.vi.1987, 1 ♂, Sanborne, Genier & Hargreave leg. (LEMQ 0040472); Round-top Mt., Sutton, 1300', 5.vi.1963, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.). **UNITED STATES OF AMERICA:** **ALASKA:** 11 km E Anchor Point, near Homer, 59°53'22"N 151°45'57"W, 16.vi.2005, 1 ♂ 1 ♀, J. & R. Skevington leg. (CNCI, Diptera #728, 921); Anchorage, [-].vii.1960, 1 ♂, M. R. Wheeler leg. (AMNH); Curry, 29.vi.1952, 2 ♂♂, W. R. M. Mason leg. (CNCI, 1 ♂ genit. prep.); Juneau, 0–100 m, [-].vii.1974, 1 ♀, 50–200 m, 31.vii.1974, 1 ♀, N. L. H. Krauss leg. (AMNH, both genit. prep.); Kenai Peninsula Borough, Long Term Ecological Monitoring Program, 3107, ~1.4 mi E of Lake Sabaka, S ½ of section 6, mixed forest, sweep net sample, 25.vi.2006, 1 ♂, T.

Burke leg. (KNWR, ID:5638); same locality and program, 3324, ~1 km N of Crooked Ck. & ~1.5 km W of Kolomin Lk., forest, sweep net sample, 20.vi.2004, 1 ♂ 1 ♀, Grimes leg. (KNWR, ID:1816, -18); same locality and program, 3229, ~1 mi W of Killey R. & ~7 mi S of Kenai R., SE corner of section 2, spruce forest, sweep net sample, 19.vi.2006, 1 ♀, A. Wu leg. (KNWR, ID:4976); Saxman, 0–50 m, 19.vii.1970, 1 ♀, N. L. H. Krauss leg. (USNM). **IDAHO:** Newman Lk., 16.v.1925, 1 ♀, A. L. Melander leg. (USNM). **MASSACHUSETTS:** Petersham, [-].vii.1926, 1 ♀ (genit. prep.), 30.vii.1926, 1 ♀, A. L. Melander leg. (USNM). **MONTANA:** Lincoln Co., Ross Ck., Giant Cedars Rec. Area, 48°12'N 115°54'W, mature forest, 26.vi.1996, 1 ♀, H. Goulet leg. (CNCI). **NEW HAMPSHIRE:** Crawford Notch, “23-vii”, 1 ♀, N. Banks leg. (MCZC, genit. prep.); Tuckerman’s Rav[ine], Mt. Washington, 51[00]–5400', 31.vii.1954, 1 ♀, Becker, Munroe & Mason leg. (CNCI). **NEW YORK:** Adirondacks, Avalanche Trail, 30.vii.1929, 1 ♀, A. L. Melander leg. (USNM, genit. prep.); Whiteface Mt., 4600–4872', 19.vii.1962, 5 ♂♂ 4 ♀♀, J. R. Vockeroth leg. (CNCI, 1 ♂ 2 ♀♀ genit. prep.). **NORTH CAROLINA:** Haywood Co., Pisgah N. F., Little Pisgah Mt., 35.42401°N 82.74751°W, 1570 m, sweep grassy forest, PIS S5, 19.v.2008, 1 ♂, T. A. Wheeler leg. (LEMQ); Mt. Mitchell, 6500–6684', 5.vi.1962, 10 ♂♂ 2 ♀♀ (2 ♂♂ 1 ♀ genit. prep.); Great Smoky Mts. N. P., Clingman’s Dome, 6300', 6642', 18.vi.1957, 1 ♂ (genit. prep.), 20.v.1957, 1 ♂; Great Smoky Mts. N. P., Indian Gap, 5200', 2.vii.1957, 1 ♂ (genit. prep.), all J. R. Vockeroth leg.; Great Smoky Mts. N. P., Nolan Divide, 4.vi.2001, 1 ♂ (genit. prep.), J. M. Cumming leg. (all CNCI). **NORTH CAROLINA/TENNESSEE:** Great Smokies N.P., Clingman Dome, 18.vii.1941, 1 ♂, A. L. Melander leg. (USNM); Great Smoky Mts. N. P., Clingman’s Dome, 6300', 6642', 2.vii.1957, 1 ♂, W. R. M. Mason leg. (CNCI). **OREGON:** Marion Co., 3 mi E Idanha, 8.vi.1969, 1 ♂, E. M. Fisher leg. (LACM); Tillamook Co., 5 mi SSE Hebo, 11.vii.1971, 1 ♂, G. Steyskal leg. (USNM). **TENNESSEE:** Beech Gap, Gatlinburg, GSMNP, 5500', “IL'h3 75”, sweeps, 23.vi.1947, 1 ♀, R. H. Whittaker leg. (USNM, genit. prep.); Great Smoky Mts. N. P., Indian Gap, 5100', 23.vii.1957, 1 ♀, J. G. Chillcott leg. (CNCI); Indian Gap, 23.vii.1957, 1 ♀, W. R. Richards leg. (CNCI, genit. prep.). **VERMONT:** Jay Peak, 2600–3000', 20.vii.1968, 1 ♂ 1 ♀, J. R. Vockeroth leg. (CNCI); Manchester, 4.vi.[-], 1 ♀, C. W. Johnson leg. (MCZC). **VIRGINIA:** Smyth Co., Mt. Rogers, 5300–5700', 1.vi.1962, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.). **WASHINGTON:** Pierce Co., Clover Creek, 12.viii.1980, 1 ♂, T. L. Whitworth leg. (LACM); Everett, 19.vi.1920, 1 ♂ 1 ♀, A. L. Melander leg. (USNM); Kaluch, 1.viii.1951, 1 ♂, [no collector] (AMNH).

Other *A. macra*-group material of questionable identity (*Anthomyza* sp. cf. *tenuis*). **CANADA: ONTARIO:** Icewater Creek WS [watershed], 46°53.7'N 84°03.4'W, sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 1 ♀, K. N. Barber leg. (CNCI, genit. prep.). **UNITED STATES OF AMERICA: ALASKA:** Kenai Peninsula Borough, ~1 mi W of Killey R. & ~7 mi S of Kenai R., SE corner of section 2, Long Term Ecological Monitoring Program, 3229, spruce forest, sweep net sample, 19.vi.2006, 1 ♂, A. Wu leg. (KNWR, ID:4979, tip of abdomen missing but little doubt this is *A. tenuis*). **MARYLAND:** Glen Echo, 20.v.1923, 1 ♀, J. R. Malloch leg. (USNM, genit. prep.). **NEW YORK:** Lewis Co., Singing Waters Picnic Area, 21.vi.1963, 1 ♀, W. W. Wirth leg. (USNM, genit. prep.); Whiteface Mt., 4600–4872', 19.vii.1962, 1 ♀, J. R. Vockeroth leg. (CNCI, missing abdomen). **PENNSYLVANIA:** Centre Co., State College, 11.vi.1975, 1 ♀, D. D. Wilder leg. (CASC, genit. prep., extensive beetle damage to abdomen). **VERMONT:** Mt. Equinox, 5.vi.[-], 1 ♀, C. W. Johnson leg. (MCZC, somewhat dirty specimen with fractured thorax). **WEST VIRGINIA:** Grant Co., Dahle Sods, 13.vi.1986, 1 ♀, A. L. Norrbom leg. (USNM, genit. prep.).

Redescription. Male. Total body length 2.38–3.02 mm. Body bicolourous, dark brown and yellow, sparsely but distinctly pale grey microtomentose, subshining. Head as long as high or slightly higher than long, anteriorly rounded in profile. Most of head yellow, only occiput and ocellar triangle brown to blackish brown. Occiput almost uniformly dark brown, entirely sparsely grey microtomentose; only its ventralmost part (below foramen) yellowish white. Frontal triangle with lateral margins slightly depressed, pale brown with dirty whitish microtomentum, rather dull and reaching slightly in front of middle of frons. Ocellar triangle dark brown and more shining, with relatively large ocelli. Small elongate spots between posterior half of frontal triangle and orbit more densely silvery white microtomentose (similar to *Arg-anthomyza*). Orbits pale yellow anteriorly up to posterior ors, darker ochreous to pale brown behind the latter and all with whitish microtomentum. Face dirty yellowish white to white,

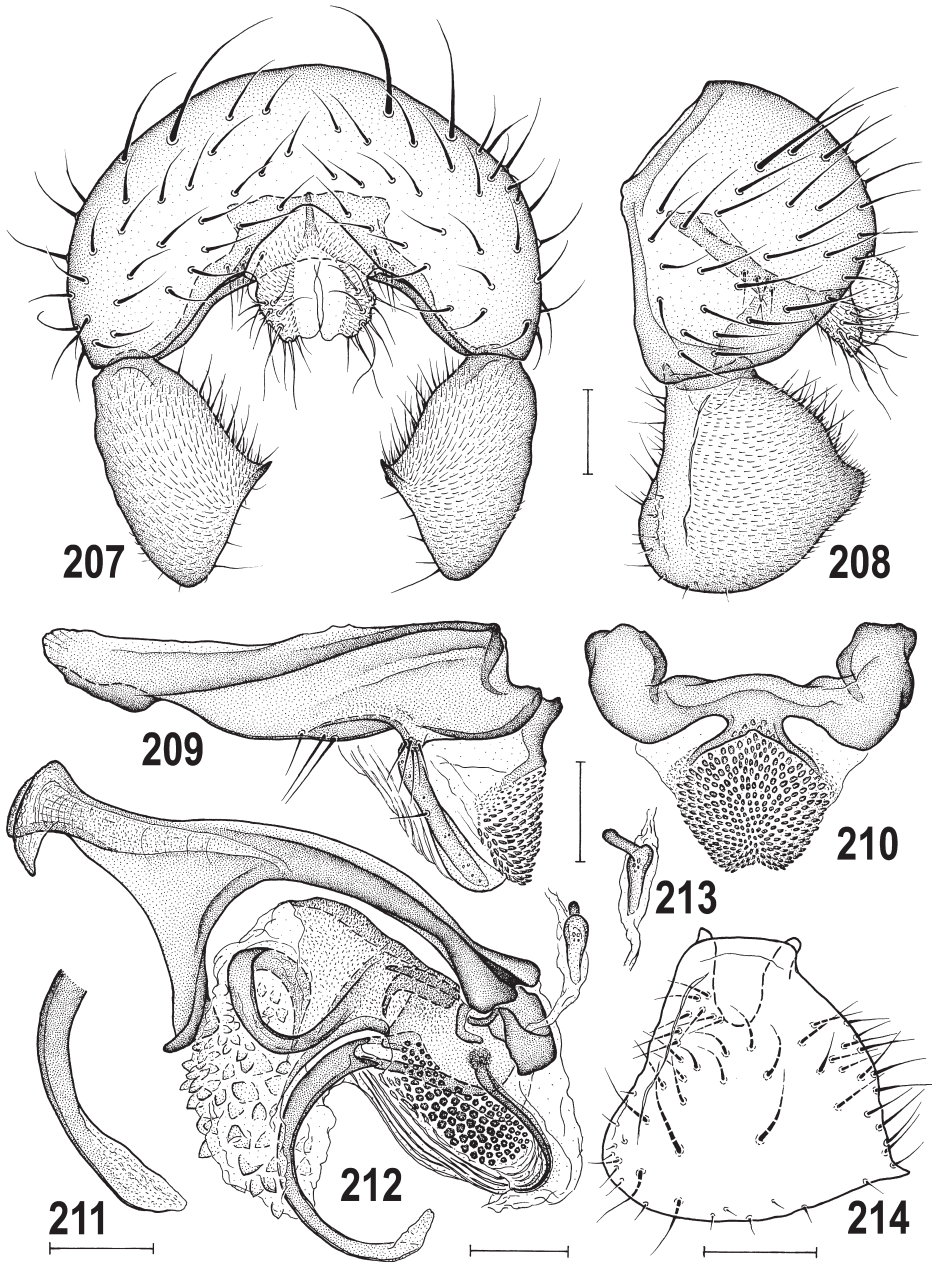
only marginal stripe yellow separating it from parafacialia. Parafacialia, gena and postgena whitish with only narrow marginal stripe yellow, all white microtomentose. Mouthparts whitish yellow including palpus, only clypeus and prementum dark yellow. Cephalic chaetotaxy: pvt relatively long (almost half length of vti) and crossing at midlength; vti and oc subequal and longest of cephalic setae; vte and posterior ors more or less shorter than vti; 3 ors but only posterior and middle ors long (middle ors usually only slightly shorter than posterior ors), anterior ors short or reduced to a weak setula; 2–3 pairs of medial microsetulae in anterior third of frons; postocular setulae (8–9) in one row, almost as long as peristomal setulae; 1 setula behind vte slightly longer than uppermost postocular setula; vi long (usually as long as middle ors) but subvibrissa reduced, slightly longer than anterior peristomal setula; peristomal setulae sparse (5–6); posterior corner of occiput and postgena with scattered setulae plus 1 longer and 1–2 shorter ventral setae. Palpus whitish yellow, with usual preapical seta and 7–9 short setulae ventrally. Eye large, broadly oval, its longest diameter distinctly oblique and about 1.3 times as long as shortest. Gena low, its height only about 0.07 times as long as shortest eye diameter. Antenna with pale yellow scape and pedicel; 1st flagellomere yellowish white and with short white cilia; arista about 2.0 times as long as antenna, shortly ciliate, brown but with basal two thickened segments paler.

Thorax bicolourous, mostly dark brown dorsally, and mostly yellow laterally and ventrally. Mesonotum, scutellum and postscutellum largely dark brown; pleural part of thorax almost entirely yellow (lighter ventrally) only laterotergite, mediotergite and rarely also dorsal margin of mesopleuron darkened (ochreous, pale brown to brown). Humeral and notopleural areas typically yellow and concolourous with adjacent pleural part of thorax; also supra-alar and postalar ridge area of mesonotum sometimes light brown to yellow; scutellum sometimes medially pale brown but never contrastingly yellow (as in palest specimens of *A. oblonga*). Mesonotum sparsely but distinctly greyish microtomentose, subshining; pleural part duller and with lighter (whitish) microtomentum. Thoracic chaetotaxy: All macrosetae long but fine; 1 hu (longer than posterior npl), 2 npl (anterior longer), 1 distinct prs (as long as or longer than anterior npl), 1 shorter sa, 1 longer pa; 2 postsutural dc, anterior long, posterior very long, together with apical sc longest of thoracic setae; 6–7 dc microsetae in front of anterior dc, the hindmost longer than others; ac microsetae fine, in 3–4 rows on suture and also between anterior dc, in 2 rows more posteriorly and ending in front of posterior dc (hindmost ac often distinctly prolonged); 2 sc, apical strong, as long as posterior dc, laterobasal weak but usually longer than longest mesonotal microsetae, rarely (1 male from Alberta: Onefour) with extra pair of small setulae basal to the basal sc and asymmetrically spaced; 2 strong stpl (anterior usually shorter), 2–3 upcurved setulae below and 1 in front of them and several setae on ventral corner of sternopleuron. Scutellum subtriangular, very slightly convex to almost flat dorsally. Legs yellow, coxae and trochanters yellowish white, only distal half of apical segment of all tarsi brownish. f_1 with ctenidial spine relatively short, as long as or slightly shorter than maximum width of t_1 and setae in posterodorsal and posteroventral rows long but fine; t_2 with short ventroapical seta; other parts of legs (including male f_3) simply finely setose. Wing (Fig. 222) long but not very narrow, with hyaline ochreous membrane and ochreous veins. C with sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} subparallel to C, apically very slightly

upcurved to almost straight. R_{4+5} very slightly bent (recurved) and apically parallel or slightly convergent to M. Cell dm relatively broad, with r-m situated distinctly in front of its middle; terminal section of CuA_1 usually somewhat longer than dm-cu and almost reaching wing margin; A_1 short, ending far from wing margin. Alula small, narrow; anal lobe well developed. Wing measurements: length 2.58–3.18 mm, width 0.79–1.03 mm; $Cs_3 : Cs_4 = 1.37\text{--}1.73$, $rm \setminus dm\text{-}cu : dm\text{-}cu = 2.23\text{--}2.68$. Haltere with dirty yellow stem and whitish yellow knob.

Abdomen with terga and sterna sparsely microtomentose and relatively shining. Preabdominal terga large, extended onto pleural part of abdomen, brown to dark brown but usually lighter than epandrium. T1 dorsally separate from and paler than T2, shortly setulose. T2–T5 unicolourous brown and uniformly sparsely setose. Preabdominal sterna narrow, pale yellow to ochreous. S1 short, transverse, bare, with darker posterior marginal ledge. S2–S5 as long as wide to slightly transverse (wider than long) and becoming progressively wider and larger posteriorly; S5 the largest, widest posteriorly, subtrapezoidal. T6 short, strongly transverse, bare, pale brown, seemingly bipartite because of broad unpigmented stripe dorsomedially. S6–S8 dorsally fused. S6–S7 asymmetrical, pale ochreous to yellow, with only anterior ledge-like margins (S7 usually also ventrally) brown. S6 with 2–3, S7 with 2 setulae. S8 relatively long, situated dorsally, more symmetrical, darker brown and setose in posterior half.

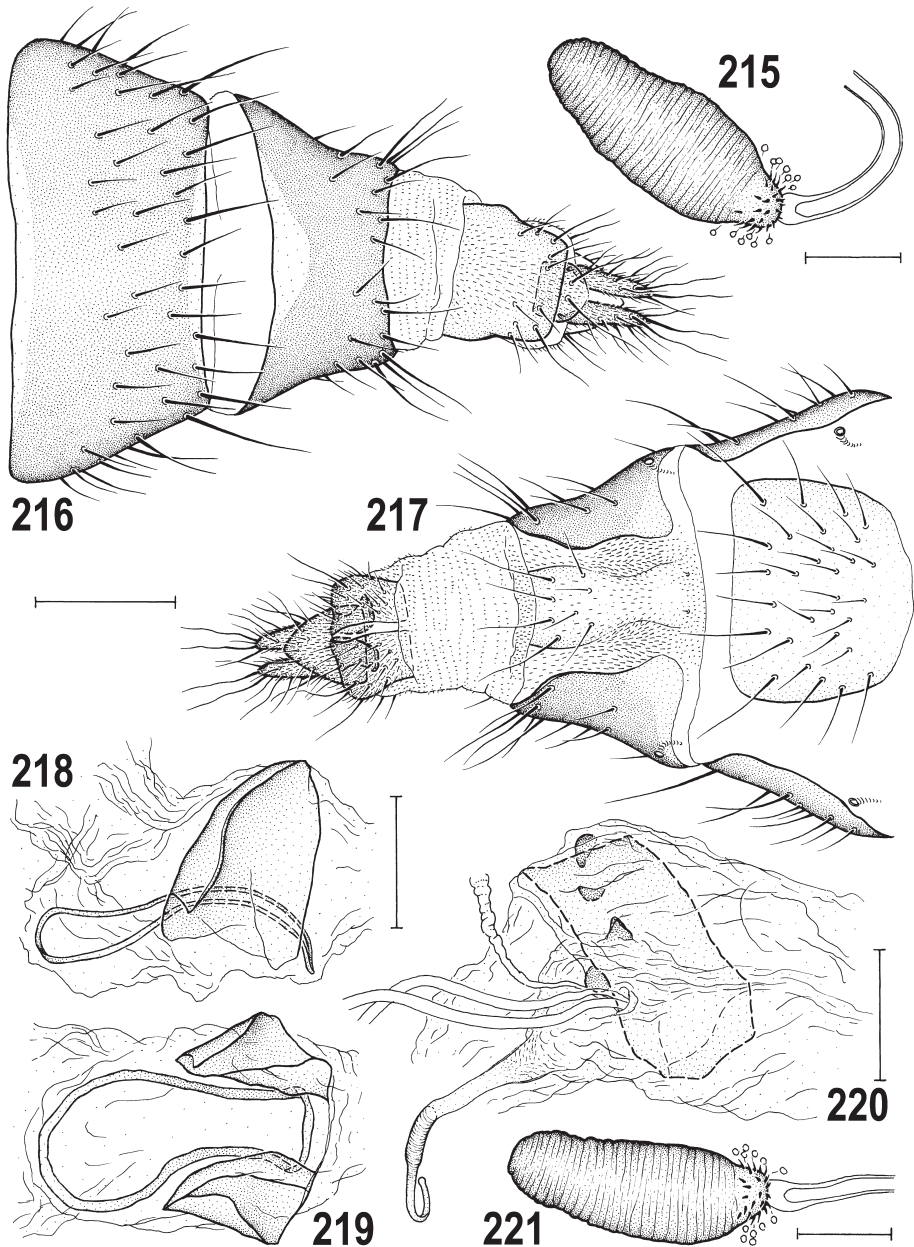
Genitalia. Epandrium (Figs 207, 208) very broad as in *A. macra*, usually with 2 pairs of longer setae besides short setae; anal fissure small, lower (shorter) than in relatives and (as in *A. decolorata*) subtriangular. Cercus small, short, finely pale setose. Medandrium wide and low, smaller and lower than in both Nearctic relatives, with somewhat projecting but rounded dorsolateral corners and several (4–5) small setae on inner side of ventrolateral arms. Gonostylus (Figs 207, 208, 214) large, convex, as long as epandrial height, distally more strongly dilated than in *A. silvatica* and with anteroventral corner broadly rounded (thus most similar to that of *A. macra*) but with posterior corner projecting with small sharp point (Figs 207, 214), with rich setae only on inner side and externally largely micropubescent except for anterior margin. Hypandrium (Fig. 209) moderately robust (more posteriorly), with very low internal anterior lobes and integrated pregonites. Transandrium (Fig. 210) closely resembling that of relatives, with flat caudal process rather short, broader basally and with very slender divergent terminal arms. Pregonite (Fig. 209) very low, with posterior process small as in most relatives but with slightly different chaetotaxy (with 3 anterior and 5 posterior setae). Postgonite also much like (including chaetotaxy) that of relatives, very slightly bent in profile but somewhat more robust (Fig. 209), dilated internally (as in other species, not visible in Fig. 209). Aedeagal part of folding apparatus with fine grain-like tubercles and striae (Fig. 212); connecting sclerite slender, distally strongly bent, more sclerotized than in most relatives; basal membrane finely and densely spine-like tuberculate (Figs 209, 210). Phallapodeme moderate in size, with forked proximal end, relatively slender fulcrum but with apex laterally widened and with sharp, long, projecting corners (Fig. 212). Phallopore virtually identical to that of *A. oblonga*. Saccus (Fig. 212) voluminous and with internal coiled strip-like structure well developed, as in allied species, but its distal membranous part with numerous short robust pale-pigmented spines. Filum (Fig. 212) largely dark, ribbon-shaped, curved, with paler and slightly dilated lancet-shaped apex (Fig. 211). Ejacapodeme (Fig. 213) similar to that of relatives, with digitiform projection, larger than in *A. silvatica*.



Figs 207–214. *Anthomyza tenuis* (Loew, 1863), male (Canada: Alberta – Fig. 209 and USA: New York – others). 207 – external genitalia, caudally; 208 – the same, laterally; 209 – hypandrial complex, laterally; 210 – transandrium, caudally; 211 – apex of filum, subventrally; 212 – aedeagal complex, laterally; 213 – ejacapodeme (widest extension); 214 – gonostylus, sublaterally (widest extension, micropubescence omitted). Scales = 0.05 mm (Fig. 211) and 0.1 mm (others).

Female. Similar to male unless mentioned otherwise. Total body length 2.46–3.10 mm. Cephalic and thoracic macrosetae longer and thicker. Antenna with 1st flagellomere darker yellow, particularly around base of arista. Ctenidial spine on f_1 longer and thicker, usually distinctly longer than maximum width of t_1 . Wing measurements: length 2.78–3.46 mm, width 0.95–1.23 mm; $Cs_3 : Cs_4 = 1.42\text{--}1.67$, $rm\ dm\text{-}cu : dm\text{-}cu = 2.14\text{--}2.65$. Preabdomen with terga more transverse and variable in colouration, usually distinctly paler than those of postabdomen. T1 and T2 dorsally separate, T2 often somewhat darker than T1 or T3. T1–T5 brown to ochreous yellow, dorsally usually lighter than on lateral bent sides but the paler (ochreous yellow to pale brown) dorsal parts not sharply separated from darker (pale brown to brown) sides (in contrast to *A. oblonga*). Preabdominal sterna slightly narrower than in male; S2 and S3 slightly longer than wide; S4 and S5 wider than long, slightly (S4) to distinctly (S5) transverse, S5 the widest (wider than S6). S2–S6 with denser but finer setae than on adjacent terga.

Postabdomen (Figs 216, 217) relatively elongate, tapered posteriorly, retractible, very closely resembling that of *A. oblonga*. T6 dark brown (also medially, thus always distinctly darker than T5), anteriorly very narrowly pale-margined, setose in posterior half. S6 pale-pigmented, slightly rounded transverse, narrower than S5, finely setose. Tergosternal complex with T7 blackish brown, large, with distinctly concave sides (Fig. 216), laterally extended onto ventral side (cf. Fig. 217) and its anterior paler corners reaching far ventromedially but not fused with S7, dorsomedially with anterior paler area, setose mainly at posterior margin; S7 forming narrow pale-pigmented sclerite having usually only 4 fine setulae in front of 4 longer setae at posterior margin, bare and tapered anteriorly; narrow membrane between S7 and T7 with distinctive micropubescence (Fig. 217). T8 not very small, brown (paler than T7), flat, trapezoidal, with rounded posterior corners, sparsely micropubescent except for marginal areas and with fine setae in posterior half. S8 brown, relatively short, longitudinally divided and posteromedially invaginated as in all relatives, densely micropubescent and setose. Genital chamber (Figs 218–220) with 1 pair of distinct pale brown-pigmented posterior bent sclerites (Fig. 219), elongate annular sclerite below them medium-sized, in profile distinctly less bent (Fig. 218) than that of *A. oblonga* and terminal part of genital chamber with pale-pigmented (but often poorly visible, as in relatives) plate-like sclerite (Fig. 220, somewhat similar to that in *A. macra* Czerny, 1928) but with a few small sclerotized grains in addition. Ventral receptacle (Fig. 220) tubular, elongate, finely ringed in front of narrowed, strongly curved terminal end with rounded apex. Accessory gland small, vesiculate, on moderately long, ringed, subterminally dilated, duct. Spermathecae (1+1) elongate, cone-shaped (Figs 215, 221), with short basal part paler, spinulose and narrower (compared to Nearctic relatives), and terminal part wider, longer, darker and transversely striated (less densely than in *A. oblonga*); spermathecal ducts very long, without terminal cervix. T10 small, pale-pigmented, rounded pentagonal, with 1 pair of long medial setae and sparse micropubescence (Fig. 216). S10 markedly larger than T10, rounded triangular, finely setulose at posterolateral margins, micropubescent on ventral surface (Fig. 217). Cercus relatively long and slender (Fig. 216), with dorsopreapical and apical setae longest but with some longer lateral setae in addition to shorter setulae.



Figs 215–221. *Anthomyza tenuis* (Loew, 1863), female (Canada: Alberta). 215 – spermatheca; 216 – postabdomen, dorsally; 217 – the same, ventrally; 218 – internal sclerites, laterally; 219 – the same, ventrally; 220 – distal part of female genital chamber, laterally; 221 – spermatheca. Scales = 0.2 mm (Figs 216, 217), 0.05 mm (Figs 215, 221) and 0.1 mm (Figs 218–220).

Discussion. *Anthomyza tenuis* (Loew, 1863) is one of the three Nearctic species of the *A. macra* group. Externally it closely resembles both its Nearctic relatives (*A. oblonga* sp. nov., *A. silvatica* sp. nov.) and also the Palaearctic *A. pleuralis* Czerny, 1928. It can be safely distinguished from these allied species by characters of the male genitalia (e.g. the very large and broad epandrium, distally strongly dilated gonostylus with sharply pointed posteromedial corner, saccus of distiphallus with numerous short spines) but females are sometimes more difficult to diagnose because *A. tenuis* has postabdominal structures very similar to those of *A. oblonga*. Identification of females of *A. tenuis* is further complicated by the variability of colouration of the pleura and, particularly, of the preabdominal terga (T1–T5), with paler specimens resembling *A. oblonga*, and darker specimens resembling *A. silvatica*. In these cases, females of the other two species can be recognized by rather tiny differences in the spermathecae (in *A. tenuis* with basal spinose part wider, less distinctly separated from the main part which is less densely striated), the form of T7 (in *A. tenuis* with concave sides), the shape of the annular sclerite (in *A. tenuis* less curved in profile) and the armature in the distal part of the female genital chamber (transverse plate-like sclerite better developed in *A. tenuis*). However, we have also found intermediate (ambiguous?) female specimens which cannot be definitely associated with any of these species and had to be left unidentified (material listed below).

Because the characters shared among various species of the *A. macra* group are so delicate, variable and often homoplasious, it is very difficult to establish their interrelationships. *Anthomyza tenuis* can possibly be more closely allied to the Palaearctic sister-pair *A. macra* + *A. pleuralis*, as they all have a laterally concave female T7 and both *A. tenuis* and *A. macra* have an extremely enlarged and distally widened gonostylus and a very broad epandrium. Moreover, these three species lack all (probable) synapomorphies of the remaining species (*A. oblonga*, *A. decolorata* and *A. silvatica*) of the group (see below). *Anthomyza macra* differs from *A. tenuis* by the inner armature of its saccus (with numerous short and weak tubercle-like spines) and by the pleura being almost completely brown.

Biology. Collection data for the Nearctic species of the *A. macra* group indicate a preference for moist woodland habitats with dicotyledonous plants predominating in the undergrowth (as is also known for species in Europe, see ROHÁČEK 2009a) but also with ferns, *Equisetum* and even grasses in some localities. This is particularly evident from collections of all three species made by the junior author in Ontario. It is notable that all three species of the *A. macra* group occurred syntopically in Ontario: Moosonee (although only a single *A. silvatica* was included) where the best collection in Ontario of *A. tenuis* was made. This habitat (Fig. 204) was again a very moist site under a mix of *Salix* sp. and *Alnus* sp. bordering a rail line. The understory was dominated by a *Rubus* sp. along with patchy *Impatiens capensis* Meerb. (Balsaminaceae, the host of *Quametopia terminalis* (Loew, 1863) which was also present). There were abundant specimens of *Heracleum maximum* W. Bartram (Apiaceae), but these are not likely to be hosts for anthomyzids, and there was a clear absence of ferns in the immediate vicinity. The site also yielded three eastern species of *Arganthomyza* (viz., *Arganthomyza carbo*, *A. bivittata* and *A. duplex*), which are often found together with *A. macra*-group members. However, a second site nearby that yielded mostly *A. tenuis* (only males) on the edge of a forest (snowmobile) trail did include some ferns in addition to *Rubus* sp. and predominantly

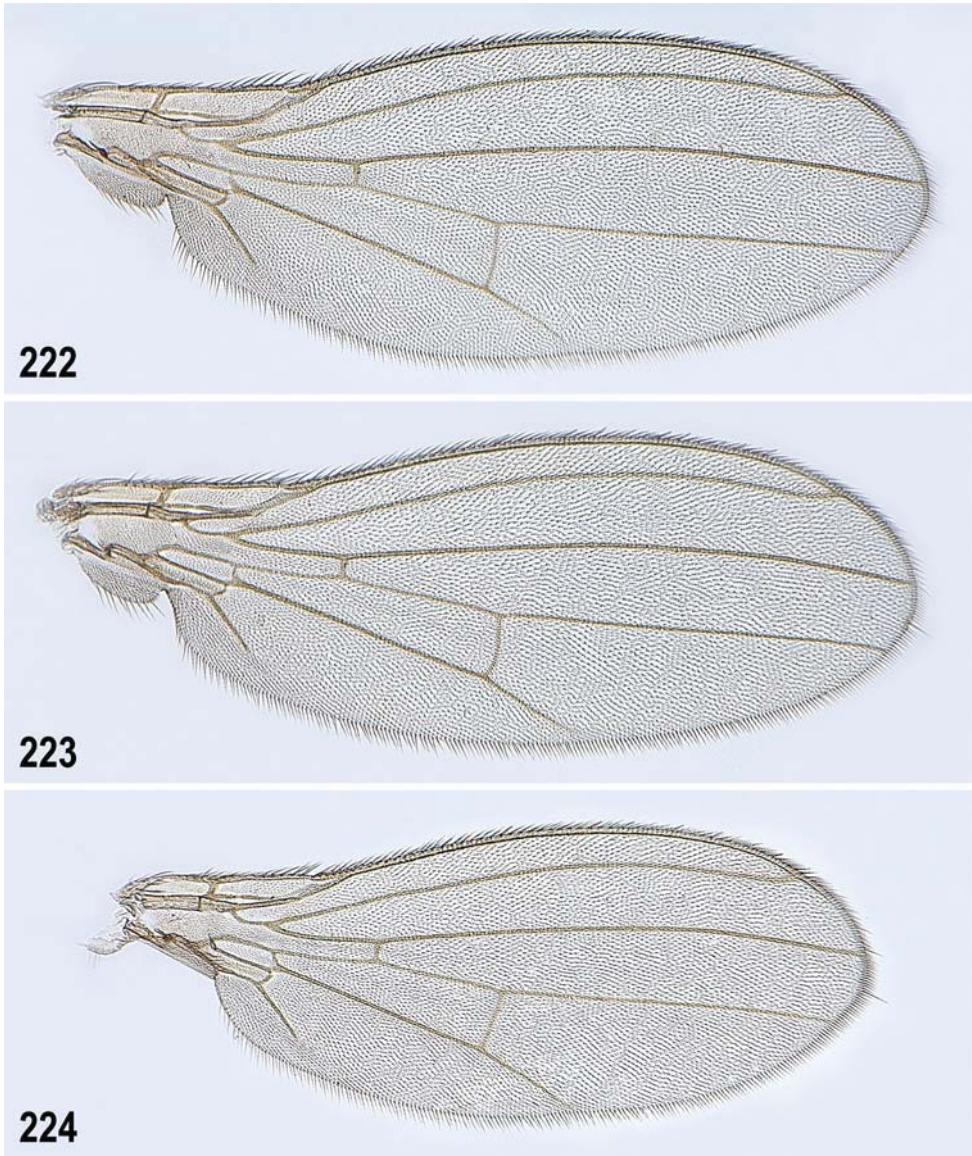
Equisetum species, the latter often representing at least a minor component of these habitats. A third site yielding a single female was similar to that in Otter Rapids (yielding a pair of specimens) in that the overstory was dominated by *Populus tremuloides*. However, there are exceptions to this generalized habitat, especially in western parts of their range and care needs to be taken as most records are based on single specimens.

Of the three Nearctic members of this species group, we know the least about the natural history of *A. tenuis*. There appear to be clusters of collections in eastern North America (Appalachia) and in western North America. The common denominator may be a more generalized requirement for moderated summer temperatures which could be provided at higher elevations or latitudes such as the type locality or, for example, at Alberta: Dunvegan and Ontario: Moosonee (sites with multiple captures). The Dunvegan specimens indicate a preference for open grassy habitat and were syntopic with an unidentified female suggestive of *A. oblonga*. There was a singular collection of a male in Alberta: Onefour where the habitat was extremely xeric and barren of any mesic habitat (Matthias Buck, pers. comm. including photos, the lone specimen with a pair of additional scutellar setulae) and a specimen from “clover and flowers” (British Columbia: Silver & Skagit Rd.) captured with a specimen of *A. silvatica*.

The few collections in eastern North America have sometimes been accompanied by one or the other species of this group (viz. *A. oblonga* or *A. silvatica*) (see discussion of the Moosonee collections above). The specimens from Icewater Creek (Ontario: nr. Searchmont) were taken with *A. silvatica* in a damp depression in a mixed forest which is similar to the habitat near Ontario: White River, where these same two species were collected on sticky traps. A single male (Ontario: Rosspoint) was taken in an isolated, thick growth of grasses in an open lakeside parking area. To date, captures in Ontario are limited to areas north of 46.5° north latitude. Several collections from eastern Canada (Nova Scotia: Cape Breton Highlands N. P.) indicate “mixed wood with small stream”, “alder thicket with small stream”, and “forest & ferns” while “grassy forest” was successfully sampled further south (North Carolina: Little Pisgah Mt.). This would suggest a wide range of potential host-plant associations.

Anthomyza tenuis was collected as early as 16 May (Idaho: Newman Lk.) and as late as 12 August (Washington: Clover Creek), but the limited number of collections may well underestimate the flight period, especially the late-season limit of mid-August.

Distribution. Published records of *A. tenuis* are from Canada: Quebec (WINN & BEAULIEU 1932, SABROSKY 1965); USA: Alaska (LOEW 1863, OSTEN SACKEN 1878), Maine (JOHNSON 1925), Minnesota (SABROSKY 1965), New Hampshire (ALDRICH 1905, MELANDER 1913), Ohio (FOOTE 2002), Virginia (SABROSKY 1965) and Washington (MELANDER 1913). However, at least some of these records are likely based on misidentified specimens and belong, in fact, to one or the other of the two new related species described below (or even possibly *Arganthomyza duplex*). The distribution of *A. tenuis* based on material examined can be summarized as follows with notable absence of records for Manitoba and Saskatchewan: Canada: Alberta, British Columbia, Newfoundland, Northwest Territories, Nova Scotia, Ontario, Quebec; United States of America: Alaska, Idaho, Massachusetts, Montana, New Hampshire, New York, North Carolina, Oregon, Tennessee, Vermont, Virginia, West Virginia (see Table 2). This leaves us unable to confirm the previous record from Maine. The Ohio record is probably a misidentification of *A. silvatica* though the specimen listed below for Herrick Fen under that



Figs 222–224. Wings of the Nearctic species of the *Anthomyza macra* group. 222 – *A. tenuis* (Loew, 1863) male, wing length 2.8 mm (Canada: Alberta); 223 – *A. oblonga* sp. nov., paratype male, wing length 2.7 mm (Canada: Ontario); 224 – *A. silvatica* sp. nov., paratype male, wing length 2.5 mm (Canada: Ontario). Photo by K. N. Barber.

species makes no reference to *Carex* (as for two specimens in Foote 2002). *Anthomyza tenuis* is the only member of the *A. macra* group yet known from Alaska and Northwest Territories in the northwest as well as Idaho, Montana and Oregon.

Anthomyza oblonga sp. nov.

(Figs 206, 223, 225–238)

Type material. HOLOTYPE: ♂, “CAN:ON: SSMarie, Bristol Pl.Pk., 04.vii.2008, KNBar-ber, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rub-us*, ferns, *Phalaris* 46°30.77'N 84°16.66'W” and “Holotypus ♂ *Anthomyza oblonga* sp. n., J. Roháček & K. N. Barber det. 2013” (red). The specimen is in perfect condition, with highly visible, partly exposed genitalia (see Fig. 206) (CNCI, intact). PARATYPES: CANADA: MANITOBA: Ninette, 13.vi.1958, 1 ♀, C. D. F. Miller leg. (CNCI); Ninette, ex. *Rudbeckia laciniota*, 3.vi.1958, 1 ♂, maple/elm floodplain community, 12.vi.1958, 2 ♂♂ 2 ♀♀, J. F. McAlpine leg. (CNCI). NEWFOUNDLAND: Port aux Basques, 6.viii.1961, 1 ♀, C. P. Alexander leg. (USNM, 1 ♀ genit. prep.). NOVA SCOTIA: C[ape] B[retton] H[ighlands] N. P., Beulach Ban Falls, PG812870, swept along fast rocky stream, 8.vii.1983, 2 ♀♀; Truro, 14.vii.1983, 1 ♀, all J. R. Vockeroth leg. (all CNCI). ONTARIO: Algonquin, mixed wood, 1.vi.1991, 1 ♂, M. Barták leg. (MBPC, genit. prep.); Cootes Paradise nr. Dundas, sweeping undergrowth of deciduous forest, 20.viii.1994, 17 ♂♂ 9 ♀♀, J. Roháček leg. (SMOC 14 ♂♂ 8 ♀♀, 3 ♂♂ 3 ♀♀ genit. prep., NMPC 3 ♂♂ 1 ♀); Dubreuilville, 48°21.05'N 84°33.84'W, sweeping *Diervilla*, ferns, *Clintonia*, *Cornus*, *Aralia*, *Eurybia*, *Vaccinium* under *Populus/Pinus*, 10.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); Ferguson, Malaise trap, 21.vii.1990, 1 ♂, S. A. Marshall leg. (DEBU); Fort Frances, 10 mi E on Hwy. 11, 8–9.vii.1978, 1 ♀, H. J. Teskey leg. (CNCI); Greenwater P. Pk., Green Trail, 49°11.73'N 81°16.76'W, sweeps, *Eurybia*, *Cornus*, *Clintonia*, *Diervilla*, *Aralia* under *Populus*, 21.vii.2009, 1 ♂, K. N. Barber leg. (DEBU 01502212); 7 mi E Griffith, 22.vi.1985, 1 ♂, B. E. Cooper leg. (CNCI); Icewater Creek WS [watershed], ~12.7 km NNE Searchmont, mi. 10.5 Whitman Dam Rd., alder thicket, 1.viii.1986, 1 ♀ (CNCI); Icewater Creek WS [watershed], 46°53.7'N 84°03.4'W, sweeps, *Thalictrum*, *Eupatorium* [*Eutrochium*], sedge, fern in mixed forest, 7.vii.1998, 6 ♂♂ 4 ♀♀ (CNCI 4 ♂♂ 2 ♀♀, 1 ♀ genit. prep., USNM 2 ♂♂ 2 ♀♀), sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 3 ♂♂ 4 ♀♀ (AMNH 2 ♂♂ 2 ♀♀, CNCI 1 ♂♂ 2 ♀♀, 1 ♂ 1 ♀ genit. prep.), sweeps, *Thalictrum*, *Eupatorium* [*Eutrochium*], fern in mixed forest, 10.vii.1998, 2 ♀♀ (1 ♀ genit. prep.), sweeps, trailside sedges, ferns, grasses, 10.vii.1998, 2 ♀♀, sweeps, trailside veg. incl. sedges, ferns, grasses, 17.vii.1998, 1 ♀ (genit. prep.) (CNCI); King Mt., 26 km N S[ault] S[te.] Marie, riparian sweeps, 16.vi.1987, 1 ♀ (CNCI), all K. N. Barber leg.; Moosonee, 51.24622°N 80.67281°W, Repl. 1 mesic, Malaise trap, 18–21.vi.2010, 2 ♀♀; Moosonee, 51.24466°N 80.67767°W, Repl. 2 mesic, Malaise trap, 21–24.vi.2010, 1 ♂, NBP Field Party leg. (LEMQ); Moosonee, 51°14.75'N 80°40.33'W, sweeps, mostly *Rubus*, *Ribes*, under *Populus*, 9.vii.2014, 1 ♀; Moosonee, 51°14.79'N 80°40.35'W, 9.vii.2014, sweeps, mostly *Solidago*, *Calamagrostis*, 1 ♀; Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 2 ♂♂ 5 ♀♀; Moosonee, 51°16.36'N 80°39.11'W, sweeps, roadside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 11.vii.2014, 1 ♀, all K. N. Barber leg. (all CNCI); Ottawa, 15.vii.1957, 1 ♀ (genit. prep.), J. E. H. Martin leg., 30.vi.1963, 1 ♀, J. R. Vockeroth leg. (CNCI); S[ault] S[te.] Marie, S of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Impatiens* under *Populus/Betula*, 13.vii.1998, 1 ♂ 1 ♀ (♀ genit. prep.); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 1 ♂, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Baseline Road, 46°31.40'N 84°24.40'W, sweeping *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, *Clematis*, ferns under aspen (*Populus*), 7.vii.2010, 2 ♂♂ 2 ♀♀ (2 ♂♂ 1 ♀ genit. prep.), 12.vii.2010, 1 ♂ (genit. prep.), J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, Malaise #1, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns under aspen, *Solidago*, in aspen clearing, 8–18.vii.2005, 1 ♀, sweeps, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 25.vi.2005, 2 ♂♂, 26.vi.2005, 1 ♂ 2 ♀♀, 22.vii.2010, 1 ♀ (CNCI), 19.vi.2011, 1 ♂ 2 ♀♀ (INHS), 29.vii.2012, 2 ♀♀, sweeps, mostly ferns under aspen, 19.vi.2011, 3 ♂♂ 2 ♀♀ (LACM), 27.vii.2012, 1 ♂ 3 ♀♀ (1 ♀ genit. prep.), 28.vii.2012, 2 ♂♂ 1 ♀ (1 ♂ genit. prep.), 29.vii.2012, 2 ♀♀ (CNCI), K. N. Barber leg.; S[ault] S[te.] Marie, Birchwood Pk., mixed forest, 15.vi.1986, 1 ♂ (MCZC), 28.vi.1986, 1 ♂, 6.vii.1986, 1 ♂ (CNCI); same locality but 46°30.7'N 84°15.6'W, sweeps, mostly *Impatiens*, under *Betula/Acer*, 19.vi.1998, 3 ♀♀ (1 ♀ genit. prep.), 23.vi.1998, 1 ♀, sweeps, *Impatiens*, under *Betula/Acer*, 27.vi.1998, 1 ♀ (genit. prep.), sweeps, graminoids, *Impatiens*, ferns under *Betula/Acer*, 17.ix.2004, 1 ♀; same locality but 46°30.67'N 84°15.63'W, sweeps, *Rubus*, *Aralia*, graminoids,

ferns, under *Betula/Acer*, 29.vi.2008, 1 ♂, sweeps, mostly *Impatiens*, fern, *Aster* [*Eurybia*], 23.viii.2009, 1 ♂ (all CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, Bristol Place, 28.vi.1987, 1 ♀, 1.vii.1987, 1 ♂, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.8'N 84°16.6'W, sweeps, *Impatiens* under *Betula/Acer*, 9.vii.1998, 1 ♂ 1 ♀, sweeps, *Clematis*, *Rubus*, *Impatiens*, grasses, 28.v.1999, 1 ♂, sweeps, mostly *Impatiens*, *Clematis*, *Rubus*, grasses, 11.vi.1999, 2 ♂♂ (CNCI); same locality but 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 29.vi.2008, 2 ♂♂ 3 ♀♀ (CASC), 30.vi.2008, 1 ♂ 1 ♀ (MCZC), 1.vii.2008, 2 ♀♀, 4.vii.2008, 6 ♂♂ 2 ♀♀ (1 ♂ wing illustration, one pair in copula), 5.vii.2008, 1 ♂ 2 ♀♀ (CNCI), 9.vii.2008, 2 ♂♂ 3 ♀♀ (DEBU, 1 ♀ genit. prep.), 11.vii.2008, 7 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), 13.vii.2008, 1 ♀, 27.vii.2009, 1 ♂ 5 ♀♀ (CNCI), 21.vii.2014, 1 ♂ 1 ♀ (SMOC), all K. N. Barber leg.; S[ault] S[te.] Marie, Finn Hill, 46°31.6'N 84°17.4'W, sweeps, vegetation under *Populus*, 4.vii.2002, 1 ♀; S[ault] S[te.] Marie, Fish Hatchery Road, along Coldwater Ck., 46°34.33'N 84°17.23'W, sweeps, trailside *Clematis*, *Eutrochium*, 17.vi.2010, 1 ♂; S[ault] S[te.] Marie, Florwin Dr. greenbelt, 46°30.3'N 84°17.2'W, sweeps, *Impatiens* under *Acer/Betula*, 23.vi.1999, 1 ♀; S[ault] S[te.] Marie, Sault Coll[ege] Woodlot, 46°32.08'N 84°18.25'W, sweeps, *Clintonia*, ferns, under *Acer*, 31.v.2010, 1 ♂, all K. N. Barber leg. (all CNCI). **QUEBEC**: Abbotsford, 4.vi.1937, 1 ♂, G. E. Shewell leg.; Beechgrove, 7.vi.1955, 1 ♀, J. F. McAlpine leg.; Beechgrove, 45°39'N 76°08'W, 29.vi.1962, 1 ♂, J. R. Vockeroth leg.; Bolton Pass, Knowlton, 800', 5.vi.1963, 1 ♂, J. G. Chillcott leg. (all CNCI); 1.2 km E Bristol, Silver Creek, 45°31'N 76°27'W, floodplain meadow, 5.vi.1996, 1 ♀, L. Dumouchel leg. (LEMQ 0040277); Gatineau Pk., Harrington Lk., 3.vii.1963, 1 ♂, J. R. Vockeroth leg.; Lac Roddic, 16 km S Maniwaki, 23.vi.1991, 1 ♂ 1 ♀, M. Barták leg. (MBPC, both genit. prep.); Magog, 1.vi.1965, 1 ♀, D. M. Wood leg. (genit. prep.); Old Chelsea, 18.vi.1963, 1 ♂, J. R. Vockeroth leg. (genit. prep.); Old Chelsea, King Mt., 26.v.1963, 1 ♂, J. G. Chillcott leg.; Wakefield, 26.vi.1946, 1 ♀, 9.vii.1946, 1 ♀, G. E. Shewell leg. (all CNCI). **SASKATCHEWAN**: Kenosee, 7.vi.1958, 2 ♂♂ 7 ♀♀; Saskatoon, 9.vii.1951, 1 ♀, all A. R. Brooks leg. (all CNCI). **UNITED STATES OF AMERICA**: **CONNECTICUT**: Canaan, 17.viii.1952, 1 ♀, A. Stone leg.; Redding, 8.vi.1928, 1 ♀ (genit. prep.), A. L. Melander leg. (both USNM). **ILLINOIS**: Savanna, 13.vi.1917, 1 ♂, [no collector] (INHS 40,188). **INDIANA**: Lafayette, 24.v.1917, 1 ♂, J. M. Aldrich leg. (USNM). **MARYLAND**: Bethesda, 14.viii.1981, 1 ♀, G. C. Steyskal leg. (USNM); Montgomery Co., Bethesda, 5.v.1968, 3 ♂♂, L. V. Knutson leg.; 26.v.1968, 1 ♂, G. C. Steyskal leg.; Cabin John, 21.vii.1921, 1 ♂, J. R. Malloch leg. (Malloch det. as *A. tenuis*); Montgomery Co., Dickerson, 14.vii.1974, 1 ♂ (genit. prep.), G. A. Foster leg.; Glen Echo, 23.vii.1922, 1 ♂, J. R. Malloch leg.; Lavale, 9.v.1970, 1 ♂ (genit. prep., left wing and apical half of right wing missing), G. Steyskal leg. (all USNM); Plummers Is., 12.v.1907, 1 ♂, W. L. McAtee leg. (with det. as *A. tenuis*), 9.viii.1909, 1 ♀ (genit. prep.), Barber & Schwarz leg., 28.vii.1912, 1 ♀, H. L. Viereck leg., 5.v.1914, 1 ♂, 10.v.1914, 1 ♂, at light, 13.vi.1914, 1 ♀ (genit. prep.), R. C. Shannon leg., Malaise trap, 8–20.vii.1968, 1 ♂ (genit. prep.), Paul Spangler leg. (all USNM). **MASSACHUSETTS**: Franklin Co., ~0.5 km E Farley, 42°36.16'N 72°25.94'W, sweeps, asters, ferns, *Impatiens*, *Rubus*, under canopy, 26.vii.2006, 2 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI, 1 ♀ genit. prep.); Middlesex Co., Lincoln, Malaise trap, 4–8.vi.1952, 1 ♀, E. T. Armstrong leg. (USNM, genit. prep.). **MICHIGAN**: Hillsdale Co., 21.v.1960, 1 ♂, R. & K. Dreisbach leg. (USNM). **MINNESOTA**: Itasca Pk., 12.vii.1952, 1 ♂, [no collector] (AMNH). **NEW HAMPSHIRE**: Mt. Washington, 18.vii.[-], 1 ♀, C. W. Johnson leg. (MCZC). **NEW YORK**: Bemus Pt., Chautauqua Lk., swampy woods, 31.v.1963, 1 ♀, W. W. Wirth leg. (USNM); Ithaca, 24.v.1900[?], 1 ♂, [no collector] (AMNH, genit. prep., wings in genit. vial); New York, 31.v.1923, 1 ♂, A. H. Sturtevant leg.; Tompkins Co., Ringwood Res., swamp, 16–17.vi.1963, 1 ♀, W. W. Wirth leg.; Rome, 24.vi.1935, 1 ♀, H. K. Townes leg. (all USNM); Whiteface Mt., 4600–4872', 19.vii.1962, 1 ♂, J. R. Vockeroth leg. (CNCI). **NORTH CAROLINA**: Buncombe Co., Blue Ridge Pkwy. at Craggy Gardens, 35.70°N 82.39877°W, 5400', sweep forest path and clearing, 17.viii.2007, 1 ♀, T. A. Wheeler leg. (LEMQ); Swain Co., Rte 441, 3 mi N Cherokee, Great Smoky Mountains National Park, 35°31.3'N 83°18.5'W, 2000', 27.v.1999, 1 ♀, S. D. Gaimari leg. (99-5, Nat'l Pk. Svc. Permit #GRSM-99-074) (USNM). **PENNSYLVANIA**: Dauphin Co., Grantville, 24.v.1962, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.); Roxborough, 23.v.1909, 1 ♀, [no collector] (USNM, genit. prep.). **VIRGINIA**: Bland Co., Brushy Mt. at Rd. 623, 37.05229°N 81.30209°W, sweep forest edge, 15.viii.2007, 6 ♂♂ 5 ♀♀, J. Mlynarek leg., 4 ♂♂ 1 ♀ (LEMQ 0040768–72, 1 ♂ genit. prep.), T. A. Wheeler leg., 1 ♂ (LEMQ 0040310, genit. prep.), A. MacLeod leg.; Chain Bridge, 7.v.1922, 1 ♀ (genit. prep.), 20.viii.1922, 1 ♀, 14.v.1924, 1 ♂, J. R. Malloch leg.; Fairfax Co., Dead Run, 28.vii.1915, 1 ♂ 1 ♀, R. C. Shannon leg. (♀ genit. prep.); Falls Church, Holmes Run, light trap, 24.viii.1960, 1 ♀, W. W. Wirth leg. (all USNM); Page Co., G. Washington N. F., Gap Creek Trail, 38.70764°N 78.56077°W, 1662', sweep forest path at creek, 19.viii.2007, 1 ♀, J. Mlynarek leg. (LEMQ 0040534); Great Falls, "12-vi", 1 ♀, N. Banks leg. (MCZC); Giles Co., Mountain

Lake Biol. Stn., 37°22'31"N 80°31'18"W, sweep nr. station, 20.v.2005, 1 ♂, S. A. Marshall leg. (DEBU 00252870); near Plimmers Island, MD [Maryland], at light, 20.v.1914, 1 ♀ (genit. prep.), R. C. Shannon leg. (USNM); Shenandoah N. P., mi. 65–100, sweeps, 29.v.1979, 2 ♂♂, M. J. Sharkey leg. (DEBU); Hawksbill Gap, Shenandoah N. P., 1600 m, 17.viii.1981, 1 ♂ 1 ♀, J. R. Vockeroth leg. (CNCI); Shenandoah Co., Mt. Jackson, 25.v.1962, 1 ♂ 1 ♀, J. G. Chillcott leg., 2 ♂♂, J. R. Vockeroth leg. (CNCI); Tazewell, Burkes Garden, Sta[tion] Spr[in]g, 37°05.9'N 81°22.4', 960 m, 18.v.2005, 4 ♂♂, W. N. & D. Mathis leg. (USNM). **WEST VIRGINIA:** Grant Co., Dahle Soda, 13.vi.1986, 1 ♂, A. L. Norrbom leg. (USNM).

Other material examined (not included in type series). Provenance unknown, "Loew Coll.", "Type 13427" (red label), 1 ♀, (MCZC, genit. prep., erroneously labelled a syntype of *Anthophilina tenuis* Loew). **CANADA: ONTARIO:** Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 1 ♀, K. N. Barber leg. (CNCI, deformed postabdominal tergites); S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 21.vii.2014, 3 ♂♂, K. N. Barber leg. (SMOC, used for molecular work). **SASKATCHEWAN:** Kenosee, 7.vi.1958, 1 ♀ (CNCI, headless, genit. prep.). **UNITED STATES OF AMERICA: NEW HAMPSHIRE:** "N.H.", "205", "Loew Coll.", "Type 14558" (red label), 1 ♀ (MCZC, headless, double mount with a ♀ of *Arganthyza duplex* on the same pinned bracket, erroneously labelled as type specimens of *Anthophilina terminalis* Loew). **NEW YORK:** Delaware Co., Franklin Mtn. nr. Oneonta, 3.vii.1980, 1 ♀, D. J. Bickel leg. (MCZC, head glued to pin, genit. prep.).

Other *A. macra* group material of questionable identity (*Anthomyza* sp. cf. *oblonga*). **CANADA: ONTARIO:** S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, *Aster* [*Eurybia*], *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 8.viii.2005, 1 ♀ (genit. prep.); S[ault] S[te.] Marie, Birchwood Park, mixed forest, 28.vi.1986, 1 ♀ (genit. prep.), both K. N. Barber leg. (both CNCI). **UNITED STATES OF AMERICA: PENNSYLVANIA:** Dauphin Co., Grantville, 24.v.1962, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.).

Description. Male. Total body length 2.02–2.66 mm. Externally extremely similar to *A. tenuis* including colouration and chaetotaxy, thus body bicolourous and sparsely pale grey microtomentose as in the latter species. Head shape as in *A. tenuis*, about as long as high. Colouration of head practically identical with that of the latter species including microtomentose pattern of all its parts. Also mouthparts very similarly coloured. Cephalic chaetotaxy as in *A. tenuis*, only pvt somewhat longer (usually slightly longer than half length of vti), 3–4 (usually 3) pairs of medial microsetulae in anterior third of frons, 9–10 postocular setulae; vi long as in *A. tenuis*; subvibrissa weak but usually distinctly longer than anterior peristomal setula. No differences in colour and chaetotaxy of palpus. Eye large and oval as in *A. tenuis*, with longest (oblique) diameter 1.3–1.4 times as long as shortest. Gena higher than that of *A. tenuis*, about 0.12 times as long as shortest eye diameter. Also antenna (including arista) as in the latter species although whitish marginal cilia on 1st flagellomere slightly longer.

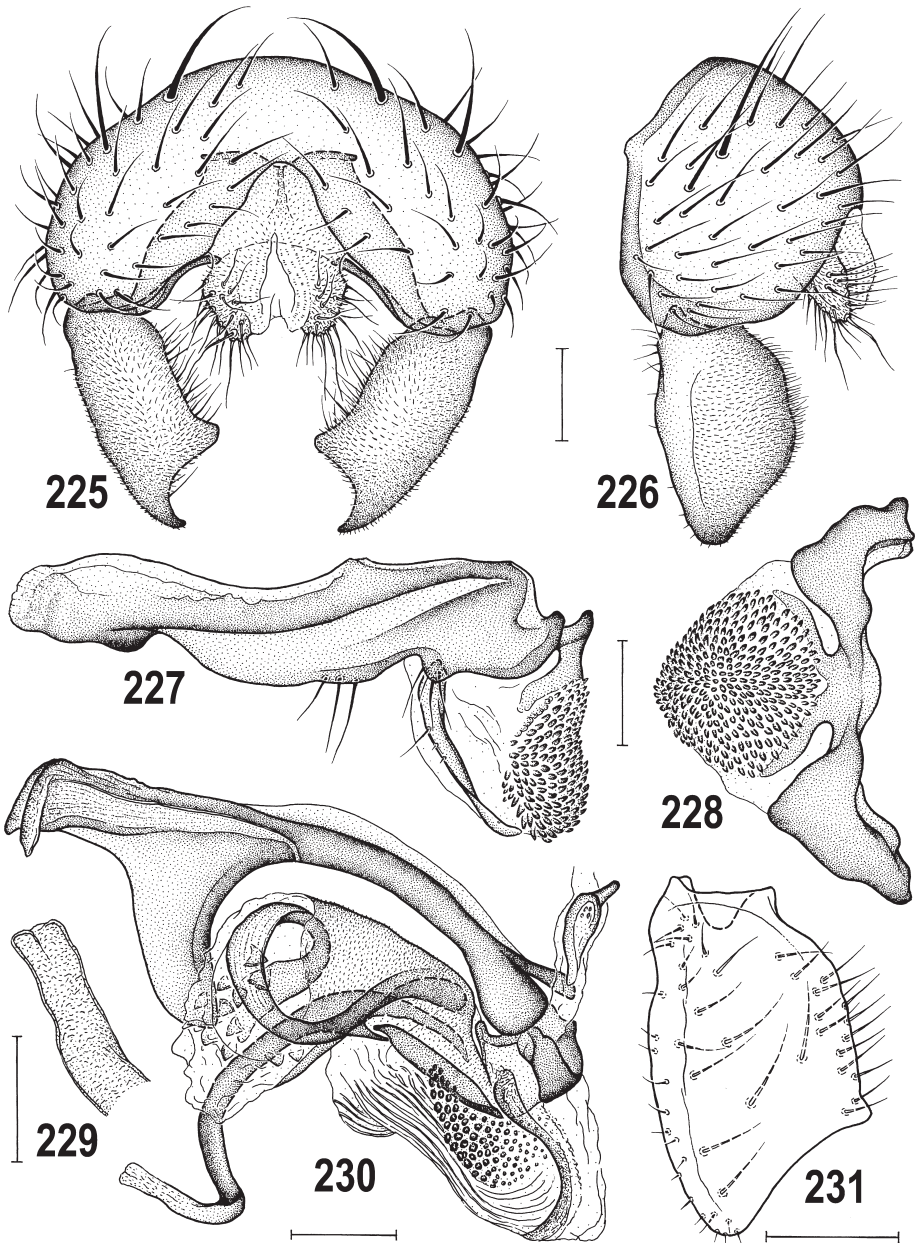
Thorax dark brown dorsally and yellow laterally and ventrally as in *A. tenuis* but the pattern is yet more variable. In lightest specimens the yellow is extended not only on humeral and notopleural areas but also on lateral sides of mesonotum (up to supralar seta); even disc of scutellum is broadly yellow leaving only its sides brownish. In darkest specimens, on the contrary, humeral callus and a band across dorsal margin of mesopleuron and pteropleuron are also brownish, in addition to darkened laterotergite, mediotergite, subscutellum and scutellum. Intermediates between these extremes are frequent. Thoracic chaetotaxy: hu, npl(s), prs, sa and pa as in *A. tenuis*; also both (postsutural) dc similar; 5–6 dc microsetae in front of anterior dc, the hindmost only slightly longer than others; ac microsetae less numerous than in *A. tenuis*, normally in only 2 rows on suture (plus a few single microsetae laterally to them), usually ending slightly behind anterior dc, only rarely reaching up to posterior dc; 2 sc and 2 stpl as in *A. tenuis* but upcurved setulae on sternopleuron more numerous (4–5) and

differently arranged, in more or less perpendicular row with most dorsal setulae longer and situated almost between stpl macrosetae; no setula in front of anterior stpl. Scutellum formed as in *A. tenuis* but usually paler on disc medially, sometimes largely yellow (see above). Legs yellow as in *A. tenuis*, with only distal third to half of apical segment of all tarsi brownish. f_1 with ctenidial spine about as long as maximum width of t_1 ; other pedal chaetotaxies as in *A. tenuis*. Wing (Fig. 223) closely resembling that of *A. tenuis*, with hyaline pale ochreous brown membrane and ochreous veins. Venation as in *A. tenuis*, only with r-m sometimes situated in middle of cell dm, and terminal section of CuA_1 slightly to distinctly longer than dm-cu. Wing measurements: length 2.30–2.74 mm, width 0.79–0.97 mm; $Cs_3 : Cs_4 = 1.48–1.84$, $rm \setminus dm-cu : dm-cu = 1.95–2.79$. Haltere yellowish white, knob often lighter.

Abdomen colouration and structures very similar to those of *A. tenuis*. Preabdominal terga brown to pale brown (sometimes slightly paler dorsomedially), distinctly lighter than mesonotum or epandrium. T1 concolourous or slightly paler than T2. T2–T5 as in *A. tenuis*. Preabdominal sterna somewhat wider than in *A. tenuis*, pale yellow and with denser setosity. S1 as in *A. tenuis*, S2–S5 slightly to distinctly wider than long, becoming wider and more transverse posteriorly; S5 the largest and widest, posteriorly distinctly widened. T6 as in *A. tenuis* but somewhat longer, seemingly bipartite, with dorsomedial unpigmented part narrower. S6–S8 dorsally fused and more or less asymmetrical as usual. S6 and S7 ochreous to yellow in pale specimens, brown and concolourous with T5 in dark ones, with anterior ledge-like margins always darker brown. Both S6 and S7 usually with more setulae (S6 with 3–5, S7 with 2–4). S8 long, brown to pale brown as T5 or (in pale specimens) with lightened marginal areas.

Genitalia. Epandrium (Figs 225, 226) very broad as in *A. tenuis* but smaller, with similar chaetotaxy, usually with setae denser laterally; anal fissure higher (longer) and cercus slightly larger (compared to epandrium) than in *A. tenuis*. Medandrium distinctly higher, with dorsolateral corners small (Fig. 225). Gonostylus (Figs 225, 226, 231) distinctive, dissimilar to those of all relatives, roughly suboblong, relatively narrow but with outer side convex, with both distal corners more or less angular, setose only on inner side and externally largely micropubescent, with only anterior marginal band bare (Fig. 226). Hypandrium (Fig. 227) as in *A. tenuis* but more robust anteriorly. Transandrium (Fig. 228) generally constructed as in relatives, somewhat wider and with terminal arms of caudal process thicker than those of *A. tenuis*. Pregonite (Fig. 227) similar to that of *A. tenuis*, 3 anterior and only 4 posterior setae (latter on short lobe-like process). Postgonite more slender (only when viewed in profile) than that of *A. tenuis* and with 1–2 setiform microsensilla below 1 usual seta inserted more proximally at anterior margin (Fig. 227). Aedeagal part of folding apparatus with the same armature as in *A. tenuis*; connecting sclerite also similar although somewhat paler and less sclerotized; basal membrane with dense short excrescences more spine-like (Fig. 227). Phallopodeme more robust, particularly the fulcrum (Fig. 230). Phallopore as in *A. tenuis*. Saccus (Fig. 230) voluminous but somewhat smaller and its membranous distal part with markedly fewer spines than that of *A. tenuis* hence resembling that of *A. silvatica*. Filum (Fig. 230) compact ribbon-shaped, largely dark, fading only towards apex which is (in contrast to *A. tenuis*) parallel-sided with blunt tip (Fig. 229). Ejacapodeme larger than in relatives (Fig. 230).

Female. Similar to male unless mentioned otherwise. Total body length 2.46–3.21 mm. Cephalic and thoracic setae longer and thicker. Orbit rarely (2 specimens seen) with 1–3

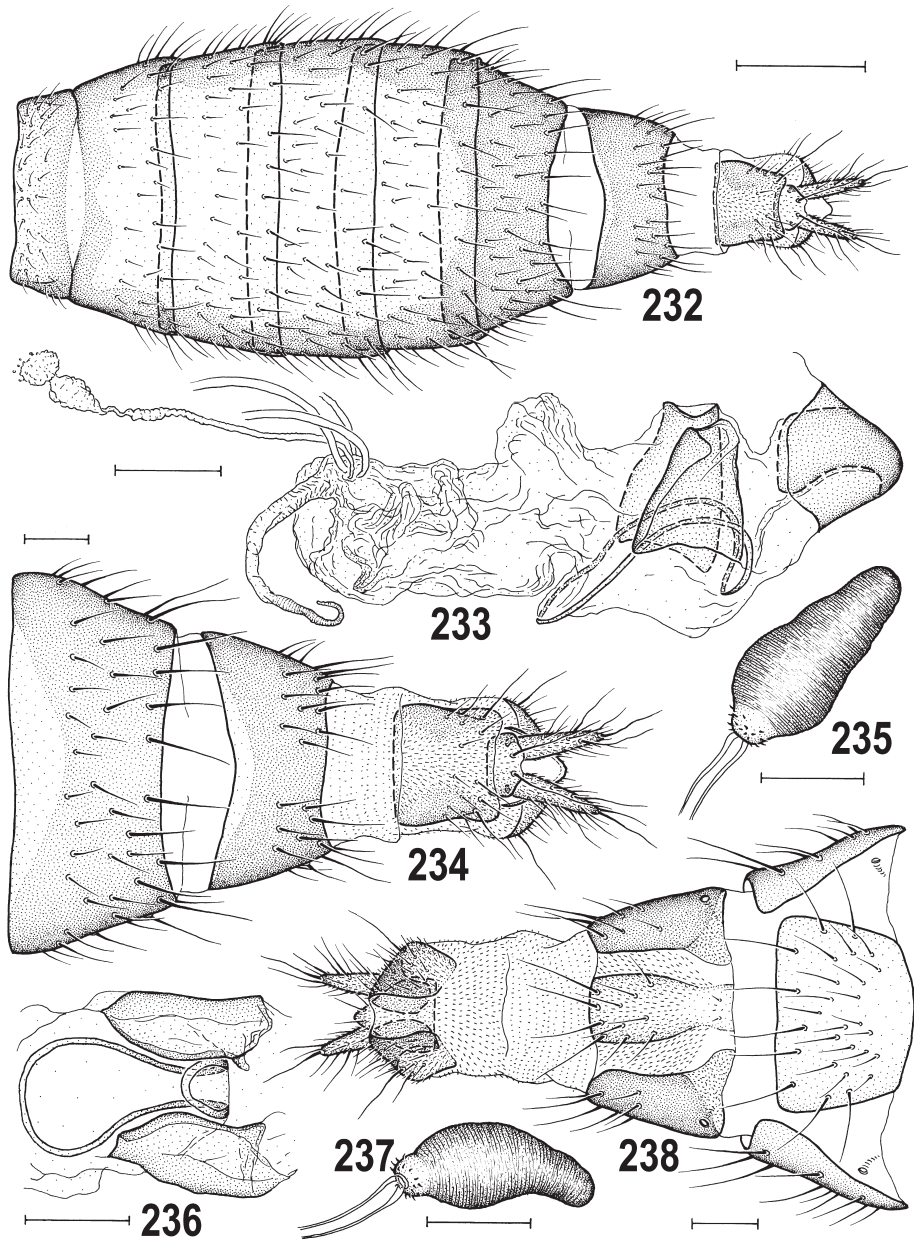


Figs 225–231. *Anthomyza oblonga* sp. nov., paratype male (Canada: Ontario). 225 – external genitalia, caudally; 226 – the same, laterally; 227 – hypandrial complex, laterally; 228 – transandrium, caudally; 229 – apex of filum, lateroventrally (widest extension); 230 – aedeagal complex, laterally; 231 – gonostylus, sublaterally (widest extension, micropubescence omitted). Scales = 0.05 mm (Fig. 229) and 0.1 mm (others).

additional microsetulae among ors. Antenna with 1st flagellomere only sometimes darker yellow around base of arista. Mesonotum with ac microsetae sometimes more numerous forming up to 4 rows on suture. Ctenidial spine on f_1 distinctly longer and thicker, longer than maximum width of t_1 . Wing measurements: length 2.73–3.25 mm, width 0.93–1.13 mm; $Cs_3 : Cs_4 = 1.33\text{--}1.68$, $rm(dm-cu) : dm-cu = 1.85\text{--}2.82$. Preabdomen with terga more transverse, bicolourous, typically dorsally largely yellow and laterally brown (cf. Fig. 232). T1 more or less ochreous to pale brown; T2 not only laterally but also anteriorly brownish, otherwise yellow, or (more rarely, in dark specimens) completely pale brown. T3–T5 largely yellow, only laterally (on bent sides) brown, with dark parts sharply contrasting with yellow dorsum of sclerites. More rarely T3–T5 (or only some of them) with dorsal pale areas smaller and ochreous and/or with dorsomedial pale brown spot. Preabdominal sterna pale yellow, narrower than in male but also densely (more than in *A. tenuis*) setose; S2 and S3 about as long as wide; S4 and S5 wider than long, both slightly transverse. S5 the largest sternum, about as wide as S6.

Postabdomen (Figs 234, 238) relatively elongate, extremely similar to that of *A. tenuis* and, consequently, mainly the differences are stressed below. T6 largely blackish brown but anteriorly with larger yellow marginal area (longest medially, Fig. 234). S6 somewhat smaller (particularly shorter) than in *A. tenuis*. T7 usually slightly shorter and with more setae, always with sides convex (Fig. 234) to straight; S7 also very similar, narrow and elongate; enlarged micropubescence of membrane between T7 and S7 somewhat different (cf. Fig. 238). T8 of almost the same shape as that of *A. tenuis* and with similar sparse micropubescence but sometimes darker, more rarely somewhat shorter and more transverse. S8 hardly different from that of *A. tenuis*. Genital chamber (Figs 233, 236) with similar posterior pair of bent sclerites (Fig. 233), but elongate annular sclerite below them anteriorly more dilated (cf. Fig. 236) and in profile distinctly more curved (Fig. 233) than that of *A. tenuis*; terminal part of genital chamber without distinct plate-like sclerite (or this structure is membranous). Ventral receptacle (Fig. 233) also closely resembling that of *A. tenuis* but with curved terminal end also finely ringed. Accessory gland vesiculate (Fig. 233), on distinctly subterminally dilated and partly ringed duct. Spermathecae (1+1) cone-shaped as those of *A. tenuis* but terminally more slender and tapered (Fig. 235) and with short basal part markedly narrower than maximum width of distal part, the latter being more densely transversely striated (Figs 235, 237); spermathecal ducts as in *A. tenuis*. T10 (Fig. 234) shorter and more transverse than that of *A. tenuis*, otherwise similar to that of latter species; also S10 hardly different (Fig. 238). Cercus slender, with chaetotaxy as in *A. tenuis* but with dorsopreapical seta often longer (Fig. 234).

Discussion. Owing to the highly characteristic suboblong shape of the gonostylus, *Anthomyza oblonga* sp. nov. is the most distinctive of the Nearctic species of the *A. macra* group. In addition, there are several more features in the male genitalia distinguishing it from relatives (particularly from the externally most similar *A. tenuis*), viz. the larger medandrium, the robust fulcrum of the phallosophore, fewer spines in the saccus of the distiphallus and the blunt apex of the filum. However, in the female sex it might sometimes be very difficult to distinguish it from *A. tenuis* because their postabdominal structures are very similar. The pale specimens of *A. oblonga* can be easily recognized in having the disc of the scutellum contrastingly yellow but in darker females (with scutellum brownish with or without pale brown medial



Figs 232–238. *Anthomyza oblonga* sp. nov., paratype female (Canada: Ontario). 232 – abdomen, dorsally; 233 – female genital chamber and S8 (with setosity omitted), laterally; 234 – postabdomen, dorsally; 235 – spermatheca; 236 – internal sclerites, ventrally; 237 – spermatheca; 238 – postabdomen, ventrally. Scales = 0.3 mm (Fig. 232), 0.05 mm (Figs 235, 237) and 0.1 mm (others).

area) it is necessary to carefully compare other characters, particularly the yellow pattern of the preabdominal terga (more contrasting in *A. oblonga*), the shape of T7 (laterally convex to straight in *A. oblonga*), the sclerotization of the genital chamber (shape of annular sclerite) and the form and striation of the spermathecae (see the key). However, despite the above female resemblances (with *A. tenuis*), *A. oblonga* is probably more closely allied to *A. silvatica* than to *A. tenuis* sharing with it the similar armature of the saccus (with spines concentrated more basally near the internal coiled structure) and the more densely striated spermathecae. The E. Palearctic species *A. decolorata* Roháček, 2009 also shares these characters but further resembles *A. oblonga* in the very projecting posterior corner of the gonostylus, the blunt apex of the filum (all other species of the group have the filum apically lanceolate) and the female preabdominal terga strongly desclerotized and depigmented. All these characters are probably apomorphic and may demonstrate a sister-species relationship of the latter pair.

Etymology. The species name is a Latin adjective (oblongus, -a, -um), meaning oblong, to reflect the suboblong shape of its gonostylus.

Biology. *Anthomyza oblonga* and *A. silvatica* frequently co-occur in Ontario, Canada. Here, this habitat is the same as that of three or even four (including the recently transferred *Arganthomyza vittipennis*) eastern species of *Arganthomyza* (see Figs 69, 149) – mixed vegetation within or on the edge of mesic mixed forest with ferns possibly representing an indicator of appropriate habitat that often has at least a component of *Populus tremuloides* (in east). A very notable exception is the Ontario: Moosonee site under *Salix* and *Alnus* with no ferns or *Populus* (in immediate vicinity) and where all three species of the *A. macra* group were found with three species of *Arganthomyza* (see discussion under *A. tenuis*). Definitive plant hosts have not been identified for any of these species. Other label references include sweeping in habitats such as “maple/elm floodplain community”, “along fast rocky stream”, “floodplain meadow” and “swamp”. *Anthomyza oblonga* has been collected as early as 5 May (Maryland: Bethesda & Plummers Island) and as late as 17 September (Ontario: Sault Ste. Marie – Birchwood Pk.).

Distribution. This is a fairly widely distributed species in the east and not yet known from west of Manitoba. Canada: Manitoba, Newfoundland, Nova Scotia, Ontario, Quebec, Saskatchewan; United States of America: Connecticut, Illinois, Indiana, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York, North Carolina, Pennsylvania, Virginia, West Virginia (see Table 2).

Anthomyza silvatica sp. nov.

(Figs 205, 224, 239–255)

Type material. HOLOTYPE: ♂, “CAN:ON: SSMarie, Bristol Pl.Pk., 11.vii.2008, KNBar-ber, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rub-us*, ferns, *Phalaris* 46°30.77'N 84°16.66'W” and “Holotypus ♂ *Anthomyza silvatica* sp. n., J. Roháček & K. N. Barber det. 2013” (red). The specimen is in perfect condition, with clearly visible gonostyli (see Fig. 205) (CNCI, intact). PARATYPES: CANADA: ALBERTA: Elkwater Park, 12.vii.1952, 1 ♀, L. A. Konotopetz leg. (CNCI). BRITISH COLUMBIA: Agassiz, Pacific Agri-Food Research Centre, 100 m, sweeps, agric[ultural] meadows, 16.vi.2000, 5 ♂♂ 1 ♀, H. Goulet leg. (DEBU, 1 ♂ genit. prep.); Cowichan Bay, ex. *Rubus* spp., 1 ♀, 2.vi.1959, R. E. Leech leg. (CNCI); Cultus Lake, 1.vii.1948, 1 ♂, 13.vii.1948, 1 ♀, 15.vii.1948, 2 ♂♂, H. R. Foxlee leg. (CNCI); Kinbasket Lake, BC Hydro drawdown study, Malaise trap (09MLRT01), 27–28.vi.2009, 1 ♀, Cooper Beauchesne & Assoc. Ltd. leg. (RBCM, genit. prep.); Mission City, 1.vii.1953, 1 ♀, G. J. Spencer leg., 1.vii.1953, 1 ♀, 10.vii.1953, 1 ♂, W. R. M. Mason leg. (CNCI); Qualicum, 15.vi.1955, 1 ♀, G. E. Shewell leg. (CNCI); 40 mi N

Revelstoke, "Au 31", 1 ♀, A. H. Sturtevant leg. (USNM); Robson, 3.vi.1950, 1 ♂ (CNCI, genit. prep.), 8.vii.1966, 1 ♀, H. R. Foxlee leg. (UBCZ); Silver Lake, Hope, 2.vii.1968, 3 ♂♂ 2 ♀♀, W. W. Wirth leg. (USNM, 1 ♂ 1 ♀ genit. prep.); Silver & Skagit Rd., 49°14'N 121°23'W to 49°08'N 121°15'W, 450–600 m, clover & flowers, 22.vi.2000, 1 ♀, Goulet & Gillespie leg. (DEBU 00278882, genit. prep.); Terrace, marshy meadow, 11.vi.1960, 1 ♂ 1 ♀, J. G. Chillcott leg., 9.vii.1960, 1 ♀, W. R. Richards leg.; Gagnon Rd., 6 mi W Terrace, 20.vi.1960, 1 ♂, 29.vi.1960, 3 ♂♂, J. G. Chillcott leg., 29.vi.1960, 2 ♂♂ 1 ♀ (1 ♂ genit. prep.), C. H. Mann leg., 13.vii.1960, 2 ♀♀, G. E. Shewell leg.; same locality but 220', 8.vi.1960, 1 ♂, R. Pilfrey leg., 220', in clearing near river, 8.vi.1960, 1 ♂, B. Heming leg.; same locality but in marshy clearing, 8.vi.1960, 1 ♂, J. G. Chillcott leg.; Shames, 18 mi SW Terrace, 23.vi.1960, 4 ♂♂ 3 ♀♀, C. H. Mann leg. (all CNCI); Yarrow, NW foot of Vedder Mt., 49°04'N 122°03'W, swept/aspirated, herbs along forest road, (Universität Bielefeld, Ca1509), 23.vii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Zymagotitz River, 6 mi W Terrace, 190', 20.vi.1960, 1 ♀, R. Pilfrey leg. (CNCI). **MANITOBA:** 13 km E Erickson, 1.viii.1983, 1 ♀, K. N. Barber leg. (DEBU, genit. prep.); Int[ernational] Peace Garden, Turtle Mt. For[est] Res[erve], 17.vi.1958, 1 ♀, J. G. Chillcott leg.; Ninette, ex *Rudbeckia laciniota*, 3.vi.1958, 1 ♂; Ninette, maple/elm floodplain community, 31.v.1958, 2 ♂♂ 4 ♀♀ (1 ♂ 1 ♀ genit. prep.), 12.vi.1958, 2 ♂♂, all J. F. McAlpine leg.; Ninette, *Betula glandulosa*/*Populus balsamifera* associates, 15.vii.1958, 1 ♂ 1 ♀, J. G. Chillcott leg.; 5 mi SW Shilo, floodplain community near tamarack bog, 28.v.1958, 1 ♂, J. F. McAlpine leg., 11.vii.1958, 1 ♂, J. G. Chillcott leg.; 5 mi SW Shilo, floodplain community near tamarack bog, sedge meadows, 5.vi.1958, 1 ♀, J. F. McAlpine leg. (all CNCI). **NOVA SCOTIA:** Kentville, 6.viii.1958, 1 ♂; Lockeport, 1.viii.1958, 1 ♀; Springfield, 6.viii.1958, 1 ♂, all J. R. Vockeroth leg. (all CNCI). **ONTARIO:** Abitibi Canyon, 49°53.54'N 81°34.09'W, sweeps, mostly *Eurybia* under *Populus*, 20.vii.2009, 1 ♂ 2 ♀♀, K. N. Barber leg. (CNCI, 1 ♀ genit. prep.); Algonquin, mixed wood, 1.vi.1991, 5 ♂♂ 3 ♀♀, 2.vi.1991, 6 ♂♂ 1 ♀, M. Barták leg. (MBPC, 1 ♂ 1 ♀ genit. prep.); Algonquin Pk., 45°50'N 77°38'W, 19.vii.1991, 1 ♀, J. R. Vockeroth leg. (CNCI); Algonquin Pk., Swan Lake Station, Scott Lake Survey, 45°29'15"N 78°43'20"W, pan A4, hemlock, 28.vi.–2.vii.1993, 1 ♂, Larson, Marshall, Barr leg. (DEBU); Algonquin P. Pk., nr. Brewer Lake, 45.5855°N 78.3104°W, Malaise trap, hardwood forest, canopy gap (BR-GAP), 22.vi.–8.vii.2008, 1 ♂; Algonquin P. Pk., nr. Lake of Two Rivers, 45.5722°N 78.4649°W, Malaise trap, hardwood forest, canopy gap (TR-GAP), 29.vi.–13.vii.2008, 1 ♀, both E. Proctor leg. (both DEBU); Aubrey Falls Prov. Park, 77 km NNE Thessalon, 46°54.96'N 83°12.71'W, sweeping *Clintonia*, ferns, *Diervilla* in mixed forest, 5.vii.2010, 4 ♂♂ 3 ♀♀, J. Roháček leg. (SMOC, 2 ♂♂ 1 ♀ genit. prep.); Aubrey Falls P. Pk., 46°54.96'N 83°12.71'W, sweeps, *Clintonia*, ferns, *Diervilla* in mixed forest, 5.vii.2010, 1 ♂ 2 ♀♀, K. N. Barber leg. (DEBU 01502493–95); Belfountain, 9.vi.1981, 1 ♂, K. Barber leg. (DEBU); Bell's Cor[n]ers], 7.vii.1952, 1 ♀, swept from wild *Clematis*, 4.vi.1952, 1 ♀, J. F. McAlpine leg. (CNCI); ~26 km SSE Chapleau, Island Lake Bioenergy, 47°38.16'N 83°14.58'W, jack pine forest (~80 yr), pitfall traps (5N), 26.vi.–11.vii.2012, 1 ♀, L. Venier leg. (CNCI); Dubreuilville, 48°21.09'N 84°33.90'W, sweeping undergrowth of *Pinus*/*Populus* forest with *Clintonia*, *Vaccinium*, ferns, graminoids, 10.vii.2010, 1 ♂; Dubreuilville, 48°21.05'N 84°33.84'W, sweeping *Diervilla*, ferns, *Clintonia*, *Cornus*, *Aralia*, *Eurybia*, *Vaccinium* under *Populus*/*Pinus*, 10.vii.2010, 3 ♂♂ 4 ♀♀ (1 ♂ 1 ♀ genit. prep.), all J. Roháček leg. (all SMOC); ~55 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°49.32'N 82°59.54'W, sweeps, mostly *Athyrium filix-femina*, 3.vii.2010, 1 ♂, K. N. Barber leg. (CNCI); Fairbank P. Pk., Wa-shai-ga-mog Trail, 46°28.11'N 81°26.19'W, sweeps, *Clintonia*, ferns, *Maianthemum*, under *Acer/Abies*, 5.ix.2009, 1 ♀ (DEBU 01502397); Greenwater P. Pk., Green Trail, 49°11.77'N 81°16.73'W, sweeps, *Eurybia*, *Cornus*, *Clintonia*, *Diervilla*, *Aralia* under *Populus*, 21.vii.2009, 1 ♂ 1 ♀ (DEBU 01502219, -20); Greenwater P. Pk., Sandbar Lk. Trail, sweeps, *Eurybia*, *Cornus*, *Clintonia*, *Diervilla*, *Aralia*, fern under *Populus*, 21.vii.2009, 49°12.85'N 81°17.42'W, 4 ♀♀ (DEBU 01502039–42, 1 ♀ genit. prep.), 49°12.78'N 81°17.44'W, 1 ♂ (DEBU, 01502016), all K. N. Barber; Griffith, 10.vii.1991, 1 ♀ (genit. prep.); 7 mi E Griffith, 11.vii.1990, 1 ♂, 9.vii.1991, 2 ♂♂ 1 ♀, all J. R. Vockeroth leg. (all CNCI); Hamilton, Cootes Paradise (sanctuary), swept/collector, bank vegetation/mixed forest herbal layer, (Universität Bielefeld, X982), 20.viii.1994, 1 ♂, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Cootes Paradise nr. Dundas, sweeping undergrowth of deciduous forest, 20.viii.1994, 13 ♂♂ 7 ♀♀, J. Roháček leg. (SMOC, 2 ♂♂ 2 ♀♀ genit prep.); ~74 km WNW Hearst, 49.9062°N 84.6590°W, Indicators of Forest Integrity, MW2/Immature/Harvest, Lindgren trap (47A-L1), 19.vi.–10.vii.2013, 1 ♀, L. Venier leg. (CNCI); Algoma District, Hilton Beach, cedar swamp, pig dung pans, 10.vii.–20.viii.1989, 1 ♂, J. E. Swann leg. (DEBU 00184560); Icewater Creek WS [watershed], 13.5 km NNE Searchmont, mi. 11.5 Whitman Dam Rd., *Populus/Prunus*, 4.vi.1986, 1 ♂, sandy access road, 20.vi.1986, 1 ♀, K. N. Barber leg.; same locality but ~12.7 km NNE Searchmont, mi. 10.5 Whitman Dam Rd., Malaise trap, riparian meadow/alder thicket, 21–28.

vii.1986, 1 ♀, [K. N. Barber leg.] (all CNCI); Icewater Creek WS [watershed], 46°53.7'N 84°03.4'W, sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 2 ♂♂ 2 ♀♀ (1 ♂ 1 ♀ genit. prep.), sweeps *Thalictrum*, *Eupatorium* [*Eutrochium*], sedge, fern in mixed forest, 7.vii.1998, 1 ♂ 7 ♀♀ (2 ♀♀ genit. prep.), sweeps *Thalictrum*, *Eupatorium* [*Eutrochium*], fern in mixed forest, 10.vii.1998, 1 ♀, sweeps, roadside sedges, ferns, grasses, 10.vii.1998, 2 ♂♂ 1 ♀ (♀ genit. prep.), all K. N. Barber leg. (all CNCI); Iroquois Falls, *Populus/Picea* wood, rich undergrowth, 28.vi.1987, 1 ♂, 30.vi.1987, 1 ♂, dry mature *Sphagnum* bog, 3.vii.1987, 1 ♀, J. R. Vockeroth leg. (CNCI); Kilarney [P.] Pk., 18.viii.1978, 1 ♀, W. A. Attwater leg. (DEBU); Lake Superior P. Pk., Crescent Lk. Trail, 29.v.2010, 47°16.70'N 84°33.11'W, sweeps, roadside *Carex*, 1 ♂ (DEBU 01502426); same locality but 47°16.75'N 84°33.19'W, sweeps, *Clintonia*, *Smilacina* [*Maianthemum*] under *Acer*, 1 ♂ (DEBU 01502427); Lake Superior P. Pk., Fenton-Treeby trail, 47°51.19'N 84°53.01'W, sweeps, *Clintonia*, *Aralia*, *Rubus*, *Cornus*, ferns under *Alnus/Acer*, 13.vi.2010, 1 ♀ (DEBU 01502463), all K. N. Barber leg.; Marmora, 18.vi.1952, 1 ♀, J. R. Vockeroth leg.; Hwy#17, ~7 km W Mattawa, 46°17.3'N 78°49.0'W, opaque mini sticky traps, mixed forest, 12.vi.–2.vii.2004, 1 ♂ (genit. prep.), K. N. Barber leg.; Midland, swampy woods, balsam poplar, 2.v.1959, 1 ♀, J. G. Chillcott leg.; Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 1 ♀, K. N. Barber leg. (all CNCI); Nagagamis P. Pk., 49°27'41"N 84°41'47"W, boreal mixedwood, multi-colour sticky trap, 15–24.vi.2003, 1 ♀, K. N. Barber leg. (DEBU 01500000, genit. prep.); ~20 km E Nipigon, Hwy. #17, rest area, 48°58.00'N 87°59.09'W, sweeps, *Aster* [*Eurybia*], *Rubus*, *Aralia*, *Diervilla*, 31.vii.2008, 7 ♂♂ 7 ♀♀, K. N. Barber leg. (USNM 3 ♂♂ 3 ♀♀, CNCI 4 ♂♂ 4 ♀♀, 1 ♂ genit. prep.); One-Sided [= Caliper] Lake, 20.vi.1960, 1 ♂ 1 ♀, 28.vi.1960, 1 ♀, S. M. Clark leg., 26.vi.1960, 1 ♂ 1 ♀, Kelton & Whitney leg.; Orleans, Chapel Hill, swept in mixed hardwood forest, 28.v.1990, 2 ♀♀, J. R. Vockeroth leg.; Ottawa, 3.vi.1946, 1 ♀, 5.vi.1946, 1 ♀, G. E. Shewell leg. (all CNCI); Ottawa, 26.vii.1955, 1 ♀ (genit. prep.), 2.vii.1958, 3 ♂♂ (1 ♂ genit. prep.), 30.vi.1963, 1 ♂, 13.vii.1963, 1 ♂, 6.vii.1963, 1 ♀, 22.vi.1965, 1 ♀ (genit. prep.); Ottawa, Montfort Hosp[ital] wood, [-].viii.1993, 2 ♂♂ 1 ♀ (♀ genit. prep.); Ottawa, Pleasant Park wood, 2.vi.2002, 1 ♀, all J. R. Vockeroth leg. (all CNCI); Otter Rapids, 50°11.08'N 81°38.37'W, sweeps, *Eurybia*, *Equisetum* under *Populus*, 19.vii.2009, 1 ♂ 1 ♀ (♀ genit. prep.), 20.vii.2009, 1 ♂ 2 ♀♀, K. N. Barber leg.; Petawawa, 7.vi.1961, 1 ♂, J. R. Vockeroth leg.; S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 1 ♂ 1 ♀, K. N. Barber leg. (all CNCI); Sault Ste. Marie, Baseline Road, 46°31.40'N 84°24.40'W, sweeping *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, *Clematis*, ferns under aspen (*Populus*), 7.vii.2010, 1 ♂ 2 ♀♀, 12.vii.2010, 2 ♂♂ 1 ♀ (all 3 genit. prep.), J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, *Thalictrum*, *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 9.vi.2005, 1 ♂, 10.vi.2005, 1 ♂, 25.vi.2005, 1 ♂ (CNCI), sweeps, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 22.vi.2005, 2 ♂♂ 2 ♀♀ (LACM), 25.vi.2005, 1 ♂, 26.vi.2005, 4 ♂♂ (1 ♂ genit. prep.), 8.vii.2005, 3 ♀♀ (1 ♀ genit. prep.), 10.vii.2005, 4 ♀♀, 16.vii.2005, 1 ♂ (CNCI), 19.vi.2011, 2 ♂♂ 2 ♀♀, 29.vii.2012, 1 ♂ 1 ♀ (CASC), 24.viii.2013, 1 ♀, 28.vi.2013, 1 ♀, sweeps, mostly ferns under aspen, 19.vi.2011, 2 ♂♂ 4 ♀♀, 27.vii.2012, 2 ♂♂ 3 ♀♀, 28.vii.2012, 4 ♂♂ 4 ♀♀ (1 ♂ abdomen glued to pin, 1 ♀ genit. prep.), 29.vii.2012, 3 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Birchwood Pk., mixed forest, 28.vi.1986, 6 ♂♂ 5 ♀♀ (1 ♀ genit. prep.), 5.vii.1986, 1 ♂ 2 ♀♀, 6.vii.1986, 2 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), rotten mushrooms, 31.viii.1986, 1 ♀, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Birchwood Pk., 46°30.7'N 84°15.6'W, sweeps, mostly fern, *Aralia*, *Impatiens*, dewberry, grass under *Betula/Acer*, 30.viii.1997, 1 ♂, 1.ix.1997, 1 ♂, sweeps, mostly *Aralia*, fern, *Impatiens*, dewberry, grass under *Betula/Acer*, 30.viii.1997, 2 ♂♂, 30.v.1999, 2 ♂♂, sweeps, low vegetation under *Betula/Acer*, 1.ix.1997, 2 ♂♂ (1 ♂ genit. prep.), 27.vi.1998, 1 ♂, sweeps, *Impatiens* under *Betula/Acer*, 27.vi.1998, 1 ♂, sweeps, including *Impatiens* under *Betula/Acer*, 19.vi.1998, 1 ♀ (genit. prep.) (CNCI), sweeps, mostly *Impatiens* under *Betula/Acer*, 19.vi.1998, 1 ♂ 1 ♀ (LACM), 20.vi.1998, 2 ♂♂ 3 ♀♀, 23.vi.1998, 1 ♀, sweeps, graminoids, *Impatiens*, ferns under *Betula/Acer*, 17.ix.2004, 1 ♂, sweeps, graminoids, *Impatiens*, *Equisetum*, ferns under *Betula/Acer*, 19.vi.2005, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Birchwood Pk., 46°30.67'N 84°15.63'W, sweeps, mostly *Impatiens*, fern, *Aster* [*Doellingeria*], 23.viii.2009, 1 ♂ 1 ♀, sweeps, *Impatiens*, *Aster* [*Doellingeria*] under *Betula/Acer*, 11.ix.2011, 1 ♀ (genit. prep.), 24.viii.2013, 1 ♀ (CNCI), sweeps, *Rubus*, *Aralia*, graminoids, ferns under *Betula/Acer*, 17.vi.2007, 1 ♂ 4 ♀♀ (CNCI 1 ♂ 3 ♀♀, SMOC 1 ♀), 29.vi.2008, 2 ♂♂ 5 ♀♀ (incl. pair in copula, 1 ♀ genit. prep.) (CNCI), K. N. Barber leg.; S[ault] S[te.] Marie, Birchwood Pk., 46°30.75'N 84°15.62'W, sweeps, *Rubus*, *Aralia*, graminoids, ferns, *Aster* [*Eurybia*] under *Betula/Acer*, 17.vi.2007, 9 ♂♂ 2 ♀♀ (CNCI 7 ♂♂ 1 ♀, SMOC 2 ♂♂ 1 ♀), 27.vi.2007, 1 ♂ (CNCI), K. N. Barber leg.; S[ault] S[te.] Marie, Bristol Place, 28.vi.1987, 1 ♀, 1.vii.1987, 2 ♀♀ (1 ♀ genit. prep.), K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.8'N 84°16.6'W, reared from soil cores, *Impatiens* under

canopy, collected 25.v.2002, 25°C, emerged 31.v.2002, 1 ♂, sweeps, *Impatiens* under canopy, 20.vii.2003, 1 ♀ (genit. prep.), sweeps, *Impatiens* under *Betula/Acer*, 9.vii.1998, 3 ♀♀ (1 ♀ genit. prep.), sweeps, *Clematis*, *Rubus*, *Impatiens*, grasses, 28.v.1999, 2 ♂♂, sweeps, *Impatiens*, *Rubus*, *Phalaris*, *Carex* under *Populus*, 28.vi.2005, 2 ♀♀, K. N. Barber leg. (CNCI); Sault Ste. Marie, Bristol Place Park, 46°30.77'N 84°16.66'W, sweeping *Impatiens* mixed with *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 7.vii.2010, 1 ♀, J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 29.vi.2008, 7 ♂♂ 14 ♀♀ (1 ♂ wing illustration, 4 ♀♀ genit. prep.), 4.vii.2008, 2 ♂♂ 4 ♀♀ (1 ♀ genit. prep.), 5.vii.2008, 1 ♀ (genit. prep.), 8.vii.2008, 1 ♀, 9.vii.2008, 6 ♂♂ 1 ♀ (1 ♂ genit. prep.), 11.vii.2008, 6 ♂♂ 7 ♀♀ (2 ♀♀ genit. prep.), 13.vii.2008, 1 ♂ (CNCI), 6.viii.2008, 2 ♂♂ 2 ♀♀ (NMPC), 27.vii.2009, 3 ♀♀ (AMNH), 27.viii.2012, 1 ♂ (CNCI), 21.vii.2014, 3 ♂♂ (AMNH), K. N. Barber leg.; S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.87'N 84°16.68'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Calamagrostis*, 1.vii.2008, 1 ♀, 5.vii.2008, 1 ♀, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Finn Hill, 46°31.6'N 84°17.4'W, sweeps, vegetation under *Populus*, 4.vii.2002, 1 ♂ 1 ♀; same locality but 46°31.63'N 84°17.43'W, sweeps, *Impatiens*, ferns, *Carex gynandra*, 15.vii.2006, 1 ♀; same locality but 46°31.64'N 84°17.40'W, sweeps, mostly *Calamagrostis*, *Rubus*, *Aster* [*Eurybia*] under *Populus*, 17.viii.2003, 1 ♀; same locality but 46°31.81'N 84°17.50'W, sweeps, mostly *Rubus*, graminoids under canopy, 13.vii.2007, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Fish Hatchery Road, along Coldwater Ck., 46°34.33'N 84°17.23'W, sweeps, trailside *Clematis*, *Eutrochium*, 17.vi.2010, 1 ♂; S[ault] S[te.] Marie, Hiawatha Highlands Conservation Area, 46°34.12'N 84°17.45'W, sweeps, *Eurybia*, ferns, *Diervilla*, *Apocynum*, under *Acer/Abies*, 15.vi.2010, 1 ♀, both K. N. Barber leg. (both CNCI); S[ault] S[te.] Marie, Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, *Impatiens* under *Acer/Betula*, 7.ix.1997, 1 ♂, 25.vi.1998, 1 ♂, 11.vi.1999, 1 ♂; S[ault] S[te.] Marie, Wishart Pk., 46°33.82'N 84°17.72'W, sweeps, *Clintonia*, *Eurybia*, ferns, 31.vii.2009, 1 ♀, all K. N. Barber leg. (all CNCI); ~6.1 km SE Shabaqua Corners, 48°34.8'N 89°49.2'W, opaque mini sticky traps, mostly *P[opolus] tremuloides*, 8.vi.–13.vii.2004, 3 ♂♂ 2 ♀♀, M. Francis leg. (CNCI, 1 ♂ genit. prep.); Shakwa Lk., Ou[e]llette Twp., plot 13, D2, 21.vii.1996, 1 ♀, A. Applejohn leg. (DEBU); ~92 km NNE Thessalon, Mountain Ash Lake, 47°03.50'N 83°12.56'W, sweeps, *Clintonia*, ferns, *Diervilla*, *Vaccinium* under *Betula/Abies*, 5.vii.2010, 1 ♂, K. N. Barber leg. (CNCI); same locality but sweeping *Clintonia*, *Eurybia*, ferns, *Diervilla* under *Betula*, 5.vii.2010, 1 ♂ 3 ♀♀, J. Roháček leg. (SMOC); Thornhill, 30.v.1964, 1 ♀, J. R. Vockeroth leg. (CNCI); 40 km SSW White River, boreal mixedwood, sweeps, *Aster* [*Eurybia*], *Aralia*, ferns, 48°13.97'N 85°22.28'W, near B6 S1, 23.vii.2003, 2 ♂♂; same locality but 48°14.23'N 85°22.13'W, near B6 S9, 23.vii.2003, 1 ♂ 1 ♀; same locality but 48°14.2'N 85°22.1'W, sweeps, *Aster* [*Eurybia*], *Aralia*, *Cornus*, B6 S4–S9, 9.vii.2003, 1 ♂; same locality but 48°14.14'N 85°21.99'W, multi-colour sticky trap #15, B6 S4, 26.vi.–10.vii.2003, 2 ♀♀, 10–23.vii.2003, 1 ♀, all K. N. Barber leg.; same locality but 48°14.1'N 85°22.2'W, opaque sticky trap, B6 S5 UD, 19.vii.–9.viii.2002, 1 ♀, S. B. Holmes leg. (all CNCI). QUEBEC: Abbotsford, 4.vi.1937, 2 ♀♀, G. E. Shewell leg. (CNCI); Beechgrove, 45°39'N 76°08'W, 29.vi.1962, 1 ♂ 1 ♀, J. R. Vockeroth leg. (CNCI, ♀ genit. prep.); Gatineau Park, 45°34'N 75°57'W, 28.vi.1995, 1 ♂ 2 ♀♀, E. Ikeda leg. (LEMQ 0040152–54); Knowlton Ldg., 19.vii.1968, 1 ♀, J. R. Vockeroth leg.; Laniel, 8.vi.1941, 1 ♀ (genit. prep.), A. R. Brooks leg.; Messines, 10.vii.1947, 1 ♂, W. R. M. Mason leg. (all CNCI); Mont-St.-Hilaire, 45°32.6'N 73°09.1'W, beech/sugar maple forest, sweep, 25.vi.2001, 1 ♀ (LEMQ 0040159), pan trap #6, 16–23.vii.2001, 1 ♀ (LEMQ 0040158), E. Fast leg.; Mont-St.-Hilaire, 45°32.6'N 73°09.1'W, beech/sugar maple forest, 18–25.vi.2001, pan trap #2, 1 ♀ (LEMQ 0040160), pan trap #14, 1 ♂ (LEMQ 0040156), pan trap #15, 1 ♂ 1 ♀ (LEMQ 0040155, -57), E. Fast & S. Hawkins leg.; Mont-St.-Hilaire, Reserve, Hemlock Bog, sweep in bog, 19.vi.2007, 1 ♂, Lyman Museum students leg. (LEMQ 0040523); Mont-St.-Hilaire, Biosphere Reserve, Pain de Sucre Trail, sweep at brook, 27.vi.2001, 2 ♂♂ 3 ♀♀, M. Pollet leg. (LEMQ 0040326, -67, -69, -71, -74); Mt.-St.-Hilaire, 500–700', 4.vi.1963, 1 ♀, 950–1350', 19.vi.1964, 1 ♀; Mt. Ste.-Marie, Low, 1800', 22.vi.1965, 1 ♂, all J. R. Vockeroth leg. (all CNCI); Old Chelsea, 11.vi.1959, 1 ♂, 25.v.1960, 1 ♀, 13.vi.1961, 1 ♂, 28.v.1963, 1 ♀, 18.vi.1963, 1 ♀, 25.v.1964, 1 ♂, 26.v.1964, 1 ♀, 12.vi.1964, 1 ♀; Old Chelsea, Champlain Lookout, 365 m, 3.vi.1987, 2 ♂♂ 2 ♀♀, all J. R. Vockeroth leg. (all CNCI); Old Chelsea, King Mt., 26.v.1963, 1 ♂, J. G. Chillcott leg. (CNCI); Old Chelsea, Summit King Mt., 12.vi.1980, 4 ♂♂, K. N. Barber leg. (DEBU); Old Chelsea, Summit King Mt., 1150', 11.vi.1959, 1 ♀, 13.vi.1961, 1 ♀, 16.vi.1961, 2 ♂♂ 4 ♀♀, 22.vi.1961, 1 ♀, 25.vi.1962, 1 ♀, 26.v.1964, 1 ♂ 1 ♀, 8.vi.1964, 1 ♂, 15.vi.1964, 1 ♂ 1 ♀, 7.vi.1965, 1 ♀, 11.vi.1971, 2 ♀♀ (1 ♀ genit. prep.), 12.vi.1971, 1 ♀, 16.vi.1971, 1 ♀, all J. R. Vockeroth leg. (all CNCI); Kam[ouraska] Co., Parke Reserve, 950', 14.viii.1957, 1 ♂, W. R. M. Mason leg.; Perkins Mills, 9.vi.1938, 1 ♀, G. E. Shewell leg. (both CNCI); Ste.-Anne-de-Bellevue, 9.vi.1966, 1 ♀, D. Johnstone leg. (LEMQ 0040278); Wakefield, 26.vi.1946, 2 ♂♂ 5 ♀♀,

9.vii.1946, 1 ♂ 1 ♀, G. E. Shewell leg. (CNCI). **SASKATCHEWAN:** Kenosee, 7.vi.1958, 1 ♀ (genit. prep.); Saskatoon, 9.vii.1957, 2 ♂♂, all A. R. Brooks leg.; Scout Lake, 49°20'N 106°0'W, 17.vi.1955, 2 ♂♂, J. R. Vockeroth leg. (all CNCI). **UNITED STATES OF AMERICA:** **CONNECTICUT:** Redding, 11.vi.1929, 1 ♀, 26.vi.1929, 1 ♂, 31.v.1930, 1 ♂, A. L. Melander leg. (USNM). **DISTRICT OF COLUMBIA:** Washington, 17.viii.1913, 1 ♀, A. L. Melander leg. (USNM). **GEORGIA:** Rabun Co., Pine Mountain, 1400', 4.v.1957, 1 ♂, J. R. Vockeroth leg. (CNCI). **ILLINOIS:** Savanna, [no collector], 11.vi.1917, 1 ♂ (INHS 40,183), 13.vi.1917, 2 ♂♂ 4 ♀♀ (INHS 40,184–87, -89, -90, 1 ♀ genit. prep.). **MARYLAND:** Montgomery Co., Bethesda, 5.v.1968, 1 ♀ (genit. prep.), L. V. Knutson leg., 4.vi.1968, 2 ♀♀ (1 ♀ genit. prep.), G. Steyskal leg. (USNM). **MASSACHUSETTS:** Concord, fern bog, 22.vii.1961, 1 ♀, W. W. Wirth leg. (USNM, genit. prep.); Petersham, 2.vi.1914, 2 ♂♂ (USNM), [-].vi.1926, 1 ♂ (SMOC), both A. L. Melander leg. **MICHIGAN:** Detroit, 20.vi.1940, 1 ♂, G. Steyskal leg.; Gratiot Co., 15.vi.1959, 1 ♀ (genit. prep.), R. R. Dreisbach leg.; Livingston Co., [E. S.] Geo[r]ge Reserve, 5–6.vi.1943, 1 ♀, C. W. Sabrosky leg. (all USNM). **NEW JERSEY:** Morristown, 19.v.1923, 1 ♂, A. H. Sturtevant leg. (USNM). **NEW YORK:** Allegany State Park, stream margin, 28.v.–3.vi.1963, 1 ♂ 1 ♀, W. W. Wirth leg. (USNM); Cairo, 1.vii.1980, 1 ♀, S. Marshall leg. (DEBU); Ithaca, 14.vi.1920, 1 ♂, M. D. Leonard leg. (AMNH), 24.vi.1927, 1 ♀ (genit. prep.), A. L. Melander leg. (USNM); Lake Placid, 2000', 19.vii.1962, 1 ♂, J. R. Vockeroth leg. (CNCI); Tompkins Co., Ringwood Res., 16–17.vi.1963, swamp, 1 ♀, W. W. Wirth leg. (USNM). **NORTH CAROLINA:** Black Mt., North Fork Swannanoa, [-].v.[-], 2 ♀♀, N. Banks leg. (MCZC); Swain Co., Heintooga Overlook, Blue Ridge Parkway, 5335', on blossoms *Acer spicatum*, 8.vi.1965, 1 ♀, J. G. Chillcott leg. (CNCI); McDowell Co., Blueridge Parkway, mi. 348, 11.ix.1969, 1 ♂, G. Steyskal leg. (USNM); Franklin, 2000', 8.v.1957, 1 ♂; Great Smoky Mts. N. P., 20.v.1957, 1 ♀, both J. R. Vockeroth leg. (both CNCI); Highlands, 21.viii.1957, 1 ♀, L. A. Kelton leg. (CNCI, genit. prep.); Highlands, 3800', 10.v.1957, 2 ♀♀, 12.v.1957, 1 ♀, 16.v.1957, 2 ♂♂ (1 ♂ genit. prep.), 21.v.1957, 1 ♂, at light during heavy rain, 29.v.1957, 2 ♀♀; Highlands, Wilson's Gap, 3100', 12.v.1957, 1 ♀, all J. R. Vockeroth leg. (all CNCI); Transylvania Co., Pisgah N. F., picnic area by Hwy 276, 35.30°N 82.77°W, 2819', sweep near river, 17.v. 2008, 1 ♀, J. Mlynarek leg. (LEMQ, genit. prep.); Graham Co., Robbinsville, 9.vi.1976, 2 ♂♂ 5 ♀♀, G. E. Bohart leg. (LACM); Macon Co., Wayah Gap, 3500', 16.viii.1957, 1 ♂, J. G. Chillcott leg. (CNCI); Yancey Co., Forest Rd. 432 nr. Black Mt. Campground, 35.7313°N 82.2383°W, sweep forest edge, 27.v.2008, 1 ♂, J. Mlynarek leg. (LEMQ). **NORTH CAROLINA/TENNESSEE:** Great Smoky Mts. N. P., 18.v.1957, 1 ♂, W. R. M. Mason leg. (CNCI, genit. prep.). **OHIO:** 3.0 mi N. Kent, Herrick Fen, 16.vi.1986, 1 ♀, B. A. Foote leg. (CNCI). **PENNSYLVANIA:** All[eghen]y Co., Upper St. Clair Township, 6.v.1959, 1 ♀, [no collector] (EMEC, genit. prep.); Union Co., Lewisburg, 26.viii.1981, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.); Dubois, 3.ix.1927, 1 ♀, A. L. Melander leg. (USNM); Centre Co., State College, 11.vi.1975, 1 ♂ 1 ♀, D. D. Wilder leg. (CASC). **TENNESSEE:** Cades Cove, G[reat] S[moky] M[ountains] N. P., sweeps, 5.vi.1979, 1 ♂, M. J. Sharkey leg. (DEBU); Munroe Co., 20 mi E Tellico Plains, on elderberry, 11.vi.1973, 1 ♀, A. G. Lavalley leg. (UGCA, genit. prep., missing one wing). **VIRGINIA:** Botetourt Co., Apple Orchard Trail, Parker Creek, 37.511°N 79.522°W, sweep forest, 31.vi.2008, 2 ♂♂ 1 ♀, M. Forrest leg. (LEMQ); Bland Co., Brushy Mt. at Rd. 623, 37.05229°N 81.30209°W, sweep forest edge, 15.viii.2007, 1 ♂, T. A. Wheeler leg. (LEMQ 0040773), 6 ♂♂ 3 ♀♀ J. Mlynarek leg. (LEMQ, 1 ♂ 1 ♀ genit. prep.); Dickenson Co., 6 mi SE of Clintwood, 6–13.v.2011, 1 ♂, J. B. Runyon leg. (MTEC); Fairfax Co., Dead Run, 6.viii.1915, 1 ♀, R. C. Shannon leg. (USNM); Giles Co., Cascade Falls trail, 19.v.1997, 1 ♀, S. A. Marshall leg. (DEBU); Giles Co., Cascades Recr. Area, 37°21'00"N 80°36'30"W, 13.v.2003, 1 ♀, S. A. Marshall leg. (DEBU, 00217164), 16–28.v.2005, 2 ♀♀, S. M. Paiero leg. (DEBU 00250716, -22); Giles Co., Mountain Lake Biol. Stn., 37°22'31"N 80°31'18"W, sweep nr. station, 20.v.2005, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU 00253059, -2862); Alexandria Co., Maywood, 14.v.1922, 1 ♀, W. L. McAtee leg. (USNM, genit. prep.); Smyth Co., Mt. Rogers, 4700–5300', 1.vi.1962, 1 ♀, J. R. Vockeroth leg. (CNCI); Mt. Rogers N[ational] R[ecreation] A[rea], Beartree Reservoir, 35.6563°N 81.6896°W, 3041', sweep, vegetation at forest edge, 29.v.2008, 1 ♂, J. Mlynarek leg. (LEMQ); Augusta Co., Mount Solon, [-].viii.1951, 1 ♀, W. S. Murphy leg. (USNM); Augusta Co., Reddish Knob, 29.viii.1953, 1 ♀, W. W. Wirth leg. (USNM, Sabrosky det. as *A. tenuis auctt.*); Hawksbill, Shenandoah N. P., 3600–4050', 7.vi.1962, 3 ♂♂ 5 ♀♀ (1 ♀ genit. prep.); Hawksbill Gap, Shenandoah N. P., 1600 m, 17.viii.1981, 2 ♂♂ (1 ♂ genit. prep.); NW Madison Co., Shenandoah N. P., 3000', on blossoms *Acer spicatum*, 7.vi.1962, 1 ♀ (genit. prep.), all J. R. Vockeroth leg. (all CNCI); Shenandoah Co., Mt. Jackson, 25.v.1962, 1 ♂, J. G. Chillcott leg. (CNCI); Shenandoah, 14.vi.1982, big meadows, 2 ♂♂ 1 ♀, H. Goulet leg. (DEBU); Shenandoah N. P., mi 65–100, sweeps, 29.v.1979, 4 ♂♂ 1 ♀, M. J. Sharkey leg. (DEBU, 1 ♂ genit. prep.); Skyline Drive on Blue Ridge Mounts., woods and open scrubland, 3–4.vi.1975, 1 ♂, B. J. Harrington & P. S. Broomfield leg.

(BMNH, B.M. 1975-392). **WASHINGTON:** Clallam Co., Sequim, 2.viii.1951, 2 ♀♀, M. R. Wheeler leg. (AMNH, 1 ♀ genit. prep.); Pierce Co., Wickersham, 30.vii.1986, 1 ♀, T. L. Whitworth leg. (LACM, genit. prep.). **WEST VIRGINIA:** Tucker Co., Davis, Blackwater Falls St. Pk., ex. yellow pan traps, hardwood forest near campground, 30.v.–2.vi.1990, 1 ♂, B. J. Sinclair leg.; Preston Co., Crane[s]ville Swamp, 10.vi.1977, 1 ♀, H. J. Teskey leg.; Pocahontas Co., Sharp Knob, 3500', 18.v.1965, 1 ♀ (genit. prep.), J. G. Chillcott leg. (all CNCI); Summers Co., Pipestem, 18.vi.1970, 1 ♀, G. Steyskal leg. (USNM).

Other material examined (not included in type series). **CANADA: BRITISH COLUMBIA:** Mt. Robson Prov. Pk., hiking trail along Robson R. (53°02'06"N, 119°13'50"W) up to Kinney Lake (53°04'56"N, 119°11'05"W, 981m), swept on herbs & shrubs incl. *Carex* spp., aspirated. (Universität Bielefeld, Ca1520), 6.viii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, deformed T6, in ethanol). **ONTARIO:** Dubreuilville, 48°21.05'N 84°33.84'W, sweeping *Diervilla*, ferns, *Clintonia*, *Cornus*, *Aralia*, *Eurybia*, *Vaccinium* under *Populus/Pinus*, 10.vii.2010, 1 ♂; Sault Ste. Marie, Baseline Road, 46°31.40'N 84°24.40'W, sweeping *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, *Clematis*, ferns under aspen (*Populus*), 7.vii.2010, 1 ♂, both J. Roháček leg. (both SMOC, both used in molecular work). **UNITED STATES OF AMERICA: ILLINOIS:** Chicago, 6.vi.1908, 1 ♀, A. L. Melander leg. (USNM, 3 legs & 1 wing missing, genit. prep.); Union Co., Shawnee N. F., Pine Hills Campground, #83039-042, 9.vi.1983, 1 ♀, I. S. Askevold leg. (DEBU, headless, genit. prep.). **MICHIGAN:** Keweenaw Co., Isle Royale, 7.vii.1938, 1 ♀, G. Steyskal leg. (USNM, headless, genit. prep.). **VERMONT:** Manchester, 4.vi.[-], 1 ♀, C. W. Johnson leg. (MCZC, headless, genit. prep.); Mt. Equinox, 4[?].vi.1910, 1 ♀, C. W. Johnson leg. (MCZC, headless, genit. prep.); Norwich, 8.vii.1908, 1 ♀, C. W. Johnson leg. (MCZC, wing and two legs missing, genit. prep.).

Other A. macra group material of questionable identity (*Anthomyza* sp. cf. *silvatica*): **CANADA: BRITISH COLUMBIA:** Terrace, marshy meadow, 11.vi.1960, 1 ♀, J. G. Chillcott leg. (CNCI, abdomen & 1 leg missing). **UNITED STATES OF AMERICA: PENNSYLVANIA:** Centre Co., State College, 11.vi.1975, 1 ♀, D. D. Wilder leg. (CASC, abdomen missing). **VIRGINIA:** Alexandria Co., Maywood, 14.v.1922, 1 ♂, W. L. McAttee leg. (USNM, head & abdomen missing); Giles Co., Cascades Recreation Area, 14.v.1998, 1 ♀, S. A. Marshall leg. (DEBU, genit. prep.).

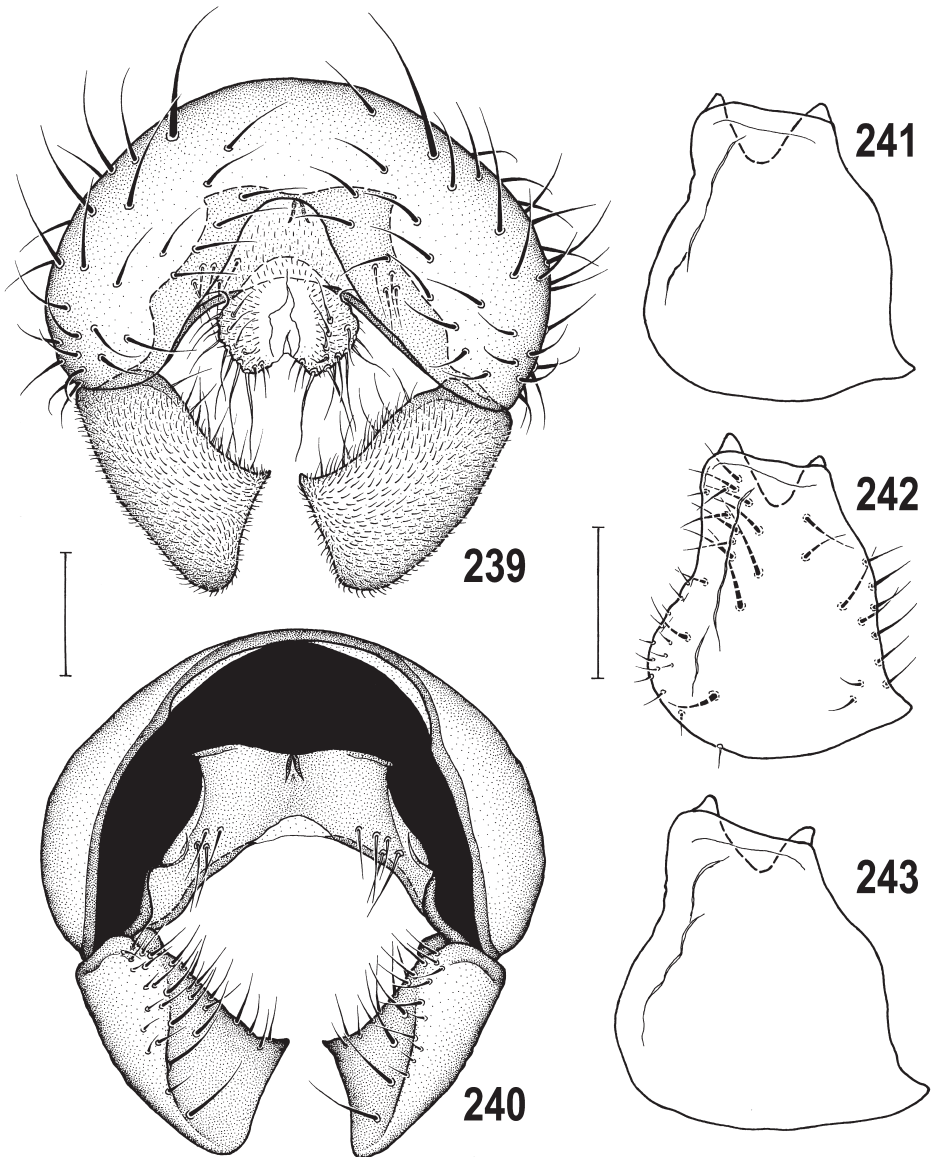
Description. Male. Total body length 1.98–2.70 mm. Body bicolourous, dark brown and yellow and subshining as in *A. tenuis* but generally darker, more extensively brown. Head shape and colouration as in *A. tenuis* but occiput and frontal triangle usually darker, frontal triangle of similar length but slightly wider and ocelli somewhat smaller. Small elongate spots between posterior half of frontal triangle and orbit more whitish than silvery microtomentose. Orbits pale yellow and whitish microtomentose anteriorly, brown behind posterior ors. Face, parafacialia, gena, postgena and mouthparts coloured as in *A. tenuis*. Cephalic chaetotaxy: pvt usually shorter than half length of vti and strongly crossed (below their middle); vti and oc subequal and longest of cephalic setae as in *A. tenuis*; vte shorter than vti but usually longer than posterior ors; 3 ors as in *A. tenuis* but anterior ors reduced to small setula; 2 pairs of medial microsetulae in anterior third of frons, posterior pair sometimes enlarged and almost as long as anterior ors setula; postocular setulae and vi as in *A. tenuis*; subvibrissa very weak, hardly longer than anterior peristomal setula; other cephalic (including palpus) chaetotaxy as in *A. tenuis*. Eye large, often more broadly oval, with longest oblique diameter 1.20–1.25 times as long as shortest. Genal height about 0.09 times as long as shortest eye diameter. Antenna as in *A. tenuis* but 1st flagellomere rather yellow and arista about 1.9 times as long as antenna.

Thorax bicolourous and similarly microtomentose to that in *A. tenuis* but its brown colour more extensive than in both Nearctic relatives. Mesonotum, scutellum (this sometimes slightly paler but never yellow) and postscutellum dark brown and also humeral callus, usually most of propleuron, as much as dorsal half of mesopleuron, laterotergite and mediotergite and sometimes even pteropleuron (latter lightest) brown or pale brown; remainder of pleural part of thorax yellow (usually paler ventrally); also notopleural area narrowly ochreous yellow

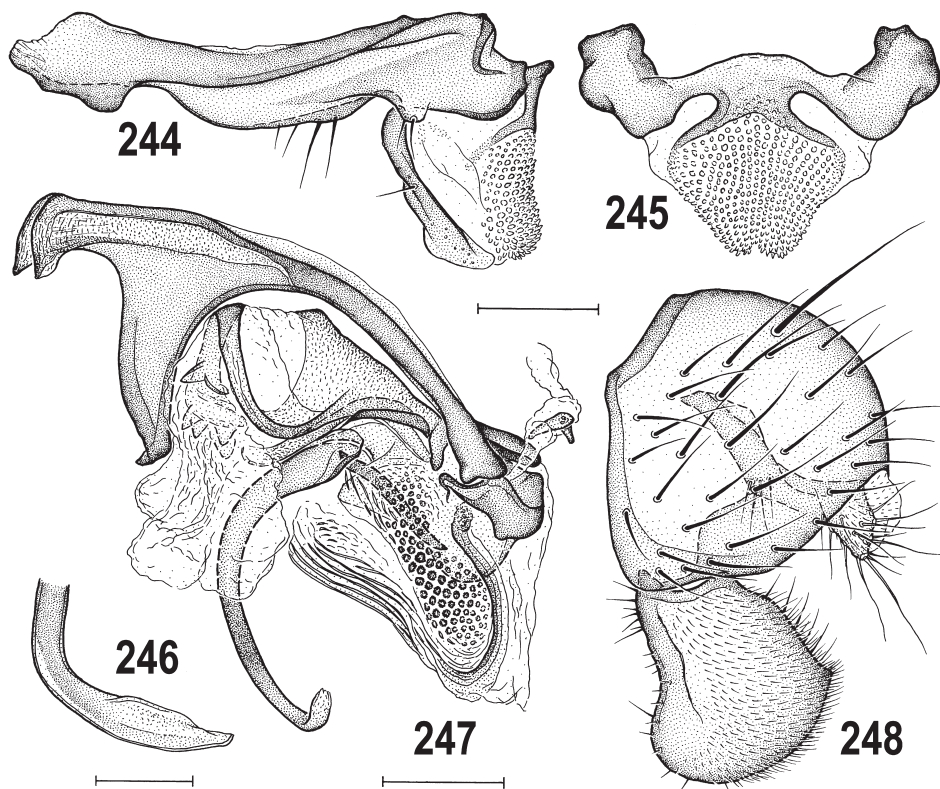
posterolaterally. Thoracic chaetotaxy most similar to that of *A. tenuis* including relative length of 1 hu, 2 npl, 1 prs, 1 sa, 1 pa, 2 postsutural dc and 2 sc; also (usually 6) dc microsetae in front of anterior dc similar, with hindmost one often distinctly longer than others; ac microsetae in 4 (both lateral very short) rows on suture but in only 2 shortly behind it, the 2 rows ending between anterior and posterior dc; sternopleural chaetotaxy most similar to that of *A. oblonga* in having 4 upcurved setulae in perpendicular row (the dorsalmost of which is inserted between stpl macrosetae) and in lacking setula in front of anterior stpl (note: in the holotype this pattern is aberrant – anterior stpl is reduced to small seta while dorsalmost upcurved setula is enlarged to a macroseta). Scutellum with disc very slightly convex as in *A. tenuis*. Legs with the same colouration and chaetotaxy as those of *A. tenuis* but ctenidial spine on f_1 can be as long as or slightly longer than maximum width of t_1 . Wing (Fig. 224) not distinctly different from that of *A. tenuis* both in colour and venation except r-m sometimes situated near middle of cell dm. Wing measurements: length 2.16–2.88 mm, width 0.75–0.93 mm; $Cs_3 : Cs_4 = 1.38\text{--}1.64$, $rm \setminus dm\text{-}cu : dm\text{-}cu = 1.87\text{--}2.82$. Haltere whitish yellow with knob usually lighter.

Abdomen with terga and sterna sparsely microtomentose and relatively (more so laterally) shining. Preabdominal terga large as in *A. tenuis*, uniformly brown to dark brown, usually slightly lighter than epandrium. T1 dorsally separate from but hardly paler than T2. T2–T5 subequal and unicolourous brown. Preabdominal sterna similarly coloured, shaped and setose to those of *A. tenuis*. T6 short, transverse and bare, but somewhat longer and darker than in *A. tenuis*, with dorsomedial unpigmented part narrower. S6–S7 asymmetrical, darker than those of *A. tenuis*, both brown but S6 usually somewhat paler, with anterior ledge-like margins blackish brown. Both S6 and S7 normally with 2 setulae. S8 relatively long and dark brown as in *A. tenuis*.

Genitalia. Epandrium (Figs 239, 240, 248) distinctly smaller and also relatively narrower than that of *A. tenuis*, with 2 pairs of long setae (dorsal stronger) besides shorter setae; anal fissure of parabolic outline, distinctly larger and higher than in *A. tenuis*. Cercus small, as in *A. tenuis*. Medandrium relatively more robust, distinctly higher (longer) than that of *A. tenuis*, with slightly projecting dorsolateral corners and stouter ventrolateral connecting arms each bearing 4–5 setae (as in *A. tenuis*) on inner side (Fig. 240). Compared to *A. tenuis* (see Figs 207, 208, 214), gonostylus (Figs 239–243, 248) distinctly smaller (shorter than height of epandrium), flatter, distally less dilated, with rounded anteroventral corner and with posteroventral corner stouter and less sharp (Figs 240, 242); setosity and pattern of micropubescence similar to those of *A. tenuis* but with fewer setae in centre of inner side of gonostylus (Fig. 242). Hypandrium (Fig. 244) and associated pregonite more similar to those of *A. oblonga* but pregonite differently setose, with 3–4 setae anteriorly but only 2 setae on small rounded posterior process. Transandrium (Fig. 245) closely resembling that of *A. tenuis* but with caudal process shorter and broader basally and with terminal arms slightly more divergent. Postgonite also similar (including chaetotaxy) to that of *A. tenuis*, but slightly bent and distally widened in profile (Fig. 244). Aedeagal part of folding apparatus with similar structures (tubercles and striae) to those in relatives (Fig. 247); connecting sclerite also similar to though less sclerotized than that in *A. tenuis*; basal membrane with very dense but finer, paler and more rounded tubercles (Figs 244, 245). Phallapodeme resembling that of *A. tenuis* including relatively slender fulcrum



Figs 239–243. *Anthomyza silvatica* sp. nov., paratype male (Canada: Ontario). 239 – external genitalia, caudally; 240 – the same, frontally (setosity of epandrium omitted); 241–243 – variation of gonostylus, sublaterally (widest extension, micropubescence and/or setosity omitted). Scales = 0.1 mm.



Figs 244–248. *Anthomyza silvatica* sp. nov., paratype male (Canada: Ontario). 244 – hypandrial complex, laterally; 245 – transandrium, caudally; 246 – apex of filum, subventrally; 247 – aedeagal complex, laterally; 248 – external genitalia, laterally. Scales = 0.05 mm (Fig. 246) and 0.1 mm (others).

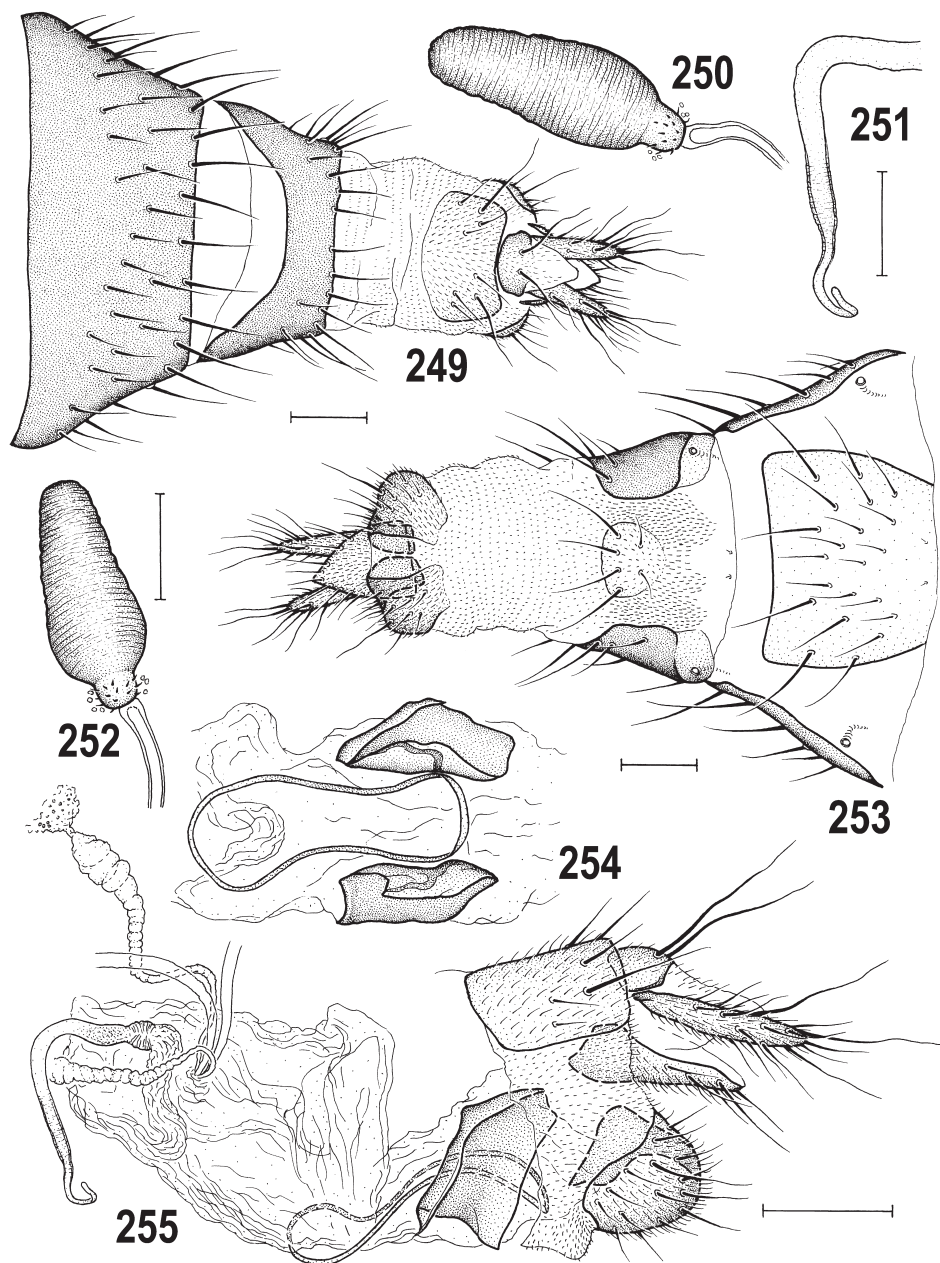
but its apex with smaller, less projecting corners (Fig. 247). Phallosophore as in both Nearctic relatives. Saccus voluminous as usual but with internal structures different from those of both *A. tenuis* and *A. oblonga*, with coiled strip-like sclerite recurved rather anteriorly (not posteriorly), and membranous part with fewer short pale spines (Fig. 247) compared to *A. oblonga*. Filum most resembling that of *A. tenuis* including its preapically slightly dilated but more pointed lancet-shaped apex (Fig. 246). Ejacapodeme (Fig. 247) similar to but somewhat smaller than that of both Nearctic relatives.

Female. Similar to male unless mentioned otherwise. Total body length 2.18–3.17 mm. Macrosetae of head and thorax usually longer and thicker. Frons sometimes with more (3 pairs) medial microsetulae in anterior third. Subvibrissa rarely enlarged, almost as long as vi (only 1 specimen seen). Antenna with 1st flagellomere darker, usually ochreous yellow, often ochreous brown around base of arista. Pleural part of thorax with dorsal longitudinal brown band sometimes narrower but humeral callus always brownish. Ctenidial spine on f_1 distinctly longer than maximum width of t_1 . Wing measurements: length 2.58–3.18 mm,

width 0.85–1.13 mm; $Cs_3 : Cs_4 = 1.35\text{--}1.54$, $dm\text{-}cu : dm\text{-}cu = 1.76\text{--}2.32$. Preabdomen with terga more transverse and completely brown (at most slightly paler dorsomedially) but usually lighter than blackish brown postabdominal T6 and T7, thus darker than in both Nearctic relatives (including their darkest specimens). T1 not paler than T2 but dorsally separate from the latter. T1–T5 rather uniformly and sparsely setose, with longest setae in posterolateral corners. Preabdominal sterna distinctly narrower than in male and becoming slightly wider posteriorly; S2–S4 as long as wide, or slightly narrower than long; only S5 wider than long, somewhat transverse and usually about as large as S6. S2–S6 with denser but finer setae than on adjacent terga.

Postabdomen (Figs 249, 253) relatively elongate as in relatives. T6 completely dark brown, thus anteriorly usually without pale marginal area, setose in posterior two-thirds. S6 similar to but slightly less transverse than that in both Nearctic relatives. T7 blackish brown, in contrast to related species dorsally shortened (anteromedially often deeply emarginate, Fig. 249) and its anterior paler corners not projecting ventromedially; S7 reduced to usually short rounded sclerite with only 6 setae and indistinct anterior margin (Fig. 253), surrounded by distinctively micropubescent membrane. T8 forming shorter (distinctly transverse) and paler flat plate (Fig. 249) than in *A. tenuis* and *A. oblonga*, almost entirely sparsely micropubescent and with a few fine setae in posterolateral areas. S8 brown, short, longitudinally divided (Fig. 253), posteromedially invaginated (Fig. 255) and similarly setose and micropubescent to that in relatives. Genital chamber (Figs 254, 255) and associated structures most resembling those of *A. tenuis*, including slightly bent (in profile) annular sclerite, but with (often hardly visible, thus not seen in Fig. 255) unpigmented plate-like sclerite in terminal part of genital chamber. Ventral receptacle (Fig. 251) also similar to that of *A. tenuis* in having strongly curved and plain terminal end but with preceding straight and thicker part indistinctly ringed. Accessory gland small, vesiculate with minute grains, on ringed, subterminally dilated, duct. Spermathecae (1+1) elongate and cone-shaped (Figs 250, 252), but form similar to those of *A. oblonga* except short basal part narrower and more distinctly separate from wider, transversely striated and darker terminal part; spermathecal ducts very long, without terminal cervix. T10 small, pale-pigmented, somewhat shorter and darker than in relatives (Fig. 249), with 1 pair of long medial setae and reduced micropubescent. S10 larger and longer than T10, elongately pentagonal with acute posteromedial corner, largely micropubescent and finely setose at posterolateral margins (Fig. 253). Cercus relatively long and slender (Fig. 255) as in relatives, with longest seta dorsopreapical, somewhat shorter apical sinuous seta and some other longer setae in addition to shorter setulae.

Discussion. *Anthomyza silvatica* sp. nov. is another species closely allied to *A. tenuis* and *A. oblonga* sp. nov. Generally, it is the darkest of the Nearctic species of the *A. macra* group and distinguished from paler forms of both *A. tenuis* and *A. oblonga* in having the brown dorsal band across the pleural part of the thorax broad, having both the humeral callus and scutellum brown and, in females, having completely brown preabdominal terga (T1–T5). However, its separation from darker forms of *A. tenuis* and *A. oblonga* on colour features alone can sometimes be problematic so it is necessary to identify these specimens using structural characters of the male and female terminalia. Males can be diagnosed by examining the shape and size of the epandrium, medandrium, gonostylus, the reduced setosity of the pregonite, and internal



Figs 249–255. *Anthomyza silvatica* sp. nov., paratype female (Canada: Ontario). 249 – postabdomen, dorsally; 250 – spermatheca; 251 – distal part of ventral receptacle, sublaterally; 252 – spermatheca; 253 – postabdomen, ventrally; 254 – internal sclerites, ventrally; 255 – female genital chamber and end of postabdomen, laterally. Scales = 0.05 mm (Figs 250–252) and 0.1 mm (others).

structures (coiled sclerite and spines) of the saccus of the distiphallus; females are diagnosed by the dorsomedially shortened T7, the short, reduced S7 and the more transverse T8. In the Nearctic, *A. silvatica* seems to be most closely related to *A. oblonga*, but due to differences in the male and female terminalia it more likely represents the sister group to the *A. oblonga* + *A. decolorata* pair (see above discussion under *A. oblonga*).

Etymology. The species name is a Latin adjective (*silvaticus*, -a, -um), meaning “living in woods”, because it is one of a few *Anthomyza* species living commonly in the Nearctic temperate and boreal woodland.

Biology. As mentioned above, *A. silvatica* and *A. oblonga* frequently co-occur in Ontario, Canada and comments and speculations have been provided above in the discussion of the biology of the two previous species. Besides this, from the many collections of *A. silvatica* a common theme for habitat descriptors appears to be forested sites or edges of forests (including Quebec: Mont-St.-Hilaire – sugar maple forest; Virginia and North Carolina: on blossoms of *Acer spicatum* Lam.) and even association with *Rubus* spp. (British Columbia: Cowichan Bay) which is reminiscent of the Ontario: Moosonee site that yielded all three *A. macra* group species (but only a single *A. silvatica*). However, some western collections suggest something somewhat different with “agricultural meadows” (British Columbia: Agassiz) and a “clearing near river” (British Columbia: Gagnon Rd. – 6 mi W Terrace). Floodplain communities may be somewhat in between (Manitoba: Ninette and Shilo). A single male was reared from a soil core (Ontario: Sault Ste. Marie – Bristol Place Park) taken in a search for immatures of *Quametopia terminalis* (see ROHÁČEK & BARBER 2011) in a growth of *Impatiens capensis*. *Anthomyza silvatica* has been collected as early as 2 May (Ontario: Midland) and as late as 17 September (Ontario: Sault Ste. Marie – Birchwood Pk.).

Distribution. This is the most frequently collected Nearctic member of the *A. macra* group and perhaps the most widely distributed, reaching Georgia in the southeast, but not reaching into the northwest as far as *A. tenuis* and not yet known from Newfoundland where the other two species have been recorded. Overlap in the west with *A. tenuis* is yet known only for Alberta, British Columbia and Washington. Canada: Alberta, British Columbia, Manitoba, Nova Scotia, Ontario, Quebec, Saskatchewan; United States of America: Connecticut, District of Columbia, Georgia, Illinois, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, Washington, West Virginia (see Table 2, Fig. 597).

Other *A. macra* group material of questionable identity (*Anthomyza* sp. *macra* group indet.). **CANADA: ALBERTA:** Dunvegan, N. side Peace River, pan traps in grasses, 6–19.vi.1995, 1 ♀, S. Boucher leg. (LEMQ, genit. prep.). **QUEBEC:** Old Chelsea, Summit King Mt., 1150', 4.vi.1964, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.). **UNITED STATES OF AMERICA: ILLINOIS:** White Heath, “6.9”.1929, 1 ♀, C. C. Goff leg. (AMNH, genit. prep.).

The *Anthomyza pallida* group

The *Anthomyza pallida* group was established by ROHÁČEK (2006a, 2009b), originally for two Palaearctic species, *A. pallida* (Zetterstedt, 1838) and *A. dissors* Collin, 1944. According to ROHÁČEK (2009a: Fig. 141), the monophyly of this group is well supported and has recently been confirmed by analysis of molecular data (ROHÁČEK & TÓTHOVÁ 2014: Fig.

1). However, because six more species belonging to this group have been recognized in the Nearctic Region, the diagnosis of the *A. pallida* group is modified as follows: (1) male f_3 with a series of shortened and thickened setae in distal part of posteroventral row; (2) pregonite with distinctive anterior tooth; (3) phallapodeme with fulcrum arising very near its apex; (4) saccus prolonged, with long membranous distal part; (5) filum with subterminal widening or tooth; (6) female genital chamber with annular sclerite situated more or less in front of posterior sclerites; (7) spermatheca with distinct terminal invagination.

At present, the group includes 8 species: the Palaearctic *A. pallida* and *A. dissors*, and the Nearctic *A. pengellyi* sp. nov., *A. mcalpinei* sp. nov., *A. pullinotum* sp. nov., *A. concolor* (Thomson, 1869), *A. occidentalis* sp. nov. and *A. vockerothi* sp. nov. These can further be classified under three subgroups, viz. the *A. pallida* (s. str.) subgroup (*A. pallida* and *A. pengellyi*), the *A. dissors* subgroup (*A. dissors*, *A. mcalpinei* and *A. pullinotum*) and the *A. concolor* subgroup comprising only Nearctic species (*A. concolor*, *A. occidentalis* and *A. vockerothi*). These subgroups are characterized below in the discussion under *A. pengellyi*, *A. mcalpinei* and *A. concolor*, respectively. While the monophyly of each subgroup is well supported by apomorphic characters, their interrelationships are not so distinct, although the *A. pallida* subgroup and *A. dissors* subgroup are likely sister groups, supported by the following synapomorphies: distiphallus with filum having a distinct dorsal, subterminal tooth or lobe-like dilation; female genital chamber with annular sclerite situated distinctly more anteriorly (with respect to other internal sclerites) than in the *A. concolor* subgroup.

Key to identification of the Nearctic species of the *Anthomyza pallida* group

- | | | |
|------|---|-------------------------------------|
| 1 | Male. | 2 |
| – | Female. | 7 |
| 2(1) | Gonostylus short, in widest extension (laterocaudal) view suboblong and with 3 distinct teeth on apex (Fig. 263) but in lateral view pointed (Fig. 261); pregonite (in lateral view) with broad trapezoidal anterior tooth-like process (Fig. 262); filum of distiphallus subterminally (in front of slender curved end) with a distinctive dorsal tooth (Fig. 266). | <i>A. pengellyi</i> sp. nov. |
| – | Gonostylus long and slender, more or less tapered towards apex and with various number of teeth (0–4) (Figs 286, 328, 368); pregonite with anterior tooth-like process more slender, subtriangular and pointed (Figs 282, 324, 364); filum of distiphallus sometimes with a dorsal lobe subapically, never with a tooth (Figs 284, 322, 362). | 3 |
| 3(2) | Gonostylus terminally with 4 distinct teeth (Fig. 286) that are also visible in lateral view (Fig. 281); aedeagal part of folding apparatus laterally with a few spine-like excrescences (Fig. 285). | <i>A. mcalpinei</i> sp. nov. |
| – | Gonostylus terminally simple (Figs 328, 349) or with teeth reduced (Figs 303, 368); aedeagal part of folding apparatus laterally with a group of small to minute dark tubercles (Figs 304, 326, 348, 367). | 4 |
| 4(3) | Thorax strikingly bicolourous: mesonotum mostly dark brown with characteristic bluish grey microtomentum, pleura contrastingly yellow (Figs 296, 297). Gono- | |

- stylus relatively short (Fig. 303), in lateral view curved, with concave anterior side (Fig. 300); postgonite flat, distally broad (Fig. 302); saccus of distiphallus distally voluminous (Fig. 304). **A. pullinotum sp. nov.**
- Thorax colouration ranging widely from entirely yellow to entirely grey with microtomentum less distinct and pale grey to brownish grey. Gonostylus longer, in lateral view with anterior side convex or slightly concave (Figs 323, 344) or concave but in the latter case long and very slender (Fig. 363); postgonite narrower, not markedly broadened distally (Figs 324, 345, 364); saccus of distiphallus more slender (Figs 326, 348, 367). 5
- 5(4) Gonostylus apically rather broad, usually not pointed (Fig. 328), rarely acute but always curved medially in distal third (Fig. 321); pregonite with additional smaller angle (Fig. 324) behind anterior tooth; connecting sclerite distally with a few robust spines (Fig. 326); filum subterminally with a distinctive dark subventral tooth (Fig. 327); upper orbits entirely yellow; femora sometimes brownish.
..... **A. concolor** (Thomson, 1869)
- Gonostylus apically pointed (Figs 349, 368) and slightly curved medially rather regularly along entire length (Figs 343, 361); pregonite lacking additional projection behind anterior tooth (Figs 345, 364); connecting sclerite distally at most with small tubercles (Figs 348, 367); filum subterminally with a small tooth or short spine (Figs 347, 362); upper orbits yellow, sometimes brownish from occiput past level of dorsomedial corner of eye as far as posterior ors; femora yellow. 6
- 6(5) Epandrium broad (Fig. 343); gonostylus shorter and basally wider (Fig. 349), in lateral view with distinctly convex anterior side (Fig. 344); saccus of distiphallus with 4 large spines (Fig. 348); upper orbits entirely yellow. **A. occidentalis sp. nov.**
- Epandrium narrower (Fig. 361); gonostylus longer and more slender, narrow also basally (Fig. 368), in lateral view with concave anterior side (Fig. 363); saccus of distiphallus with 5 smaller spines (Fig. 367); upper orbits often brownish from occiput past level of dorsomedial corner of eye as far as posterior ors.
..... **A. vockerothi sp. nov.**
- 7(1) 7th abdominal segment with S7 separate (Figs 270, 289, 374). 8
- 7th abdominal segment with S7 anteriorly fused to T7 forming with it tergosternum T7+S7 (Figs 308, 331, 352 and 377). 10
- 8(7) T7 very narrow, elongate (Figs 370, 379), laterally without microtomentum and strikingly glossy and with distinctive posterolateral lobes (Fig. 379); also S7 and S8 (Fig. 374) and T8 strikingly elongate, the latter anteromedially deeply incised (Fig. 370); upper orbits often brownish from occiput past level of dorsomedial corner of eye as far as posterior ors. **A. vockerothi sp. nov.**
- T7 broader (Figs 268, 287), laterally distinctly microtomentose and posterolaterally simple (Figs 269, 380); S7 and S8 (Figs 270, 289) and T8 shorter, the latter without deep anteromedial incision (Figs 268, 287); upper orbits entirely yellow. 9
- 9(8) T7 dorsally shortened because of deep anteromedial incision (Fig. 287), and its anteroventral corners projecting as pigmented lobes far onto ventral side almost meeting medially (Fig. 289); 7th spiracle situated in membranous emargination at margin of

- T7 (Figs 289, 380). T8 broad and pale (Fig. 287); T10 pale and with 2–3 pairs of setae (1 long) (Fig. 287); spermatheca with deep terminal invagination and distinct blunt spines around duct insertion (Fig. 293). ***A. mcalpinei* sp. nov.**
- T7 dorsally longer, with a shallow anteromedial emargination (Fig. 268), and its anteroventral corners less projecting onto ventral side (Fig. 270); 7th spiracle embedded in T7 (Figs 269, 270). T8 narrow and dark (Fig. 268); T10 also dark and with single pair of long setae (Fig. 268); spermatheca with shallow terminal invagination and minute spinulae around duct insertion (Fig. 267). ***A. pengellyi* sp. nov.**
- 10(7) Mesonotum dark brown with characteristic bluish grey microtomentum, pleura contrastingly yellow (Fig. 297). Tergosternum T7+S7 shorter (Fig. 378), with relatively small, narrow and flat part formed by original S7, the latter narrower anteriorly and narrowly connected with enlarged T7 (Fig. 308); spermatheca with terminal invagination wider and shorter, base with spines larger and more numerous (Fig. 310).
..... ***A. pullinotum* sp. nov.**
- Thorax colouration different, with microtomentum less distinct and pale grey to brownish grey. Tergosternum T7+S7 longer (Figs 376, 377), with large, broad and ventrally convex part formed by original S7, the latter wider anteriorly and broadly connected with T7 (Figs 331, 352); spermatheca with terminal invagination narrow and deep, base with small and fewer spinulae (Figs 333, 350). 11
- 11(10) T6 short and more transverse (Fig. 330); ventral part of T7+S7 with original S7 distinctly convex and separated laterally from T7 by very narrow membranous slit and 7th spiracle embedded in T7 far from this slit (Figs 331, 376); dorsal part of T7+S7 with short thick setae (Fig. 330); ventral internal sclerites in female genital chamber close to each other (Fig. 332); spermatheca with fine pointed spinulae on base (Fig. 329); femora sometimes brownish. ***A. concolor*** (Thomson, 1869)
- T6 long, slightly transverse (Fig. 351); T7+S7 ventrally less convex and separated from T7 by wider membranous slit almost reaching to anterior margin of synsclerite and 7th spiracle embedded close to this slit (Figs 352, 377); dorsal part of T7+S7 with longer and finer setae (Fig. 351); ventral internal sclerites in female genital chamber more distant from each other (Fig. 353); spermatheca with blunt spinulae on base (Fig. 350); femora entirely yellow. ***A. occidentalis* sp. nov.**

***Anthomyza pengellyi* sp. nov.**

(Figs 256, 257, 260–274, 294)

Type material. HOLOTYPE: ♂, “CAN: AB: Elbow-Sheep Wi-Ildland Pk, ~22.5kmNW Hi-ghwood House, 14.vii.2011, KNBarber, sweeps, gras-ses incl. *Poa compressa* 50°31.38'N 114°53.17'W”, “debu 01502616” and “Holotypus ♂ *Anthomyza pengellyi* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in perfect condition (see Fig. 294), with well visible gonostyli (DEBU, intact). PARATYPES: CANADA: ALBERTA: Banff, Norquay Mt. Meadows, 5000–6000', 4.vi.1925, 1 ♀, O. Bryant leg. (USNM); Banff N. P., 4500', 28.vii.1967, 1 ♀, J. R. Vockeroth leg.; Banff N. P., Eisenhower Jct., 4700', 6.vii.1955, 1 ♀, J. R. McGillis leg.; Banff [N. P.], Eisenhower Jct., 4700', Malaise trap, 9.vii.1962, 1 ♀, Mason leg. (all CNCI); Banff N. P., Mt. Eisenhower, 27.vii.1967, 1 ♂, B. A. Foote leg. (USNM); ~21.9 km W Bearberry, Hwy #734, 51°56.18'N 115°11.76'W, sweeps, wet roadside, *Equisetum fluviatile*, 24.vii.2008, 1 ♂, sweeps, mostly *Calamagrostis canadensis*, 24.vii.2008, 1 ♂; ~22.7 km S Bellevue, Hwy 774, 49°22.62'N 114°22.58'W, sweeps, roadside ditch, mostly *Carex* spp., *Equisetum*, grasses, 17.vii.2011, 1 ♂, all

K. N. Barber leg. (all CNCI); Bilby, 1.vi.1924, 1 ♀, 22.vi.1924, 1 ♂ 1 ♀, 12.vii.1924, 1 ♂, O. Bryant leg. (USNM); Hwy 97, Blue Lake, 34 km NW Williams Lake, 23.vi.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Cadomin, base of Prospect Mt., mouse runs in grass, 18.vii.1987, 1 ♂ 2 ♀♀, S. A. Marshall leg. (DEBU); ~1.2 km S Cadomin, entrance to Whitehorse Wildland P. Pk., 53°00.70'N 117°20.05'W, sweeps, *Bromus inermis*, *Hedysarum boreale*, 23.vii.2008, 5 ♂♂ 5 ♀♀; ~3.7 km NNE Cadomin, Hwy #40, 53°03.84'N 117°17.82'W, sweeps, roadside *Bromus inermis*, 23.vii.2008, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); Calgary, Fish Creek P. Pk., 50°55.581'N 114°07.399'W, sweep by river, 11.vi.2010, 1 ♀; same locality but 50°54.407'N 114°01.119'W, sweep brush by ranch house, 25.vi.2010, 1 ♂, both J. E. Swann leg. (both BDUC); Cooking Lk., 13.vi.1937, 1 ♂ 1 ♀, F. O. Morrison leg. (LEMQ 0039947, -65); Dunvegan, 55°55.39'N 118°35.74'W, sweep south facing grass slope at dusk, 19.vii.2003, 7 ♂♂ 1 ♀, S. Boucher leg. (LEMQ 0040436, -37, -39, -41–45); Dunvegan, N shore of Peace River, sweep south facing grass slope at dusk, 12.vii.1997, 6 ♂♂ 2 ♀♀ (LEMQ 0039944, -45, -57–60, -62, -63); Dunvegan, n. shore of Peace River, sweep grasses at edge of agricultural field, 13.vii.1997, 8 ♂♂ 5 ♀♀ (LEMQ 0039912, -23, -26, -32, -43, -48, -88–92, -98, -99), sweep grasses along agricultural field, 14.vii.1997, 1 ♂ 3 ♀♀ (LEMQ 0039993, -0040000, -01, -07), all T. A. Wheeler leg.; Dunvegan, N side Peace River, pan traps in grasses, 22.v.–6.vi.1995, 1 ♀ (LEMQ 0039909), 6–19.vi.1995, 1 ♂ (LEMQ 0039908), S. Boucher leg.; Dutch Creek Bridge, Hwy 940, 3.vii.1982, 1 ♀, B. V. Peterson leg. (CNCI); Edmonton, 11.vi.1937, 1 ♂, E. H. Strickland leg. (LEMQ); Edmonton, 14.vi.1966, 2 ♂♂ 1 ♀, K. A. Spencer leg. (BMNH, 1 ♂ 1 ♀ genit. prep.); Edmonton, prairie, 12.vi.1937, 1 ♀, E. H. Strickland leg. (USNM); Edmonton, Ft. Edmonton Pk., 53°30.3'N 113°34.2'W, sweeps, veg. banks of N. Sask[atchewan] R., 14.vii.1999, 2 ♀♀, K. N. Barber leg. (CNCI); Elbow-Sheep Wildland Pk., ~22.5 km NW, Highwood House, 50°31.38'N 114°53.17'W, sweeps, *Carex utriculata*, 14.vii.2011, 5 ♂♂ 6 ♀♀ (DEBU 01502573–83), sweeps, grasses incl. *Poa compressa*, 14.vii.2011, 21 ♂♂ 14 ♀♀ (DEBU 01502609–15, -17–44), pooter, *Carex utriculata*, 14.vii.2011, 1 ♀ (DEBU 01502594), pooter, *Carex utriculata*, 16.vii.2011, 2 ♂♂ 3 ♀♀ (DEBU 01503655–59); ~22.5 km NW Highwood House, ~4 km W Mist Ck., 50°31.38'N 114°53.17'W, sweeps, *Carex* sp. (large), 25.vii.2008, 2 ♂♂, sweeps, *Carex* sp. (small), 25.vii.2008, 1 ♀ (DEBU); Elbow-Sheep Wildland Pk., ~22.5 km NW Highwood House, 50°31.40'N 114°53.12'W, sweeps, *Carex utriculata*, 14.vii.2011, 1 ♂ (DEBU 01502661); same locality but ~26 km NW Highwood House, Mt. Lipsett day use, 50°33.26'N 114°57.27'W, sweeps, various grasses, 14.vii.2011, 1 ♂ (DEBU 01502568); ~26 km NW Highwood House, Mt. Lipsett pulloff, 50°33.26'N 114°57.27'W, sweeps, *Bromus inermis*, *Leymus innovatus*, 25.vii.2008, 10 ♂♂ 16 ♀♀ (DEBU), all K. N. Barber leg.; Elkwater, 5.vi.1952, 1 ♂, 8.vi.1952, 3 ♀♀, A. R. Brooks leg., 8.vi.1952, 1 ♀, L. A. Konotopetz leg.; Elkwater Park, 26.v.1952, 1 ♂, A. R. Brooks leg., 31.v.1952, 1 ♀, 12.vi.1952, 1 ♂, L. A. Konotopetz leg. (all CNCI); 4 km SE Grimshaw, sweep grasses at margin of wheat field, 13.vii.1997, 1 ♂ 1 ♀ (LEMQ 0039913, 0040010), sweep vegetation at edge of wheat field, 13.vii.1997, 2 ♂♂ (LEMQ 0039966, -67), S. Boucher leg., sweep margin of agricultural field, 13.vii.1997, 2 ♂♂ (LEMQ 0039970, -40002), T. A. Wheeler leg.; [Fort] McMurray, 3.vii.1953, 1 ♀, 10.vii.1953, 5 ♂♂ 7 ♀♀, 4.viii.1953, 5 ♂♂ 1 ♀, 7.viii.1953, 2 ♀♀, 8.viii.1953, 1 ♂ 2 ♀♀, 10.viii.1953, 2 ♂♂; nr. [Fort] McMurray, 29.v.1953, 1 ♂, all G. E. Ball leg. (all CNCI); 2 km N of Fortree Mountain Ski Resort Road jct. Hwy 40, 1700 m, Alta 6 meadow, 21.vii.1986, 1 ♂, H. Goulet leg.; Halfway Slough, 59°56.049'N 111°44.344'W, sweep, 5.vii.2012, 1 ♂, S. & K. Williamson leg. (both BDUC); ~3.4 km SSW Hinton, Hwy #40, 53°21.24'N 117°37.35'W, sweeps, mostly *Bromus inermis*, 23.vii.2008, 1 ♂; ~11 km WSW Hinton, nr. jct. Twp. Rd. 510A & Range Rd. 262, 53°22.72'N 117°44.13'W, sweeps, mostly *Bromus inermis*, 22.vii.2008, 3 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Jasper, 16.vi.1966, 2 ♂♂, K. A. Spencer leg. (BMNH); 2 mi S Jasper, 30.vii.1967, 1 ♂, S. P. Whitney leg. (USNM); Kananaskis, 0.3 km N of Barrier Lk. Dam, 51°02'N 115°03'W, sweep, 2.viii.2001, 1 ♀, C. J. Borkent leg. (RBCM ENT006-007073); Kananaskis, Mt. Loretto [sic Lorette] Pond[s], 50°38.076'N 113°06.649'W, Bioblitz, sweep, 16.vii.2011, 1 ♂, G. Shrestha & E. Nelson leg. (BDUC); Kananaskis Country, nr. Beehive Natural Area, 50°05.07'N 114°36.47'W, sweeps, hillside seep, *Carex utriculata*, 17.vii.2011, 1 ♂, K. N. Barber leg. (CNCI); Leduc, mixed grassland, 26.vi.1967, 1 ♀, D. Chomyn leg. (PMAE); Nordegg, 25.vii.1936, 1 ♂, E. H. Strickland leg. (USNM); Peace River, NE side of Peace R., sweep south facing grass slope, 13.vii.1997, 1 ♀, T. A. Wheeler leg. (LEMQ 0039964); Peter Lougheed P. Pk., 50°41.82'N 115°06.92'W, sweeps, fen, *Carex utriculata* with cf. *Poa pratensis*, 13.vii.2011, 4 ♂♂ 4 ♀♀ (DEBU 01502921–28), 14.vii.2011, 1 ♂ 1 ♀ (DEBU 01503290, -91), 16.vii.2011, 3 ♂♂ (DEBU 01503387–89); same locality but 50°41.85'N 115°06.93'W, sweeps, roadside grasses and herbs, 13.vii.2011, 3 ♂♂ 3 ♀♀ (DEBU 01503281–86); same locality but Upper Lake Drive, 50°36.98'N 115°07.13'W, sweeps, edge of fen, *Carex utriculata*, 14.vii.2011, 1 ♀ (DEBU 01503313), 16.vii.2011, 11 ♂♂ 5 ♀♀ (DEBU 01503492–507), 21.vii.2011, 1 ♂

(DEBU 01503671), sweeps/pooter, edge of fen, *Carex utriculata*, 15.vii.2011, 1 ♂♂ 2 ♀♀ (DEBU 01503360–64); same locality but Upper Lake Drive, 50°36.94'N 115°07.16'W, sweeps, edge of fen, *Carex utriculata*, 16.vii.2011, 1 ♂ (DEBU 01503646); same locality but 0.5 km W Little Highwood Pass, 50°38.55'N 115°02.94'W, sweeps, roadside grasses incl. *Bromus inermis*, 14.vii.2011, 1 ♂ 7 ♀♀ (DEBU 01502558–65), 16.vii.2011, 27 ♂♂ 26 ♀♀ (DEBU 01502699–751), all K. N. Barber leg.; Ponoka, 12.vi.1921, 1 ♂, O. Bryant leg. (USNM); ~20 km SSE Robb, Hwy #40, Lovett River P[rovincial] R[ecreation] A[rea], 53°03.89'N 116°49.02'W, sweeps, streamside, mostly grasses, 23.vii.2008, 16 ♂♂ 8 ♀♀, K. N. Barber leg. (DEBU); Rocky Mtn. House, 52°22.57'N 114°56.34'W, pooter, grasses on bridge embankment, edge of parking area, 24.vii.2008, 1 ♂; ~40.8 km SSW Rocky Mtn. House, Hwy #752, 52°09.79'N 115°25.89'W, sweeps/pooter, roadside Poa, 24.vii.2008, 1 ♀, both K. N. Barber leg. (both CNCI); Sheep Creek P. Pk., 54°03.6'N 119°00.7'W, sweep at campground, 22.vii.2003, 2 ♂♂ (LEMQ 0040455, -57); Kananaskis, Sheep River P. Pk., Sandy McNabb camp, 50°38.27'N 114°31.7'W, sweep, open forest & grasses, 28.vii.2003, 1 ♂ 1 ♀ (LEMQ 0040397, -407), all S. Boucher leg.; Slave L., 14.viii.1924, 4 ♂♂, O. Bryant leg. (CASC 2 ♂♂, USNM 2 ♂♂); Spray Valley P. Pk., 50°48.95'N 115°09.84'W, sweeps, fen, *Carex utriculata?* and *Poa* sp., 13.vii.2011, 2 ♂♂ (DEBU 01502771, -72); same locality but 50°48.98'N 115°09.80'W, sweeps, graminoids and herbs nr. edge of fen, 13.vii.2011, 1 ♂ 1 ♀ (DEBU 01502859, -60); same locality but Buller Mt. day use, 50°52.02'N 115°21.23'W, sweeps, edge of fen, *Carex utriculata?*, 15.vii.2011, 1 ♂ (DEBU 01503379); W. A. Switzer P. Pk., Beaver Ranch Trail, 53°29.67'N 117°48.00'W, sweeps, sedge-filled oxbow, *Carex utriculata?*, 22.vii.2011, 1 ♂ (DEBU 01503776); same locality but 53°29.80'N 117°48.02'W, sweeps, edge of Jarvis Ck., *Carex utriculata*, 22.vii.2011, 1 ♂ 2 ♀♀ (DEBU 01503704–06), all K. N. Barber leg.; Wabamun, 1.vii.1966, 2 ♂♂, K. A. Spencer leg. (BMNH, 1 ♂ genit. prep.); Waterton Lakes N. P., 7–12.vii.1980, 1 ♀, 14–20.vii.1980, 1 ♀, H. J. Teskey leg. (CNCI); 10 km N Whitecourt, Sakwatamau R., 54°12'03"N 115°46'40"W, sweep sedges & grass at upper beach, 18.vii.2003, 1 ♀, T. A. Wheeler leg. (LEMQ 0040424). **BRITISH COLUMBIA:** Adams Lake, 19.vi.1950, 1 ♀, F. Cameron leg. (CNCI); Atlin, 2200', 3.vi.1955, 2 ♀♀, 4.vi.1955, 1 ♂ 1 ♀, 20.vi.1955, 1 ♂ 4 ♀♀, 21.vi.1955, 1 ♂ 1 ♀, 23.vi.1955, 1 ♂ 1 ♀, 24.vi.1955, 2 ♂♂ 1 ♀, 27.vi.1955, 3 ♀♀, 29.vi.1955, 1 ♀, 6.vii.1955, 1 ♀, 7.vii.1955, 1 ♂ (genit. prep.), 8.vii.1955, 1 ♀, B. A. Gibbard leg., 20.vi.1955, 1 ♂ 3 ♀♀, 23.vi.1955, 1 ♂ 3 ♀♀, 3.vii.1955, 1 ♀, 6.vii.1955, 1 ♂, H. Huckel leg. (CNCI); S of Atlin, Warm Springs, sweep vegetation at warm stream margin, 2.vi.1997, 3 ♂♂ 3 ♀♀ (LEMQ 0039914, -24, -25, -38, -39, 0040011); 23 km S Atlin, Warm Spring, 59°23'N 133°32'W, sweep vegetation stream, 25.vi.1997, 2 ♂♂ (LEMQ 0040005, -06), all T. A. Wheeler leg.; Bear Lake, 20.vii.1903, 1 ♂ 2 ♀♀, R. P. Currie leg. (USNM); Canim Lake, 22.vi.1938, 1 ♀, J. K. Jakob leg., 22.vi.1938, 2 ♀♀, G. S. Walley leg. (CNCI); Chetwynd, 615 m, 25.vi.1978, 4 ♂♂ 1 ♀, P. H. Arnaud Jr. leg. (CASC, 1 ♂ genit. prep.); Clinton, 14.vi.1938, 1 ♀, G. S. Walley leg. (CNCI); nr. Cranbrook, sweeps, 16.vii.1980, 1 ♂, G. Gibson leg. (DEBU); Fernie, Annex Pk., 49°30'43"N 115°04'07"W, 2.viii.2010, 3 ♂♂ 2 ♀♀, S. M. Paiero leg. (DEBU 00334405, -08, -14, -16, -26); Fernie, Annex Pk., 49°30.72'N 115°04.13'W, sweeps, wet ditch, mostly *Equisetum arvense* & *E. laevigatum*, 17.vii.2011, 1 ♂ 3 ♀♀, sweeps, wet ditch, *Carex utriculata*, 17.vii.2011, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); 35 km NW Fraser on Klondike Hwy, Tutshi Lake, sweep grasses beside road, 3.vi.1997, 2 ♀♀, T. A. Wheeler leg. (LEMQ 0040014, -15); Glacier, 1.viii.1950, 1 ♀, K. Bourns leg. (CNCI); Glacier National Park, ca. 1.6 km N Glacier, 14.vii.1974, 1 ♂ 2 ♀♀, P. H. Arnaud Jr. leg. (CASC); Haines Cut-Off, 900', 13.vii.1948, 1 ♂ 1 ♀, W. R. Mason leg.; Honeymoon Bay, Cowichan L., 6.vi.1955, 1 ♀, G. E. Shewell leg.; 15 mi E Hope, 12.vii.1973, 2 ♀♀, H. J. Teskey leg. (all CNCI); Kaslo, 11.vi.[-], 2 ♀♀, H. G. Dyer leg., 11.vi.[-], 2 ♂♂ 2 ♀♀, 25.vi.[-], 1 ♀, R. P. Currie leg.; Kaslo Cr., 18.vi.[-], 2 ♂♂ 2 ♀♀, R. P. Currie leg., 18.vi.[-], 1 ♀, A. N. Caudell leg. (all USNM); Kimpton Creek, Hwy 93, 23.vi.1982, 1 ♂ 2 ♀♀, B. V. Peterson leg. (CNCI); Kimbasket Lake, BC Hydro drawdown study, Malaise trap (WIL84-01), 18.vii.2008, 1 ♀, (33MTRT15), 12–13.vii.2009, 1 ♀, (34MTRT15), 12–13.vii.2009, 1 ♀, (84MCOT15), 21.vi.2010, 1 ♀, (87MTRT01), 29–30.vii.2009, 1 ♀, (88MCOT01), 10.vii.2010, 1 ♀, (88MCOT15), 10.vii.2010, 1 ♂, Cooper Beauchesne & Assoc. Ltd. leg. (RBCM); ~7.9 km SE Valemount, edge of Kimbasket Lake, 52°46.70'N 119°10.44'W, sweeps, mixed graminoids & *Equisetum*, 23.vii.2011, 1 ♂, K. N. Barber leg.; King Salmon L., 58°43'N 132°54'W, 1750', *Carex*, grass, *Equisetum*, beside lake, 3.vii.1960, 1 ♂, W. W. Moss leg., around camp veg'n. garbage, 14.vii.1960, 1 ♀, R. Pilfrey leg. (all CNCI); Kiskatinaw Public Campground, Alaska Hwy, DC-20 (31.4km), 26.vi.1978, 1 ♂ 1 ♀, P. H. Arnaud Jr. leg. (CASC); Kootenay N. P., Daer-Pitts, Aspen Control 2, Malaise, 16–30.vii.2000, 1 ♂, G. Gareau leg. (BDUC); Lac La Hache, 15.vii.1973, 1 ♂; Lac La Jeune, 27.vi.1973, 1 ♀, both H. J. Teskey leg.; Liard Hot Spring, mi. 496, 1500', Alaska Hwy, 9–10.vii.1959, 1 ♀, R. E. Leech leg.; Mission City, 6.vi.1953, 1 ♂, 18.vii.1953, 1 ♀, W. R. M. Mason leg., 27.vii.1953, 1 ♂, G. J. Spencer leg. (all CNCI); Mt. Robson

Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 2 ♂♂; Mt. Robson Prov. Pk., hiking trail along Robson R. (53°02'06"N, 119°13'50"W) up to Kinney Lake (53°04'56"N, 119°11'05"W, 981 m), swept on herbs & shrubs incl. *Carex* spp., aspirated, (Universität Bielefeld, Ca1520), 6.viii.2002, 1 ♂; Nancy Greene Lake (Blueberry Creek), S of Hwy #3, ~24 km WSW Castlegar, ~49°14'N ~118°W, swept, aspirated, (Universität Bielefeld, Ca1534), 14.viii.2002, 1 ♂ 1 ♀, all M. v. Tschirnhaus leg. (all ZSMC, in ethanol); Nancy Greene Park, sweep, [-].viii.1980, 1 ♂ 1 ♀, S. Marshall leg. (DEBU); Prophet River Prov. Campground, Alaska Hwy, DC-221, 13.viii.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Quesnel, 12.vi.1949, 1 ♀, G. J. Spencer leg. (UBCZ, head glued to minuten); Revelstoke, 2.vii.1973, 2 ♀♀, H. J. Teskey leg.; Robson, 24.vi.1949, 1 ♀, 10.vi.1950, 1 ♀, 7.vii.1950, 2 ♂♂, H. R. Foxlee leg. (all CNCI); Robson, 28.v.1958, 1 ♀, H. R. Foxlee leg. (UBCZ, genit. prep.); Salmon Arm, 17.vi.1925, 1 ♀, A. A. Dennys leg.; Sawmill Lk., Telegraph Ck., 1100', *Carex*, grass, *Equisetum*, beside lake, 2.vii.1960, 1 ♀, R. Pilfrey leg.; Summit Lake, mi. 392 Alaska Hwy, 4500', 8.vii.1959, 1 ♂ 1 ♀, E. E. MacDougall leg., 8.vii.1959, 1 ♂, 11–14.vii.1959, 1 ♀, R. E. Leech leg. (all CNCI); Alaska Hwy at Summit Lake, 58°39.1'N 124°39.1'W, sweep along small outlet stream, 12.vii.1997, 1 ♀, T. A. Wheeler leg. (LEMQ 0039942); Alaska Hwy at Summit Lake Campground, sweep vegetation, 26.vii.2000, 1 ♂ 1 ♀, V. Dion & S. Boucher leg. (LEMQ 0039915, -55); Terrace, 5.vi.1960, 1 ♂, C. H. Mann leg., 9.vii.1960, 1 ♀, 21.vii.1960, 1 ♀, 24.vii.1960, 1 ♀, W. R. Richards leg.; Gagnon Rd., 6 mi W Terrace, 220', on buttercup, 20.vi.1960, 1 ♂ 2 ♀♀; same locality but on blueberry, 20.vi.1960, 1 ♀, all W. W. Moss leg.; Kitsumkalum, Lake, 20 mi N Terrace, 500', 16.vi.1960, 1 ♀, R. Pilfrey leg.; Kleanza Ck., 14 mi E Terrace, 14.vii.1960, 4 ♂♂ 3 ♀♀, G. E. Shewell leg.; same locality but 250', 17.vii.1960, 1 ♂, R. Pilfrey leg.; Remo, 7 mi E Terrace, 230', 13.vi.1960, 2 ♀♀, R. Pilfrey leg.; Shames, 17 mi W Terrace, 13.vii.1960, 1 ♂, J. G. Chillcott leg.; Shames, 18 mi SW Terrace, 23.vi.1960, 1 ♀, C. H. Mann leg.; Zymagotitz River, 6 mi W Terrace, 190', 20.vi.1960, 1 ♂, R. Pilfrey leg.; Tunjony L., 58°26'N 132°45'W, 3200', 20.vii.1960, 1 ♀, W. W. Moss leg. (all CNCI); Vancouver Is., Courtenay, [-].vi.1965, 1 ♂, N. L. H. Krauss leg. (USNM); Williams L., 20.viii.1960, 4 ♂♂ 1 ♀, W. R. Richards leg.; 20 km SW Williams Lake, CD1420, 20.vii.1992, 3 ♂♂ 2 ♀♀ (incl. pair in copula), A. Borkent leg. (all CNCI); Yarrow, NW foot of Vedder Mt., 49°04'N 122°03'W, swept/aspirated, herbs along forest road, (Universität Bielefeld, Ca1509), 23.vii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol). **LABRADOR:** Cartwright, 26.vi.1955, 1 ♀, E. E. Sterns leg.; Hopedale, 8.viii.1926, 1 ♀, W. W. Perrett leg. (both CNCI). **MANITOBA:** Aweme, 4.vii.1917, 1 ♂, N. Criddle leg., 16.vii.1923, 1 ♂, H. A. Robertson leg. (CNCI); Aweme, Criddle farm, 49°42.5'N 99°36.1'W, sweep open forest at graveyard, 8.vii.2000, 1 ♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039922, -30); Churchill, 12.vii.1952, ecological data T-C 3-1, 1 ♂, J. G. Chillcott leg. (CNCI); 11 km S Churchill, Goose Creek Bridge, 58.662°N 94.165°W, 0 m a.s.l., 16.vii.2010, 1 ♂, J. Wang leg. (BIOUG, in ethanol, Barcode of Life, Sample ID:10PROBE-14693, BOLD ID:JWDCJ353-11); 26 km SE Churchill, Twin Lakes, 58.63°N 93.819°W, 14 m a.s.l., 19.vii.2009, 1 ♀, Arctic Ecology 2009 leg. (BIOUG, in ethanol, Barcode of Life, Sample ID:09PROBE-JW0720, BOLD ID:JWDCC720-10); 26 km SE Churchill, Twin Lakes, burn site, 58.6173°N 93.8123°W, 38 m a.s.l., 1.viii.2010, 1 ♂, J. Wang leg. (BIOUG, in ethanol, Barcode of Life, Sample ID:10PROBE-12875, BOLD ID:JWDCH669-10); Churchill, 12 km E on Launch Rd., 58°45'16"N 93°59'55"W, fen, Malaise trap, 10–14.vii.2007, 1 ♂, A. Renaud leg. (DEBU 00362140); 13 km E Erickson, 31.vii.1983, 1 ♂, K. N. Barber leg. (DEBU); Ninette, maple/elm floodplain community, along stream, 25.vii.1958, 1 ♂, N. B. Chillcott leg.; 5 mi SW Shilo, 28.v.1958, 1 ♀, C. D. F. Miller leg.; 5 mi SW Shilo, floodplain community near tamarack bog, 28.v.1958, 2 ♀♀; 5 mi SW Shilo, floodplain community near tamarack bog, sedge meadows, 16.vi.1958, 1 ♀; same locality but ex. *Anemone* sp., 6.viii.1958, 1 ♀, all J. F. McAlpine leg.; same locality but swampy wooden hillside, 2.viii.1958, 1 ♂, J. G. Chillcott leg. (all CNCI). **NEW BRUNSWICK:** Chamcook, 30.vi.1965, 1 ♀; Chamcook, Glebe Road, 28.vi.1965, 1 ♂, both G. E. Shewell leg. (both CNCI). **NOVA SCOTIA:** [ape] B[reton] H[ighlands] N. P., Mackenzie Mt., PG640848, dry spruce birch forest, 24.vi.1984, 2 ♀♀, H. J. Teskey leg. (CNCI); Cape Breton Island, 1 km N Mabou, sweep grasses in roadside picnic area, 16.viii.1996, 1 ♀, T. A. Wheeler leg. (LEMQ 0039928). **NORTHWEST TERRITORIES:** Fort Liard, 9.vi.1969, 1 ♀, G. E. Shewell leg.; Ft. McPherson, 2.vii.1957, 1 ♂, S. D. Hicks leg., 10.vii.1957, 1 ♂, R. Hurley leg. (all CNCI); Fort Smith, 60°00.109'N 111°51.508'W, frog swamp, sweep, 29.vi.2012, 2 ♂♂, S. & K. Williamson leg. (BDUC); Norman Wells, 2.vii.1969, 1 ♂, G. E. Shewell leg. (CNCI); Norman Wells, 65.26694°N 126.72827°W, 62 m, Repl. 2 mesic, sweep, 17.vi.2011, 1 ♂ 1 ♀, NBP Field Party leg. (LEMQ); Norman Wells, nr. D.O.T. Lake, 65.252°N 126.665°W, sweep, 12.vi.2011, 2 ♂♂ 1 ♀, A. M. Solecki leg. (LEMQ). **ONTARIO:** Algonquin Pk., 4.vii.1978, 1 ♀, D. McCorquodale leg.; Algonquin P. Pk., nr. Madawaska Lake, 45.3261°N 78.3056°W, Malaise trap, hardwood forest (MD-GAP), 21.vi.–4.vii.2008, 1 ♀, E.

Proctor leg. (both DEBU); Algonquine [sic], mixed wood, 1.vi.1991, 1 ♂ 2 ♀♀ (1 ♀ genit. prep.); Beaver Bay, mixed wood nr. river, 31.v.1991, 1 ♂ (genit. prep.), all M. Barták leg. (all MBPC); Bruce Co., Crane River & Hwy #6, sweep, 23.vi.1995, 1 ♀, S. A. Marshall leg. (DEBU); Bruce Peninsula N. P., Bartley Lake, 45°12.9'N 81°29.3'W, sweeps, shoreline graminoids, 2.vii.1999, 1 ♀; Bruce Peninsula N. P., Cameron Lk. Rd., 45°12.5'N 81°33.5'W, sweeps, trailside grasses, mixed forest, 4.vii.1998, 6 ♂♂ 1 ♀, sweeps, trailside veg., grasses, mixed forest, 4.vii.1998, 2 ♂♂ 2 ♀♀; same locality but 45°12.7'N 81°33.0'W, sweeps, roadside vegetation, 5.vii.1998, 1 ♀; Bruce Peninsula N. P., Emmett Lake, 45°13.5'N 81°28.2'W, sweeps, mostly graminoids, open area under *Acer/Quercus*, 2.vii.1999, 2 ♂♂ 6 ♀♀, all K. N. Barber leg. (all DEBU); Charlton, 29.vii.1930, 1 ♀, H. S. Parish leg. (USNM); Cochrane, 49°03.54'N 81°04.41'W, sweeps, grasses on edge of hwy. pulloff, 21.vii.2009, 5 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Dubreuilville, 48°21.09'N 84°33.90'W, sweeping undergrowth *Pinus/Populus* forest, with *Clintonia*, *Vaccinium*, ferns, graminoids, 10.vii.2010, 4 ♂♂, J. Roháček leg. (SMOC, 1 ♂ genit. prep.); Dubreuilville, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, along Magpie River, 10.vii.2010, 1 ♂; ~35 km WSW Dubreuilville, 2 km SE jct. Hwys #17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside vegetation incl. wet ditch, 31.vii.2008, 1 ♀, both K. N. Barber leg.; Eagle River, 11.vii.1960, 1 ♀, Kelton & Whitney leg.; ~55 km NNW Elliot Lake, s. of Rocky Island Lake, 46°49.32'N 82°59.54'W, sweeps, *Scirpus*, grasses, *Equisetum*, ferns, 3.vii.2010, 3 ♂♂ 2 ♀♀, K. N. Barber leg. (all CNCI); same locality but 455 m, sweeping vegetation with predominant grasses, 3.vii.2010, 11 ♂♂ 17 ♀♀ (1 ♂ 1 ♀ genit. prep.); ~61 km NNW Elliot Lake, Three Lakes, 46°49.94'N 83°06.31'W, 425 m, sweeping grasses [mostly *Glyceria striata*] near lakeshore, 3.vii.2010, 7 ♂♂ 6 ♀♀ (1 ♀ genit. prep.), all J. Roháček leg. (all SMOC); ~63 km NNW Elliot Lake, s. of Rocky Island Lake, 46°49.80'N 83°09.08'W, sweeps, streamside graminoids, 4.vii.2010, 3 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); same locality but 425 m, sweeping streamside graminoids, 4.vii.2010, 4 ♂♂ 2 ♀♀, J. Roháček leg. (SMOC); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, sweeps, *Scirpus [microcarpus]* on dried shoreline, 4.vii.2010, 1 ♂, K. N. Barber leg.; Finland, 21.vii.1960, 1 ♂, S. M. Clark leg. (both CNCI); Fork[s of the] Credit, 2.viii.1933, 1 ♀, H. S. Parish leg. (USNM); Foymont, 1600', 25.vi.1983, 1 ♀, H. Walther leg. (CNCI); Greenwater P. Pk., 49°10.93'N 81°16.37'W, sweeps, *Phalaris arundinacea* in creek floodplain, 21.vii.2009, 1 ♂ (DEBU 01502119); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp., graminoids, *Caltha*, 21.vii.2009, 1 ♀ (DEBU 01502089), both K. N. Barber leg.; ~5 km NE Heyden, Hwy 552, 46°41.37'N 84°16.85'W, sweeps, roadside ditch/stream, graminoids, 31.vii.2006, 1 ♀; 12 km NE Heyden, Bellevue Tower Hill, open meadow & mixed forest, 4.vi.1987, 1 ♀, both K. N. Barber leg.; Icewater Creek WS [watershed], ~12.7 km NNE Searchmont, mi. 10.5 Whitman Dam Rd., riparian meadow/alder thicket, Malaise, 29.vi.–3.vii.1986, 1 ♀, 10–15.vii.1986, 2 ♂♂, 15–21.vii.1986, 1 ♀, [K. N. Barber] leg.; same locality but 13.5 km NNE Searchmont, mi. 11.5 Whitman Dam Rd., sandy access road, 20.vi.1986, 6 ♂♂ 6 ♀♀, 1.vii.1986, 3 ♀♀, 15.vii.1986, 1 ♀; Icewater Creek WS [watershed], 46°53.7'N 84°03.4'W, sweeps, roadside sedges/grasses, mixed forest, 10.vii.1998, 3 ♂♂ 3 ♀♀, sweeps, roadside sedges/grasses, mixed forest, 7.vii.1998, 4 ♂♂ 4 ♀♀, sweeps, *Thalictrum*, *Eupatorium [Eurochium]*, sedges in mixed forest, 17.vii.1998, 1 ♂, sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 2 ♂♂ 2 ♀♀, sweeps, trailside sedges, ferns, grasses, 10.vii.1998, 2 ♂♂, sweeps, trailside vegetation incl. sedges, ferns, grasses, 24.vii.1998, 1 ♀; same locality but 46°53.72'N 84°03.39'W, sweeps, riparian ferns, graminoids, 5.viii.2006, 8 ♂♂ 2 ♀♀, all K. N. Barber leg.; Iroquois Falls, *Carex*, grass, on unshaded wet soil, 24.vi.1987, 1 ♂, swept along small cold mossy stream, 29.vi.1987, 3 ♂♂, J. R. Vockeroth leg. (all CNCI); Kirkland Lake, 22.vi.1980, 1 ♂, 24.vi.1980, 1 ♀, J. Cashaback leg. (DEBU); Lake Superior P. Pk., 47°16.42'N 84°33.66'W, pooter, grasses in roadside ditch, 15.vi.2004, 2 ♂♂ 1 ♀, K. N. Barber leg. (DEBU 01501450–52); Lake Superior Prov. Park, Crescent Lake Trail, 47°16.81'N 84°33.23'W, sweeping, mostly graminoids under *Betula/Acer*, 9.vii.2010, 8 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep., 1 ♂ 2 ♀♀ photographed); Lake Superior P. Pk., Trappers Trail, 47°32.53'N 84°48.50'W, sweeps, trailside sedges, 13.vi.2010, 5 ♂♂ 11 ♀♀, K. N. Barber leg. (DEBU 01502469–84); Manitoulin Is., Carter Bay, 45°36.3'N 82°08.5'W, sweeps, creekside graminoids, 30.vi.1999, 2 ♂♂, sweeps, Pearly Everlasting [*Anaphalis margaritacea*], 30.vi.1999, 1 ♂ (CNCI); Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.4'N 82°06.1'W, sweeps, low veg. in mixed wood, 5.vii.1998, 16 ♂♂ 12 ♀♀ (CNCI 12 ♂♂ 8 ♀♀, 1 ♂ genit. prep., NMPC 2 ♂♂ 2 ♀♀, SMOC 2 ♂♂ 2 ♀♀), 4.vii.1999, 4 ♂♂ 10 ♀♀ (CNCI, 1 ♀ genit. prep.), all K. N. Barber leg.; Manitoulin Is., Poplar, 45°46'N 82°28'W, sweep along grassy trail, 27.vi.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0039917); Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.07'W, sweeps, roadside graminoids, 7 ♂♂ 5 ♀♀, 31.vii.2008, K. N. Barber leg.; Mynooth, 18.vi.1963, 1 ♂, J. F. McAlpine leg.; Minnitaki, 13.vi.1960, 1 ♀, Kelton & Whitney leg. (all CNCI); Moosonee, 51.24690°N

80.68102°W, Repl. 3 mesic, pan traps, 17–20.vi.2010, 1 ♀, 20–23.vi.2010, 1 ♀; Moosonee, 51.28288°N 80.63926°W, Repl. 2 wet, pan traps, 19–23.vi.2010, 1 ♂, all NBP Field Party leg. (all LEMQ); Moosonee, 51°14.79'N 80°40.35'W, sweeps, mostly *Solidago*, *Calamagrostis*, 9.vii.2014, 1 ♀; Moosonee, 51°16.33'N 80°39.11'W, sweeps, mostly *Rubus*, *Impatiens*, under *Salix*, *Alnus*, 10.vii.2014, 2 ♂♂ 1 ♀, 11.vii.2014, 4 ♂♂ 1 ♀; Moosonee, 51°16.36'N 80°39.11'W, sweeps, roadside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 10.vii.2014, 4 ♀♀, 11.vii.2014, 1 ♀; Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 8.vii.2014, 1 ♂ 1 ♀, 9.vii.2014, 1 ♂ 6 ♀♀, 10.vii.2014, 8 ♂♂ 20 ♀♀, 11.vii.2014, 7 ♂♂ 13 ♀♀; Moosonee, 51°16.55'N 80°39.01'W, sweeps, mostly *Carex* spp., wet forest trail, 11.vii.2014, 4 ♂♂ 3 ♀♀; Moosonee, 51°16.63'N 80°38.87'W, sweeps, *Calamagrostis*, *Carex*, drier edge of sedge meadow, 9.vii.2014, 1 ♀; Moosonee, 51°16.68'N 80°38.65'W, sweeps, mostly *C[arex] utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 1 ♀; Moosonee, 51°16.75'N 80°38.76'W, sweeps, *Equisetum* & graminoids, wet edge of sedge meadow, 9.vii.2014, 1 ♂; Moosonee, 51°16.99'N 80°38.37'W, sweeps, mostly *Equisetum fluviatile*, *Carex* spp., wet sedge meadow, 10.vii.2014, 1 ♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Nestor Falls, 7–8.viii.1960, 1 ♀, Kelton & Whitney leg.; ~8 km SSW Nipigon, Hwy #628, 48°57.09'N 88°19.71'W, sweeps, damp roadside, mixed graminoids, 16.vii.2008, 1 ♀; ~20 km E Nipigon, Hwy #17, rest area, 48°58.00'N 87°59.09'W, sweeps, *Aster* [*Eurybia*], *Rubus*, *Aralia*, *Diervilla*, 31.vii.2008, 2 ♂♂ 3 ♀♀; Otter Rapids, 50°11.08'N 81°38.37'W, sweeps, *Eurybia*, *Equisetum* under *Populus*, 19.vii.2009, 7 ♂♂ 8 ♀♀, 20.vii.2009, 8 ♂♂ 6 ♀♀; Otter Rapids, 50°10.91'N 81°38.54'W, sweeps, mostly *Calamagrostis canadensis* in hydro cut, 19.vii.2009, 1 ♂ 4 ♀♀, sweeps, mostly *C. canadensis*, *E. fluviatile* in hydro cut, 20.vii.2009, 5 ♂♂ 6 ♀♀; Otter Rapids, 50°10.96'N 81°37.88'W, sweeps, grasses, herbs on roadside slope, 20.vii.2009, 1 ♀, all K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°57.74'N 84°42.63'W, sweeps, beach grasses [*Ammophila breviligulata*], 7.viii.2004, 6 ♂♂ 2 ♀♀ (DEBU 01501206–13); Pancake Bay P. Pk., 46°58.11'N 84°42.62'W, sweeps, open grassy area, 17.vii.2004, 1 ♂ (DEBU 01500263); Pancake Bay P. Pk., 46°58.13'N 84°42.70'W, sweeps, open grassy area near highway, 17.vii.2004, 1 ♂, 7.viii.2004, 4 ♂♂ 1 ♀ (DEBU 01501103–07), all K. N. Barber leg.; Hwy #17 at Prairie River mouth, 48°48.32'N 86°46.64'W, sweeps, grasses, composites, *Rubus*, forest edge, 12.viii.2006, 3 ♂♂, 16.vi.2007, 4 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); Pukaskwa N. P., Coastal Trail, Hattie Cove–Playter Harbour, sweep, 21.vii.2001, 1 ♀, M. Buck leg. (DEBU 00183046); René Brunelle P. Pk., 49°25.89'N 82°08.44'W, sweeps, roadside *Equisetum* spp., 19.vii.2009, 1 ♂ 1 ♀, K. N. Barber leg. (DEBU 01502000–01); ~2 km E Rosspoint, Hwy #17 picnic area, 48°50.3'N 87°29.4'W, 9.vii.1999, sweeps of graminoids, 1 ♂ 2 ♀♀; S[ault] S[ainte] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, graminoids under *Populus/Betula*, 11.vii.1997, 1 ♀, sweeps, grassy edge of *Populus/Betula*, 11.vii.1997, 1 ♀, sweeps, grassy edge of woods, 11.vii.1997, 1 ♀, sweeps, trailside *Carex/Scirpus*, 14.vii.1998, 3 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, Malaise #1, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, *Solidago*, in aspen clearing, 7–17.vi.2005, 1 ♀, 17–29.vi.2005, 1 ♂, 18–29.vii.2005, 1 ♂, sweeps, *Rubus*, *Equisetum*, *Thalictrum*, *Impatiens*, ferns, under aspen, 17.vi.2005, 1 ♂, sweeps, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 22.vi.2005, 1 ♂ 1 ♀, 25.vi.2005, 1 ♂, 26.vi.2005, 1 ♂ 2 ♀♀, 14.vii.2005, 2 ♂♂ 1 ♀, 18.vii.2005, 1 ♂ 1 ♀, 19.vi.2011, 1 ♀, sweeps, mostly ferns under aspen, 19.vi.2011, 1 ♀, sweeps, mostly *Carex* in aspen clearing, 25.vi.2005, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 2 ♂♂ 7 ♀♀, 26.vi.2005, 1 ♂ 6 ♀♀ (CNCI), 10.vii.2005, 9 ♂♂ 5 ♀♀ (CNCI 7 ♂♂ 3 ♀♀, 1 ♂ wing illustration, SMOC 2 ♂♂ 2 ♀♀), 14.vii.2005, 5 ♂♂ 3 ♀♀, 29.vii.2005, 2 ♀♀ (AMNH), K. N. Barber leg.; same locality but w. of creek, 46°31.52'N 84°24.63'W, sweeps, *Carex* under ash/aspens, 22.vii.2005, 1 ♀, sweeps, graminoids on path, 22.vii.2005, 1 ♀; same locality but w. of creek, 46°31.61'N 84°24.68'W, sweeps, graminoids/composites, 20.viii.2008, 1 ♂, both K. N. Barber leg. (both CNCI); S[ault] S[ainte] Marie, Birchwood Pk., mixed forest, 28.vi.1986, 1 ♂, 6.vii.1986, 3 ♀♀, 26.vii.1986, 1 ♀; same locality but 46°30.7'N 84°15.6'W, sweeps, including *Impatiens* under *Betula/Acer*, 20.vi.1998, 1 ♂, sweeps, *Impatiens* under *Betula/Acer*, 27.vi.1998, 1 ♂, sweeps, mostly sedges under *Betula/Acer*, 23.vi.1998, 1 ♂; S[ault] S[ainte] Marie, Bristol Place, 46°30.8'N 84°16.4'W, at MV [mercury vapour] lights in yard, 10.vii.2000, 1 ♀; S[ault] S[ainte] Marie, Bristol Pl. Pk., 46°30.8'N 84°16.6'W, [sweeps], graminoids, *Impatiens*, *Rubus*, *Clematis*, 18.vii.2006, 1 ♀, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); S[ault] S[ainte] Marie, Finn Hill, 46°31.48'N 84°17.39'W, sweeps, graminoids, *Equisetum*, *Rubus*, *Eurybia*, 20.vii.2010, 2 ♂♂ 1 ♀; same locality but 46°31.49'N 84°17.39'W, sweeps, mostly grasses, 25.vii.2010, 1 ♂ 3 ♀♀, K. N. Barber leg. (CNCI); Sault Ste. Marie, Fish Hatchery Road, near Coldwater

Creek, 46°34.29'N 84°17.21'W, sweeping graminoids, *Impatiens*, 9.vii.2010, 1 ♀, J. Roháček leg. (SMOC); S[ault] S[ainte] Marie, Ft. Creek Cons[ervation] Area, 46°32.5'N 84°20.8'W, sweeps, *Carex* under *Populus/Acer*, 30.vi.2002, 1 ♂, sweeps, trailside vegetation, mostly *Poa* sp., 8.vii.1998, 4 ♂♂ 4 ♀♀, sweeps, *Impatiens*, sedge, fern, 8.vii.1998, 1 ♀; S[ault] S[ainte] Marie, Kinsmen Pk., 46°35.5'N 84°16.6'W, sweeps, trailside graminoids in mixed forest, 7.viii.1997, 1 ♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Sault Coll[ège] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, low vegetation under *Acer/Betula*, 18.vi.1998, 2 ♂♂ 1 ♀, sweeps, trailside graminoids, *Impatiens* under *Acer/Betula*, 11.vi.1999, 1 ♂ 1 ♀, sweeps, short trail grasses, *Acer/Betula*, 25.vii.1997, 5 ♂♂ 6 ♀♀, sweeps, trailside grasses, *Acer/Betula*, 25.vii.1997, 2 ♂♂ 3 ♀♀, sweeps, trailside *Carex* under *Acer/Betula*, 26.vi.2002, 3 ♀♀, 29.vi.2002, 1 ♀, 30.vi.2002, 1 ♂ 1 ♀, sweeps, *Carex* sp., 25.vii.1997, 2 ♂♂; S[ault] S[ainte] Marie, hydro cut nr. Sault Coll[ège] Outdoor Lab, 46°32.1'N 84°18.0'W, sweeps, mostly sedges, 10.vii.2002, 1 ♂ 2 ♀♀, sweeps, *Scirpus cyperinus*, 12.viii.2008, 1 ♂; same locality but 46°32.18'N 84°18.01'W, sweeps, mostly *Calamagrostis*, *Scirpus cyperinus*, on trail, 12.viii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Voyageur Trail, 46°35.48'N 84°15.23'W, sweeps, *Scirpus cyperinus*, 9.vii.2006, 1 ♀, [K. N. Barber] leg.; S[ault] S[ainte] Marie, Wishart Park, 46°33.86'N 84°17.57'W, sweeps, graminoids/ferns under canopy, 23.vii.2005, 1 ♀; 6 km ENE Searchmont, Whitman Dam Falls, sweeps, 1.vii.1986, 1 ♀, both K. N. Barber leg. (all CNCI); 12.4 km NNE Searchmont, mi.10 Whitman Dam Rd., herb/grass meadow by Goulais R., 1.vii.1986, 1 ♂ 2 ♀♀, K. N. Barber leg., 2.vii.1986, 1 ♀, 3.vii.1986, 1 ♂, 9.vii.1986, 1 ♂ 1 ♀, D. J. M. Harvey leg.; 18 km NNE Searchmont, mi.15 Whitman Dam Rd., grassy access road, 2.vi.1986, 1 ♂, 6.vi.1986, 1 ♀, D. J. M. Harvey leg., 6.vi.1986, 4 ♀♀, 19.vi.1986, 2 ♂♂, 24.vi.1986, 1 ♀, K. N. Barber leg.; same locality but *Vaccinium/Sphagnum*, 19.vi.1986, 1 ♀; ~18 km NNE Searchmont, Goulais River WS [watershed], ~mi. 15 Whitman Dam Rd., 46°55.3'N 83°56.3'W, sweeps, grass under jackpine, 30.vii.1999, 2 ♂♂ 5 ♀♀; ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, ditchside *Equisetum* spp., grasses, herbs, 19.vii.2009, 4 ♀♀, all K. N. Barber leg. (all CNCI); The Shoals P. Pk., Prairie Bee, 47°52.35'N 83°53.56'W, sweeps, grasses nr. parking area, 17.vi.2004, 1 ♂, K. N. Barber leg. (DEBU 01500176); Algoma District, Thessalon, 18.vi.1965, 1 ♂, K. P. Butler leg. (LEMQ 0039929); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp., 17.vii.2010, 1 ♂, K. N. Barber leg. (CNCI); ~92 km NNE Thessalon, Mountain Ash Lake, 47°03.53'N 83°12.56'W, sweeping *Clintonia*, *Eurybia*, ferns, *Diervilla* under *Betula*, 5.vii.2010, 2 ♀♀, J. Roháček leg. (SMOC); Thunder Bay, 22.vii.1970, 1 ♂, K. J. G. Deacon leg. (DEBU, head glued to point); Timagami, 19.viii.1947, 1 ♀, G. S. Walley leg. (CNCI); Waubamick [sic Waubamik], 14.vi.1915, 1 ♀, H. S. Parish leg. (USNM); White River, 48°35.5'N 85°16.6'W, sweeps, mixed grasses, edge of parking lot, 9.vii.1999, 1 ♂ 3 ♀♀; White River, behind Continental Motel, 48°35.65'N 85°16.82'W, pooter, grasses, 16.vi.2004, 2 ♀♀; White River, "Black's Cabin", 48°36.71'N 85°15.61'W, sweeps, mowed grass/herbs on stable sand, 14.vi.2003, 1 ♀; 40 km SSW White River, 48°14.13'N 85°22.01'W, B6S4, boreal mixedwood, Malaise trap, 7–22.vii.2003, 1 ♂; same locality but 48°13.95'N 85°22.20'W, B6S1, boreal mixedwood, sweeps, *Calamagrostis canadensis*, 23.vii.2003, 1 ♂ 3 ♀♀, all K. N. Barber leg. (all CNCI). **QUEBEC:** Bolton Pass, Knowlton, 800', 5.vi.1963, 1 ♂ 1 ♀, J. R. Vockeroth leg.; Bradore Bay, 19.vii.1929, 1 ♀, W. J. Brown leg.; Breckenridge, 11.vi.1959, 1 ♀, C. H. Mann leg.; Fort Chimo [Kuujuuaq], 2.vii.1954, 3 ♀♀, W. R. Richards leg.; Gaspé, 22.vi.1954, 1 ♂, G. P. Holland leg. (all CNCI); Gaspé, ZEC [Zone d'Exploitation Contrôlée] York-Baillargeon, 48°49'N 64°52'W, shore of Lac Ross, sweep, 26.vii.2000, 1 ♂ (LEMQ 0039927), forest edge near Lac Pauline, 26.vii.2000, 1 ♀ (LEMQ 0039916), H. Varady-Szabo leg.; Gaspésie, l'Anse-au-Griffon, "La vallée" trail, sweep near marsh, 48°55'45"N 64°19'19"W, 14.viii.2006, 1 ♂ (LEMQ 0040304); Gaspésie, near Routhierville, 48°10.9'N 67°08.8'W, sweep picnic area, 4.viii.2001, 1 ♀ (LEMQ 0039916), both S. Boucher leg.; Great Whale River, 26.vi.1949, 1 ♀, 8.vii.1949, 1 ♀, 13.vii.1949, 1 ♀, J. R. Vockeroth leg. (CNCI); Ile Bonaventure, 48°30'N 64°10'W, 3 km from Côte de Percé, sweep grass, 28.vii.2000, 1 ♂, H. Varady-Szabo leg. (LEMQ 0039910); Indian House Lk., 9.vii.1954, 1 ♀, 18.vii.1954, 2 ♂♂, 27.vii.1954, 2 ♀♀, W. R. Richards leg.; La Verendrye P. Pk., mi.139 Rte.58, 28.vi.1965, 2 ♀♀, D. M. Wood leg. (all CNCI); Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 4 ♂♂ 2 ♀♀, M. Barták leg. (MBPC, 1 ♀ genit. prep.); Laniel, 17–18.vi.1963, 1 ♂, W. Gagne leg. (CNCI); Laurentide Pk., 7.viii.1956, 1 ♀, A. H. Sturtevant leg. (USNM); Magog, 1.vi.1965, 1 ♀, D. M. Wood leg.; Mistassini, 3.vii.1956, 1 ♀, 7.vii.1956, 1 ♂, J. R. McGillis leg.; Mistassini Post, 5.vii.1956, 1 ♀, 14.vii.1956, 1 ♂, 21.vii.1956, 2 ♀♀, J. R. Lonsway leg.; Mt. Albert, 11.viii.1954, 1 ♂, J. E. H. Martin leg.; Mt. Ste. Marie, Low, 1800', 22.vi.1965, 1 ♀, J. R. Vockeroth leg.; Newport, 14.viii.1983, 1 ♀, B. M. Bissett leg.; Old Chelsea, 28.v.1963, 1 ♀, 4.vi.1964, 1 ♀, J. R. Vockeroth leg.; Old Chelsea, King Mt., 26.v.1963, 1 ♀, J. G. Chillcott leg. (all CNCI); Old Chelsea, Summit King Mt., 13.vi.1980, 1 ♂, K. N. Barber leg. (DEBU);

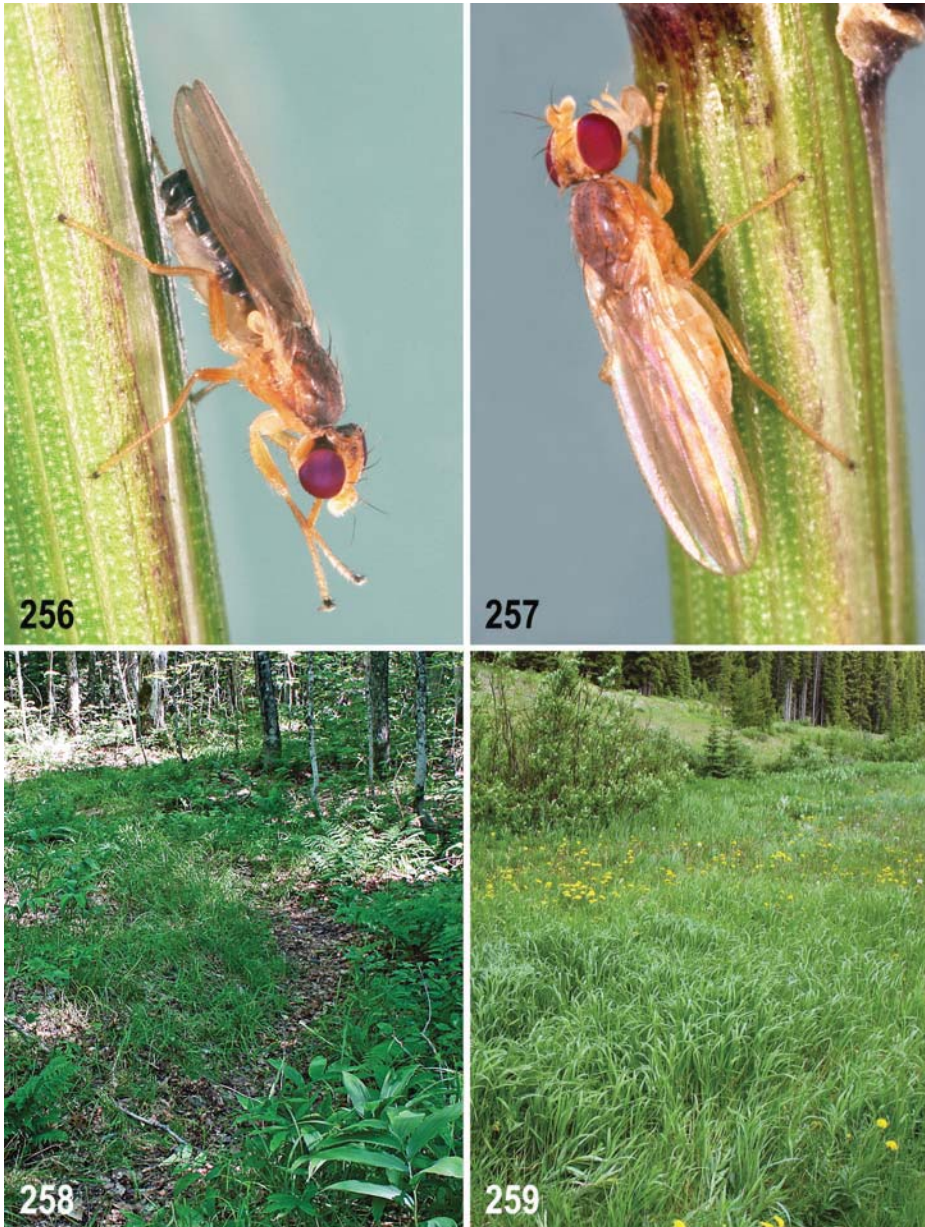
Old Chelsea, Summit King Mt., 1150', 11.vi.1959, 3 ♂♂, 18.vii.1961, 1 ♂, 25.vi.1962, 3 ♂♂ 3 ♀♀, 2.vi.1963, 1 ♂ 1 ♀, 18.vi.1963, 1 ♂, 21.vi.1963, 1 ♂, 4.vi.1964, 1 ♀, 8.vi.1964, 2 ♂♂ 1 ♀, 15.vi.1964, 2 ♂♂ 4 ♀♀, 24.vi.1964, 1 ♂, 16.vi.1971, 6 ♀♀, J. R. Vockeroth leg. (CNCI); Parc Jacques Cartier, Lac a la Chutes, 47°20'N 71°21'W, sweep open meadow, 2.viii.1999, 1 ♂, T. A. Wheeler leg. (LEMQ 0040363); Kam[ouraska] Co., Parke Reserve, 950', 5.viii.1957, 1 ♂, E. Mason leg. (CNCI). **SASKATCHEWAN:** Beaver Creek Cons[ervation] Area, ~13 km S Saskatoon, 51°58.6'N 106°43.0'W, sweeps, mostly grasses under *Betula/Populus*, 12.vii.1999, 10 ♂♂ 9 ♀♀, 17.vii.1999, 2 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); Beaver River, 5 mi S Goodsoil, 6.vii.1985, 1 ♂, D. W. Webb leg. (INHS 40,219); Christopher Lake, [-].v.1959, 1 ♂, A. & J. Brooks leg. (CNCI); E side of Cowan Lake, 54°00'16"N 107°14'19"W, sweep near lake margin, 22.vii.2003, 1 ♂, T. A. Wheeler leg. (LEMQ 0040410); Kenosee, 7.vi.1958, 2 ♀♀, A. R. Brooks leg.; ~6.5 km SE Langham, Hwy #16, 52°19.13'N 106°53.03'W, sweeps, mostly *Elymus glaucus*, 21.vii.2008, 3 ♂♂ 1 ♀, K. N. Barber leg.; Saskatoon, 19.vi.1926, 1 ♀, 29.vi.192[-], 1 ♂, K. M. King leg., 5.vii.1950, 1 ♀, 5.vii.1957, 2 ♀♀, 9.vii.1957, 2 ♂♂, A. R. Brooks leg.; Sturgis, 51°56'N 102°32'W, 1.vii.1955, 1 ♂, J. R. Vockeroth leg. (all CNCI). **YUKON:** Klondike Hwy, 15 km S Carmacks, sweep sedges & rushes at pond margin, 11.vi.1997, 1 ♂ 3 ♀♀ (LEMQ 0039972, -73, -94, 0040012); Klondike Hwy, S of Carmacks, Montague Road House, sweep roadside vegetation, 11.vi.1997, 3 ♀♀ (LEMQ 0040008, -09, -13), all S. Boucher leg.; Dawson, 14.vi.1949, 2 ♂♂, 16.vi.1949, 1 ♂, 1.vii.1949, 3 ♀♀, W. W. Judd leg. (CNCI); Emerald Lake, 60°15.8'N 134°45.1'W, sweep at lake margin, 20.vii.1998, 2 ♂♂ 1 ♀ (LEMQ 0039934, -35, 0040017); Alaska Hwy at M'[C]linton R., 60°33.6'N 134°29.4'W, sweep river edge, 14.vii.1998, 1 ♂ (LEMQ 0039936); Tagish Campground, 60°18.8'N 134°16.1'W, sweep vegetation at campsite, 26.vi.1997, 3 ♂♂ (LEMQ 0039931, -49, -50); Tagish Campground, 60°19'N 134°15'W, sweep vegetation at campsite, 26.vi.1997, 7 ♂♂ 6 ♀♀ (LEMQ 0039933, -76-87); Tagish, Tagish Govt. Campground, 60°18'N 134°16'W, sweep grass at campsite, 26.vi.1997, 2 ♀♀ (LEMQ 0039974, -75); Tagish, Tagish Govt. Campground, swept in open grassy area, 26.vi.1997, 1 ♂ 1 ♀ (LEMQ 0040433, -34); Whitehorse, Bert Law Park at Yukon R., 60°42'N 135°02'W, sweep clearing in open forest, 27.vi.1997, 3 ♂♂ (LEMQ 0039954, -69, -71); Whitehorse, Miles Canyon, 60°40'N 135°01.8'W, sweep grass/sedges at Yukon River margin, 27.vii.1998, 3 ♂♂ 1 ♀ (LEMQ 0039956, 0040003, -04, -16); Alaska Highway at Yarger Lake, sweep sedge & grasses along lake margin, 22.vi.1997, 1 ♂ (LEMQ 0039968), all T. A. Wheeler leg.; Alaska Highway at Yukon River crossing, sweep sedges & grasses along river, 2.vii.1997, 1 ♂ 2 ♀♀, S. Boucher leg. (LEMQ 0039937, -96, -97); same locality but 60°34'N 134°40'W, sweep grass/sedges along river margin, 2.vii.1997, 2 ♂♂ 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039920, -21, -40, -41). **UNITED STATES OF AMERICA: ALASKA:** Fairbanks, [-].viii.1960, 1 ♀, M. R. Wheeler & L. Throckmorton leg. (AMNH); Fairbanks, Birch Hill, Alaska Ins[ect] Project, 15.viii.1948, 1 ♂, S. Lienk & C. O. Esselbaugh leg. (USNM); Kenai Peninsula Borough, Long Term Ecological Monitoring Program, 3324, ~1 km N Crooked Ck. & ~1.5 km W Kolomin Lk., forest, sweep net sample, 20.vi.2004, 2 ♂♂ 2 ♀♀, Grimes leg. (KNWR, 1 ♂ 1 ♀ ID:1819, 2118); Knik Lake, NW of Wasilla, sweeping vegetation, 18.vii.1978, 1 ♂ 1 ♀; same locality but sweeping vegetation edge of lake, 18.vii.1978, 2 ♂♂ 1 ♀, all P. H. Arnaud Jr. leg. (all CASC); Kodiak, [-].vii.1960, 2 ♂♂, M. R. Wheeler leg. (AMNH); Mat-Su, Eklutna (Knik Arm), 61°28.2'N 149°21.4'W, 7.viii.2002, 1 ♀, D. & W. N. Mathis leg. (USNM); Naknek, on tundra, 21.vii.1952, 1 ♀, W. R. Mason leg. (CNCI); Nenana, 16.vi.1953, 1 ♀, R. I. Sailer leg.; Niniichik, 11.vii.1954, 1 ♂, R. Coleman leg. (both USNM); Tielkel River, Richardson Hwy ca. V-47, 1.viii.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Tunnel Sta., 9.vi.1921, 1 ♀, J. M. Aldrich leg. (USNM); Unalakleet, 18.vi.1961, 1 ♀, 19.vi.1961, 1 ♀, 6.vii.1961, 1 ♀, R. Madge leg., 22.vi.1961, 1 ♂, 5.vii.1961, 1 ♂, 8.vii.1961, 1 ♀, 12.vii.1961, 1 ♂, B. S. Heming leg. (CNCI); Valdez, 5.vii.1948, 1 ♂, R. I. Sailer leg. (USNM); Valdez, Valdez Glacier Campground, 2.viii.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC). **COLORADO:** Clear Cr. Co., Chicago Cr., 8800', 25.viii.1961, 1 ♂, C. H. Mann leg. (CNCI); Estes Park, 13.vii.1934, 1 ♀, A. L. Melander leg. (USNM); Evans, Doolittle Ranch, 9800', 23.vii.1961, 1 ♂, J. G. Chillcott leg. (CNCI); 3.5 mi S Florissant, Sanborn Ranch, swept from aspen grove nr. girls camp, 17.vii.2000, 2 ♂♂, 19.vii.2000, 1 ♂, B. A. Foote leg. (CMNH); Summit Co., Frisco, 3.viii.2001, 1 ♂, I. S. Winkler leg. (BYUC); Glen Haven, 14.viii.1952, 1 ♂, R. R. Dreisbach leg. (USNM); Idaho Springs, 5 mi SW, 8600', 27.vii.1961, 2 ♂♂, J. G. Chillcott leg.; Loveland Pass, w. slope, 9850', 8.viii.1961, 1 ♂ (genit. prep.), B. H. Poole leg., 8.viii.1961, 1 ♀, C. H. Mann leg. (all CNCI); Boulder Co., Nederland, 24.vi.1961, 1 ♀, G. C. Steyskal leg. (USNM); New Castle, 15.vii.1966, 2 ♀♀, W. Boyle & R. Lalonde leg. (LEMQ); Rio Grande Co., South Fork, 8000', Malaise trap, 20.vi.1972, 2 ♀♀, W. W. Wirth leg. (USNM); State Bridge nr. Bond, 7000', dry river bed and bank, 24-25.vi.1961, 2 ♀♀, C. H. Mann leg. (CNCI); Eagle Co., State Bridge, Colorado R., 18.vi.1985, 1 ♀, D. W. Webb leg. (INHS 40,208). **IDAHO:** Valley Co., Camp Cr., S. Fork Salmon River, 14.vi.1966, 1 ♂, L. S. Hawkins Jr. leg.

(WFBM); Franklin Co., Cub River Canyon, 2–11.vii.1985, 1 ♀, 7.viii.–17.ix.1985, 1 ♀, W. J. Hanson leg. (LACM); Elmore Co., 6 mi E Featherville, 22.vi.1977, 1 ♀, [no collector]; Latah Co., Laird Park, 13 mi E Potlatch, 2800–3200', 4.vii.1983, 1 ♀, J. Jenkins leg.; Lemhi Co., 2 mi SW Lemhi, 9.vi.1976, 1 ♂, [no collector], 9.vi.1976, 1 ♂, M. W. Hanks leg. (all WFBM); Priest Lake, 1.viii.1916, 1 ♀, A. L. Melander leg. (USNM); Custer Co., 6 mi E Stanley, 6200', 14.vii.1973, 1 ♂, Oman & Musgrave leg. (OSAC). **MAINE:** Baxter St. Pk., bog nr. togue pond, 1–6.vii.1968, 1 ♀, D. M. Wood leg. (CNCI); Echo Lake, Mt. Desert, 12.vii.1918, 1 ♀, C. W. Johnson leg.; Seal Harbor, 29.vii.1930, 2 ♂♂, A. L. Melander leg. (all USNM). **MICHIGAN:** Houghton Co., 20.vi.1960, 1 ♂, R. & K. Dreisbach leg. (USNM); Ironwood, 46°27.9'N 90°10.1'W, sweeps, low veg. *Populus/Pinus*, 22.vii.1999, 1 ♀; Ironwood, Mt. Zion Ski Area, 46°28.5'N 90°10.2'W, sweeps, low veg. in cut under *Acer*, 22.vii.1999, 1 ♂, both K. N. Barber leg. (both CNCI); Isle Royale, 3–7.viii.1936, 1 ♂, C. Sabrosky leg. (USNM, S. W. Frost det. as *A. tenuis*); Isle Royale, McCargo Cover, 10.vii.1966, 1 ♂, D. E. Bixler leg.; Keweenaw Co., Isle Royale, 10., 12.vii.1938, 1 ♀, G. Steyskal leg.; Mackinac Co., 4.vi.1959, 1 ♀, R. & K. Dreisbach leg. (all USNM). **MINNESOTA:** Eaglesnest, 13.vii.1957, 1 ♀ (INHS 40,174), 30.vi.1959, 1 ♀ (INHS 40,175), W. V. Balduf leg. **MONTANA:** 15 mi S Big Fork, 4.vii.1967, 1 ♂ 1 ♀, B. A. Foote leg. (USNM); Gallatin Co., 79 mi S Bozeman, 7300', 11.vii.1973, 1 ♀, Oman & Musgrave leg. (OSAC); Glacier Co., Duck Lake, 19.vii.1967, 1 ♂, D. Allen leg., 19.vii.1967, 1 ♂, B. A. Foote leg., 19.vii.1967, 2 ♂♂ 1 ♀, S. Whitney leg.; Saltese, 22.viii.1916, 1 ♂, A. L. Melander leg.; 33.0 mi N West Glacier, 5.vii.1966, 5 ♂♂, K. Valley leg. (all USNM). **NEW HAMPSHIRE:** "N.H.", "Loew Coll.", "PARATYPE *Anthomyza terminalis* Loew No. 2122" (yellow label), "Type 14558", handwritten "*Anthomyza terminalis*" (red label), "SYNTYPE CNC No.", 1 ♂ (yellow label) (CNCI, misidentified as a paratype of *Anthophilina terminalis* Loew); "N.H.", "Loew Coll.", "Type 14558", 1 ♀ (red label) (MCZC, misidentified as type specimen of *Anthophilina terminalis* Loew); Colebrook, 30.v.1965, 1 ♂, D. M. Wood leg. (CNCI); Franconia, 1 ♂, Mrs. Slosson leg. (USNM, with det. as *Anthomyza tenuis*); Gorham, 15.vii.1957, 1 ♀, J. R. Vockeroth leg. (CNCI); Jefferson Notch, creek margin, 30.vii.1961, 1 ♂, W. W. Wirth leg.; Lost River, 7.vii.1931, 1 ♂, A. L. Melander leg. (both USNM); Mt. Washington, Auto Road, 3200', 14.viii.1958, 1 ♀, J. R. Vockeroth leg. (CNCI); Mt. Washington, Dolly Copp, 4.vii.1936, 1 ♂ 1 ♀, 5.vii.1936, 1 ♂, A. L. Melander leg. (USNM); Mt. Washington, Lakes of the Clouds, 5000', 31.viii.1954, 1 ♂, Becker, Munroe & Mason leg.; Coos Co., Pittsburg, 18.vi.1982, 1 ♀, J. R. Vockeroth leg. (both CNCI); Coos Co., 1 km E Stark, 44°36'N 71°24'W, sweep along Ammonoosuc R., 8.viii.2000, 1 ♂ 2 ♀♀ (LEMQ 0039911, -18, -51); Coos Co., White Mt. National Forest, Dolly Copp, 44°19'N 71°13'W, sweep forest near river, 8.viii.2000, 1 ♀ (LEMQ 0039953), all T. A. Wheeler leg.; Grafton Co., White Mt. Nat. Forest, Kancamagus Pass, 44°01'N 71°29'W, sweep, 10.viii.2000, 1 ♀, J. Forrest leg. (LEMQ 0039952); Grafton Co., White Mtns. Nat. For., Long Pond, 675 m, 44°03'34.5"N 71°53'21.2"W, 30.vi.2004, 1 ♂, S. D. Gaimari leg. (CSCA). **NEW MEXICO:** Santa Fe Co., 14 mi NE Santa Fe, 9600', aspen with stream, 18.vi.–3.vii.1979, 1 ♂ 1 ♀, S. & J. Peck leg. (DEBU). **NEW YORK:** Adirondack Park, Blue Mountain, 43°52.5'N 74°25.8'W, sweep trail in mixed forest, 31.vii.2002, 1 ♂ 1 ♀ (LEMQ 0040361, -62), sweep grasses at summit, 31.vii.2002, ♀ (LEMQ 0040380), J. Forrest & T. A. Wheeler leg.; Adirondacks, Connery Pond, 15.vii.1938, 1 ♂; Adirondacks, Fish Creek, 2.viii.1929, 1 ♂, both A. L. Melander leg.; St. Lawrence Co., Cranberry Lk., swamp, 25.vi.1963, 2 ♂♂, W. W. Wirth leg.; Lake Placid, 28.vii.1929, 1 ♂, A. L. Melander leg. (all USNM); Lake Placid, 2000', 19.vii.1962, 3 ♀♀; Whiteface Mt., 19.vii.1962, 4600–4872', 1 ♂ 2 ♀♀, all J. R. Vockeroth leg.; Essex Co., Whiteface Mt., 44°21.96'N 73°54.18'W, ~1483 m, sweeps, mostly *Calamagrostis* at peak, 27.vii.2006, 15 ♂♂ 6 ♀♀; same locality but 44°22.16'N 73°53.88'W, ~1350 m, sweeps, graminoids, *Rubus*, 27.vii.2006, 1 ♂, all K. N. Barber leg. (all CNCI). **OREGON:** Benton Co., Mary's Peak, ~14.2 km WSW Flynn, 44°30.62'N 123°33.07'W, sweeps, sedge/herb meadow nr. parking, 10.vi.2009, 1 ♀, K. N. Barber leg. (CNCI); Seaside, 26.vi.1963, 1 ♀, G. F. Knowlton leg. (LACM); Tillamook Co., 1 mi W Sand Lake, 13.vi.1972, 1 ♂, W. N. Mathis leg. (OSAC); Wallowa Lake, Hurricane Cr., 3.vii.1949, 2 ♂♂ 1 ♀ (2 ♂♂ on same pin), 11.vii.1949, 1 ♂ 1 ♀ (1 ♂ genit. prep.), J. L. & G. H. Sperry leg. (USNM). **SOUTH DAKOTA:** Lawrence Co., #4, 6.2 mi SW Lead, 6000', 10.vii.1959, 1 ♀, G. W. Byers leg.; Pennington Co., Pactola Reservoir, 17.vi.1968, 1 ♀, "SLW" leg. (both OSAC). **UTAH:** Utah Co., Aspen Grove, [no date], 1 ♂, L. King leg. (BYUC); Cache Co., Blacksmith Fork Canyon, 8–19.vii.1985, 1 ♀, 19.vi.–8.vii.1985, 1 ♂ 1 ♀, Malaise trap, 7–10.viii.1970, 1 ♂, W. J. Hanson leg.; Elk Park Creek, Uinta Mts., 17.vii.1952, 1 ♂, G. F. Knowlton & G. E. Bohart leg.; Cache Co., Green Canyon, 12–15.vi.1985, 1 ♀, 15–19.vi.1985, 1 ♀, 19–23.vi.1985, 2 ♂♂ 5 ♀♀, Malaise trap, 27–28.vi.1985, 1 ♀, N. Youssef leg. (all LACM); Cache Co., W Hodges Canyon, 23–27.vi.1978, 1 ♀, Hanson & Knowlton leg., 18–21.vii.1978, 1 ♀, Knowlton & Hanson leg.; Summit Co., 17 mi E Kamas, 5.viii.1971, 1 ♂, W. J. Hanson & G. F. Knowlton leg.; San Juan Co., La Sal Mtns., Geyser Pass, 10200',

Malaise trap, 19.vii.1968, 1 ♂, [no collector]; Cache Co., Logan Canyon, 3.vii.1980, 1 ♀, Knowlton & Cazier leg., 8–15.ix.1993, 1 ♀, W. J. Hanson leg.; Cache Co., Logan Canyon, Bunchgrass Creek, 3–11.vii.1986, 1 ♂, Hanson & Knowlton leg.; same locality but Turner C.G. [campground], 16–30.viii.1985, 1 ♂, W. J. Hanson leg., 20.vi.1985, 1 ♀, G. F. Knowlton leg.; same locality but Twin Creek, 1–8.vii.1988, 1 ♀, 8–15.vii.1988, 3 ♀♀, 15–22.vii.1988, 1 ♂, W. J. Hanson leg. (all LACM); Utah Co., Mapleton, Malaise trap, 25.vi.–6.vii.1985, 1 ♀, [no collector]; San Juan Co., 10 mi SW Monticello, 20.vi.1971, 1 ♀, J. L. Petty leg.; Cache Co., Tony Grove Cr., 12–18.viii.1995, 1 ♀, W. J. Hanson leg.; Cache Co., Tony Grove Jct., Malaise trap, 22–30.vi.1983, 2 ♀♀, 6–12.vii.1983, 1 ♀, 19–27.vii.1983, 1 ♂, 2–8.viii.1983, 1 ♂, 16–23.viii.1983, 1 ♂, 23–30.viii.1983, 1 ♂, 11–25.vii.1984, 4 ♀♀, 25–31.vii.1984, 1 ♂ 1 ♀, 1–13.viii.1984, 1 ♂, 13–21.viii.1984, 1 ♀, 1–7.ix.1984, 1 ♂, [no collector] (all LACM). **WASHINGTON:** Clallam Co., Bogachiel, 1.viii.1951, 2 ♂♂, M. R. Wheeler leg. (AMNH); Pierce Co., Clover Creek, 9.vi.1979, 1 ♂, 15.vi.1979, 1 ♀, 7.vii.1979, 1 ♀, 20.vii.1979, 2 ♀♀, T. L. Whitworth leg. (LACM); Longmire, 27.vi.1935, 5 ♂♂ 3 ♀♀; Mt. Constitution, 17.v.1910, 1 ♀, all A. L. Melander leg. (all USNM); Olympic N. P., 2 mi on Hoh Rain Forest Rd., 1797/1, 29.vi.1988, 1 ♀, J. A. Downes leg. (CNCI); Olympic Nat. Park, Kalaloch, 8.vii.1968, 1 ♂ 1 ♀, W. W. Wirth leg. (USNM); Pierce Co., Pleasant Valley, 1.viii.1977, 1 ♀, 4.viii.1978, 1 ♀, T. L. Whitworth leg. (LACM); Seattle, 16.vi.1920, 1 ♂, A. L. Melander leg. (USNM). **WYOMING:** Teton Co., 3 mi SW Hoback Jct., Teton Nat. For., 22.vi.1985, 1 ♂ 1 ♀, D. W. Webb leg. (INHS 40,209, -210); Park Co., Pahaska Tepee, 6800', riverside meadow & pine forest, 24.viii.1979, 1 ♀, S. & J. Peck leg. (DEBU); Yellowstone Pk., Apollinaris, 8.vii.1923, 1 ♂; Yellowstone Pk., Spring Crk., 15.vii.1923, 1 ♂ 1 ♀; Yellowstone Pk., Thumb Sta., 16.vii.1923, 1 ♂; Yellowstone Pk., Twin Lakes, 10.vii.1923, 2 ♀♀; Yellowstone Pk., Upper Basin, 13.vii.1923, 1 ♀, all A. L. Melander leg. (all USNM).

Other material examined (not included in type series). **CANADA:** ALBERTA: Edmonton, University [of Alberta], 8.vi.1966, 1 ♂, K. A. Spencer leg. (BMNH, abdomen lost); Edmonton, George Lake, 21.vi.1966, 1 ♀, K. A. Spencer leg. (BMNH, damaged, one wing and head preserved in glycerine with genit. prep.); Jasper, 16.vi.1966, 1 ♂, K. A. Spencer leg. (BMNH, headless); Peter Lougheed P. Pk., 0.5 km W Little Highwood Pass, 50°38.55'N 115°02.94'W, sweeps, roadside grasses incl. *Bromus inermis*, 14.vii.2011, 1 ♀, K. N. Barber leg. (DEBU 01502566, teneral). **BRITISH COLUMBIA:** Atlin, 2200', 7.vii.1955, 1 ♀, B. A. Gibbard leg. (CNCI, headless); Crowsnest, Crowsnest Pass rest area, 11U 666201 5502396, 1377 m, (CC09-36), 17.viii.2009, 1 ♀, C. & D. Copley & J. Miskelly leg. (RBCM ENT009-006203, poor shape, genit. prep.); Ft. Nelson, 13.vi.1948, 1 ♀, W. R. Mason leg. (CNCI, greasy); Revelstoke, 2.vii.1973, 1 ♂, H. J. Teskey leg. (CNCI, headless). **ONTARIO:** Lake Superior P. Pk., 47°16.42'N 84°33.66'W, pooter, grasses in roadside ditch, 15.vi.2004, 1 ♀, K. N. Barber leg. (DEBU 01501453, teneral); Lake Superior Prov. Park, Crescent Lake Trail, 47°16.81'N 84°33.23'W, sweeping, mostly graminoids under *Betula/Acer*, 9.vii.2010, 2 ♂♂ 1 ♀, J. Roháček leg. (SMOC, 2 ♂♂ used for molecular work, 1 ♂ 1 ♀ headless); Thunder Bay, 22.vii.1970, 1 ♂, K. J. G. Deacon leg. (DEBU, headless, genit. prep.); Waubamick [sic Waubamick], [-].vi.1915, 1 ♂, H. S. Parish leg. (USNM, headless). **SASKATCHEWAN:** Kenosee, 7.vi.1958, 1 ♀, A. R. Brooks leg. (CNCI, headless). **UNITED STATES OF AMERICA:** ALASKA: Palmer, 24.vii.1958, 1 ♀, R. H. Washburn leg. (UAMF 100022769). COLORADO: Rocky Mt. N. P., 26.vii.1938, 1 ♀, H. H. Ross leg. (INHS 40,180, greasy, genit. prep.). UTAH: Cache Co., Green Canyon, 19–23.vi.1985, 1 ♀, N. N. Youssef leg. (LACM, poor condition). WYOMING: Yellowstone Park, Imperial Geyser, 2.viii.1934, 1 ♀, A. L. Melander leg. (USNM, abdomen missing).

Description. Male. Total body length 2.18–2.94 mm; bicolourous, yellow ventrally and laterally and (relatively pale) brown dorsally, largely dull, dorsal parts of thorax and abdomen distinctly pale grey microtomentose. Head slightly higher than long, anteriorly (at antennal base) rather rounded in profile with face very slightly receding, almost entirely yellow, only ocellar triangle and lateral spots on occiput brownish. Occiput slightly concave, medially with usual pair of silvery white microtomentose spots (largely fused ventrally above foramen), laterally to them at least with crescent-shaped ochreous to brown areas which, in darkest specimens, can be expanded dorsolaterally to reach eye margin. Frons relatively narrow, largely dull yellow, lighter anteriorly and on orbits, darker (to orange) medially in front of frontal triangle; ocellar triangle brown to dark brown and greyish microtomentose; frontal triangle dark yellow to orange and dull, narrowly margined by some golden microtomentum;



Figs 256–259. Living *Anthomyza pengellyi* sp. nov. and its habitats. 256 – *A. pengellyi* sp. nov., male, laterally, body length ca. 2.5 mm; 257 – female, subdorsally, body length ca. 2.9 mm (both Canada: Ontario: Lake Superior Prov. Park – Crescent Lake Trail); 258 – grassy undergrowth of birch-maple forest at Crescent Lake (Canada: Ontario), natural habitat of *A. pengellyi*; 259 – roadside grasses with predominant *Bromus inermis* near Little Highwood Pass (Canada: Alberta), secondary habitat of *A. pengellyi*. Photo by J. Roháček (Figs 256–258) and K. N. Barber (Fig. 259).

stripes between the latter and orbits silky yellow; orbits whitish microtomentose up to posterior ors, subshining more posteriorly. Frontal triangle narrow and rather short, reaching at most to anterior third of frons. Frontal lunule minute, yellow. Face narrow, medially concave to folded, and, like parafacialia and gena, yellowish white with silvery white microtomentum; marginal stripe of parafacialia and gena golden yellow; postgena and mouthparts whitish yellow to yellow. Cephalic chaetotaxy (setae usually paler than in relatives): pvt relatively long and often strongly crossed; vt_i and oc longest of cephalic setae; vt_e and posterior ors usually slightly shorter than vt_i; 3 ors but only 2 long, middle ors slightly shorter than to as long as posterior ors; 1 shorter anterior ors setula well developed; 1–2 (usually) pairs of medial microsetulae in anterior third of frons but none in front of anterior ors setula; 1 small setula behind vt_e; postocular setulae (7–8) short, in single row; postgena with several setulae and 2 relatively small posteroventral setae; 1 vt_i (usually weaker but sometimes as long as posterior ors), subvibrissa small, normally slightly longer than anterior peristomal; only 3–4 fine peristomal setulae. Palpus light yellow, with 1 ventral preapical seta and several (6–7) small setulae subapically and ventrally. Eye convex, subovoid (widest in anteroventral half), with longest diameter oblique and about 1.4 times as long as shortest. Gena relatively high; its shortest height about 0.15 times as long as shortest eye diameter. Antenna strongly geniculate, pale yellow, 1st flagellomere with short white pilosity. Arista brown but basal segments yellow, about 1.8–1.9 times as long as antenna, with shorter ciliation than on 1st flagellomere.

Thorax slightly narrower than head, laterally yellow but dorsally mostly brown with light grey (often with bluish tinge) microtomentum. Scutum entirely or largely brown to greyish brown, in latter case with yellow or ochreous longitudinal vittae (of various length) on dc lines, in palest specimens also anterior third of scutum yellow; notopleural area and dorsal part of humeral callus yellow but lateral side of the latter always brownish; scutellum yellow on disc only in lightest specimens, otherwise partly or completely brown; both scutum and scutellum distinctly pale grey microtomentose and dull. Pleural part of thorax more shining than scutum, all brightly yellow, only in darkest specimens with very narrow brownish darkening at dorsal (rarely also posterior) margin of mesopleuron. Postscutellum and postnotum brown to dark brown. Thoracic chaetotaxy (setae usually paler than in relatives): 1 hu plus 2 (1 longer) setulae on humeral callus; 2 npl (anterior longer than hu, posterior shorter); 1 weak prs (about as long as hu); 1 sa and 1 pa (both weak as prs, pa often shorter); 2 usual postsutural dc (anterior markedly shorter) and 4–6 dc microsetae in front of them (the hindmost distinctly enlarged, sometimes resembling a 3rd dc macroseta); 3–4 rows of ac microsetae on suture, only 2 rows between dc macrosetae and posteriorly not reaching to level of posterior dc; 2 sc, apical as long as posterior dc (longest thoracic setae), laterobasal very weak, shorter than sa; 1 minute ppl; 2 long stpl, anterior shorter, and 2–4 setulae in dorsal half of sternopleuron, its ventral part with 3–4 longer setae. Scutellum rounded triangular, very slightly convex dorsally. Legs yellow to pale yellow, only last tarsal segments of all tarsi dark brown in distal half to three-fourths; setosity of all legs pale ochreous yellow except for brown ctenidial spine, ventroapical seta on t₂ and ventral setulae on mid basitarsus. f₁ with ctenidial spine slightly to distinctly longer than maximum width of t₁. f₃ with posteroventral row of sparse erect setae; only 4–5 of them in distal two-fifths shortened and thickened; t₂ with moderate ventroapical seta; fore and hind basitarsus proximoventrally with several (usually 2–3) longer pale

setulae; also 1–2 proximoventral setulae in mid basitarsus somewhat prolonged but brown; other parts of legs simply setulose. Wing (Fig. 274) elongate, moderately narrow, with pale yellowish ochreous veins and membrane. C with very sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} long, parallel to C with apex very slightly upcurving; R_{4+5} very slightly bent to almost straight, usually very slightly divergent from M (this almost straight) towards apex. Discal cell (dm) long, moderately narrow; r-m situated near the middle of cell dm or slightly basal to the midpoint. Apical portion of CuA_1 slightly to distinctly longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula distinct but narrow. Wing measurements: length 2.18–2.88 mm, width 0.73–0.99 mm, $Cs_3 : Cs_4 = 1.03–1.32$, $rm/dm-cu : dm-cu = 1.82–2.65$. Haltere pale yellow to yellowish white.

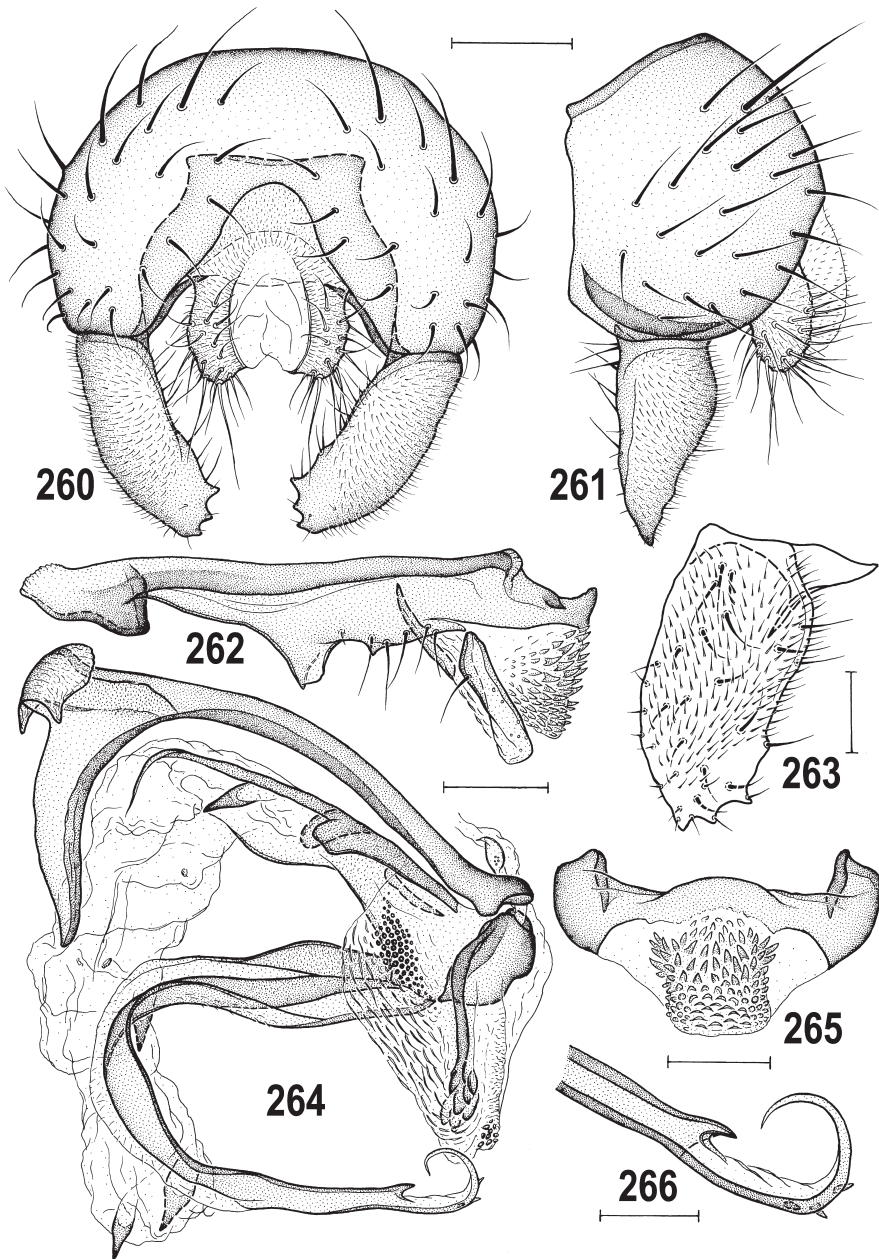
Abdomen. Preabdominal terga pale brown to brown, subshining but distinctly pale grey microtomentose and relatively shortly and usually pale setose. T1 and T2 only laterally partly fused; T1 shorter than T2 and distinctly narrower than T3. T3–T5 subequal in size, reaching onto lateroventral side of abdomen. Preabdominal sterna pale yellow (S2 sometimes darker yellow), not very narrow and becoming wider posteriorly, S2 slightly, S3–S4 more and S5 distinctly transversely trapezoidal, the latter being the largest and widest sternum; sterna finely setose, only S1 bare and with darker posterior marginal stripe. T6 short (less than one-third of T5), transverse, bare, medially broadly unpigmented, with only lateral parts pale brown. S6 and S7 strongly asymmetrical and fused dorsally, brown as T5, both with more sclerotized and dark brown anterior margin; S6 with 2–3, S7 with 2–4 distinct setae; S8 slightly longer than epandrium, tapered posteriorly, often somewhat darker than S6 and S7 and setose in posterior half.

Genitalia. Epandrium (Figs 260, 261, 294) brown to dark brown, concolourous with or somewhat darker than pregenital sclerites in contrast to that of *A. pallida*, relatively long and broad (longer and wider than in *A. pallida*) and moderately setose, with 2 pairs of longer and thicker dorsomedial setae; also anal fissure larger and wider than in latter species. Cercus rather short and broad, with numerous fine setae, apical longest. Medandrium (Fig. 260) distinctly wider and with more projecting dorsolateral corners than in *A. pallida*. Gonostylus (Figs 260, 261, 263) slightly incurved, largely micropubescent on outer side and sparsely setose on inner side, as in *A. pallida*, but shape relatively short and oblong (not tapered and triangular), and distally with 3 distinct teeth (1 apical and 2 subapical). Hypandrium (Fig. 262) also similar to that of *A. pallida*, being medium-sized, relatively slender and with anterior internal lobes reduced. Transandrium (Fig. 265) simple, slightly bent medially and without caudal process as in *A. pallida*, but somewhat broader. Pregonite (Fig. 262) strongly resembling that of *A. pallida*, having a small, short, triangular process behind the larger anterior tooth-like projection, but the latter process is trapezoidal rather than subtriangular, and the posterior part of the pregonite has more (5–6) setae. Postgonite (Fig. 262) relatively robust, less widened distally compared to *A. pallida*, with 1 anterior setula in proximal fourth, several sensillae and blunt apex; its proximal part connected with slender basal sclerite. Dorsal internal sclerite at base of postgonite narrow but distinct. Basal membrane (Figs 262, 265) densely overgrown with pigmented and distinctly larger spines than those in *A. pallida*. Aedeagal part of folding apparatus with a group (larger than in *A. pallida*) of grain-like tubercles and usual elongate hyaline warts (Fig. 264). Connecting sclerite (Fig. 264) slender, dark-pigmented and, in contrast

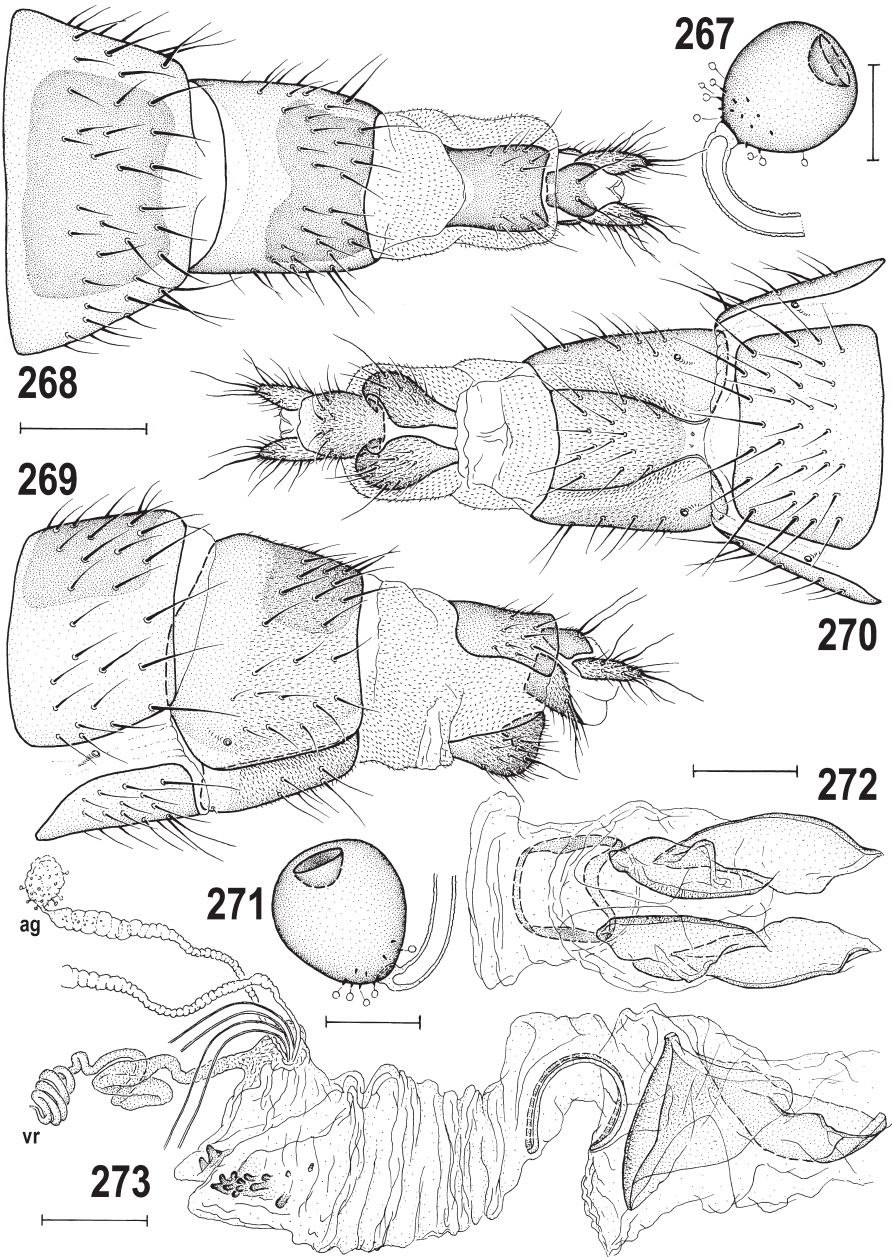
to that of *A. pallida*, terminating in a group of distinct pigmented spines. Phallapodeme (Fig. 264) relatively slender, with basal part deeply forked; fulcrum shifted close to apex as in *A. pallida*, but apex more projecting and wing-like laterally. Aedeagus with short phallosphore (Fig. 264) and very large and long distiphallus that is bifid from near its base. Saccus unusually long and proximally distinctly sclerotized as in *A. pallida*, but its large membranous part is armed with 4 robust dark spines. Filum slender, long and arched, very similarly constructed to that of *A. pallida*, but basally broader and partly micropubescent, medially curved and with membranous fringe, and distally with distinct sharp dorsal tooth and thin, curved, acutely pointed apex (Fig. 266), the latter provided with 3 subterminal spinulae. Ejacopodeme very small and pale-pigmented, with minute and pointed terminal projection (Fig. 264).

Female. Similar to male unless mentioned otherwise. Total body length 2.58–3.30 mm. Generally paler with brown markings reduced. Antenna with outer side of 1st flagellomere distinctly darkened, ochreous orange to pale brown, with only margins variably yellow. Darkened pattern on scutum and scutellum more reduced, appearing as longitudinally greyish brown-and-yellow stripes, sometimes even with yellow areas prevailing. f_3 simply setulose posteroventrally. Wing measurements: length 2.42–3.41 mm, width 0.81–1.13 mm, $Cs_3 : Cs_4 = 0.97\text{--}1.26$, $rm\backslash dm\text{-}cu : dm\text{-}cu = 2.07\text{--}2.84$. Abdomen with preabdominal terga variable in colour, ranging from almost entirely yellow (only T1 with medial pale brown darkening) to proximally (T1, T2) completely pale brown to brown and distally (T3–T5) with large medial brownish areas. T2–T5 shorter and more transverse than in male. Preabdominal sterna hardly shorter than in male, similarly coloured but rather transversely suboblong than trapezoidal. S2–S3 slightly, S4–S5 distinctly transverse, S5 largest.

Postabdomen (Figs 268–270) relatively long and narrow, tapered posteriorly, telescopic, with sclerites yellow and/or (partly) brown. T6 simple, narrower than T5 (longer than in *A. pallida*), trapezoidal, entirely yellow or variably brown medially (Fig. 268) and with relatively short setae. S6 narrower than S5 (and less transverse compared to *A. pallida*), transversely suboblong, finely setose. T7 slightly tapered posteriorly, always (in contrast to that of *A. pallida*) with large brown area of various length posteromedially, yellow laterally and anteriorly, setae relatively short and fine, and its sides expanded onto venter but not with anterior corners touching (Fig. 270) and not fused to S7; S7 (Fig. 270) small and narrow, widened posteriorly and finely setose. 7th spiracle embedded in T7 far from anteroventrolateral margin (Fig. 269). 8th segment densely micropubescent laterally. T8 brown, distinctly longer than broad, anteriorly slightly tapered and deeply emarginate (Fig. 268), with fine exclinate setae and reduced micropubescent; S8 slightly shorter than T8, medially divided into 2 sclerites (together of cordate shape, Fig. 270) each with 2 longer fine setae besides short setosity and with posterior end invaginated into 8th segment. Genital chamber (uterus) with internal sclerotization well developed (Figs 272, 273) although rather pale-pigmented, formed by 2 separate pairs of flat curved sclerites (anterior pair higher, posterior pair longer, hence different from those in *A. pallida*, where subequal, cf. ROHÁČEK 2006a: Figs 237, 238) and 1 anterior, slender, strongly curved annular sclerite (Fig. 273). Distal part of genital chamber often with dark secondary spine-like excrescences (Fig. 273). Ventral receptacle (Fig. 273) slender, tube-like, long, hyaline, terminally spirally twisted, proximally broader but without subbasal attenuation seen in *A. pallida*; accessory gland hyaline, with minute granulae on surface, borne on distally dilated



Figs 260–266. *Anthomyza pengellyi* sp. nov., paratype male (Canada: Ontario). 260 – external genitalia, caudally; 261 – the same, laterally; 262 – hypandrial complex, laterally; 263 – gonostylus, laterocaudally (widest extension); 264 – aedeagal complex, laterally; 265 – transandrium, caudally; 266 – apex of filum, sublaterally (widest extension). Scales = 0.05 mm (Figs 263, 266) and 0.1 mm (others).



Figs 267–273. *Anthomyza pengellyi* sp. nov., paratype female (Canada: Ontario). 267 – spermatheca; 268 – postabdomen, dorsally; 269 – the same, laterally; 270 – the same, ventrally; 271 – spermatheca; 272 – female internal sclerites, ventrally; 273 – female genital chamber laterally. Scales = 0.05 mm (Figs 267, 271), 0.2 mm (Figs 268–270) and 0.1 mm (others). For abbreviations see p. 11.

and distinctly ringed duct. Spermathecae (1+1) shortly ovoid (Figs 267, 271), each with short cup-like terminal invagination (wider and shorter than in *A. pallida*), very finely spinulose base and smooth surface (not finely ringed in distal half as that of *A. pallida*); spermathecal duct very long, terminally without distinct cervix. T10 small, darker than in *A. pallida* and of subcordate shape, with 1 medial pair of long setae and very reduced micropubescence. S10 also different from that of *A. pallida*, elongately suboblong thus narrow and longer, finely setulose and micropubescent. Cerci moderately sized, separated by their width (Fig. 268); with numerous fine setae, apical and dorsopreapical longest.

Discussion. This new species, *Anthomyza pengellyi* sp. nov., belongs to the *A. pallida* group as defined above. It is distinctly different from all other Nearctic relatives of the *A. pallida* group (see the key) and is, in fact, closest to the Palaearctic *A. pallida* forming with it the *A. pallida* (s. str.) subgroup. Their sister-species relationship is demonstrated by general resemblance (including the brown lateral side of the humeral callus) and, more importantly, by several shared synapomorphies that define the subgroup: gonostylus shortened; pregonite with broadened anterior tooth and short posterior triangular process; saccus of distiphallus prolonged; filum of distiphallus with characteristic subterminal tooth; and internal pairs of sclerites of female genital chamber situated as anterior and posterior (not dorsal and ventral). The most distinct differences between *A. pengellyi* and *A. pallida* can be seen in the structures of the male genitalia (shape of gonostylus, armature of basal membrane, saccus and connecting sclerite) and female postabdomen (shape and/or pigmentation of T6, S6, T7, T8, T10, structure of spermatheca, form of internal sclerites of female genital chamber) but *A. pengellyi* is most readily differentiated by the distinct brown to greyish brown markings on the mesonotum (largely yellow or with very faint marking in *A. pallida*), a brown to dark brown subscutellum and postnotum (reddish brown to ochreous in *A. pallida*), a brown epandrium (yellow in *A. pallida*), and often by pale setae that are ochreous to yellow in most specimens but ranging to black (always brown to black in *A. pallida*).

Etymology. This species is dedicated to the memory of Professor David Pengelly who formally introduced the junior author, as an undergraduate and graduate student, to the wonders of the insect world.

Biology. The habitat for *A. pengellyi* is still rather ill-defined but graminoids are the most common component. Collections have often been made from dry sites dominated by grasses to moist sites dominated by sedges and various combinations of graminoids. Dry (open disturbed) sites with grasses have included *Bromus inermis*, *Poa compressa* L., and *Leymus innovatus* (Beal) Pilg. in the west (Alberta: Peter Lougheed P. Pk. – 0.5 km W Little Highwood Pass, Fig. 259; ~26 km NW Highwood House – Mt. Lipsett pulloff; Elbow-Sheep Wildland Pk. – ~22.5 km NW Highwood House) while a much less disturbed site under *Betula/Acer* had a dominant graminoid component in the east (Ontario: Lake Superior Prov. Park – Crescent Lake Trail, Fig. 258). A decidedly mesic site with mostly *Glyceria striata* (Lam.) Hitchc. (Ontario: ~61 km NNW Elliot Lake – Three Lakes) was shared with *A. dichroa* and *A. mcalpinei*, while an extremely xeric sandy beach supporting the beachgrass *Ammophila breviligulata* Fernald (Ontario: Pancake Bay P. Pk., Fig. 546), was shared with the more numerous *A. vulgaris*. Additional references are made to “grass slope” and “grasses at edge of agricultural field” (Alberta: Dunvegan) which sound similar to the “streamside, mostly grasses” reference (Al-

berta: ~20 km SSE Robb). More specifically, *Calamagrostis* sp. (probably *C. canadensis*) was identified in a dry site (New York: Whiteface Mt.) and *C. canadensis* in a wet hydro cut, either by itself or mixed with *Equisetum fluviatile* (Ontario: Otter Rapids).

A mesic forested site yielded *A. pengellyi* from a range of “trailside graminoids, *Impatiens*”, “short trail grasses”, “trailside grasses” and “trailside *Carex*” (Ontario: Sault Ste. Marie – Sault College Outdoor Lab). The wet border of a fen habitat dominated by a mix of *Carex utriculata* Boott in Hook. and *Poa* cf. *pratensis* L. also yielded *A. pengellyi*, a site that transitioned to a sparse growth of mixed herbs and grasses (probably including *P. cf. pratensis*) near the roadside (Alberta: Peter Lougheed P. Pk). But a similarly dry border of a fen with sparse growth of *C. utriculata*, without a strong grass component, was also productive (Alberta: Peter Lougheed P. Pk. – Upper Lake Drive). Another example where graminoids were either absent or an insignificant component was of a community dominated by *Eurybia* and *Equisetum* under an aspen canopy (Ontario: Otter Rapids). The edge of a wet forest trail (Ontario: Moosonee) dominated by *Equisetum*, *Rubus*, and *Cornus* but with a significant graminoid component was also a good site for *A. pengellyi*. The flight period for *A. pengellyi* runs from 26 May (Alberta: Elkwater Park; Quebec: Old Chelsea) to 8–15 September (Utah: Logan Canyon).

Distribution. *Anthomyza pengellyi* has a broad transcontinental distribution from Labrador to Nova Scotia, Maine, New York, Michigan and Minnesota, west to Northwest Territories, Alaska and Oregon, and south to Utah, Colorado and New Mexico. Records are available for Canada: Alberta, British Columbia, Labrador, Manitoba, New Brunswick, Northwest Territories, Nova Scotia, Ontario, Quebec, Saskatchewan, Yukon; United States of America: Alaska, Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New Mexico, New York, Oregon, South Dakota, Utah, Washington, Wyoming (see Table 2).

Anthomyza mc Alpinei sp. nov.

(Figs 3, 275, 277, 278, 280–293, 295, 380)

Type material. HOLOTYPE: ♂, “ONT: SSMarie, S.of Alg-oma U.College, 25.vi.2001 KNBarber, sweeps, mostly *Carex aquatilis* 46°39.9'N 84°17.2'W” and “Holotypus ♂ *Anthomyza mc Alpinei* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in perfect condition, with well visible gonostyli (see Fig. 295) (DEBU, intact). PARATYPES: **CANADA: ALBERTA:** Elk Island, light mixed forest and marsh, 13.vi.1993, 1 ♀, T. Clarke leg. (DEBU); w. border Elk Island N. P., Range Rd. 210, 0.5 km N Hwy #16, 53°34.52'N 112°57.09'W, sweeps, *Calamagrostis canadensis*, 21.vii.2008, 16 ♂♂ 8 ♀♀, K. N. Barber leg. (CNCI); Calgary, Fish Creek Prov. Pk., 50°54.407'N 114°01.119'W, sweep, brush near ranch house, 25.vi.2010, 1 ♀; same locality but 50°55.739'N 114°03.312'W, sweep near creek, 22.vii.2010, 1 ♂, both J. E. Swann leg. (both BDUC); Dunvegan, 55°55.39'N 118°35.74'W, sweep south facing grass slope at dusk, 19.vii.2003, 1 ♂, S. Boucher leg. (LEMQ 0040435); Dunvegan, north shore of Peace River, sweep vegetation along shoreline, 12.vii.1997, 4 ♂♂ 4 ♀♀, T. A. Wheeler leg. (LEMQ 0039872, -75, -79, -80, -81, -84, -89, -90); Dunvegan, n. shore of Peace River, sweep grasses at edge of agricultural field, 13.vii.1997, 10 ♂♂ 11 ♀♀ (LEMQ 0039869, -870, -883, -885–888, -891–895, -897–900, -902–904, -907, -995), 14.vii.1997, 5 ♂♂ 1 ♀ (LEMQ 0039867, -871, -876–878, -901), T. A. Wheeler leg.; Halfway Slough, 59°56.049'N 111°44.344'W, sweep, 5.vii.2012, 2 ♂♂, S. & K. Williamson leg. (BDUC); ~14.4 km E Obed, Range Rd. 213 @ RR crossing, 53°32.19'N 117°01.02'W, sweeps, mostly *Carex utriculata*, 25.vii.2011, 1 ♂; Rocky Mtn. House, 52°22.57'N 114°56.34'W, pooter, grasses on bridge embankment, edge of parking area, 24.vii.2008, 1 ♀; ~40.8 km SSW Rocky Mtn. House, Hwy #752, 52°09.79'N 115°25.89'W, sweeps/pooter, roadside Poaeae, 24.vii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); 10 km NW Whitecourt, Hwy 32 at Sakwatamau River, 54°10'N 115°42'W, sweep vegetation at river edge, 15.vii.1997, 1 ♀, T. A. Wheeler leg. (LEMQ 0039855); R[egional] M[unicipality] of Wood Buffalo, ABMI site #67 NE, 1 km E Winnifred Lake, 59.22785187°N 110.360909°W, organic soil, Berlese, 18.vi.2014,

1 ♂, ABMI field crew (ABO3) leg. (PMAE). **BRITISH COLUMBIA:** Big Beaver Creek, Alaska Highway DEC-263, 13.viii.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC, genit. prep.); Fernie, Annex Pk., 49°30'43"N 115°04'07"W, 2.viii.2010, 14 ♂♂ 8 ♀♀, S. M. Paiero leg. (DEBU 00334407, -09-11, -17-19, -22, -24, -27, -28, -32, -38, -39, -42, -48, -54, -56-58, -66, -68); Fernie, Annex Pk., 49°30.72'N 115°04.13'W, sweeps, wet ditch, mostly *Equisetum arvense* & *E. laevigatum*, 17.vii.2011, 1 ♂ 1 ♀; same locality but sweeps, wet ditch, *Carex utriculata*, 17.vii.2011, 13 ♂♂ 15 ♀♀, 18.vii.2011, 3 ♂♂ 6 ♀♀, 19.vii.2011, 13 ♂♂ 2 ♀♀; Fernie, Annex Pk., 49°30.66'N 115°04.16'W, sweeps, pond margin, *Carex utriculata*, 18.vii.2011, 2 ♂♂, 19.vii.2011, 1 ♂, all K. N. Barber leg. (all CNCI); Kinbasket Lake, BC Hydro drawdown study, Malaise trap (WIL83-01), 18.vii.2008, 1 ♀, (00MRFTb01), 10.vii.2010, 1 ♀, (09MCOT01), 27-28.vi.2009, 1 ♀, (84MCOT15), 4-5.viii.2009, 1 ♀, (84MTRT01), 4-5.viii.2009, 1 ♂, (84MTR-Ta15), 4.vii.2010, 1 ♀, (88MCOT01), 10.vii.2010, 1 ♀, (91MTRT01), 10-11.vii.2009, 1 ♀, all Cooper Beuchesne & Assoc. Ltd. leg. (all RBCM); ~8.0 km SE Valemount, edge of Kinbasket Lake, 52°46.65'N 119°10.38'W, sweeps, mostly *Carex utriculata*, 23.vii.2011, 1 ♀, K. N. Barber leg. (CNCI); Kootenay Region, Arrow Lake, 11U 449421E 5623320N, sweeping/searching, 5.vi.2010, 2 ♂♂, J. K. Sharkey (LGL Ltd.) leg. (RBCM); Mission City, 8.vi.1953, 1 ♂, E. Mason leg., 8.vi.1953, 1 ♂, 4.vii.1953, 1 ♀, 18.vii.1953, 1 ♂ 1 ♀, W. R. M. Mason leg. (CNCI); Mt. Robson Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Revelstoke, 2.vii.1973, 2 ♂♂ 2 ♀♀, H. J. Teskey leg. (CNCI); Robson, 18.vi.1958, 1 ♀, 5.vii.1967, 1 ♂ 3 ♀♀, H. R. Foxlee leg. (UBCZ); Vancouver, Point Grey, 23.vii.1973, 1 ♂, J. R. Vockeroth leg. (CNCI). **MANITOBA:** ~14 km SW Falcon Lake, jct. Hwy #1 & Rd. 86E, 49°38.24'N 95°29.89'W, sweeps, graminoids, mostly *Carex* spp., 29.vii.2011, 1 ♂ 1 ♀, K. N. Barber leg.; Int. Peace Gardens, Turtle Mtn. For. Res., 17.vii.1958, 1 ♂, R. B. Madge leg., 7.viii.1958, 2 ♂♂, J. G. Chillcott leg.; 5 mi W Norgate, Riding Mtn. Nat. Pk., aspen-spruce swamp, 16.viii.1958, 1 ♂, J. G. Chillcott leg. (all CNCI); 4 km E Ste. Rita, Hwy 15 at Brokenhead R., sweeping sedge and grass along shore, 9.vii.1992, 1 ♂ 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039896, -905, -906); 5 mi SW Shilo, 13.viii.1958, 1 ♂; 5 mi SW Shilo, floodplain community near tamarack bog, 22.vii.1958, 1 ♀, both R. L. Hurley leg.; ~6 km SW Shilo, 49°45.19'N 99°41.28'W, edge of wet area, sweeps, incl. *Equi. fluviatile*, *Carex*, *Calamagrostis*, *Impatiens*, 10.vii.2011, 1 ♂, K. N. Barber leg.; Treesbank, Assiniboine R., 18.vi.1958, 1 ♀, J. F. McAlpine leg. (all CNCI). **NEW BRUNSWICK:** Chamcook, 9.viii.1957, 1 ♂, G. E. Shewell leg.; Sackville, Tantramar Marsh, 14.vii.1983, 2 ♀♀, J. R. Vockeroth leg.; St. Andrews, 8.viii.1957, 4 ♂♂, G. E. Shewell leg. (all CNCI). **NEWFOUNDLAND:** Avalon Peninsula, Portugal Cove, Indian Meal Line, 15.vii.1982, 1 ♂ 1 ♀, [no collector] (NFRFC); Portugal Cove, pasture sweep, 1.vii.1987, 1 ♂ 2 ♀♀, T. A. Wheeler leg. (DEBU); Terra Nova Nat. Pk., 7.vii.1961, 1 ♂, C. P. Alexander leg. (USNM, genit. prep.). **NOVA SCOTIA:** C[ape] B[reton] H[ighlands] Nat. Pk., Lone Shieling, PG732859, over small stream in maple forest, 1.vii.1983, 1 ♀, J. R. Vockeroth leg.; same locality but Pleasant Bay, PG684871, wet hardwood forest, 10.vii.1984, 1 ♀, H. J. Teskey leg.; Kentville, 6.viii.1958, 1 ♂, J. R. Vockeroth leg.; Halifax Co., Lawrencetown, 19-20.vii.1967, 1 ♀, D. M. Wood leg.; Lockeport, 18.vii.1958, 1 ♂ 2 ♀♀, 25.vii.1958, 1 ♀, J. R. Vockeroth leg. (all CNCI); Petite Riviere, 44°13.2'N 64°26.2'W, sweep vegetation above ocean beach, 23.vii.2002, 1 ♂, J. Forrest & T. A. Wheeler leg. (LEMQ 0040360); Sydney, [-].vii.1967, 1 ♂ 2 ♀♀, N. L. H. Krauss leg. (USNM). **ONTARIO:** 4 mi W Arthur, 25.vii.1985, weedy ditch, 1 ♂, K. N. Barber leg.; Belwood, 14.vii.1972, 1 ♀, D. H. Pengelly leg. (both DEBU); Blackburn, Mer Bleue, 27.vi.1955, 1 ♀, W. R. M. Mason leg. (CNCI); Bruce Co., Crane River, 21.vii.1996, 1 ♂; Bruce Co., Miller Lake, 21.vii.1996, 1 ♂, both S. A. Marshall leg.; Bruce Co., Hwy #6 @ Willow River, 45°10.43'N 81°31.21'W, sweeps, mostly *Carex aquatilis*, 21.vi.2008, 2 ♂♂, K. N. Barber leg. (all DEBU); Bruce Penin[sula], 1 km NNW Ague Lake, spring creek, 45°03'48"N 81°24'34"W, sweeping *Calamagrostis canadensis* in a fen, 1.vii.2010, 2 ♂♂ 9 ♀♀, J. Roháček leg. (SMOC); Bruce Peninsula N. P., bank of Crane River nr. Hwy 6, 45°08.9'N 81°28.1'W, sweeps/pooter, *Calamagrostis* & *Carex*, 31.vii.1997, 11 ♂♂ 12 ♀♀, K. N. Barber leg., sweeps, grasses/sedges, 31.vii.1997, 2 ♂♂ 1 ♀, S. A. Marshall leg.; Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 3.vii.1999, 3 ♂♂ 5 ♀♀; Bruce Peninsula N. P., Emmett Lake, 45°13.4'N 81°29.3'W, sweeps, graminoids, edge of marsh, 2.vii.1999, 1 ♂ 1 ♀; Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.4'W, sweeps, grasses along dry ditch, 31.vii.1997, 2 ♂♂ 3 ♀♀, 4.vii.1998, 3 ♂♂ 3 ♀♀; same locality but 45°11.6'N 81°35.2'W, sweeps, *Carex*, 5.vii.1998, 1 ♀, all K. N. Barber leg. (all DEBU); ~5 km SE Cochrane, 49°01.16'N 80°57.93'W, sweeps, railside *Equisetum* spp., graminoids, herbs, 18.vii.2009, 1 ♀; ~13.5 km S Cochrane, 48°56.65'N 81°00.18'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 9.vii.2012, 1 ♀, 12.vii.2013, 1 ♀; ~35 km WSW Dubreuilville, 2 km SE jct. Hwys #17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside *Calamagrostis/Scirpus*,

23.vii.2003, 1 ♂ 1 ♀; ~3.8 km ENE Dugwal, 48°35.33'N 80°57.90'W, sweeps, wet ditch, *Carex utriculata*, *Equisetum fluviatile*, *Scirpus*, 13.vii.2013, 2 ♂♂ 3 ♀♀; ~5 km SSE Echo Bay, Jct. Bar River Rd./Government Rd., 46°26.52'N 84°02.80'W, sweeps, *Calamagrostis*, 27.viii.2003, 2 ♂♂ 1 ♀; ~59 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°50.16'N 83°03.05'W, sweeps, mostly *Carex aquatilis* in fen, 3.vii.2010, 5 ♂♂ 6 ♀♀, all K. N. Barber leg. (all CNCI); ~59 km NNW Elliot Lake, S of Rocky Island Lake, 46°50.16'N 83°03.05'W, 455 m, sweeping, mostly *Carex rostrata*? [more likely *C. utriculata*] in fen, 3.vii.2010, 1 ♀; ~61 km NNW Elliot Lake, Three Lakes, 46°49.94'N 83°06.31'W, 425 m, sweeping grasses [mostly *Glyceria striata*] near lakeshore, 3.vii.2010, 1 ♂ 4 ♀♀ (1 ♀ genit. prep.), all J. Roháček leg. (all SMOC); ~63 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°49.80'N 83°09.08'W, sweeps, streamside graminoids, 4.vii.2010, 2 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); same locality but 425 m, sweeping streamside graminoids, 4.vii.2010, 19 ♂♂ 12 ♀♀, J. Roháček leg. (SMOC); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, sweeps, *Scirpus [microcarpus]* on dried shoreline, 4.vii.2010, 2 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI); same locality but 405 m, sweeping *Scirpus* sp. [*S. microcarpus*] on dried shoreline, 4.vii.2010, 1 ♂ 2 ♀♀, J. Roháček leg. (SMOC); Fathom Five N. Pk., Cove Is., Bass Bay shore, fen, p.m. sweeps, 25.vi.1995, 1 ♂; same locality but shore of Bass Bay, sweep, 26.vii.1995, 1 ♂, both S. A. Marshall leg. (both DEBU); Fergus, 43°41.5'N 80°23.2'W, Grand R. floodplain, sweeps/pooter, *Bromus inermis*, 17.vii.1997, 1 ♀, K. N. Barber leg. (CNCI); Finland, S of Caliper Lake, sweep sedge at beaver dam, 10.vii.1992, 3 ♂♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039865, -66, -68, -73); Greenwater P. Pk., 49°11.05'N 81°16.04'W, sweeps, mostly lakeside *Calamagrostis*, 18.vii.2009, 2 ♂♂ 2 ♀♀ (DEBU 01501993-96); Greenwater P. Pk., 49°10.93'N 81°16.37'W, sweeps, *Phalaris arundinacea* in creek floodplain, 21.vii.2009, 8 ♂♂ 3 ♀♀ (DEBU 01502108-18); Greenwater P. Pk., 49°10.91'N 81°16.28'W, sweeps, *Carex*, *Calamagrostis*, *Phalaris* in creek floodplain, 21.vii.2009, 17 ♂♂ 18 ♀♀, K. N. Barber leg. (DEBU 01502140-45, -47-75); Guelph, 3.vii.1980, 2 ♂♂ 1 ♀, S. A. Marshall leg., 3.viii.1980, 1 ♂, K. N. Barber leg. (DEBU); 6 km W Hagar, 46.47°N 80.48°W, sweep river edge, at rest area, 29.vi.2007, 1 ♂ 1 ♀, J. Mlynarek leg. (LEMQ 0040531, -532); ~5 km NE Heyden, Hwy 552, 46°41.37'N 84°16.85'W, sweeps, roadside ditch/stream, graminoids, 31.vii.2006, 1 ♂ 3 ♀♀; ~6 km N Heyden, Hwy #17 base of "Mile Hill", 46°41.74'N 84°20.60'W, sweeps, graminoids under alder, 7.viii.2005, 2 ♂♂; same locality but 46°41.75'N 84°20.71'W, sweeps, graminoids in wet meadow, 7.viii.2005, 2 ♂♂; Icewater Creek WS [watershed], 12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., alder thicket, 21.vi.1986, 2 ♂♂, 7.vii.1986, 1 ♀; Icewater Creek WS [watershed], 46°53.72'N 84°03.39'W, sweeps, riparian ferns, graminoids, 5.viii.2006, 1 ♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Lake Superior Prov. Park, Crescent Lake Trail, 47°16.73'N 84°33.12'W, sweeping *Clintonia*, ferns, *Aralia*, *Maianthemum* under *Betula/Acer*, 9.vii.2010, 1 ♀, J. Roháček leg. (SMOC); ~11.9 km N Kejick, 49°43.89'N 95°04.14'W, sweeps, wet ditch, *Calamagrostis canadensis*, 30.vii.2008, 1 ♂; Manitoulin Is., Carter Bay, 45°36.3'N 82°08.5'W, sweeps, Pearly Everlasting [*Anaphalis margaritacea*], 30.vi.1999, 1 ♂; Manitoulin Is., Michael's Bay Pk., 45°36.0'N 82°06.2'W, sweeps, grasses near shore, 28.vii.1997, 1 ♀; Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.5'N 82°06.2'W, sweeps, roadside grasses, 28.vii.1997, 4 ♂♂ 2 ♀♀, sweeps, *Carex/Calamagrostis* in fen flat, 5.vii.1998, 5 ♂♂ 6 ♀♀, sweeps/pooter, graminoids in fen flat, 28.vii.1997, 1 ♂ 2 ♀♀, 30.viii.2004, 3 ♂♂ 1 ♀; Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck. @ Hwy 540, 45°53.2'N 82°06.3'W, sweeps, various grasses/sedges in floodplain, 5.vii.1998, 5 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 7 ♂♂ 4 ♀♀; same locality but 45°53.1'N 82°06.2'W, sweeps/pooter, *Calamagrostis canadensis*, 4.vii.1999, 13 ♂♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); Manitoulin I., Misery Bay Nature Reserve, 45°47.64'N 82°44.93'W, sweeping, mostly *Carex* from wetland boardwalk, 2.vii.2010, 1 ♀, J. Roháček leg. (SMOC); same locality but sweeps, mostly *Carex stricta* from wetlands boardwalk, 2.vii.2010, 2 ♀♀, K. N. Barber leg. (DEBU 01502486, -87); Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.07'W, sweeps, roadside graminoids, 2 ♀♀, 31.vii.2008, K. N. Barber leg.; Maynooth, swept from beaver meadow, 5.ix.1953, 1 ♂ 1 ♀, J. F. McAlpine leg.; Midland, 30.vii.1956, 2 ♀♀, J. G. Chillcott leg. (all CNCI); Moosonee, 51°16.07'N 80°38.66'W, sweeps, shoreline graminoids, 9.vii.2014, 1 ♀; Moosonee, 51°16.17'N 80°39.10'W, sweeps, mostly *Carex utriculata*, *Scirpus*, in wet hydro cut, 10.vii.2014, 1 ♀; Moosonee, 51°16.36'N 80°39.11'W, sweeps, roadside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 10.vii.2014, 2 ♂♂ 4 ♀♀, 11.vii.2014, 1 ♂ 1 ♀; Moosonee, 51°16.55'N 80°39.01'W, sweeps, mostly *Carex* spp., wet forest trail, 11.vii.2014, 1 ♀; Moosonee, 51°16.63'N 80°38.87'W, sweeps, *Calamagrostis*, *Carex*, drier edge of sedge meadow, 9.vii.2014, 2 ♂♂ 2 ♀♀; Moosonee, 51°16.68'N 80°38.65'W, sweeps, mostly *C[arex] utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 1 ♂ 3 ♀♀; Moosonee, 51°16.99'N 80°38.37'W, sweeps, mostly *Equisetum fluviatile*, *Carex* spp., wet sedge meadow, 10.vii.2014, 1 ♂; ~8 km SSW Nipigon, Hwy #628, 48°57.09'N 88°19.71'W,

sweeps, damp roadside, mixed graminoids, 16.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); One-sided [= Caliper] Lake, 27.vi.1960, 1 ♂, Kelton & Whitney leg.; Ottawa, 14.ix.1955, 1 ♀, 12.vii.1956, 1 ♂, J. R. Vockeroth leg. (all CNCI); Otter Rapids, 50°10.80'N 81°38.59'W, sweeps, *Carex* sp., 19.vii.2009, 1 ♀, sweeps, roadside *Equisetum* spp., 19.vii.2009, 1 ♂; Otter Rapids, 50°10.87'N 81°38.56'W, sweeps, *Calamagrostis canadensis* in hydro cut, 20.vii.2009, 1 ♂ 1 ♀; ~7 km SSE Otter Rapids, 50°07.52'N 81°35.92'W, sweeps, *Scirpus* sp., 20.vii.2009, 2 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); Pancake Bay Prov. Park, 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 7 ♂♂ 1 ♀, J. Roháček leg. (SMOC); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 17.vii.2004, 1 ♂ (DEBU 01500322), 24.vii.2004, 2 ♂♂ (DEBU 01500573, -74), 7.viii.2004, 2 ♂♂ 1 ♀ (DEBU 01501085–87), 27.vi.2005, 2 ♀♀ (DEBU 01501608, -09); Pancake Bay P. Pk., 46°58.12'N 84°42.75'W, sweeps, mostly graminoids/*Typha*, near wetland boardwalk, 2.viii.2004, 4 ♂♂ 1 ♀ (DEBU 01500966–70), all K. N. Barber leg.; Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 3 ♂♂ 1 ♀; ~4.5 km E Rosseau, on Aspden Rd., 45°15.88'N 79°34.88'W, sweeps, mostly *Carex* in sedge meadow, 7.vii.2005, 1 ♂ 1 ♀, all K. N. Barber leg. [S[ault] S[ainte] Marie, Algoma U[niversity] College, sweeps, 20.vii.1987, 2 ♂♂ 1 ♀; S[ault] S[ainte] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Phalaris arundinacea*, 12.vii.1997, 1 ♂ 2 ♀♀, 22.vi.1998, 2 ♂♂, sweeps, trailside *Carex/Scirpus*, 14.vii.1998, 1 ♂ 1 ♀, sweeps, *Carex lacustris*, 12.vii.1997, 3 ♂♂ 2 ♀♀, sweeps, *Typha*, 11.vi.1997, 1 ♀, sweeps/pooter, grasses under *Populus/Betula*, 11.vii.1997, 1 ♀, sweeps, grassy edge of woods, 11.vii.1997, 1 ♂, sweeps, graminoids mostly *Carex aquatilis*, 11.vi.1997, 5 ♂♂ 9 ♀♀, sweeps/pooter, *Calamagrostis canadensis*, 12.vii.1997, 14 ♂♂ 29 ♀♀, 3.viii.1997, 2 ♂♂ 2 ♀♀ (all CNCI), 26.viii.1997, 12 ♂♂ 11 ♀♀ (USNM), 12.vii.2002, 2 ♂♂ 1 ♀, sweeps, *Calamagrostis canadensis*, 28.viii.1997, 7 ♂♂ 1 ♀, 29.viii.1997, 56 ♂♂ 5 ♀♀, 22.vi.1998, 3 ♂♂ 9 ♀♀ (CNCI), 26.vi.1998, 31 ♂♂ 41 ♀♀ (BYUC, CLEV, CMNH, CSCA, CSUC, EMEC, KNWR, MCZN, MEMU 3 ♂♂ 4 ♀♀ each; BDOC 4 ♂♂ 5 ♀♀), 29.vii.1999, 2 ♂♂, 31.vii.2002, 3 ♀♀, sweeps, mostly *Calamagrostis canadensis*, 28.vii.2001, 6 ♂♂ 1 ♀, 29.vii.2001, 1 ♂ 2 ♀♀, 6.viii.2001, 7 ♂♂, 4.viii.2002, 4 ♂♂ 1 ♀, sweeps, *Calamagrostis canadensis* & *Carex aquatilis*, 23.vii.1997, 16 ♂♂ 3 ♀♀, 28.viii.1997, 2 ♂♂ 2 ♀♀ (CNCI), sweeps, *Carex/Calamagrostis*, 3.viii.2002, 5 ♂♂ 5 ♀♀ (CASC), 10.viii.2002, 1 ♂ 1 ♀, 5.ix.2002, 1 ♀, pooter, *Carex/Calamagrostis*, 10.viii.2002, 1 ♀ (CNCI), all K. N. Barber leg.; same locality but sweeps, *Carex/Calamagrostis*, used in lab rearing, [with various dates of death], 6.viii.2002, 3 ♂♂ 9 ♀♀; same locality but lab-reared, *Phalaris arundinacea*, from 3 ♂♂ 9 ♀♀, 46°29.9'N 84°17.2'W, sweeps, *Carex/Calamagrostis*, 6.viii.2002, 20°C, L:D 16:8, 50–70% RH, moist 3 cm sections *P. arundinacea* in 5 cm plates, oviposition: 15–21.viii.2002, puparium: 21.ix.2002, adult: 4.x.2002, 1 ♀, all K. N. Barber leg. (all CNCI); same locality but sweeps/pooter, *Carex aquatilis*, 3.viii.1997, 1 ♂ 7 ♀♀, sweeps, *Carex aquatilis*, 12.vii.1997, 15 ♂♂ 27 ♀♀, 3.viii.1997, 2 ♂♂ 4 ♀♀ (CNCI), 22.vi.1998, 3 ♂♂ 3 ♀♀ (NMPC), 26.vi.1998, 7 ♂♂ 13 ♀♀, 29.vii.1998, 1 ♂, 28.vi.2002, 1 ♂ 4 ♀♀, 29.vi.2002, 5 ♂♂, 1.vii.2002, 2 ♂♂ 3 ♀♀, 9.vii.2002, 2 ♀♀ (CNCI), 12.vii.2002, 6 ♂♂ 8 ♀♀ (LACM), 31.vii.2002, 6 ♂♂ 5 ♀♀ (AMNH), sweeps, mostly *Carex aquatilis*, 13.vi.2001, 1 ♂, 14.vi.2001, 1 ♂ 1 ♀, 17.vi.2001, 1 ♀, 21.vi.2001, 7 ♂♂ 7 ♀♀ (incl. pair in copula), 22.vi.2001, 1 ♂ (CNCI), 25.vi.2001, 26 ♂♂ 17 ♀♀ (CNCI 24 ♂♂ 15 ♀♀, SMOC 2 ♂♂ 2 ♀♀), 28.vi.2001, 1 ♂ 3 ♀♀, 11.vii.2001, 17 ♂♂ 5 ♀♀ (incl. 3 pairs in copula), 15.vii.2001, 9 ♂♂ 7 ♀♀ (1 ♂ wing illustration) (CNCI), 17.vii.2001, 35 ♂♂ 27 ♀♀ (MTEC, OSAC, PMAE, RBCM, SEMC, UBCZ, UCR, UGCA 4 ♂♂ 3 ♀♀ each; WFBM 3 ♂♂ 3 ♀♀), 18.vii.2001, 2 ♂♂ 6 ♀♀, 21.vii.2001, 3 ♂♂ 1 ♀, 28.vii.2001, 6 ♂♂ 7 ♀♀, 29.vii.2001, 1 ♂ 2 ♀♀, 2.viii.2002, 4 ♂♂ 9 ♀♀, 4.viii.2002 (CNCI), 5 ♂♂ 3 ♀♀ (INHS), sweeps, mixed graminoids, 18.vi.1998, 5 ♂♂ 2 ♀♀ (CNCI), all K. N. Barber leg.; same locality but 46°29.88'N 84°17.19'W, sweeps, *Phalaris arundinacea*, 18.vi.2005, 1 ♀, sweeps, *Calamagrostis canadensis*, 18.vii.2004, 4 ♂♂, 26.viii.2003, 1 ♂ 2 ♀♀, sweeps, *Carex aquatilis*, 1.vii.2003, 1 ♂ 3 ♀♀, 26.viii.2003, 7 ♂♂ 6 ♀♀ (incl. pair in copula), 18.vi.2005, 2 ♀♀, 21.vii.2005, 6 ♂♂ 3 ♀♀ (CNCI), 27.vii.2005, 6 ♂♂ 4 ♀♀ (LEMQ), sweeps, mostly *Carex aquatilis*, 18.vii.2004, 7 ♂♂ 15 ♀♀, sweeps, trampled graminoids, mostly *Carex aquatilis*, 5.ix.2004, 3 ♀♀, 1.viii.2005, 8 ♂♂ 12 ♀♀, pooter, mostly *Carex aquatilis*, 21.viii.2004, 2 ♂♂ 1 ♀ (CNCI); same locality but 46°29.82'N 84°17.17'W, sweeps, mostly *Carex aquatilis* near river, 21.vii.2005, 5 ♂♂ 2 ♀♀ (CNCI), all K. N. Barber leg.; S[ault] S[ainte] Marie, S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, mostly *Carex aquatilis*, 29.vi.2008, 1 ♂ 3 ♀♀, sweeps, *Carex aquatilis*, *Calamagrostis canadensis*, 5.vii.2008, 3 ♂♂ 3 ♀♀, sweeps, *Carex aquatilis*, *Typha latifolia*, 6.viii.2008, 5 ♂♂ 3 ♀♀; same locality but 46°29.81'N 84°17.15'W, sweeps, *Carex aquatilis*, *Calamagrostis canadensis* (by river), 5.vii.2008, 2 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, Malaise #1, *Aster* [*Doellingeria*], *Rubus*,

Equisetum, *Carex*, *Solidago*, in aspen clearing, 18–29.vii.2005, 1 ♀, sweeps, *Thalictrum*, *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 25.vi.2005, 1 ♀; same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 2 ♂♂, 29.vi.2005, 1 ♂ 1 ♀; same locality but w. of creek, 46°31.52'N 84°24.63'W, sweeps, graminoids on path, 22.vii.2005, 8 ♂♂ 2 ♀♀, sweeps, *Carex* under ash/aspen, 22.vii.2005, 2 ♂♂ 1 ♀; same locality but 46°31.61'N 84°24.68'W, sweeps, *Carex* edge of alder thicket, 22.vii.2005, 5 ♂♂ 3 ♀♀, sweeps, graminoids/composites, 20.viii.2008, 4 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Bellevue Pk., 46°30.1'N 84°18.1'W, sweeps, mostly *Calamagrostis*, 7–8.vii.2000, 2 ♀♀; S[ault] S[ainte] Marie, Birchwood Pk., mixed forest, 15.vi.1986, 1 ♂, 28.vi.1986, 13 ♂♂ 5 ♀♀, 13.viii.1986, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Bristol Pl. Pk., 46°30.8'N 84°16.6'W, sweeps, *Phalaris arundinacea*, 18.vii.1997, 1 ♀, 28.vi.1998, 7 ♂♂ 17 ♀♀, sweeps/pooter, *Phalaris arundinacea*, 1.viii.1997, 1 ♀, 8.viii.1997, 1 ♂ 2 ♀♀; same locality but 46°30.77'N 84°16.66'W, sweeps, *Phalaris arundinacea* under *Populus*, 7.viii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 7 ♂♂ 4 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep., 1 ♂ 1 ♀ photographed); S[ault] S[ainte] Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 18.vi.2005, 1 ♂, 13.viii.2005, 2 ♂♂ 2 ♀♀, 14.viii.2005, 14 ♂♂ 8 ♀♀, 16.viii.2005, 2 ♂♂ 1 ♀, 25.viii.2005, 2 ♂♂, 12.ix.2005, 1 ♀, 16.ix.2005, 1 ♂, 8.vii.2006, 4 ♂♂ 3 ♀♀; same locality but 46°31.63'N 84°17.29'W, sweeps, mostly *Scirpus microcarpus*, 8.vii.2006, 1 ♂ 1 ♀; same locality but 46°31.6'N 84°17.3'W, sweeps, graminoids/composites, 19.vii.2005, 3 ♀♀; same locality but 46°31.60'N 84°17.30'W, pooter, *Carex stipata stipata*, 27.vii.2004, 1 ♂ 1 ♀; same locality but 46°31.63'N 84°17.33'W, sweeps, *Carex stipata stipata*, 19.vii.2004, 1 ♂ 3 ♀♀, 20.vii.2004, 3 ♂♂ 2 ♀♀, 1.viii.2005, 1 ♀, pooter, *Carex stipata stipata*, 25.vii.2004, 2 ♀♀, sweeps, *Calamagrostis canadensis*, 26.vi.2007, 4 ♂♂ 1 ♀, sweeps, mostly *Calamagrostis canadensis*, 6.vii.2008, 2 ♂♂ 1 ♀, sweeps, mostly *Carex stipata stipata*, 26.vi.2007, 3 ♂♂ 2 ♀♀, sweeps, mostly *Carex/Calamagrostis*, edge of *Populus tremuloides*, 25.vi.2009, 2 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI), sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 12 ♂♂ 18 ♀♀ (1 ♂ 3 ♀♀ genit. prep.), 12.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC); same locality but 46°31.66'N 84°17.34'W, sweeps, mostly *Calamagrostis canadensis*, 8.viii.2008, 1 ♂ 1 ♀, 10.viii.2008, 1 ♀ (CNCI); same locality but 46°31.67'N 84°17.32'W, sweeps, *Calamagrostis canadensis*, 20.vii.2004, 3 ♂♂ 3 ♀♀ (CNCI 1 ♂ 1 ♀, SMOC 2 ♂♂ 2 ♀♀), 30.vii.2004, 1 ♂ 1 ♀ (CNCI); same locality but 46°31.7'N 84°17.5'W, sweeps, mostly sedges in trail, *Calamagrostis canadensis*, 4.vii.2002, 5 ♂♂ 1 ♀, 7.vii.2002, 1 ♂ 3 ♀♀ (incl. pair in copula) (CNCI), all K. N. Barber leg.; Sault Ste. Marie, Fish Hatchery Road, near Coldwater Creek, 46°34.29'N 84°17.21'W, sweeping graminoids, *Impatiens*, 9.vii.2010, 7 ♂♂ 2 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); S[ault] S[ainte] Marie, Ft. Creek Cons[ervation] Area, 46°32.5'N 84°20.8'W, sweeps/pooter, *Phalaris arundinacea*, 9.viii.1997, 1 ♂, sweeps, *Scirpus* sp., 9.viii.1997, 1 ♀; S[ault] S[ainte] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, mostly *Carex/Calamagrostis* in wet area, 16.viii.2004, 1 ♂ 5 ♀♀, 23.viii.2004, 2 ♂♂ 3 ♀♀, sweeps, mostly *Carex/Calamagrostis* in wet area, 19.vii.2008, 1 ♂ 2 ♀♀, 13.viii.2008, 1 ♂ 2 ♀♀, sweeps, *Calamagrostis canadensis* in wet area, 16.viii.2004, 6 ♂♂ 1 ♀; same locality but 46°36.62'N 84°17.91'W, sweeps, mostly riparian sedges, 16.viii.2004, 2 ♂♂ 5 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Kinsmen Pk., 46°35.7'N 84°16.7'W, sweeps, mostly *Carex*, 11.viii.2002, 1 ♀; S[ault] S[ainte] Marie, Landslide Rd., Coldwater Ck. floodplain, 46°33.8'N 84°16.6'W, sweeps, mostly *Carex* sp., 7.viii.1997, 1 ♂ 3 ♀♀, sweeps/pooter, *Calamagrostis canadensis*, 7.viii.1997, 2 ♂♂ 1 ♀; same locality but 46°33.94'N 84°16.66'W, sweeps, graminoids in wet ditch, 26.viii.2008, 2 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, *Carex* sp., 25.vii.1997, 4 ♂♂ 2 ♀♀, sweeps, *Phalaris arundinacea*, 25.vii.1997, 1 ♂, sweeps, trailside grasses, *Acer/Betula*, 25.vii.1997, 1 ♂, sweeps, short trail grasses, *Acer/Betula*, 25.vii.1997, 2 ♂♂ 4 ♀♀, sweeps, graminoids in open, 25.vii.1997, 1 ♀, sweeps, *Carex* in clearing, 7.ix.1997, 1 ♂ 1 ♀; same locality but 46°32.08'N 84°18.21'W, sweeps, *Carex lacustris* in opening, 17.vii.2005, 1 ♂, 2.viii.2005, 1 ♀, sweeps, *Scirpus* sp. in opening, 17.vii.2005, 1 ♂; S[ault] S[ainte] Marie, hydro cut nr. Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.0'W, sweeps, mostly sedges, 10.vii.2002, 1 ♂ 4 ♀♀, sweeps, *Scirpus cyperinus*, 24.viii.2005, 2 ♂♂, 12.viii.2008, 1 ♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, 2nd Line E, 46°32.3'N 84°16.6'W, sweeps, *Calamagrostis canadensis*, 26.vi.1999, 2 ♂♂ 2 ♀♀, sweeps, graminoids in open meadow, 26.vi.1999, 1 ♂; S[ault] S[ainte] Marie, Thayers Acres, 46°35.54'N 84°15.53'W, sweeps, emergent *Carex* sp., 1.vii.2007, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Voyageur Trail, 46°35.48'N 84°15.23'W, sweeps, *Calamagrostis canadensis*, 9.vii.2006, 1 ♂, [K. N. Barber] leg.; S[ault] S[ainte] Marie, Whitefish Is./St. Mary's Is., 46°30.68'N 84°21.20'W, sweeps, riparian graminoids, 8.viii.2004, 5 ♂♂

7 ♀♀, K. N. Barber leg. (all CNCI); ~10 km W S[ault] S[ainte] Marie, Airport Rd., 46°29.9'N 84°28.9'W, natural gas r[igh]t-of-way, sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns, 25.viii.2008, 2 ♂♂ 2 ♀♀; same locality but 46°29.72'N 84°28.96'W, natural gas r[igh]t-of-way, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 2 ♂♂, sweeps, mostly ferns, graminoids, 5.viii.2009, 3 ♂♂ 5 ♀♀, sweeps, mostly *Scirpus/Calamagrostis*, 4.viii.2004, 1 ♂, all K. N. Barber leg. (all CNCI); same locality but sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 6 ♂♂ 7 ♀♀, J. Roháček leg. (SMOC); NW S[ault] S[ainte] Marie, Red Rock, 46°36.21'N 84°32.85'W, sweeps, graminoids, ferns, *Impatiens*, 4.viii.2006, 2 ♂♂ 1 ♀; Searchmont, N Hwy #552, 46°50.3'N 84°04.4'W, sweeps, roadside sedges/grasses, 10.vii.1998, 2 ♀♀; ~5 km SE Searchmont, km 6.2 Ranger Lk. Rd., 46°45.52'N 83°59.51'W, sweeps, sedges at beaver dam outflow, 23.vi.2007, 1 ♀, all K. N. Barber leg.; 12.4 km NNE Searchmont, mi. 10 Whitman Dam Rd., herb/grass meadow by Goulais R., 23.vi.1986, 1 ♂ 1 ♀, 25.vi.1986, 1 ♂ 2 ♀♀, 3.vii.1986, 1 ♀, 9.vii.1986, 1 ♂, D. J. M. Harvey leg.; ~18 km NNE Searchmont, Goulais River WS [watershed], ~mi. 15 Whitman Dam Rd., 46°55.3'N 83°56.3'W, sweeps, grass under jackpine, 30.vii.1999, 1 ♀, K. N. Barber leg. (all CNCI); S of Sioux Narrows, sweeping sedge at beaver dam, 10.vii.1992, 2 ♂♂ 3 ♀♀, T. A. Wheeler leg. (LEMQ 0039856, -60, -61, -64, -82); ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, ditchside *Equisetum* spp., grasses, herbs, 19.vii.2009, 1 ♂ 2 ♀♀, 8.vii.2012, 1 ♀; 2 km E Sowerby, Hwy 17 @ Harris Ck. Rd., 46°17.6'N 83°21.3'W, sweeps, floodplain grasses, 1.viii.1997, 1 ♂; 0.4 km S Stonecliffe, Pine Valley Rd. @ RR crossing, 46°11.9'N 77°52.8'W, sweeps, graminoids, 9.vii.2001, 5 ♀♀, all K. N. Barber leg.; Swastika, 7.vii.1987, 1 ♀, J. R. Vockeroth leg. (all CNCI); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi River, sweeping graminoids and *Equisetum* spp. on muddy shore, 5.vii.2010, 2 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC); same locality but sweeps, graminoids, herbs, *Equisetum* spp., 5.vii.2010, 2 ♂♂ 5 ♀♀, sweeps, graminoids, herbs, *Equisetum* spp., 17.vii.2010, 6 ♂♂ 5 ♀♀, sweeps, graminoids, herbs, *Equisetum* spp., 12.ix.2010, 1 ♂, K. N. Barber leg. (CNCI); ~92 km NNE Thessalon, nr. Mountain Ash Lake, 47°02.98'N 83°10.88'W, sweeping *Carex aquatilis* on edge of wetland, 4.vii.2010, 6 ♂♂ 7 ♀♀, J. Roháček leg. (SMOC); ~29 km SW Timmins, 48°19.12'N 81°44.79'W, sweeps, mostly *Carex* spp./*Calamagrostis*, 18.vii.2009, 2 ♂♂; ~34 km N Timmins, 48°45.88'N 81°21.71'W, sweeps, *Carex* spp., 18.vii.2009, 5 ♂♂ 1 ♀; ~25 km W Upsala, 49°08.83'N 90°48.20'W, sweeps, wet area, mostly *Calamagrostis canadensis*, 30.vii.2008, 3 ♂♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); Waterloo Reg., Blair, RARE, Blair Trail, 43°22'38"N 80°20'34"W, 20.vi.2006, 3 ♂♂ 4 ♀♀, M. D. Bergeron leg. (DEBU 00271089, -090, -093-95, -106, -100); Waubamick [sic Waubamick], [-].vii.1915, 2 ♂♂, H. S. Parish leg. (USNM). **PRINCE EDWARD ISLAND:** Eglington Bay, sweep vegetation, 20.vii.1996, 1 ♂, N. de Ville leg. (LEMQ 0039852). **QUEBEC:** Beech Grove, 7.vi.1955, 1 ♀, J. F. McAlpine leg.; Beechgrove, 45°39'N 76°08'W, 29.vi.1962, 2 ♂♂ 1 ♀, 27.vi.1984, 1 ♀, 5.vii.1984, 1 ♀, 24.vi.1988, 3 ♂♂ 1 ♀, all J. R. Vockeroth leg.; Papineau Co., Buckingham Twp., 1.viii.1962, 1 ♀, L. K. Smith leg.; Cascapedia, 2.viii.1954, 1 ♀, J. E. H. Martin leg. (all CNCI); Chokingin-du-Lac Bog, 47°45'38.3"N 69°31'43.2"W, sweeping, natural site, T1, 30.vi.2006, 1 ♂, A. G. Taillefer leg. (LEMQ 0040320); Eardley, 23.vii.1968, 1 ♀, P. Ward leg. (CNCI); Gaspé, Forillon N. P., Ruisseau Castor, 48°54'N 64°21'W, sweep beaver dam, 6.viii.2000, 1 ♂, H. Varady-Szabo leg. (LEMQ 0039874); Gaspé, Forillon N. P., Cap des Rosiers, 48°50'N 64°12'W, sweep grass, 6.viii.2000, 1 ♂ 1 ♀, H. Varady-Szabo leg. (LEMQ 0039858, -63); Gaspésie, near Percé, 48°37'N 64°11'W, sweep, 1.viii.2001, 1 ♂, V. Dion & S. Boucher leg. (LEMQ 0039850); Gatineau Co., Masham Township, 27.vii.1995, 2 ♂♂, E. Ikeda leg. (LEMQ 0039853, -54); Godbout, dunes near ferry dock, swept, elector, (Universität Bielefeld, X988), 24.viii.1994, 2 ♂♂, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Harrington L., Gatineau Pk., 3.vii.1963, 2 ♂♂ 3 ♀♀, J. R. Vockeroth leg.; Hull, nr. Fairy Lake, 27.vii.1959, 1 ♂, L. K. Smith leg. (all CNCI); Île Bonaventure, 48°30'N 64°10'W, 3 km from Côte de Percé, sweep grass, 28.vii.2000, 1 ♀, A. Thibault leg. (LEMQ 0039859); Îles de la Madeleine, Île de la Grand[e] Entrée, Chemin du Bassin Ouest, 47°32.96'N 61°32.64'W, sweep field along road, 9.vii.2004, 2 ♂♂ 1 ♀, S. Boucher leg. (LEMQ 0040500, -502, -503); Îles Penchées, Les Escoumins, 48°22'N 69°22'W, sweep *Juncus*, *Lathyrus* on sand beach, 1.viii.2001, 1 ♂, M. Giroux leg. (LEMQ 0039851); Lac Phillippe, 45°37'N 76°W, 7.vii.1968, 2 ♂♂, J. R. Vockeroth leg. (CNCI); Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 1 ♀, M. Barták leg. (MBPC, genit. prep.); Laurentide Pk., 7.viii.1956, 2 ♂♂, A. H. Sturtevant leg.; Mantane [sic Matane], 12.viii.1967, 1 ♂ (genit. prep.); A. Stone leg. (all USNM); Newport, 14.viii.1983, 3 ♂♂ 1 ♀, B. M. Bissett leg.; Kam[ouraska] Co., Parke Reserve, sweeping *Kalmia angustifolia*, 11.vii.1957, 1 ♀, G. E. Shewell leg. (all CNCI); Percé, Bridgeville, 48°36'N 64°19'W, sweep vegetation in peat bog, 8.viii.2000, 1 ♀, H. Varady-Szabo leg. (LEMQ 0039857); Percé, Pointe-St.-Pierre, 48°37'N 64°10'W, sweep vegetation, 8.viii.2000, 2 ♂♂, H. Varady-Szabo leg. (LEMQ 0039849, -62); Québec [City], 30.vii.1952, 1 ♂, G. Steyskal leg.; "Québec CAN", 5.viii.1930,

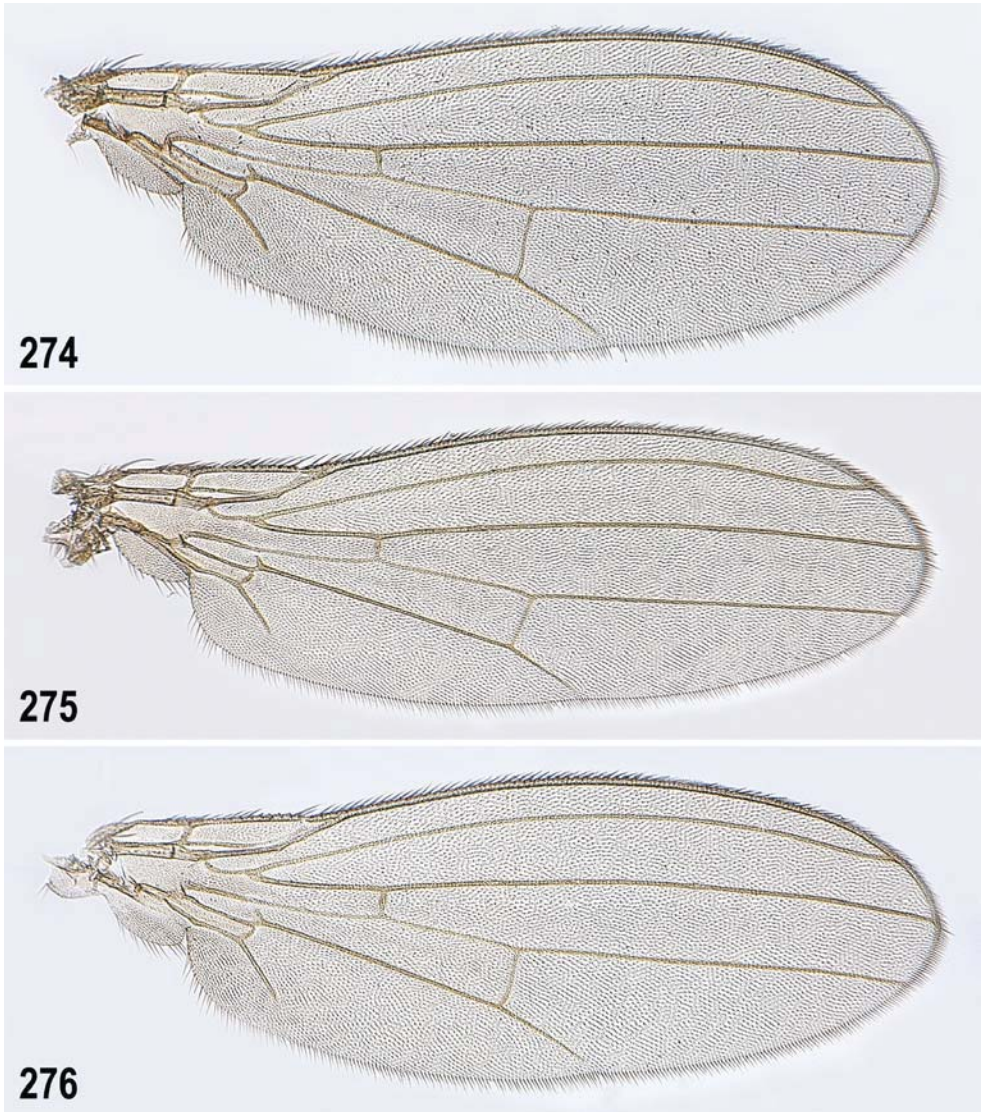
1 ♂, A. L. Melander leg. (both USNM). **SASKATCHEWAN:** Assiniboia, 27.vi.1955, 1 ♀, J. R. Vockeroth leg.; Beaver Creek Cons. Area, ~13 km S Saskatoon, 51°58.6'N 106°43.0'W, sweeps, mostly grasses under *Betula/Populus*, 12.vii.1999, 1 ♀, K. N. Barber leg.; Christopher Lake, 11.vii.1959, 1 ♂ 2 ♀♀, A. & J. Brooks leg. (all CNCI). **UNITED STATES OF AMERICA: COLORADO:** 3.5 mi S Florissant, Sanborn Ranch, swept from aspen grove nr. girls camp, 17.vii.2000, 1 ♀, B. A. Foote leg. (CMNH). **IDAHO:** Bonner Co., 6.5 mi W Granite Lake, *Cirsium arvense*, 30.vi.1976, 1 ♀, S. T. Rose leg. (WFBM); Priest Lake, 1.viii.1916, 1 ♀, A. L. Melander leg. (USNM). **MICHIGAN:** Houghton Co., 28.vi.1955, 1 ♀, R. R. Dreisbach leg., 20.vi.1960, 1 ♀, R. & K. Dreisbach leg.; Keweenaw Co., 26.vi.1955, 1 ♀, R. R. Dreisbach leg., 22.viii.1959, 1 ♀, R. & K. Dreisbach leg., 27.vii.1953, 1 ♂, G. Steyskal leg.; Keweenaw Co., Isle Royale, 5., 8.vii.1938, 1 ♀, 15., 17.vii.1938, 1 ♂, G. Steyskal leg.; Menominee Co., 29.viii.1952, 1 ♀, R. R. Dreisbach leg.; Newaygo Co., 27.vi.1953, 1 ♂, R. R. Dreisbach leg.; St. Ignace, 31.viii.1954, 1 ♂, R. L. Fischer leg. (all USNM). **MINNESOTA:** Eaglesnest, 13.vii.1957, 1 ♀, W. V. Balduf leg. (INHS 40,176); Aitkin Co., 14 mi W Willow River, 46.334°N 93.096°W, 31.vi.1994, 1 ♂, 27.viii.1994, 2 ♀♀, 26.vii.1995, 1 ♀, 22.vi.1997, 1 ♀, 5.vii.1997, 1 ♂, D. E. Hansen leg. (CNCI). **MONTANA:** 15 mi S Big Fork, 4.vii.1967, 2 ♂♂; 4 mi E Big Fork, 11.viii.1967, 1 ♀; 15.0 mi NE Polson, 2.vii.1966, 1 ♂; 20 mi S Swan Lake, 14.vii.1967, 1 ♀, all B. A. Foote leg.; 20 mi N Whitefish, 31.vi.1966, 2 ♂♂ 1 ♀, T. Krystowski leg. (all USNM). **NEW HAMPSHIRE:** Kinsman Notch, 7.vii.1931, 1 ♂, J. M. Aldrich leg. (USNM). **NEW YORK:** St. Lawrence Co., Colton, Raquette R., 24.vii.1963, 1 ♂, W. W. Wirth leg. (USNM); St. Lawrence Co., ~25 km SE S.Colton, 44°19.07'N 74°43.42'W, sweeps, mostly *Carex*, edge of wetland, 27.vii.2006, 1 ♀, K. N. Barber leg.; St. Lawrence Co., Huggards, 4.viii.1957, 2 ♀♀, J. R. Vockeroth leg. (all CNCI); Clinton Co., Saranac, 17.vii.1952, 1 ♀, W. A. MacDonald leg. (USNM). **OREGON:** Deschutes Co., Bend, 8.viii.1951, 1 ♂, M. R. Wheeler leg. (AMNH, genit. prep.). **WASHINGTON:** Olympic Nat. Park, Kalaloch, 8.vii.1968, 1 ♀, W. W. Wirth leg. (USNM); Pierce Co., Tacoma, 12.viii.1982, 1 ♀, T. L. Whitworth leg. (LACM). **WISCONSIN:** Washburn Co., T39N R12W B32, 25.vi.1953, 1 ♂ 2 ♀♀, 3.vii.1953, 1 ♀, 4.vii.1953, 1 ♂ 1 ♀, 24.vii.1953, 1 ♂, 30.viii.1953, 1 ♀, T39N R12W B33, 20.vi.1953, 1 ♂, T39N R12W B33, 29.vi.1953, 1 ♂, T39N R13W B30, 4.vii.1953, 1 ♂, R. H. Jones leg. (USNM).

Other material examined (not included in type series). **CANADA: ONTARIO:** Bruce Peninsula N. P., bank of Crane River nr. Hwy 6, 45°08.9'N 81°28.1'W, sweeps, grasses/sedges, 31.vii.1997, 1 ♂, S. A. Marshall leg. (DEBU, head & thorax crushed); Greenwater P. Pk., 49°10.91'N 81°16.28'W, sweeps, *Carex*, *Calamagrostis*, *Phalaris*, in creek floodplain, 21.vii.2009, 1 ♂, K. N. Barber leg. (DEBU 01502146, deformed T4 & T5); Ottawa, 13.vii.1963, 1 ♀, J. R. Vockeroth leg. (CNCI, headless); Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 4 ♂♂, J. Roháček leg. (SMOC, 3 ♂♂ used for molecular work, other ♂ headless). **QUEBEC:** Québec [City], 30.vii.1952, 1 ♂, G. Steyskal leg. (USNM, abdomen missing). **UNITED STATES OF AMERICA: MASSACHUSETTS:** Woods Hole, [-],vii.1918, 1 ♀, A. H. Sturtevant leg. (USNM, wings missing).

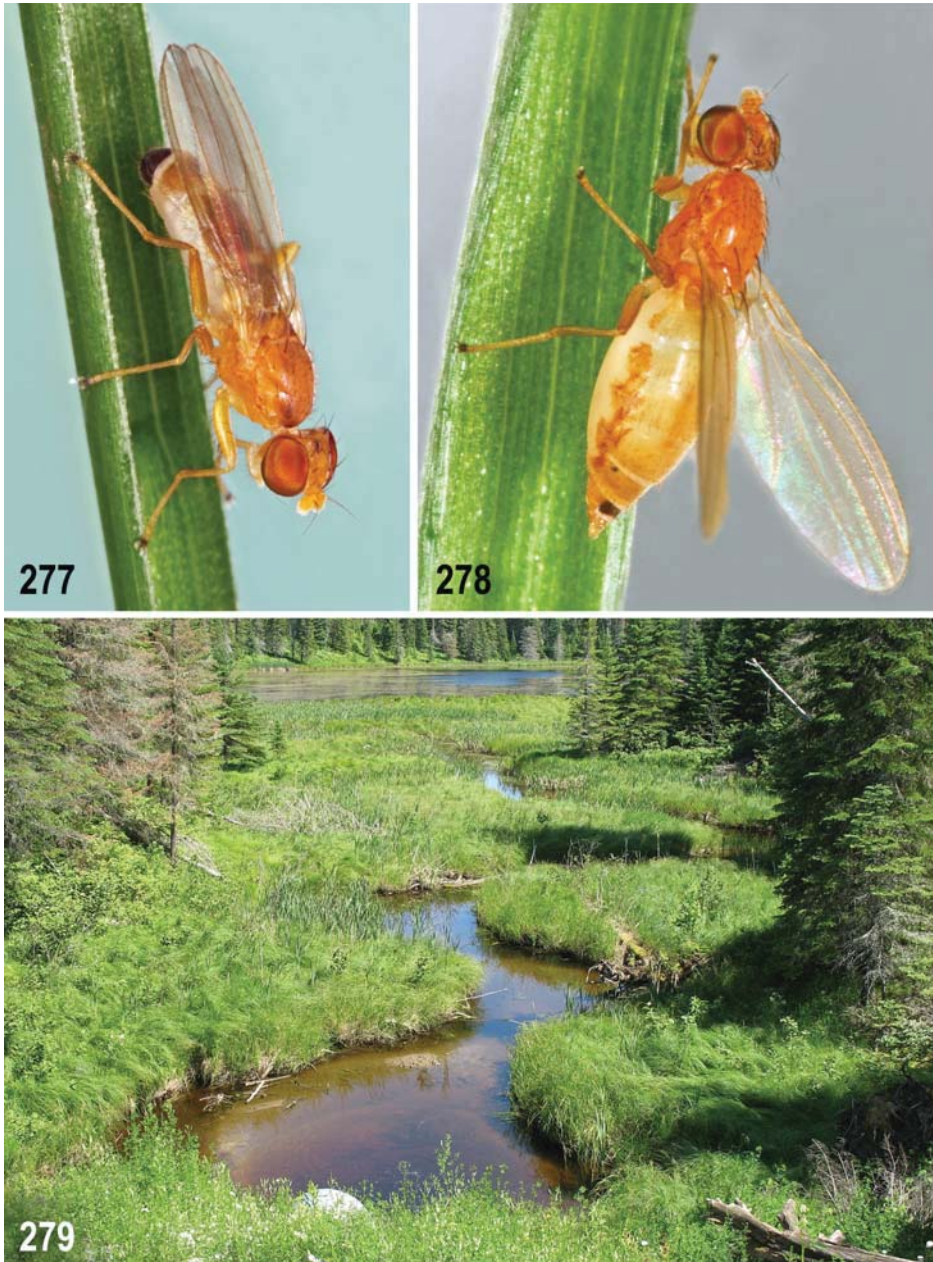
Description. Male. Total body length 2.46–3.02 mm; general colour closely resembling that of *A. dissors* Collin, 1944, thus largely yellow but with highly variable brown to greyish brown darkenings on mesonotum and preabdominal terga; pleural part of thorax completely yellow and epandrium always blackish brown (Figs 3, 277). Head about as long as high, anteriorly slightly angular in profile with face slightly receding, normally entirely yellow except for brownish ocellar triangle, very rarely (in darkest specimens) with lateral areas of occiput somewhat brownish darkened. Occiput slightly concave, laterally usually slightly darker yellow (rarely brownish, see above) than medially; in lighter yellow medial area with two divergent elongate spots of silvery white microtomentum meeting above foramen. Frons relatively narrow, yellow and largely dull, only ocellar triangle brown; frontal triangle with sparse but distinct silvery golden glittering microtomentum. Orbits lighter yellow, with sparse silvery whitish microtomentum being attenuated posteriorly (usually behind middle ors). Frontal triangle relatively narrow, reaching to anterior third of frons. Frontal lunule small but distinct, pale yellow. Face moderately narrow, medially slightly concave, yellow to whitish yellow and separated from parafacialia by distinct golden-orange marginal stripe also reaching onto ventral margin of gena; parafacialia and gena whitish yellow, with silvery

white microtomentum; postgena and mouthparts pale yellow. Cephalic chaetotaxy (all setae black): pvt relatively long and strongly crossed; oc (usually) or vti (rarely) longest of cephalic setae but oc can rarely be shortened and weak; vte usually shorter but sometimes almost as long as vti; posterior ors almost as long as vte; 3 ors, 2 posterior long (middle ors slightly shorter than posterior ors) and 1 shorter anterior ors setula (this sometimes unusually strong and longer than half length of middle ors); 2–3 pairs of medial microsetulae in anterior third of frons; 1 small setula behind vte; postocular setulae (only 7–8) short, situated mainly dorsally; postgena with several setulae and 2 short posteroventral setae; 1 long vi (as long as middle ors), subvibrissa reduced, slightly longer than peristomals; only 5–6 relatively long but fine peristomal setulae. Palpus yellow, with 1 distinct dark ventral preapical seta and a series of 9–10 setulae subapically and ventrally. Eye broadly ovoid, wider anteroventrally, with longest diameter oblique and about 1.3 times as long as shortest. Shortest genal height 0.14–0.15 times as long as shortest eye diameter. Antenna strongly geniculate, entirely yellow; 1st flagellomere with short white pilosity. Arista with basal segments ochreous and distal setiform part blackish brown, about 1.9–2.0 times as long as antenna, short-ciliate (cilia shorter than those on 1st flagellomere).

Thorax slightly narrower than head. Scutum with colouration ranging from largely yellow with faint ochreous brown darkenings anteriorly between dc and prs-sa lines and/or medially (between dc lines) in front of scutellum, through to distinctly brown except for yellow medial area in anterior half and humeral-notopleural area to almost completely dark greyish brown with only humeral-notopleural area (this always) yellow. Scutellum always more or less dark, ochreous brown to dark brown. Dorsum of thorax grey microtomentose and relatively dull. Pleural part of thorax more shining than scutum, entirely yellow (no darker dorsal stripe in contrast to *A. dissors*). Postscutellum and postnotum pale to dark brown, the latter sometimes yellow in dorsal half. Thoracic chaetotaxy: 1 hu (longer than posterior npl) plus 1–3 hu setulae; 2 npl (anterior distinctly longer than hu, posterior shorter); 1 relatively weak prs (about as long as or shorter than hu); sa and pa usually slightly longer than prs; 2 long postsutural dc (the smaller anterior seta about as long as anterior npl, posterior longest of thoracic setae) and 5–6 dc microsetae in front of them (the hindmost distinctly enlarged); 4 (rarely only 3) rows of ac microsetae on suture but only 2 rows between dc with hindmost ac pair usually situated somewhat beyond level of posterior dc; 2 sc, laterobasal weak (as long as or shorter than sa), apical sc almost as long as posterior dc; 1 small, pale and hair-like ppl; 2 long stpl (anterior usually slightly shorter) and 5–6 upcurved setulae in dorsal half of sternopleuron (sometimes with 1 setula in front of anterior stpl in addition); ventral part of sternopleuron with a cluster of 6–7 longer setae. Scutellum rounded triangular, very slightly convex dorsally. Legs pale yellow, only distal half to three-fourths of last tarsal segment of all tarsi dark brown. f_1 with ctenidial spine not very strong, usually only slightly longer than maximum width of t_1 and with a number of long but fine setae in posterodorsal and posteroventral rows. f_2 simply setose; f_3 with a row of posteroventral setae, 5–7 of them in distal half shortened and distinctly thickened; t_2 with short ventroapical seta; other tibiae and tarsi simply setulose, only fore and hind basitarsus with 2–3 slightly enlarged setulae ventrobasally; mid basitarsus with 1 somewhat longer and thicker ventrobasal setula. Wing (Fig. 275) elongate and relatively narrow, with pale yellowish ochreous veins and membrane. C with distinct



Figs 274–276. Wings of the Nearctic species of the *Anthomyza pallida* group. 274 – *A. pengellyi* sp. nov., male, wing length 2.65 mm (Canada: Ontario); 275 – *A. mc Alpinei* sp. nov., male, wing length 2.7 mm (Canada: Ontario); 276 – *A. pullinotum* sp. nov., male, wing length 2.3 mm (Canada: Yukon Territory). Photo by K. N. Barber.

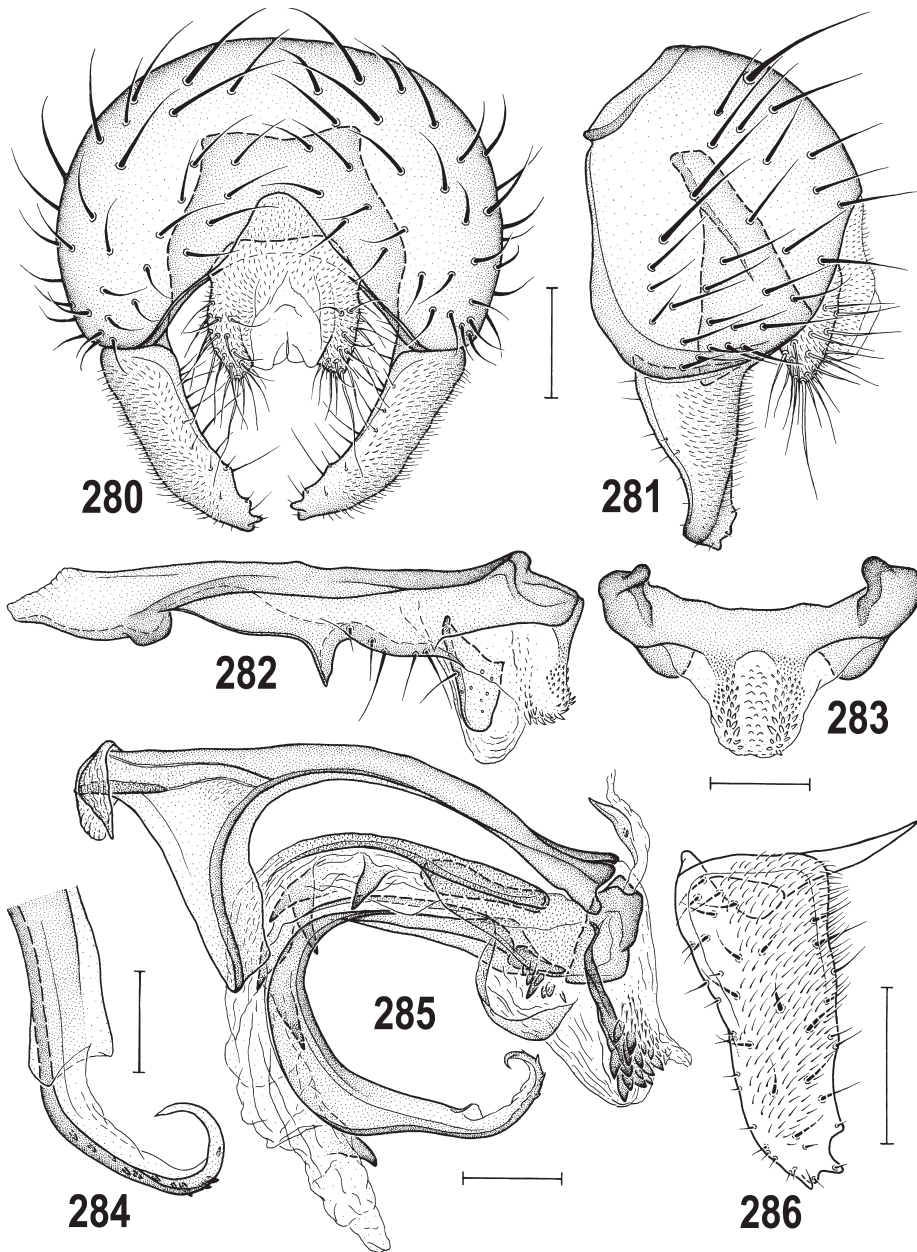


Figs 277–279. Living *Anthomyza mcalpinei* sp. nov. and its habitat. 277 – *A. mcalpinei* sp. nov., male, laterodorsally, body length ca. 2.8 mm; 278 – female, laterodorsally, body length ca. 3.5 mm (both from Canada: Ontario: Sault Ste. Marie – Finn Hill); 279 – wetland at a lake inflow with *Carex*, *Calamagrostis*, *Phalaris* and other graminoids in Greenwater Prov. Park (Canada: Ontario), habitat of *A. mcalpinei*. Photo by J. Roháček (Figs 277, 278) and K. N. Barber (Fig. 279).

sparse spinulae among hair-like setosity between apices of R_1 and R_{2+3} . R_{2+3} long, bent parallel to C with apex slightly upcurved to it; R_{4+5} very slightly bent to straight, parallel with almost straight M. Discal cell (dm) long and narrow; r-m situated very slightly to distinctly in front of the middle of cell dm. Apical portion of CuA_1 slightly to distinctly longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula distinct but narrow. Wing measurements: length 2.30–3.10 mm, width 0.71–0.95 mm, $Cs_3 : Cs_4 = 1.07–1.24$, $rm/dm-cu : dm-cu = 2.24–3.00$. Haltere yellowish white, with stem more yellow.

Abdomen dorsally with variable extent of brown colouring on yellow ground, ventrally always pale yellow. Colour pattern of preabdominal terga (T1–T5) ranging from largely yellow to predominantly brown; lightest specimens with only T1–T3 anteromedially brownish (or T1 completely yellow), medium dark specimens with anteromedial brown spots enlarged (often with T2–T3 largely to completely brown) and also present on T4–T5, darkest specimens with T1–T3 completely and T4–T5 largely brown with only sides and posterior margins yellow. T1–T5 sparsely greyish microtomentose and subshining, relatively shortly and sparsely setose. T1 and T2 distinctly separate, only laterally fused. T1–T2 slightly shorter and more transverse than T3–T5, the latter subequal in size, all reaching onto lateroventral sides of abdomen. Preabdominal sterna pale yellow, relatively narrow and becoming wider posteriorly; S1 short and transverse, S2 about as long as wide, S3 slightly, S4 more and S5 (widest sternum) most transverse. S2–S5 densely finely setose, only S1 bare and with darker posterior marginal stripe. T6 submembranous, short, transverse, bare, almost unpigmented. S6 and S7 yellow, both with brown anterior marginal ledge; S6 with 2–3 (usually 2), S7 with 1–3 (usually 2) setae; S8 longer than epandrium, but paler brown, with only anterolateral marginal area more or less yellow, setose in posterior half.

Genitalia. Epandrium (Figs 280, 281) blackish brown (only in lightest specimens with short posteroventral area light brown to yellow), contrasting with yellow S6–S7 and lighter brown S8, moderately long and relatively broad (slightly wider than in *A. dissors*), rather densely setose, with 2 or more pairs of longer and thicker setae dorsolaterally; anal fissure relatively small (slightly shorter than in *A. dissors*), rounded triangular. Cercus short and pale, with fine setae, apical longest. Cerci more distant from each other than those of *A. dissors*. Medandrium (Fig. 280) moderate, slightly narrower than in *A. dissors*, dorsally somewhat narrowed, with dorsolateral corners simple (not acute), ventrally with shallow broad emargination, bare. Gonostylus (Figs 280, 281, 286) elongate and relatively slender, shorter than epandrial height, slightly bent medially and anteriorly, distally gradually tapering but apically less pointed than in *A. dissors* and posteroapically provided with 4 small teeth (2 apical and 2 subapical – Fig. 286); outer side mostly micropubescent, inner side with longer setae and only slightly concave (both as in *A. dissors*). Hypandrium (Fig. 282) closely resembling that of *A. dissors*, relatively slender, with anterior internal lobes small and low. Transandrium (Fig. 283) straight and relatively thick, without distinct caudal process except for a pair of short medial sclerotizations transilient to spinose parts of basal membrane. Pregonite (Fig. 282) generally formed as in *A. pallida* group and very similar to that of *A. dissors*, fused to hypandrium, with slender and acute anterior tooth, posteriorly with fine projection transilient to basal membrane, ventrally with 4–5 (one longer) setae (only 3 setae in *A. dissors*). Postgonite (Fig. 282) markedly different from that of *A. dissors*, shorter and widest proximally (in lateral

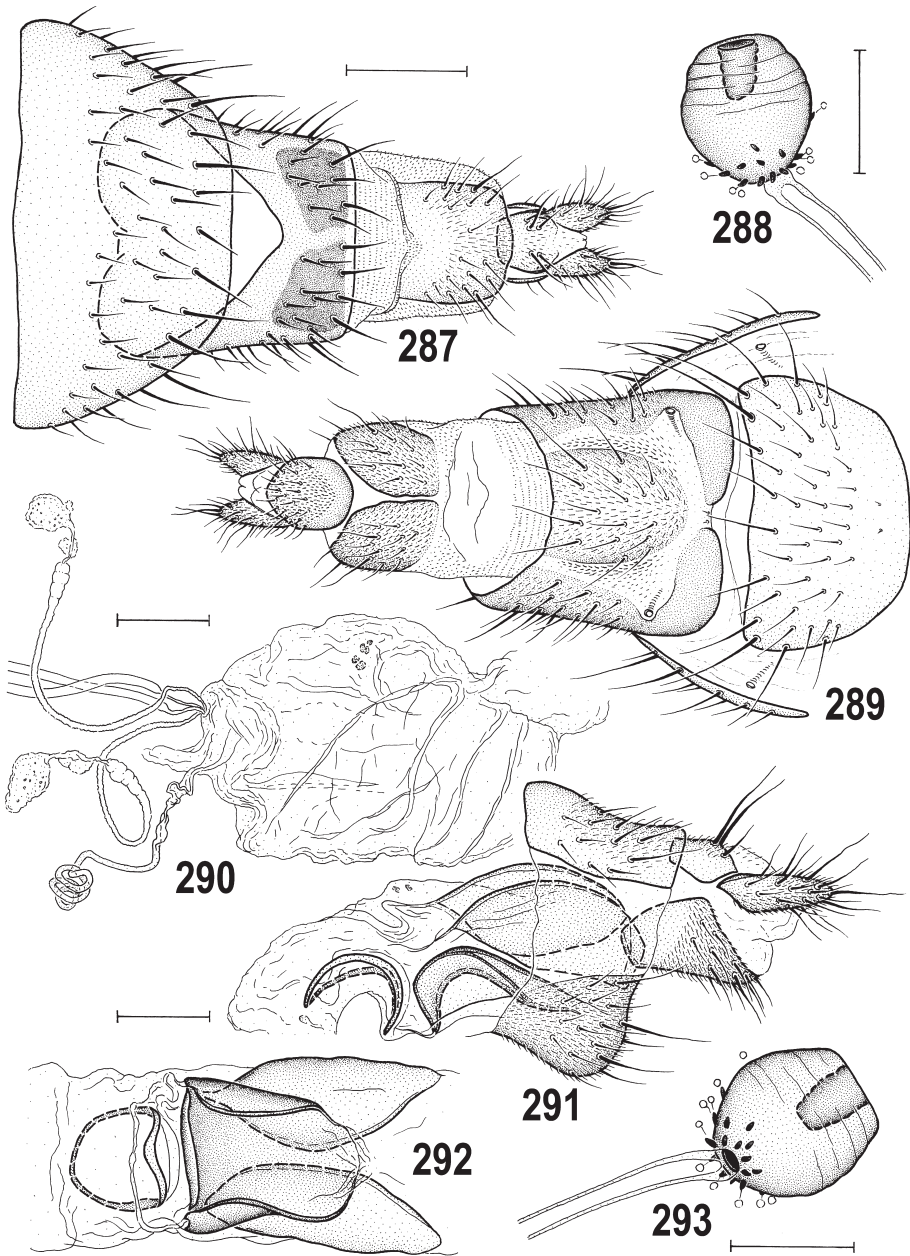


Figs 280–286. *Anthomyza mcalpinei* sp. nov., paratype male (Canada: Ontario). 280 – external genitalia, caudally; 281 – the same, laterally; 282 – hypandrial complex, laterally; 283 – transandrium, caudally; 284 – apex of filum, subventrally (widest extension); 285 – aedeagal complex, laterally; 286 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Fig. 284) and 0.1 mm (others).

view) and with broadly rounded apex, pale-pigmented, with 1 setula near middle of anterior margin and several sensillae on outer side. Dorsal internal sclerite (normally situated at base of postgonite) narrow and curved (visible in Fig. 285 attached to aedeagal part of folding apparatus). Basal membrane (Figs 282, 283) with small spinulae covering two posterolateral elongate areas reaching also onto ventral side (as in *A. dissors*). Aedeagal part of folding apparatus differing from that of *A. dissors* in having several dark blunt spines dorsolaterally. Connecting sclerite strong, dark, proximally slender and attached to phallopore, distally widened and provided with a cluster of dark spines (Fig. 285) but, in contrast to *A. dissors*, with only fine spinulae in membrane posterior to these spines (without additional cluster of dark spines). Phallopodeme as in other members of the *A. pallida* group, relatively slender, with basal part deeply forked, and fulcrum situated very close to laterally projecting apex (Fig. 285). Aedeagus (Fig. 285) with very short phallopore and large long distiphallus that is bifid from near its base. Saccus long as in *A. dissors* but usually less widened distally, membranous, with elongate slender basal sclerites and armed with fewer (usually 6) robust dark-pigmented spines. Filum also resembling that of *A. dissors*, long and arched but somewhat wider, with smaller membranous preapical lobes, and apex curved, slender, pointed and with a number of small spines (Fig. 284). Ejacapodeme small, pale, with pointed (not digitiform) terminal end (Fig. 285).

Female. Similar to male unless mentioned otherwise. Total body length 2.65–3.90 mm. Head with ocellar triangle pale brown and/or with brownish colour reduced to small spots at ocelli. Occiput always entirely yellow laterally. Orbit sometimes with 1 additional microsetula in front of short anterior ors setula. Outer side of 1st flagellomere always with large darker orange ochreous to pale brown anterodorsal spot below insertion of arista, also inner side sometimes faintly darkened. Thorax (Fig. 278) usually almost completely yellow, at most with scutum and scutellum darker (orange) than humeral-notopleural area, only postscutellum and/or postnotum ochreous to brownish darkened (postscutellum sometimes brown). f_3 without row of shortened and thickened posteroventral setae. Discal cell (dm) broader on average. Cross-vein r-m situated often in the middle of cell dm. Wing measurements: length 2.71–3.57 mm, width 0.91–1.19 mm, $Cs_3 : Cs_4 = 1.03\text{--}1.20$, $rm/dm\text{-}cu : dm\text{-}cu = 2.07\text{--}2.64$. Abdomen with T1–T6 (Fig. 278) usually entirely yellow to pale yellow (T5 and particularly T6 often somewhat darker yellow to ochreous), rarely with small medial brownish spots on T1–T6 (or on some of them), exceptionally with more (2–3) small spots on T6. T2–T5 shorter and more transverse than in male, T1–T2 narrower, T3–T5 wider and subequal in size, all wider than T6. Preabdominal sterna pale yellow, slightly narrower than in male, S2 as long as wide, S3 and S4 slightly (both suboblong) and S5 (trapezoidal) distinctly transverse, S5 largest and widest but narrower than postabdominal S6.

Postabdomen (Figs 287, 289, 380) relatively long, narrow from 7th segment, telescopic, having sclerites yellow to pale yellow with brown markings. T6 simple, large (but narrower than T5), tapered posteriorly and with broadly rounded posterior corners, usually dark yellow, rarely with 1 or 3 brownish spots, with relatively short and dense setae in posterior two-thirds, marginal setae longest. S6 transversely subtrapezoidal with anterior corners rounded or anterior margin almost semicircular, broader than S5, pale yellow and finely densely setose. 7th segment with separate T7 and S7 (Figs 289, 380), the former long, subcylindrical, slightly



Figs 287–293. *Anthomyza mcalpinei* sp. nov., paratype female (Canada: Ontario). 287 – postabdomen, dorsally; 288 – spermataeca; 289 – postabdomen, ventrally; 290 – distal part of female genital chamber, laterally; 291 – female internal sclerites and apex of postabdomen, laterally; 292 – internal sclerites, ventrally; 293 – spermataeca. Scales = 0.2 mm (Figs 287, 289), 0.05 mm (Figs 288, 293) and 0.1 mm (others).

narrower apically, dorsomedially strongly shortened due to deep incision (Fig. 287), ventrally longer, with anterior margin narrowly divided and separated from anteromedial portion of S7, without anteroventral pouch-like lobes (Fig. 289). T7 pale brown to completely dark brown dorsally, and with either one or two dark brown spots (Fig. 287); brown (pale or dark) colour reaching onto sides of T7 and sometimes also anteroventrally where it can be markedly darkened; ventral part of 7th segment with large central area yellow, within which S7 is somewhat darker and still discernible (Fig. 289), finely setose and surrounded by distinctive micropubescence on membrane, 7th spiracle arising in anterolateral corners of membrane (Figs 289, 380). Dorsal and lateral parts of T7 with rather short setae mainly at posterior margin (Figs 287, 380). 8th segment finely micropubescent laterally. T8 (Fig. 287) about as long as wide, bent to form parallel sides, anteromedially slightly to distinctly emarginate; its colour ranging from pale ochreous yellow to brown, with sparse but long micropubescence and fine exclinate setae laterodorsally; S8 (Fig. 289) about as long as T8, medially divided into 2 convex, finely hirsute and micropubescent sclerites. Genital chamber (uterus) posteriorly with distinctive dark-pigmented internal sclerotization (Figs 291, 292) formed by 1 compact crooked ventral sclerite (similar to that of *A. dissors*), a pair of relatively long, flat and paler dorsal sclerites (these are absent in *A. dissors*) and 1 subcircular, curved (in profile) annular sclerite situated in front of the former. Membranous part of genital chamber large but without additional sclerotizations (Fig. 290). Ventral receptacle (Fig. 290) very slender (also basally), tube-like, hyaline, terminally with multiply twisted vermicular apex. Accessory gland small, vesicular, hyaline, on distally slightly dilated and sparsely ringed duct. Spermathecae (1+1) broadly suboval to ovoid (Figs 288, 293), each with distinct, narrow but deep invagination and a number of short blunt spines in basal fourth surrounding duct insertion; duct very long and ending simply (without distinct cervix) in centre of spermathecal body. T10 small (Fig. 287), suboval to rounded trapezoidal (distinctly wider than in *A. dissors*), ochreous to yellow, with 2–3 pairs of setae (1 long) and reduced micropubescence. S10 pale brown to yellow, somewhat larger and wider than T10, suboval in ventral view (Fig. 289), finely setulose and micropubescent. Cercus relatively short (Figs 291, 380), not slender, with numerous fine and relatively short setae, apical and dorsopreapical longest.

Discussion. *Anthomyza mc Alpinei* sp. nov. belongs to the *A. pallida* group, as defined above. Its closest relatives are the Palaearctic *A. dissors* and the W. Nearctic *A. pullinotum* sp. nov.; their close relationship can be justified not only from external appearance (thorax often with dorsal darkening, pleura always yellow) but particularly from highly similar structures in the male and female genitalia, including such fine details as: finely spinulose basal membrane with acute spinulae laterally and flat short ones medially; subterminal membranous lobe-like dilation of the filum of distiphallus; connecting sclerite distally with a cluster of dark spines; female T7+S7 with original T7 expanded as narrow lobes that almost meet ventromedially (sometimes even meeting in *A. dissors*); and female genital chamber with compact unpaired ventral sclerite (interpreted to be a fusion product of a pair of ventral sclerites as known in other relatives of the *A. pallida* group). At least some of the above characters can be considered synapomorphic and diagnose the *A. dissors* subgroup. Interestingly, each of the three species belonging to this subgroup has a differently armed aedeagal part of the folding apparatus. *Anthomyza pullinotum* exhibits the plesiomorphic state of a group of fine dark tubercles,

which is also seen in the rest of the *A. pallida* group outside of this subgroup. Derived states are seen in the other two species of the subgroup, with the tubercles in *A. dissors* reduced and hyaline, and those of *A. mcalpinei* reduced to a few enlarged wart-like spines. *Anthomyza mcalpinei* undoubtedly is the nearest ally of the Palaearctic species *A. dissors*, demonstrated not only by their external resemblance (including the colour variability of the body, mainly of the mesonotum and abdomen), but chiefly by almost identical structures in the male and female genitalia, especially a similarly formed ventral sclerite and a reduced number of dorsal sclerites in the female genital chamber.

Anthomyza mcalpinei differs from both above relatives in having the occiput laterally normally only darker yellow (without brown areas behind eyes); the pleural part of the thorax entirely yellow and without a dark dorsal stripe (but pleura in *A. pullinotum* also is usually unicolourous yellow); male S6 and S7 yellow, contrasting with blackish brown epandrium; gonostylus apically not pointed but with distinct posteroapical teeth (Fig. 286); aedeagal part of folding apparatus with a few dark blunt spines; saccus with fewer (usually 6) robust dark-pigmented spines; female thorax never brown dorsally; female 7th segment with a distinct S7 that is not fused with T7 (Fig. 289); and female genital chamber with only a single pair of flat sclerites above the single compact and crooked ventral one.

Etymology. This common species is named in honour of J. F. McAlpine, a preeminent Canadian dipterist whose body of work on acalyprate Diptera systematics serves as an inspiration to the junior author, whose graduate committee he served on.

Biology. There are fewer western records for *A. mcalpinei* compared to *A. pengellyi*, and include collections from pure stands of *Calamagrostis canadensis* (Alberta: w. border of Elk Island N. P.) and *Carex utriculata* (British Columbia: Fernie). In the east, the primary plants from which this species has been taken are the grasses *Phalaris arundinacea* and *C. canadensis* and sedges such as *Carex aquatilis*, *C. utriculata* and *Scirpus microcarpus* J. & C. Presl. There is a single record from “mostly” *Carex stricta* Lam. (Ontario: Manitoulin Is. – Misery Bay Nature Reserve) and repeated collections from *Carex stipata* Muhl. ex Willd. var. *stipata* (Ontario: Sault Ste. Marie – Finn Hill). Beaver dams and meadows are mentioned on labels, with some including additional reference to sedges (Ontario: S of Sioux Narrows, ~5 km SE Searchmont, Finland – S of Caliper Lake). A “pasture sweep” yielded *A. mcalpinei* (Newfoundland: Portugal Cove) while another less specific collection indicates “grasses at edge of agricultural field” (Alberta: Dunvegan), a site shared with *A. pengellyi* and *A. vockerothi*. Various other plants such as *Equisetum*, *Typha*, *Solidago*, *Rubus* and ferns can be included but it is the graminoids in these plant mixtures or growing nearby that are the most likely hosts. A mixed riparian community (Ontario: Greenwater P. Pk., Fig. 279) was dominated by *Carex* spp., *C. canadensis*, and *P. arundinacea* (from higher to lower prevalence) while a drier adjacent upstream area, dominated by *P. arundinacea*, also yielded specimens. There is a singular site in Sault Ste. Marie, Ontario (S of Algoma University) where several hundred specimens were collected over a number of years. This is a small, narrow site that supports a mixture of *C. canadensis* and *C. aquatilis*, each transitioning to dominance at either end of a forest edge with a dense patch of *P. arundinacea* in the middle. This narrow stretch is bordered on the opposite side by a raised municipal snow dump and a wetter area dominated by *Typha latifolia* L. While most of the collection effort was expended in sampling from the *C.*

aquatilis (primarily for syntopic *A. gibbiger* and *A. orthogibbus*), *A. mcalpinei* was also very abundant on *C. canadensis* at this site, but also present at lower numbers on *P. arundinacea*.

More than 150 eggs of *A. mcalpinei* were obtained from a collection of nine females with three males (Ontario: Sault Ste. Marie – S of Algoma University) and used in a rearing attempt over the period of 8 August to 20 September 2002. The three dominant species of plants from this site (*C. aquatilis*, *C. canadensis*, and *P. arundinacea*) were initially offered to the adults and the subsequent larvae, but on 14 September all (~34) surviving larvae were transferred to *P. arundinacea*. The single puparium (21 September) which yielded an adult female (4 October) originated from eggs laid on *P. arundinacea*; the pupariation period at 20°C was 13 days. The remaining five larvae were transferred to 10°C on 3 November but were dead by 29 November. Despite the lack of success reported here, one or more of these graminoids are likely to serve as a natural host for *A. mcalpinei*. Adults of *A. mcalpinei* have been collected from 3 June (Minnesota: Willow River) to 16 September (Ontario: Sault Ste. Marie).

Distribution. This commonly collected species has a transcontinental distribution in Canada and the northern United States of America that is similar to, but latitudinally narrower than that of *A. pengellyi*. It has not yet been recorded in New Mexico in the southwest or in the northern jurisdictions of Alaska, Yukon, Northwest Territories and Labrador, although it has been recorded from Newfoundland and Prince Edward Island in the northeast. The list of records includes Canada: Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan; United States of America: Colorado, Idaho, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Washington, Wisconsin (see Table 2, Fig. 599).

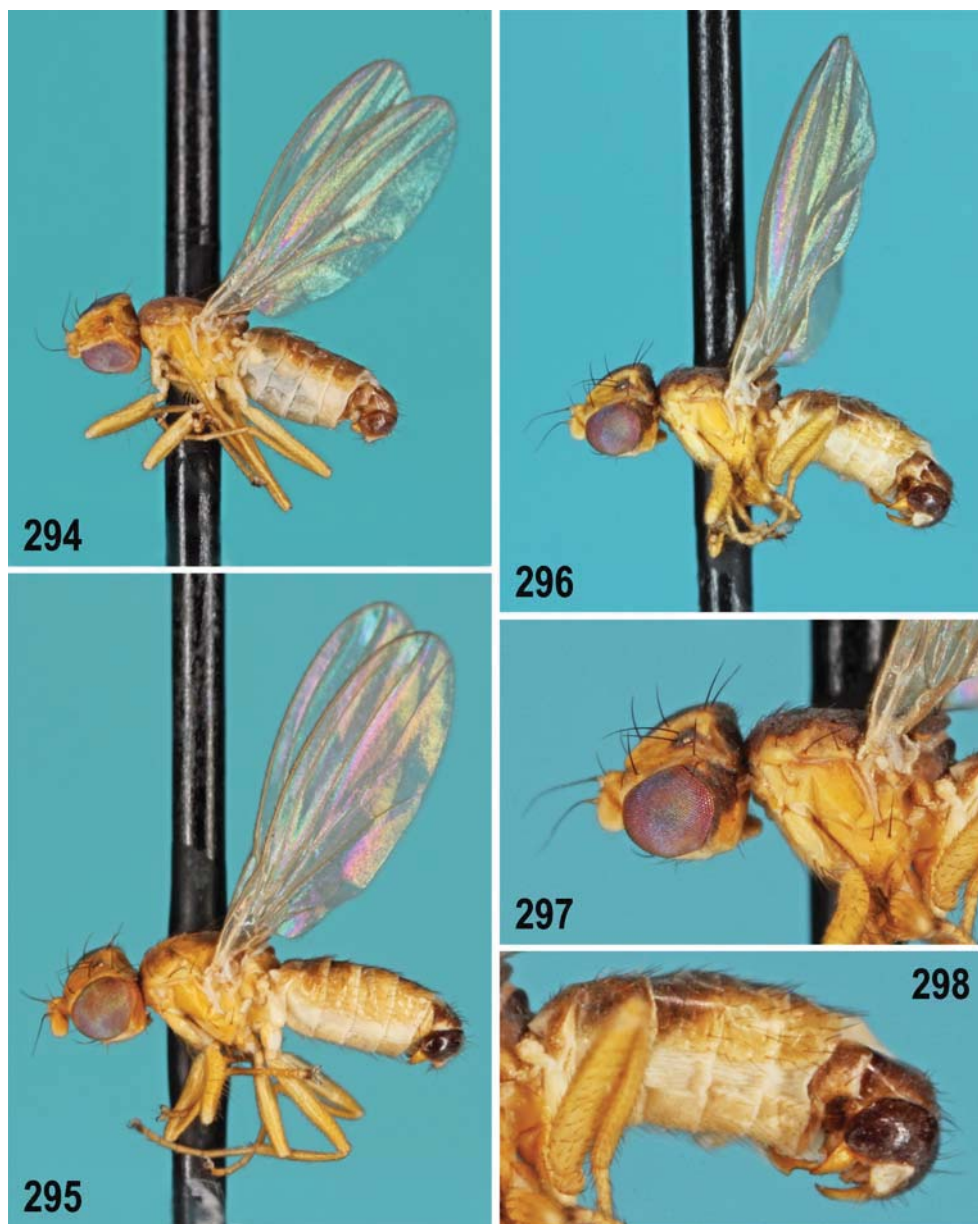
Anthomyza pullinotum sp. nov.

(Figs 276, 296–312, 378)

Type material. HOLOTYPE: ♂, “CAN: AB: ~22.7kmS Belle-vue, Hwy 774, 17.vii.2011, KNBarber, sweeps, road-side ditch, mostly *Carex* spp., *Equisetum*, grasses 49°22.62'N 114°22.58'W” and “Holotypus ♂ *Anthomyza pullinotum* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in good condition, with exposed genitalia (sacculus and filum visible on right side) and readily observable gonostyli (see Figs 296, 298) (DEBU, intact). PARATYPES: CANADA: ALBERTA: Banff N. P., 11 mi W Banff, 4500', 11.vii.1955, 1 ♂, G. E. Shewell leg. (CNCI); Banff Nat. Pk., 15 mi E Mt. Eisenhower Jct., 27.vii.1967, 1 ♂, S. P. Whitney leg. (USNM, genit. prep.); ~22.7 km S Bellevue, Hwy 774, 49°22.62'N 114°22.58'W, sweeps, roadside ditch, mostly *Carex* spp., *Equisetum*, grasses, 17.vii.2011, 10 ♂♂ 8 ♀♀, K. N. Barber leg. (CNCI 6 ♂♂ 4 ♀♀, SMOC 2 ♂♂ 2 ♀♀, USNM 2 ♂♂ 2 ♀♀); Calgary, Fish Creek Prov. Pk., 50°55.61'N 114°07.43'W, sweeps, mostly *Carex utriculata* & *Equisetum fluviatile*, 12.vii.2011, 1 ♀, J. E. Swann & K. N. Barber leg.; same locality but 50°55.600'N 114°07.426'W, sweep, oxbow with sedges, 9.vii.2011, 1 ♂; same locality but 50°55.739'N 114°03.312'W, sweep near creek, 22.vii.2010, 1 ♂; same locality but pond near Shannon Terrace, 50°55.600'N 114°07.427'W, swept from sedges and *Equisetum*, 12.viii.2011, 1 ♂; same locality but Shannon Terrace, sweep around pond by 2nd bridge, 9.vii.2010, 7 ♂♂ 1 ♀, all J. E. Swann leg. (all BDUC); Cypress Hills, Elkwater, trails, 49°39'24"N 110°17'32"W, 1250 m, 5.vii.2001, 2 ♀♀ (DEBU 00354151–52); Cypress Hills Prov. Pk., Elkwater, 5.vii.2001, 1 ♀ (DEBU 00362459), all S. A. Marshall leg.; w. border Elk Island N. P., Range Rd. 210, 0.5 km N Hwy #16, 53°34.52'N 112°57.09'W, sweeps, mixed sedges, 21.vii.2008, 2 ♀♀, sweeps, *Calamagrostis canadensis*, 21.vii.2008, 1 ♀, K. N. Barber leg.; Elkwater Lk., 19.vii.1956, 1 ♂, O. Peck leg. (all CNCI); ~22.5 km NW Highwood House, ~4 km W Mist Ck., 50°31.38'N 114°53.17'W, sweeps, *Carex* sp. (large), 25.vii.2008, 1 ♂, K. N. Barber leg. (DEBU); ~3.4 km SSW Hinton, Hwy #40, 53°21.27'N 117°37.32'W, sweeps, *Equisetum fluviatile*, 22.vii.2008, 1 ♂; ~11 km WSW Hinton, nr. jct. Twp. Rd. 510A & Range Rd. 262, 53°22.72'N 117°44.13'W, sweeps, mostly *Bromus inermis*, 22.vii.2008, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); 2 mi S Jasper,

30.vii.1967, 1 ♂, S. P. Whitney leg. (USNM, genit. prep.); Kananaskis Country, Sibbald Area, Hwy 68, 3.1 km W Powderface Trail, 51°03.10'N 114°54.72'W, sweeps, mostly *Carex utriculata*, 15.vii.2011, 1 ♂ 1 ♀; same locality but Hwy 68 & Powderface Trail, 51°02.28'N 114°52.40'W, sweeps, mostly *Carex utriculata*?, 15.vii.2011, 1 ♂, K. N. Barber (all CNCI); ~31.5 km S Kananaskis Village, 0.5 km W Little Highwood Pass, 50°38.55'N 115°02.94'W, sweeps, *Bromus inermis*, 25.vii.2008, 1 ♀, K. N. Barber leg. (genit. prep.); 50 mi N Nordegg, F[orestry] Trunk Rd., along beaver pond, 20.vii.1987, 1 ♂ 2 ♀♀ (incl. pair in copula), S. A. Marshall leg. (all DEBU); ~14.4 km E Obed, Range Rd. 213 @ RR crossing, 53°32.19'N 117°01.02'W, sweeps, mostly *Carex utriculata*, 25.vii.2011, 4 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Spray Valley P. Pk., 50°48.95'N 115°09.84'W, sweeps, fen, *Carex utriculata*? and *Poa* sp., 13.vii.2011, 1 ♂, K. N. Barber leg. (DEBU 01502856). **BRITISH COLUMBIA:** Fernie, Annex Pk., 49°30.72'N 115°04.13'W, sweeps, wet ditch, *Carex utriculata*, 17.vii.2011, 1 ♂, K. N. Barber leg. (CNCI); Kaslo Cr., 18.vi.[-], 1 ♂, R. P. Currie leg. (USNM, genit. prep.); ~8.0 km SE Valemount, edge of Kinbasket Lake, 52°46.65'N 119°10.38'W, sweeps, mostly *Carex utriculata*, 23.vii.2011, 1 ♀, K. N. Barber leg.; Lac Le Jeune, 27.vi.1973, 1 ♂, H. J. Teskey leg.; Liard Hot Spring, mi. 496, 1500', Alaska Hwy, 9–10.vii.1959, 1 ♀, E. E. MacDougall leg. (all CNCI); Mt. Robson Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 1 ♂, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Revelstoke, 2.vii.1973, 1 ♀, H. J. Teskey leg.; Sawmill Lk., Telegraph Ck., 1100', 2.vii.1960, 2 ♂♂ 2 ♀♀, W. W. Moss leg., *Carex*, grass, *Equisetum* beside lake, 2.vii.1960, 1 ♂, 28.viii.1960, 1 ♂, R. Pilfrey leg.; ~27 km N Sparwood, Lower Elk Valley Rd., 49°50.24'N 114°53.29'W, sweeps, edge of creek, *Carex utriculata*?, 20.vii.2011, 1 ♀, K. N. Barber leg.; Summit Lake, mi. 392 Alaska Hwy, 4500', 8.vii.1959, 1 ♀, E. E. MacDougall leg.; Spring Creek, Terrace, 220', 11.vi.1960, 1 ♂, R. Pilfrey leg. (all CNCI). **LABRADOR:** Goose Bay, 9.vii.1948, 1 ♂, 13.vii.1948, 1 ♀, W. E. Beckel leg., 11.vii.1950, 1 ♀, J. J. Tibbles leg. (CNCI). **ONTARIO:** Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, Malaise trap, 19–22.vi.2010, 1 ♀, NBP Field Party leg. (LEMQ). **YUKON:** Klondike Hwy, 8.8 km S Twin Lakes, Conglomerate Mt., 61°37.9'N 135°53.1'W, sweep along Klusha Creek, 15.vii.1998, 1 ♂; same locality but Conglomerate Mt., Klusha Creek, 61°38'N 135°53'W, sweep grass/sedges along creek, 8.vii.1997, 1 ♂ both (LEMQ); Alaska Highway at Yukon River crossing, 60°34'N 134°40'W, sweep grass/sedges along river margin, 2.vii.1997, 13 ♂♂ 6 ♀♀ (LEMQ 0039623 [only 1 ♂ with accession #], 1 ♂ wing illustration, 2 ♂♂ 1 ♀ genit. prep.); Yukon River at Alaska Hwy crossing, sweep grass/sedges along riverbank, 2.vii.1997, 1 ♀ (LEMQ 0039961), all T. A. Wheeler leg. **UNITED STATES OF AMERICA:** **ALASKA:** Knik Lake, NW of Wasilla, sweeping vegetation edge of lake, 18.vii.1978, 7 ♂♂ 1 ♀, P. H. Arnaud Jr. leg. (CASC, 1 ♂ genit. prep.). **COLORADO:** Electra Lake, F4367E, ~37°33'N 107°48'W, ~8400', 28.vi.–1.vii.1919, 2 ♀♀, [no collector] (AMNH, 1 ♀ genit. prep.); Estes Park, 11.vii.1934, 1 ♂, A. L. Melander leg. (USNM, genit. prep.); Teller Co., 3.5 mi S Florissant, Sanborn Ranch, along tributary of Plum Creek, 14.vii.2004, 1 ♂ 1 ♀, The Nature Place, sweeping forbs, 10.vii.2004, 1 ♀, B. A. Foote leg. (CMNH); Summit Co., Frisco, 3.viii.2001, 2 ♂♂, I. S. Winkler leg. (BYUC); Jackson Co., Gould, 8.viii.1965, 1 ♀, F. C. Harmston leg. (LACM, genit. prep.); Boulder County, Middle Boulder Creek, 16 km W Boulder, Hwy 119, 2280 m, 8.viii.1973, 2 ♂♂ 2 ♀♀, P. H. Arnaud Jr. leg. (CASC, 1 ♂ genit. prep.); 3 mi N Nederland, 8500', marshy stream margin, 2.vii.1961, 1 ♀; 5 mi E Nederland, 7500', marshy lake & stream margin, 2.vii.1961, 1 ♂, both J. G. Chillcott leg.; State Bridge nr. Bond, 7000', 24–25.vi.1961, 1 ♂, C. H. Mann leg. (all CNCI). **MICHIGAN:** Keweenaw Co., Isle Royale, 15., 17.vii.1938, 1 ♂ 1 ♀, G. Steyskal leg. (USNM, 1 ♂ genit. prep.). **NEW HAMPSHIRE:** Pinkham Notch, 9.vii.1931, 1 ♀, J. M. Aldrich leg. (USNM).

Description. Male. Total body length 2.48–2.90 mm; body distinctively bicolourous (Figs 296–298), with occiput (partly) and dorsal sides of thorax and abdomen largely brown to dark greyish brown (notum in particular), sharply contrasting with yellow lateral and ventral sides of thorax and abdomen, most of head, and all extremities (including antenna and palpus). Head about as long as high, anteriorly slightly angular in profile, with face slightly receding, largely yellow except for brownish ocellar triangle and darker brown occipital pattern. Occiput very slightly concave, bicolourous, laterally with large dark brown subtriangular area extended from posterior eye margin to foramen and medially with small pale brown spot behind ocellar triangle; lateroventral parts of occiput and medial V-shaped area above foramen yellow (the latter dorsally translucent to yellow parts of frons and largely covered with 2 silvery micro-



Figs 294–298. Primary types of the *Anthomyza pallida* group. 294 – *A. pengellyi* sp. nov., holotype male, laterally, body length 2.44 mm; 295 – *A. mcalpinei* sp. nov., holotype male, laterally, body length 2.94 mm; 296 – *A. pullinotum* sp. nov., holotype male, laterally, body length 2.74 mm; 297 – the same, head and thorax, laterally; 298 – the same, abdomen laterally. Photo by J. Roháček.

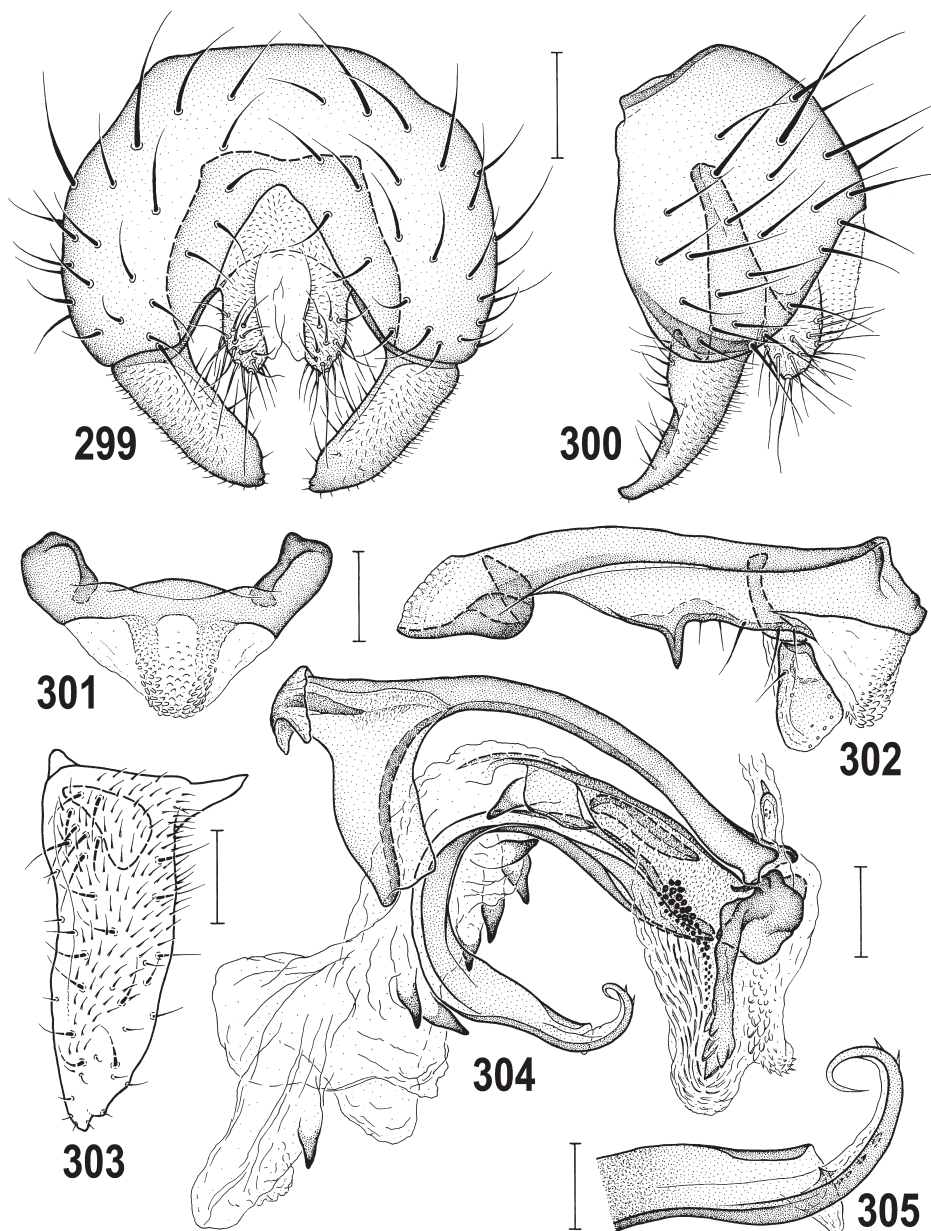
tomentose spots meeting above foramen). Frons relatively narrow, yellow and largely dull, only ocellar triangle brown; frontal triangle with sparse but distinct silvery golden glittering microtomentum as in *A. mcalpinei*. Also orbits as in latter species, with silvery whitish microtomentum reduced behind middle ors to form a narrow line. Frontal triangle very narrow and with attenuated and acutely pointed anterior corner reaching to anterior fourth to fifth of frons. Frontal lunule small but distinct, yellow. Face as in that of *A. mcalpinei* but separated from parafacialia by broader and usually darker, golden-orange microtomentose marginal stripe reaching onto ventral margin of gena; parafacialia, gena, postgena and mouthparts coloured and microtomentose as in *A. mcalpinei*. Cephalic chaetotaxy not particularly different from that of *A. mcalpinei* including dark colour and variability in length of setae; only postocular setulae (6–7) somewhat longer, particularly those situated more dorsally. Palpus as described for *A. mcalpinei* including chaetotaxy. Eye also very similar to that of *A. mcalpinei*, with longest diameter oblique and 1.3–1.4 times as long as shortest. Shortest genal height 0.16–0.18 times as long as shortest eye diameter, thus gena somewhat deeper (higher) than that of *A. mcalpinei*. Antenna geniculate, entirely yellow; 1st flagellomere with short white pilosity. Arista about 1.9 times as long as antenna; basal segments ochreous yellow, distal setiform part blackish brown and with (dark) cilia shorter than those on 1st flagellomere as in *A. mcalpinei*.

Thorax slightly narrower than head. Scutum dorsally invariably dark greyish brown with dense pale grey microtomentum with distinct bluish tinge (Fig. 297). Humeral callus and notopleural area yellow (but the latter usually with ochreous to pale brown darkening around anterior npl), often with yellow or ochreous colour extended along suture up to level of prs, and sometimes also with short yellow stripe between sa and pa. Scutellum also brown and similarly microtomentose to scutum but sometimes (particularly medially) paler brown. Pleural part of thorax sparsely whitish grey microtomentose, more shining than scutum, usually entirely bright yellow (Fig. 297), rarely with very narrow brownish marginal darkening dorsally on mesopleuron and propleuron. Postscutellum and postnotum brown to dark brown. Thoracic chaetotaxy: 1 hu (usually longer than posterior npl) plus 1 (rarely 2) hu setula on humeral callus; 2 npl (anterior distinctly longer than hu); 1 distinct prs (as long as or longer than hu); 1 sa (as long as prs) and 1 pa (usually longer than sa); 2 long postsutural dc (anterior about as long as anterior npl, posterior longest of thoracic setae) and 6–8 dc microsetae in front of them (the hindmost distinctly enlarged); ac microsetae more sparse than in *A. mcalpinei*, arranged in only 2 medial rows but with 1–2 lateral ac microsetae behind suture in addition; hindmost (medial) ac pair usually situated somewhat beyond level of posterior dc; 2 sc (shorter laterobasal about as long as sa, apical almost as long as posterior dc); 1 small hair-like ppl (exceptionally 2, observed in single specimen); 2 long stpl (anterior shorter) and 4–5 upcurved setulae in dorsal half of sternopleuron, its ventral part with 5–6 longer setae. Scutellum rounded triangular, slightly convex dorsally. Legs pale yellow, only distal half to three-fourths of last tarsal segment of all tarsi dark brown. Pedal chaetotaxy very similar to that in *A. mcalpinei*: f_1 with ctenidial spine only slightly longer than maximum width of t_1 ; f_3 in distal two-fifths with 5–7 shortened and thickened setae in posteroventral row; t_2 with short ventroapical seta; fore and hind basitarsus with 2–3 enlarged (also thickened on hind basitarsus) ventrobasal setulae, also mid basitarsus with 1 or 2 somewhat longer and thicker ventrobasal setulae. Wing (Fig. 276) less elongate (somewhat wider) than that of *A. mcal-*

pinei, having pale yellowish ochreous veins and membrane. C with distinct sparse spinulae (not well visible on Fig. 276 because erect and perpendicular to alar plane) among hair-like setosity between apices of R_1 and R_{2+3} . R_{2+3} long, bent parallel to C with apex slightly up-curved to it; R_{4+5} very slightly bent, subparallel with almost straight or indistinctly bent M. Discal cell (dm) moderately long and narrow; r-m situated slightly in front of the middle of cell dm. Apical portion of CuA_1 longer than dm-cu and ending near wing margin; A_1 short, ending far from it. Alula distinct, moderately narrow. Wing measurements: length 2.56–2.90 mm, width 0.81–0.99 mm, $Cs_3 : Cs_4 = 0.86–1.25$, $rm(dm-cu : dm-cu = 2.63–3.17$. Haltere yellowish white with stem more yellow.

Abdomen dorsally largely brown, ventrally pale to whitish yellow (Fig. 298). Preabdominal terga T1–T5 mostly brown but their side areas variously yellow; T2–T3 usually darkest with only margins yellow, T1 and T4–T5 (particularly) usually with lateral yellow regions larger, covering up to one third on each side. T1–T5 relatively shortly and sparsely setose, subshining, with greyish microtomentum distinct but sparser than that on thorax. T1 and T2 separate, only narrowly fused laterally. T1 shortest and most transverse, T2 slightly shorter than T3–T5, the latter subequal in size, all reaching onto lateroventral sides of abdomen. Preabdominal sterna pale to whitish yellow, relatively broad (only S1 and S2 narrower) and becoming wider posteriorly; S1 short and transverse, S2 slightly, S3–S5 distinctly transverse, all suboblong to slightly trapezoidal (wider posteriorly), S5 widest. S2–S5 finely but not very densely setose, only S1 bare and with darker posterior marginal stripe. T6 submembranous as in *A. mcalpinei*, very short, transversely strip-like, bare and almost unpigmented. S6 and S7 pale brown (usually) to brown, often with central part lighter (up to ochreous yellow), both with dark brown anterior marginal ledge; both S6 and S7 with 2–3 (usually 2) setae; S8 somewhat longer than epandrium, brown (usually darker than S6 and S7 but paler than epandrium), setose in posterior two-thirds.

Genitalia. Epandrium (Figs 299, 300) darker than S8 (Fig. 298), moderately long and relatively broad as in *A. mcalpinei*, but slightly less setose, with 2 or 3 pairs of longer and thicker setae dorsolaterally; anal fissure relatively small but more acutely triangular than that of *A. mcalpinei*. Cercus relatively short and pale, with fine setae, apical and preapical longest. Cerci (Fig. 299) distinctly closer to each other than in *A. mcalpinei*. Medandrium (Fig. 299) simple, slightly smaller (lower) than in *A. mcalpinei*, dorsally slightly narrowed and with dorsolateral corners simple, obtuse-angled, ventrally with shallow broad emargination, bare. Gonostylus (Figs 299, 300, 303) elongate and slender but shorter than epandrial height, bent anteriorly (with distinct anterior concavity in lateral view – Figs 298, 300), distally gradually tapered and apically somewhat pointed, with 1 short apical and 1 small subapical tooth (Fig. 303), thus more resembling that of the Palaearctic *A. dissors* but distinctly different from that of *A. mcalpinei* although similarly micropubescent on most of outer side and with longer setae only on inner side. Hypandrium (Fig. 302) resembling that of *A. mcalpinei* but somewhat more robust. Transandrium (Fig. 301) also as in the latter species although more arched dorsally, without caudal process except for a pair of short medial sclerotizations transilient to finely spinose parts of basal membrane. Pregonite (Fig. 302) most similar to that of *A. mcalpinei* but with anterior tooth more slender and acutely pointed, ventrally with 5 (2 middle usually longest) setae. Postgonite (Fig. 302) clearly different from that of *A. mcalpinei*, short and

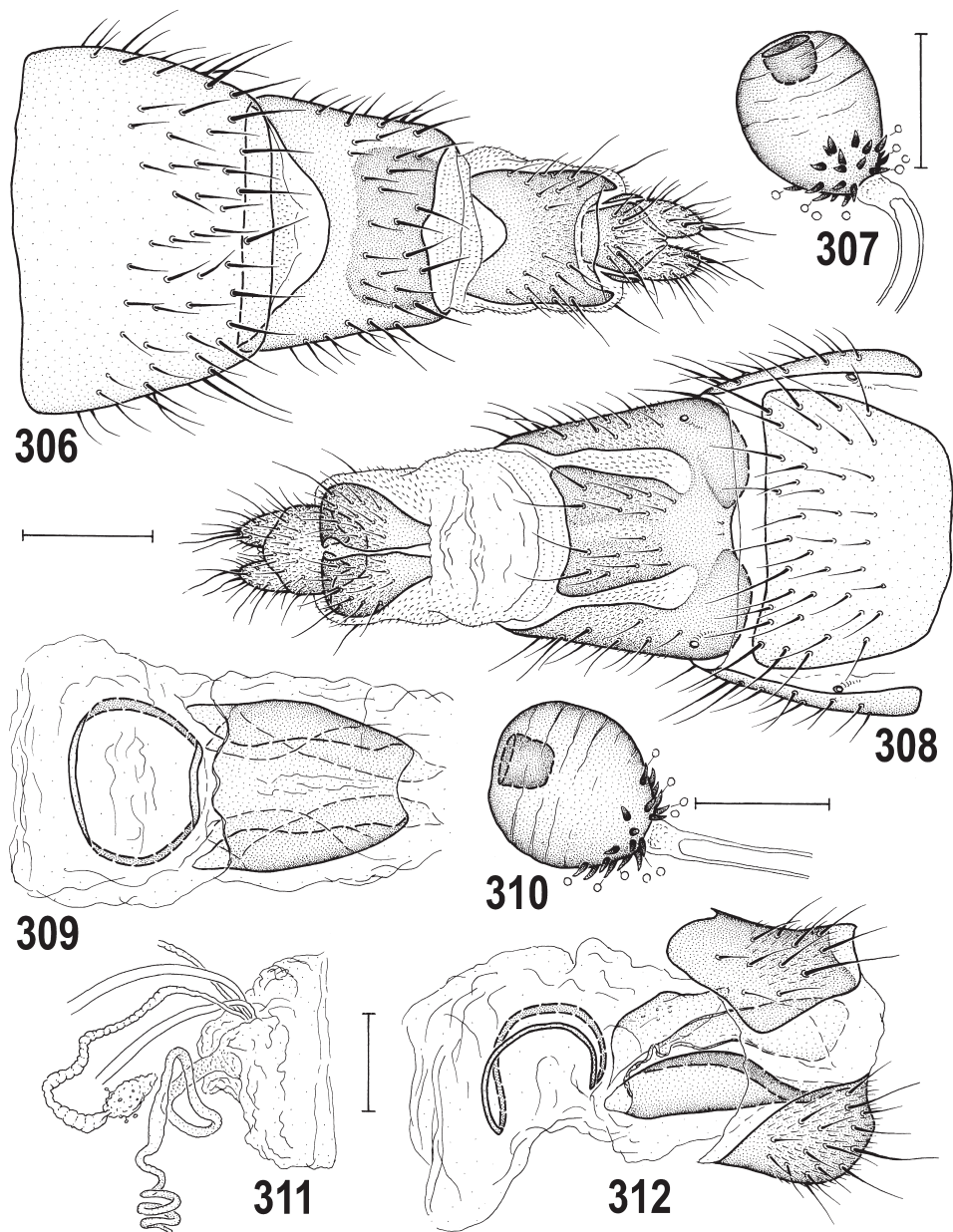


Figs 299–305. *Anthomyza pullinotum* sp. nov., paratype male (Canada: Alberta). 299 – external genitalia, caudally; 300 – external genitalia, laterally; 301 – transandrium, caudally; 302 – hypandrial complex, laterally; 303 – gonostylus, ventrocaudally (widest extension); 304 – aedeagal complex, laterally; 305 – apex of filum, lateroventrally (widest extension). Scales = 0.05 mm (Figs 303, 305) and 0.1 mm (others).

unusually broad, widest preapically (in lateral view), with wide rounded apex, dark basally, pale apically, with 1 setula in basal third to fourth of anterior margin and several sensillae on outer side. Dorsal internal sclerite at base of postgonite distinct, narrower than, and almost as long as postgonite. Basal membrane (Figs 301, 302) with the same fine armature as in *A. mcalpinei*, but spinulae on posterolateral areas smaller. Aedeagal part of folding apparatus with different structure from those of *A. mcalpinei* and *A. dissors*, laterally with elongate group of fine dark tubercles in addition to elongate hyaline striae. Connecting sclerite strong, dark, proximally fused to phallopore, distally slightly wider and with a few (in contrast to that of *A. mcalpinei*) spines on apex (Fig. 304); membrane posterior to connecting sclerite with only fine unpigmented spinulae and flat warts. Phallapodeme very similar to that of *A. mcalpinei* including position and shape of fulcrum and laterally projecting apex (Fig. 304). Aedeagus (Fig. 304) with phallopore short and compact; distiphallus large and long, bifid from near its base. Saccus more voluminous and longer than in *A. mcalpinei* and *A. dissors*, often more dilated distally, membranous, basally with usual slender sclerites plus one short lateral sclerite and armed with 8 robust dark-pigmented spines (thus more than in *A. mcalpinei*). Filum most resembling that of *A. mcalpinei* but its curved slender terminal part distal to small subterminal membranous lobe with fewer spinulae (Fig. 305). Ejacapodeme small, pale, with small pointed terminal projection (Fig. 304).

Female. Similar to male unless mentioned otherwise. Total body length 3.09–3.73 mm. Head with occiput sometimes yellower, with lateral brown areas interrupted by a yellow stripe connecting orbit with lateroventral area of occiput. Frons with up to 4 pairs of medial microsetulae in front of frontal triangle. Outer side of 1st flagellomere with large darker (ochreous to pale brown) anterodorsal spot below insertion of arista, also dorsal margin of inner side sometimes faintly darkened. Thorax often paler than in male because yellow lateral areas extend dorsally or even onto posterior fifth of scutum to form small yellow spots in prescutellar area; scutellum also sometimes partly (usually laterally) yellow to (rarely) completely ochreous yellow. Largest female specimens with more ac microsetae (forming 4 rows also presuturally) and with more setose sternopleuron (with up to 6 upcurved setulae and 7 ventral setae). f_3 without row of shortened and thickened posteroventral setae. Wing generally more elongate. Wing measurements: length 3.07–3.67 mm, width 0.99–1.19 mm, $Cs_3 : Cs_4 = 0.87–1.11$, $rm \setminus dm-cu : dm-cu = 2.29–3.20$. Abdomen with T1–T6 distinctly lighter, brownish only medially but these darker areas often reduced to small medial spots or sometimes disappear to leave terga completely yellow. T2–T5 shorter and more transverse than in male, T1 distinctly, T2 slightly narrower than T3. T3–T5 broad and subequal in size, all wider than T6. Preabdominal sterna pale yellow, somewhat more densely setose and slightly narrower than in male. S2 as long as wide, S3 slightly, S4 and S5 distinctly transversely suboblong. S5 largest and widest abdominal sternum, being slightly wider than S6.

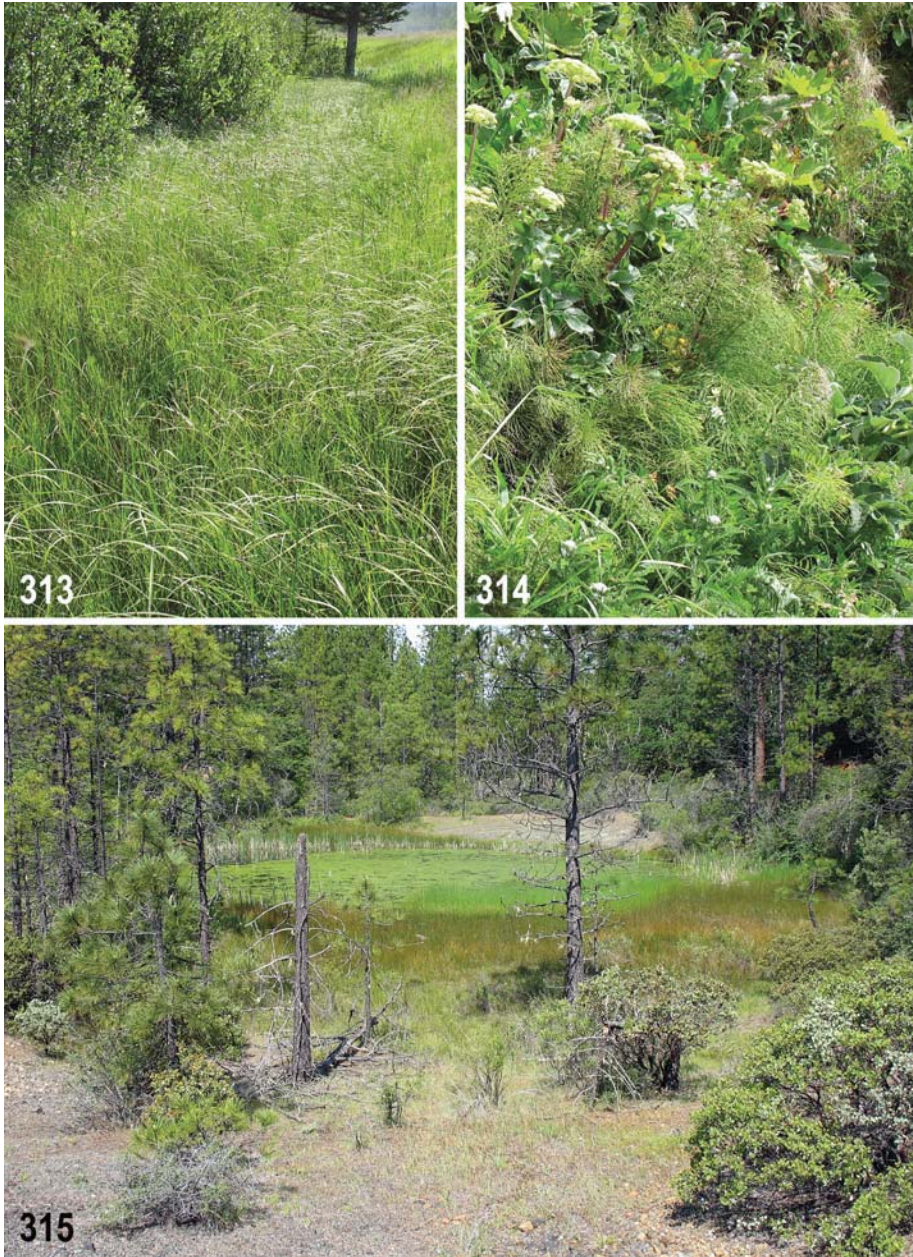
Postabdomen (Figs 306, 308) relatively long (more elongate than in *A. mcalpinei*), telescopic, yellow with brown markings. T6 simple, large, narrower than T5 and much longer than that of *A. mcalpinei*, slightly tapered posteriorly and with broadly rounded posterior corners, dark yellow or with medial brownish area of various size, with relatively short and dense setae in posterior two-thirds (dorsomedially in only posterior half), marginal setae longest. S6 also relatively narrow (less transverse than in *A. mcalpinei*), slightly trapezoidal with anterior



Figs 306–312. *Anthomyza pullinotum* sp. nov., paratype female (Canada: Alberta). 306 – postabdomen, dorsally; 307 – spermatheca; 308 – postabdomen, ventrally; 309 – female internal sclerites ventrally; 310 – spermatheca; 311 – distal end of female genital chamber, laterally; 312 – internal sclerites and T8 and S8, laterally. Scales = 0.2 mm (Figs 306, 308), 0.05 mm (Figs 307, 310) and 0.1 mm (others).

corners rounded, less broad than S5, pale yellow and finely densely setose. Tergosternum T7+S7 relatively long, subcylindrical, narrowing slightly posteriorly, dorsomedially (Fig. 306) shortened due to anteromedial incision (shallower than that seen in *A. mcalpinei*), ventrally longer but without anteroventral pouch-like structures (Fig. 308). T7+S7 with variable yellow and brown pattern, dorsally with brown posteromedial area that is variable in size, ventrolateral region often with brown area that becomes darker anteroventrally; ventral part of T7+S7 with original S7 well discernible but fused anteriorly with dilated anteroventral lobes of T7, relatively dark but with paler elongate area medially, with fine setae and sparse micropubescence (Fig. 308); dorsal and lateral parts of T7+S7 with rather short setae, those dorsally distinctly shorter and thicker (Figs 306, 378); 7th spiracle embedded in expanded lateral part of original T7 (Figs 308, 378). 8th segment finely micropubescent laterally. T8 (Fig. 306) about as long as wide, with sides bent ventrally, brownish, with deep emargination anteromedially and with unpigmented crescent-shaped marginal area posteromedially (hence different from that of *A. mcalpinei*), with sparse micropubescence centrally and fine exclinate setae laterodorsally; S8 (Fig. 308) shorter than T8, anteriorly strongly tapered, medially divided into 2 posteriorly convex (dorsally bent), finely hirsute and micropubescent sclerites that have a rather cordate shape. Genital chamber (uterus) posteriorly with distinctive dark-pigmented internal sclerotization (Figs 309, 311, 312) formed by 1 compact ventral sclerite (different from that of *A. mcalpinei* because convex ventrally), a complex (doubled) pair of weak, elongate and pale-pigmented dorsal sclerites and 1 subcircular, curved (in profile) annular sclerite situated in front of the former. Membranous part of genital chamber large but without additional sclerotizations. Ventral receptacle (Fig. 311) slender (also somewhat thicker basally compared to *A. mcalpinei*), tube-like, hyaline, terminally with spirally twisted vermicular apex. Accessory gland small, vesicular as in *A. mcalpinei*; slightly dilated and ringed part of duct sometimes longer than in the latter species. Spermathecae (1+1) broadly ovoid (Figs 307, 310), each with distinct terminal invagination being shallower than that of *A. mcalpinei* and with a number of short spines (more pointed and somewhat bigger than in *A. mcalpinei*) in basal third surrounding duct insertion; duct very long and without distinct cervix, terminating in centre of base of spermatheca. T10 small (Fig. 306), pentagonal, brownish and with usually 4–5 pairs of setae (1 long) and reduced micropubescence. S10 pale brown, somewhat wider and distinctly longer than T10, elongate rounded-pentagonal in ventral view (Fig. 308), finely setose and micropubescent. Cercus relatively short and robust and somewhat dorsoventrally flattened, with numerous fine and relatively short setae, apical and dorsopreapical longest.

Discussion. *Anthomyza pullinotum* sp. nov. proved to be closely allied to *A. mcalpinei* sp. nov. and *A. dissors* (Palearctic). The latter pair probably forms the sister group to *A. pullinotum* (see discussion under *A. mcalpinei*) even though the gonostylus of *A. pullinotum* more closely resembles that of *A. dissors*. Regarding its external appearance, *A. pullinotum* can be distinguished from all species of the *A. pallida* group by the dark greyish brown scutum with distinctive bluish-grey microtomentum that contrasts with the bright yellow pleuron. The dark forms of *A. mcalpinei* and *A. dissors* (also having yellow pleura) have this microtomentum darker grey and, moreover, *A. mcalpinei* has the lateral occipital spot behind the eye paler or absent. Dark specimens of other related species, *A. concolor*, *A. occidentalis* and *A.*



Figs 313–315. Habitats of species of the *Anthomyza pallida* group. 313 – growth of graminoids (*Carex* spp. and grasses) and *Equisetum* in road ditch 22.5 km S Bellevue (Canada: Alberta), habitat in type locality of *A. pullnotum* sp. nov.; 314 – close-up of growth with predominant *Equisetum telmateia braunii* in Tokatee Klootchman State Natural Site (USA: Oregon), microhabitat in type locality of *A. occidentalis* sp. nov.; 315 – a pool along Waldo Rd. about 4.1 km E O'Brien (USA: Oregon) with emergent *Juncus* sp., habitat of *A. concolor* (Thomson, 1860). Photo by K. N. Barber.

vockerothi, differ in having the pleura brown or at least brownish spotted. The new species is further diagnosed by a unique combination of the following characters: frontal triangle narrow and long with attenuated and acute anterior corner; ac microsetae sparser (in male in particular); male S6–S8 brownish; gonostylus with distinct anterior concavity in lateral view (most similar to that of *A. dissors*); postgonite short and very broad; saccus voluminous and long; female T6 relatively narrow; ventral part of T7+S7 with distinctive formation and pigmentation; spermatheca with largest spines and relatively shallow terminal invagination; female genital chamber with 2 pairs of pale dorsal sclerites in addition to single ventral one.

Etymology. The name of the new species is derived from the dark greyish brown colouration of the thoracic notum contrasting with the bright yellow pleura; pullus meaning dark in Latin. Noun in apposition.

Biology. The type locality (Alberta: ~22.7 km S Bellevue, Fig. 313) is representative of the habitat for *A. pullinotum*. This was a wet, roadside ditch supporting a dense growth dominated by *Carex* spp., *Equisetum* sp. and undetermined grasses. Only one other collection provided a similar number of specimens (Yukon: Alaska Highway at Yukon River crossing, both n = 19) and is described as “grass/sedges along river margin”. Another collection (Alberta: ~14.4 km E Obed) yielded six specimens from a wet depression dominated by *Carex utriculata*, next to a railway crossing. All other records with biological data are of one or two specimens each where there is general mention of riparian habitats and margins of water bodies. More specific mention is made of a mix of “*Carex*, grass, *Equisetum* beside lake” (British Columbia: Sawmill Lk.), which is vegetatively similar to the type locality. Other records include a mixture of species dominated by *C. utriculata* and *Equisetum fluviatile* (Alberta: Fish Creek P. Pk.), and there are several other collection localities in Alberta and British Columbia containing *C. utriculata*. Additionally, the grasses *Calamagrostis canadensis* (Alberta: w. border Elk Island N. P.) and *Bromus inermis* (Alberta: ~11 km WSW Hinton, ~31.5 km S Kananaskis Village), and the horsetail *E. fluviatile* (Alberta: ~3.4 km SSW Hinton) were specifically sampled and yielded *A. pullinotum*. One locality (Alberta: Spray Valley P. Pk.) mentioned *Poa* sp. mixed with what was probably *C. utriculata*. There are no biological data from the few scattered eastern records. Adults of *A. pullinotum* were collected from 11 June (British Columbia: Terrace – Spring Creek) to 12 August (Alberta: Fish Creek P. Pk.).

Distribution. The records for this species are relatively sparse and widely distributed. Most are from the west in Alberta, British Columbia, Yukon and Colorado. There are only single localities recorded in Alaska and the eastern jurisdictions of Ontario, Labrador, Michigan and New Hampshire. These are summarized as Canada: Alberta, British Columbia, Labrador, Ontario, Yukon; United States of America: Alaska, Colorado, Michigan, New Hampshire (see Table 2, Fig. 598).

Anthomyza concolor (Thomson, 1869)

(Figs 316–336, 376)

Piophilha concolor Thomson, 1869: 596.

Anthomyza concolor: SABROSKY (1965): 819 (catalogue, generic combination); ROHÁČEK (1998a): 173 (checklist).

Type material. LECTOTYPE: ♀ (designated herewith): “Califor-nia”, “Kinb.”, “Typus”, “366” and “87” (both on red label, the latter number handwritten), “NHRS-BYWS 000000018” (see Fig. 317), “Lectotypus ♀ *Piophilha concolor* Thomson, J. Roháček & K. N. Barber des. 2014” (red) and “*Anthomyza concolor* (Thomson) ♀, J. Roháček & K.

N. Barber det. 2014⁷. The specimen (deposited in NHRS, genit. prep.) belongs to the pale form and is relatively well preserved (Figs 316, 317) but its abdomen was detached after photography to study the terminalia. According to THOMSON (1869) the description is based on material from USA: California. The only type specimen found is designated as the lectotype, because THOMSON (1869) did not explicitly state the number or sex of the specimens he used for the description, and the necessity to fix the taxonomic concept of the species to avoid confusion with very similar Nearctic relatives (*A. occidentalis* sp. nov. in particular).

Other material examined. CANADA: ALBERTA: 7 mi W Banff, 11.vii.1966, 1 ♀, J. Novak leg.; Bilby, 22.vi.1924, 1 ♂ (genit. prep.), O. Bryant leg. (both USNM); ~18.3 km NW Cadomin, Hwy #40, 53°10.02'N 117°29.72'W, sweeps, edge of roadside pond, *Carex* spp., 22.vii.2008, 1 ♂, K. N. Barber leg. (CNCI); Calgary, Fish Creek Provincial Park, 50°55.739'N 114°03.312'W, sweep near creek, 22.vii.2010, 1 ♂, J. E. Swann leg. (BDUC). **BRITISH COLUMBIA:** Banks Island, 53°34'18"N 130°31'31"W, inlet with brackish waterways & meadow of *Carex*, cinquoils, *Angelica*, *Juncus*, 21.vi.2005, 1 ♂, C. Copley leg. (RBCM); Brisco, 19.vi.1932, 2 ♂♂, O. Bryant leg. (USNM); Clinton, 13.vi.1938, 2 ♀♀, J. K. Jacob leg. (CNCI); E. C. Manning P. Pk., ~42 km SE Hope, Hwy #3, ~49°10'N ~120°57'W, 1352 m, swept/elector, roadside veg. incl. *Juncus*, *Carex*, *Equisetum*, (Universität Bielefeld, Ca1535), 16.viii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); 24 km E Enderby, CD1334, 8–9.vi.1991, 1 ♂, A. Borkent leg. (CNCI); Golden, 15.vii.1988, 1 ♀, A. Freidberg leg. (TAUI, genit. prep.); ~2.9 km NNW Golden, Anderson Rd., 51°19.49'N 116°58.81'W, sweeps, roadside, mostly *Equisetum fluviatile* & *E. palustre*, 19.vii.2011, 2 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); Graham Is., Q[ueen] C[h]arlotte Islands, Tow Hill, sweep above beach, 14.vii.1988, 1 ♀, S. A. Marshall leg. (DEBU); Hatzic Lake, 20.vii.1953, 1 ♂, 22.vii.1953, 1 ♀, 24.vii.1953, 1 ♂, W. R. M. Mason leg.; Horseshoe Bay, 0–300', 25.v.1961, 1 ♂, 30.v.1961, 3 ♂♂, J. R. Vockerth leg. (all CNCI); Iona Is., Richmond, 16.vi.1981, 1 ♂, S. G. Cannings leg. (UBCZ); Kinbasket Lake, BC Hydro drawdown study, Malaise trap (91MCOT01), 10–11.vii.2009, 1 ♀, Cooper Beaudesne & Assoc. Ltd. leg. (RBCM); Ladysmith, 2.vi.1955, 5 ♂♂ 2 ♀♀, R. Coyles leg., 2.vi.1955, 1 ♀, J. R. McGillis leg. (CNCI); Lardo [sic Lardeau], "7.7" [7.vii or vii.1907?], 2 ♂♂, H. G. Dyar leg. (USNM, 1 ♂ genit. prep.); MacGillivray [sic McGillivray] Creek Game Reserve, near Chilliwack, 27.vii.1953, 1 ♀, W. R. M. Mason leg. (CNCI); Merritt, Lundbom Lk., 1.5 km NE, 1.vii.1988, 1 ♂, G. E. Hutchings leg. (RBCM ENT991-6126, genit. prep.); Milner, 12.vii.1953, 1 ♂ 1 ♀, W. R. M. Mason leg. (CNCI); Nanaimo Lakes, forested area, 11.vi.1988, 1 ♀, G. E. Hutchings leg. (RBCM ENT991-11822); Oliver, 13.viii.1923, 1 ♂, 20.iv.1923, 1 ♀, 28.iv.1923, 1 ♀, C. B. Garrett leg. (CNCI); Parson, Crestbrook Rd., 51°03.68'N 116°39.06'W, sweeps, wet ditch, *Carex uriculata* with *Equisetum palustre* & *E. xlitrale*, 18.vii.2011, 4 ♂♂ 6 ♀♀, K. N. Barber leg. (DEBU 4 ♂♂ 4 ♀♀, SMOC 2 ♀♀); Princess Royal Island, Home Bay, 53°16'44.3"N 129°04'57.5"W, Malaise trap, sheltered bay with beach & stream, 24.vi.2005, 1 ♀, C. Copley leg. (RBCM); Qualicum, 19.vi.1955, 2 ♂♂, G. E. Shewell leg.; Richter Pass, Osoyoos, 30.v.1959, 1 ♀, R. Madge leg. (all CNCI); Robson, 20.ix.2008, 1 ♂; 19.viii.1957, 1 ♂, 14.vi.1960, 1 ♀, 24.ix.1963, 1 ♀, 28.ix.1967, 1 ♂, 29.vii.1970, 1 ♂ (genit. prep.), H. R. Foxlee leg. (UBCZ); 16.8 km NE 70 Mile House, 51°20'N 121°19'W, sweeps/elector, large swamp with diverse vegetation, (Universität Bielefeld, Ca1517), 3.viii.2002, 10 ♂♂ 6 ♀♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); 5 mi E Sidney, 23.viii.1971, 1 ♀, J. Sawbridge leg. (OSAC); Sproat Lake, 22.vi.1955, 2 ♂♂, W. R. M. Mason leg.; Summerland, 25.ix.1931, 1 ♂, A. N. Gartrell leg. (all CNCI); Ucluelet, beach edge, 31.v.1980, 1 ♀, R. A. Cannings leg. (RBCM ENT991-19737); Vancouver, Point Grey, 21.viii.1972, 1 ♂ 1 ♀, 26.iv.1973, 1 ♂, J. R. Vockerth leg. (CNCI); Vancouver, Univ. Campus, 2.v.1959, 1 ♂, G. Scudder leg. (UBCZ); Vancouver, Wreck Beach, 49°15.8'N 123°15.7'W, bare sand & wrack on upper beach, 17.viii.2001, 1 ♀, J. Forrest & T. A. Wheeler leg. (LEMQ 0040130), sweep grass/sedge/forbs on sea beach, 17.viii.2001, 1 ♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0040129, -31, 1 ♂ genit. prep.); Vancouver Island, Brooks Pen., Cape Cook Lagoon, 50°12'N 127°48'W, in *Carex/Elymus*, sand dunes, BCPM Brooks Pen. Project, 2.viii.1981, 1 ♂, R. A. & S. G. Cannings leg. (UBCZ, genit. prep.); Vancouver Is., Parksville, Community Beach, 49°19.48'N 124°18.61'W, 20–21.viii.2008, 3 ♂♂, S. E. Brooks leg., 20–21.viii.2008, 1 ♂; Vancouver Is., Parksville, Englishman River Outlet, 49°19.87'N 124°17.33'W, 21.viii.2008, 2 ♂♂, S. E. Brooks leg., 21.viii.2008, 4 ♂♂, J. M. Cumming leg.; Vancouver Is., Parksville, Rath Trevor Beach, 49°18.99'N 124°16.38'W, 21.viii.2008, 1 ♀, J. M. Cumming leg.; Vancouver Is., Qualicum First Nation Cmpgrd., 49°23.98'N 124°36.80'W, ex. cobble/pebble beach, 12.viii.2008, 1 ♂, S. E. Brooks leg.; Vancouver Island, Sidney Is., Sidney Spit, 48°38'28.06" N 123°19'50.05" W, sandy beach, 8.viii.2008, 1 ♂ 1 ♀ (1 ♂ genit. prep.), J. M. Cumming leg.; Vernon, 27.vi.1937, 1 ♂ 1 ♀, H. Leech leg. (all CNCI); Victoria, Ascot Pond, 25.vi.1981, 1 ♀, R. A. Cannings leg. (RBCM ENT991-22095). **SASKATCHEWAN:** Elbow, 3.vi.1960, 1 ♂, 17.vi.1960, 1 ♀, A. R. Brooks leg. (both genit. prep.); Lisieux, 49°16'N

105°59'W, 21.vi.1955, 1 ♀, J. R. Vockeroth leg.; Uranium City, 19.vi.1962, 1 ♂ (genit. prep.), J. G. Chillcott leg.; Val Marie, 14.vi.1955, 1 ♀, A. R. Brooks leg.; Val Marie, 49°15'N 107°44'W, 14.vi.1955, 1 ♂ (genit. prep.), J. R. Vockeroth leg. (all CNCI). **UNITED STATES OF AMERICA: ARIZONA:** Apache Co., St. John's, 12.vi.1950, 1 ♂ 1 ♀, M. R. Wheeler leg. (AMNH, both genit. prep.). **CALIFORNIA:** Napa Co., Angwin, 3.ix.1971, 1 ♀, L. Eighme leg.; Alameda, 6.x.1926, 1 ♀, E. P. Van Duzee leg. (both CASC); Alameda Co., Alvarado, 18.v.1950, 2 ♀♀, M. R. Wheeler leg., 18.v.1950, 1 ♂ 1 ♀ (both genit. prep.), [no collector] (AMNH); Glenn Co., 1 mi NE Alder Springs, Mendocino Nat. Forest, 4000', Malaise trap, 20.viii.1983, 1 ♀, E. M. Fisher leg. (CSCA); Marin Co., Alpine Lk., Lily Pond, 1500', Malaise trap, 12.v.–9.vii.1970, 1 ♀, D. D. Munroe leg. (CNCI); Modoc Co., 15 mi NE Alturas, 5800', 22.vi.1971, 1 ♂, G. Steyskal leg. (USNM); Humboldt Co., Arcata, 20.x.1980, 1 ♀, R. Hurley leg. (MTEC); Los Angeles Co., Ballona Wetlands near Playa del Rey, Unit 1[?], 23.vii.1980, 1 ♂, C. Nagano, J. Hogue, E. Birdsall & C. Chapelle leg. (LACM ENT329088); Shasta Co., 8 mi SE Bartle, #3, 17.vi.1959, 1 ♂, Byers & party leg. (SEMC); E [of] Barton Flat, 25.vi.1946, 1 ♂ (genit. prep.); Barton Store, 20.vi.1945, 1 ♀, both A. L. Melander leg. (both USNM); Berkeley, 30.iv.1968, 1 ♂, D. D. Munroe leg. (CNCI); Solano Co., L. Berryessa, 0.85 mi SW Monticello Dam, 38°30'20"N 122°06'39"W, 500 m, ex. vegetation along shoreline, 4.vi.2002, 26 ♂♂ 3 ♀♀, S. D. Gaimari leg. (CSCA, 1 ♂ 1 ♀ genit. prep.); Big Bear Lake, 6.vii.1942, 2 ♂♂ 1 ♀ (1 ♀ headless); Los Angeles Co., Big Pines, 29.vi.1948, 1 ♀, all A. L. Melander leg.; Bolinas, 5.vi.1949, 1 ♀, R. E. Ryckman leg. (all USNM); Cambria, Santa Rosa Creek Trail, 35°33.94'N 121°06.03'W, sweeps, *Equisetum telmateia braunii* & *Delairea odorata* under canopy, 3.v.2014, 1 ♂, K. N. Barber leg. (CNCI); Campo, 18.vii.1940, 1 ♀, D. E. Hardy leg. (SEMC); Modoc Co., Cedar Pass, 29.vi.1955, 1 ♂, C. L. Hogue leg. (LACM ENT329087); Chino, 6.iv.1928, 1 ♂, A. H. Sturtevant leg. (USNM, genit. prep.); Tuolumne Co., end of Clark Fork Road, 1955 m, meadow, 2.vii.1977, 1 ♂, P. H. Arnaud Jr. (CASC); Clear Lake, 18.vi.1935, 1 ♀, A. L. Melander leg.; Lake Co., Clear Lake St. Pk., 9.ix.1957, 1 ♂, P. H. Arnaud Jr.; Corona Del Mar, 25.vii.1942, 2 ♂♂ 2 ♀♀ (2 ♂♂ on same pin, 2 ♀♀ on same pin), A. L. Melander leg.; Santa Clara Co., Coyote, 9.iii.1947, 1 ♂, P. H. Arnaud (all USNM); Del Norte Co., 18.5 mi N Crescent City, 28.vi.1972, 1 ♂, W. N. Mathis leg. (OSAC), 28.vi.1972, 1 ♂, G. Steyskal leg. (USNM); Davis, collected on rice, 21.vii.1935, 1 ♂, A. A. Grigarick leg. (USNM); Davis, 21.v.1940, 1 ♀, 2.vi.1940, 1 ♂, 3.vi.1940, 1 ♂, 13.vi.1940, 1 ♂, C. D. & M. H. Michener leg. (SEMC); Trinity Co., FR17, Deadfall Meadow, 41.3347°N 122.5209°W, 1972 m, sweep wet meadow, 8.vi.2009, 1 ♀, J. Mynarek leg. (DEBU); Del Norte Co., Del Norte Coast Redwoods S. P., Wilson Ck., sweeps, grasses near parking area, 41°36.22'N 124°06.04'W, 9.vi.2009, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); Stanislaus Co., Del Puerto Canyon, Frank Raines Park, ca.1120', insect flight trap, 3.iv.1970, 1 ♂, P. H. Arnaud Jr. (CASC, genit. prep.); Santa Clara Co., Del Puerto Road (Rd. 130), pan traps & sweeping, 28.v.1992, 1 ♂ 2 ♀♀, J. Skevington & A. Goering leg. (LEMQ); Lassen Co., Eagle Lake, 31.vii.1957, 1 ♀, C. L. Hogue leg. (LACM ENT329091); Echo Lake, 7600', 24.viii.1957, 1 ♂, A. H. Sturtevant leg. (USNM); El Portal, Sierra Nat. For., 3500', 26.iv.1968, 1 ♀, D. D. Munroe leg. (CNCI); Eldorado Hills, 38°41'43"N 121°04'44"W, 222 m, 24.iii.2003, 2 ♂♂ 1 ♀, J. & A. Skevington leg. (CSCA); Fresno, 12.xi.1922, 1 ♀, [no collector] (with det. as *A. pallida* Zett.); Del Norte Co., 2 mi E Gasquet, 28.vi.1972, 1 ♂, G. Steyskal leg.; Gen. Grant Park, 7.vi.1935, 1 ♂ 1 ♀; Nevada Co., Glenbrook, [no date], 1 ♂, all A. L. Melander leg. (all USNM); Siskiyou Co., 8 mi S Grenada, 23.ix.1973, 1 ♂, W. N. Mathis leg. (OSAC); Hemet Reservoir, San Jacinto Mts., 22.v.1940, 1 ♂, C. D. Michener leg. (CASC, genit. prep.); Hopland, 3.iv.1968, 1 ♀, D. D. Munroe leg. (CNCI); San Benito Co., Idria, 1 ♂, [no date, no collector] (USNM); Inyo Co., Independence, 5.ix.1963, 1 ♀, J. D. Birchim leg. (CASC); Marin Co., Inverness, 10.v.1968, 1 ♂, D. D. Munroe leg. (CNCI); Marin Co., 2 air mi W Inverness, 1.v.1976, 1 ♂, J. Doyen & P. Rude leg. (EMEC); Del Norte Co., Jediah Smith Redwoods S. P., Enderts Beach, 41°42.04'N 124°08.52'W, sweeps, grasses on top of high bluff, 4.vi.2009, 2 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Jenks Lake, 20.vi.1945, 3 ♀♀, A. L. Melander leg. (USNM, 1 ♀ headless, 2 ♀♀ on same pin); El Dorado Co., Jones Fork, Silver Creek at Ice House Rd., 38°50'54"N 120°22'33"W, 1500 m, 2.vii.2002, 1 ♂ 1 ♀, S. D. Gaimari & E. M. Fisher leg. (CSCA); Keen Camp, 7.vi.1942, 1 ♂, A. L. Melander leg. (USNM, headless); Sonoma Co., Kenwood, Sonoma Creek, Mortons Warm Springs, 105 m, 18.v.1974, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Lafayette, 6.iv.1968, 1 ♀, D. D. Munroe leg. (CNCI); Del Norte Co., Lake Earl Wildlife Area, 41°48.68'N 124°10.83'W, sweeps, grasses bordering flooded road/marsh, 1.vi.2009, 2 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI 1 ♂ 4 ♀♀, SMOC 1 ♂ used for molecular work); Lake Tahoe, 20.vi.1953, 1 ♀, A. L. Melander leg. (USNM); Lake Tahoe, Glenn Alpine, 1.ix.1930, 1 ♀, H. H. Keifer leg. (LACM ENT329092); Live Oak Park, 24.v.1944, 2 ♀♀ (1 ♀ headless), 6.vi.1945, 1 ♀, A. L. Melander leg. (USNM); San Joaquin Co., Manteca, 28.viii.1964, 1 ♂, B. Bauer leg. (CASC); Manzanita, 21.viii.1957, 1 ♀, A. L. Melander leg. (USNM); Marsh Cr., [-].

iv.1937, 2 ♀♀, E. S. Ross leg. (CASC); Mono Lake, 19.vi.1950, 1 ♂, G. Sperry leg. (USNM); Sonoma Co., Monte Rio, Russian River, 5.ix.1971, 1 ♀, P. H. Arnaud Jr. (CASC); Morro Bay, 27.vii.1940, 1 ♂; Muir Beach, "6/8".1950, 1 ♀; Muir Wood, 21.vi.1947, 1 ♂ 1 ♀, all A. L. Melander leg. (all USNM); Napa Co., Napa, 14.iv.1981, 1 ♂, L. Eighme leg. (CASC); Mendocino Co., NCCRP [Northern California Coast Range Preserve], 3 mi N Branscomb, 1400', 30.iv.1977, 1 ♂ 1 ♀, E. I. Schlinger leg. (EMEC, 1 ♂ genit. prep.); Marin Co., Novato, 21.iv.1963, 1 ♂, D. C. Rentz leg.; Marin Co., "Umdhlehlanynoni", Novato, 24.x.1948, 1 ♂, E. L. Kessel leg. (both CASC); Orick, 18.ix.1934, 2 ♂♂, A. L. Melander leg. (USNM, 1 ♂ genit. prep., 1 ♂ headless); Contra Costa Co., 4 mi NE Orinda, 15.iii.1954, 1 ♂, B. A. McKinley leg.; Oroville, 23.vii.1926, 1 ♂, H. H. Keifer leg. (both CASC); Palo Alto, salt marshes, 22.iii.1906, 1 ♀, R. W. Doane leg. (LACM ENT329116); Pasadena, 14.ix.1949, 1 ♂, 5.x.1949, 1 ♂, 14.x.1949, 1 ♂, M. R. Wheeler leg. (AMNH); Contra Costa Co., Point Richmond, south slope above Brickyard Cove Rd., 16.iv.1980, 1 ♂ 1 ♀, T. W. Davies leg. (CASC); Humboldt Co., Prairie Ck. Redwoods S. P., Davidson Rd. access, 41°19.27'N 124°02.45'W, sweeps, *Scirpus* sp.1, meadow edge, 8.vi.2009, 3 ♂♂ 1 ♀; same locality but 41°19.29'N 124°02.38'W, sweeps, *Scirpus* sp.2, wet area, 8.vi.2009, 14 ♂♂ 10 ♀♀ (2 ♂♂ 2 ♀♀ genit. prep.), all K. N. Barber leg.; Prosser Creek, near Hobart Mills, 6300', stream margin, 13.vii.1961, 1 ♀, J. G. Chillcott leg. (all CNCI); Alameda Co., Redwood Park, 26.vi.1957, 1 ♀, H. P. Shurtleff leg. (BYUC); Del Norte Co., ~8.3 km NW Requa, mouth of Wilson Ck., 41°36.29'N 124°06.04'W, sweeps, *Eleocharis* sp., creekside, 9.vi.2009, 3 ♂♂, K. N. Barber leg. (CNCI); Rio Hondo, 21.x.1949, 1 ♂, 17.iii.1950, 1 ♀, M. R. Wheeler leg. (AMNH); Solano Co., near Rio Vista, 1.iv.1971, 1 ♀, C. B. Philip leg. (CASC); Rosemead, 17.iii.1950, 1 ♀, M. R. Wheeler leg. (AMNH); Sacramento, 15.iii.1931, 2 ♀♀, 18.iii.1931, 1 ♂, 22.vi.1932, 1 ♂, 30.vi.1932, 1 ♂, alfalfa, 30.iii.1929, 1 ♀, H. H. Keifer leg.; Sacramento Co., Sacramento, Sacramento River Levee, 24.iii.1966, 2 ♂♂ 1 ♀, M. S. Washbauer leg. (all CSCA); San Diego, [-].iv.[-], 1 ♀, E. P. Van Duzee leg. (CASC, with det. as *Anthomyza gracilis* Fallén); Santa Clara Co., San Jose, Guadalupe Crk., 6.vi.1966, 1 ♂, R. E. Orth leg. (UCRC ENT79387); "UP"[Upper?] Santa Ana River, 7.viii.1953, 2 ♂♂, A. L. Melander leg. (USNM, on same pin, 1 ♂ headless); Santa Clara Co., 556, [no date], 1 ♀, Baker leg. (LACM ENT329090); Sonoma Co., Santa Rosa, 27.iii.1965, 1 ♀, J. D. Birchim leg. (CASC), 19.iv.1975, 1 ♂ 1 ♀, J. B. Johnson leg. (WFBM); Lake Co., Seigler Springs, 7.ix.1957, 2 ♂♂ 6 ♀♀, P. H. Arnaud Jr. leg. (USNM, 1 ♂ 2 ♀♀ genit. prep.); Sequoia Pk., 4000 ft, 6.vi.1935, 2 ♂♂ 1 ♀ (1 ♂ headless, genit. prep.), elev. 5000 ft, 6.vi.1935, 1 ♂, el. 6200 ft, 6.vi.1935, 1 ♀, A. L. Melander leg. (USNM); Ventura Co., Sherwood Lk., 26.vii.1952, 1 ♂, R. X. Schick leg. (LACM ENT329089); Smith River, 21.vii.1932, 1 ♀, J. M. Aldrich leg.; Summit Lake, 24.viii.1957, 2 ♂♂; Stanford, [-].vii.1915, 1 ♂ 1 ♀; Sugarloaf Mt., 15.vii.1946, 1 ♀; Valyermo, 13.v.1944, 1 ♀, all A. L. Melander leg. (all USNM); Tehama Co., 4 mi SE Vina, Brush Creek at Hwy 99E, 12.vi.1965, 1 ♂ 1 ♀, [no collector] (UCRC ENT79391–92); Lake Co., Whispering Pines, 14.iv.1964, 1 ♀, C. N. Slobodchikoff leg. (CASC); Mendocino Co., 2 mi N Willits, 23.iv.1968, 5 ♀♀, T. W. Fisher & R. E. Orth leg. (UCRC ENT79382–86); El Dorado Co., Wrights Lake, El Dorado Nat. Forest, 38°50'48"N 120°14'06"W, 2150 m, "mid".viii.2001, 1 ♀, S. D. Gaimari leg. (CSCA); Yosemite, 10.vi.1935, 1 ♂ 2 ♀♀; Yosemite Park, Glacier P[oin]t Road, 1.vii.1947, 1 ♂ (genit. prep.), all A. L. Melander leg. (all USNM). **COLORADO:** Electra Lake, F4367E, ~37°33'N 107°48'W, ~8400', 28.vi.–1.vii.1919, 1 ♀, [no collector] (AMNH); Estes Park, 7500', 2.vii.1961, 1 ♀, C. H. Mann leg. (CNCI); Teller Co., Florissant, Petrified Forest Area, 2530 m, 11.viii.1973, 1 ♂, P. H. Arnaud Jr. leg. (CASC); 3.5 mi S Florissant, Sanborn Ranch, along tributary of Grape Creek, 29.vii.1999, 1 ♀, B. A. Foote leg. (CMNH); Golden, 17.vi.1940, 1 ♀, A. L. Melander leg. (USNM). **IDAHO:** Blaine Co., 2.5 mi NE Carey, 27.viii.1965, 1 ♂, E. J. Allen leg. (WFBM); Kellogg, alt. 2305 ft, 14.viii.1926, 1 ♀, R. W. Haegele leg. (WFBM, Curran det. as *A. pallida* Zett.); Lake Co[e]jur d'Alene, ½ mi E Harrison, 16.vii.1968, 1 ♂ 1 ♀, [no collector]; 5 mi W New Meadows, 10.vii.1968, 1 ♀, [no collector] (all OSAC); Potlatch, 21.ix.1918, 1 ♂ (headless), A. L. Melander leg., 20.vi.1907, 1 ♀, J. M. Aldrich leg.; Priest Lake, 3.ix.1919, 1 ♂ 1 ♀; Priest Lake, 4-Mile Camp, [-].viii.1920, 1 ♂; Priest Lake, Soldier Creek, 22.viii.1919, 4 ♂♂ 5 ♀♀ (1 ♂ genit. prep.), all A. L. Melander leg. (all USNM); Tamarack, 26.vii.1926, alt. 4106', 1 ♀, F. E. Whitehead leg. (AMNH, with det. as *A. pallida* Zett.). **MONTANA:** 2 mi E Babb, 19.vii.1967, 1 ♀, B. A. Foote leg.; 1 mi W Big Fork, 1.viii.1966, 1 ♂, 8.viii.1967, 1 ♂ 6 ♀♀, B. A. Foote leg., 25.vi.1967, 1 ♀, S. Whitney leg.; 2 mi W Big Fork, 9.vii.1967, 4 ♂♂ 18 ♀♀ (1 ♂ genit. prep., wing illustration), B. A. Foote leg., 9.vii.1967, 1 ♀, S. Whitney leg.; 3 mi S Big Fork, 21.vi.1966, 1 ♀, K. Valley leg.; 5 mi E Big Fork, 29.vi.1966, 1 ♂ 3 ♀♀, K. Valley leg., 20.vi.1967, 1 ♂, S. Whitney leg.; 6 mi W Big Fork, 14.vii.1966, 2 ♂♂ 2 ♀♀, S. Whitney leg. (all USNM); 6 mi NW Big Fork, 19.vii.1966, 6 ♂♂ 1 ♀, 27.vii.1966, 2 ♀♀, T. Krystowski leg., 29.vi.1966, 1 ♀, 7.vii.1966, 3 ♂♂ 7 ♀♀, K. Valley leg., 25.vi.1967, 1 ♀, S. Whitney leg.; 8 mi NW Big Fork, 9.vii.1967, 2 ♂♂ 3 ♀♀ (1 ♂ genit. prep.),

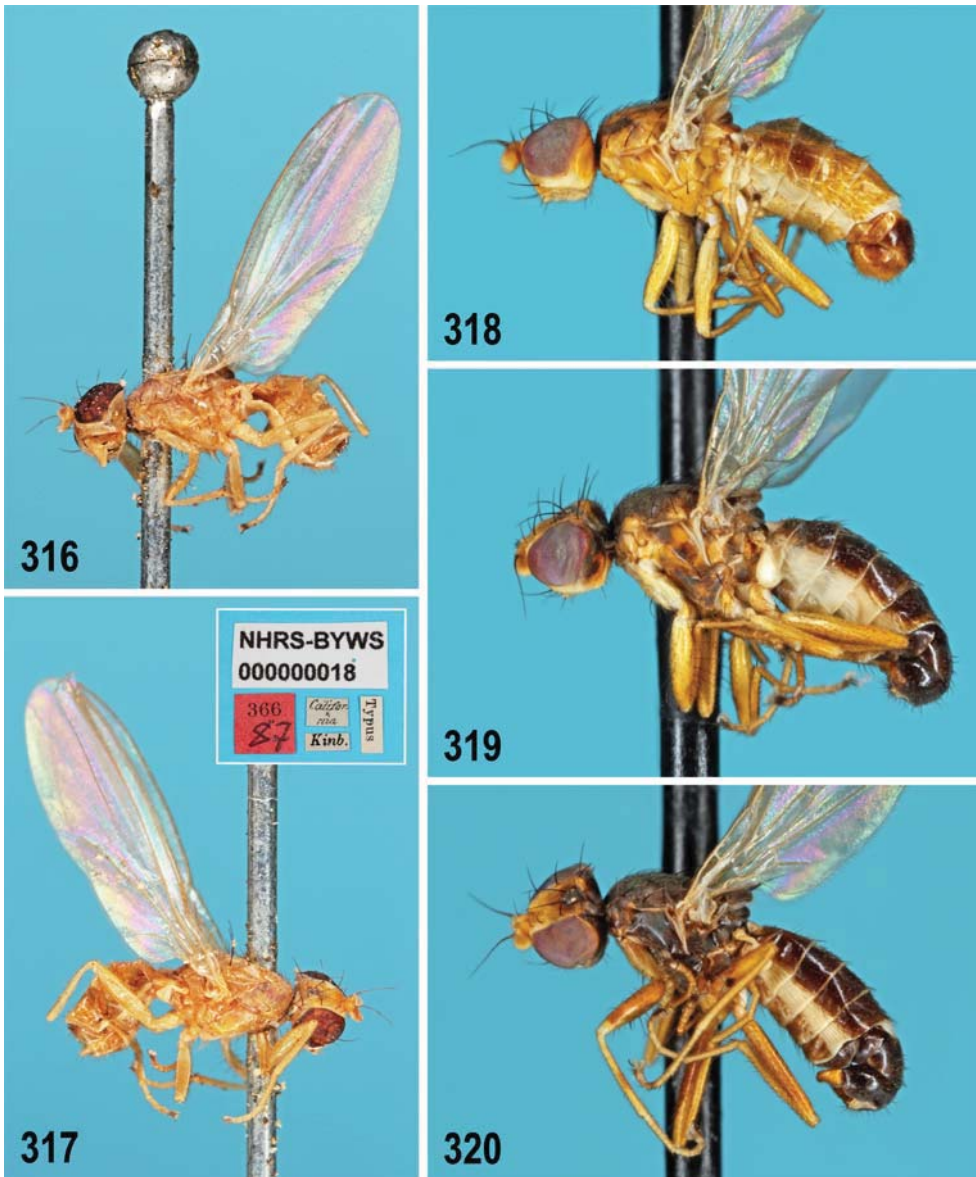
14.vii.1967, 1 ♂, D. Allen leg., 5.vii.1967, 1 ♂ 2 ♀♀, B. A. Foote leg.; 10 mi NW Big Fork, 14.vii.1967, 2 ♂♂ 2 ♀♀, (1 ♂ genit. prep.), 24.vii.1967, 1 ♂ 2 ♀♀ (1 ♀ genit. prep.), D. Allen leg., 27.iv.1964, 1 ♂, T. Krystowski leg., 22.vi.1966, 1 ♀, K. Valley leg.; 15 mi S Big Fork, 4.vii.1967, 1 ♀, B. A. Foote leg. (all USNM); Granite Co., Glint Creek, 5300', 3.1 mi N Philipsburg, 25.vii.2000, 1 ♀, R. Hurley & J. Runyon leg. (MTEC); 3 mi E Polson, 5.vii.1967, 1 ♀, S. Whitney leg.; 4 mi E Polson, 5.vii.1967, 1 ♂ 1 ♀, D. Allen leg.; 15 mi NE Polson, 10.vii.1967, 1 ♀, D. Allen leg. (all USNM); Lake Co., 4 mi E Polson, 8.viii.1972, 1 ♀, W. Mathis leg. (OSAC); 1 mi S Swan Lake, 5.vii.1965, 1 ♀, 1.vii.1966, 3 ♂♂ 1 ♀ (1 ♂ genit. prep.), 30.vi.1967, 3 ♂♂ 2 ♀♀, B. A. Foote leg., 2.viii.1967, 3 ♀♀, S. Whitney leg.; 9 mi N Swan Lake, 21.vi.1966, 1 ♀, K. Valley leg., 19.vii.1966, 4 ♂♂ 2 ♀♀, K. Valley leg.; 14 mi N Whitefish, 28.vi.1966, 1 ♀, B. A. Foote leg.; 20 mi N Whitefish, 30.vi.1966, 1 ♂ 4 ♀♀, B. A. Foote leg., 30.vi.1966, 1 ♀, K. Valley leg., 31.vi.1966, 1 ♂ 1 ♀, T. Krystowski leg. (all USNM). **NEVADA:** Fallon, 23.viii.1957, 1 ♂, A. H. Sturtevant leg. (USNM, genit. prep.); Humboldt Co., E. foot Golconda Summit, 0.5 mi N of Hwy 40, 4800', 26.viii.1965, 1 ♂, H. B. Leech leg.; Wahoe Co., Patrick, 16.vi.1964, 1 ♂, C. N. Slobodchikoff leg.; Sparks, 28.vi.1927, 1 ♀ (genit. prep.), E. P. Van Duzee leg. (all CASC). **NEW MEXICO:** Questa, Red River, river margin, 26.v.1969, 4 ♂♂ 2 ♀♀, W. W. Wirth leg. (USNM); Benton Co., Klamath Co., Aspen Lake, 10.viii.1973, 1 ♂, W. N. Mathis leg. (OSAC); Benton Co., Bellfountain, 13.viii.1962, 2 ♂♂, W. H. Hanson leg. (LACM, 1 ♂ genit. prep.); Deschutes Co., Camp Abbot, 27.v.1944, 1 ♂, P. H. Arnaud leg.; Charleston, Marine Biol. Sta., 9.vii.1954, 1 ♀, M. T. James leg. (both USNM); Deschutes Co., Cline Falls State Park, W of Redmond, Deschutes River, 25.vii.1974, 1 ♀, P. H. Arnaud Jr. leg. (CASC); Benton Co., Corvallis, 15.vii.1972, 4 ♂♂ 3 ♀♀, 16.vii.1973, 7 ♀♀, W. N. Mathis leg. (OSAC); Corvallis, Beach Farm, from soil trap, 14.v.1950, 1 ♀, 2.vi.1950, 1 ♂, 8.vi.1950, 1 ♂, H. E. Morrison leg. (OSAC, Sabrosky det. as *Anthomyza gracilis* Fallén); Corvallis, Oregon [Agricultural] Exp[eriment] Sta[tion], Acc. 1796, 2.v.1915, 1 ♂ 2 ♀♀, A. L. Lovett leg.; [Corvallis], Oregon [Agricultural] Exp[eriment] Sta[tion], Acc. 1788, [no date], 3 ♂♂ (2 ♂♂ headless), G. F. Moznette leg. (all OSAC, all Cole det. as *Anthomyza gracilis* Fallén); Polk Co., 3 mi S Dallas, 19.vii.1971, 1 ♂, G. Steyskal leg. (USNM); Deschutes River, near Redmond, 19.vii.1939, 4 ♂♂, Gray & Schuh leg. (OSAC, Sabrosky det. as *Anthomyza variegata* Loew); Lane Co., Fern Ridge Reservoir, Zumwalt Park, 22.vi.1974, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Benton Co., Finley Refuge, 3.vii.1972, 16 ♂♂ 6 ♀♀, G. Steyskal leg. (USNM); Benton Co., Finley Refuge, 3.vii.1972, 16 ♂♂ 22 ♀♀ (1 ♂ 1 ♀ genit. prep., including det. as *Anthomyza gracilis* Fallén), 19.vii.1972, 6 ♂♂ 15 ♀♀ (1 ♂ headless), 26.v.1975, 1 ♂ 1 ♀; Lane Co., 8 mi S Florence, 29.vi.1972, 1 ♂, all W. N. Mathis leg. (all OSAC); Lane Co., 2 mi S Florence, 7.vii.1971, 1 ♂, G. Steyskal leg.; Forest Grove, "summer".1923, 1 ♂ (genit. prep.), S. E. Keen leg., 8.v.1923, 1 ♀, [no collector] (all USNM); Forest Grove, 6.vi.1918, 1 ♀, F. R. Cole leg. (EMEC, Cole det. as *Anthomyza gracilis* Fallén); "probably Forest Grove (Rockwood)", "23-45", [-].vii.1923, 1 ♂, [no collector] (USNM, with empty puparium); Klamath Co., 2 mi N Fort Klamath, Kimball State Pk., Wood River Spring, 20.vi.1978, 1 ♂, N. L. Herman leg. (AMNH); Hood River, [no date], 1 ♂, Childs leg. (OSAC); Marion Co., Idanha, 6.vii.1971, 1 ♂, G. Steyskal leg. (USNM); Linn Co., 21 mi SE Idanha, 20.vii.1972, 1 ♂ 2 ♀♀, W. N. Mathis leg. (OSAC); Harney Co., Idlewild Campg., Mal[heur] Nat. For[est], 43°50.6'N 118°57.2'W, 1537 m, 8.viii.2005, 1 ♀; Harney Co., King Mt. Lookout Rd., 43°48'N 119°W, 1537 m, 8.viii.2005, 1 ♂, both D. & W. N. Mathis leg. (both USNM); Klamath Co., Klamath For[est] Nat[ional] Wild[life] Ref[uge], 11.viii.1973, 2 ♂♂; Jackson Co., Little Squaw Lk., 8.viii.1973, 7 ♂♂ 4 ♀♀, all W. N. Mathis leg.; Benton Co., McDonald Forest, general sweeping, 15.x.1974, 1 ♀, B. Rose leg.; Benton Co., MacDonald [sic] Forest, 23.iv.1977, 1 ♀, B. Gilmour leg. (all OSAC); Curry Co., Nesika Beach, 42°30.85'N 124°24.59'W, sweeps, roadside *Equisetum telmateia*, 3.vi.2009, 1 ♂ 2 ♀♀; Josephine Co., ~4.1 km E O'Brien, Waldo Rd., 42°03.72'N 123°39.05'W, sweeps, *Juncus* sp. emergent in pond margin, 6.vi.2009, 8 ♂♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); Oneonta Gorge, 9.ix.1934, 1 ♀, A. L. Melander leg. (USNM); Curry Co., Ophir, 42°33.34'N 124°23.48'W, sweeps, *Eleocharis* sp. in very wet area behind low dunes, 3.vi.2009, 16 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI 14 ♂♂ 3 ♀♀, SMOG 2 ♂♂ 1 ♀, 1 ♂ used for molecular work); Josephine Co., Oregon Caves, 3900', 27.vi.1972, 1 ♂ (genit. prep.), G. Steyskal leg.; Harney Co., Page Springs Campg., 42°47'N 118°51'W, 1300 m, 6.viii.2005, 1 ♀, D. & W. N. Mathis leg. (both USNM); Portland, 13.vii.1939, 1 ♀, B. Brookman leg. (CASC); [R. A.] Booth [Memorial] St. Pk., 14 mi W Lakeview, 18.vi.1952, 1 ♂ 2 ♀♀, V. Roth leg. (OSAC, 1 ♂ genit. prep.); Redmond, 1.vi.1939, 1 ♂, Gray & Schuh leg. (OSAC, Sabrosky det. as *Anthomyza gracilis* Fallén); Curry Co., Samuel Boardman S. P., Lone Ranch Beach, 42°06.07'N 124°20.76'W, sweeps, mostly *Equisetum telmateia*, 3.vi.2009, 1 ♀, K. N. Barber leg. (CNCI); Tillamook Co., 2½ mi W Sand Lake, 13.vi.1972, 3 ♂♂ 2 ♀♀, W. N. Mathis leg.; Scappoose, 23.iv.1938, 2 ♀♀, Gray & Schuh leg. (Sabrosky det. as *Anthomyza gracilis* Fallén); Scappoose, *Urtica*

lyalli, 4.iv.1936, 1 ♀, K. Gray & J. Schuh leg. (all OSAC); Coos Co., Seven Devils St. Rec[reaction] Site, 43°14.2'N 124°23.4'W, beach, 30.vii.2005, 1 ♂, D. & W. N. Mathis leg.; Trail, 20.viii.1951, 2 ♂♂, A. H. Sturtevant leg. (1 ♂ genit. prep.); Tumalo St. Pk., 5 mi N Bend, 20.viii.1977, 1 ♂, L. Knutson leg. (all USNM); Yachats, 14.iv.1970, 1 ♂, P. Oman leg. (OSAC). **UTAH:** Weber Co., Head, Beaver Creek, 7.vii.1977, 1 ♂, Hanson & Knowlton leg.; Cache Co., Benson, 10.v.1968, 1 ♂, G. F. Knowlton leg.; Bluff, 28.viii.1938, 1 ♀, G. F. Knowlton & F. C. Harmston leg. (all LACM); Uintah Co., Bonanza, 30.viii.1975, 1 ♀, G. F. Bohart leg. (LACM ENT329096); Weber Co., Eden, 2.vii.1965, 2 ♂♂, G. F. Knowlton leg.; Lakota, 27.v.1966, 1 ♂, R. S. Roberts leg.; Pickleville, 24.vi.1967, 1 ♀, G. F. Knowlton leg. (all LACM); Provo, 26.v.1955, 1 ♂, L. King leg. (BYUC); Strawberry, 5.viii.1938, 1 ♀, G. F. Knowlton & G. S. Stains leg. (LACM); Grand Co., Thompson Springs, 39°02.3'N 109°43.4'W, 1740 m, 1.viii.2007, 1 ♂, D. & W. Mathis leg. (USNM); Wasatch Co., Wasatch Mountain St. Pk., 21.v.1979, 1 ♀, S. Jackson leg. (BYUC); Wellsville, 23.v.1948, 1 ♀, R. S. Bailey leg. (LACM). **WASHINGTON:** Buena, 9.vii.1923, 1 ♀, V. Argo leg. (USNM); Skamania Co., Carson, 6.viii.1951, 1 ♂, M. R. Wheeler leg. (AMNH, genit. prep.); Chimacum, 23.viii.1910, 1 ♀, A. L. Melander leg.; Copalis, 5.vii.1934, 1 ♀ (genit. prep., right wing missing), 5.ix.1934, 1 ♂ 2 ♀♀, A. L. Melander leg., 26.viii.1951, 1 ♂, A. H. Sturtevant leg. (all USNM); Lincoln Co., 19 mi NW Ewan, Snyder Slough, 21.viii.1983, 1 ♀, J. Jenkins & J. M. Sirota leg. (WFBM); Pierce Co., Fort Lewis, Sears Lake, 1.ix.1945, 1 ♀, P. H. Arnaud leg.; Friday Harbor, 29.v[?].1906, 1 ♂, J. M. Aldrich leg.; Ilwaco, 28.vi.1925, 2 ♂♂ (1 ♂ headless), 6.ix.1934, 1 ♀, A. L. Melander leg. (all USNM); Jefferson Co., Kalaloch, 19.vii.1975, 1 ♀, T. L. Whitworth leg. (LACM); Lake, Paha, 20.ix.1920, 1 ♂, R. C. Shannon leg.; Grant Co., O'Sullivan Dam, 21.viii.1954, 1 ♂, H. G. Davis leg. (both USNM); Pullman, 8.vi.1908, 1 ♀, W. M. Mann leg. (LACM ENT329093); Pullman, 1.vi.1924, 1 ♀, A. L. Melander leg. (USNM); Whitman Co., 8 mi SW Pullman, Lyle Grove Biol. Area, 18.vii.1983, 1 ♀, J. Jenkins leg. (WFBM); Grays Harbor Co., Rayonier Park, 5 km N Humptulips, 27.vi.1974, 1 ♀, P. H. Arnaud Jr. leg. (CASC); Seattle, 2.viii.1908, 1 ♀, A. L. Melander leg. (USNM); Pierce Co., Tacoma, 22.vi.1982, 1 ♀ (genit. prep.), 28.vi.1982, 2 ♀♀, 12.viii.1982, 1 ♀, T. L. Whitworth leg. (LACM); Valleyford, 17.v.1924, 1 ♀; Walla Walla, [-].iv.[-], 1 ♂ 1 ♀, all A. L. Melander leg. (all USNM); Grays Harbor Co., Westport, 17.vi.1979, 2 ♂♂, T. L. Whitworth leg. (LACM, 1 ♂ genit. prep.); Whidbey Island nr. Keystone Ferry, 18.ix.1975, 2 ♂♂ 3 ♀♀, G. F. Hevel leg. (USNM, 1 ♂ genit. prep.); Chelan Co., Wenatchee, 2000', Squillchuck Creek, 14.v.1953, 1 ♀, J. Jenkins leg. (WFBM); Yakima, 18.v.1941, 1 ♂, Reeves & Brookman leg. (CASC). **WYOMING:** Johnson Co., 14 mi W Buffalo, No. 5, Clear Creek, 7550', 8.vii.1959, 1 ♀, G. W. Byers leg. (SEMC). **LOCALITY UNKNOWN:** [no locality], 25.x.1966, 1 ♂, [no collector] (UBCZ). **Other *A. pallida*-group material of questionable identity (*Anthomyza* sp. cf. *concolor*).** **UNITED STATES OF AMERICA:** **CALIFORNIA:** Davis, weedy rice field, 26.vii.1955, 1 ♂, W. H. Lange leg. (USNM, abdomen missing); Sacramento, 18.iii.1931, 1 ♀, H. H. Keifer leg. (CSCA). **MONTANA:** 1 mi W Big Fork, 11.vii.1967, 1 ♂, D. Allen leg. (USNM, abdomen missing); 20 mi N Whitefish, 30.vi.1966, 1 spec., B. A. Foote leg. (USNM, abdomen & hind legs missing). **NEW YORK:** Churchville, 25.vii.1942, 1 ♂, H. Stalker leg. (USNM, abdomen lost). **OREGON:** [Corvallis], Oregon [Agricultural] Exp[eriment] Sta[tion], Acc. 1788, [no date], 1 ♂, G. F. Moznette leg. (LACM, abdomen missing).

Redescription. Male. Total body length 2.54–3.18 mm; general colour highly variable, ranging from largely yellow with some pale brown (often faint) to more darkly patterned, with brown markings on head, thorax and abdomen, or largely dark brown with only forehead predominantly yellow (Figs 316–320). Head about as long as high, anteriorly somewhat angular in profile and face distinctly (but not strongly) receding, largely yellow but frons and occiput with variable pale brown to blackish brown darkenings. Occiput slightly concave medially, in pale specimens yellow with ochreous brown to brown crescent-shaped areas surrounding the usual medial pair of silvery white microtomentose spots; in darker adults these brown areas expanded laterally and in darkest specimens occiput largely blackish brown with only very small yellow spots (confluent dorsally with yellow orbital stripes) remaining above medial silvery ones. Frons relatively narrow, largely dull, yellow with only ocellar triangle brownish or brown area extended to cover most of frontal triangle and ocellar triangle blackish brown (in darkest specimens); frontal triangle subshining, with sparse whitish grey microtomentum

that is denser on ocellar triangle. Orbits pale yellow (sometimes darker yellow behind posterior ors), with silvery whitish microtomentum being sparser posteriorly but reaching up to vti. Frontal triangle relatively large, reaching to anterior fourth of frons. Frontal lunule small but distinct, yellow. Face moderately narrow, medially concave to wrinkled, yellow and separated from parafacialia by broad golden-orange marginal stripe also reaching (but narrowly) onto ventral margin of gena; parafacialia and gena whitish yellow, with dense silvery white microtomentum; postgena and mouthparts pale yellow. Cephalic chaetotaxy (all setae black): pvt moderate but strongly crossed; oc and/or vti longest of cephalic setae; vte usually shorter but sometimes almost as long as vti; posterior ors often almost as long as vte; 3 ors, 2 long (middle ors usually slightly shorter than posterior ors) and 1 shorter anterior ors setula (up to half length of middle ors but distinctly weaker); very rarely 1 additional microsetula in front of shorter anterior ors setula; 2 (rarely 1) pairs of medial microsetulae in anterior third of frons; 1 small setula behind vte; postocular setulae (6–8) situated mainly dorsally; lateroventral part of occiput and postgena with several setulae and the latter with 2 short posteroventral setae; 1 long vi (up to as long as posterior ors); subvibrissa very reduced, hardly longer than anterior peristomal setula; only 4–5 peristomals, all relatively long but fine. Palpus slender, yellow, with 1 distinct dark ventral preapical seta and a series of 7–8 setulae subapically and ventrally. Eye subovoid, wider anteroventrally, with longest diameter oblique and 1.3–1.4 times as long as shortest. Gena relatively high, with shortest height 0.15–0.17 times as long as shortest eye diameter. Antenna strongly geniculate, entirely yellow or 1st flagellomere with ochreous brown darkening anterodorsally; 1st flagellomere with short white pilosity. Arista with basal segments brown and distal setiform part blackish brown, about 2.0 times as long as antenna, short-ciliate (cilia as long as those on 1st flagellomere).

Thorax very slightly narrower than head. Scutum with colouration ranging from largely yellow with faint ochreous brown darkenings anteriorly between dc and prs-sa lines, through to extensively brown (or greyish brown) in mainly anterior half with humeral-notopleural area yellow to completely blackish brown. Scutellum also variable, yellow to pale brown (sometimes only medially) or blackish brown. Dorsum of thorax distinctly yellowish grey microtomentose (more visible in dark specimens) and relatively dull. Pleural part of thorax more shining than scutum, either entirely yellow (Fig. 318), with various brown darkenings (Fig. 319) or entirely blackish (Fig. 320) with only sutures between sclerites paler. Postscutellum and postnotum ochreous in yellow specimens to blackish brown in darkest ones. Thoracic chaetotaxy: 1 hu (almost as long as anterior npl) plus 1–3 hu setulae; 2 npl (posterior distinctly shorter); 1 relatively weak prs (about as long as or shorter than hu); sa and pa slightly longer than prs; 2 long postsutural dc (the shorter anterior seta often longer than anterior npl, and posterior seta longest of thoracic setae) and 5–6 dc microsetae in front of them (the hindmost distinctly enlarged, sometimes up to half length of anterior dc and resembling a third dc seta); 4 rows of ac microsetae on suture but only 2 rows between dc setae with hindmost ac pair usually situated slightly beyond level of posterior dc; 2 sc, laterobasal weak (shorter and weaker than pa), apical sc almost as long as posterior dc; 1 minute and hair-like ppl; 2 strong stpl (anterior slightly shorter) and 4–5 upcurved setulae in dorsal half of sternopleuron; its ventral part with 4–6 longer setae. Scutellum rounded triangular, slightly convex dorsally. Legs pale yellow, only distal half to three-fourths of last tarsal segment of all tarsi dark brown

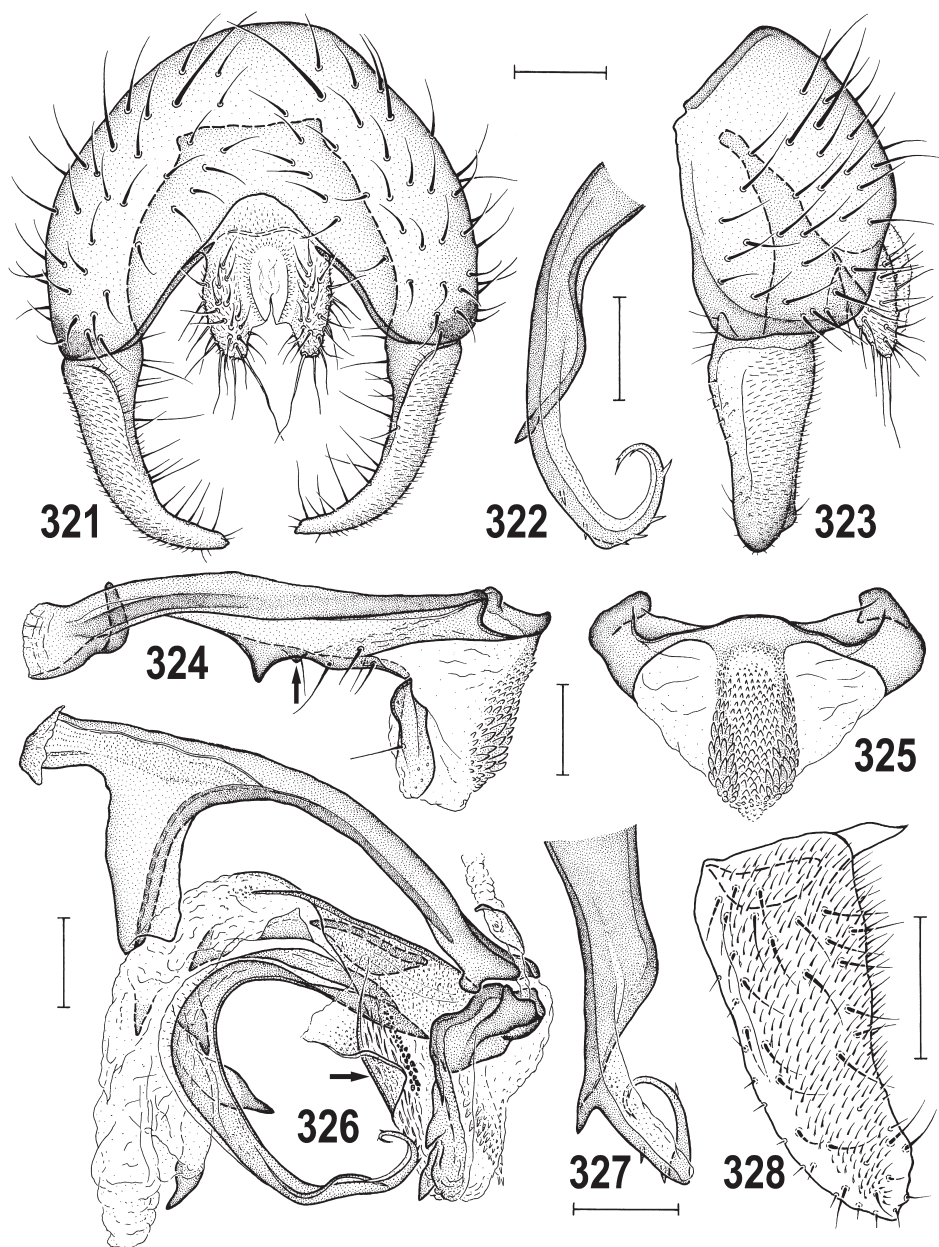


Figs 316–320. *Anthomyza concolor* (Thomson, 1869) and its colour variants. 316 – lectotype female, left laterally, body length 3.08 mm; 317 – the same, right laterally and type labels; 318 – *A. concolor*, male (pale form), laterally, body length 3.02 mm (Canada: BC); 319 – the same, male (intermediate form), laterally, body length 3.18 mm (USA: Oregon); 320 – the same, male (darkest form), laterally, body length 3.10 mm (USA: California). Photo by J. Roháček.

but femora in dark specimens more or less darkened to ochreous or pale brown with knees and bases always yellow; darkest specimens also with coxae and central parts of t_1 and t_3 with brownish tinge. f_1 with ctenidial spine short, not longer than maximum width of t_1 , and with series of usual long but fine setae in posterodorsal and posteroventral rows. f_2 simply setose; f_3 with a long row of posteroventral setae 7–8 of them in distal half shortened and distinctly thickened; t_2 with short ventroapical seta; other tibiae and tarsi simply setulose, only fore and hind basitarsus with 2–3 slightly enlarged setulae ventrobasally; also mid basitarsus with 1 somewhat longer and thicker ventrobasal setula (as in *A. mcalpinei*). Wing (Fig. 336) elongate and relatively narrow, veins and membrane yellowish ochreous. C with distinct sparse spinulae among setulae between apices of R_1 and R_{2+3} . R_{2+3} long, bent parallel to C with apex slightly but distinctly upcurved; R_{4+5} very slightly bent, parallel with similarly bent to almost straight M. Discal cell (dm) relatively long and narrow; r-m situated usually slightly in front of or at middle of cell dm. Apical portion of CuA_1 slightly to distinctly longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula small, moderately narrow. Wing measurements: length 2.81–3.59 mm, width 0.91–1.23 mm, $Cs_3 : Cs_4 = 1.03–1.26$, $rm \setminus dm-cu : dm-cu = 2.18–3.04$. Haltere with knob yellowish white, stem (mainly basally) with darker yellow to ochreous tinge.

Abdomen also with highly variable colouration ranging from entirely yellow (with sterna whitish yellow) in lightest specimens, through to variably brown darkened on terga (with associated sterna yellow to ochreous, Fig. 318) or completely blackish brown (or with paler brown sterna, Fig. 320) in darkest specimens. T1–T5 sparsely greyish microtomentose and subshining, with relatively short and sparse setae. T1 and T2 dorsally separate, only laterally fused. T1–T2 slightly shorter and more transverse than T3–T4, the latter subequal in size; T5 somewhat longer than T3 or T4, all reaching onto lateroventral sides of abdomen. Preabdominal sterna pale yellow to dark brown, relatively broad (all wider than long) and becoming successively wider posteriorly; S1 short and transverse, S2–S5 subequal in length, 1.5 times (S2) to 2 times (S5) wider than long; S5 (widest sternum) most transverse. S2–S5 finely but not densely setose, only S1 bare and with darker posterior marginal stripe. T6 submembranous, short, transverse, bare, whitish yellow to pale brown but with only lateral parts pigmented (best visible in dark specimens). S6–S8 yellow to blackish brown (including various intermediates), S8 usually darkest. S6 and S7 with darker anterior marginal ledge and each with 2–3 setae; S8 longer than epandrium, setose in posterior half.

Genitalia. Epandrium (Figs 321, 323) very variable in colour (Figs 318–320), entirely yellow (in lightest specimens), through to dorsally brown and ventrally yellow or completely blackish brown (in darkest specimens); moderately long and broad but relatively high, setae relatively dense and short, with 2 pairs of longer and thicker setae dorsolaterally; anal fissure small and shallow, rounded triangular (Fig. 321). Cercus relatively short and pale, with fine setae, apical longest. Medandrium (Fig. 321) moderate but wider than in *A. mcalpinei*, dorsally tapered, with dorsolateral corners slightly projecting, ventrally with broad shallow emargination, bare. Gonostylus (Figs 321, 323, 328) elongate, about as long as epandrial height, strongly curved medially (mainly in distal third), slightly tapered towards apex; apex usually relatively blunt and without distinct teeth (Fig. 328), but rarely acute when posterior flange reduced; micropubescent on most of outer side and with longer fine setae only on

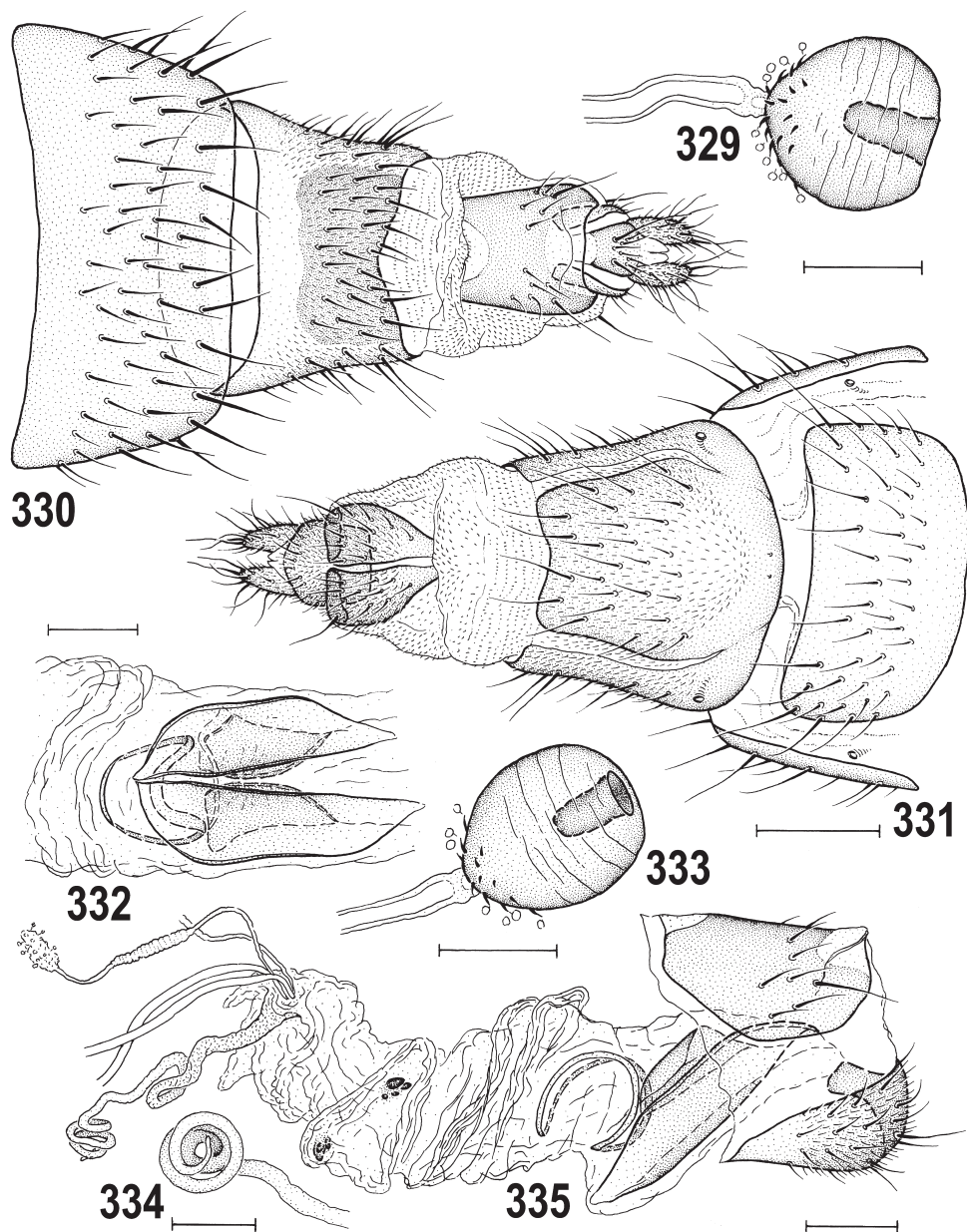


Figs 321–328. *Anthomyza concolor* (Thomson, 1869), male (USA: California). 321 – external genitalia, caudally; 322 – apex of filum, ventrolaterally; 323 – external genitalia, laterally; 324 – hypandrial complex, laterally; 325 – transandrium, caudally; 326 – aedeagal complex, laterally; 327 – apex of filum, ventrally; 328 – gonostylus, ventrolaterally (widest extension). Scales = 0.05 mm (Figs 322, 327) and 0.1 mm (others).

concave inner side. Hypandrium (Fig. 324) generally constructed as in other members of the *A. pallida* group, relatively slender, with reduced anterior internal lobes. Transandrium (Fig. 325) slightly bent and relatively slender, caudal process reduced to a narrow pair of short medial sclerotizations transilient to spinose parts of basal membrane. Pregonite (Fig. 324) largely as in other species of the *A. pallida* group, fused to hypandrium, with acute and medially bent anterior tooth plus (in contrast to relatives) an additional smaller point (see arrow in Fig. 324) behind it that has 1 or 2 tubercles on apex (best viewed ventrally), posteriorly with usual small projection transilient to basal membrane, ventrally usually with 5 (one longer) setae. Postgonite (Fig. 324) flat, of moderate size, most similar to that of *A. occidentalis*, with darker base and pale rounded apex, and with 1 seta situated below middle of anterior margin. Dorsal internal sclerite (normally situated at base of postgonite) flat and pale; it is visible in Fig. 326 (arrow) attached to aedeagal part of folding apparatus). Basal membrane (Fig. 325) with a narrow (in contrast to *A. occidentalis*) area covered by short spines that are larger and darker laterally, and pale and flat medially. Aedeagal part of folding apparatus laterally with a double row of very small dark tubercles in addition to fine and short hyaline striae (as in *A. occidentalis*). Connecting sclerite strong, dark, proximally slender and fused to phallosophore, distally expanded and provided with 2 robust spines (Fig. 326). Phallopodeme as in other members of the *A. pallida* group, relatively slender, with basal part deeply forked, and fulcrum arising not so close to laterally projecting apex (Fig. 326). Aedeagus (Fig. 326) with short phallosophore and large long distiphallus. Saccus long, not much widened distally, membranous, basally darker and with a pair of internal sclerites and a flat ventral plate, distally armed with 5 robust dark-pigmented spines. Filum most resembling that of *A. occidentalis*, long and strongly arched, characterized by robust tooth-like subventral process in front of terminal slender part that is curved and attenuated with a bicuspid apex bearing only 3–4 small spines (Figs 322, 327). Ejacapodeme small, pale, with small curved terminal end (Fig. 326).

Female. Similar to male unless mentioned otherwise. Total body length 3.05–4.19 mm. Head, thorax and abdomen with the same colour variability as described for the male but palest specimens often with faint darkenings on occiput and mesonotum almost indiscernible and darkest specimens with preabdominal sclerites (sterna in particular) paler. Antenna with 1st flagellomere always (also in yellow specimens) with outer side brownish darkened, usually to a larger extent than in male and also in dark specimens with inner side sometimes narrowly infuscated along anterodorsal margin. f_1 with ctenidial spine about as long as maximum width of t_1 ; f_3 without posteroventral row of shortened and thickened setae; darkest specimens with f_1 and f_3 less distinctly brownish darkened. Cross-vein r-m situated often more distinctly in front of the middle of cell dm. Wing measurements: length 3.05–4.21 mm, width 0.99–1.43 mm, $Cs_3 : Cs_4 = 1.02\text{--}1.18$, $rm/dm\text{--}cu : dm\text{--}cu = 2.22\text{--}3.01$. Abdomen with T1–T6 variably coloured, from entirely yellow, through to partly brown or entirely brown. T1–T5 somewhat shorter and more transverse than in male. T1–T2 narrower, T3–T5 widest and subequal in size. Preabdominal sterna whitish yellow to brown, slightly narrower than in male, becoming distinctly wider posteriorly. S2 as long as wide and usually darker than other sterna (except for posterior stripe of S1), S3 slightly, S4 more and S5 distinctly transverse (all slightly trapezoidal). S5 largest and widest but narrower than postabdominal S6.

Postabdomen (Figs 330, 331) relatively long (somewhat longer than in related *A. occi-*



Figs 329–335. *Anthomyza concolor* (Thomson, 1869), female (USA: California). 329 – spermatheca; 330 – postabdomen, dorsally; 331 – the same, ventrally; 332 – female internal sclerites, ventrally; 333 – spermatheca; 334 – apex of ventral receptacle, ventrally; 335 – female genital chamber and T8 and S8, laterally (micropubescence on pleural membrane omitted). Scales = 0.2 mm (Figs 330, 331), 0.1 mm (Figs 332, 335) and 0.05 mm (others).

dentalis), telescopic. T6 simple, large (but slightly narrower than T5), shorter than in *A. occidentalis*, slightly tapered posteriorly, entirely yellow with central brown spot of various size or completely dark brown, with relatively short and dense setae in posterior three-fourths, marginal setae longest. S6 transversely suboblong to trapezoidal with anterior corners rounded or anterior margin almost semicircular, broader than S5, pale yellow to brown and finely (not densely) setose. Tergosternum T7+S7 moderately long (distinctly narrower than in *A. occidentalis*), slightly conical, dorsomedially shortened (anteromedially incised, Fig. 330), longer ventrally, with simple anterior margin (Fig. 331). T7+S7 variable in colour, with brown dorsal spot (Fig. 330) in pale specimens that can be enlarged to eventually cover the entire synsclerite in dark specimens. Ventral part of T7+S7 with original S7 distinctly convex with somewhat sinuous lateral margins and separated laterally from T7 by very narrow membranous slit reaching to anterior fifth or sixth of synsclerite (Fig. 331) with 7th spiracle embedded in original T7 far from this slit (Figs 331, 376). Dorsal part of T7+S7 (Fig. 330) with short thicker setae (in contrast to *A. occidentalis*); ventral part finely setose. 8th segment finely micropubescent on membrane laterally. T8 (Fig. 330) relatively narrow, longer than wide, bent onto sides, brownish but anteromedially and posteromedially with pale-pigmented semicircular areas, in posterior part with pale submarginal lappet; with sparse setae and almost devoid of micropubescence; S8 (Fig. 331) slightly shorter than T8, subcordate, medially divided into 2 convex sclerites that are finely setose, micropubescent and posterodorsally partly invaginated. Genital chamber (uterus) posteriorly with distinctly pigmented internal sclerotizations (Figs 332, 335) consisting of 2 pairs of flat sclerites (larger and elongate pair ventral and smaller short pair dorsal) posteriorly, and 1 subcircular, curved (in profile) annular sclerite anteriorly. Membranous part of genital chamber relatively long, usually with some small spine-like sclerotizations in distal third. Ventral receptacle (Figs 334, 335) very slender, tube-like, hyaline, terminally with coiled vermicular apex. Accessory gland small, vesicular, hyaline, on very slightly dilated and ringed duct. Spermathecae (1+1) shortly ovoid (Figs 329, 333), each with deep and narrow invagination (narrower than in *A. occidentalis*) and a number of small pointed spines in basal part surrounding duct insertion; duct very long and ending simply (without distinct cervix) centrally in spermathecal body. T10 small and narrow (Fig. 330), rounded trapezoidal, wider posteriorly, brownish, with 3–4 pairs of setae (1 long) and without micropubescence. S10 pale ochreous to yellow, distinctly larger and wider than T10, rounded pentagonal in ventral view (Fig. 331), finely setulose and micropubescent. Cercus moderately short and slender, with numerous fine and relatively short setae, apical and dorsopreapical longest.

Discussion. *Anthomyza concolor* (Thomson, 1869) is here confirmed and recharacterized following the examination (with dissection of postabdomen) of the only preserved type specimen, which is designated as the lectotype above. The species belongs to the *Anthomyza pallida* group but, contrary to its name, is highly variably yellow-and-brown patterned and usually not unicolourous; only extremely pale specimens such as the lectotype female are almost uniformly yellow, but these are rather rare; the majority of specimens are bicolourous, having small to large brown darkenings on the body, but some of the darkest are largely blackish brown and have at least head and legs mostly yellow to orange ochreous. Because of this extreme colour variability, the species is difficult to distinguish by mere external appearance, particularly from its similarly variable closest relative, *A. occidentalis*.

Anthomyza concolor, together with *A. occidentalis* sp. nov. and *A. vockerothi* sp. nov., forms the *A. concolor* subgroup, which is characterized as follows: extreme variability in body colouration; saccus with fewer enlarged spines; filum with subterminal (subventral) tooth-like process or spine and with finely bicuspid apex; similarly formed postgonite and spinose area of the basal membrane; similar fulcrum of the phallapodeme; female genital chamber with paired (not fused) and elongate posterior sclerites; female T7+S7 with original S7 fused anteriorly to anterolateral parts of T7 (but separate in *A. vockerothi*); and spermatheca with narrow and deep terminal invagination. Within this subgroup, *A. vockerothi* forms the sister group to *A. concolor* and *A. occidentalis*.

Anthomyza concolor is often difficult to identify using external characters alone, although the darkest specimens differ from relatives in having partly darkened legs, as discussed above. As such, confident identification requires the examination of either the male genitalia (e.g. shape of gonostylus, pregonite with a small tuberculate angle behind anterior tooth, filum with subterminal tooth) or the female postabdomen (structure of T7+S7 in particular), see the key and discussion under *A. occidentalis*.

Biology. Habitats for *A. concolor* are quite varied, including emergent plants such as *Eleocharis* in a wet coastal dune complex (Oregon: Ophir, Fig. 341, with *A. vockerothi* dominant), *Juncus* along the margin of a small pond (Oregon: ~4.1 km E O'Brien, Fig. 315) or non-emergent *Eleocharis* along a river margin (California: ~8.3 km NW Requa, with *A. vockerothi* dominant). Two different species of *Scirpus* mostly yielded *A. concolor* in association with *A. vockerothi* (California: Prairie Creek Redwoods State Park) in open, moist depressions near road accesses. Roadside or ditch graminoids and/or horsetails yielded *A. concolor* with *A. vockerothi* (British Columbia: ~2.9 km NNW Golden, Parson), or *A. concolor* alone (Oregon: Nesika Beach). The role of *Equisetum telmateia braunii* (Milde) Hauke as a potential host plant is discussed under *A. occidentalis*: *A. concolor*, *A. vockerothi* and *A. occidentalis* have all been found in combination with each other in habitat dominated by this very large horsetail. Less specific references are made to a "meadow of *Carex*, cinquoils, *Angelica*, *Juncus*" (British Columbia: Banks Is.), "roadside veg. incl. *Juncus*, *Carex*, *Equisetum*" (British Columbia: E. C. Manning P. Pk.), and "*Carex/Elymus*, sand dunes" (British Columbia: Vancouver Is. – Cape Cook Lagoon). More general descriptors include "large swamp with diverse vegetation" (British Columbia: 16.8 km NE 70 Mile House), "grass/sedge/forbs on sea beach" (British Columbia: Vancouver – Wreck Beach), "vegetation along shoreline" (California: L. Berryessa), and "grasses on top of high bluff" (California: Jedediah Smith Redwoods S. P. – Enderts Beach). Adults of *A. concolor* have been collected from 9 March (California: Coyote) to 12 November (California: Fresno).

Distribution. Previously published records for *A. concolor* are limited to THOMSON'S (1869) original species description, while SABROSKY (1965) and COLE (1969) simply list the species from California because the species concept has until now remained unrecognizable in the Nearctic fauna. Records are summarized here as Canada: Alberta, British Columbia, Saskatchewan; United States of America: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming (see Table 2, Fig. 600). Based on these data, *A. concolor* seems to be a western Nearctic species. Consequently, a single male from the east (New York: Churchville), whose identity could not be confirmed (abdomen lost), could represent either an occasional outlier eastern record or (more probably) a mislabelled specimen.

***Anthomyza occidentalis* sp. nov.**

(Figs 337, 339, 343–356, 377)

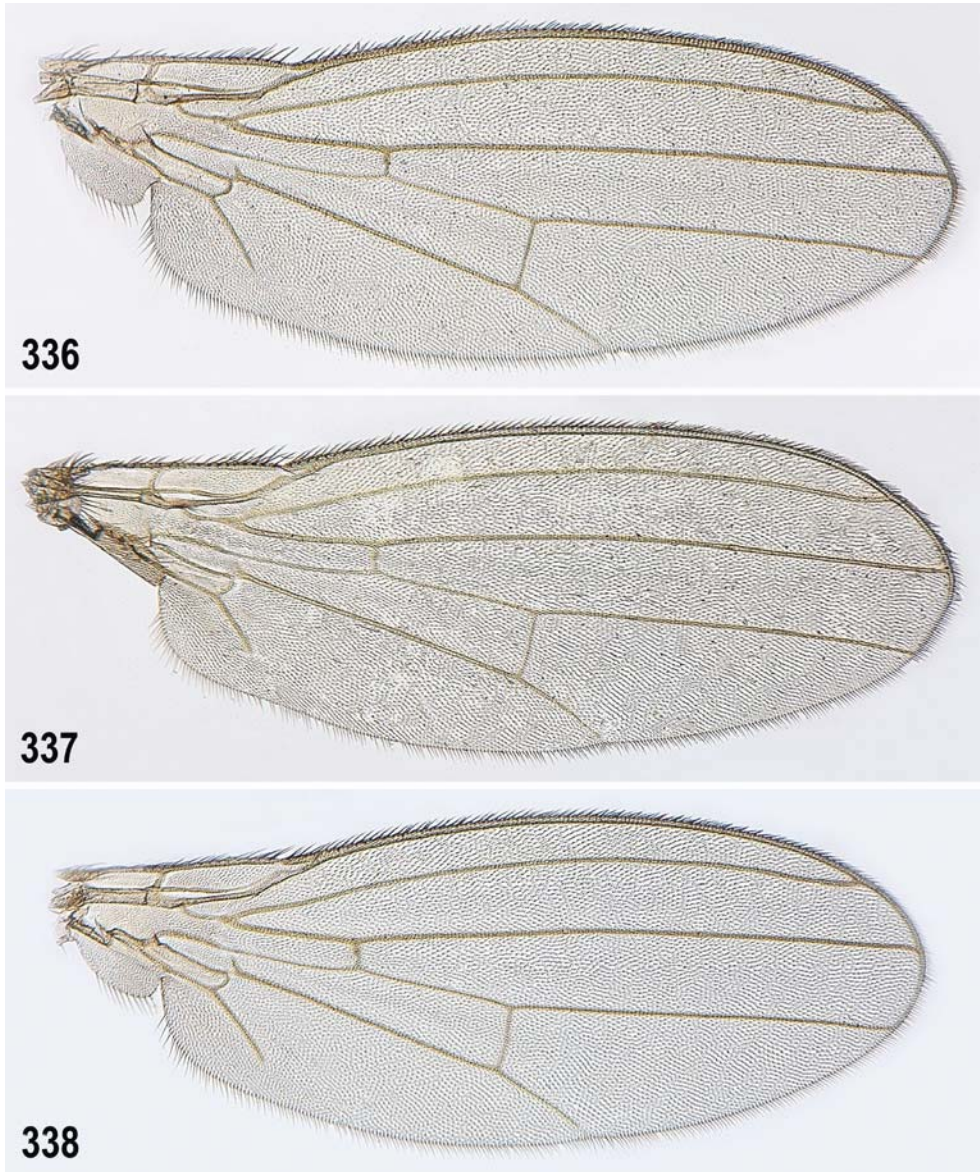
Type material. HOLOTYPE: ♂, “USA: OR: Lane Co., Tokatee Klootchman St.Nat.Site., ~7.9kmS Yachats, 10.vi.2009, KN Barber, sweeps, mostly *E. tel-mateia*, *Angelica*, base of cliff 44°12.47'N 124°06.90'W” and “Holotypus ♂ *Anthomyza occidentalis* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen (largely yellow coloured, Fig. 339) is in good condition, with partly visible gonostylus (DEBU, intact). PARATYPES: **CANADA: BRITISH COLUMBIA:** Milner, 12.vii.1953, 1 ♀, G. J. Spencer leg. (CNCI, genit. prep., right wing missing). **UNITED STATES OF AMERICA: CALIFORNIA:** Cambria, Santa Rosa Creek Trail, 35°33.94'N 121°06.03'W, sweeps, *Equisetum telmateia braunii* & *Delairea odorata* under canopy, 3.v.2014, 1 ♀, 4.v.2014, 1 ♂, K. N. Barber leg. (LACM); Mendocino Co., Inglenook Fen, fen area, 30–50', 11.viii.1972, 2 ♂♂ 1 ♀ (1 ♂ 1 ♀ genit. prep., 1 ♂ with det. as *Anthomyza pallida*), 22.vii.1972, 2 ♀♀ (1 ♀ genit. prep.), E. I. Schlinger leg. (EMEC, UCIS-215194, -233, -249, -597, -599); Marin Co., 2 air mi W. Inverness, 1.v.1976, 1 ♀, J. Doyen & P. Rude leg. (EMEC, genit. prep.); San Francisco Co., Lake Merced, 7.v.1927, 1 ♂, C. L. Fox leg. (genit. prep., wing illustration); San Francisco, Lake Merced, collected with flight trap in willow thicket, 21.vi.1964, 2 ♂♂ (both genit. prep.), collected in willow thicket near lake, 1.viii.1964, 3 ♂♂ (2 ♂♂ genit. prep.), P. H. Arnaud Jr. leg.; Humboldt Co., McKinleyville bog area nr. Azalea Avenue, 9.vii.1980, 1 ♂ 1 ♀ (1 ♂ genit. prep.), T. W. Davies leg. (all CASC); Morro Bay, 27.vii.1940, 1 ♂ (genit. prep.), A. L. Melander leg.; Pacific Grove, 4.vii.1921, 1 ♂, A. H. Sturtevant leg. (both USNM); Marin Co., Point Reyes, 19.iv.1980, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU); Humboldt Co., Prairie Ck. Redwoods S. P., Elk Prairie Cmpgd., 41°21.63'N 124°01.73'W, sweeps, riparian *Scirpus* sp., 8.vi.2009, 1 ♂, K. N. Barber leg. (CNCI); Rosemead, 17.iii.1950, 1 ♂ 1 ♀, A. H. Sturtevant leg. (USNM); Los Angeles Co., Rosemead, 17.iii.1950, 5 ♂♂ 4 ♀♀ (3 ♂♂ 1 ♀ genit. prep.), 22.iii.1950, 1 ♂ 1 ♀ (1 ♂ genit. prep.); San Mateo Co., San Francisco, 18.v.1950, 2 ♂♂ 2 ♀♀ (1 ♂ 1 ♀ genit. prep.), all M. R. Wheeler leg. (all AMNH); San Francisco, 1.viii.1915, 1 ♂, A. L. Melander leg. (USNM, genit. prep.). **OREGON:** Curry Co., Cape Blanco, 29.vi.1972, 1 ♂, W. N. Mathis leg.; Curry Co., 8 mi N Gold Beach, 29.vi.1972, 3 ♂♂ 1 ♀ (2 ♂♂ 1 ♀ genit. prep.), G. Steyskal leg. (all USNM); Curry Co., Samuel Boardman S. P., Lone Ranch Beach, 42°06.07'N 124°20.76'W, sweeps, mostly *Equisetum telmateia*, 3.vi.2009, 2 ♂♂; Lane Co., Tokatee Klootchman St[at]e Nat[ural] Site., ~7.9 km S Yachats, 44°12.47'N 124°06.90'W, sweeps, mostly *E. telmateia*, *Angelica*, base of cliff, 10.vi.2009, 5 ♂♂ 3 ♀♀, all K. N. Barber leg. (CNCI 4 ♂♂ 2 ♀♀, 1 ♂ 1 ♀ genit. prep., SMOC 1 ♂ 1 ♀, both genit. prep.). **WASHINGTON:** Friday Harbor, 6.vii.1905, 1 ♂ 2 ♀♀, J. M. Aldrich leg. (USNM, 1 ♂ 1 ♀ genit. prep., 1 ♀ with det. as *Anthomyza pallida* Zett.); Pierce Co., Tacoma, 22.vi.1982, 1 ♀, T. L. Whitworth leg. (LACM); Whidbey Island nr. Keystone Ferry, 18.ix.1975, 1 ♀, G. F. Hevel leg. (USNM). **Other material examined (not included in type series).** **UNITED STATES OF AMERICA: CALIFORNIA:** Asilomar, 1.ix.1945, 1 ♂, A. L. Melander leg. (headless, genit. prep.); Pacific Grove, 4.vii.1921, 1 ♂ (headless, genit. prep.), A. H. Sturtevant leg. (both USNM). **OREGON:** Curry Co., 8 mi N Gold Beach, 29.vi.1972, 1 ♂, G. Steyskal leg. (USNM, headless, genit. prep.). **WASHINGTON:** Whidbey Island nr. Keystone Ferry, 18.ix.1975, 1 ♀, G. F. Hevel leg. (USNM, genit. prep., legs and one wing missing).

Description. Male. Total body length 2.58–3.10 mm. Externally very similar to *A. concolor* including the (slightly less) variable body colour (Fig. 339), ranging from largely yellow to largely brown, although the latter variant seems to be comparatively infrequent. Head about as long as high or somewhat longer than high, anteriorly distinctly angular in profile and face receding (more than in *A. concolor*), largely yellow but frons and particularly occiput with variable pale to dark brown markings. Occiput distinctly concave medially, in pale specimens light yellow with dark yellow to ochreous brown crescent-shaped areas surrounding the medial pair of silvery white microtomentose spots; in darker specimens these areas darker and widened laterally; in darkest specimens occiput largely brown to dark brown (including small spot behind ocellar triangle), with only medial area above foramen (= ground of silvery white microtomentose spots) yellow and connected dorsally with orbital stripes. Frons relatively narrow, largely dull, pale to dark yellow with only ocellar triangle brownish (lighter in pale specimens), in darkest adults also middle of frontal triangle (usually pale) brown and ocellar triangle blackish brown; frontal triangle subshining, with sparse whitish grey to white

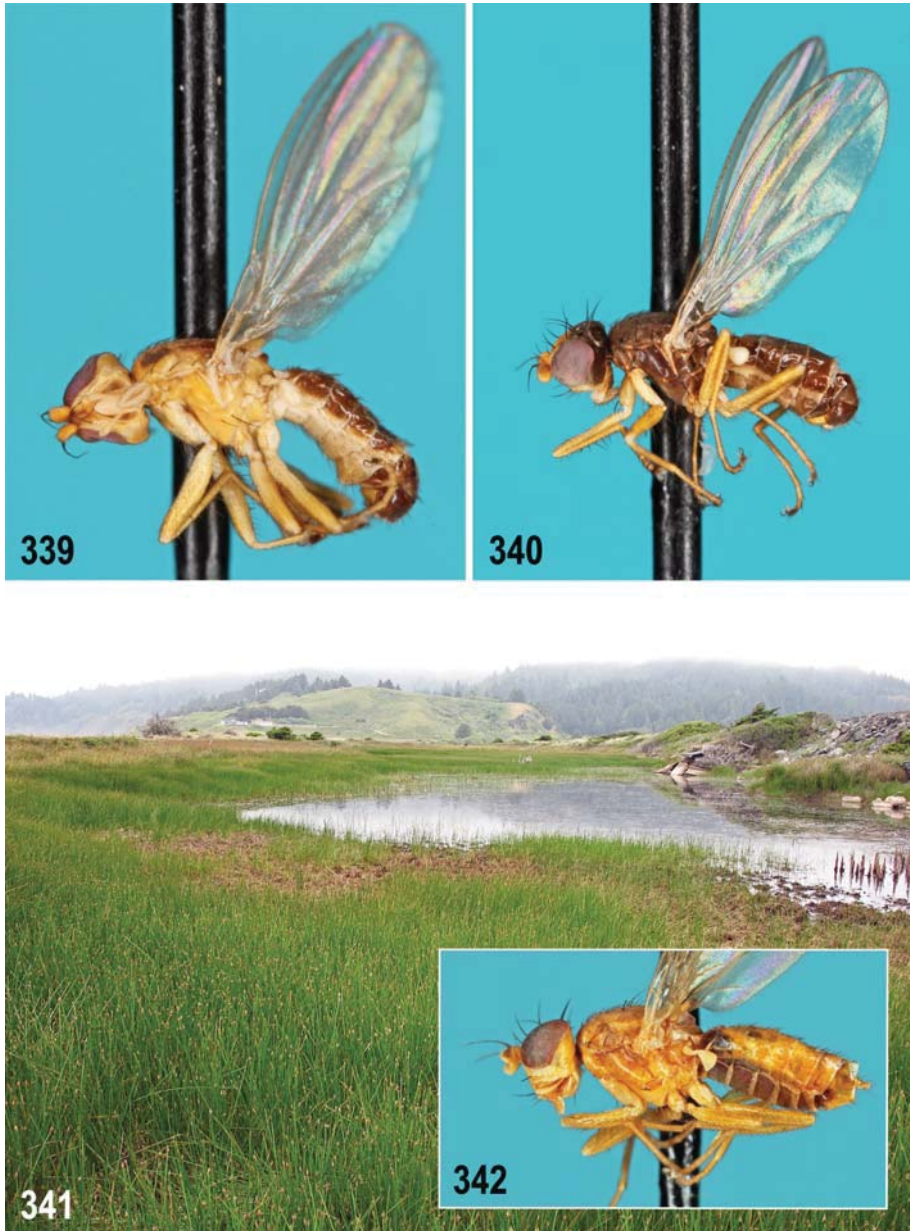
microtomentum (denser and finer on ocellar triangle). Orbits pale to whitish yellow with sparse silvery white microtomentum as in *A. concolor*. Frontal triangle narrower (posteriorly only slightly wider than ocellar triangle) and shorter than in *A. concolor*, reaching to anterior third of frons. Frontal lunule small, yellow. Face, parafacialia and gena formed, coloured and microtomentose as in *A. concolor*; postgena, ventral part of occiput and mouthparts pale yellow to yellow (also in darkest specimens). Cephalic chaetotaxy (all setae black) as in *A. concolor* but pvt usually (sometimes surprisingly) long and strongly crossed, no additional microsetula in front of shorter anterior ors setula; subvibrissa similar to foremost peristomal setula and peristomals (4–6) usually shorter. Palpus as in *A. concolor*, including chaetotaxy. Eye subovoid, broader anteroventrally, with longest diameter oblique and 1.5–1.6 times as long as shortest. Gena lower than in *A. concolor*, with shortest height 0.11–0.13 times as long as shortest eye diameter. Antenna geniculate, entirely yellow; 1st flagellomere with white pilosity somewhat longer than in *A. concolor*. Arista with basal segments ochreous to brown and distal setiform part blackish brown, the latter about 2.1 times as long as antenna, short-ciliate (cilia somewhat shorter than those on 1st flagellomere).

Thorax hardly narrower than head. Scutum with variable colouration ranging from almost entirely yellow, through yellow with various brownish darkened areas (lateral stripes outside of dc lines, medial area in posterior half) to almost entirely dark brown (usually with paler brown notopleural area). Scutellum yellow, with various brown darkening medially to almost completely dark brown (often with paler margins). Dorsum of thorax with distinct yellowish grey microtomentum (best visible in darkest specimens) and relatively dull. Pleural part of thorax more shining than scutum, most often entirely yellow or with various brown markings (more dorsally) to largely dark brown with only small areas (usually ventrally) ochreous brown to yellow. Postscutellum (this always darker) and postnotum yellow to ochreous to dark brown. Thoracic chaetotaxy very similar to that of *A. concolor* but anterior dc longer than all other setae on scutum except for posterior dc (being longest thoracic seta) and hindmost dc microseta unusually enlarged and resembling a third dc macroseta (sometimes there is 1 additional, more anterior, enlarged dc microseta); sternopleuron with 4–6 upcurved setulae in dorsal half and with 4–5 longer setae ventrally. Scutellum rounded subtriangular, slightly to distinctly convex dorsally. Legs pale yellow to deep yellow (also in darkest specimens in contrast to *A. concolor*), only distal half to four-fifths of last tarsal segment of all tarsi dark brown. Pedal chaetotaxies as in *A. concolor* but f_1 with ctenidial spine as long as or slightly longer than maximum width of t_1 and f_3 with 6–9 (usually 8–9) shortened and thickened setae in posteroventral row. Wing (Fig. 337) extremely similar to that of *A. concolor* including venation but R_{4+5} and M usually more distinctly bent and r-m often situated distinctly in front of middle of discal cell (dm). Wing measurements: length 2.79–3.38 mm, width 0.97–1.12 mm, $Cs_3 : Cs_4 = 0.97-1.12$, $rm(dm-cu : dm-cu = 2.15-2.61$. Haltere yellowish white with slightly darker stem (as in *A. concolor*).

Abdomen also variable in colouration, although less so than in *A. concolor*. Colour of pre-abdominal terga (T1–T5) largely yellow to ochreous only in palest specimens and completely brown in darkest specimens, but in others with various darker markings: T1–T3 usually more darkened than T4–T5 or T1–T3 entirely brown and T4–T5 partly ochreous yellow. T1–T5 sparsely greyish microtomentose and subshining, with relatively short and sparse setae as



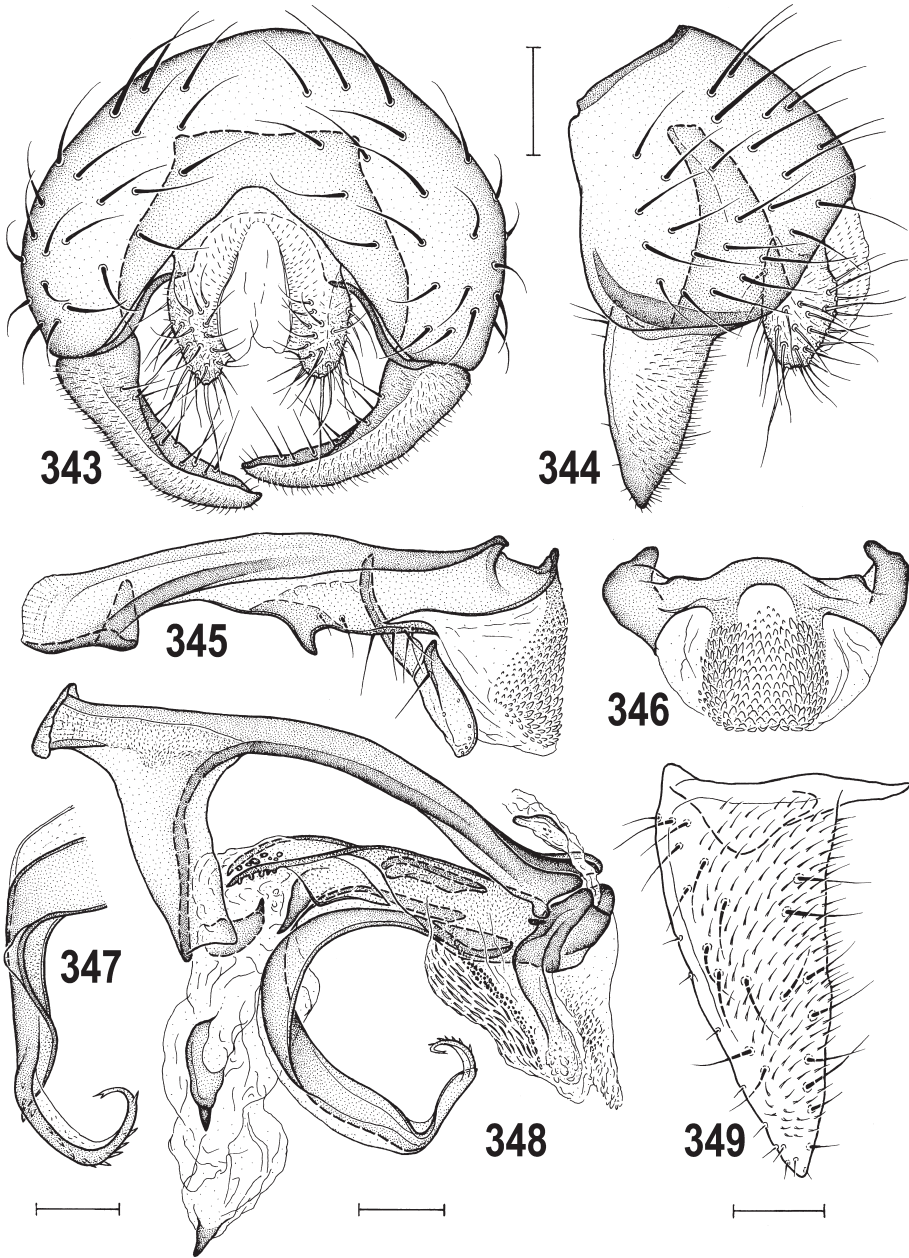
Figs 336–338. Wings of the Nearctic species of the *Anthomyza pallida* group. 336 – *A. concolor* (Thomson, 1869), male, wing length 3.1 mm (USA: Montana); 337 – *A. occidentalis* sp. nov., male, wing length 3.2 mm (USA: California); 338 – *A. vockerothi* sp. nov., male, wing length 2.8 mm (Canada: Ontario). Photo by K. N. Barber.



Figs 339–342. Primary types, colour variant and habitat of the *Anthomyza concolor* subgroup. 339 – *A. occidentalis* sp. nov., holotype male, laterally, body length 2.94 mm; 340 – *A. vockerothi* sp. nov., holotype male, laterally, body length 2.58 mm; 341 – growth of predominant *Eleocharis* sp. between dune and shallow pool at Ophir (USA: Oregon), habitat of *A. vockerothi* and *A. concolor*; 342 – *A. vockerothi* sp. nov., female (pale form), laterally (Canada: British Columbia), body length 3.22 mm. Photo by K. N. Barber (Fig. 341) and J. Roháček (others).

in *A. concolor*. T1 and T2 dorsally distinctly separate but laterally fused. T1 shortest, T2 slightly shorter than T3–T4, the latter subequal in size; T5 slightly longer than T4, all terga bent onto lateroventral sides of abdomen. Preabdominal sterna pale yellow to ochreous, in dark specimens S1, S2 and S5 (this usually partly) brown darkened, all relatively broad and becoming slightly wider posteriorly; S1 as in *A. concolor*, S2 slightly wider than long, S3–S5 about 1.5 times wider than long; S3–S4 transversely suboblong, S5 not wider than S4 but with posterior margin slightly emarginate. S2–S5 finely but not densely setose, S1 bare and with usual darker posterior stripe. T6 very short and transverse, bare, submembranous, pale yellow to ochreous brown but with only lateral parts pigmented (usually poorly visible). S6–S8 brown to dark brown, S8 darkest but usually paler than epandrium. S6 and S7 with darker anterior marginal ledge, S6 with 2–3, S7 with 2 relatively long setae; S8 about as long as epandrium, paler at anterior margin, setose in posterior half.

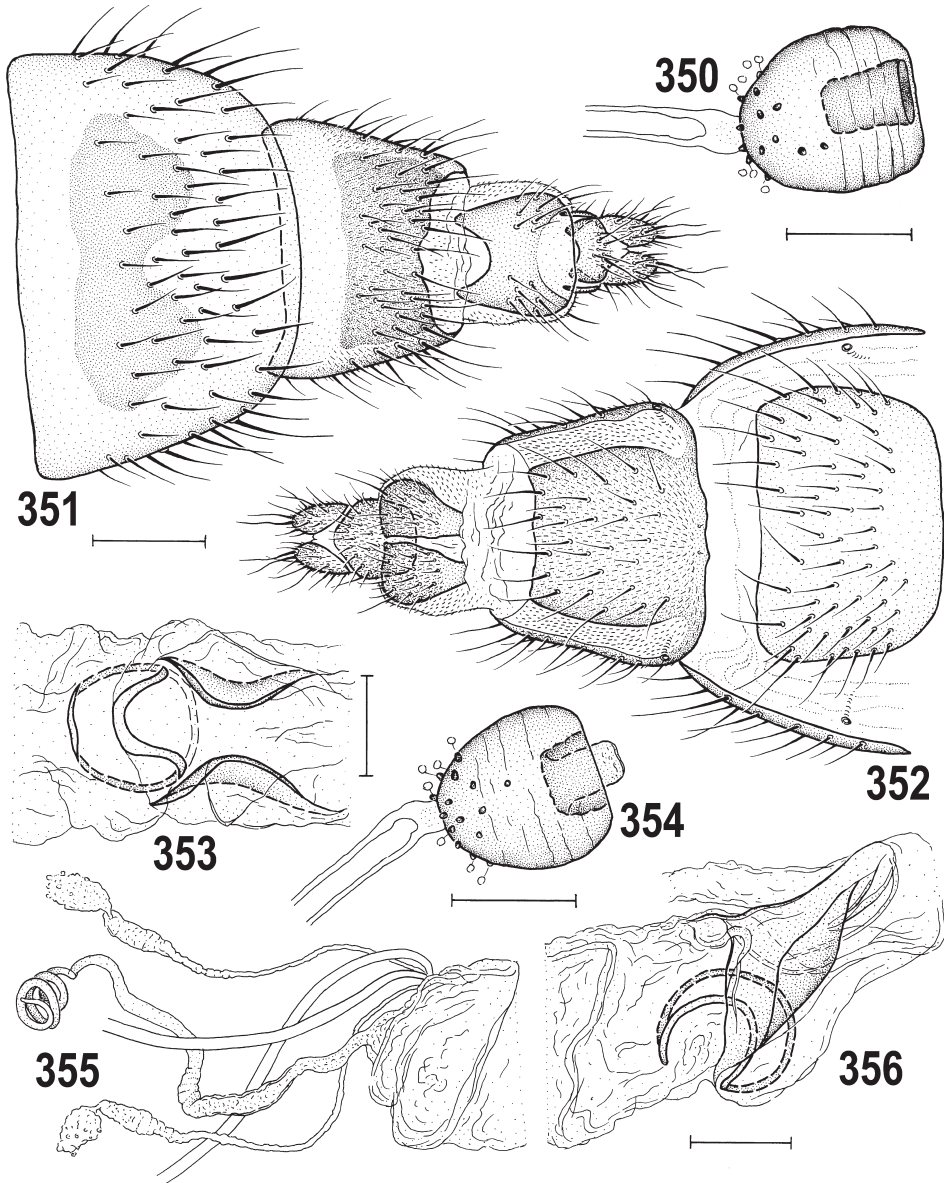
Genitalia. Epandrium (Figs 343, 344) uniformly brown to blackish brown, distinctly longer, of shorter height and particularly broader than in *A. concolor*, with sparser setae than in latter species, several (2–3 dorsolateral pairs) of them longer than others; anal fissure larger and wider than that of *A. concolor*, triangular (Fig. 343). Cerci more robust and more distant from each other (Fig. 343), with a number of fine setae, apical longest. Medandrium (Fig. 343) moderate and formed as in *A. concolor* but ventrally with deeper semicircular emargination. Gonostylus (Figs 343, 344, 349) distinctly different from that of *A. concolor* and other relatives, elongate but somewhat shorter than epandrial height, regularly bent medially, tapered towards an acutely pointed apex (Fig. 349), in lateral view with anterior margin distinctly convex (Fig. 344), micropubescent on most of outer side and with relatively long fine setae on concave inner side. Hypandrium (Fig. 345) similarly formed to that in *A. concolor* but more robust. Transandrium (Fig. 346) thicker than in *A. concolor* and distinctly arched dorsomedially, without distinct caudal process except for a (broadly set) pair of short sclerotizations transilient to spinose parts of basal membrane. Pregonite (Fig. 345) somewhat different from that of *A. concolor*, with anterior tooth acute and bent posteromedially, but small angled, tuberculate protuberance behind it lacking; posteriorly with usual narrow projection transilient to basal membrane; pregonite with 6–7 (one longer) setae ventrally. Postgonite (Fig. 345) flat, similar to that in *A. concolor* but having simple base attached to a distinct internal dorsal sclerite and 1 anterolateral seta situated near base. Basal membrane (Fig. 346) with spinose area wider and shorter than in *A. concolor* (darker spines laterally, pale and flat medially). Aedeagal part of folding apparatus laterally with a double row of very small dark tubercles (Fig. 348) as in *A. concolor*. Connecting sclerite strong and dark proximally, distally less sclerotized, lighter and with only small pale tubercles (without spines) (Fig. 348). Phallapodeme similar to that in *A. concolor*, including position of fulcrum, which is basally broader. Aedeagus (Fig. 348) also resembling that of *A. concolor* but saccus with different armature, base without flat ventral plate but with a weak lateral sclerotization partly overlapping basal spine, and with only 4 robust dark-pigmented spines, 1 or 2 of which have bases dilated and sclerotized. Filum also most similar to that of *A. concolor* but having only small spines (instead of one robust tooth-like process) in front of terminal slender part, and its curved apex (with bicuspid tip) provided with more (up to 10) small spines (Fig. 347). Ejacapodeme small, pale, with thicker but short terminal end (Fig. 348).



Figs 343–349. *Anthomyza occidentalis* sp. nov., paratype male (USA: Oregon). 343 – external genitalia, caudally; 344 – the same, laterally; 345 – hypandrial complex, laterally; 346 – transandrium, caudally; 347 – apex of filum, lateroventrally; 348 – aedeagal complex, laterally; 349 – gonostylus, lateroventrally (widest extension). Scales = 0.05 mm (Figs 347, 349) and 0.1 mm (others).

Female. Similar to male unless mentioned otherwise. Total body length 3.01–3.77 mm. Head, thorax and preabdomen with similar colour variations to those in male, but dark specimens rarer and lightest specimens with darkenings on occiput and mesonotum very faded to absent. Antenna with 1st flagellomere ochreous to brownish darkened on anterodorsal half of outer side; inner side of 1st flagellomere sometimes (also in pale specimens) similarly or less infuscated. f_1 with ctenidial spine as in male but f_3 lacking posteroventral row of shortened and thickened setae. Wing measurements: length 3.43–4.01 mm, width 1.15–1.39 mm, $Cs_3 : Cs_4 = 0.98–1.18$, $rm \setminus dm-cu : dm-cu = 2.08–2.67$. Abdomen with T1–T6 of variable colouration, ranging from entirely yellow, through partly brown to entirely brown. T1–T5 somewhat shorter and more transverse than in male. T1 distinctly, T2 slightly narrower than T3, T3–T5 widest and subequal in size or T5 slightly longer. Preabdominal sterna whitish yellow to ochreous, not narrower than in male, S3–S5 becoming only slightly wider posteriorly. S2 distinctly transverse, about 1.5 times as long as wide and usually darker (or with central brownish spot) than other sterna (except for the usual dark posterior stripe of S1), S3–S5 distinctly suboblong, up to twice as long as wide. All S2–S5 densely finely setose.

Postabdomen (Figs 351, 352, 377) somewhat shorter and wider than in *A. concolor*, telescopic. T6 large, longer and narrower than in *A. concolor*, slightly tapered posteriorly and with posterior corners broadly rounded, yellow and (often) with central brown spot of various extent or completely brown, with relatively short and dense setae in posterior two-thirds, marginal setae longest. S6 transversely suboblong to trapezoidal with anterior corners rounded, also longer than in *A. concolor*, pale yellow to pale ochreous and (in contrast to *A. concolor*) densely setose. Tergosternum T7+S7 moderately long, slightly tapered posteriorly, dorsomedially less shortened (not incised anteromedially) than in *A. concolor*, ventrally shorter and with simple anterior margin. T7+S7 variable in colour, yellow with large brown dorsal spot (Fig. 351) in pale specimens to completely dark brown (also ventrally brown) in darkest specimens. T7+S7 ventrally less convex than in *A. concolor*, with lateral margins of original S7 relatively straight (Fig. 377) and separated from T7 by wider membranous slit almost reaching to anterior margin of synsclerite with 7th spiracle embedded in T7 close to this slit (Figs 352, 377). Dorsal part of T7+S7 (Fig. 351) with dense, fine and longer setae (in contrast to *A. concolor*); ventral part finely setose. 8th segment with finely densely micropubescent membrane laterally. T8 (Fig. 351) wider than in *A. concolor*, slightly longer than wide, bent onto sides, brownish, with deep anteromedial emargination and posteromedially with pale-pigmented semicircular area, sparsely setose, and without micropubescence; S8 (Fig. 352) slightly shorter than T8, subcordate and medially divided as in *A. concolor*. Genital chamber (uterus) posteriorly with pigmented internal sclerotization (Figs 353, 356) composed of only 1 pair of flat crooked sclerites (medially more separated than those of *A. concolor*, cf. Fig. 353 versus Fig. 332) and 1 subcircular, curved (in profile) annular sclerite situated anteroventrally to the former. Membranous part of genital chamber long, as in *A. concolor*, without additional small sclerotizations. Ventral receptacle (Fig. 355) very slender and long, tubular and hyaline, with coiled vermicular apex, thus resembling that of *A. concolor*. Accessory gland small, vesicular, hyaline, on distally slightly dilated but indistinctly ringed duct. Spermathecae (1+1) shortly ovoid with somewhat flattened distal end (Figs 350, 354); with deep invagination (distinctly broader than in *A. concolor*) which may be partially everted, and with several small tubercular



Figs 350–356. *Anthomyza occidentalis* sp. nov., paratype female (USA: Oregon). 350 – spermatheca; 351 – postabdomen, dorsally; 352 – the same, ventrally; 353 – female internal sclerites, ventrally; 354 – spermatheca; 355 – distal part of female genital chamber, laterally; 356 – female internal sclerites, laterally. Scales = 0.2 mm (Figs 351, 352), 0.05 mm (Figs 350, 354) and 0.1 mm (others).

(not pointed) spines in basal part; duct very long and ending without obvious cervix centrally in spermathecal body. T10 pale brown, small and shorter than long (Fig. 351), rounded and wider posteriorly and emarginate anteriorly, with 3–5 pairs of setae (1 long) and reduced micropubescence. S10 yellowish, larger and wider than T10, pentagonal in ventral view (Fig. 352), finely setulose and micropubescent. Cercus moderately short, slightly wider than in *A. concolor*, with fine and relatively short setae, apical and dorsopreapical longest (Figs 351, 352).

Discussion. *Anthomyza occidentalis* sp. nov. is one of the largest representatives of the genus and is supported as being closely allied to *A. concolor*, externally resembling this species in numerous aspects including large body size and striking colour variability. Structures of the male genitalia are especially supportive of a sister-species relationship, having a similarly formed fulcrum of the phallapodeme, similar armature of the basal membrane and aedeagal part of folding apparatus, and similar construction and armature of the saccus and filum of the aedeagus. The short, narrow frontal triangle is one of a few external features distinguishing *A. occidentalis* from *A. concolor*, but the genitalia of both sexes provide a number of often small differences useful for diagnosis. For the *A. occidentalis* male: epandrium broad, gonostylus pointed and differently curved, pregonite without small tuberculate angle behind anterior tooth and with more setae, postgonite with basally situated seta, basal membrane with spinose area broad and short, saccus with only 4 spines and some with expanded bases, filum without subterminal tooth but with more small spines on apex, and connecting sclerite without spines apically. For the *A. occidentalis* female: T6 and S6 both longer and narrower, dorsal part of T7+S7 without anterior emargination or long fine setosity, ventral part of T7+S7 less convex and S7 component shorter and more separated from T7, 7th spiracle close to margin of T7, T8 shorter, internal sclerotization of the genital chamber with only 1 pair of more separated posterior sclerites, spermathecae with wider invagination and spines reduced to blunt tubercles, and T10 short and transverse.

Etymology. The name of this new species refers to its strictly western distribution; Latin adjective *occidentalis* meaning western.

Biology. The type locality (Oregon: Tokatee Klootchman State Natural Site, Fig. 314) contained a relatively narrow patch of *Equisetum telmateia braunii* and an unidentified species of *Angelica* at the base of a coastal cliff; the latter species is unlikely to serve as a host for *A. occidentalis*. The central role of *E. telmateia braunii* as a host plant is further implicated in two other separate collections (California: Cambria; Oregon: Samuel Boardman St. Pk.). The Cambria site had a very simplified vegetative cover with only the horsetail and the introduced invasive ivy, *Delairea odorata* Lemaire, present under a forest canopy. The most productive subsite at the open coastal hillside of Samuel Boardman State Park supported a more complex community including a grass component but the horsetail was still dominant. The distribution of *A. occidentalis* also very closely tracks the distribution of *E. telmateia braunii*, as documented by HAUKE (1993), but see comments under Distribution. Another fairly specific observation was made of a riparian *Scirpus* sp. (California: Prairie Ck. Redwoods S. P. – Elk Prairie Campground) where *E. telmateia braunii* was not observed but this needs confirmation as it is based on a single male of *A. occidentalis*. There are additional less specific habitat references such as “fen area” (California: Inglenook Fen), “willow thicket” (California: San Francisco, Lake Merced), and “bog area” (California: McKinleyville). *Anthomyza occi-*

dentalis has been taken at sites also yielding *A. concolor* (California: Cambria, Rosemead), *A. vockerothi* (California: Pt. Reyes) or both these species (Oregon: Samuel Boardman St. Pk.) but the collections at the last two sites were dominated by *A. vockerothi*. *Anthomyza occidentalis* and *A. concolor* would represent the third and fourth species of *Anthomyza* to be associated with a horsetail (see discussions under *A. equiseti* and *A. vockerothi*), possibly exclusively for *A. occidentalis* as in *A. equiseti*. The known flight period for *A. occidentalis* runs from 17 March (California: Rosemead) to 18 September (Washington: Whidbey Island). **Distribution.** *Anthomyza occidentalis* has, by far, the most restricted distribution of all the Nearctic *Anthomyza*. In Canada it is known only from southern British Columbia (Milner, single female) and in the United States of America from the three west coast states of Washington, Oregon and California (see Table 2, Fig. 600). As mentioned above, this distribution may well be constrained by the range of *E. telmateia braunii*, but this horsetail reaches as far north as southeastern Alaska (HAUKE 1993), which is well beyond the current northern record for *A. occidentalis*.

***Anthomyza vockerothi* sp. nov.**

(Figs 338, 340, 342, 357, 358, 361–375, 379)

Type material. HOLOTYPE: ♂, “CAN: ON: Hwy#17, ~8.5kmNW Marathon, 16.vi.2007, KNBarber, sweeps, emergent *Equisetum fluviatile* with *Carex* sp. 48°47.69'N 86°26.11'W” and “Holotypus ♂ *Anthomyza vockerothi* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen (dark form) is in perfect condition, with well visible gonostyli (see Fig. 340) (DEBU, intact). PARATYPES: CANADA: ALBERTA: Banff, 24.vi.1922, 1 ♀, C. B. D. Garrett leg., 11.vii.1924, 1 ♂ 1 ♀, 12.vii.1924, 1 ♂, 21.vii.1924, 1 ♀, E. Hearle leg., 4500', 28.vii.1967, 1 ♂ 1 ♀, J. R. Vockeroth leg. (all CNCI); Banff, 29.vi.1925, 2 ♀♀, 1.vii.1925, 1 ♂, 13.vi.1928, 1 ♀, O. Bryant leg. (USNM); 9.0 mi W Banff, 12.vii.1966, 1 ♂; 9.5 mi W Banff, 12.vii.1966, 1 ♂, both K. Valley leg.; Banff, Vermillion Lake, 4500', 17.viii.1925, 1 ♂ 3 ♀♀, O. Bryant leg. (all USNM); Banff Nat. Pk., 11 mi W Banff, 4500', 11.vii.1955, 1 ♂ 2 ♀♀, G. E. Shewell leg. (CNCD); Banff N. Pk., Mt. Eisenhower, 27.vii.1967, 1 ♂, B. A. Foote leg. (USNM, genit. prep.); ~21.9 km W Bearberry, Hwy #734, 51°56.18'N 115°11.76'W, sweeps, wet roadside, *Equisetum fluviatile*, 24.vii.2008, 25 ♂♂ 19 ♀♀; ~22.7 km S Bellevue, Hwy 774, 49°22.62'N 114°22.58'W, sweeps, roadside ditch, mostly *Carex* spp., *Equisetum*, grasses, 17.vii.2011, 18 ♂♂ 13 ♀♀ (1 ♂ genit. prep.), all K. N. Barber leg. (all CNCI); Bilby, 15.vii.1924, 1 ♂, O. Bryant leg. (CASC); Calgary, Fish Creek Prov. Pk., 50°55.61'N 114°07.43'W, sweeps, mostly *Carex utriculata* & *Equisetum fluviatile*, 12.vii.2011, 1 ♀, J. E. Swann & K. N. Barber leg. (BDUC); ~2.5 km SE Canmore, 51°03.42'N 115°16.46'W, sweeps, ditchside, mostly *Equisetum fluviatile*, 25.vii.2008, 2 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCD); Cypress Hills Prov. Pk., Elkwater, 5.vii.2001, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU 00362461, -74); Dunvegan, north shore of Peace River, sweep vegetation along shoreline, 12.vii.1997, 16 ♂♂ 31 ♀♀ (LEMQ 0039627, -671, -683, -684, -699, -700, -707, -709–712, -715–720, -724, -725, -767, -769–772, -781–783, -799–802, -811–813, -815, -830–837, -842–844, -846); Dunvegan, n. shore of Peace River, sweep grasses at edge of agricultural field, 13.vii.1997, 40 ♂♂ 27 ♀♀ (LEMQ 0039657, -670, -672–682, -685–698, -701, -702, -726–759, -762–765, 2 ♂♂ genit. prep.), 14.vii.1997, 1 ♂ 5 ♀♀ (LEMQ 0039827, -821–823, -845, -848), all T. A. Wheeler leg.; Edmonton, Ft. Edmonton Pk., 53°30.3'N 113°34.2'W, sweeps, veg. banks of N. Sask. R., 14.vii.1999, 13 ♂♂ 10 ♀♀ (1 ♂ 1 ♀ genit. prep.); same locality but 53°30.32'N 113°34.29'W, sweeps, riverside vegetation, 21.vii.2008, 3 ♂♂ 1 ♀, sweeps, *Equisetum palustre*, *Eleocharis* sp., 21.vii.2008, 9 ♂♂ 6 ♀♀, sweeps, *Equisetum palustre*, 21.vii.2008, 3 ♂♂, all K. N. Barber leg.; Elkwater Park, 31.vi.1952, 1 ♂, L. A. Konotopetz leg.; [Fort] McMurray, 6.vii.1953, 3 ♂♂, W. J. Brown leg., 11.vi.1953, 1 ♀, 22.vii.1953, 2 ♀♀, 30.vii.1953, 5 ♂♂ 7 ♀♀ (1 ♀ with head glued to pin), G. E. Ball leg. (all CNCI); 40 km S Grand Prairie, Hwy 40, on *Carex*, 7.vii.1987, 1 ♀, S. Marshall leg. (DEBU); Halfway Slough, 59°56.049'N 111°44.344'W, sweep, 5.vii.2012, 1 ♀, S. & K. Williamson leg. (BDUC); ~3.4 km SSW Hinton, Hwy #40, 53°21.27'N 117°37.32'W, sweeps, *Equisetum fluviatile*, 22.vii.2008, 3 ♂♂ 6 ♀♀; ~4.4 km SSW Hinton, Hwy #40, 53°20.77'N 117°36.83'W, sweeps, *Equisetum fluviatile*, *Carex* sp. [*aquatilis*], 22.vii.2008,

2 ♂♂ 1 ♀; ~15 km SSW Hinton, gas right-of-way nr. Wildhorse Lake P[rovincial] R[ecreation] A[rea], 53°16.65'N 117°44.57'W, sweeps, roadside *Equisetum palustre*, 23.vii.2008, 8 ♂♂ 6 ♀♀, all K. N. Barber leg. (all CNCI); 2 mi S Jasper, 30.vii.1967, 1 ♀; 7 mi W Jasper, 30.vii.1967, 1 ♀, both S. Whitney leg. (both USNM); ~4.4 km NNE Kananaskis Village, Mt. Lorette Ponds, 50°58.11'N 115°06.59'W, sweeps, mostly *Equisetum fluviatile*, 25.vii.2008, 6 ♂♂ 9 ♀♀, K. N. Barber leg. (DEBU); Lake Louise, 23.vii.1938, 1 ♀, G. S. Walley leg. (CNCI); Slave Lake, 14.viii.1924, 1 ♀, O. Bryant leg. (CASC); Spray Valley P. Pk., 50°48.95'N 115°09.84'W, sweeps, fen. *Carex utriculata?* and *Poa* sp., 13.vii.2011, 4 ♂♂ (DEBU 01502852–55); W. A. Switzer P. Pk., Hay River Rd. W., 53°31.94'N 117°50.06'W, sweeps, *Equisetum fluviatile*, 22.vii.2011, 9 ♂♂ 2 ♀♀ (DEBU 01503814–24) all K. N. Barber leg.; 10 km N Whitecourt, Sakwatamau R., 54°12'03"N 115°46'40"W, sweep sedges & grass at upper beach, 18.vii.2003, 20 ♂♂ 6 ♀♀ (LEMQ 0040382, -383, -387–390, -392, -393, -412–423, -425–430); same locality but Hwy 32 at Sakwatamau River, 54°10'N 115°42'W, sweep vegetation at river edge, 15.vii.1997, 7 ♂♂ 8 ♀♀ (LEMQ 0039611–622, -760, -761, -766, 1 ♂ genit. prep.), all T. A. Wheeler leg. **BRITISH COLUMBIA:** Atlin, 2200', 18.vii.1955, 1 ♀, 22.vii.1955, 1 ♀, 29.vii.1955, 2 ♀♀, 31.vii.1955, 1 ♂, 22.viii.1955, 1 ♀ (head glued to pin), B. A. Gibbard leg. (CNCI); Atlin L., Warm Bay, 29.v.1981, 1 ♀, R. A. Cannings leg. (RBCM ENT991-20283); S of Atlin, Warm Springs, sweep vegetation at warm stream margin, 2.vi.1997, 5 ♂♂, T. A. Wheeler leg. (LEMQ 0039703–706, -713); same locality but sweep grasses in open field near stream, 2.vi.1997, 1 ♂, S. Boucher leg. (LEMQ 0039775); 23 km S Atlin, Warm Spring, 59°23'N 133°32'W, sweep vegetation stream, 25.vi.1997, 5 ♂♂, T. A. Wheeler leg. (LEMQ 0039803, -16, -28, -29, -40); Banks Island, 53°34'18"N 130°31'31"W, inlet with brackish waterways & meadow of *Carex*, cinqfoilcs, *Angelica*, *Juncus*, 21.vi.2005, 1 ♀, C. Copley leg. (RBCM); Brisco, 19.vi.1932, 1 ♂ 1 ♀, O. B[ryant] leg. (USNM); vicinity Cache Creek, Highway 97, lake, 18.viii.1978, 1 ♀, P. H. Arnaud Jr. leg. (CASC); 26 mi W Castlegar, 4800', 10.vii.1988, 1 ♂, R. Hurley leg. (MTEC); Chilliwack Lake Rd., 46°06'N 121°36'W, 800 m, roadside vegetation, 15.vi.2000, 1 ♀, Goulet & Gillespie leg. (DEBU 00278826); 18 km ENE Cranbrook, 49°33'N 115°29'W, 2700', swept/aspirated, lake bank, dry coniferous forest, (Universität Bielefeld, Ca1527), 12.viii.2002, 7 ♂♂ 8 ♀♀ (1 ♀ with head separated from body); ~3 km E Crownsnest Pass, Hwy #3, ~49°05'N ~117°00'W, swept/aspirated, ditch & slope, Cyperaceae/*Juncus*, (Universität Bielefeld, Ca1532), 3.viii.2002, 7 ♂♂ 4 ♀♀, all M. v. Tschirnhaus leg. (all ZSMC, all in ethanol); Cultus Lake, 1.vii.1948, 1 ♂, 12.vii.1948, 1 ♀, 15.vii.1948, 2 ♂♂, 20.vii.1948, 2 ♂♂ (1 ♂ genit. prep.), 26.vii.1948, 1 ♂ (genit. prep.), H. R. Foxlee leg.; Departure Bay, 2.vi.1925, 1 ♀, A. P. Macdougall leg. (all CNCI); Dundas Is., Boat Harbour, lake, 200 m inland, (I.R.32B), 25.vii.1987, 1 ♂, C. Guppy leg. (RBCM ENT987-374); E. C. Manning P. Pk., ~42 km SE Hope, Hwy #3, ~49°10'N ~120°57'W, 1352 m, swept/lector, roadside veg. incl. *Juncus*, *Carex*, *Equisetum*, (Universität Bielefeld, Ca1535), 16.viii.2002, 20 ♂♂ 13 ♀♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Exchamsiks River, 58 km SW Terrace, 54°20.00'N 129°17.81'W, 18.viii.2008, 1 ♂ 2 ♀♀, S. E. Brooks leg. (CNCI); Fernie, Annex Pk., 49°30'43"N 115°04'07"W, 2.viii.2010, 6 ♂♂ 7 ♀♀, S. M. Paiero leg. (DEBU 00334412, -13, -21, -23, -29, -35, -06, -25, -41, -45, -71, -85, -86); Fernie, Annex Pk., 49°30.72'N 115°04.13'W, sweeps, wet ditch, mostly *Equisetum arvense* & *E. laevigatum*, 17.vii.2011, 1 ♀, sweeps, wet ditch, *Carex utriculata*, 17.vii.2011, 1 ♂ 2 ♀♀, 18.vii.2011, 1 ♂ (genit. prep.), 19.vii.2011, 2 ♂♂; Fernie, Annex Pk., 49°30.66'N 115°04.16'W, sweeps, pond margin, *Carex utriculata*, 18.vii.2011, 4 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Klondike Hwy near Fraser, White Pass railway crossing, sweep grasses, 5.vii.1997, 12 ♂♂ 16 ♀♀, T. A. Wheeler leg. (LEMQ 0039776–780, -786–792, -794–798, -804–810, -817–820); Glacier N. Pk., Rogers Pass, creek margin, 30.vi.1968, 2 ♂♂, W. W. Wirth leg. (USNM); 11 km E Golden, waterfall, 15.vii.1974, 1 ♂, P. H. Arnaud Jr. leg. (CASC); ~2.9 km NNW Golden, Anderson Rd., 51°19.49'N 116°58.81'W, sweeps, roadside, mostly *Equisetum fluviatile* & *E. palustre*, 19.vii.2011, 14 ♂♂ 17 ♀♀, K. N. Barber leg. (CNCI); Graham Is., Lepas Bay, meadow above beach, 15.vii.1988, 1 ♂ 3 ♀♀, T. A. Wheeler leg. (DEBU); Graham Is., Queen Charlotte Is., Lepus [sic] Bay, intertidal, 15.vii.1988, 2 ♀♀, sand/intertidal, 15.vii.1988, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU); Graham Is., QCI, 3 mi S Pure L., 4.vii.1981, 1 ♀, G. G. E. Scudder leg. (UBCZ); Graham Is. near Queen Charlotte City, QCI, sweep, logging road, 10–23.vii.1988, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU, 1 ♂ genit. prep.); [Graham Is.], Queen Charlotte City, QCI, 6.viii.1957, 1 ♂, E. E. MacDougall leg. (CNCI); Graham Is., Rennell Sound at Gregory Ck., estuarine meadow, 17.vii.1988, 1 ♀, 18.vii.1988, 1 ♂; Graham Is., Slatechuck Mt., roadside sweep, 12.vii.1988, 4 ♂♂ 3 ♀♀ (1 ♂ 1 ♀ genit. prep.), all T. A. Wheeler leg.; Graham Is., Queen Charlotte Is., Tlell River edge, 13.vii.1988, 1 ♀; Graham Is., QCI, Tow Hill, sweep above beach, 14.vii.1988, 1 ♀, both S. A. Marshall leg. (all DEBU); Haida Gwaii, 09U 305510 5940293, 4 m, (CC09-03), 23.vii.2009, 1 ♂, R. Bennett, M. Connelly, C. & D. Copley, J. DeWaard, J. Heron, S. Kirk & J. Kiskelly leg. (RBCM ENT009-005093);

Hatzic Lake, 10.vii.1953, 5 ♂♂ 6 ♀♀, 16.vii.1953, 2 ♂♂ 1 ♀, G. J. Spencer leg., 10.vii.1953, 3 ♂♂ 2 ♀♀, 18.vii.1953, 1 ♂, 20.vii.1953, 2 ♂♂ 1 ♀, 26.vii.1953, 2 ♂♂ 2 ♀♀, 30.vii.1953, 1 ♂, W. R. M. Mason leg.; 42 km NE Hope, CD1370, 2.viii.1991, 2 ♂♂ 7 ♀♀, A. Borkent leg.; Horseshoe Bay, 0–300', 25.v.1961, 1 ♂, 30.v.1961, 1 ♀, J. R. Vockeroth leg.; Juskatla, Q[ueen] C[harlotte] Islands, 12.vi.1957, 1 ♀, 14.vi.1957, 1 ♀, E. E. MacDougall leg. (all CNCI); Kaslo, 29.v.[-], 2 ♂♂ 1 ♀, 13.vi.[-], 1 ♂, H. G. Dyer leg., 11.vi.[-], 2 ♀♀, 25.vi.[-], 1 ♀, R. P. Currie leg.; Kaslo Cr., 18.vi.[-], 1 ♂ 1 ♀, R. P. Currie leg. (all USNM); Kimpton Creek, Hwy 93, 23.vi.1982, 1 ♂ 1 ♀, B. V. Peterson leg. (CNCI); Kinbasket Lake, BC Hydro drawdown study, Malaise trap (SDG02-01), 13.vi.2008, 1 ♀, (WIL83-01), 18.vii.2008, 2 ♂♂, (00MCOT01), 4–5.viii.2009, 3 ♀♀, (00MCOT15), 4–5.viii.2009, 1 ♀, (00MLRT01), 4–5.viii.2009, 2 ♀♀, (00MRFTb01), 10.vii.2010, 1 ♀, (00MTRT15), 4–5.viii.2009, 1 ♂ 3 ♀♀, (08MCOT15), 12.vi.2010, 1 ♀, (34MLRT01), 12–13.vii.2009, 1 ♀, (84MCOT01), 4–5.viii.2009, 1 ♂ 1 ♀, (84MTRT01), 4–5.viii.2009, 3 ♂♂ 3 ♀♀, (88MCOT01), 29–30.vii.2009, 1 ♂ 2 ♀♀, (88MCOT15), 29–30.vii.2009, 8 ♂♂ 5 ♀♀, (91MCOT01), 10–11.vii.2009, 3 ♂♂ 4 ♀♀, (91MTRT01), 10–11.vii.2009, 4 ♂♂ 2 ♀♀, (91MTRT15), 10–11.vii.2009, 2 ♂♂ 14 ♀♀, pan trap (00MPRFTb15), 10.vii.2010, 1 ♀, Cooper Beauchesne & Assoc. Ltd. leg. (RBCM); ~7.9 km SE Valemount, edge of Kinbasket Lake, 52°46.70'N 119°10.44'W, sweeps, mixed graminoids & *Equisetum*, 23.vii.2011, 4 ♂♂ 1 ♀; ~8.0 km SE Valemount, edge of Kinbasket Lake, 52°46.65'N 119°10.38'W, sweeps, mostly *Carex utriculata*, 23.vii.2011, 3 ♂♂ 5 ♀♀; ~9.6 km SE Valemount, edge of Kinbasket Lake, 52°45.74'N 119°09.68'W, sweeps, mostly *Carex* spp., 23.vii.2011, 1 ♂ 1 ♀, all K. N. Barber leg.; King Salmon L., 58°43'N 132°54'W, 1750', *Carex*, grass, *Equisetum*, beside lake, 3.vii.1960, 1 ♂ 1 ♀, 17.vii.1960, 3 ♂♂ 7 ♀♀, W. W. Moss leg., around camp veg'n, garbage, 14.vii.1960, 1 ♀, in camp grounds, 4.viii.1960, 1 ♂, R. Pilfrey leg. (all CNCI); Kootenay Region, Arrow Lake, 11U 417725E 5513833N, sweeping/searching, 14.vii.2010, 1 ♀; same locality but 435 m, (EA01T), 11U 433823E 5549603N, pitfall trap, 21.v.2010, 1 ♀; same locality but 437 m, (BE002), 11U 449421E 5623320N, sweeping/searching, 5.vi.2010, 1 ♂, all J. K. Sharkey (LGL Ltd.) leg. (all RBCM); Lac Le Jeune, 25.vi.1973, 1 ♂ 1 ♀, H. J. Teskey leg.; MacGillivray [sic McGillivray] Creek Game Reserve, near Chilliwack, 15.vi.1953, 2 ♂♂ 3 ♀♀, 14.vii.1953, 1 ♀, G. J. Spencer leg., 15.vii.1953, 1 ♀, W. R. M. Mason leg.; Manning Pk., 6400', 29.vi.1973, 1 ♂, H. J. Teskey leg.; Masset, Q[ueen] C[harlotte] Islands, 20.vii.1957, 1 ♀, E. E. MacDougall leg.; McQueen Lake, 10 mi N Kamloops, 18.vi.1973, 1 ♂, H. J. Teskey leg. (all CNCI); Merritt, Lundbom Lk., 1.5 km NE, 1.vii.1988, 1 ♂, G. E. Hutchings leg. (RBCM ENT991-6111); Miracle Beach, nr. Oyster River, 11.vi.1955, 2 ♂♂ 5 ♀♀ (1 ♂ genit. prep.), J. R. McGillis leg., 13.vi.1955, 1 ♂ 1 ♀, R. Coyles leg.; Mission City, 3.vi.1953, 2 ♂♂, 6.vi.1953, 1 ♀, 8.vi.1953, 3 ♂♂ 2 ♀♀, 18.vi.1953, 1 ♀, 22.vi.1953, 1 ♂, 28.vi.1953, 1 ♂ 2 ♀♀, W. R. M. Mason leg., 8.vi.1953, 1 ♂, 14.vi.1953, 2 ♀♀, 29.vi.1953, 1 ♀, E. Mason leg., 26.vii.1953, 1 ♀, 27.vii.1953, 1 ♂, G. J. Spencer leg. (all CNCI); Monashee, McIntyre L., 30.vi.1980, 1 ♂, R. A. Cannings leg. (RBCM); Moresby Camp, Q[ueen] C[harlotte] Islands, 29.vi.1957, 5 ♂♂ 1 ♀, E. E. MacDougall leg. (CNCI, 2 ♂♂ genit. prep.); Moresby Is., Mosquito Lk., meadow nr. lake, 20.vii.1988, 5 ♂♂ 2 ♀♀, T. A. Wheeler leg. (DEBU, 1 ♂ genit. prep.); Mt. Robson Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 2 ♂♂, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Nanaimo, 2.vi.1955, 2 ♀♀, R. Coyles leg. (CNCI); Nanaimo, Buttertubs Marsh, sweeps in graminoids, 12.v.2005, 1 ♂ 1 ♀, J. Klymko leg. (DEBU 00258081, -82); Nanaimo Lakes, bog vegetation, 11.vi.1988, 1 ♂ (RBCM ENT991-11699), forested area, 11.vi.1988, 1 ♂ 1 ♀ (RBCM ENT991-11819, -11821), G. E. Hutchings leg.; Nancy Greene Lake (Blueberry Creek), S of Hwy #3, ~24 km WSW Castlegar, ~49°14'N ~118°W, swept, aspirated, (Universität Bielefeld, Ca1534), 14.viii.2002, 3 ♂♂ 2 ♀♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Oliver, 20.iv.1923, 1 ♀, C. B. Garrett leg., 14.v.1959, 1 ♂, E. E. MacDougall leg. (CNCI); Parson, Crestbrook Rd., 51°03.68'N 116°39.06'W, sweeps, wet ditch, *Carex utriculata* with *Equisetum palustre* & *E. ×litorale*, 18.vii.2011, 40 ♂♂ 40 ♀♀ (CNCI 37 ♂♂ 40 ♀♀, 1 ♂ genit. prep., SMOG 3 ♂♂), 19.vii.2011, 2 ♂♂, K. N. Barber leg. (CNCI); 37 km NE Pipe Pass, Highway 97, creek, 25.vi.1978, 1 ♀, P. H. Arnaud Jr. leg. (CASC); Pitt Meadows, 15.v.1979, 1 ♀, G. G. E. Scudder leg. (UBCZ); Pitt Meadow[s], 16.vi.1960, 1 ♂ 1 ♀, A. Clancy leg.; Pitt Meadows, peat bog, 21.vii.1953, 1 ♀, G. J. Spencer leg.; Port Clements, Q[ueen] C[harlotte] Islands, 20.vi.1957, 1 ♂ 1 ♀, E. E. MacDougall leg.; Port Edward, 18.vii.1960, 1 ♂ 1 ♀, W. R. Richards leg.; 5 km NE Port Renfrew, CD1341, 5.vii.1991, 2 ♂♂ (1 ♂ genit. prep.), A. Borkent leg. (all CNCI); Prince George, floodplain, 50 sweeps, 2 ♂♂, 31.viii.1926, [no collector] (AMNH, 1 ♂ genit. prep.); Prince Rupert, 4.vi.1960, 2 ♀♀, W. W. Moss leg., 18.vii.1960, 1 ♂ 1 ♀, W. R. Richards leg., *Ledum/Kalmia* bog, 4.vi.1960, 6 ♂♂ 4 ♀♀, J. G. Chillcott leg., 4.vi.1960, 2 ♂♂ 1 ♀, R. Pilfrey leg., wet grassy marsh, 18.vii.1960, 1 ♂, C. H. Mann leg. (CNCI); Prince Rupert, 0–100 m, 7.vii.1970, 1 ♀, N. L. H. Krauss leg. (USNM); Princeton, 13.vii.1973, 1 ♀, H. J. Teskey leg.

(CNCI); Prizzie L., QCI, 28.vii.1980, 1 ♂, J. Shepard leg. (RBCM ENT991-20361); Qualicum, 19.vi.1955, 14 ♂♂ 3 ♀♀ (2 ♂♂ 1 ♀ genit. prep.), 21.vi.1955, 6 ♂♂ 15 ♀♀ (1 ♂ genit. prep.), G. E. Shewell leg. (CNCI); Qualicum Beach, Little Qualicum River Estuary Regional Conservation Area, ex. *Carex* spp., 3.vi.1980, 1 ♀, Canadian Wildlife Service leg. (RBCM ENT991-17145); Revelstoke, 2.vii.1973, 1 ♂ 4 ♀♀, H. J. Teskey leg. (CNCI); Robson, 21.v.1953, 1 ♀, 13.v.1957, 1 ♀, 21.viii.1957, 1 ♂, 9.v.1958, 1 ♀, 13.v.1958, 1 ♀, 15.v.1958, 1 ♂, 7.vi.1960, 1 ♂, 14.vi.1960, 2 ♂♂ (1 ♂ genit. prep.), 27.vi.1964, 1 ♀, 5.vii.1967, 1 ♂ 1 ♀, H. R. Foxlee leg. (UBCZ); Hwy #3B, NNW Rossland, ~49°12'N ~117°53'W, 1575', swept/elector, ditch with *Juncus*, *Castilleja*, (Universität Bielefeld, Ca1533), 14.viii.2002, 15 ♂♂ 12 ♀♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Saanich, Rithet's Bog, 21.vi.1988, 1 ♂, G. E. Hutchings leg. (RBCM ENT991-11546); Salmon Arm, Shuswap Lk., shore, 13.vii.1949, 1 ♂, H. B. Leeche leg. (CASC); Sawmill Lk., Telegraph Ck., 1100', *Carex*, grass, *Equisetum*, beside lake, 2.vii.1960, 1 ♀, R. Pilfrey leg.; 8 km NE Sicamous, CD1410, 22.v.1992, 4 ♂♂ 1 ♀, A. Borkent leg. (all CNCI); Silver Lake, Hope, 2.vii.1968, 1 ♀, W. W. Wirth leg. (USNM); Silver & Skagit Rd., 49°14'N 121°23'W to 49°08'N 121°15'W, 450–600 m, clover & flowers, 22.vi.2000, 1 ♀, Goulet & Gillespie leg. (DEBU 00278871, genit. prep.); Smith River Bridge, Alaska Hwy, DC-514, 11.viii.1978, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Terrace, 9.vi.1960, 1 ♂ 1 ♀, R. J. Pilfrey leg. (DEBU); Terrace, 5.vi.1960, 1 ♂, 10.vi.1960, 1 ♀, 17.vii.1960, 1 ♀, C. H. Mann leg., 15.vii.1960, 3 ♂♂, 21.vii.1960, 2 ♂♂, W. R. M. Mason leg., 26.vii.1960, 1 ♀, W. R. Richards leg.; Terrace, marshy meadow, 11.vi.1960, 1 ♂ 5 ♀♀, J. G. Chillcott leg.; Terrace, under Skeena River bridge, 19.vii.1960, 1 ♂ 1 ♀, C. H. Mann leg., 220', 19.vii.1960, 1 ♂, B. Heming leg.; 10 mi W Terrace, farm plot, 13.vii.1960, 1 ♂ 2 ♀♀, C. H. Mann leg.; 32 mi SW Terrace, on *Rubus* species, 6.vi.1960, 3 ♂♂ 1 ♀ (1 ♂ genit. prep.), W. W. Moss leg.; 32 mi SW Terrace, 100', 13.vii.1960, 1 ♀, B. Heming leg.; 40 mi SW Terrace, marginal sedges, 9.vii.1960, 1 ♂ 2 ♀♀, J. G. Chillcott leg. (all CNCI); Gagnon Rd., 6 mi W Terrace, 13.vii.1960, 1 ♀, G. E. Shewell leg., 29.vi.1960, 1 ♂, in marshy clearing, 8.vi.1960, 1 ♀, J. G. Chillcott leg.; Lakelse nr. Terrace, hot springs, 30.v.1960, 1 ♂ 3 ♀♀, J. G. Chillcott leg.; Lakelse nr. Terrace, 300', 14.vi.1960, 1 ♂ (genit. prep.), W. W. Moss leg.; Lakelse Lake nr. Terrace, 300', 14.vi.1960, 2 ♂♂ 1 ♀, R. Pilfrey leg.; Lakelse Lake bog nr. Terrace, 14.vi.1960, 4 ♀♀, J. G. Chillcott leg., 14.vi.1960, 1 ♂, 11.vii.1960, 2 ♂♂ 3 ♀♀, C. H. Mann leg.; Lakelse bog, 18 mi S Terrace, 11.vii.1960, 1 ♀, G. E. Shewell leg. (all CNCI); Remo, 7 mi SW Terrace, flowers of *Heracleum*, 13.vi.1960, 1 ♀, J. G. Chillcott leg.; Shames, 17 mi W Terrace, 13.vii.1960, 1 ♀, J. G. Chillcott leg.; Shames, 18 mi SW Terrace, 23.vi.1960, 1 ♂, 24.vii.1960, 3 ♂♂ 1 ♀, C. H. Mann leg.; Spring Creek, Terrace, 29.vi.1960, 1 ♂, J. G. Chillcott leg., 220', 3.vi.1960, 2 ♀♀, 11.vi.1960, 2 ♂♂ 2 ♀♀, R. Pilfrey leg.; Tlell, [Queen] [Charlotte] Islands, 25.vi.1957, 1 ♂ 1 ♀, 26.vi.1957, 1 ♂ 2 ♀♀, E. E. MacDougall leg.; Toad River Lodge, mi. 422 Alaska Hwy, 4500', 20.vii.1959, 1 ♀, E. E. MacDougall leg. (all CNCI); Tsawwassen Beach, 7.vii.1962, 1 ♂, G. E. Scudder leg. (UBCZ, genit. prep.); 50 km E Vancouver, 3.vii.1988, 1 ♀, A. Freidberg leg. (TAU); Vancouver, Point Grey, 21.viii.1972, 1 ♂, 9.ix.1972, 1 ♂, 24.iv.1973, 1 ♂ (genit. prep.), 8.iv.1973, 1 ♂, 20.vii.1973, 1 ♂ 1 ♀, on tidal flat, 19.ix.1972, 1 ♀, J. R. Vockeroth leg. (CNCI); Vancouver Is., Cowichan Bay, 12.vii.1924, 1 ♂, A. L. Melander leg. (USNM); Vancouver Is., Cowichan Lk., 17 km W Youbou, 48°55.34'N 124°24.30'W, ex. muddy pond margin, 10.viii.2008, 2 ♂♂; Vancouver Is., Mt. Washington area, trail to Battleship Lake, 49°43.90'N 125°18.84'W, 1150 m, 13.viii.2008, 1 ♀, all J. M. Cumming leg. (all CNCI); Zayas Is., bog near lake, 23.vii.1987, 1 ♂, C. Guppy leg. (RBCM ENT987-138). **МАНИТОБА:** ~6 km SW Shilo, 49°45.19'N 99°41.28'W, edge of wet area, sweeps, incl. *Equi. fluviatile*, *Carex*, *Calamagrostis*, *Impatiens*, 10.vii.2011, 4 ♂♂, K. N. Barber leg. (CNCI). **NORTHWEST TERRITORIES:** Aklavik, 5.viii.1930, 1 ♀, O. Bryant leg. (CASC); Aklavik, Lot 110, 5.viii.1930, 4 ♂♂ 4 ♀♀ (USNM 4 ♂♂ 3 ♀♀, SMOC 1 ♀ Sabrosky det. as *A. gracilis*), Lot 241, 24.vi.1931, 1 ♂ 1 ♀, Lot 291, 2.vii.1931, 4 ♀♀, Lot 292, 5.vii.1931, 1 ♀, Lot 245, 8.vii.1931, 1 ♂ 1 ♀, Lot 305, 18.vii.1932, 2 ♂♂ 2 ♀♀ (1 ♂ Malloch det. as *A. gracilis*) (USNM), all Bryant leg.; [Fort] Good Hope, Mackenzie River (1929 Trip Lot 73), 23.viii.1929, 2 ♂♂, O. Bryant leg. (USNM 1 ♂, SMOC 1 ♂ genit. prep.); Hay River, 5.vii.1951, 1 ♂, P. R. Ehrlich leg.; Norman Wells, 2.vii.1969, 2 ♂♂ 1 ♀; Wrigley, 14.vi.1969, 9 ♂♂ 10 ♀♀ (1 ♂ genit. prep.); Yellowknife, road nr. Stock Lake, 16.vi.1966, 1 ♂, all G. E. Shewell leg. (all CNCI). **ONTARIO:** Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, 10.vii.2010, 2 ♂♂, K. N. Barber leg. (CNCI); same locality but sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.07'W, sweeps, emergent *Equisetum fluviatile*, 12.viii.2006, 1 ♂ 1 ♀; same locality but 48°47.69'N 86°26.11'W, sweeps, emergent *Equisetum fluviatile*, 16.vi.2007, 29 ♂♂ 33 ♀♀ (1 ♂ genit. prep.), 31.vii.2008, 3 ♂♂ 3 ♀♀, sweeps, *Equisetum fluviatile* on saturated gravel, 16.vi.2007, 16 ♂♂ 16 ♀♀ (all CNCI), sweeps, emergent *Equisetum fluviatile* with *Carex* sp., 12.viii.2006,

33 ♂♂ 26 ♀♀ (CNCI 29 ♂♂ 22 ♀♀, SMOC 4 ♂♂ 4 ♀♀), 16.vi.2007, 121 ♂♂ 131 ♀♀ (AMNH, BDOC, BYUC, CLEV, CMNH, CSUC, DEBU, INHS, LACM, MCZN, MEMU, MTEC, NMPC, PMAE, SEMC, UBCZ, UGCA, USNM, WFBM 4 ♂♂ 4 ♀♀ each; CNCI 45 ♂♂ 55 ♀♀), 26.viii.2007, 1 ♂ 1 ♀, sweeps, emergent *Carex* sp., 16.vi.2007, 9 ♂♂ 12 ♀♀ (CNCI), all K. N. Barber leg; Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex *Equisetum fluviatile*, [reared] misted daily, 22°C, 16L:8D, 60–70% RH, dry stalks on surface, bulk pails, [various emergence dates 14.v.–10.vi.2012], 27 ♂♂ 24 ♀♀; same locality and data but wet stalks on [sic! “near”] surface, bulk pails, [various emergence dates 15.v.–28.vi.2012], 51 ♂♂ 35 ♀♀; Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex *Equisetum fluviatile*, [reared - each with empty puparium in gelatin capsule] 22°C, 16L:8D, 60–70% RH, larva dissected: 29.iv.–1.v.2012, dry stalks on surface, puparium: 12.v.2012, adult: 23.v.2012, 1 ♀; same locality and data but wet stalks near surface, [various pupariation dates 3–19.v.2012 & emergence dates 14–29.v.2012], 6 ♂♂ 12 ♀♀, all K. N. Barber leg. (all CNCI); Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, Malaise trap, 19–22.vi.2010, 1 ♂; Moosonee, 51.28288°N 80.63926°W, Repl. 2 wet, Malaise trap, 16–19.vi.2010, 1 ♀, both NBP Field Party leg. (both LEMQ); Moosonee, 51°16.36'N 80°39.11'W, sweeps, railroad ditch, mostly *Equisetum fluviatile*, *Carex* spp., 11.vii.2014, 1 ♂, K. N. Barber leg. (CNCI); Pancake Bay Prov. Park, 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 9 ♂♂ 7 ♀♀, J. Roháček leg. (SMOC, 2 ♂♂ 2 ♀♀ genit. prep., 2 ♂♂ 1 ♀ photographed); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 17.vii.2004, 5 ♂♂ 1 ♀ (DEBU 01500316–21), 24.vii.2004, 5 ♂♂ 3 ♀♀ (DEBU 01500565–72), 2.viii.2004, 6 ♂♂ 7 ♀♀ (DEBU 01500859–71), 7.viii.2004, 5 ♂♂ 2 ♀♀ (DEBU 01501078–84), 3.ix.2004, 1 ♀ (DEBU 01501323), 27.vi.2005, 64 ♂♂ 39 ♀♀ (DEBU 01501505–607), 16.vi.2007, 3 ♂♂ 2 ♀♀ (DEBU 01501801–05), 7.vii.2007, 1 ♂ 4 ♀♀ (DEBU 01501902–06), 29.v.2010, 6 ♂♂ 2 ♀♀ (DEBU 01502436–43); same locality but 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 1 ♂ 1 ♀ (DEBU 01500720, -21); same locality but 46°58.12'N 84°42.75'W, sweeps, mostly graminoids/*Typha* near wetland boardwalk, 2.viii.2004, 1 ♂ 1 ♀ (DEBU 01500964, -65), all K. N. Barber leg. **QUEBEC:** Great Whale River, 20.viii.1949, 1 ♂ 1 ♀, J. R. Vockeroth leg. (CNCI). **SASKATCHEWAN:** Uranium City, 19.vi.1962, 1 ♀, J. G. Chillcott leg. (CNCI). **YUKON:** 14 mi E Dawson, 1300', 1.viii.1962, 3 ♂♂ 1 ♀, P. J. Skitsko leg. (CNCI, 1 ♂ genit. prep.); Dragon L., 21 km S on N. Canol Rd., 62°23'N 131°27'W, 11.vi.1981, 1 ♂; Eagle River, km 382 Dempster Hwy., 66°27'N 136°43'W, 21.vi.1981, 1 ♀, both C. Guppy leg. (both UBCZ); Alaska Hwy at Marsh Lake, Marsh Lake Campground, sweep vegetation at lake edge, 1.vii.1997, 1 ♀ (LEMQ 0039784); Alaska Hwy at M'Clintock River, 60°33.6'N 134°29.4'W, sweep river edge, 14.viii.1998, 3 ♂♂ (LEMQ 0039656, -664, -668); Alaska Hwy at M'Clintock River, sweep sedges at river edge, 4.vii.1997, 2 ♂♂ 1 ♀ (LEMQ 0039825, -826, -847); Atlin Road, Snafu Creek Government Campground, sweep sedges along creek, 25.vi.1997, 1 ♀ (LEMQ 0039628), all T. A. Wheeler leg.; Takhini Hot springs, 31.v.1981, 2 ♂♂, L. Vasington & S. G. Cannings leg.; Tuchitua R., 6 km S on Campbell Hwy, 60°50'N 129°15'W, 13.vi.1981, 1 ♂, C. Guppy leg. (all UBCZ); Whitehorse, 20.viii.1959, 1 ♂, R. Madge leg. (CNCI); Whitehorse, Miles Canyon, 60°40'N 135°01.8'W, sweep grass/sedges at Yukon River margin, 27.vii.1998, 2 ♂♂ (LEMQ 0039838, -39); Whitehorse, Robert Service Campground, Yukon River, sweep sedges at margin, 14.vi.1997, 2 ♂♂ 2 ♀♀ (LEMQ 0039768, -774, -785, -793); Alaska Highway at Yukon River crossing, 60°34'N 134°40'W, sweep grass/sedges along river margin, 2.vii.1997, 17 ♂♂ 23 ♀♀ (LEMQ 0039624–26, -29–55, -58–63, -65–67, -69, 1 ♂ genit. prep.), all T. A. Wheeler leg.; Alaska Highway at Yukon River crossing, sweep sedges and grasses along river, 2.vii.1997, 1 ♂ 4 ♀♀, S. Boucher leg. (LEMQ 0039708, -14, -21–23). **UNITED STATES OF AMERICA: ALASKA:** Anchor River at Sterling Hwy, 1 ♀, 11.vii.1954, R. Coleman leg. (USNM); Anchorage, 15.vi.1921, 1 ♂, J. M. Aldrich leg. (USNM, 1 ♂ Aldrich det. as *A. gracilis*); Big Delta, 30.vi.1951, 4 ♂♂ 1 ♀, Mason leg. (CNCI); Fairbanks, 4.vii.1921, 3 ♂♂, J. M. Aldrich leg.; Gulkana River, 19.3 km N Glenallen, 62°16.1'N 145°23.1'W, 9.vii.2006, 1 ♂, D. & W. N. Mathis leg. (all USNM); Homer, on marsh grass weed, 24.vii.1945, 1 ♂, J. C. Chamberlin leg. (OSAC, genit. prep.); Juneau, 15.vi.1979, 1 ♀, H. O. Lund leg. (UGCA); Juneau, 8.vi.1988, 1 ♂, F. Brodo leg. (CNCI, genit. prep.); Kenai, Arc Lake, 3.2 km W Soldotna, 60°27'N 151°06.3'W, 5.vii.2006, 3 ♂♂, D. & W. Mathis leg.; Kenai, Kenai Fjord N. Pk., Exit Glacier, 60°11.7'N 149°35.8'W, 30.vii.2002, 1 ♂ 1 ♀; Kenai, Lowell Point, 6.5 km S Seward, 60°03.9'N 149°26.6'W, 31.vii.2003, 1 ♂, all D. & W. N. Mathis leg. (all USNM); Kenai NWR [National Wildlife Reserve], ~0.5 mi E of Berg Lk., LTEMP [Long Term Ecological Monitoring Program] site 3271, wetland, sweep net sample, 20.vi.2004, 1 ♀, S. Grimes leg. (KNWR, ID:3873); Kenai Peninsula Borough, Long Term Ecological Monitoring Program, 3064, ~1/4 mi W of Chickaloon R. & ~3 mi S of Chickaloon Bay, Section 17, marsh at edge of Chickaloon Flats, sweep net sample, 15.vi.2006, 1 ♂, A. Wu leg. (KNWR, ID:6043); same locality and program,

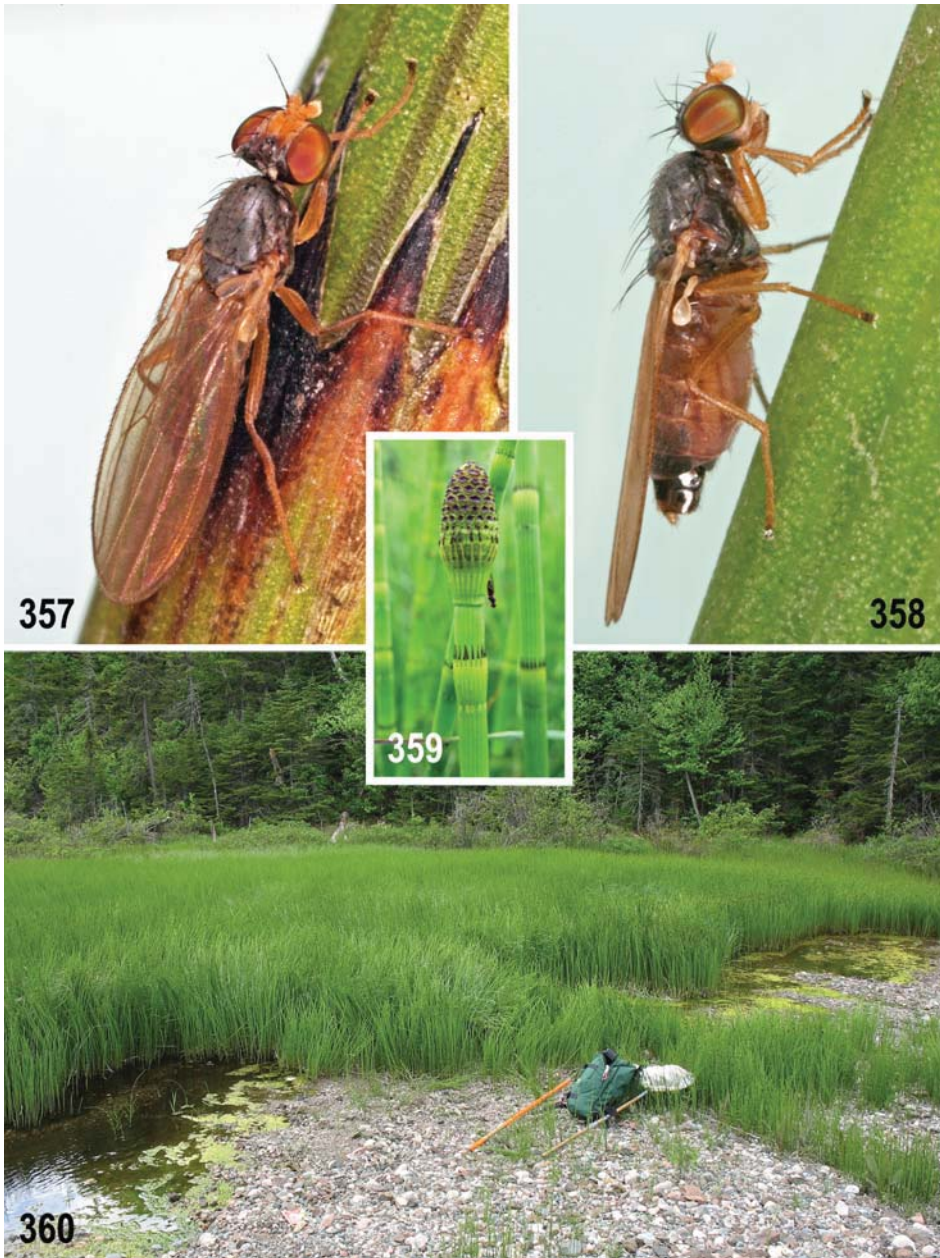
3089, ~2 mi ENE of Snipe Lk., SE ¼ of Section 19, meadow, sweep net sample, 25.vi.2006, 1 ♂, T. Burke leg. (KNWR, ID:5787); Kenai River near Seward, 60°28'59"N 150°03'49"W, 16.vi.2005, 2 ♂♂, J. & R. Skevington leg. (CNCI, Diptera #884, 888); King Salmon, Naknek, on tundra, 20.vii.1952, 1 ♀; King Salmon, Naknek River, 6.vii.1952, 1 ♂, 13.vii.1952, 1 ♀, 19.vii.1952, 1 ♂ 1 ♀, 23.vii.1952, 1 ♂, 31.vii.1952, 1 ♂ 1 ♀, 1.viii.1952, 2 ♀♀, 4.viii.1952, 1 ♂, 11.viii.1952, 1 ♂, all W. R. Mason leg. (all CNCI); Savanoski, Naknek Lake, 2.vii.1919, 1 ♂, 25.vii.1919, 5 ♂♂ 3 ♀♀ (1 ♂ 1 ♀ genit. prep.); Savanoski, Naknek Lake, National Geographic Society Katmai Expedition, 20.vii.1919, 1 ♂, all A. J. Basinger leg. (all CASC); Seabee Island, 22.vii.1965, 2 ♂♂ 1 ♀, D. M. DeLong leg.; Skagway, 3.vi.1921, 2 ♂♂, J. M. Aldrich leg. (all USNM); Skilak River at Skilak Lake, 60.3945°N 150.1325°W, 30.vi.2011, 2 ♂♂ 2 ♀♀, M. Bowser leg. (KNWR, 7560, -61, -63, -66); 6.5 km E Soldotna, 60°30.5'N 150°55.6'W, 1.viii.2003, 1 ♂, D. & W. N. Mathis leg. (USNM); Unalakleet, 10.vii.1961, 1 ♀, B. S. Heming leg. (CNCI); Ruth Pond, 61°07.5'N 146°21.5'W, 8.vii.2006, 6 ♂♂, D. & W. N. Mathis leg.; Wrangell, 0–50 m., [-].vii.1970, 2 ♂♂, N. L. H. Krauss leg. (all USNM). CALIFORNIA: Del Norte Co., Crescent City, Tell Blvd., N of Lake Earl, 41°50.80'N 124°12.30'W, sweeps, *Juncus* sp. in wet ditch, 2.vi.2009, 11 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); Eureka, "5.6" [no other date], 1 ♂, H. S. Barber leg. (USNM, genit. prep.); Marin Co., Fort Cronkhite, 25.ix.1963, 1 ♂ 1 ♀, P. H. Arnaud Jr. leg. (CASC); Mendocino Co., Inglenook Fen, dunes, 20–80', 6.ix.1972, 1 ♀, E. I. Schlinger & P. Rauch leg. (EMEC, UCIS-215058); same locality but fen area, 30–50', 11.viii.1972, 18 ♂♂ 9 ♀♀ (EMEC, UCIS-215085, -087, -092, -093, 095, -105, -115, -130, -185, -196, -200, -208, -209, -223, -237, -308, -309, -314, -317, -319, -320, -341, -342, -523, -526, -527, -536, 5 ♂♂ genit. prep.), 22.viii.1972, 2 ♂♂ (EMEC, UCIS-215633, -34, 1 ♂ genit. prep.), all E. I. Schlinger leg.; Mendocino Co., Inglenook Fen, N of Cleone, 24.vii.1975, 1 ♀, Powell leg.; Marin Co., 2 air mi W Inverness, 1.v.1976, 1 ♂ (genit. prep.), J. Doyen & P. Rude leg. (both EMEC); Del Norte Co., Jedediah Smith Redwoods S. P., Enderts Beach, 41°41.99'N 124°08.52'W, sweeps, grasses on top of low bluff, 4.vi.2009, 1 ♀, K. N. Barber leg. (CNCI); Humboldt Co., 1 mi W Kneeland, 27.vii.1969, 1 ♀, D. P. Levin leg. (LACM); Del Norte Co., Lake Earl Wildlife Area, 41°48.68'N 124°10.83'W, sweeps, grasses bordering flooded road/marsh, 1.vi.2009, 12 ♂♂ 8 ♀♀ (CNCI 9 ♂♂ 6 ♀♀, 1 ♂ genit. prep., SMOG 3 ♂♂ 2 ♀♀); same locality but Cadra Pt. Trail, 41°48.50'N 124°12.27'W, sweeps, grasses nr. marshy border of lake, 5.vi.2009, 2 ♂♂ (both genit. prep.), all K. N. Barber leg. (CNCI); Humboldt Co., McKinleyville bog area nr. Azalea Avenue, 9.vii.1980, 1 ♂ 1 ♀, T. W. Davies leg. (CASC); Muir Beach, "6/8".1950, 1 ♂ 5 ♀♀ (2 per pin); Orick, 18.ix.1934, 3 ♀♀, all A. L. Melander leg. (all USNM); Humboldt Co., ~1.5 km W Orick, 41°17.02'N 124°05.44'W, sweeps, *Juncus* sp., standing water behind sand dune, 8.vi.2009, 18 ♂♂ 15 ♀♀ (CNCI 13 ♂♂ 10 ♀♀, 5 ♂♂ genit. prep., CSCA 5 ♂♂ 5 ♀♀), sweeps, grasses, edge of standing water behind sand dune, 8.vi.2009, 1 ♂ 1 ♀ (CNCI), K. N. Barber leg.; Marin Co., Point Reyes, 19.iv.1980, 15 ♂♂ 7 ♀♀, S. A. Marshall leg. (DEBU, 4 ♂♂ 1 ♀ genit. prep.); Humboldt Co., Prairie Ck. Redwoods S. P., Davidson Rd. access, 41°19.27'N 124°02.45'W, sweeps, *Scirpus* sp.1, meadow edge, 8.vi.2009, 1 ♂ (genit. prep.); same locality but 41°19.29'N 124°02.38'W, sweeps, *Scirpus* sp.1, wet area, 8.vi.2009, 2 ♂♂, sweeps, *Scirpus* sp.2, wet area, 8.vi.2009, 2 ♂♂ (1 ♂ genit. prep.); Humboldt Co., Prairie Ck. Redwoods S. P., Elk Prairie Cmpgd., 41°21.63'N 124°01.73'W, sweeps, riparian *Scirpus* sp., 8.vi.2009, 1 ♀; Del Norte Co., ~8.3 km NW Requa, mouth of Wilson Ck., 41°36.29'N 124°06.04'W, sweeps, *Eleocharis* sp., creekside, 9.vi.2009, 12 ♂♂ 2 ♀♀ (1 ♂ genit. prep.), sweeps, *Scirpus* sp., creekside, 9.vi.2009, 3 ♂♂, all K. N. Barber leg. (all CNCI); Sagehen Creek, nr. Hobart Mills, 6500', 13.vii.1961, 1 ♂, J. G. Chillcott leg. (CNCI); Sierra Co., Sagehen Creek Field Station, 6.viii.1975, 1 ♀, M. E. Buelger & E. I. Schlinger leg. (EMEC); Smith River, 21.vii.1932, 1 ♀, 24.vii.1932, 1 ♀, J. M. Aldrich leg. (USNM); Placer Co., Tahoe Nat. Forest, Ward's Canyon Meadow, 7.2 km SW Tahoe City, 2134 m, 22.vii.1983, 1 ♀, T. W. Davies leg. (CASC). COLORADO: Cameron Pass, 20.viii.1940, 1 ♀, G. F. Knowlton leg. (LACM); Summit Co., Frisco, 3.vii.2001, 1 ♂, I. S. Winkler leg. (BYUC, genit. prep.); Boulder County, Middle Boulder Creek, 16 km W Boulder, Hwy 119, 2280 m, 8.viii.1973, 1 ♂, P. H. Arnaud Jr. leg. (CASC, genit. prep.); 3 mi N Nederland, 8500', marshy stream margin, 2.vii.1961, 1 ♀; Jackson Co., Rabbit Ears Pass, 7.vii.1961, 1 ♀, both J. G. Chillcott leg. (both CNCI); Summit Co., Wheeler Junction, ponds nr. Tenmile Creek, 27.vi.1995, 1 ♀, S. Fitzgerald & A. Foley leg. (CSUC). IDAHO: Franklin Co., Beaver Creek, 14.vii.1977, 1 ♀, G. F. Knowlton leg. (LACM); Bovill, 17.vi.1911, 1 ♀, A. L. Melander leg. (USNM); Camas Co., 28 mi E Featherville, 18.vi.1966, 1 ♀, M. A. Brusven leg. (WFBM); Boundary Co., Dawson Lake, 48°46.3'N 116°14.3'W, 885 m, 1 ♂, 3.vi.2006, W. N. Mathis leg. (USNM, genit. prep.); Blaine Co., Galena, 7600', 15.vii.1961, 2 ♂♂, B. H. Poole leg., 1 ♂ 1 ♀, J. G. Chillcott leg. (CNCI); Latah Co., 7 mi N Harvard, 18.vi.1980, 1 ♂, G. C. Steyskal leg. (USNM); Idaho Co., Lola Pass, 2.vii.1977, 1 ♀, W. F. Barr leg.; Latah Co., Moscow Mt., "7-5".1966, 1 ♂, H. C. Manis leg. (both WFBM); Boundary Co., Perkins Lake, 48°45.6'N 116°05.5'W, 760 m, 3.vi.2006, 2 ♂♂, W. N. Mathis leg. (USNM, 1 ♂ genit.

prep.); Priest Lake, [-].viii.1919, 1 ♀, 22.viii.1919, 4 ♂♂, 3.ix.1919, 1 ♂, 20.viii.1920, 1 ♀; Priest Lake, Soldier Creek, 22.viii.1919, 2 ♀♀; Priest Lake, Tule Bay, 22.viii.1920, 2 ♂♂ 2 ♀♀, all A. L. Melander leg. (all USNM); Custer Co., Stanley, 20.vii.1965, 1 ♀, R. L. Westcott leg. (WFBM). **MICHIGAN:** Keweenaw Co., 27.vii.1953, 7 ♂♂ 1 ♀; Keweenaw Co., Isle Royale, 15., 17.vii.1938, 1 ♀, all G. Steyskal leg. (all USNM). **MONTANA:** Granite Co., No. 1, 22 mi WNW Anaconda, 3.vii.1959, 1 ♀, G. W. Byers leg. (SEMC); 1 mi W Big Fork, 25.vi.1967, 1 ♀, S. Whitney leg.; 2 mi W Big Fork, 9.vii.1967, 1 ♀, B. A. Foote leg.; 10 mi NW Big Fork, 8.vii.1966, 2 ♀♀, T. Krystowski leg. (all USNM); Lake Co., 2.3 E Bigfork, 9.viii.1972, 1 ♀, W. N. Mathis leg. (OSAC); 4.5 mi NE Polson, 31.vii.1966, 1 ♀, T. Krystowski leg. (USNM). **OREGON:** Brownsmead, 9.v.1936, 1 ♀, K. Gray leg.; Coos Co., Charleston, 27.v.1952, 1 ♀, V. Roth leg. (both OSAC); Deschutes Co., Deschutes River, 1 mi SW Pringle Falls, 4250', flight trap, 31.vii.1970, 1 ♀, P. H. Arnaud Jr. leg. (CASC); Lane Co., 2 mi S Florence, 7.vii.1971, 3 ♂♂ 4 ♀♀; Lane Co., 8 mi S Florence, 7.vii.1971, 3 ♂♂ 1 ♀, 29.vi.1971, 2 ♂♂, all G. Steyskal leg. (all USNM); Lane Co., 2 mi S Florence, South Jetty Road, 7.vii.1971, 3 ♂♂ 8 ♀♀, Oman leg. (OSAC, 1 ♂ 1 ♀ genit. prep.); Benton Co., Mary's Peak, ~14.2 km WSW Flynn, 44°30.63'N 123°33.15'W, sweeps, sedge meadow, 10.vi.2009, 3 ♀♀; same locality but 44°30.66'N 123°33.24'W, sweeps, sedge meadow, 10.vi.2009, 1 ♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); Benton Co., McDonald Forest, 9.iv.1977, 1 ♀, S. Rolston leg. (OSAC); Grant Co., Moon Meadows, 12. vi.1939, 1 ♀, P. H. Arnaud leg.; Tillamook Co., 5 mi SSE Hebo, 11.vii.1971, 1 ♀, G. Steyskal leg. (both USNM); Tillamook Co., Little Nestucca River, 2 mi E Hwy 101, [no date], 2 ♂♂ 1 ♀, J. D. Lattin leg. (OSAC, 1 ♂ genit. prep.); Curry Co., Ophir, 42°33.34'N 124°23.48'W, sweeps, *Eleocharis* sp. in very wet area behind low dunes, 3. vi.2009, 28 ♂♂ 13 ♀♀ (CNCI 28 ♂♂ 11 ♀♀, 9 ♂♂ genit. prep., SMOC 2 ♀♀), sweeps, *Carex* sp. in moist sandy area behind low dunes, 3.vi.2009, 8 ♂♂ 2 ♀♀ (CNCI, 3 ♂♂ genit. prep.); Curry Co., Ophir, Coy Ck. Rd., 42°33.85'N 124°22.99'W, sweeps, mostly *Scirpus* sp., 3.vi.2009, 1 ♂ 3 ♀♀ (CNCI), all K. N. Barber leg.; Tillamook Co., 2 mi SE Pacific City, 1.v.1973, 1 ♀, J. D. Lattin leg. (OSAC); Curry Co., Samuel Boardman S. P., Lone Ranch Beach, 42°06.05'N 124°20.80'W, sweeps, veg. incl. *Equisetum telmateia*, 3.vi.2009, 1 ♀ (CNCI); same locality but 42°06.06'N 124°20.69'W, sweeps, mostly *Equisetum telmateia*, 3.vi.2009, 7 ♂♂ 2 ♀♀ (CNCI 4 ♂♂ 2 ♀♀, SMOC 3 ♂♂); same locality but 42°06.07'N 124°20.76'W, sweeps, mostly *Equisetum telmateia*, 3.vi.2009, 15 ♂♂ 9 ♀♀, K. N. Barber leg. (CNCI); Tillamook Co., 0.9 mi W Sand Lake, 13.vi.1972, 1 ♀, Lattin leg.; Tillamook Co., 1 mi W Sand Lake, 13.vi.1972, 1 ♂ 1 ♀, W. N. Mathis leg. (all OSAC); Tillamook Co., 2 mi W Sand Lake, 1.v.1973, 3 ♂♂ 3 ♀♀, J. D. Lattin leg. (OSAC 2 ♂♂ 2 ♀♀, DEBU 1 ♂ 1 ♀); Tillamook Co., 2½ mi W Sand Lake, 13.vi.1973, 3 ♀♀; Tillamook Co., 2 mi S Sand Lake, 13.vi.1973, 1 ♀, all W. N. Mathis leg.; Tillamook Co., 2½ mi S Sand Lake, 1.v.1973, 2 ♀♀, J. D. Lattin leg. (all OSAC); Waldport, 16.iv.1968, 1 ♂ 1 ♀, P. Oman leg. (1 ♂ genit. prep.); Lincoln Co., Waldport, 22.viii.1971, 1 ♀, Oman leg.; Yachats, 14.iv.1970, 1 ♀, P. Oman leg. (all OSAC). **УТАН:** Allen Canyon, 16.vii.1955, 1 ♂, S. L. Wood leg. (CNCI, genit. prep.); Cache Co., Ant Valley, 7.vii.1977, 1 ♀, G. F. Knowlton leg.; Weber Co., Beaver Creek, 7.vii.1977, 1 ♀, Knowlton & Hanson leg. (both LACM); Wasatch Co., 2 mi S Daniels Pass, 9.vii.1961, 8500', 3 ♂♂ 1 ♀, J. G. Chillcott leg. (CNCI, 2 ♂♂ genit. prep.); Cache Co., Franklin Basin, 13.viii.1974, 1 ♀, Knowlton & Hanson leg., 29.vi.1979, 1 ♀, G. F. Knowlton leg.; Cache Co., W. Hodges Canyon, 25–28.vii.1978, 1 ♀, Knowlton & Hanson leg.; Cache Co., Logan Canyon, 5.vi.1967, 1 ♂; Cache Co., Logan Canyon, Turner C.G. [campground], 15.vi.1984, 1 ♀, both G. F. Knowlton leg.; Cache Co., Logan River, 1.vii.1961, 1 ♂ 2 ♀♀; Logan River, 1.vii.1961, 1 ♂ 1 ♀ (1 ♂ genit. prep.), all W. J. Hanson leg.; Cache Co., Tony Grove Jct., 14.vi.1983, 1 ♀, G. F. Knowlton leg.; Cache Co., Tony Grove Jct., Malaise trap, 12–19.vii.1983, 1 ♀, 23–30.viii.1983, 1 ♂, 3–11.vii.1984, 1 ♀, [no collector] (all LACM). **WASHINGTON:** Big Four Mt., 5.vii.1924, 1 ♀, A. L. Melander leg. (USNM); Skamania Co., Carson, 6.viii.1951, 3 ♂♂ 5 ♀♀, M. R. Wheeler leg. (AMNH, 2 ♂♂ 1 ♀ genit. prep.); Dartford, 17.v.1924, 1 ♂; Dewatto, 7.vi.1966, 2 ♀♀, all A. L. Melander leg.; Asotin Co., Fields Spr[ing] St. Pk., 10.vi.1980, 1 ♂ 3 ♀♀ (1 ♂ genit. prep.), G. C. Steyskal leg.; Pacific Co., Ft. Canby St. Pk., 29.vi.1988, 1 ♀, W. N. & D. Mathis leg.; Friday Harbor, 29.v[?].1906, 1 ♀, J. M. Aldrich leg.; Hoquiam, 27.v.1917, 1 ♂, H. G. Dyer leg.; Pend Or[eille] Co., Ione, ca. 10 km W Rt. 20, 48°40.4'N 117°28.2'W, 975 m, 5.vi.2006, 1 ♂ 4 ♀♀, W. N. Mathis leg. (all USNM); Lewis Co., Knuppenburg Lake, 17 km ENE Packwood, Hwy 12 mi. 149, 46°37'46"N 121°24'57"W, 1260 m, hemlock forest around lake, CJB04-15, 11.vii.2004, 1 ♀, C. J. Borkent leg. (LEMQ); Longmire, 27.vii.1935, 4 ♀♀; Mt. Constitution, 17.vii.1909, 8 ♂♂ 6 ♀♀ (1 ♂ genit. prep.), 22.vii.1909, 1 ♂, 31.vii.1909, 1 ♂, 7.viii.1909, 2 ♂♂, all A. L. Melander leg.; Mt. Constitution, 17.vii.1909, 1 ♂ 1 ♀, J. M. Aldrich leg., 17.vii.1909, 1 ♂, 31.vii.1909, 1 ♀, C. F. Baker leg., 7.viii.1909, 1 ♀, [no collector] (all USNM); Mt. Constitution, Orcas Id., 7.vii.1905, 1 ♂ 3 ♀♀, J. M. Aldrich leg. (USNM 1 ♂ 2 ♀♀, SMOC 1 ♀); Mt. Rainier, Longmire, 20.vii.1922, 1 ♀, 30.vii.1922, 2 ♂♂; Mt.

Rainier, White River, 20.vii.1924, 1 ♂ (genit. prep.), all A. L. Melander leg. (all USNM); Olympic N. P., 2 mi on Hoh Rain Forest Rd., 1797/1, 29.vi.1988, 2 ♂♂, J. A. Downes leg. (CNCI); Olympic Nat. Park, Kalaloch, 8.vii.1968, 1 ♂, W. W. Wirth leg. (USNM); San Juan Co., Orcas Island, Moran St. Pk., Lily Pad Lake, 6.vii.1974, 1 ♂, P. H. Arnaud Jr. leg. (CASC, 1 ♂ genit. prep.); Palouse, 18.vi.[-], 1 ♂; Quilcene, 16.viii.1910, 1 ♀, both A. L. Melander leg.; Raymond, 23.viii.1951, 1 ♀, A. H. Sturtevant leg. (all USNM); Grays Harbor Co., Rayonier Park, 5 km N Humptulips, 27.vi.1974, 1 ♂, P. H. Arnaud Jr. leg. (CASC); Seattle, 16.vi.1920, 1 ♂; South Bend, 23.v.1917, 4 ♀♀ (1 ♀ genit. prep.), all A. L. Melander leg.; Pend Oreille Co., Sullivan Lake, 27.vi.1968, 1 ♂, W. W. Wirth leg.; Pend Oreille Co., s. end Sullivan Lake, 48°47.3'N 117°17.1'W, 655 m, 5.vi.2006, 2 ♂♂ 3 ♀♀, W. N. Mathis leg. (all USNM); Tacoma, 27.viii.1911, 3 ♀♀ (1 ♀ genit. prep.), 1 ♀ with det. as *Anthomyza tenuis* Lw); Valleyford, 19.vi.1919, 1 ♀, 17.v.1924, 4 ♂♂ 2 ♀♀ (1 ♂ genit. prep.); Vashon, 28.v.1917, 3 ♂♂ 2 ♀♀, all A. L. Melander leg. (all USNM). **WYOMING:** Battle Lake Road, Sierra Madre Range, 8000', on side of stream, 18.vii.1961, 1 ♀, J. G. Chillcott leg. (CNCI); Yellowstone Pk., Lake, 18.vii.1923, 1 ♂; Yellowstone Pk., Old Faithful, 14.vii.1923, 1 ♂ 1 ♀; Yellowstone Pk., Roosevelt Sta., 5.vii.1923, 2 ♀♀; Yellowstone Pk., Spring Creek, 15.vii.1923, 1 ♂; Yellowstone Pk., Twin Lakes, 10.vii.1923, 1 ♂; Yellowstone Pk., Upper Basin, 13.vii.1923, 1 ♂; Yellowstone Pk., Yellowstone Lake, 23.vii.1934, 1 ♀, all A. L. Melander leg. (all USNM).

Other material examined (not included in type series). **CANADA: ALBERTA:** Banff N. Pk., Mt. Eisenhower, 27.vii.1967, 1 ♀, B. A. Foote leg. (USNM, headless); Dunvegan, north shore of Peace River, sweep vegetation along shoreline, 12.vii.1997, 1 ♂ 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039773, -814, -841, all headless). **BRITISH COLUMBIA:** Atlin, 2200', 7.vii.1955, 1 ♂, B. A. Gibbard leg. (headless); Hatzic Lake, 10.vi.1953, 1 ♀, G. J. Spencer leg. (tattered wings); Juskatla, Q[ueen] C[h]arlotte Islands, 14.vi.1957, 1 ♀, E. E. MacDougall leg. (1 wing attached to pin, other missing); Miracle Beach, nr. Oyster River, 11.vi.1955, 1 ♀, J. R. McGillis leg. (headless); Prince Rupert, *Ledum/Kalmia* bog, 4.vi.1960, 1 ♂, J. G. Chillcott leg. (headless); Qualicum, 19.vi.1955, 1 ♂, G. E. Shewell leg. (headless, genit. prep.), (all CNCI). **ONTARIO:** Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, sweeps, emergent *Equisetum fluviatile* with *Carex* sp., 16.vi.2007, 1 ♂, K. N. Barber leg. (SMOC, headless); Pancake Bay Prov. Park, 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC, used for molecular work). **YUKON:** Alaska Hwy at M'Clintock River, sweep sedges at river edge, 4.vii.1997, 1 ♂, T. A. Wheeler leg. (LEMQ 0039824, headless). **UNITED STATES OF AMERICA: ALASKA:** Kenai NWR [National Wildlife Reserve], ~0.5 mi E of Berg Lk., LTEMP [Long Term Ecological Monitoring Program] site 3271, wetland, sweep net sample, 20.vi.2004, 1 ♂, S. Grimes leg. (KNWR, ID:3886, BOLD ID:DKNWR061-11, dirty); Kenai Peninsula Borough, Long Term Ecological Monitoring Program, 3364, ~0.4 km W of Nikolai Ck., W of Windy Lk., section 6, grassy area, sweep net sample, 22.vi.2004, 1 ♂, J. Lewis leg. (KNWR, ID:2249, crushed, dirty). **CALIFORNIA:** Mendocino Co., Inglenook Fen, fen area, 30–50', 22.vii.1972, 1 ♂, E. I. Schlinger leg. (EMEC, UCIS-215635, 1 ♂ headless, genit. prep.). **IDAHO:** Priest Lake, 3.ix.1919, 1 ♂, [-].viii.1919, 1 ♂; Priest Lake, Soldier Creek, 22.viii.1919, 1 ♂, all A. L. Melander leg. (all USNM, all headless). **MONTANA:** Gallatin Co., Gallatin R., 2 mi N Gallatin Gtwy [Gateway], 4100', 23.vi.2001, 1 ♀, J. B. Runyon leg. (MTEC, tip of abdomen crushed). **OREGON:** Curry Co., Ophir, 42°33.34'N 124°23.48'W, sweeps, *Eleocharis* sp. in very wet area behind low dunes, 3.vi.2009, 1 ♂, K. N. Barber leg. (SMOC, used for molecular work). **UTAH:** Cache Co., Logan Canyon, Turner C.G. [campground], 23.vii.–3.viii.1985, 1 ♂, W. J. Hanson leg. (LACM, salt deposition). **WASHINGTON:** Everett, 19.vi.1920, 1 ♂, A. L. Melander leg. (USNM, headless); Asotin Co., Fields Spr[ing] St. Pk., 10.vi.1980, 1 ♀, G. C. Steyskal leg. (USNM, wingless); Mt. Constitution, 17.vii.1909, 1 ♀, J. M. Aldrich leg. (USNM, headless); San Juan Co., Orcas Island, Moran St. Pk., Lily Pad Lake, 6.vii.1974, 1 ♀, P. H. Arnaud Jr. leg. (CASC, headless); Palouse, 18.vi.[-], 1 ♂; South Bend, 23.v.1917, 1 ♀; Valleyford, 17.v.1924, 2 ♀♀, all A. L. Melander leg. (all USNM, all headless). **WYOMING:** Yellowstone Pk., Twin Lakes, 10.vii.1923, 1 ♀, A. L. Melander leg. (USNM, headless).

Other A. pallida-group material of questionable identity (*Anthomyza* sp. cf. *vockerothi*). **CANADA: ALBERTA:** [Fort] McMurray, 30.vii.1953, 1 spec., G. E. Ball leg. (CNCI, abdomen and hind legs missing). **BRITISH COLUMBIA:** Kimpton Creek, Hwy 93, 23.vi.1982, 1 ♀, B. V. Peterson leg.; Mission City, 29.vi.1953, 1 ♂, W. R. M. Mason leg.; Tlell, Q[ueen] C[h]arlotte Islands, 26.vi.1957, 1 ♂, E. E. MacDougall leg. (all CNCI, all missing abdomen). **NORTHWEST TERRITORIES:** Aklavik, Lot 245, 8.vii.1931, 1 ♂, Bryant leg. (USNM, abdomen damaged). **UNITED STATES OF AMERICA: IDAHO:** Bovill, 17.vi.1911, 1 ♀, A. L. Melander leg. (USNM, abdomen missing). **WASHINGTON:** Mt. Rainier, White River, 20.vii.1924, 1 ♀, A. L. Melander leg. (USNM, abdomen missing).



Figs 357–360. Living *Anthomyza vockerothi* sp. nov. and its habitat. 357 – *A. vockerothi* sp. nov., male, subdorsally, body length ca. 2.8 mm; 358 – female, laterally, body length ca. 3.2 mm (both from Canada: Ontario: Pancake Bay Prov. Park); 359 – strobilating *Equisetum fluviatile* with a female of *A. vockerothi* on stem (same locality as in Fig. 360); 360 – waterlogged growth of *Equisetum fluviatile* in Marathon (Canada: Ontario), typical habitat of *A. vockerothi*. Photo by J. Roháček (Figs 357, 358) and K. N. Barber (Figs 359, 360).

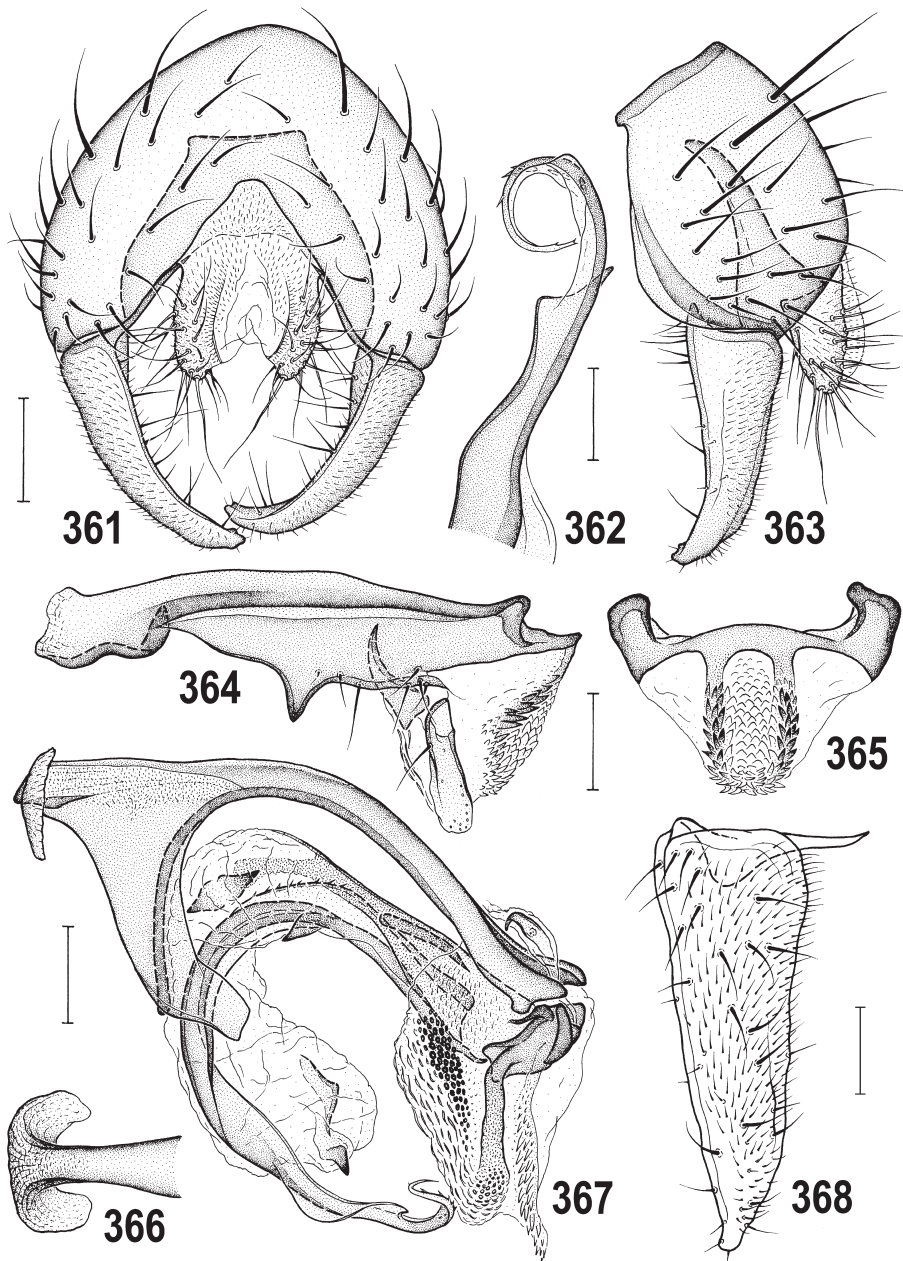
Description. Male. Total body length 2.22–3.10 mm; general colour widely variable as in *A. concolor* but most specimens largely dark brown (Figs 340, 357) with only head (partly) and extremities yellow, rarely partly to largely yellow (cf. female on Fig. 342) with various pale brown to dark brown darkenings on head, thorax and abdomen. Head about as long as high, anteriorly somewhat angular in profile as in *A. concolor*, largely yellow but frons and occiput with brown to blackish brown darkenings of various extent. Occiput slightly concave medially, in (rare) pale specimens yellow with brown crescent-shaped areas surrounding medial pair of silvery white microtomentose spots but not reaching eye margin; in (more common) dark specimens these areas darkened and enlarged even to the extent of covering most of occiput, leaving yellow only on ventralmost part behind postgena and small spots in dorsal part of medial silvery microtomentose areas. Frons relatively narrow, largely dull yellow; pale specimens with only ocellar triangle brownish; darker specimens with brown area darker and covering most of frontal triangle (except for narrow anterior corner), and orbits behind posterior ors, and ocellar triangle blackish brown; frontal triangle subshining, with sparse whitish to grey (posteriorly) microtomentum, the latter denser and darker on ocellar triangle. Orbits pale yellow with silvery whitish microtomentum, but in dark specimens orbits brownish and with greyish microtomentum posteriorly (between posterior ors and vti). Frontal triangle relatively narrow but elongate, with long acute anterior corner reaching to anterior fifth (or more) of frons. Frontal lunule small but distinct, yellow. Face as in *A. concolor*, light yellow to yellow and separated from parafacialia by dark yellow to orange ochreous and somewhat golden glittering marginal stripe (narrower than in *A. concolor*) also reaching onto ventral margin of gena; parafacialia and gena whitish yellow, with dense silvery white microtomentum; postgena yellow; mouthparts pale yellow, clypeus (small) and prementum dark yellow to ochreous. Cephalic chaetotaxy resembling that of *A. concolor* but pvt often longer; vte usually almost as long as vti; sometimes 1 additional microsetula in front of shorter anterior ors setula; 1–2 pairs of medial microsetulae in anterior third of frons; postocular setulae (6–7) sparse, situated mainly dorsally; 3–4 relatively long but fine peristomals. Palpus also as in *A. concolor*, including chaetotaxy. Eye formed as in *A. concolor*, with longest diameter about 1.3 times as long as shortest. Gena slightly smaller, with shortest height 0.13–0.15 times as long as shortest eye diameter. Antenna similar to that of *A. concolor*, entirely yellow, at most 1st flagellomere with small circular darkening surrounding base of arista. Arista about 2.0 times as long as antenna, with basal segments yellow to ochreous and distal setiform part dark brown, with cilia shorter than those on 1st flagellomere.

Thorax slightly narrower than head, variably yellow (rarely) to blackish brown (commonly), coloured as in *A. concolor*. Scutum colouration ranging from orange yellow with small and faint ochreous darkenings, yellow and brown spotted (both these variants rare) to blackish brown including humeral-notopleural area. Scutellum also variable, yellow, yellow-and-brown (darker medially) to blackish brown. Dorsum of thorax densely yellowish grey to grey microtomentose (tomentosity most readily seen in dark specimens, Fig. 357) and dull. Pleural part of thorax also microtomentose but more shining than scutum, rarely almost entirely orange yellow or with various brown darkenings, most often entirely blackish (Figs 340, 357) with only some sutures between sclerites ochreous. Postscutellum and postnotum ochreous orange to ochreous brown in pale specimens to blackish brown in dark ones. Thoracic chaetotaxy closely resembling that of *A. concolor*, differing only as follows: prs relatively well devel-

oped (up to as long as anterior npl); sa and pa subequal to prs; 5–8 dc microsetae in front of dc macrosetae, the hindmost of them markedly enlarged, sometimes only slightly shorter than anterior dc and resembling a third dc macroseta; 2 medial rows of ac microsetae long, always reaching beyond level of posterior dc, sometimes up to prescutellar position; only 3–4 upcurved setulae in dorsal half of sternopleuron and its ventral part with 4–5 longer setae. Scutellum as in *A. concolor*. Legs almost completely yellow, only distal half or more of last tarsal segment of all tarsi brown to dark brown, often with sides of segment darkened along entire length. f_1 with ctenidial spine about as long as maximum width of t_1 ; f_3 with 5–7 posteroventral setae in distal two-fifths shortened and thickened; other femoral, tibial and tarsal chaetotaxies as in *A. concolor*. Wing (Fig. 338) very similar to that of *A. concolor*, including venation. R_{2+3} long, bent parallel to C but with its apex less upcurved to C; R_{4+5} very slightly bent to straight, mostly parallel to M, which is similarly bent to almost straight. Discal cell (dm) with r-m usually situated slightly to distinctly in front of its middle. Other veins and alula as in *A. concolor*. Wing measurements: length 2.54–3.49 mm, width 0.87–1.17 mm, $Cs_3 : Cs_4 = 0.94–1.13$, $rm/dm-cu : dm-cu = 2.25–3.00$. Haltere yellowish white with darker yellow stem as in *A. concolor*.

Abdomen less variable in colour than that of *A. concolor*, in pale specimens terga largely brownish (with yellow areas on some of them, most often on sides of T1, T4, T5) and sterna yellowish, in dark specimens terga entirely brown to dark brown (at most narrowly yellow at lateral margins) and sterna ochreous to brown (darker posteriorly, T4 and T5 usually darkest). T1–T5 subshining, greyish microtomentum less dense than on thorax; similarly formed and setose compared to *A. concolor*, but T3–T5 subequal in size. Preabdominal sterna relatively broad (all wider than long) and becoming wider posteriorly; S1 short and transverse, S2–S5 subequal in length or S5 longer, all distinctly transverse, 1.5 times (S2) to more than twice (S5) wider than long, suboblong to slightly trapezoidal but S5 (widest sternum) with shallow posteromedial emargination. S2–S5 finely but not densely setose, only S1 bare and with darker posterior marginal stripe. T6 largely (medially) membranous and unpigmented, short, transverse, bare, with only small lateral parts (larger on left) yellow to pale-brown pigmented. S6–S8 pale brown with some (usually marginal) areas yellow to entirely blackish brown, S8 usually darkest. S6 and S7 with darker anterior marginal ledge; S6 with 2–3 setae, S7 with 3–4 setae; S8 longer than epandrium, setose in posterior two-thirds.

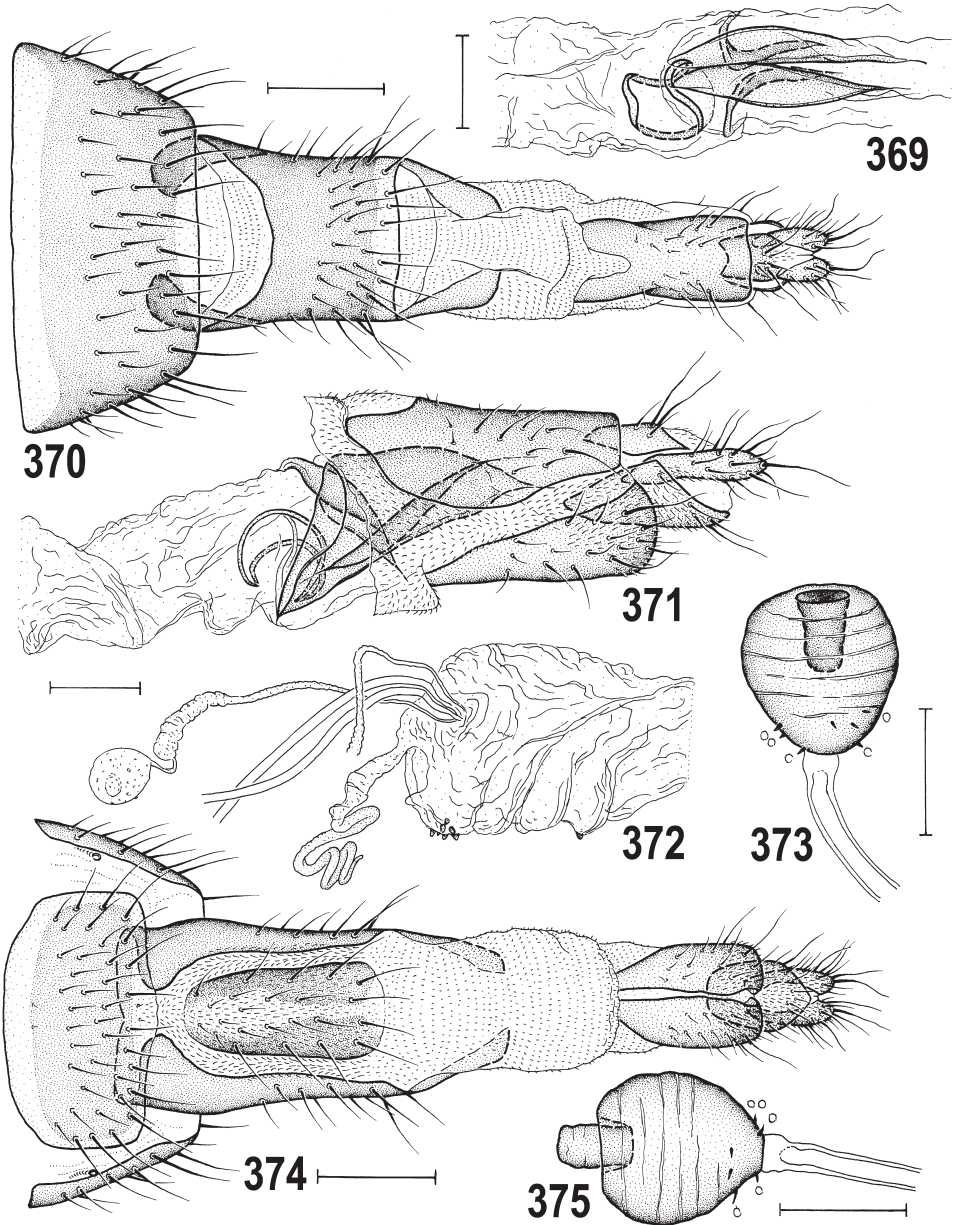
Genitalia. Epandrium (Figs 361, 363) also somewhat variable in colour, orange yellow with dorsal part brown darkened (in pale specimen) to completely blackish brown (Fig. 340), moderately long and broad (slightly narrower than in *A. concolor*) but relatively high, with less dense and longer setae than in *A. concolor*, 2–3 dorsolateral pairs of them longer and thicker; anal fissure narrow but rather high, distinctly triangular (Fig. 361). Cercus somewhat larger than that of *A. concolor* and with longer fine setae. Medandrium (Fig. 361) moderate, slightly narrower than in *A. concolor*, with dorsolateral corners little projecting, bare. Gonostylus (Figs 361, 363, 368) longer and narrower than in all other members of the *A. pallida* group, being as long as or slightly longer than epandrial height, rather regularly curved medially, tapered towards apex, the latter narrow, ending in 2 short blunt teeth (visible in posterior view, Figs 361, 363), micropubescent on most of outer side and with longer fine setae only on concave inner side. Hypandrium (Fig. 364) rather similar to that of *A. concolor*, with reduced anterior



Figs 361–368. *Anthomyza vockerothi* sp. nov., paratype male (Canada: Ontario). 361 – external genitalia, caudally; 362 – apex of filum, subventrally (widest extension); 363 – external genitalia, laterally; 364 – hypandrial complex, laterally; 365 – transandrium, caudally; 366 – apex of phallapodeme, posterodorsally; 367 – aedeagal complex, laterally; 368 – gonostylus, lateroventrocaudally (widest extension). Scales = 0.05 mm (Figs 362, 368) and 0.1 mm (others).

internal lobes. Transandrium (Fig. 365) slightly bent and slender as in *A. concolor* but with better developed and longer pair of medial sclerotizations transilient to spinose parts of basal membrane. Pregonite (Fig. 364) also most similar to that of *A. concolor*, with acute and relatively robust anterior tooth, but lacking a small protuberance behind it; posteriorly with usual small projection connected with basal membrane, ventrally usually with more (6–7, middle longest) setae. Postgonite (Fig. 364) closely resembling that of *A. concolor* but with narrower base and 1 seta situated in basal third of anterior margin; internal dorsal sclerite attached to base of postgonite well developed, widened ventrally. Basal membrane (Fig. 365) with a narrow (but wider than in *A. concolor*) area covered by short spines (biggest and pigmented laterally, pale and flat medially). Aedeagal part of folding apparatus (Fig. 367) laterally with elongate group of very dark tubercles (larger and more numerous than in both *A. concolor* and *A. occidentalis*) in addition to fine and short hyaline striae (as in these species). Connecting sclerite (Fig. 367) relatively strong, proximally slender and fused to phallopore, distally slightly widened and its terminal pale part with only small tubercles (thus resembling that of *A. occidentalis*). Phallopodeme (Fig. 367) relatively slender, with basal part deeply forked, fulcrum robust and arising relatively close to apex, the latter with wing-like lobes projecting laterally (Fig. 366). Aedeagus (Fig. 367) with short phallopore and large long distiphallus. Saccus elongate, somewhat widened distally, membranous, basally darker and with usual pair of internal sclerites, armed with 5 robust dark-pigmented spines, 3 situated rather basally and only 2 distally (Fig. 367). Filum most similar to that of *A. concolor*, long and strongly arched, with tooth-like subventral process (distinctly smaller than in *A. concolor*) in front of terminal slender part, and its curved, attenuated apex with 6–7 small spines and finely bicuspid tip (Fig. 362); dorsobasal submembranous part of filum with a row of fine spinulae (Fig. 367). Ejacapodeme small, pale, with darker, strongly curved terminal end (Fig. 367).

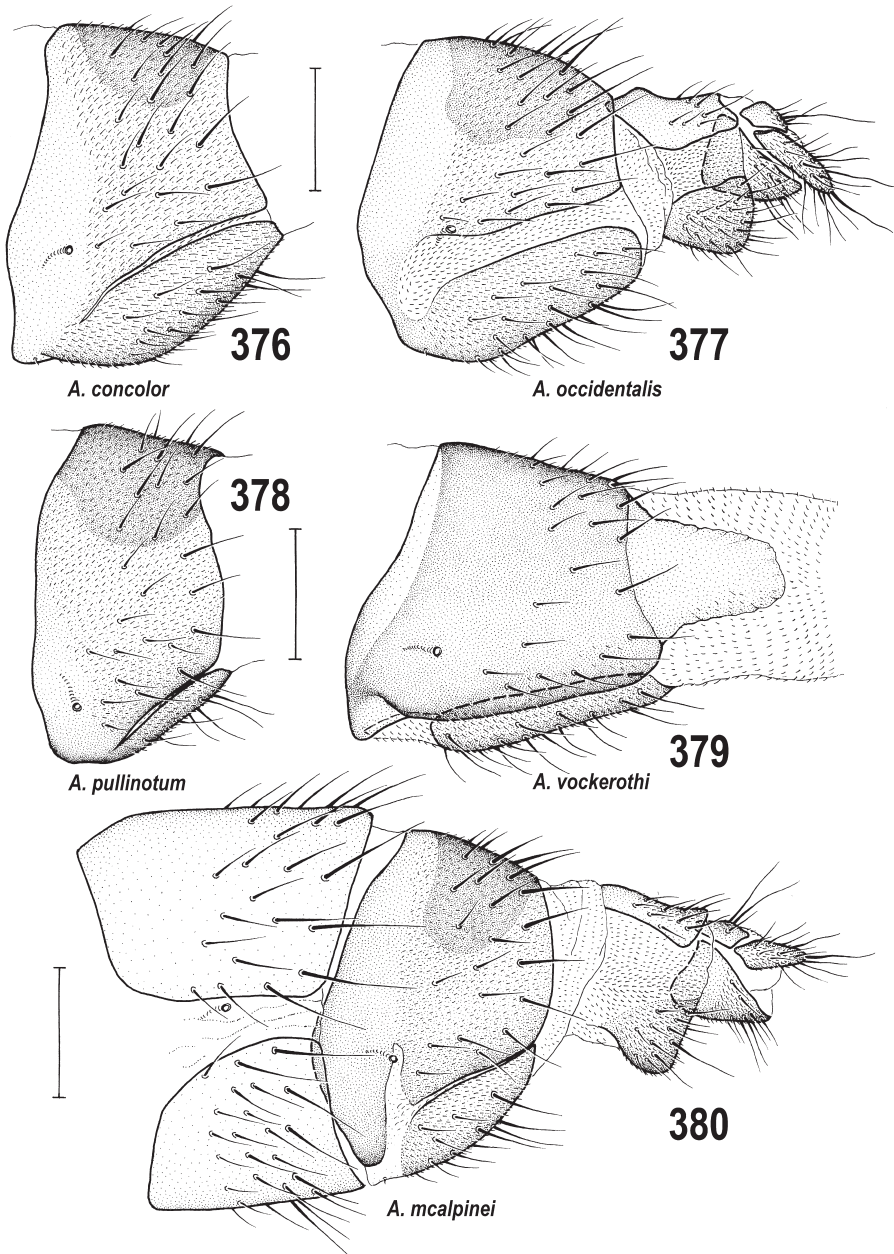
Female. Similar to male unless mentioned otherwise. Total body length 2.70–3.81 mm. Colour of head, thorax and abdomen similarly variable to that in male, but pale (Fig. 342) and intermediate specimens more frequent. Lightest specimens with darkenings on occiput and mesonotum paler, smaller and less distinct, and their preabdominal sclerites almost entirely yellow; darkest specimens with preabdominal sterna paler brown (Fig. 358). Clypeus and prementum brownish, particularly in dark specimens. Antenna with 1st flagellomere always with most of outer side brownish darkened and also its inner side usually narrowly infuscated along anterodorsal margin (as in *A. concolor*). f_1 with ctenidial spine as long as or slightly longer than maximum width of t_1 ; f_3 without posteroventral row of shortened and thickened setae. Cross-vein r-m often situated in front of the middle of cell dm. Wing measurements: length 2.74–3.89 mm, width 0.91–1.25 mm, $Cs_3 : Cs_4 = 0.92\text{--}1.11$, $rm(dm-cu : dm-cu = 2.46\text{--}2.82$. Abdomen with T1–T5 variably coloured, from entirely yellow, through partly (medially) brown to entirely brown, T1–T2 usually darker and T5 paler, contrasting with always distinctly darker brown T6. T1–T5 somewhat shorter and distinctly more transverse than in male. T1–T2 narrower, T3–T5 wider and subequal in size. Preabdominal sterna whitish yellow to brown, all more or less transverse and becoming only slightly wider posteriorly, S2 and postabdominal S6 usually darker than others. S2 very slightly, S3 slightly, S4 and S5 more transverse, all suboblong to slightly trapezoidal. S5 largest and widest, about as wide as but longer than postabdominal S6.



Figs 369–375. *Anthomyza vockerothi* sp. nov., paratype female (Canada: Ontario). 369 – female internal sclerites, ventrally; 370 – postabdomen, dorsally; 371 – female internal sclerites and apex of abdomen, laterally; 372 – distal part of female genital chamber, laterally; 373 – spermatheca; 374 – postabdomen, ventrally; 375 – spermatheca. Scales = 0.2 mm (Figs 370, 374), 0.05 mm (Figs 373, 375) and 0.1 mm (others).

Postabdomen (Figs 370, 374) very long and slender (much more than in all congeners of the *A. pallida* group, particularly in 7th and 8th segment), telescopic. T6 simple, large (but distinctly narrower than T5), smaller than in *A. concolor* and *A. occidentalis*, tapered posteriorly and hence trapezoidal, largely brown, with only short anterior and posterior marginal areas pale, relatively shortly setose in posterior two-thirds, marginal setae longest. S6 transversely suboblong to trapezoidal with anterior corners rounded, shorter and darker than S5, usually brown with all margins pale, and finely setose. T7 much longer and narrower than in all relatives in the *A. pallida* group; also with distinctive posterolateral sclerotized lobes (probably secondary sclerotization of pleural membrane, Fig. 379) rendering T7 seemingly posteromedially deeply incised (Fig. 370; readily visible also in air-dried specimens). T7 dark brown, only posteriorly with pale-pigmented marginal band, slightly semiconical to semicylindrical, dorsomedially shortened (anteromedially deeply emarginate, Fig. 370), finely setose in posterior half, largely without microtomentum (Fig. 379) and strikingly shining (Fig. 358), ventrally long, with anteroventrally projecting anterior corners (Fig. 374). S7 very elongate and narrow (Fig. 374), distinctly (possibly secondarily) separated from T7 by narrow, distinctively micropubecent membranous areas but 7th spiracle embedded in T7 far from this membrane (Fig. 379). S7 with distinctive pattern (Fig. 374), dark laterally, pale medially (of various extent), finely setose. 8th segment very long and narrow, anteriorly largely membranous and finely micropubescent. T8 (Figs 370, 371) also very narrow, brown, with a deep narrow anteromedial incision, with short sparse setae (except for posterolateral one) and lacking micropubescence; S8 (Figs 371, 374) also unusually long, although shorter than T8, medially divided into 2 elongate, posteriorly dorsally bent (posterodorsally slightly invaginated), finely setose sclerites, with sparse micropubescence only in posterior third. Genital chamber (uterus) posteriorly with pigmented internal sclerotization (Figs 369, 371) formed by 2 pairs of sclerites, ventromedial pair larger and elongate, dorsomedial pair smaller, shorter and curved; 1 short, strongly curved (in profile) annular sclerite situated in front of the former. Membranous part of genital chamber relatively long (Fig. 372), usually with some small tubercle-like sclerotizations on ventral side of distal part. Ventral receptacle (Fig. 372) hyaline, slender and tubular (also proximally) as in relatives, terminating in coiled vermicular apex. Accessory gland small, vesicular, hyaline, set on distally dilated and indistinctly ringed duct. Spermathecae (1+1) shortly subovoid (Figs 373, 375), with sparsely transversely striated surface, each with deep, narrow (almost as narrow as that of *A. concolor*) invagination which may be partially everted, several small pointed spines in basal part surrounding duct insertion; duct very long and ending simply in centre of spermathecal body. T10 small and narrow (Fig. 370), longer than wide, somewhat emarginate anteriorly, slightly wider posteriorly, brownish, usually with 3 pairs of setae (1 long) and almost without micropubescence. S10 pale ochreous, distinctly larger and wider than T10, elongately rounded-pentagonal in ventral view (Fig. 374), finely setulose and micropubescent. Cercus long and slender (its basal part hidden below T10, Fig. 371), with numerous fine and moderately long setae (apical and dorsopreapical longest), but largely without micropubescence, which is restricted to ventral side.

Discussion. *Anthomyza vockerothi* sp. nov. belongs to the *A. concolor* subgroup, and appears to be the group's most extensively modified member, particularly with respect to the female postabdominal sclerites, which are strikingly narrowed and prolonged from the 7th segment.



Figs 376–380. Female T7+S7 and/or apex of postabdomen of *Anthomyza* species, laterally. 376 – *A. concolor* (Thomson, 1869) (USA: California); 377 – *A. occidentalis* sp. nov., paratype (USA: Oregon); 378 – *A. pullinotum* sp. nov., paratype (Canada: Alberta); 379 – *A. vockerothi* sp. nov., paratype (Canada: Ontario). 380 – *A. mcalpinei* sp. nov., paratype (Canada: Ontario). Scales = 0.2 mm.

Because of its similarly formed structures in the male and female terminalia, *A. vockerothi* is considered a member of the *A. concolor* subgroup, forming a sister group to the *A. concolor* – *A. occidentalis* pair (see discussion under *A. concolor*).

The species is the most frequently collected and widest-ranging species of the *A. concolor* subgroup. It is similarly variable in body colouration to both of its nearest relatives but, in contrast to these, pale specimens are relatively rare, with the darker specimens prevailing in collections. However, there is an unusual series that is highly dominated by pale specimens (British Columbia: Qualicum). *Anthomyza vockerothi* females can be readily recognized by their slender, elongate postabdomen, combined with one pair of medial, silvery white microtomentose spots on the occiput (these are absent in externally similar females in the *A. tschirnhausi* group). Males can be easily confused with those of *A. concolor* and *A. occidentalis* without examination of the male genitalia, as the form of the gonostylus is particularly diagnostic, being long and very slender, tapering towards the apex. Other diagnostic characters of *A. vockerothi* are: frontal triangle elongate, with long projecting and acute anterior corner; aedeagal part of folding apparatus with numerous dark tubercles; saccus with 3 (of a total 5) robust spines situated near its basal part; female T7 and S7 very slender and elongate; T7 unusually glossy because of reduced micropubescence and with large posterolateral sclerotized lobes; S7 narrowly pale-pigmented medially; female T8 elongate and with narrow deep anteromedial incision; female S8 unusually long; female cercus long and dorsally without micropubescence.

Etymology. The new species is named after the late J. R. Vockeroth, an inspiring dipterist whose legacy includes the anthomyzid chapter in the “Manual of Nearctic Diptera” and many anthomyzid specimens in the CNCI.

Biology. The results from rearing *A. vockerothi* from *Equisetum fluviatile* in Ontario (~8.5 km NW Marathon, Figs 359, 360) are discussed below. This host relationship is further supported by the fact that all known collections from Ontario (Dubreuilville, Marathon, Moosonee, Pancake Bay P. Pk.) and the only site in Manitoba (~6 km SW Shilo) included *E. fluviatile*, which was usually the dominant vegetative component. Adults in western Canada were also collected from pure growths of *E. fluviatile* (Alberta: ~21.9 km W Bearberry, ~3.4 km SSW Hinton, W. A. Switzer P. Pk. – Hay River Rd. W.) or “mostly” *E. fluviatile* (Alberta: ~2.5 km SE Canmore, ~4.4 km NNE Kananaskis Village). Combinations of *E. fluviatile* with *Carex* species include *C. utriculata* (Alberta: Fish Creek P. Pk.) and *C. aquatilis* (Alberta: ~4.4 km SSW Hinton; Ontario: Marathon). Other species of horsetail are also possible hosts for this species, either in combination with *E. fluviatile* (British Columbia: ~2.9 km NNW Golden, *E. palustre* L.) or in combination with *C. utriculata* (British Columbia: Parson, *E. palustre* & *E. ×litorale* Kühlew. ex Rupr., pro sp. (*E. arvense* × *E. fluviatile*)), with both sites also yielding small numbers of *A. concolor*. *Equisetum palustre* is implicated by collections in Alberta (Edmonton – Fort Edmonton Pk., ~15 km SSW Hinton) or in combination with *Eleocharis* (Edmonton – Fort Edmonton Pk.). In Oregon (Samuel Boardman St. Pk.), *Equisetum telmateia braunii* was a very dominant component of the habitat shared with *A. occidentalis* (n = 2) and *A. concolor* (n = 1). The record of a single female from a mix of *E. arvense* and *E. laevigatum* A. Braun (British Columbia: Fernie) is doubtful evidence of a host relationship, as this very small patch bordered a much larger growth of *C. utriculata* that yielded more

specimens of *A. vockerothi* along with *A. mcalpinei* and *A. pengellyi*. Another site that was dominated by *C. utriculata*(?) and a *Poa* sp. (Alberta: Spray Valley P. Pk.) did not have an obvious component of *Equisetum*.

A common theme in the majority of collections of *A. vockerothi* is a habitat of moist to wet ground or even emergent vegetation. Hosts clearly include horsetails, but graminoids, particularly sedges and rushes, are also strong candidates where they occur with or without horsetails. The dune system supporting emergent *Eleocharis* sp. (Oregon: Ophir, Fig. 341) is a simplified habitat shared with *A. concolor*, but in a drier portion of this same dune system supporting *Carex* sp., only a few *A. vockerothi* were found. A nearby habitat (Oregon: Ophir – Coy Ck. Rd.) also produced *A. vockerothi* (to the exclusion of both *A. concolor* and *A. occidentalis*) from an unidentified *Scirpus*. Two species of *Scirpus* separately yielded *A. vockerothi* (California: Prairie Ck. Redwoods St. Pk.) along with larger numbers of *A. concolor*. A collection of *A. vockerothi* was also made from *Juncus* (California: Crescent City – Tell Blvd.), while independent collections suggest a preference for *Juncus* (n = 33) over grasses (n = 2) in the absence of *Carex* or *Equisetum* (California: ~1.5 km W Orick). Complex mixes of grasses, sedges and horsetails, such as the type locality for *A. pullinotum* (Alberta: ~22.7 km S Bellevue, Fig. 313), cannot be specifically assessed for potential host plant based solely on field observation or label data (this site yielded *A. vockerothi*, *A. pullinotum*, and *A. pengellyi*).

More general references for habitat of *A. vockerothi* include “vegetation along shoreline” and “grasses at edge of agricultural field” (Alberta: Dunvegan), “sedges and grass at upper beach” (Alberta: 10 km N Whitecourt), “grasses” (British Columbia: Klondike Hwy near Fraser), “grass/sedges along river margin” (Yukon: Alaska Highway at Yukon River crossing) and “fen area” (California: Inglenook Fen).

The sampling of *E. fluviatile* at the Ontario: Marathon site was intended to investigate and confirm a relationship with *A. vockerothi*, similar to that seen in *A. equiseti* (see below under that species). Since both species of fly occur together at this site (Fig. 359, *A. vockerothi*), there was an opportunity to look for evidence of differential use of the habitat.

Overwintered stems of *E. fluviatile* were sampled on 28 April 2012. Spring melt was still flowing through from a neighbouring lake so that exposed dry stems were raked off the surface (“dry” sample) and segregated from a larger sample of wet and submerged stems (“wet” sample). Samples were transported in 20-L plastic pails and the “wet” pails were decanted several times on the trip back to the laboratory to avoid compaction. The “wet” sample was further decanted and dried using paper towels and overnight exposure to a fan, with all samples held at 22°C and 16L:8D. Although the search was focused on the nodes, stems (hollow internodes) were often quickly checked but a larva was never found within a stem, just as was found for *A. equiseti* at the Echo Bay Marsh site (see discussion under that species). A subsample of 50 nodes containing larvae from each of the “dry” and “wet” samples (100 nodes total) was accumulated from 29 April to 1 May 2012 and held in 4-dram pill vials at 22°C. The remainders of the samples were maintained in 20-L pails with sheer fabric fastened over the tops with shock cords for assessment of daily adult emergence.

The 100 occupied nodes yielded 101 fly larvae. These larvae, in turn, yielded 92 puparia, which produced 54 adult flies – 53 *Anthomyza* spp. and one female *Plunomia transversa* Malloch, 1940 (Chamaemyiidae). Of these 53 *Anthomyza*, a total of 46 had data sufficient for

estimation of pupariation periods at 22°C. The larger-bodied *A. vockerothi* had a pupariation period of about one day shorter (3 ♂♂ 10.7 ± 0.3 ; 12 ♀♀ 10.5 ± 0.2 days) than that of the smaller *A. equiseti* (18 ♂♂ 11.7 ± 0.1 ; 13 ♀♀ 11.6 ± 0.1 days) in both sexes. Thirty puparia (not identified to species) were parasitized: 13 by Figitidae (Eucoilinae), 6 by Braconidae, 6 by Encyrtidae, and 5 by unknown parasitoids (did not emerge). Another 6 fly puparia died of unknown causes, one puparium was punctured and one was lost.

The 53 adult *Anthomyza* reared from nodes consisted of 34 *A. equiseti* and 19 *A. vockerothi* (Table 1). Most of the *A. vockerothi* adults were from the “wet” sample (18 of 19) while the distribution of *A. equiseti* was more even. The pails yielded a total of 32 *A. equiseti* and 138 *A. vockerothi* (12 May to 10 July 2012) but it is more instructive to discuss the proportional distribution of the total emergence from the nodes and pails together. From these combined data, most of the total 223 flies were *A. vockerothi* (157) of which 105 were from the “wet” sample compared to 52 from the “dry” sample while the combined sex ratio favoured males (84 ♂♂ : 73 ♀♀). In contrast, there was no difference between “wet” and “dry” samples for *A. equiseti* ($n = 33$) and males again outnumbered females (40 : 26). However, since there was a 1.3x difference in total air-dried weight of the larger “wet” (315.4 g) versus the smaller “dry” (238.8 g) samples, part of the 2.0x difference in the proportional numbers of *A. vockerothi* in the “wet” and “dry” samples could be explained by a difference in the size of samples. A similar correction would tip the proportions of *A. equiseti* from balanced toward a bias for “dry” stems.

Table 1. Adult *Anthomyza* obtained from *Equisetum fluviatile*, Marathon, Ontario.

	<i>A. equiseti</i>		<i>A. vockerothi</i>	
	♂♂	♀♀	♂♂	♀♀
Dissections of nodes:				
“Dry”	11	9	0	1
“Wet”	9	5	6	12
Emergence from pails:				
“Dry”	10	3	27	24
“Wet”	10	9	51	36
Combined:				
“Dry”	21	12	27	25
“Wet”	19	14	57	48

The difference in proportional representation of the two species between the dissected nodes and the pails is probably an artefact of subsampling which did not employ a rigorously randomized approach. It is our opinion that the total yield favouring *A. vockerothi* is a better reflection of the overall proportional representation of each species and that the larvae all resided behind the sheath at the nodes. The segregation of the “wet” and “dry” samples was initially made as a pragmatic means of handling the field samples, but it was also recognized that these might represent different spring habitats, and the two species might differentially infest (survive in) stems that dry out at different times in the spring. There is some initial

evidence here to suggest that these two species are utilizing the stems differently.

The host association for both species of fly with *E. fluviatile* is established in at least Ontario, although it is not the only potential host for at least *A. vockerothi* (see discussion above and under *A. equiseti*). It should be pointed out that among species of *Equisetum*, only those that have annual stems that retain their sheath teeth throughout the season and fall to the duff layer in the cold season (subgenus *Equisetum* including *E. arvense*, *E. fluviatile*, *E. palustre*, *E. pratense* Ehrh., *E. sylvaticum* L., *E. telmateia braunii*, *E. ×litorale* and other hybrids, and subgenus *Hippochaete* with only *E. laevigatum* A. Braun), are likely candidates if the larval microhabitat described here can be generalized.

There were only two other adult *Anthomyza* that emerged from *E. fluviatile* that represent other species. A single male of *A. gibbiger* emerged from the “dry” sample while a single female of *A. gilviventris* emerged from the “wet” sample.

The flight period for *A. vockerothi* runs from 9 April (Oregon: McDonald Forest) to 25 September (California: Fort Cronkhite).

Distribution. *Anthomyza vockerothi* is commonly encountered in western North America from Alaska to Northwest Territories south to California, Utah and Colorado, with only a few records found from Saskatchewan, Manitoba, Ontario, Quebec, and Michigan. The recorded data represent Canada: Alberta, British Columbia, Manitoba, Northwest Territories, Ontario, Quebec, Saskatchewan, Yukon; United States of America: Alaska, California, Colorado, Idaho, Michigan, Montana, Oregon, Utah, Washington, Wyoming (see Table 2).

The *Anthomyza neglecta* group

The *Anthomyza neglecta* group was established by ROHÁČEK (2006a, 2009a) for three Palaearctic species, viz. *A. neglecta* Collin, 1944, *A. paraneglecta* Elberg, 1968 and *A. orineglecta* Roháček, 2006. In the Nearctic Region, four additional species belonging to this group have been found, including *Anthomyza variegata* (Loew, 1863) and three new species described below, viz. *A. dichroa* sp. nov., *A. gibbiger* sp. nov. and *A. orthogibbus* sp. nov. However, although all the above-named species are distinctly related, the inclusion of the Nearctic species required redefinition of the taxonomic limits of the *A. neglecta* group, because not all added species share all characters used by ROHÁČEK (2006a: 129) to diagnose the group. The expanded *A. neglecta* group can be best diagnosed by the following (most of them obviously apomorphic) characters: (1) white pilosity of the 1st antennal flagellomere long; (2) pregonite simplified and with a very reduced posterior process; (3) postgonite usually with 1 lateral seta; (4) saccus of distiphallus shortened; (5) filum robust, not attenuated apically but ending in a curved digitiform terminal process; (6) female T7+S7 forming a compact conical sclerite with anterolateroventral (often pouch-like) lobes; (7) annular sclerite in female genital chamber small and asymmetrically bent; (8) spermathecae with shallow terminal impression.

The *A. neglecta* group was also confirmed as monophyletic (although with only European species included) by analyses of molecular data (ROHÁČEK et al. 2009; ROHÁČEK & TÓTHOVÁ 2014). Its relationship to other groups of *Anthomyza* has not been recognized with certainty. Two separate analyses of morphological (ROHÁČEK 2009a: Fig. 141) and molecular data (ROHÁČEK et al. 2009: Fig. 2) placed it as a sister group to an E. Palaearctic clade including

A. flavosterna Sueyoshi & Roháček, 2003 and the sister pair *A. bellatrix* Roháček, 1984 + *A. trifurca* Sueyoshi & Roháček, 2003, while the molecular analysis of ROHÁČEK & TÓTHOVÁ (2014: Fig. 1) postulated it to have a common ancestor with the *A. collini* group.

Inasmuch as three of the Nearctic species (*A. variegata*, *A. gibbiger*, *A. orthogibbus*) have relatively simple, flat and not or weakly medially bent gonostyli (plesiomorphic, those of *A. variegata* of the most ancestral type), it is possible that all Palaearctic species (*A. neglecta*, *A. paraneglecta*, *A. orineglecta*) which have strongly curved gonostyli could be derived later and probably from the ancestor of the *A. variegata* + *A. dichroa* sister pair (probable synapomorphies: very long ciliation of 1st flagellomere; 1 pair of internal sclerites in female genital chamber). They (together with *A. variegata* and *A. dichroa*) also lack the distinctive synapomorphies of the other Nearctic sister pair (*A. gibbiger* + *A. orthogibbus*), see below.

Another hypothesis (preferred here) presupposes that all four Nearctic species are derived from a common ancestor (possible synapomorphies: aedeagal part of folding apparatus with armature reduced to small tubercles; female T7+S7 dorsomedially shortened and weakened to interrupted; internal sclerites of female genital chamber weakly sclerotized) so forming the sister group to a branch with Palaearctic species (*A. neglecta*, *A. paraneglecta*, *A. orineglecta*). The latter three species can be clustered on the basis of the following synapomorphies: caudal process of transandrium with spinulae reduced and female genital chamber with annular sclerite situated ventrally under the paired internal sclerites.

Key to identification of the Nearctic species of the *Anthomyza neglecta* group

- 1 Antenna with strikingly long ciliation of 1st flagellomere (Fig. 395). Head about as long as high and eyes more broadly ovoid (Figs 381, 404). Wing broader (Figs 437, 438). Caudal process of transandrium (simple dorsally) and basal membrane densely prickly spinulose (Figs 387, 388). Female T7+S7 dorsally posteromedially membranous, with posterior dark stripe interrupted in the middle (Figs 394, 413). 2
- Antenna with somewhat shorter ciliation of 1st flagellomere. Head distinctly longer than high and eyes more elongately ovoid (Figs 383, 420). Wing narrower (Figs 439, 440). Caudal process of transandrium with peculiar dorsal hump-like projection and basal membrane shortly spinulose (Figs 423, 425, 426). Female T7+S7 dorsally complete, with posterior dark stripe continuous (Figs 431, 450). 3
- 2(1) Arista long ciliate (Fig. 395). Scutellum often with 1–3 small erect setulae between apical sc (Fig. 398). Gonostylus (Figs 391, 400) flat, of elongately oval outline, micropubescent on most of its outer side. Medandrium dorsally narrowed and with distinct corners (Fig. 385). Female T7+S7 larger, dorsally very shortened and dorsomedially membranous (interrupted, Fig. 394), ventrally without anterior ledge-like stripe (Fig. 393), and with large pouch-like anteroventrolateral lobes and brown posterior dorso-lateral band larger (Fig. 392). *A. variegata* (Loew, 1863)
- Arista with cilia shorter. Scutellum always without additional setulae between apical sc. Gonostylus slender and strongly curved medially (Fig. 406), with micropubescent on outer side reduced (Fig. 412). Medandrium dorsally broad and with corners rounded (Fig. 406). Female T7+S7 smaller, dorsomedially only posteriorly membranous (inter-

- rupted, Fig. 413), with pouch-like anteroventrolateral lobes smaller but ventrally with distinct anterior transverse ledge-like stripe (Fig. 415) and brown posterior dorso-lateral band smaller (Fig. 413). ***A. dichroa* sp. nov.**
- 3(2) Male with ctenidial spine on f_1 long, markedly longer than maximum width of t_1 . Gonostylus short and broad, posteroproximally dilated and with apex truncate (Fig. 429). Female 1st flagellomere entirely yellow or with outer side brownish-darkened. Female T7+S7, in lateral view, shorter, projecting anteroventrally and with more or less distinct ventral dome-like bulge (Fig. 431a, arrows); T6 sometimes without posterior dark stripe or with only faint darkening (Fig. 431); posterior stripes tending to become less distinct on more anterior tergites; T7+S7 usually with posterior dark stripe shorter and T8 short (Fig. 431). ***A. gibbiger* sp. nov.**
- Male with ctenidial spine small, as long as or shorter than maximum width of t_1 . Gonostylus elongate, narrow, gradually tapered towards bidentate apex (Fig. 448). Female 1st flagellomere always with outer side brownish-darkened. Female T7+S7, in lateral view, longer, projecting more angularly anteromedially and not bulging ventrally (Fig. 450a, arrows); T6 always with posterior dark stripe distinct (Fig. 450); posterior stripes often remaining strong on all tergites; T7+S7 usually with posterior dark stripe longer and T8 long (Fig. 450). ***A. orthogibbus* sp. nov.**

***Anthomyza variegata* (Loew, 1863)**

(Figs 381, 385–400, 437)

Anthophilina variegata Loew, 1863: 324; OSTEN SACKEN (1878): 198 (catalogue).

Anthomyza variegata: CZERNY (1902): 251 (key), 254 (list); ALDRICH (1905): 645 (catalogue); MELANDER (1913): 293 (key, distribution); SABROSKY (1965): 819 (catalogue); COLE (1969): 436 (distribution); ROHÁČEK (1998a): 173 (checklist).

Type material. LECTOTYPE: ♂ (designated herewith): “variegata m.” (Loew’s handwriting), “Loew Coll.,” “Type 13428” (red label), “LECTOTYPUS ♂ *Anthophilina variegata* Loew, J. Roháček & K. N. Barber des. 2013” (red) and “*Anthomyza variegata* (Loew) ♂, J. Roháček & K. N. Barber det. 2013”. The specimen is in good condition, with clearly visible genitalia (see Fig. 381) (MCZC, intact). PARALECTOTYPE: ♀, “36”, “D. C.,” “Loew Coll.,” “Type 13428” (red label), “PARALECTOTYPUS ♀ *Anthophilina variegata* Loew, J. Roháček & K. N. Barber des. 2013” (red) and “*Anthomyza variegata* (Loew) ♀, J. Roháček & K. N. Barber det. 2013” (MCZC, intact). According to the original description (LOEW 1863), these specimens originate from USA: District [of] Columbia and were collected by Osten Sacken. Both type specimens belong to the pale form (see below). The lectotype and paralectotype are designated because LOEW (1863) did not explicitly enumerate specimens he used for the description and owing to the necessity to fix the status of the species inasmuch as there are another three closely related Nearctic species hitherto confused under the name *A. variegata*.

Other material examined. CANADA: ONTARIO: Burlington, edge Tuck Ck, 43°21.2'N 79°46.6'W, pooter, *Bromus inermis*, 16.vii.1997, 1 ♀, sweeps/pooter, *Bromus inermis*, 18.vii.1997, 1 ♂, 20.vii.1997, 1 ♀; Burlington, Royal Botanical Gdn., 43°17.5'N 79°52.4'W, sweeps/pooter, *Calamagrostis canadensis*, 16.vii.1997, 1 ♀; same locality but 43°17.8'N 79°52.6'W, sweeps, trailside vegetation in mixed hardwood, 14.vii.2002, 1 ♂ 2 ♀♀ (all CNCI), 15.vii.2002, 3 ♂♂ 4 ♀♀ (AMNH), 16.vii.2002, 2 ♂♂ 4 ♀♀ (CASC), all K. N. Barber leg.; same locality but trailside sweeps, mostly *Carex*, *Fragaria*, *Solidago*, 18.vii.2002, 5 ♂♂ 5 ♀♀ (CNCI 2 ♂♂ 2 ♀♀, SMOC 3 ♂♂ 3 ♀♀, 1 ♀ genit. prep.); same locality but 43°17.79'N 79°52.61'W, trailside sweeps, mostly *Carex*, *Fragaria*, *Solidago*, 27.vii.2003, 2 ♂♂ 11 ♀♀ (CNCI 1 ♂ 10 ♀♀, SMOC 1 ♂ 1 ♀, both genit. prep.), sweeps, trailside vegetation, 18.viii.2014, 1 ♀ (CNCI); same locality but 43°17.78'N 79°52.61'W, sweeps, trailside vegetation in mixed hardwood, 6.ix.2005, 1 ♂ 1 ♀ (CNCI), all K. N. Barber leg.; Fergus, yard near Grand R., 27.vii.1995, 1 ♂, S. A. Marshall leg.

(DEBU); Fergus, 43°41.5'N 80°23.2'W, Grand R. floodplain, sweeps/pooter, *Bromus inermis*, 17.vii.1997, 1 ♀, K. N. Barber leg. (DEBU); Fergus nr. Guelph, Grand River, riverside vegetation, 30.vii.1994, 2 ♂♂ 1 ♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); Lake Simcoe, Sibbald Point Prov. Pk., sweep humid forest along stream, 29.vi.2001, 1 ♂, S. E. Brooks leg. (LEMQ 0040107); Guelph, 3.vii.1979, 1 ♂, K. N. Barber leg. (DEBU); Ottawa, 19.vii.1946, 1 ♂, A. R. Brooks leg., 6.vii.1963, 1 ♂ 3 ♀♀, 13.vii.1963, 2 ♂♂ 2 ♀♀, J. R. Vockeroth leg. (CNCI); Pelee Island, Stone Rd., behind alvar, 41°45.2'N 82°38.3'W, sweeps, graminoids/*Impatiens* under canopy, 8.vi.2002, 4 ♀♀, sweeps, *Carex* under canopy, 9.vi.2002, 2 ♂♂ 6 ♀♀, K. N. Barber leg. (DEBU); Haldimand-Norfolk Co., Port Ryerse, along stream, 15.vii.1986, 1 ♂ (headless), R. Danielsson leg. (MZLU); Rondeau P. Pk., 1.ix.1979, 3 ♂♂ 1 ♀, L. Masner leg. (DEBU); same locality but South Point Trail, 26.vi.1985, 1 ♀ (DEBU); same locality but South Point Trail, east parking lot, 42°16'48"N 81°51'17"W, sweeps, mostly *Impatiens/Carex*, 29.vii.2003, 4 ♂♂ 4 ♀♀ (DEBU 01500150–57); same locality but Spicebush Trail, 42°18'08"N 81°51'13"W, sweeps, mostly *Impatiens/Carex*, 29.vii.2003, 3 ♂♂ 3 ♀♀ (DEBU 01500142–47); Short Hills P. Pk., Terrace Ck. Trail east loop, 43°05.8'N 79°16.1'W, mostly *Carex/Impatiens* in mixed hardwood, sweeps, 17.vii.2002, 4 ♂♂ 1 ♀, all K. N. Barber leg. (DEBU); Simcoe, 26.vi.1939, 1 ♀, G. E. Shewell leg. (CNCI); Essex Co., Windsor, Broadway Park & Black Oak Savannah Park, 5–7.vii.2007, 1 ♀, S. M. Paiero leg. (DEBU 00299926). **QUEBEC:** Mt-St-Hilaire, 45°32.3'N 73°09.4'W, el. 150–200 m, sweep in deciduous forest, CJB07-02, 19.vi.2007, 1 ♂, C. Borkent leg. (LEMQ 0040536); Mont-St-Hilaire Reserve, Pain de Sucre Trail, sweep along trail in forest, 27.vi.2001, 2 ♀♀, S. E. Brooks leg. (LEMQ 0040108, -09); Mont-St-Hilaire Biosphere Reserve, Pain de Sucre Trail, 27.vi.2001, sweep trail edge, 1 ♂, S. E. Brooks leg. (LEMQ 0040315), sweep at brook, 27.vi.2001, 1 ♂ 3 ♀♀, M. Pollet leg. (LEMQ 0040365, -66, -73, -76); Old Chelsea, Summit King Mt., 1150', 16.vi.1963, 1 ♀, J. R. Vockeroth leg. (CNCI); Trois Rivières, western outskirts, forest, swept, eclector, (Universität Bielefeld, X989), 25.viii.1994, 1 ♂ 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol). **UNITED STATES OF AMERICA:** **ALABAMA:** Monroe Co., 1 mi S Claiborne Dam, 31°35'30"N 87°32'12"W, 29–30.v.1995, 1 ♂, J. A. MacGown leg. (MEMU); DeKalb Co., DeSoto St. Pk., 1600–1700', T6S, R10E, Sec.19W, mercury vapor & black light trap, William H. Cross Expedition, 18.v.1990, 1 ♀, D. Hildebrand & T. Schiefer leg. (MEMU). **COLORADO:** Evergreen, grassland slope, 22.viii.1943, 1 ♀, M. T. James leg. (USNM, genit. prep.). **CONNECTICUT:** Redding, 3.vi.1933, 1 ♀, A. L. Melander leg. (USNM). **DISTRICT OF COLUMBIA:** [no other data], 1 ♂, J. M. Aldrich leg. (USNM); Deanwood, nr. brook, 9.vi.1991, 5 ♂♂ 7 ♀♀, M. Barták leg. (MBPC 3 ♂♂ 4 ♀♀, 1 ♂ 1 ♀ genit. prep., SMOC 2 ♂♂ 3 ♀♀, 1 ♂ genit. prep.); Rock Creek, 3.viii.1913, 1 ♀, R. C. Shannon leg.; Theodore Roosevelt Island, 4.vi.1977, 1 ♀, W. N. Mathis leg.; Washington, 17.viii.1913, 3 ♂♂, A. L. Melander leg. (all USNM). **GEORGIA:** Lumpkin Co., 15 mi NW Dahlonega, 2.vi.1971, 1 ♀, G. Hicks leg. (LACM); Rabun Co., Pine Mountain, 1400', 4.v.1957, 2 ♂♂ 3 ♀♀, 14.v.1957, 1 ♀, J. R. Vockeroth leg. (CNCI). **ILLINOIS:** Champaign Co., 19.vi.1926, 1 ♀, V. Q. Smith leg. (CNCI); Williamson Co., 3 mi S Crab Orchard Lake, 17.viii.1969, 1 ♂, J. C. Marlin leg. (INHS 40,202); Dongola, 10.v.1916, 2 ♂♂ 3 ♀♀, [no collector] (INHS 40,169–73); McLean Co., Downs, 10.vi.1969, 1 ♂, D. W. Webb & J. C. Marlin leg. (INHS 40,212); Dubois, 22.v.1917, 2 ♂♂ 1 ♀, [no collector] (INHS 40,166–68); Alexander Co., Horseshoe Lake, T16S, R2N, Sec.16, sweeps, (#83032), 7.vi.1983, 1 ♂ 1 ♀, I. S. Askevold leg. (DEBU); Union Co., 0.7 mi NE Lick Creek, 24.v.1976, 2 ♂♂ 1 ♀, D. W. Webb leg. (INHS 40,203–05); Macomb, river-woods, 29.v.1962, 2 ♂♂ 1 ♀, W. W. Wirth leg. (USNM); Urbana, university forest, 28.viii.1915, 1 ♂, [no collector] (INHS 40,162); White Heath, 20.v.1916, 1 ♀, 3.vi.1917, 1 ♂, [no collector] (INHS 40,163, -64). **INDIANA:** Lafayette, 19.vi.1922, 2 ♂♂ 1 ♀, 22.vi.1922, 1 ♀, E. W. Stafford leg., 4.viii.1922, 1 ♀, [no collector] (MEMU); Lafayette, "viii-5", 1 ♂, 27.vi.1916, 1 ♀ (headless), *Elymus canadensis*, 30.v.1917, 1 ♀ (genit. prep.), J. M. Aldrich leg. (USNM); Lafayette, 19.vii.1916, 1 ♂, [-].vii.1931, 1 ♀, J. M. Aldrich leg. (SMOC, ♀ genit. prep.). **IOWA:** Ames, 25.vi.1947, 1 ♀, A. R. Brooks leg. (CNCI). **KENTUCKY:** Franklin Co., Cove Springs Park, 38°13'N 84°51'W, 26.v.–28.vii.2005, Malaise trap, 1 ♀, Lindsay & Edelen leg. (LACM); Mammoth Cave, Nat. Pk., 23.viii.1981, 1 ♂, J. R. Vockeroth leg. (CNCI). **MARYLAND:** Prince Georges Co., Beltsville, 14.v.1979, 2 ♂♂ 1 ♀, A. Freidberg leg. (TAUI, 1 ♀ headless); Montgomery Co., Bethesda, 18.v.1968, 1 ♂, 26.v.1968, 1 ♂ 1 ♀, 1.vi.1968, 2 ♂♂, 2.vi.1968, 2 ♂♂ 1 ♀, 4.vi.1968, 2 ♂♂ (1 ♂ genit. prep.), 17.v.1969, 1 ♀, 25.v.1970, 1 ♀, 27.v.1972, 1 ♂, 27.vii.1972, 2 ♀♀, 29.v.1977, 2 ♂♂, 11.vi.1978, 1 ♂, G. Steyskal leg.; P[rin]ce G[eorge's] Co., Camp Springs, blacklight trap, 9.vi.1979, 1 ♂, G. F. Hevel leg.; Chesapeake Beach, 30.v.1924, 1 ♀, J. R. Malloch leg.; Colesville, 11.vii.1974, 1 ♂, 4.vi.1977, 1 ♂, 14.vi.1977, 1 ♂, 18.vi.1977, 1 ♂; Montgomery Co., Colesville, Malaise trap, 26.vi.1977, 1 ♂, 3.viii.1979, 1 ♂, all W. W. Wirth leg. (all USNM); Howard Co., Dayton, Pig Tail Recreation Area, 39°13'08.37"N 77°00'23.20"W, damp undergrowth, 22.vi.2014, 6 ♂♂ 1 ♀ (GAFC 3 ♂♂ 1 ♀, 2 ♂♂ genit. prep.,

SMOC 3 ♂♂, 1 ♂ genit. prep., 2 ♂♂ used for molecular analysis), 20.vii.2014, 3 ♂♂ 1 ♀, G. A. & A. M. Foster leg. (GAFC); Montgomery Co., Dickerson, 14.vii.1974, 1 ♂ 1 ♀, G. A. Foster leg.; College Park, 7.v.1969, 1 ♂, G. F. Hevel leg.; Glen Echo, 21.viii.1921, 1 ♀, 16.vii.1922, 1 ♀, 20.v.1923, 1 ♂, J. R. Malloch leg.; Lavale, 9.v.1970, 1 ♀, G. Steyskal leg. (all USNM); Prince Georges Co., Patuxent Nat. Wildlife Refuge, 30.vi.1986, 1 ♂, R. Daniels-son leg. (MZLU, genit. prep.); Plimmers Island, 9.vi.1913, 1 ♀, R. C. Shannon leg. (SMOC); Plimmers Island, 23.vi.1907, 1 ♂ 1 ♀, 2.vi.1912, 1 ♀, 9.v.1913, 1 ♂, 17.vi.1913, 2 ♀♀, 3.viii.1913, 1 ♀ (headless), 7.vi.1914, 1 ♀, W. L. McAtee leg., 5.viii.1913, 1 ♀, 8.v.1915, 1 ♂ 1 ♀, R. C. Shannon leg., 29.viii.1971, 1 ♀, G. F. Hevel leg.; near Plimmers Island, at light, 12.viii.1914, 1 ♀, R. C. Shannon leg.; Somerset Co., Snow Hill, swamp margin, 19.v.1968, 1 ♀, W. W. Wirth leg. (all USNM); Montgomery Co., Wheaton, 27–28.v.1979, 1 ♂, 25.vi.1979, 1 ♂ 3 ♀♀, 3.vii.1979, 1 ♀, 16.viii.1979, 1 ♂ (headless) 1 ♀ (genit. prep.), A. Freidberg leg. (TAUI). MASSACHUSETTS: Catoctin, Mt. Park, Chestnut wood, 15.vi.1991, 2 ♂♂ 2 ♀♀ (MBPC, 1 ♂ genit. prep.); Catoctin, Mt. Park (Lantz), 15.vi.1991, edge of wood, 1 ♂ (MBPC), meadow nr. pond, 1 ♂ 1 ♀ (SMOC 1 ♂, MBPC 1 ♀, genit. prep.); Catoctin, Mt. Park, Owen's Creek, 15.vi.1991, 3 ♀♀, all M. Barták leg. (MBPC 2 ♀♀, SMOC 1 ♀, genit. prep.); Concord, fern bog, 22.vii.1961, 1 ♀, W. W. Wirth leg. (USNM); Franklin Co., ~0.5 km E Farley, 42°36.16'N 72°25.94'W, sweeps, asters, ferns, *Impatiens*, *Rubus*, under canopy, 26.vii.2006, 1 ♀, K. N. Barber leg. (CNCI); Petersham, [-].vii.1926, 1 ♂ 1 ♀ (♂ headless), 30.vii.1926, 1 ♂, A. L. Melander leg. (USNM); Woods Hole, 20–30.vi.1913, 1 ♂, 13.vii.1913, 1 ♂ (USNM), 1–20.ix.1922, 1 ♂ (LACM), A. H. Sturtevant leg. MICHIGAN: Detroit, 20.vi.1940, 1 ♀, G. C. Steyskal leg. (USNM). MISSOURI: St. Louis, Forest Park, 10–22.vi.1983, 1 ♂, C. E. Dyte leg. (BMNH); Washington Co., 14.vi.1951, 1 ♀, H. D. Stalker leg. (AMNH). NEW HAMPSHIRE: Hillsborough Co., Nashua, Long Hill, 42°42'59"N 71°27'04"W, 20 m, 27–28.vi.2004, 1 ♀, S. D. & A. V. Gaimari leg. (CSCA). NEW JERSEY: Fort Lee, 25.v.1923, 1 ♀, A. H. Sturtevant leg.; Ocean Co., [-].v.[-], 2 ♀♀, [no collector] (all USNM). NEW YORK: Bear Mt., 31.v.1937, 1 ♂, A. L. Melander leg.; Buffalo, 27.vi.1908, 1 ♀, M. C. Van Duzee leg. (both USNM); Cold Spring Harbor, L[ong] I[sland], 26.vii.1932, 1 ♀, C. H. Curran leg., [-].viii.[-], 1 ♀ (headless), A. L. Melander leg. (AMNH); Millwood, 21.vi.1936, 1 ♀, H. K. Townes leg.; Poughkeepsie, 25.viii.1936, 1 ♂, H. K. Townes leg.; Chautauqua Co., S. Dayton, marsh area, 1.vi.1963, 1 ♀, W. W. Wirth leg. (all USNM). NORTH CAROLINA: Graham Co., Asheville, 5.vi.1976, 1 ♂, G. E. Bohart leg. (LACM); Yancey Co., Black Mt. Campground, 35.753°N 82.219°W, 3009', sweep deciduous forest near river, 27.v.2008, 9 ♂♂ 3 ♀♀, M. Forrest leg.; Yancey Co., Forest Rd. 432 nr. Black Mt. Campground, 35.7313°N 82.2383°W, sweep forest edge, 27.v.2008, 1 ♀, J. Mlynarek leg., 1 ♂, T. A. Wheeler leg., 2 ♂♂, M. Forrest leg.; Yancey Co., Pisgah Nat. Forest, Black Mt. Campground, 35.7525°N 82.2194°W, 917 m, sweep by river, 27.v.2008, 4 ♂♂ 1 ♀, T. A. Wheeler leg. (all LEMQ); Cherokee, sweeps, 4.vi.1979, 1 ♂ 1 ♀, M. J. Sharkey leg. (DEBU); Graham Co., Cherokee, 5.vi.1976, 1 ♂, G. E. Bohart leg. (LACM); Transylvania Co., Cove Creek Campground, Davidson River, 35.2814°N 82.8142°W, 780 m, sweep path by river, 17.v.2008, 2 ♂♂, J. Mlynarek leg. (LEMQ); Franklin, 2000', 8.v.1957, 1 ♀; Great Smoky Mt. Nat. Pk., Mingus Creek nr. Cherokee, 2000', 29.v.1957, 1 ♀; Highlands, 3800', 16.v.1957, 1 ♂, all J. R. Vockeroth leg.; Lake Toxaway, 12.vii.1957, 1 ♀, J. G. Chillcott leg.; Looking Glass Rock nr. Pisgah Forest, 2500', 19.vii.1957, 1 ♂; Mt. Mitchell, 6500–6684', 5.vi.1962, 1 ♀, both J. R. Vockeroth leg. (all CNCI); Transylvania Co., Pisgah N. F., picnic area by Hwy 276, 35.30°N 82.77°W, 2819', sweep near river, 17.v. 2008, 2 ♂♂, J. Mlynarek leg. (LEMQ); Rich Mt., 2000', 31.vii.1957, 1 ♂, W. R. Richards leg. (CNCI); Graham Co., Robbinsville, 9.vi.1976, 6 ♂♂ 6 ♀♀, G. E. Bohart leg. (LACM); Wayah Bald, 4100', 29.vii.1957, 1 ♀, W. R. Richards leg. (CNCI). OHIO: Hocking Co., Coovert Nature Preserve, 39°27.2'N 82°36.8'W, sweep along stream in forest gully, 19.v.2003, 1 ♂, T. A. Wheeler leg. (LEMQ 0040342), sweep grassy hillside, 18.v.2003, 1 ♀, S. Boucher leg. (LEMQ 0040329); Hocking Co., Laurel Twp., Crane Hollow Nature Preserve, 39°29'30"N 82°34'53"W, sweep along stream in forest, 19.v.2003, 1 ♂, T. A. Wheeler leg. (LEMQ 0040358), 1 ♀, S. Boucher leg. (LEMQ 0040378); Portage Co., Northeast City Kent, 41.09°N 81.30°W, 20.v.2007, 1 ♀, B. A. Foote leg. (CMNH); Woodside, 8.vi.1940, 1 ♀, A. L. Melander leg. (USNM, headless). PENNSYLVANIA: Berks Co., French Creek State Park, #2, 350', 3.vii.1958, 1 ♂, G. Byers leg. (SEMC); Glenside, "7.5".1909, 1 ♀, [no collector] (USNM); Lycoming Co., Ralston, 8.vi.1962, 1 ♀, J. R. Vockeroth leg. (CNCI); Centre Co., State College, 11.vi.1975, 1 ♂, D. D. Wilder leg. (CASC). SOUTH CAROLINA: Anderson, 21.vii.1957, 1 ♂, W. R. Richards leg. (CNCI). TENNESSEE: Wilson Co., Cedars of Leb[anon] St. Park, 19.v.1979, 2 ♂♂, G. C. Steyskal leg. (USNM); East Ridge, 6.v.1952, 1 ♀, 9.v.1952, 2 ♀♀, G. S. Walley leg. (CNCI); Cades Cove, GSMNP, sweeps, 2.vi.1979, 1 ♀ (genit. prep.), 5.vi.1979, 30 ♂♂ 19 ♀♀ (1 ♂ genit. prep., 1 ♂ wing illustration), M. J. Sharkey leg. (DEBU); Blount Co., Cades Cove, Great Smoky Mts. N. P., 1600', 26.viii.1986, 1 ♂, G. T. Baker leg. (MEMU); Blount Co., SW corner of Cades

Cove, Gt. Smokies National Park, 24.v.2001, 1 ♂ 3 ♀♀, B. A. Foote leg. (CMNH); Blount Co., Grt. Smoky Mt. N. P., SW corner of Cades Cove, swept wetland, 23.v.2001, 2 ♀♀, Foote & Keiper leg. (CLEV); Great Smoky Mt. National Park, SW Cades Cove area, swept wetland vegetation, 28.vi.2001, 1 ♂ 2 ♀♀, J. B. Keiper leg. (CLEV); Cocke Co., Forney Ridge Trail, Clingman's Dome, Great Smokey Mountain N. P., 35°33'N 83°29'W, 6000 ft, (99-11), N.P.S. Permit #GRSM-99-074, 29.v.1999, 1 ♀, S. D. Gaimari leg. (USNM); Townsend, sweeps, 2.vi.1979, 13 ♂♂ 9 ♀♀, M. J. Sharkey leg. (DEBU, 1 ♀ genit. prep.). **VIRGINIA:** Alexandria, fern bog, 27.v.1951, 1 ♂, stream margin, 15.vii.1951, 1 ♀, Dyke Marsh, 13.v.1958, 1 ♀, W. W. Wirth leg.; Shenandoah Co., Basye, 21.vii.1974, 1 ♂, G. A. Foster (all USNM); Blacksburg, 2100', 28.v.1962, 1 ♂, J. G. Chillcott leg. (CNCI); Bath Co., Blowing Spring Campground, 8 mi W Warm Springs, 28.vi.1982, 1 ♂, Mathis & Flint leg.; Bon Air, 1.vi.1936, 1 ♂, 15.viii.1936, 1 ♀, [no collector] (all USNM); Giles Co., Buckeye's Mountain Retreat campground, 17-21.vi.2005, 1 ♀, S. M. Paiero leg. (DEBU 00287220); Chain Bridge, 7.v.1922, 1 ♀, 14.v.1924, 1 ♀, J. R. Malloch leg. (USNM); Patrick Co., Fairy Stone St. Pk., 1000' [some mistakenly labeled 11000'], 30.v.1962, 5 ♂♂ 2 ♀♀, J. R. Vockeroth leg. (CNCI); Falls Church, 26.vi.1951, 1 ♂, 1.vi.1954, 1 ♀, light trap, 1.vi.1958, 1 ♀, W. W. Wirth leg. (USNM); Falls Church, 13.vii.1954, 1 ♂, [no collector] (AMNH); Falls Church, Holmes Run, light trap, 10.v.1951, 1 ♂, 10.vi.1951, 1 ♀, 20.vi.1960, 1 ♂, 25.vi.1960, 1 ♀, 26.vi.1960, 1 ♀, 6.viii.1960, 1 ♀, 13.v.1961, 1 ♂, 26.v.1961, 1 ♀, 12.vi.1961, 2 ♂♂, 14.vi.1961, 1 ♂, 17.vi.1961, 1 ♂, 5.vii.1961, 1 ♀, 17.ix.1961, 1 ♀, 2.vi.1962, 1 ♀, W. W. Wirth leg. (USNM); Dickenson Co., Cranes Nest R., 1250', 4 mi SE Clintwood, 10.v.2004, 1 ♂, J. Runyon leg. (MTEC); Glencarllyn, 7.v.1922, 1 ♂, W. L. McAtee leg., 23.v.1925, 1 ♀ (genit. prep.), J. R. Malloch leg.; Great Falls, 9.vii.1926, 1 ♀, A. L. Melander leg. (all USNM); Martinsville, 800', 30.v.1962, 1 ♂, J. R. Vockeroth leg. (CNCI); Alexandria Co., Maywood, 4.vi.1922, 5 ♂♂ 4 ♀♀, W. L. McAtee leg. (USNM, 1 ♂ with abdomen glued to point, 1 ♂ genit. prep., 1 ♀ headless, 1 ♀ wingless); Shenandoah Co., Mt. Jackson, 25.v.1962, 6 ♂♂ 8 ♀♀, J. R. Vockeroth leg., 1 ♂ 1 ♀ 1 spec. (missing abdomen), J. G. Chillcott leg.; Giles Co., Mountain Lake, 3200', 28.v.1962, 1 ♀, J. G. Chillcott leg.; same locality but 3800', 26.v.1962, 1 ♀, 31.v.1962, 1 ♂ 1 ♀, J. G. Chillcott leg., 29.v.1962, 2 ♀♀, J. R. Vockeroth leg. (all CNCI); Giles Co., Mt. Lake, 9.ix.1976, 1 ♂, G. Steyskal leg. (USNM); Giles Co., Mount. Lake Biol. Stn., 37°22'31"N 80°31'18"W, sweep nr. station, 20.v.2005, 1 ♀, S. A. Marshall leg. (DEBU 00252849); Giles Co., Mt. Lake Biol. Sta., 3850', #90, 26.v.1972, 1 ♂, G. Byers & N. Penny leg., #108, 17.vi.1975, 1 ♀, G. W. Byers leg. (SEMC); Smyth Co., Mt. Rogers, 5300-5700', 1.v.1962, 1 ♀, J. R. Vockeroth leg. (CNCI); near Plummers Island, MD [Maryland], 20.v.1914, 1 ♀, R. C. Shannon leg. (USNM); Prince William Co. & Forest Pk., Pyrite Mine, 38°34.6'N 77°22'W, 6.vii.1993, 1 ♀, D. & W. N. Mathis leg. (USNM); Prince William Co., #1, Prince William Forest Pk., 100', 6.vii.1967, 1 ♀, G. W. Byers leg. (SEMC); Rosslyn, 11.vii.1913, 1 ♂, R. C. Shannon leg. (USNM, genit. prep.); Shenandoah N. P., mi. 65-100, sweeps, 29.v.1979, 1 ♀, M. J. Sharkey leg. (DEBU); Giles Co., Stony Creek, 2000', 26.v.1962, 4 ♂♂ 1 ♀; Patrick Co., Vesta, 2800', 30.v.1962, 1 ♀, all J. G. Chillcott leg. (all CNCI); Giles Co., Warspur Overlook, 15 km NW Blacksburg, 29.v.2005, 1 ♀, S. A. Marshall leg. (DEBU 00252826); Woolwine, 19.v.1965, 1 ♀, J. G. Chillcott leg. (CNCI). **WEST VIRGINIA:** Ansted, Hawks Nest St. Pk., 20.vi.1970, 1 ♀, G. Steyskal leg. (USNM); Blackwater Falls S. P., Balsam Fir Trail, 36°06'34"N 75°29'29"W [coordinates do not match locality], 6.vii.2004, 1 ♀, B. J. Sinclair leg. (CNCI); Bluefield, 17.vi.1970, 1 ♂, G. Steyskal leg.; Morgan Co., near Great Cacapon, 1.ix.1984, 2 ♀♀, G. F. & J. F. Hevel leg.; Richie Co., North Bend St. Pk., 23.vi.1970, 1 ♂; Parkersburg, 21.vi.1970, 1 ♂, both G. Steyskal leg. (all USNM).

Other *A. neglecta*-group material of questionable identity (*Anthomyza* sp. cf. *variegata*). **UNITED STATES OF AMERICA:** **VIRGINIA:** Patrick Co., Fairy Stone St. Pk., 1000', 30.v.1962, 1 spec., J. R. Vockeroth leg. (CNCI, missing abdomen); Alexandria Co., Maywood, 4.vi.1922, 1 ♂, W. L. McAtee leg. (USNM, missing abdomen).

Redescription. Male. Total body length 2.04-3.14 mm; general colour largely yellow but with variable ochreous to greyish brown darkening on mesonotum, brownish dorsal band on pleuron (Fig. 381) and partly brown preabdominal terga. Head slightly longer than high to as long as high (thus less elongate than in *A. gibbiger* and *A. orthogibbus*), anteriorly slightly angular in profile because of distinctly receding face. Head dichroic, occurring in two colour forms. Pale form has head almost completely yellow (with only some brownish darkening of ocellar triangle) while dark form has face and 1st antennal flagellomere dark brown and sides of occiput brown (see also below). Occiput slightly concave, laterally darker yellow



Figs 381–384. Primary types of the Nearctic species of the *Anthomyza neglecta* group. 381 – *A. variegata* (Loew, 1863), lectotype male, laterally and type labels, body length 2.50 mm; 382 – *A. dichroa* sp. nov., holotype male, laterally, body length 2.74 mm; 383 – *A. gibbiger* sp. nov., holotype male, laterally, body length 2.78 mm; 384 – *A. orthogibbus* sp. nov., holotype male, laterally, body length 2.62 mm. Photo by J. Roháček.

(pale form) or brown (dark form), medially yellow; in yellow medial area there are two elongate spots of silvery white microtomentum meeting ventrally above foramen. Frons rather narrow, yellow to orange yellow; ocellar triangle (at least partly) brown; frontal triangle dull yellow, margined by very narrow, darker orange and somewhat golden glittering stripes. Anterior parts of frons often darker, orange yellow and dull. Orbits pale yellow, silvery whitish microtomentose, more so in front of anterior long ors. Frontal triangle narrow, reaching to anterior third of frons. Frontal lunule minute, pale yellow. Face narrow, medially concave or folded, either dull yellow and separated from parafacialia by golden orange marginal stripe (pale form) or brown to blackish brown with darker marginal stripe (dark form); parafacialia and gena whitish yellow to white, with silvery white microtomentum; marginal stripe of gena narrow and yellow; postgena and mouthparts yellow in both forms. Cephalic chaetotaxy: pvt relatively long, strongly crossed; oc usually longest of cephalic setae; vti somewhat shorter than oc; posterior ors often almost as long as vti, vte usually shorter than vti; 3 ors but only posterior and middle ors long (middle ors slightly shorter than posterior ors), anterior ors reduced to a short setula but still usually stronger than the medial frontal microsetulae and sometimes lengthened (2–3 times as long as medial microsetulae), rarely with an additional microsetula in front of the anterior ors; 2–3 pairs of medial microsetulae in anterior third of frons; 1 small setula behind vte; postocular setulae (9–12) very short, dorsally in dense row; postgena with several setulae and 2 short posteroventral setae; 1 long vi (as long as posterior ors), subvibrissa reduced, hardly longer than anterior peristomal; only 5–6 relatively long but fine peristomal setulae. Palpus yellow, with 1 ventral preapical seta and a series of (10–12) shorter setulae subapically and ventrally. Eye ovoid, broader anteroventrally, with longest diameter oblique and about 1.4–1.5 times as long as shortest. Shortest genal height about 0.14–0.15 times as long as shortest eye diameter. Antenna geniculate, yellow but 1st flagellomere either entirely yellow (pale form) or brown (also on inner side) with only base narrowly yellow (dark form) and always with very long white pilosity (Fig. 395). Arista with basal segments ochreous yellow and distal seta blackish brown, about 2.1 times as long as antenna, relatively long-ciliate (but shorter than in *A. neglecta*).

Thorax slightly narrower than head, largely yellow (Fig. 381); scutum either largely yellow with ochreous grey to pale brownish sublateral bands and sometimes with a pair of short anteromedial ochreous stripes in addition (pale form) or largely pale brown to brownish grey with variable short yellow stripes anteromedially and yellow area in front of scutellum (dark form). Dorsum of thorax pale grey microtomentose and relatively dull. Humeral and notopleural areas yellow in both forms; scutellum yellow to dark ochreous. Pleural part of thorax more shining than scutum, yellow to whitish yellow, but always with narrow brown dorsal band extended from thoracic cervix almost to haltere. Postscutellum yellow, postnotum often darker ochreous. Thoracic chaetotaxy: 1 hu plus 1 hu setula; 2 npl (anterior longer than hu, posterior shorter); 1 relatively weak prs (about as long as hu); 1 sa (weak, as long as prs), 1 pa (hardly longer than sa); 2 long postsutural dc (the smaller anterior longer than anterior npl, posterior longest of thoracic setae) and 6–8 dc microsetae in front of them (the hindmost distinctly enlarged); 4 rows of ac microsetae on suture but only 2 rows between dc; hindmost ac pair longest and situated between posterior dc or beyond; 2 sc, laterobasal weak (shorter than sa), apical sc slightly shorter and thinner than posterior dc; in addition there are often

1–3 small erect setulae between apical sc (see Fig. 398); 1 small fine ppl; 2 long stpl (anterior usually slightly shorter) and 4–5 upcurved setulae in dorsal half of sternopleuron, its ventral part with a cluster of 6–7 longer setae. Scutellum rounded triangular, somewhat flattened dorsally. Legs pale yellow, only last tarsal segments of all tarsi brown to dark brown in distal half. f_1 with ctenidial spine relatively strong, much longer than maximum width of t_1 and with numerous long but fine setae in posterodorsal and posteroventral rows. f_2 and f_3 simply setose; t_2 with short ventroapical seta; other tibiae and tarsi simply setulose, only fore and hind basitarsus with slightly enlarged setulae ventrobasally. Wing (Fig. 437) elongate but not very narrow (broader than in *A. gibbiger* and *A. orthogibbus*), with pale yellowish ochreous veins and membrane. C with small sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} long, bent parallel to C with apex distinctly upcurving; R_{4+5} very slightly bent, usually subparallel with M; the latter almost straight. Cell dm long, moderately narrow; r-m situated slightly in front of the middle of cell dm. Apical portion of CuA_1 as long as or slightly longer than dm-cu and almost reaching wing margin; A_1 short, ending far from margin. Alula distinct, narrow. Wing measurements: length 2.20–2.86 mm, width 0.65–0.97 mm, $Cs_3 : Cs_4 = 1.48–1.90$, $rm \setminus dm-cu : dm-cu = 2.50–2.95$. Haltere dirty yellow to ochreous, with pale brownish tinge both on stem and knob.

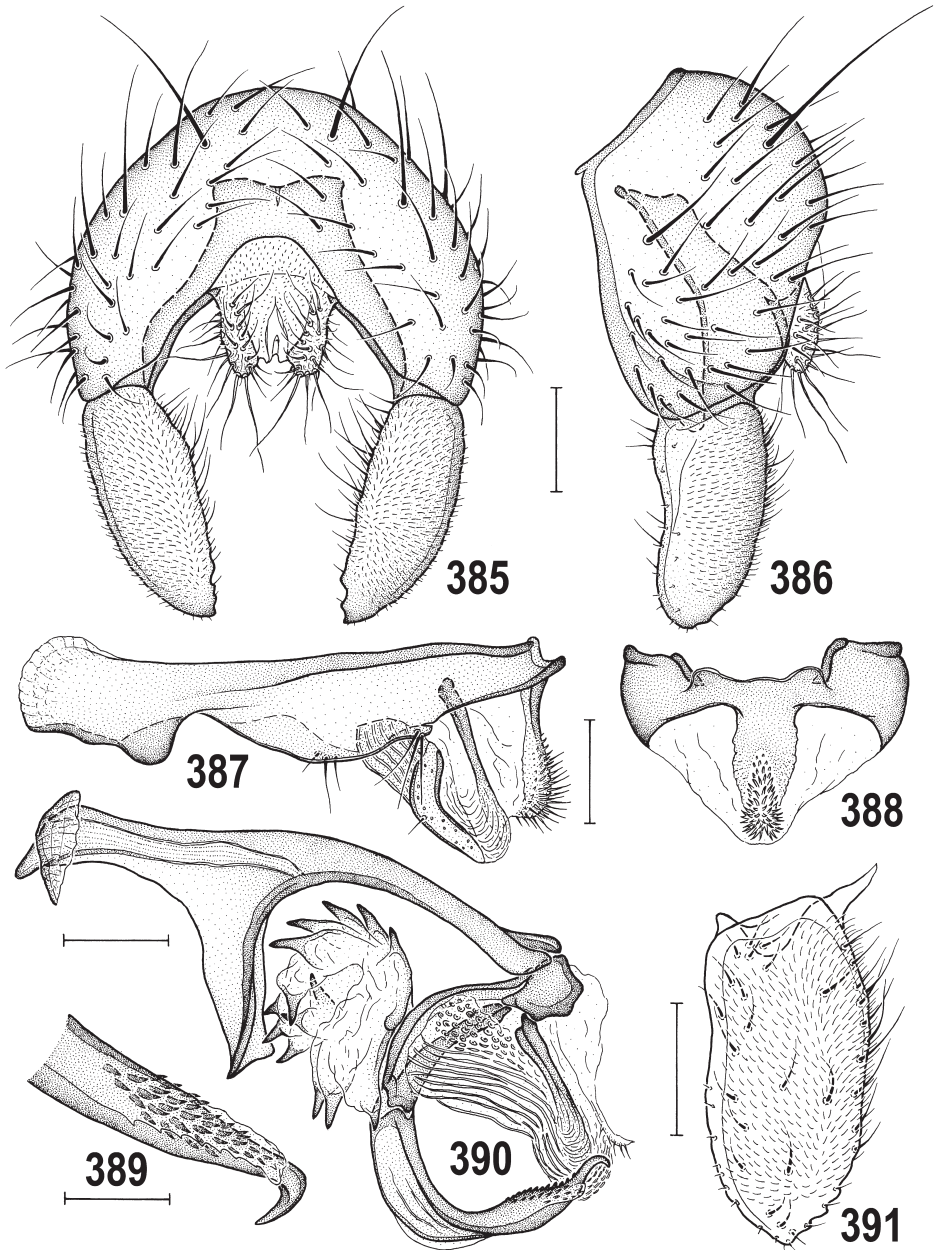
Abdomen dorsally brown-and-yellow variegated, ventrally pale yellow, no discernible difference in range of colour pattern between pale and dark forms. Preabdominal terga (T1–T5) largely brown, T1 completely brown but T2–T5 with large anteromedial areas yellow (usually shorter, narrower and darker on T2 and T3). T1–T5 subshining, relatively shortly and sparsely setose. T1 and T2 separate, only laterally fused. T2–T5 large, subequal in size, reaching onto lateroventral sides of abdomen. Preabdominal sterna pale yellow, relatively narrow and becoming wider posteriorly; S1 short and transverse, S2 slightly longer than wide, S3 as long as wide, S4 and S5 (widest sternum) slightly to distinctly transverse. S2–S5 densely setose, only S1 bare and with darker posterior marginal stripe. T6 very short, transverse, bare, almost unpigmented. S6 and S7 yellow, both with brownish anterior marginal ledge; S6 with 3–4, S7 with 2–3 setae; S8 as long as epandrium, largely brown (with only anterolateral area adjacent to S7 yellow) and setose in posterior two-thirds.

Genitalia. Epandrium (Figs 385, 386) pale yellow (contrasting with brown S8), moderately long and broad, densely setose, with 1 pair of distinctly longer and thicker setae; anal fissure relatively small, rounded subtriangular. Cercus rather small, pale, with fine setae, apical longest. Medandrium (see Fig. 385) relatively high, dorsally narrowed, with dorsolateral corners simple, ventrally broadly emarginate, bare. Gonostylus (Figs 385, 386, 391, 400) simple, almost as long as epandrial height, relatively flat (externally slightly convex), of elongately oval outline, distally slightly pointed, apically posteriorly provided with 3 or 4 small and blunt teeth, micropubescent on most of outer side, with some longer setae on slightly concave inner side and at posterior margin. Its shape is somewhat variable (see extreme variant on Fig. 400) but markedly different from those known in all relatives (cf. Figs 412, 429, 448 and ROHÁČEK 2006a: Figs 266, 281, 297). Hypandrium (Fig. 387) medium-sized, with anterior internal lobes small. Transandrium (Fig. 388) straight but laterally with bulging corners, ventromedially projecting as flat ligulate caudal process being distally medially membranous and spinulose, transilient to longer-spinose basal membrane. Pregonite (Fig. 387) fused to

hypandrium, posteriorly with small process carrying 3 long setae, anteriorly simple, slightly convex ventrally and with 3 (middle longer) short setae. Postgonite (Fig. 387) slender and bent (boomerang-shaped in lateral view), pale-pigmented, with 1 setula near middle of anterior margin, numerous sensillae and moderately pointed apex. Basal membrane (Figs 387, 388) coalesced to ventral end of caudal process and prickly spinose (as in *A. dichroa*). Aedeagal part of folding apparatus (Fig. 390) with small, inconspicuous, lenticular tubercles in addition to usual hyaline striae. Connecting sclerite slender, dorsally sclerotized and dark-pigmented (Fig. 390), ventrally membranous, without spinulae. Phallapodeme moderately robust (Fig. 390), with basal part shortly forked, robust but pale fulcrum and distinctly bicuspidate, laterally projecting apex. Aedeagus (Fig. 390) with small phallophore and bifid distiphallus. Saccus relatively short (compared to long filum), vesicular, membranous, with small basal sclerite attached to base of filum and armed with a number (12–14) of robust dark-pigmented spines. Filum robust, formed basally by two, distally by one long, curved sclerite; its apex with terminal curved and pointed projection and a number of tooth-like spines along dorsal surface (Fig. 389). Ejacapodeme reduced (as usual in the group), very small, with pale slender digitiform projection (not illustrated but similar to that of *A. dichroa*, see Fig. 411).

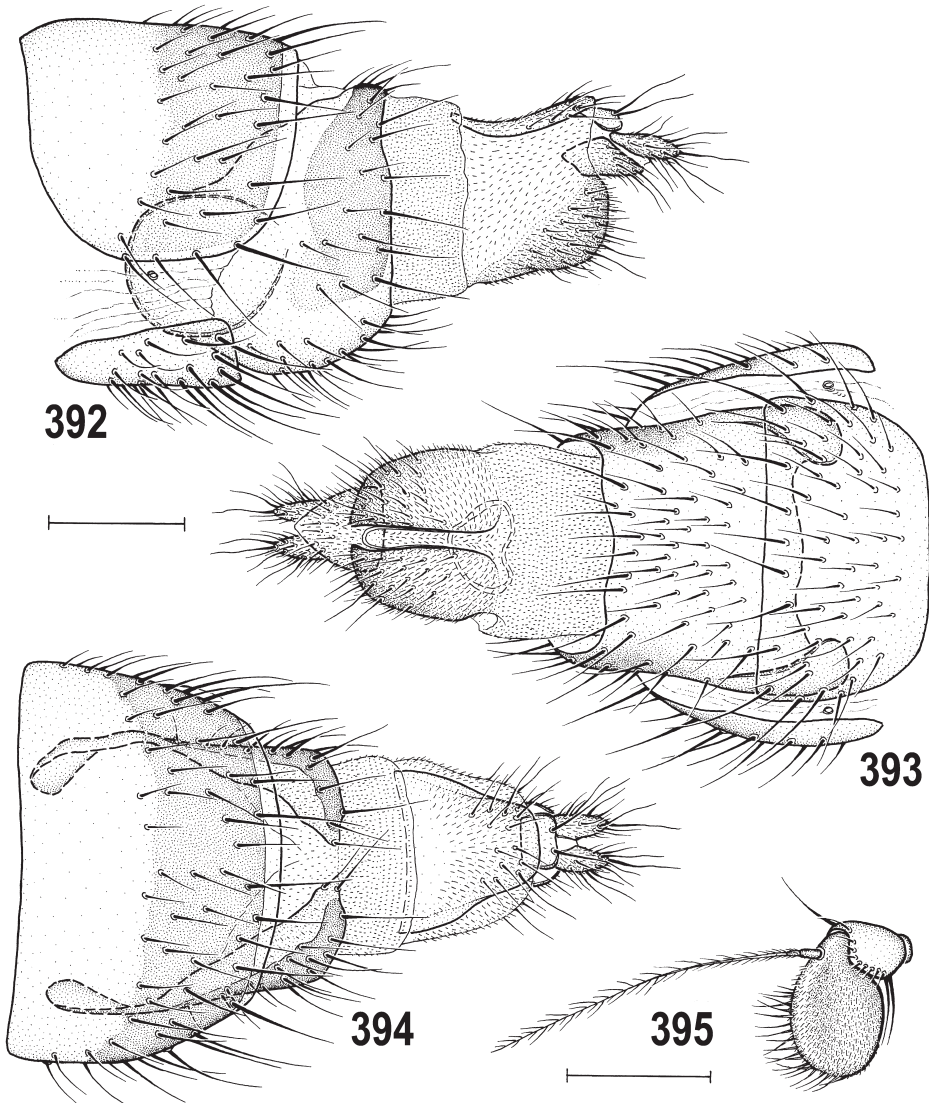
Female. Similar to male unless mentioned otherwise. Total body length 2.50–3.33 mm. Dichroism of head reduced, face always pale: in pale form inner side of 1st flagellomere is yellow (outer side is brown except for basal margin) and occiput is largely yellow, at most with ochreous lateral darkening; in dark form 1st flagellomere is brown on both inner and outer sides and occiput is also brown laterally. Pattern of thoracic scutum variable as in male (pale and dark forms). Sternopleuron usually with more upcurved setulae (up to 7). Wing measurements: length 2.69–3.31 mm, width 0.83–1.13 mm, $Cs_3 : Cs_4 = 1.41\text{--}1.83$, $rm/dm\text{-}cu : dm\text{-}cu = 2.27\text{--}2.73$. Abdomen with T2–T6 brown-and-yellow transversely variegated, with anterior yellow areas larger than in male, only T1 entirely brown as in the latter. T2–T5 shorter and more transverse than in male, subequal in size, wider than T6. Preabdominal sterna pale yellow, not narrower than in male, S2 as long as wide, S3 slightly, S4 and S5 distinctly transverse and suboblong to trapezoidal, S5 largest and widest of preabdominal sterna but narrower than postabdominal S6.

Postabdomen (Figs 392–394) moderately long, tapered posteriorly, telescopic, with sclerites yellow to pale yellow, only T6 and T7+S7 with brown markings. T6 simple, large, suboblong with rounded corners, yellow in anterior, brownish in posterior half, the latter with dense setae, marginal longest. S6 transversely suboblong to trapezoidal with anterior corners rounded, pale yellow and finely densely setose. Tergosternum T7+S7 of distinctive shape and pattern, long, slightly conical, ventrolaterally expanded and forming large pouch-like lobes (Figs 392, 393), and its dorsal part (original T7) dorsomedially strongly shortened and membranous (Fig. 394); yellow with brown posterior dorsolateral band on each side (Fig. 392). Dorsal and lateral parts of T7+S7 with setae mainly at posterior margin, ventral pale yellow part densely setose medially in posterior two-thirds (Fig. 393). 8th segment micropubescent laterally. T8 yellow, elongate, anteriorly broad and with indistinct margin, posteriorly narrowed and rounded, distinctly micropubescent, with fine exclinate setae in posterior half; S8 (Fig. 393) almost as long as T8, medially divided into 2 convex, finely setose and micropubescent sclerites, posteriorly slightly invaginated into 8th segment. Genital chamber (uterus) posteriorly



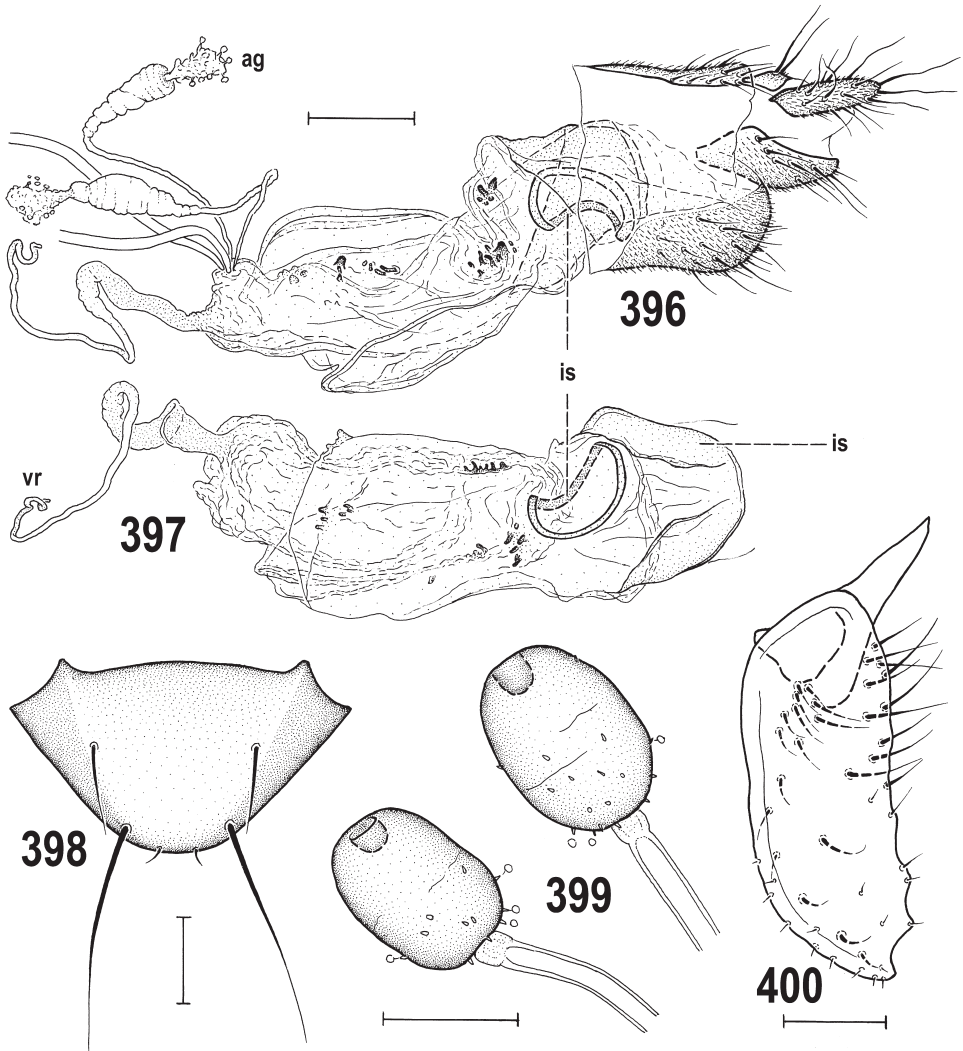
Figs 385–391. *Anthomyza variegata* (Loew, 1863), male (Canada: Ontario). 385 – external genitalia, caudally; 386 – the same, laterally; 387 – hypandrial complex, laterally; 388 – transandrium, caudally; 389 – apex of filum, subventrally; 390 – aedeagal complex, laterally; 391 – gonostylus, laterocaudally (widest extension). Scales = 0.05 mm (Fig. 389) and 0.1 mm (others).

with pale-pigmented internal sclerotization (Figs 396, 397) formed by 1 pair of relatively short, flat, pale-pigmented and poorly defined, posteromedially meeting and partly fused sclerites and 1 suboval (somewhat asymmetrical) and bent, annular sclerite situated ventral to the latter. Membranous part of genital chamber long, often with small spine- or grain-like sclerotizations. Ventral receptacle (Figs 396, 397) tube-like, hyaline, basally distinctly broader,



Figs 392–395. *Anthomyza variegata* (Loew, 1863), female (Canada: Ontario). 392 – postabdomen, laterally; 393 – the same, ventrally; 394 – the same, dorsally; 395 – antenna, dark form, laterally. Scales = 0.2 mm.

distally very slender and terminally with vermicular apex. Accessory gland small, hyaline, on distally dilated and sparsely ringed duct; its wrinkled surface with minute stalked globulae. Spermathecae (1+1) oval to rounded cylindrical (Fig. 399), each with small but distinct terminal cup-shaped invagination and several minute blunt spinulae in basal half; duct very long and ending in poorly defined hyaline cervix inserted centrally in spermathecal body.



Figs 396–400. *Anthomyza variegata* (Loew, 1863), female (Canada: Ontario) and male (USA: District of Columbia). 396 – female genital chamber and apex of female postabdomen, laterally; 397 – female genital chamber, ventrally; 398 – female scutellum, dorsally; 399 – spermathecae; 400 – male gonostylus, laterocaudally (widest extension, micropubescence omitted). Scales = 0.1 mm (Figs 396–398) and 0.05 mm (Figs 399, 400). For abbreviations see p. 11.

T10 very small (Figs 394, 396), slightly wider than long, with 1 posteromedial pair of long setae and reduced micropubescence. S10 markedly larger and wider than T10, subtriangular in ventral view (Fig. 393), finely setulose and micropubescent. Cercus relatively short (Figs 394, 396), slender, with numerous fine setae, with apical and dorsopreapical being longest.

Discussion. *Anthomyza variegata* (Loew, 1863) belongs to the *Anthomyza neglecta* group as diagnosed above. It seems to be most closely allied to *A. dichroa* on the basis of the following synapomorphies: caudal process of transandrium and adjacent basal membrane densely prickly spinose; female T7+S7 dorsally posteromedially interrupted or membranous. This pair also differs from the two remaining Nearctic species in having particularly long cilia on the 1st flagellomere (this character is shared with all Palaearctic species of the group) and in lacking the synapomorphies diagnosing the *A. gibbiger* + *A. orthogibbus* pair.

Besides the colour differences sometimes seen between sexes of anthomyzids (sexual dichroism), *A. variegata* and *A. dichroa* are further characterized by dichroism within each sex. This non-sexual dichroism (more strongly expressed in the males, see Figs 404, 405), having pale and dark forms (no intermediates, pale form more common) that are usually both represented in populations of these species, is a hitherto unknown phenomenon in Anthomyzidae. A similar type of non-sexual dichroism also occurs in *A. gibbiger* where it is, however, restricted to males, but has not been found in *A. orthogibbus* and/or Palaearctic species of the *A. neglecta* group. Due to this colour variability and rather uniform external structures of *A. variegata* (and its relatives), it is sometimes difficult to recognize the species from only external characters (see the key below). Thus, *A. variegata* males can be best identified by a large and flat gonostylus (Figs 391, 400), and females can be diagnosed by a dorsally membranous (posteromedially interrupted) T7+S7 (Fig. 394) that has a large, dark posterior band and large ventrolateral pouch-like lobes (Fig. 392). Alternatively, the species can be recognized by the combination of a long-ciliate arista and 1st flagellomere (Fig. 395), a head that is about as long as high, and a long ctenidial spine. The presence of additional setulae on the scutellum (Fig. 398), although occurring in only some specimens, is extremely helpful in identifying the species.

Biology. FOOTE (2004) recorded *A. variegata* as swept from *Carex stricta* and *C. lacustris* Willd., however, there was some ambiguity in the data presented – the text refers to six specimens swept from *C. lacustris* but only two specimens are listed in the table but as swept from *C. stricta*. The locality (Ohio: Kent – Horning Road Marsh) is certainly within the known range reported here for *A. variegata*, but since we have not seen these specimens their identity and the locality record must remain questionable. The associated assessment that “larvae of this stem-boring species overwinter in culms of the host plant” must also be confirmed as this may be extrapolation from FERRAR (1987). The relatively limited label data presented here indicate that possible host plants are likely to be graminoids. Unidentified species of *Carex* in association with *Impatiens* yielded specimens in two localities in southern Ontario (Rondeau P. Pk., Short Hills P. Pk.). There is some suggestion that mesic habitats under canopy (Ontario: Royal Botanical Gardens, Pelee Island, incl. *Carex*) are acceptable, as are open riparian sites (Ontario: Burlington, *Bromus inermis*) that also yielded specimens of *A. dichroa*. Other habitat references include “swamp margin”, “fern bog”, and “marsh area”, along with variations on canopied sites such as “along stream in forest”, “university forest” and “humid forest along

stream". This species has been taken several times at lights or light traps, a behaviour shared only with *A. dichroa* of this species group, the latter more rarely collected in this manner. The flight period for *A. variegata* is quite long (at least in Virginia) – 1 May (Virginia: Mt. Rogers) to 17 September (Virginia: Falls Church).

Distribution. Published records of *A. variegata* are from the United States of America: California (MELANDER 1913, COLE 1969, SABROSKY 1965), District of Columbia (LOEW 1863, OSTEN SACKEN 1878, MELANDER 1913, SABROSKY 1965), Georgia (MELANDER 1913, SABROSKY 1965), Maine (JOHNSON 1925, SABROSKY 1965), Massachusetts (JOHNSON 1925), New Hampshire (JOHNSON 1925), New Jersey (ALDRICH 1905, MELANDER 1913), Ohio (FOOTE 2004), Virginia (SABROSKY 1965), Washington (MELANDER 1913, COLE 1969, SABROSKY 1965). However, at least some of these records are likely based on misidentified specimens of the three related species described as new below (e.g. Washington records are likely of *A. gibbiger*) or even pale members of the *A. pallida* group (specimens of the *A. neglecta* group are not yet known from California). The records for Maine have not been confirmed for *A. variegata* (we have not seen JOHNSON'S (1925) specimens) although the state borders its known range; these records could represent *A. dichroa*, the only *A. neglecta*-group species known from the state. The distribution of *A. variegata* based on material examined can be summarized as follows: Canada: Ontario, Quebec; United States of America: Alabama, Colorado, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia (see Table 2, Fig. 597). This species reaches further into the southeast than the other three species in the group, and is commonly collected in the northeastern United States.

Anthomyza dichroa sp. nov.

(Figs 1, 382, 401, 402, 404–418, 438)

Type material. HOLOTYPE: ♂, "ONT: Burlington, edge Tuck Ck, 20.vii.1997, KNBarber, sweeps/pooter *Bromus inermis* 43°21.2'N 79°46.6'W" and "HOLOTYPE ♂ *Anthomyza dichroa* sp. n., J. Roháček & K. N. Barber det. 2013" (red). The specimen is in perfect condition, with highly visible, partly exposed genitalia (see Fig. 382) (CNCI, intact). PARATYPES: **CANADA: MANITOBA:** Brandon, 18.vii.1958, 1 ♂, R. B. Madge leg., 1 ♀, R. L. Hurley leg.; Ninette, 15.vii.1958, 1 ♀, N. B. Chillcott leg.; 5 mi SW Shilo, at margin of grain field, 22.vii.1958, 1 ♀, J. G. Chillcott leg.; 5 mi SW Shilo, floodplain community near tamarack bog, 22.vii.1958, 1 ♂ 1 ♀ (1 ♀ genit. prep.), R. L. Hurley leg., 13.viii.1958, 1 ♂ (genit. prep.), J. G. Chillcott leg.; ~6 km SW Shilo, 49°45.19'N 99°41.28'W, edge of wet area, 10.vii.2011, sweeps, grasses and sedges, 1 ♂ 1 ♀, sweeps, incl. *Equi. fluviatile*, *Carex*, *Calamagrostis*, *Impatiens*, 1 ♂ 1 ♀, K. N. Barber leg. (all CNCI); 5 km N Gardenton, Tallgrass Prairie Reserve, 49°10.71'N 96°40.75'W, sweep prairie at roadside, 6.vii.2000, 1 ♀ (LEMQ 0040105); Spruce Woods Prov. Pk., Marsh Lake, sweeping path in deciduous forest, 8.vii.1992, 1 ♀ (LEMQ 0040103), both T. A. Wheeler leg; Winnipeg Beach, [-]. vi.1954, 1 ♂, H. D. Stalker leg. (AMNH). **NOVA SCOTIA:** CBH [Cape Breton Highlands] Nat. Pk., Pleasant Bay, PG684871, wet hardwood forest, 10.vii.1984, 2 ♀♀, H. J. Teskey leg. (CNCI); Inverness, 6.viii.1970, 1 ♀, C. Sabrosky leg. (USNM); Kentville, 6.viii.1958, 1 ♀; Lockeport, 30.vii.1958, 1 ♀, 11.viii.1958, 1 ♂; Springfield, 2.viii.1958, 1 ♂, 6.viii.1958, 1 ♂, all J. R. Vockeroth leg. (all CNCI). **ONTARIO:** Batchawana P. Pk., 46°56.67'N 84°33.30'W, sweeps, mostly *Carex* spp. in wet trench under mixed canopy, 19.vii.2014, 1 ♂ 1 ♀, K. N. Barber leg. (DEBU 01503964, -65); Bell's Corners, 7.vii.1952, 1 ♂, J. F. McAlpine leg. (CNCI); Belleville, 22.vi.1971, 1 ♂, C. D. Rollo leg. (DEBU, genit. prep.); ~1 km NW Bewdley, Jct. Hwy 28 & Rice Lake Rd., 44°05.92'N 78°20.18'W, sweeps, mostly creekside *Carex*, 7.vii.2005, 1 ♀, K. N. Barber leg.; Blackburn, 12.vii.1954, 2 ♀♀, W. R. M. Mason leg. (all CNCI); Bruce Co., Miller Lake, 21.vii.1996, 1 ♀, S. A. Marshall leg. (DEBU); Bruce Co., Scone, North

Saugeen River, riparian sweep, 17.vii.2004, 1 ♂ 1 ♀, M. Buck leg. (DEBU 00298402, -24); Bruce Peninsula N. P., bank of Crane River nr. Hwy 6, 45°08.9'N 81°28.1'W, sweeps, grasses/sedges, 31.vii.1997, 3 ♂♂, S. A. Marshall leg., sweeps/pooter. *Calamagrostis* & *Carex*, 31.vii.1997, 1 ♂, K. N. Barber leg. (DEBU); Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 3.vii.1999, 2 ♂♂ 1 ♀; Bruce Peninsula N. P., Emmett Lake, 45°13.1'N 81°29.0'W, sweeps, graminoids, wet area under *Acer*, 2.vii.1999, 6 ♂♂ 3 ♀♀; same locality but 45°13.5'N 81°28.2'W, sweeps, mostly graminoids, open area under *Acer/Quercus*, 2.vii.1999, 6 ♂♂ 3 ♀♀; Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.4'W, sweeps, grasses along dry ditch, 4.vii.1998, 1 ♂; same locality but 45°11.6'N 81°34.7'W, sweeps, *Agropyron/Calamagrostis*, 5.vii.1998, 1 ♂ 1 ♀, all K. N. Barber leg. (all DEBU); Burlington, edge Tuck Ck, 43°21.2'N 79°46.6'W, sweeps/pooter, *Bromus inermis*, 15.vii.1997, 2 ♀♀, 18.vii.1997, 4 ♂♂ 10 ♀♀, 20.vii.1997, 10 ♂♂ 7 ♀♀, sweeps, mowed long grasses, 1.viii.2003, 2 ♀♀; Burlington, Royal Botanical Gdn., 43°17.5'N 79°52.4'W, sweeps, trailside *Poa*, *Agrostis*, *Phleum*, *Festuca*, *Juncus*, 16.vii.1997, 2 ♀♀, all K. N. Barber leg. (all CNCI); same locality but 43°17.8'N 79°52.6'W, sweeps, trailside vegetation in mixed hardwood, 14.vii.2002, 3 ♂♂ 9 ♀♀ (CNCI), 15.vii.2002, 7 ♂♂ 14 ♀♀ (CNCI) 6 ♂♂ 13 ♀♀, SMOC 1 ♂ 1 ♀, 16.vii.2002, 9 ♂♂ 15 ♀♀ (CNCI), trailside sweeps, mostly *Carex*, *Fragaria*, *Solidago*, 18.vii.2002, 10 ♂♂ 11 ♀♀; same locality but 43°17.79'N 79°52.61'W, trailside sweeps, mostly *Carex*, *Fragaria*, *Solidago*, 27.vii.2003, 12 ♂♂ 17 ♀♀ (1 ♀ genit. prep.) (all CNCI), all K. N. Barber leg.; Dubreuilville, 48°21.09'N 84°33.90'W, sweeping undergrowth *Pinus/Populus* forest, with *Clintonia*, *Vaccinium*, ferns, graminoids, 10.vii.2010, 1 ♂, J. Roháček leg. (SMOC, genit. prep.); ~3.8 km ENE Dugwal, 48°35.33'N 80°57.90'W, sweeps, wet ditch, *Carex utriculata*, *Equisetum fluviatile*, *Scirpus*, 13.vii.2013, 1 ♂; ~55 km NNW Elliot Lake, s. of Rocky Island Lake, 46°49.32'N 82°59.54'W, sweeps, *Scirpus*, grasses, *Equisetum*, ferns, 3.vii.2010, 2 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); same locality but 455 m, sweeping vegetation with predominant grasses, 3.vii.2010, 10 ♂♂ 10 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); ~63 km NNW Elliot Lake, s. of Rocky Island Lake, 46°49.80'N 83°09.08'W, sweeps, streamside graminoids, 4.vii.2010, 1 ♀, K. N. Barber leg. (CNCI); same locality but 425 m, sweeping streamside graminoids, 4.vii.2010, 1 ♀ (genit. prep.); ~61 km NNW Elliot Lake, Three Lakes, 46°49.94'N 83°06.31'W, 425 m, sweeping grasses [mostly *Glyceria striata*] near lakeshore, 3.vii.2010, 7 ♂♂ 5 ♀♀; Fergus nr. Guelph, Grand River, riverside vegetation, 30.vii.1994, 10 ♂♂ 12 ♀♀ (1 ♂ 3 ♀♀ genit prep.), all J. Roháček leg. (all SMOC); Wellington Co., Fergus, Grand River, sweep in *Eupatorium*, 2.viii.1993, 1 ♂, D. C. Caloren leg.; Fergus, 43°41.5'N 80°23.2'W, Grand R. floodplain, sweeps/pooter, *Bromus inermis*, 17.vii.1997, 3 ♂♂ 5 ♀♀ (1 ♀ genit. prep.), K. N. Barber leg.; Goderich, 22.vi.1977, 2 ♀♀, K. Barber leg. (all DEBU); Goulais River, Pine Shores Rd., 46°41.67'N 84°25.47'W, sweeps, *Thalictrum*, *Clematis*, sedges, edge of Cranberry Ck., 4.vii.2007, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); Grand Bend, 8.vii.1939, 1 ♂, 11.vii.1939, 1 ♀, G. E. Shewell leg. (CNCI); 7 mi E Griffith, 22.vii.1984, 2 ♀♀, B. E. Cooper leg. (CNCI); Guelph, 13.vii.1983, 1 ♀, R. D. Smith leg., 6.vii.1979, 1 ♀, K. L. Bailey leg., 1 ♀, J. E. Corrigan leg., "5.7".1965, 1 ♂, C. J. Edwards leg., 13.vii.1978, 1 ♀, P. Jursevskis leg., 17.vi.1979, 1 ♂, 3.vii.1979, 6 ♂♂ 1 ♀, 4.vii.1979, 2 ♂♂ 1 ♀, 5.vii.1979, 1 ♂ 1 ♀, 25.vii.1979, 2 ♂♂, 2.viii.1980, 1 ♀, 23.vii.1982, 3 ♀♀, Malaise trap, 14.viii.–16.viii.1981, 1 ♂, 1–20.vii.1982, 1 ♀, K. N. Barber leg. (DEBU); Hamilton, Malaise trap, 10–13.vii.1980, 1 ♂, M. Sanborne leg. (DEBU); ~5 km NE Heyden, Hwy 552, 46°41.37'N 84°16.85'W, sweeps, roadside ditch/stream, graminoids, 31.vii.2006, 2 ♂♂ 2 ♀♀; ~13 km N Heyden, ~3.8 km E Robertson Lake Rd., 46°45.7'N 84°18.4'W, sweeps, *Carex*, *Impatiens*, *Aster*, 1.viii.2005, 1 ♀; Iceswater Creek WS [watershed], 12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., alder thicket, 21.vi.1986, 1 ♂, all K. N. Barber leg. (all CNCI); Iceswater Creek WS, ~12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., riparian meadow/alder thicket, Malaise, 21–28.vii.1986, 1 ♀, 27.viii.–8.ix.1986, 1 ♂, [K. N. Barber] leg. (CNCI); Iceswater Creek WS, 46°53.7'N 84°03.4'W, sweeps, *Thalictrum*, sedge, fern, riparian mixed forest, 7.vii.1998, 1 ♂; same locality but 46°53.72'N 84°03.39'W, sweeps, riparian ferns, graminoids, 5.viii.2006, 3 ♂♂ 3 ♀♀; ~11.9 km N Kejick, 49°43.89'N 95°04.14'W, sweeps, wet ditch, graminoids/*Equisetum*, 30.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); 6 km S Langton, Concession Rd. 8, S Hwy 45, 42°42.01'N 80°31.93'W, sweep in Carolinian forest, 29.vi.2002, 1 ♀ (LEMQ 0040474), sweep clearing at dusk near Carolinian forest, 29.vi.2002, 1 ♀ (LEMQ 0040474), S. Boucher leg.; Manitoulin Is., Carter Bay, 45°36.3'N 82°08.5'W, sweeps, Pearly Everlasting [*Anaphalis margaritacea*], 30.vi.1999, 5 ♂♂ 4 ♀♀; Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck. @ Hwy 540, 45°53.2'N 82°06.3'W, sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 1 ♀; Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.4'N 82°06.1'W, sweeps, low veg. in mixed wood, 4.vii.1999, 1 ♀, all K. N. Barber leg.; Metcalfe, 24.vii.1984, 2 ♀♀, 22.vii.1986, 1 ♀, B. E. Cooper leg. (all CNCI); Oakville, 5.vii.1978, 1 ♀, D. Morris leg. (DEBU); One-sided [= Caliper] Lake, 26.vi.1960,

1 ♂, Kelton & Whitney leg.; Ottawa, 15.vii.1938, 4 ♂♂ 7 ♀♀, 17.vii.1938, 2 ♀♀, 27.vi.1946, 1 ♀, A. R. Brooks leg., 17.vi.1955, 1 ♂, 26.vii.1955, 2 ♀♀, J. G. Chillcott leg., 22.vii.1954, 1 ♂ 1 ♀ (1 ♀ genit. prep.), W. R. M. Mason leg., 5.vii.1938, 1 ♂, G. E. Shewell leg., 9.viii.1953, 1 ♀, 17.vii.1955, 2 ♂♂ 1 ♀, J. F. McAlpine leg.; Ottawa, compost heap, 9.vii.1953, 1 ♂, bleeding elm, 9.vii.1953, 1 ♀, 30.vii.1953, 1 ♀, stump of bleeding elm, 21.vi.1955, 1 ♀, J. F. McAlpine leg.; Ottawa, 26.vii.1955, 2 ♂♂ 2 ♀♀, 12.vii.1956, 1 ♂ 1 ♀, 22.vi.1963, 1 ♂ 1 ♀ (1 ♀ genit. prep.), 30.vi.1963, 3 ♂♂ 7 ♀♀, 6.vii.1963, 3 ♂♂ 4 ♀♀, 20.vii.1963, 1 ♀, 13.vii.1963, 10 ♂♂ 7 ♀♀ (1 ♀ genit. prep.), 28.vi.1964, 2 ♂♂, 12.vii.1964, 1 ♀, J. R. Vockeroth leg.; Ottawa, taken at light, 29.vi.1964, 1 ♀, damp second-growth *Acer-Betula* wood, 11.viii.1989, 1 ♀, J. R. Vockeroth leg.; Ottawa, at light during heavy rain, 26.vi.1964, 1 ♂, [J. R. Vockeroth?] leg. (all CNCI); Ottawa, Beechwood Cemetery, 45°26.88'N 75°40.05'W, sweeps, *Equisetum hyemale*, grasses nr. creek outlet, 27.vii.2007, 3 ♂♂, K. N. Barber leg. (CNCI); Ottawa, Black Rapids, 28.vi.1958, 1 ♂, 28.vi.1959, 1 ♂ 1 ♀ (CNCI); Ottawa, Mackay Lake Outlet, 6.viii.2006, 1 ♀ (CNCI, Diptera #58957); Ottawa, Mer Bleue, 25.vi.1964, 1 ♀ (CNCI), all J. R. Vockeroth leg.; Pancake Bay P. Pk., 46°57.89'N 84°42.55'W, sweeps, *Carex* in moist area under canopy, 7.viii.2004, 3 ♂♂ (DEBU 01501447–49); Pancake Bay P. Pk., 46°58.00'N 84°42.47'W, Black Creek floodplain, sweeps, *Carex/Calamagrostis*, 7.viii.2004, 1 ♀ (DEBU 01501100), 19.vii.2014, 2 ♂♂ 1 ♀ (DEBU 01503968–70), all K. N. Barber; ~1 km NW Ponsonby, 43°38.2'N 80°22.9'W, sweeps/pooter, roadside, mostly *Poa pratensis* & *Poa compressa*, 17.vii.1997, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI); Haldimand-Norfolk Co., Port Ryerse, along stream, 15.vii.1986, 1 ♀, R. Danielsson leg. (MZLU, genit. prep.); Powassan, 14.vii.1978, 1 ♂, J. Cappleman leg. (DEBU); Prescott, 44°42.8'N 75°31.1'W, sweeps/pooter, mixed grasses, 22.viii.1997, 1 ♀; ~4 km SW Richmond, Jct. Munster Rd./Kettles Rd., 45°06.83'N 75°52.76'W, sweeps, sedges, *Equisetum fluviatile*, flooded ditch/fen, 23.vii.2007, 1 ♂; ~2 km SW Richmond, along railway 3.2 km NE Kettles Rd., 45°08.54'N 75°51.09'W, sweeps, *Equisetum fluviatile*, *Typha*, *Calamagrostis*, *Impatiens*, ditch, 25.vii.2007, 1 ♂ 1 ♀, all K. N. Barber leg.; Rockport, 24.vii.1963, 1 ♂ 2 ♀♀, 5.viii.1985, 1 ♀, J. R. Vockeroth leg. (all CNCI); Rondeau P. Pk., Spicebush Trail, 42°18'08"N 81°51'13"W, sweeps, mostly *Impatiens/Carex*, 29.vii.2003, 1 ♂ 1 ♀, K. N. Barber leg. (DEBU 01500140, -41); S[ault] S[te.] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Calamagrostis canadensis*, 29.viii.1997, 1 ♂, 22.vi.1998, 1 ♂, sweeps, mostly *Calamagrostis canadensis*, 6.viii.2001, 2 ♂♂, sweeps, low veg. under *Populus/Betula*, 3.viii.1997, 1 ♀, sweeps, trailside *Carex/Scirpus*, 14.vii.1998, 1 ♂ 2 ♀♀, sweeps, *Calamagrostis canadensis* & *Carex aquatilis*, 23.vii.1997, 1 ♂ 1 ♀, sweeps, *Calamagrostis canadensis* under *Populus/Betula*, 23.vii.1997, 1 ♂ 1 ♀, sweeps, mostly *Carex aquatilis*, 17.vii.2001, 1 ♀, 18.vii.2001, 1 ♀; same locality but 46°29.82'N 84°17.17'W, sweeps, mostly *Carex aquatilis* near river, 21.vii.2005, 3 ♂♂ 2 ♀♀, sweeps, mostly graminoids/*Impatiens* under canopy, 21.viii.2004, 1 ♀; same locality but 46°29.88'N 84°17.19'W, sweeps, *Carex aquatilis*, 27.vii.2005, 1 ♀, sweeps, *Impatiens*, *Carex*, ferns under canopy, 21.vii.2005, 2 ♂♂ 1 ♀; same locality but S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, *Carex* spp., *Scirpus cyperinus*, 5.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Baseline Rd. @ Allen's S[ide] R[oad], 46°31.35'N 84°24.38'W, sweeps, graminoids/*Impatiens*, under *Populus* canopy, 14.viii.2004, 5 ♂♂ 7 ♀♀; S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, Malaise #1, *Aster [Doellingeria]*, *Rubus*, *Equisetum*, *Carex*, *Solidago*, in aspen clearing, 22.viii.–2.ix.2005, 1 ♀, 16–30.ix.2005, 1 ♀ (all CNCI); same locality but sweeps, *Thalictrum*, *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 25.vi.2005, 1 ♂, 10.vii.2005, 1 ♂ sweeps, *Aster [Doellingeria]*, *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 25.vi.2005, 1 ♀, 26.vi.2005, 1 ♂ 2 ♀♀, 8.vii.2005, 1 ♂ 1 ♀, 10.vii.2005, 3 ♀♀ (1 ♀ genit. prep.), 14.vii.2005, 1 ♀, 16.vii.2005, 1 ♀, 18.vii.2005, 1 ♀ (CNCI), 22.vii.2005, 3 ♂♂ 2 ♀♀, 29.vii.2005, 1 ♀ (AMNH), 8.viii.2005, 2 ♀♀, 23.viii.2011, 4 ♂♂ 2 ♀♀ (LACM), 28.viii.2011, 3 ♂♂ 1 ♀, 27.vii.2012, 3 ♂♂ 7 ♀♀, 29.vii.2012, 1 ♂ 7 ♀♀, 24.viii.2013, 1 ♀, sweeps, *Aster [Doellingeria]*, *Rubus*, graminoids under aspen, 19.vii.2006, 1 ♂ 1 ♀, sweeps, mostly *Carex* in aspen clearing, 25.vi.2005, 1 ♂ 1 ♀ (CNCI), 16.vii.2005, 3 ♂♂ 4 ♀♀ (INHS), sweeps, mostly ferns under aspen, 27.vii.2012, 3 ♂♂ 4 ♀♀, 28.vii.2012, 4 ♂♂ 6 ♀♀ (USNM), 29.vii.2012, 1 ♂ 3 ♀♀, 25.viii.2012, 1 ♂ (CNCI), all K. N. Barber leg.; same locality but sweeping, *Aster [Doellingeria]*, *Rubus*, *Equisetum*, *Carex*, *Clematis*, ferns under aspen (*Populus*), 7.vii.2010, 11 ♂♂ 8 ♀♀ (1 ♂ 1 ♀ genit. prep.), 12.vii.2010, 3 ♂♂ 3 ♀♀, J. Roháček leg. (SMOC); same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 1 ♂, 10.vii.2005, 2 ♀♀, 14.vii.2005, 2 ♂♂ 1 ♀; same locality but 46°31.44'N 84°24.40'W, sweeps, *Aster [Doellingeria]*, *Rubus*, *Carex*, ferns, under aspen, 10.vii.2005, 2 ♂♂ 2 ♀♀; same locality but w. of creek, 46°31.52'N 84°24.63'W, sweeps, *Carex* under ash/aspen, 22.vii.2005, 10 ♂♂ 2 ♀♀; same locality but 46°31.41'N 84°24.57'W, sweeps, sparse veg. on disturbed site, 26.vi.2005, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Bellevue Pk., 46°30.1'N 84°18.1'W, sweeps,

mostly *Calamagrostis*, 7–8.vii.2000, 2 ♀♀, K. N. Barber leg. (CNCI, 1 ♀ genit. prep.); S[ault] S[te.] Marie, Birchwood Pk., mixed forest, 13.vi.1986, 3 ♀♀, 15.vi.1986, 1 ♂, 28.vi.1986, 2 ♂♂; same locality but 46°30.7'N 84°15.6'W, sweeps, trailside *Impatiens*, fern, raspberry, grass under *Populus/Betula*, 4.ix.1997, 1 ♂, sweeps, trailside *Impatiens*, fern, raspberry, grass under *Betula/Acer*, 30.viii.1997, 3 ♀♀, 1.ix.1997, 2 ♀♀, 4.ix.1997, 1 ♂, sweeps, mostly *Impatiens* under *Betula/Acer*, 20.vi.1998, 1 ♀, sweeps, *Impatiens* under *Betula/Acer*, 27.vi.1998, 1 ♂, all K. N. Barber leg. (all CNCI); same locality but sweeps, graminoids/*Impatiens*, 23.viii.2002, 6 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI 5 ♂♂ 2 ♀♀, SMOC 1 ♂ 1 ♀); same locality but 46°30.67'N 84°15.63'W, sweeps, *Impatiens*, *Aster*, under *Betula/Acer*, 11.ix.2011, 1 ♀, K. N. Barber leg. (CNCI); S[ault] S[te.] Marie, Bristol Place, 28.vi.1987, 1 ♂; S[ault] S[te.] Marie, Bristol Pl. Pk., 46°30.8'N 84°16.6'W, sweeps, *Impatiens* under *Betula/Populus*, 9.vii.1998, 1 ♂ (both CNCI), sweeps/pooter, *Phalaris arundinacea*, 8.viii.1997, 2 ♂♂ 2 ♀♀ (NMPC), sweeps, *Phalaris arundinacea*, 18.vii.1998, 1 ♀, sweeps, pathside *Impatiens/sedge* under *Betula/Populus*, 16.vii.1998, 2 ♂♂ (1 ♂ genit. prep.), sweeps, low veg. including grasses, 14.viii.1999, 1 ♂, sweeps, mostly sedges, 2.vii.2001, 7 ♂♂ 5 ♀♀ (incl. pair in copula), *Carex* under canopy, 4.vii.2002, 1 ♀, 20.vii.2003, 1 ♂ 5 ♀♀, sweeps, *Impatiens* under canopy, 20.vii.2003, 1 ♀, sweeps, *Impatiens*, *Rubus*, *Phalaris*, *Carex* under *Populus*, 28.vi.2005, 3 ♂♂ 6 ♀♀ (CNCI), K. N. Barber leg.; same locality but sweeps, *Impatiens/Phalaris* under *Populus*, 23.vii.2005, 19 ♂♂ 17 ♀♀ (CNCI 17 ♂♂ 15 ♀♀, SMOC 2 ♂♂ 2 ♀♀), [sweeps], *Phalaris*, *Carex*, *Impatiens* under *Populus*, 12.vii.2006, 7 ♂♂ 6 ♀♀ (1 ♂ wing illustration), [sweeps], graminoids, *Impatiens*, *Rubus*, *Clematis*, 18.vii.2006, 5 ♂♂ 1 ♀ (CNCI), K. N. Barber leg.; same locality but sweeping *Impatiens* mixed with *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 7.vii.2010, 8 ♂♂ 2 ♀♀, J. Roháček leg. (SMOC, 1 ♂ photographed); same locality but 46°30.87'N 84°16.68'W, sweeps, mostly *Carex gynandra*, 30.vi.2008, 1 ♂ 4 ♀♀, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Calamagrostis*, 1.vii.2008, 1 ♂ (CNCI); same locality but 46°30.77'N 84°16.66'W, sweeps, *Impatiens*, *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 29.vi.2008, 1 ♂ 3 ♀♀, 1.vii.2008, 1 ♀, 4.vii.2008, 5 ♂♂ 6 ♀♀, 5.vii.2008, 3 ♂♂ 6 ♀♀, 8.vii.2008, 1 ♂ (CNCI), 9.vii.2008, 4 ♂♂ 3 ♀♀ (CASC), 11.vii.2008, 2 ♀♀, 13.vii.2008, 1 ♂, 7.viii.2008, 1 ♂, 27.vii.2009, 7 ♂♂ 6 ♀♀, 8.ix.2009, 4 ♂♂ 4 ♀♀, sweeps, trailside vegetation, 25.ix.2009, 1 ♀, sweeps, *Phalaris arundinacea* under *Populus*, 7.viii.2008, 7 ♂♂ 2 ♀♀ (CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeps, *Phalaris arundinacea*, 17.ix.2005, 1 ♂, sweeps, mostly *Scirpus microcarpus*, 14.viii.2005, 1 ♀, 25.viii.2005, 1 ♂, 1.ix.2005, 1 ♀, 16.ix.2005, 1 ♂, K. N. Barber leg. (CNCI); same locality but sweeping graminoid vegetation, 7.vii.2010, 6 ♂♂ 4 ♀♀ (1 ♂ 3 ♀♀ genit. prep.), 12.vii.2010, 1 ♂ (genit. prep.), J. Roháček leg. (SMOC); same locality but 46°31.48'N 84°17.39'W, sweeps, graminoids, *Equisetum*, *Rubus*, *Eurybia*, 25.vii.2010, 1 ♂, sweeps, mostly grasses, 25.vii.2010, 1 ♂; same locality but 46°31.63'N 84°17.33'W, sweeps, graminoids, herbs, composites, edge of *Populus tremuloides*, 8.viii.2008, 1 ♂; same locality but 46°31.63'N 84°17.43'W, sweeps, *Impatiens*, ferns, *Carex gynandra*, 8.vii.2006, 2 ♂♂ 2 ♀♀, 15.vii.2006, 1 ♂ 3 ♀♀; same locality but 46°31.64'N 84°17.40'W, sweeps, mostly *Calamagrostis*, *Rubus*, *Aster* under *Populus*, 17.viii.2003, 2 ♂♂; same locality but 46°31.6'N 84°17.3'W, sweeps, graminoids/*Rubus*, 19.vii.2005, 1 ♂; same locality but 46°31.7'N 84°17.5'W, sweeps, mostly sedges in trail, 4.vii.2002, 1 ♀, sweeps, mostly graminoids, 10.viii.2002, 1 ♂; same locality but 46°31.9'N 84°17.6'W, sweeps, mostly graminoids, 10.viii.2002, 1 ♀, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Fish Hatchery Road, near Coldwater Creek, 46°34.33'N 84°17.23'W, sweeping graminoids, *Impatiens*, 9.vii.2010, 3 ♂♂ 2 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); S[ault] S[te.] Marie, Ft. Creek Cons[ervation] Area, 46°32.5'N 84°20.8'W, sweeps, graminoids under canopy, 7.viii.2001, 2 ♂♂ 3 ♀♀; S[ault] S[te.] Marie, Kinsmen Pk., 46°35.7'N 84°16.7'W, sweeps, mostly *Carex*, 11.viii.2002, 1 ♂ 1 ♀; S[ault] S[te.] Marie, Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, *Carex* sp., 25.vii.1997, 1 ♂, sweeps, streamside graminoids under *Acer/Betula*, 18.vi.1998, 1 ♀; same locality but 46°32.08'N 84°18.21'W, sweeps, graminoids/ferns in opening, 17.vii.2005, 2 ♀♀; same locality but 46°32.12'N 84°18.04'W, sweeps, mostly graminoids, *Equisetum* under canopy, 12.viii.2008, 1 ♂; S[ault] S[te.] Marie, hydro cut nr. Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.0'W, sweeps, mostly sedges, 10.vii.2002, 2 ♂♂ 3 ♀♀, sweeps, *Scirpus cyperinus*, 24.viii.2005, 4 ♂♂, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, 1405 3rd Line E, 46°32.86'N 84°16.80'W, sweeps, graminoids under mostly aspen, 7.viii.2005, 1 ♂; S[ault] S[te.] Marie, Jct. 6th Line & Hwy#17, 46°35.83'N 84°17.61'W, sweeps, floodplain of Root River, 7.viii.2005, 1 ♀; S[ault] S[te.] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, *Calamagrostis canadensis* in wet area, 16.viii.2004, 1 ♀, all K. N. Barber leg. (all CNCI); ~10 km W S[ault] S[te.] Marie, Airport Rd., natural gas r[ight]-of-way, 46°29.9'N 84°28.9'W, sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns, 25.viii.2008, 1 ♂; same locality but 46°29.72'N 84°28.96'W, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 2 ♂♂, sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns,

12.vii.2010, 6 ♂♂ 4 ♀♀, 14.vii.2010, 2 ♂♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); same locality but sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 1 ♂, J. Roháček leg. (SMOC, genit. prep.); ~10 km W [ault] [te.] Marie, Sunnyside Beach Rd., 46°29.70'N 84°31.87'W, sweeps, emergent *Equisetum fluviatile* in wet ditch, 22.vi.2007, 1 ♂; NW S[ault] S[te.] Marie, Red Rock, 46°36.21'N 84°32.85'W, sweeps, graminoids, ferns, *Impatiens*, 4.viii.2006, 3 ♂♂ 1 ♀; same locality but 46°36.68'N 84°32.47'W, Pebble Beach, sweeps, riparian graminoids/ferns, 6.viii.2006, 1 ♀, all K. N. Barber (all CNCI); Short Hills P. Pk., sweeps, Terrace Ck. Trail west loop, 43°05.7'N 79°16.4'W, streamside graminoids, 17.vii.2002, 1 ♀; same locality but east loop, 43°05.8'N 79°16.1'W, mostly *Carex/Impatiens* in mixed hardwood, 17.vii.2002, 1 ♀, both K. N. Barber leg. (both DEBU); S[outh] March, 8.viii.1968, 1 ♂, J. R. Vockeroth leg.; 2 km E Sowerby, Harris Ck. Rd., 46°17.80'N 83°21.10'W, sweeps, sedges along beaver pond, 30.vii.2006, 1 ♀; 0.4 km S Stonecliffe, Pine Valley Rd. @ RR crossing, 46°11.9'N 77°52.8'W, sweeps, graminoids, 9.vii.2001, 1 ♂ 1 ♀; ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp., 17.vii.2010, 1 ♂ 2 ♀♀, all K. N. Barber (all CNCI); Walpole Island, 13.vii.1980, 1 ♂ 2 ♀♀; Windsor, Ojibway Prairie Reserve, 18.viii.1983, 1 ♀, all K. N. Barber leg. (all DEBU); Essex Co., Windsor, Ojibway Prairie, 42°15'51"N 83°04'30"W, 20.vii.2002, 1 ♂ 1 ♀, S. A. Marshall leg. (DEBU 00224440, -48). **QUEBEC:** Aylmer, 19.vii.1926, 1 ♀, C. B. Hutchings leg., 16.vii.1959, 2 ♂♂ 3 ♀♀, 17.vii.1959, 1 ♂, C. H. Mann leg. (CNCI); Baptiste Lake, 45°10'N 78°00'W, sweep near lake shore, 25.vii.2000, 1 ♂, J. Forrest leg. (LEMQ 0040096); Beechgrove, 45°39'N 76°08'W, 29.vi.1962, 2 ♂♂, J. R. Vockeroth leg.; Breckenridge, 21.vi.1959, 1 ♂, 12.vii.1959, 1 ♂ 2 ♀♀, 14.vii.1959, 2 ♀♀, C. H. Mann leg.; Cottage Beaulieu, 20.vii.1906, 2 ♀♀, Beaulieu leg. (all CNCI); Eugenia, Eugenia Falls, sweep along river, 30.vi.2001, 1 ♂, S. E. Brooks leg. (LEMQ 0040097); Gaspésie, near Routherville, 48°10.9'N 67°08.8'W, sweep picnic area, 4.viii.2001, 1 ♀, S. Boucher leg. (LEMQ 0040100); Gatineau Park, 45°34'N 75°57'W, 28.vi.1995, 1 ♀ (LEMQ 0040095); Gatineau Co., Masham Township, 27.vii.1995, 1 ♂ (LEMQ 0040095), both E. Ikeda leg.; Hudson, Parc Lévy Macdonald, 45°27'N 74°09'W, 26.vi.2001, sweep by stream, 1 ♀ (LEMQ 0040101), J. Forrest leg., sweeping grass, 1 ♂ 1 ♀ (LEMQ 0040094, -99), S. Boucher leg.; Îles de la Madeleine, Île de la Grand[e] Entrée, Chemin du Bassin Ouest, 47°32.96'N 61°32.64'W, sweep field along road, 9.vii.2004, 1 ♀, S. Boucher leg. (LEMQ 0040497); Knowlton Ldg., 20.vii.1968, 2 ♀♀, J. R. Vockeroth leg. (CNCI); Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 9 ♂♂ 7 ♀♀, M. Barták leg. (MBPC, 2 ♂♂ 4 ♀♀ genit. prep.); Laniel, 3.vii.1944, 1 ♀, A. R. Brooks leg. (CNCI); Mont-St-Hilaire Reserve, Pain de Sucre Trail, sweep along trail in forest, 27.vi.2001, 1 ♂ 1 ♀, S. E. Brooks leg. (LEMQ 0040093, -98); Mont-St-Hilaire Biosphere Reserve, Pain de Sucre Trail, 27.vi.2001, sweep trail edge, 2 ♀♀ (LEMQ 0040325, -27), S. E. Brooks leg., sweep at brook, 2 ♂♂ 2 ♀♀ (LEMQ 0040368, -70, -72, -77), M. Pollet leg.; Old Chelsea, 9.viii.1961, 1 ♂, 30.viii.1961, 1 ♀; Old Chelsea, Summit King Mt., 1150', 18.vii.1961, 2 ♂♂, 18.vi.1963, 1 ♀, all J. R. Vockeroth leg.; Kam[ouraska] Co., Parke Reserve, sweeping *Kalmia angustifolia*, 11.vii.1957, 1 ♀, G. E. Shewell leg. (all CNCI); Pointe Fortune Conservation Area, 45°34'N 74°23'W, sweep, 7.vii.1999, 1 ♀, S. E. Brooks leg. (LEMQ 0040328); Ste-Anne-de-Bellevue, Stoneycroft, 45°25.8'N 73°56.4'W, sweep south end of pond, 2.vii.1998, 1 ♀, J. Savage leg. (LEMQ 0040106); same locality but Stoneycroft Pond, sweep, 5.vii.1999, 1 ♂ (LEMQ 0040313), M. Pollet leg., sweep grass, 2.vii.1999, 1 ♀ (LEMQ 0040470), S. E. Brooks leg.; Terrasse-Vaudreuil, Molson Nature Reserve, 45°23.57'N 73°58.81'W, sweep path in forest, 1.vii.1999, 1 ♀ (LEMQ 0040102), S. Boucher leg., 1 ♀ (LEMQ 0040117), T. A. Wheeler leg.; Wakefield, 9.vii.1946, 1 ♂ 3 ♀♀, G. E. Shewell leg. (CNCI). **UNITED STATES OF AMERICA:** **ILLINOIS:** Champagne Co., 5.vii.1925, 1 ♀, M. W. Shackelford leg. (CNCI); Urbana, "7/10".1929, 1 ♂, L. Stewart leg. (AMNH). **INDIANA:** Lafayette, [-].vi.1910, 1 ♀, J. M. Aldrich leg. (USNM). **MAINE:** Chebeag[ue] Island, 17.vii.1962, 1 ♀, A. H. Sturtevant leg. (USNM); Mt. Katahdin, 4.vii.1968, "Abol.", 1 ♀, D. M. Wood leg. (CNCI); Seal Harbor, 29.vii.1930, 1 ♂ 1 ♀, A. L. Melander leg. (USNM). **MASSACHUSETTS:** Catoctin, Mt. Park, Chestnut wood, 15.vi.1991, 1 ♂, M. Barták leg. (MBPC); Concord, marsh, 19.vii.1961, 1 ♂ (headless), marshy pond, 27.vii.1961, 1 ♂, W. W. Wirth leg. (USNM); Franklin Co., ~0.5 km E Farley, 42°36.16'N 72°25.94'W, sweeps, asters, ferns, *Impatiens*, *Rubus*, under canopy, 26.vii.2006, 2 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Petersham, [-].vii.1926, 1 ♂, A. L. Melander leg. (USNM). **MICHIGAN:** Baraga Co., 27.viii.1932, 1 ♀, R. R. Dreisbach leg.; Battle Creek, [no date], 1 ♀, J. M. Aldrich leg.; Clare Co., 3.vii.1938, 1 ♂, R. R. Dreisbach leg.; Detroit, 20.vi.1940, 1 ♂ 1 ♀, 7.vii.1944, 2 ♂♂ 1 ♀ (1 ♀ genit. prep.), G. C. Steyskal leg.; Hart, 8.vii.1941, 1 ♂ 1 ♀, C. W. Sabrosky leg.; E. Lansing, 24.vii.1941, 2 ♂♂ 1 ♀, B. Wilson leg.; Houghton Co., 11.viii.1953, 1 ♀, R. R. Dreisbach leg.; Lapeer Co., Deerfield Twp., 4.vii.1947, 1 ♀ (genit. prep.), G. C. Steyskal leg.; Newaygo Co., 27.vi.1953, 2 ♂♂, R. R. Dreisbach leg. (all USNM); Berrien Co., St. Joseph, 15.vi.1975, 1 ♂, D. D. Wilder leg. (CASC). **MINNESOTA:** Eaglesnest, 12.vii.1957, 1 ♀, W.

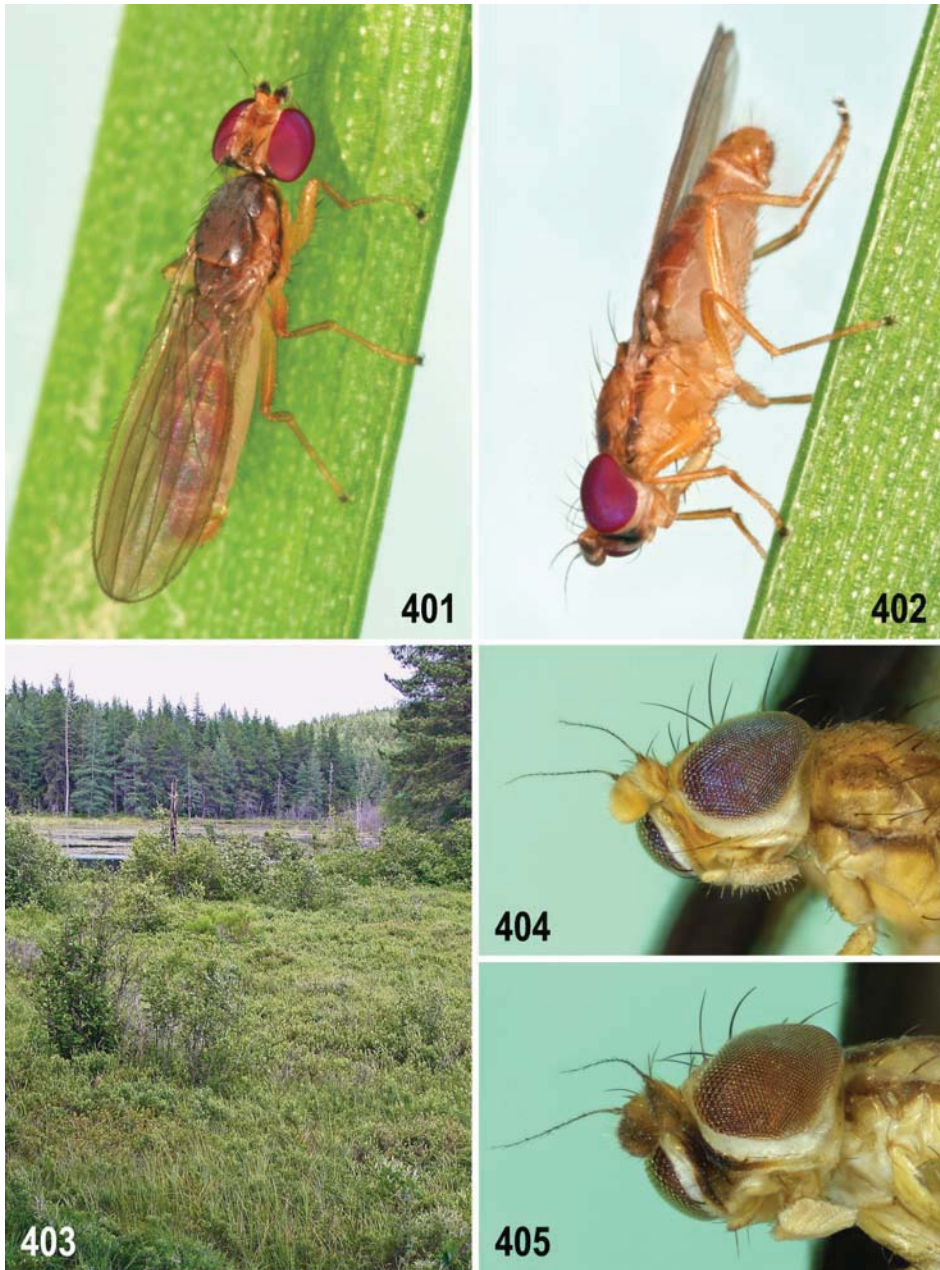
V. Balduf leg. (INHS 40,122). **NEW HAMPSHIRE:** Hanover, 31.viii.1916, 1 ♂, A. H. Sturtevant leg. (USNM); Hillsborough Co., Nashua, Long Hill, 42°42'59"N 71°27'04"W, 20 m, 27–28.vi.2004, 1 ♂ 2 ♀♀, S. D. & A. V. Gaimari leg. (CSCA). **NEW JERSEY:** Mendham, 4.viii.1926, 1 ♀, A. H. Sturtevant leg. (USNM). **NEW YORK:** Monroe Co., Churchville, 25.vii.1942, 1 ♀, H. D. Stalker leg. (AMNH); Cold Spring Harbor, L[ong] I[sland], [-].vii.[-], 1 ♂, A. L. Melander leg. (USNM); Essex Co., Keene Valley, 1200', 20.vii.1962, 1 ♂, J. R. Vockeroth leg. (CNCI); Oneonta, 30.v.1935, 1 ♂, H. K. Townes leg. (USNM); Schoharie, Co., 18, 5.vii.1974, 1 ♂, P. Gargiullo leg. (UGCA). **OHIO:** Portage Co., 4 mi NE Kent, Battaglia Bog, swept from *Carex oligosperma*, 12.vii.1999, 1 ♀, B. A. Foote leg. (CMNH); 3.0 mi N. Kent, Herrick Fen, 1.viii.1987, 1 ♂, B. A. Foote leg. (CNCI). **PENNSYLVANIA:** Wilmerding, 13.viii.1921, 1 ♀, Zahrobsky leg. (CLEV). **VERMONT:** Jay Peak, 2600–3000', 20.vii.1968, 1 ♂, J. R. Vockeroth leg. (CNCI). **VIRGINIA:** Shenandoah, Big Meadows, 1.vii.1939, 2 ♀♀, 2.vii.1939, 1 ♂, A. L. Melander leg. (USNM). **WEST VIRGINIA:** Bluefield, 17.vi.1970, 1 ♂, G. Steyskal leg. (USNM). **WISCONSIN:** Washburn Co., T39N R12W B28, 23.vi.1953, 1 ♀, T39N R12W B32, 20.vi.1951, 1 ♀, T39N R12W B32, 25.vi.1953, 1 ♂ 1 ♀, T39N R12W B32, 3.vii.1953, 1 ♂, T39N R12W B33, 18.vi.1953, 1 ♀, T39N R13W B30, 4.vii.1953, 1 ♂, R. H. Jones leg. (USNM). **Other material examined (not included in type series).** **CANADA:** **ONTARIO:** Elora, 8.vii.1971, 2 ♀♀, G. A. Surgeoner leg. (DEBU, shrivelled and bleached); Ottawa, 6.vii.1963, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep., headless); Sault Ste. Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeping, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, *Clematis*, ferns under aspen (*Populus*), 7.vii.2010, 4 ♂♂ 1 ♀, J. Roháček leg. (SMOC, 2 ♂♂ 1 ♀ damaged, 2 ♂♂ used for molecular analysis); Sault Ste. Marie, Bristol Place Pk., 46°30.8'N 84°16.6'W, sweeping *Impatiens* mixed with *Clematis*, *Equisetum*, *Rubus*, ferns, *Phalaris*, 7.vii.2010, 1 ♀, J. Roháček leg. (SMOC, damaged); Algoma District, Thessalon, 19.vi.1965, 1 ♂, K. P. Butler leg. (LEMQ, headless). **QUEBEC:** Mont-St-Hilaire Biosphere Reserve, Pain de Sucre Trail, sweep at brook, 27.vi.2001, 1 ♂ 1 ♀, M. Pollet leg. (LEMQ 0040314, -16, both headless). **UNITED STATES OF AMERICA:** **MICHIGAN:** Baraga Co., 4.viii.1937, 1 ♂, R. R. Dreisbach leg. (USNM, beetle damage). **NEW YORK:** Buffalo, 13.vi.1908, 1 ♀, 27.vi.1908, 1 ♀, M. C. Van Duzee leg. (CASC, both genit. prep., both beetle damage); Ithaca, 8.vii.1907, 1 ♀, [no collector] (INHS 40,161, genit. prep., headless). **Other A. neglecta-group material of questionable identity** (*Anthomyza* sp. cf. *dichroa*). **UNITED STATES OF AMERICA:** **MICHIGAN:** E. Lansing, 20.v.1941, 1 ♀, C. Sabrosky leg. (USNM, missing head & abdomen).

Description. Male. Total body length 2.14–2.74 mm; in external and colour characters (see Figs 1, 401, 402) closely resembling *A. variegata* including the presence of pale and dark forms (non-sexual dichroism) so that mainly differences against *A. variegata* are stressed below. Head about as long as high and similarly formed to that in *A. variegata*, dichroic (Figs 404, 405), in pale form coloured as that of *A. variegata*, in dark form with not only face, 1st antennal flagellomere and sides of occiput (Fig. 1) brown to dark brown but also mouthparts (palpus in particular) more or less darkened (usually ochreous brown). Occiput slightly concave and coloured as in *A. variegata*, with silvery white microtomentose spots above foramen developed but often less distinct. Frons largely as in *A. variegata*; ocellar triangle (at least partly in pale form) brown; frontal triangle of the same form and size as in *A. variegata*, yellow but more or less distinctly glittering and contrasting with adjacent dull yellow areas of frons. Anterior parts of frons, orbits, frontal lunule, parafacialia and gena as in *A. variegata*; sometimes anterior frontal area behind antennal bases brownish-darkened (in dark form only). Face in both forms margined by somewhat darker and wider stripe; also ventral marginal stripe of gena usually wider and darker, particularly anteriorly. Mouthparts yellow in pale form but somewhat darkened in dark form. Cephalic chaetotaxy largely as in *A. variegata* but vte typically distinctly shorter than vti and more curved. Palpus yellow in pale form to ochreous brown in dark form, setose as in *A. variegata*. Eye ovoid, with longest diameter oblique as in *A. variegata* and about 1.3–1.4 times as long as shortest. Shortest genal height about 0.13–0.15 times as long as shortest eye diameter. Antenna dichroic as in *A. varie-*

gata, thus with 1st flagellomere entirely yellow in pale form, or brown (also on inner side) with only basal part yellow in dark form, and with very long marginal pilosity. Arista also as in *A. variegata* but with cilia shorter (about half length of marginal cilia of 1st flagellomere).

Thorax slightly narrower than head, similarly coloured to that of *A. variegata*; scutum in pale form yellow with usually distinct pale brown sublateral bands, in dark form more extensively pale brown to greyish brown (Fig. 401) with variably long narrow yellow stripes anteromedially and larger yellow area in front of scutellum, more rarely almost completely brown except for humeral-notopleural area. Dorsum of thorax pale grey microtomentose, not shining. Humeral and notopleural areas yellow in both forms; scutellum normally yellow, in dark form often somewhat darkened on disc to (rarely) pale brown. Pleural part of thorax as in *A. variegata*, yellow to whitish yellow, with narrow brown (usually darker anteriorly) dorsal band extended from thoracic cervix almost to haltere (Figs 382, 402). Postscutellum usually yellow (rarely, in darkest specimens, brownish), postnotum always darker, pale brown. Thoracic chaetotaxy: 1 hu (longer than posterior npl) plus 1 hu setula; 2 npl (anterior longer than hu, posterior shorter); prs, sa and pa subequal and about as long as hu; 2 long postsutural dc (the weaker anterior longer than anterior npl, posterior longest of thoracic setae) and 6–7 dc microsetae in front of them (the hindmost usually enlarged); 3–4 rows of ac microsetae on suture but only 2 rows between dc; hindmost ac pair usually slightly longer and situated in front to beyond posterior dc; 2 sc, laterobasal weaker and shorter than sa, apical sc slightly shorter and thinner than posterior dc; no additional erect setulae on scutellum; 1 small fine ppl; 2 long stpl (anterior usually slightly shorter) and 3–5 upcurved setulae in dorsal half of sternopleuron (sometimes also 1 in front of anterior stpl seta); its ventral part with a cluster of 6–8 longer setae. Scutellum rounded triangular, slightly flattened dorsally. Legs with colouration and chaetotaxy not particularly different from those of *A. variegata*. f_1 with ctenidial spine distinctly longer than maximum width of t_1 . Fore and hind basitarsus ventrobasally with 2–3 slightly enlarged setulae, also mid basitarsus with 1 longer ventrobasal setula. Wing (Fig. 438) closely resembling that of *A. variegata*, thus distinctly wider than in *A. gibbiger* or *A. orthogibbus*. R_{2+3} long, bent subparallel to C with apex very slightly upcurving; R_{4+5} and M very slightly bent to almost straight, running parallel to each other. Cell dm long, moderately narrow; r-m usually situated in front of the middle (sometimes in the middle) of cell dm. Apical portion of CuA_1 usually somewhat longer than dm-cu. Alula distinct but narrow. Wing measurements: length 2.02–2.66 mm, width 0.65–0.87 mm, Cs_3 : Cs_4 = 1.37–1.87, $rm \setminus dm-cu$: $dm-cu$ = 2.23–2.83. Haltere yellow to ochreous, with some pale brownish tinge, as in *A. variegata*.

Abdomen dorsally dichroic in contrast to *A. variegata*, in pale form light brown-and-yellow variegated (Fig. 382) with posterior brownish stripes small (short), in dark form largely brownish (Fig. 402) or with anterior yellow areas reduced and darkened (brown stripes covering more than half of tergum). Preabdominal terga T2–T5 of pale form yellow to pale yellow with transverse, relatively short (sometimes medially interrupted) brownish posterior band, T1 pale brown with only anterior corner yellow. T2–T5 of dark form largely brownish, but usually anteriorly and laterally pale ochreous to yellow, in darkest specimens almost entirely brown or with somewhat paler margins; T1 as in pale form. T1–T5 subshining, rather shortly and sparsely setose. T1 and T2 separate, only laterally fused. T3–T5 large, subequal in size,

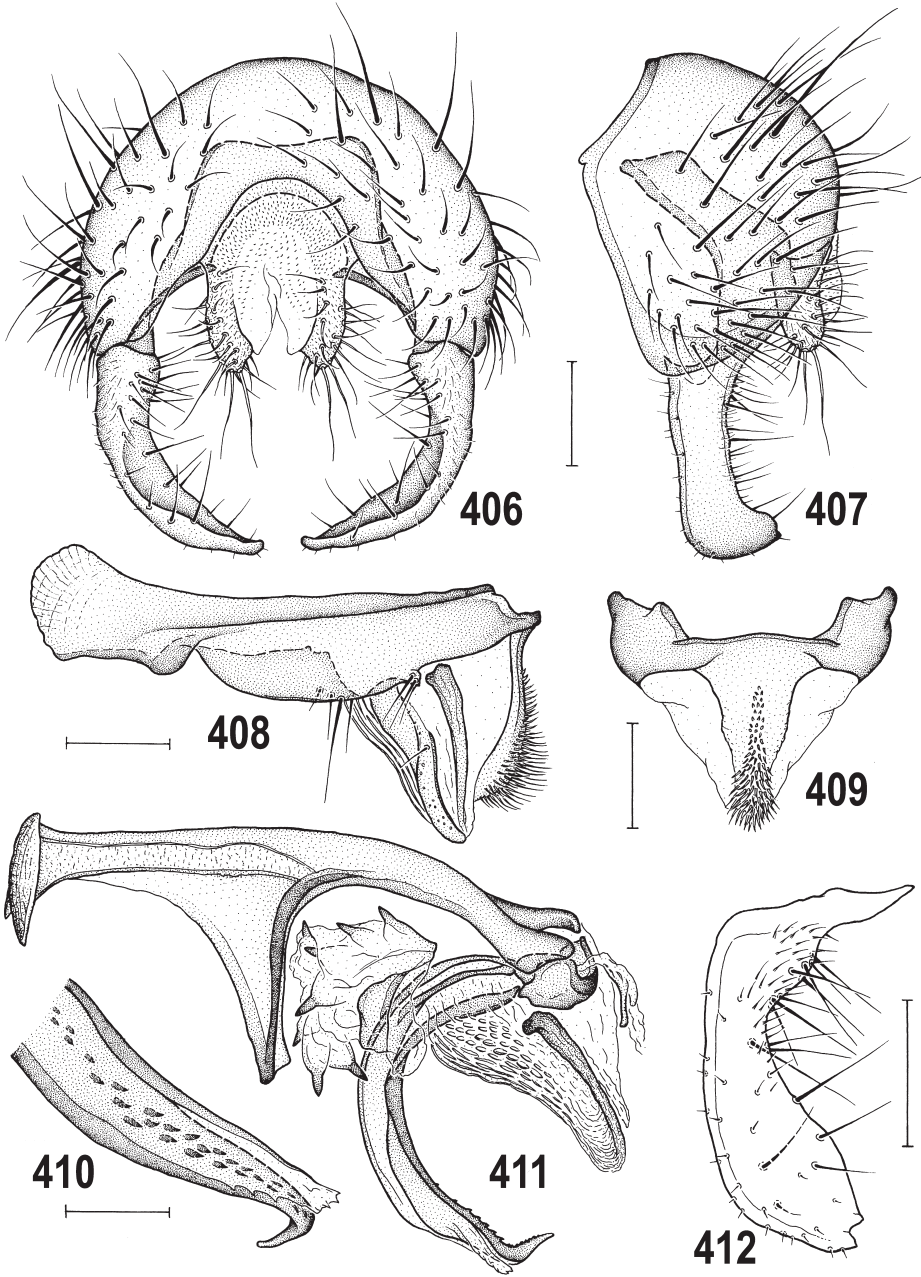


Figs 401–405. Living *Anthomyza dichroa* sp. nov. and its habitat. 401 – *A. dichroa* sp. nov., male, dark form, dorsally, body length ca. 2.5 mm; 402 – same specimen, laterally (Canada: Ontario: Sault Ste. Marie, Bristol Place Park); 403 – marshy area bordering a small lake S of Rocky Island lake (Canada: Ontario), habitat of *A. dichroa*; 404 – *A. dichroa* sp. nov., male head of pale form sublaterally; 405 – the same, dark form (both from Canada: Ontario). Photo by J. Roháček (Figs 401–403) and M. Deml (Figs 404, 405).

T2 usually slightly shorter and more transverse. Preabdominal sterna pale yellow, becoming wider posteriorly, thus of similar shape and size to those in *A. variegata* but S4 and particularly S5 wider and more transverse. S2–S5 densely setose, only S1 bare and with darker posterior marginal stripe. T6 short, transverse, bare, poorly visible because it is membranous and unpigmented. S6 and S7 yellow, both with brownish anterior marginal ledge; S6 with 2–3, S7 with 2 setae; S8 as long as epandrium, variable in colour, largely yellow and only posteriorly brownish in pale form, or largely brown with only anterior marginal areas yellow in dark form, setose in posterior two-thirds to three-fourths.

Genitalia. Epandrium (Figs 406, 407) pale yellow (contrasting with posteriorly brown S8), moderately long but broad (markedly wider than S8), densely setose, with one or more somewhat longer and thicker setae dorsolaterally; anal fissure larger than in *A. variegata*, roughly semicircular. Cercus relatively small, as in *A. variegata*. Medandrium (see Fig. 406) relatively high, in contrast to that of *A. variegata* dorsally slightly narrowed, with dorsolateral corners rounded and ventrally more deeply emarginate. Gonostylus (Figs 406, 407, 412) of distinctive shape, long but slender, strongly curved medially, with distal half dilated, apically tapered and with 2 teeth on apex (Fig. 412), with micropubescence reduced and restricted to posterobasal area and longer setae mainly along concavity on inner side and at posterior margin (here also proximally). In caudal view (Fig. 406) gonostylus most resembles that of *A. paraneglecta* (cf. ROHÁČEK 2006a: Fig. 278). Hypandrium (Fig. 408) medium-sized, with anterior internal lobes small, so resembling other species of the group. Transandrium (Fig. 409) straight, laterally simple, without bulging corners, and with flat caudal process transilient to longer-spinose basal membrane, thus very similar to that of *A. variegata* but paler-pigmented. Pregonite (Fig. 408) fused to hypandrium, posteriorly with small process carrying 3 setae (shorter than in *A. variegata*), anteriorly simple, with straight ventral outline and (usually) with 4 (3 short and 1 long) setae. Postgonite (Fig. 408) slender and slightly sinuate in profile, pale-pigmented, with 1 setula in basal two-fifths, numerous sensillae and rounded apex. Basal membrane (Figs 408, 409) coalesced to narrow ventral end of caudal process and prickly spinose, sharing this feature with *A. variegata*. Aedeagal part of folding apparatus also similar to that of *A. variegata* including inconspicuous lenticular armature. Connecting sclerite elongate, slender, well sclerotized and dark-pigmented (particularly dorsally), without spinulae. Phallapodeme moderately robust, relatively pale distally, with basal part forked, fulcrum moderate and pale-pigmented, and distinctly bicuspidate apex. Aedeagus (Fig. 411) with small phallopore as in *A. variegata*. Saccus of distiphallus most similar to that of *A. variegata*, membranous, with small basal sclerite attached to filum and armed with only 8–10 (thus fewer than in *A. variegata*) robust dark-pigmented spines. Filum robust, similarly formed to that of *A. variegata* but with dark tooth-like spines along its distal end less numerous and more scattered (Fig. 410). Ejacapodeme reduced to tiny pale sclerite, with slender digitiform projection (see Fig. 411).

Female. Similar to male unless mentioned otherwise. Total body length 2.38–3.49 mm. Dichroism of head reduced, face of both forms yellow as in *A. variegata*. In pale form inner side of 1st flagellomere is yellow and outer side is pale brown with yellow margins (rarely completely yellow) and occiput is yellow, at most with small lateral brownish darkenings; in dark form inner side of 1st flagellomere is orange yellow with brown margins (mainly dorsally, differing so from *A. variegata*) and outer side is distinctly brown (except base) and

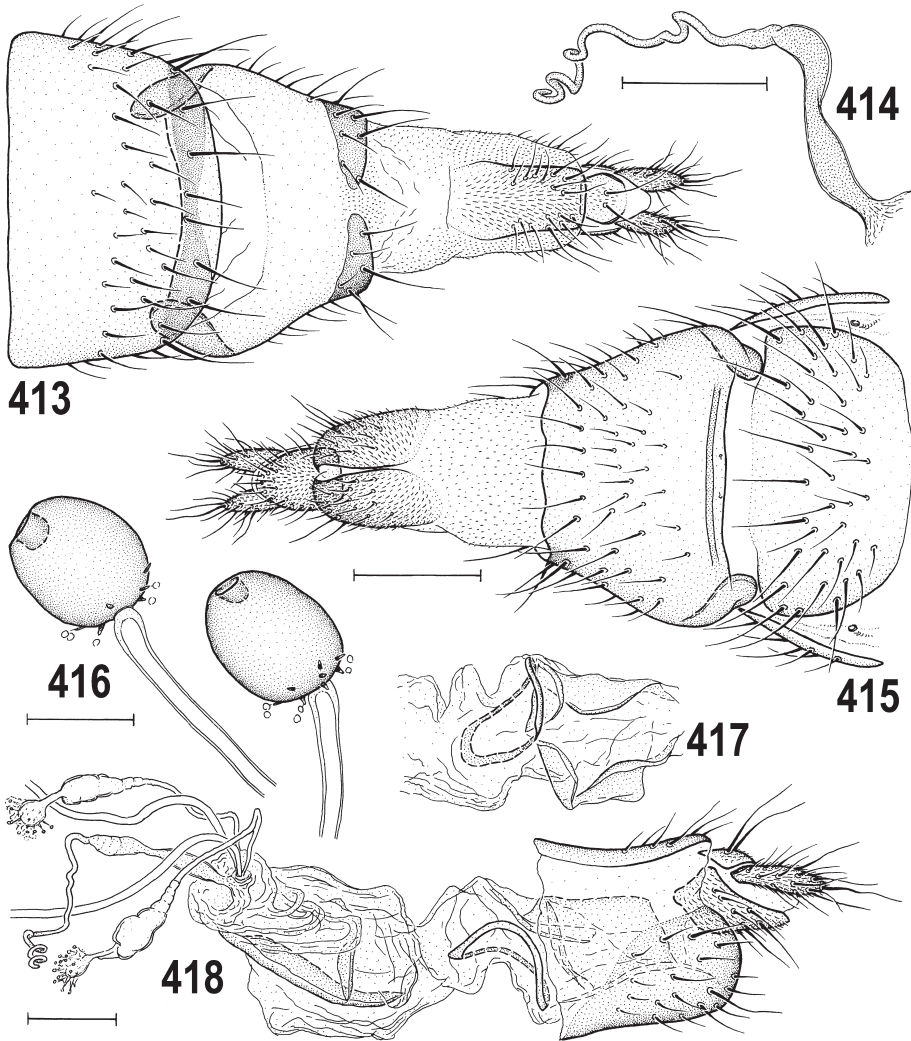


Figs 406–412. *Anthomyza dichroa* sp. nov., paratype male (Canada: Ontario). 406 – external genitalia, caudally; 407 – the same, laterally; 408 – hypandrial complex, laterally; 409 – transandrium, caudally; 410 – apex of filum, subventrally; 411 – aedeagal complex, laterally; 412 – gonostylus, laterocaudally (widest extension). Scales = 0.05 mm (Fig. 410) and 0.1 mm (others).

lateral sides of occiput are more or less brown. Brown pattern of thoracic scutum variable as in male, with pale and dark forms. Wing measurements: length 2.56–3.22 mm, width 0.79–1.05 mm, $Cs_3 : Cs_4 = 1.21–1.53$, $rm\backslash dm-cu : dm-cu = 2.29–2.90$. Abdomen with T2–T6 brown-and-yellow transversely variegated: in dark form posterior brown bands enlarged (rarely T2–T4 almost completely brown), in pale form shortened and sometimes medially interrupted. T2–T5 shorter and more transverse than in male, subequal in size, wider than T6. Preabdominal sterna pale yellow, not narrower than in male and closely resembling those of *A. variegata* in shape, relative size and setosity.

Postabdomen (Figs 413, 415) relatively long, tapered posteriorly, telescopic, with most sclerites yellow to pale yellow, only T6 and T7+S7 with small brown markings. T6 simple, large (but narrower than T5 as in *A. variegata*), suboblong with rounded posterior corners, largely yellow but with very short (somewhat longer in dark form) transverse brown stripe at posterior margin (Fig. 413), setose in posterior half with marginal setae longest. S6 transversely subtrapezoidal with anterior corners rounded, broader than S5, pale yellow and finely, densely (usually less so than in *A. variegata*) setose. Tergosternum T7+S7 almost as wide as T6, long, conical (posteriorly tapered), dorsomedially shortened (Fig. 413) and weakly sclerotized (although not membranous as in *A. variegata*), ventrolaterally expanded and forming distinct (smaller than in *A. variegata*) pouch-like lobes (Fig. 415), yellow, dorsally with small brown posterior stripe being medially interrupted (Fig. 413) being distinctly shorter and not widened laterally as in *A. variegata*. Dorsal part of T7+S7 with setae only at posterior margin, ventral pale yellow part more densely setose in posterior two-thirds and with distinct dark transverse ledge-like strip behind anterior margin (Fig. 415). 8th segment narrow, micropubescent laterally. T8 yellow, elongate (Fig. 413), markedly narrower than that of *A. variegata*, narrow also anteriorly, distinctly micropubescent and with fine exclinate setae in posterior two-thirds; S8 (Fig. 415) as in *A. variegata* but usually narrower. Genital chamber (Figs 417, 418) with pale-pigmented internal sclerotization as in *A. variegata* formed by 1 pair of poorly defined, flat and crooked (more than in *A. variegata*) sclerites and 1 suboval, asymmetrical annular sclerite situated anteroventral to the latter. Membranous part of genital chamber also similar but without small grain-like sclerotizations and with more distinct (though poorly sclerotized) ventral plate below insertion of ducts. Ventral receptacle (Fig. 418) tube-like, hyaline, basally distinctly broader as in *A. variegata* but its terminal part usually with more twisted vermicular apex. Accessory gland as in *A. variegata*, on distally dilated but indistinctly ringed duct. Spermathecae (1+1) shorter oval (Fig. 416) than those of *A. variegata*, each with smaller terminal cup-shaped invagination and with minute blunt spinulae situated only around duct insertion; duct very long and ending without distinct cervix in base of spermathecal body. T10 small (Fig. 413), as long as wide, roughly rounded hexagonal, with usual 1 posteromedial pair of long setae and reduced micropubescence. S10 markedly larger and wider than T10, elongately subpentagonal in ventral view (Fig. 415), longer and narrower than in *A. variegata*, finely setulose and micropubescent. Cercus slightly longer than that of *A. variegata* but with similar setosity (Fig. 418).

Discussion. *Anthomyza dichroa* sp. nov. seems to be the nearest relative of *A. variegata*, demonstrated by the close resemblance in colouration (of both pale and dark forms occurring in these two species), shape of the head, ciliation of the antenna, broader wings, and male



Figs 413–418. *Anthomyza dichroa* sp. nov., paratype female (Canada: Ontario). 413 – postabdomen, dorsally; 414 – ventral receptacle, lateroventrally; 415 – postabdomen, ventrally; 416 – spermathecae; 417 – female internal sclerites, ventrally; 418 – female genital chamber and apex of postabdomen, laterally (8th segment with micropubescence omitted). Scales = 0.2 mm (Figs 413, 415), 0.05 mm (Fig. 416) and 0.1 mm (others).

and female postabdominal structures (as given above under *A. variegata*). This new species essentially differs from all Nearctic relatives by the slender, elongate and strongly medially curved gonostylus with reduced micropubescence (cf. Figs 406, 407), being somewhat similar to that of the European species *A. paranelecta* (cf. ROHÁČEK 2006a: Fig. 278). Despite some resemblance of the gonostylus, *A. paranelecta* is likely not closely allied to *A. dichroa* because

it lacks the non-sexual dichroism (a dark form is not known in that species), the prickly spinose caudal process of the transandrium and basal membrane as well as the posterodorsally medially interrupted (membranous) female T7+S7, that is, all apomorphies shared by the *A. variegata* + *A. dichroa* sister pair. While the male is easily recognized, identification of the female of *A. dichroa* is more difficult, particularly from the externally very similar *A. variegata*. The best diagnostic female characters can be seen on T7+S7, which has the posterior dorsomedially interrupted stripe distinctly shorter and not widened laterally (in contrast to that of *A. variegata*), and ventrally there is a distinct dark transverse ledge-like strip behind the anterior margin (Fig. 415); T8 is also different, elongate, and distinctly narrower anteriorly compared to *A. variegata* (Fig. 413). For other (relatively subtle) differences see the above description. **Etymology.** The specific name is the latinized Greek adjective dichrous (-a, -um), meaning bicolourous, derived from the non-sexual dichroism of the head of this species.

Biology. *Anthomyza dichroa* often shares forested habitat with the closely related *A. variegata* where the two overlap, at least in southern Ontario (see Biology of latter species). Similarly, habitats further north in Ontario include those shared with one or both (Fig. 421) of *A. gibbiger* and *A. orthogibbus* and/or with other anthomyzids. Habitats also include those where this species was found by itself (Fig. 403) and more often in moist to wet open sites. Host plants are not yet confirmed for *A. dichroa*, but on a few occasions it has been swept from *Carex gynandra* Schwein. that occurred either in isolated clumps or mixed with other plants (Ontario: Sault Ste. Marie). Among species in the *A. neglecta* group, *C. gynandra* has only yielded *A. dichroa*, except for a single female of *A. orthogibbus* collected on the periphery of a site dominated by a pure growth of *C. lacustris*. Collections from other open habitats have suggested various sedges such as *Scirpus microcarpus* and *S. cyperinus* (L.) Kunth as host plants (Ontario: Sault Ste. Marie), and a rather dry roadside site (Ontario: Ponsonby, *Poa* spp.) shared with *A. gibbiger* indicates a wider range of habitat (and host plants) is possible. *Impatiens capensis* is often an indicator of habitat that might yield this and several other species of *Anthomyza*. The flight period is known to run from 30 May (New York: Oneonta) to 25 September (Ontario: Sault Ste. Marie).

Distribution. This species is commonly collected in the northeast, and is perhaps similarly distributed to *A. variegata* except shifted somewhat north and east. This is the most commonly collected species of this group in eastern Canada. Canada: Manitoba, Nova Scotia, Ontario, Quebec; United States of America: Illinois, Indiana, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Vermont, Virginia, West Virginia, Wisconsin (see Table 2).

Anthomyza gibbiger sp. nov.

(Figs 383, 419, 420, 422–436, 439)

Type material. HOLOTYPE: ♂, "ONT: SSMarie, S.of Algoma U.College, 12.vii.2002, KNBarber, sweeps, *Carex aquatilis* 46°29.9'N 84°17.2'W" and "HOLOTYPUS ♂ *Anthomyza gibbiger* sp. n., J. Roháček & K. N. Barber det. 2013" (red). The specimen is in perfect condition, with well visible, partly exposed genitalia (see Fig. 383) (CNCI, intact). PARATYPES: **CANADA: ALBERTA:** w. border Elk Island N. P., Range Rd. 210, 0.5 km N Hwy#16, 53°34.52'N 112°57.09'W, sweeps, mixed sedges, 21.vii.2008, 2 ♂♂, K. N. Barber leg. (CNCI). **BRITISH COLUMBIA:** Vancouver, Point Grey, on tidal flat, 12.vii.1973, 2 ♂♂, J. R. Vockeroth leg. (CNCI). **MANITOBA:** 13 mi N Glenboro, Bald Head Hills, 21.vi.1958, 1 ♀ (genit. prep.), ex. *Betula occidentalis*, sand dunes, 1 ♀, J. F. McAlpine leg.; Ninette, *Betula*

glandulosa – *Populus balsamifera* associates, 15.vii.1958, 1 ♂, J. G. Chillcott leg. (all CNCI); Winnipeg, St. Charles Rifle Range, Arrowhead block, 49°54.6'N 97°20.5'W, sweep in tallgrass prairie, 21.vi.1999, 1 ♀, S. Boucher leg. (LEMQ 0040119); same locality but 49°54.2'N 97°20.3'W, sweep in tallgrass prairie, 10.vi.1998, 1 ♂, P. Bouchard leg. (LEMQ 0040124). **NEW BRUNSWICK:** St. Andrews, 24.vii.1978, 1 ♂, S. A. Marshall leg. (DEBU). **NOVA SCOTIA:** [mistakenly labeled NB] CBHNP [Cape Breton Highlands N. P.], La Prairie, 24–29.vi.1984, 1 ♂, H. J. Teskey leg.; CBHNP, Pleasant Bay, 17.viii.1984, ex. damp meadow, 1 ♂ 1 ♀, R. Martin leg.; same locality but PG684871, 10.vii.1984, wet hardwood forest, 1 ♂, H. J. Teskey leg.; Kingsport Marsh, [-].viii.1980, 1 ♀, C. D. Dondale leg.; Halifax Co., Lawrencetown, 19–20.vii.1967, 1 ♀ (genit. prep.), D. M. Wood leg. (all CNCI); Lockeport, 18.vii.1958, 1 ♂ 5 ♀♀ (1 ♀ genit. prep.), 20.vii.1958, 1 ♂, 21.vii.1958, 1 ♂, 22.vii.1958, 1 ♂, 27.vii.1958, 1 ♀, 1.viii.1958, 1 ♀, 11.viii.1958, 1 ♀; Lockeport, Cranberry I., 20.vii.1958, 2 ♀♀, all J. R. Vockerth leg.; Sable Is., west end, 5.vii.1967, 1 ♀ (genit. prep.), 13.vii.1967, 4 ♂♂ 4 ♀♀ [1 ♂ with penciled label “*Poa flat*”], D. M. Wood leg. (all CNCI); S[outh] Harbour, PG929935, marshy lake shore, brackish water, *Carex*, *Iris*, *Juncus*, 19.vi.1983, 1 ♂, 27.vi.1983, 2 ♂♂; S[outh] Harbour Beh., VQ949958, 3.vii.1983, wet bare sand shore, nearly fresh water, 1 ♂, damp ground with *Carex* & *Iris*, 1 ♀, all J. R. Vockerth leg. (all CNCI). **ONTARIO:** ~1 km NW Bewdley, Jct. Hwy 28 & Rice Lake Rd., 44°05.92'N 78°20.18'W, sweeps, mostly creekside *Carex*, 7.vii.2005, 5 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Bruce Co., Crane River, 21.vii.1996, 1 ♀, S. A. Marshall leg. (DEBU); Bruce Penin[sula], 1 km NNW Ague Lake, spring creek, 45°03'48"N 81°24'34"W, sweeping *Calamagrostis canadensis* in a fen, 1.vii.2010, 3 ♂♂ 8 ♀♀, J. Roháček leg. (SMOC, 3 ♀♀ genit. prep.); Bruce Peninsula N. P., Crane River below Lake Scugog, 45°07.0'N 81°32.1'W, sweeps, riverside vegetation, 3.vii.1999, 1 ♂ 3 ♀♀; Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 3.vii.1999, 1 ♂; same locality but 45°09.39'N 81°34.43'W, sweeps, *Carex aquatilis*, 22.vi.2008, 1 ♀; Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.7'W, sweeps, *Agropyron/Calamagrostis*, 5.vii.1998, 3 ♀♀, all K. N. Barber leg. (all DEBU); Burlington, edge Tuck Ck, 43°21.2'N 79°46.6'W, sweeps/pooter, *Bromus inermis*, 15.vii.1997, 1 ♀, 16.vii.1997, 1 ♀, 20.vii.1997, 2 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), pooter, *Phleum pratense*, 18.vii.1997, 1 ♀, 20.vii.1997, 1 ♀; ~40 km NE Chapleau, 47°59.76'N 82°55.04'W, wet roadside sweeps, mostly *Carex utriculata*, 23.vi.2013, 1 ♂ 1 ♀ (1 ♀ genit. prep.), 13.vii.2013, 1 ♂, sweeps, mostly *Carex utriculata*, grasses, 13.vii.2013, 1 ♀; ~2.5 km W Cobocok, Hwy 48, at Hannivan's Ck., 44°39.29'N 78°50.20'W, sweeps, mostly waterside *Carex*, 7.vii.2005, 3 ♀♀, all K. N. Barber leg. (all CNCI); ~5 km SE Cochrane, 49°01.16'N 80°57.93'W, sweeps, roadside *Equisetum* spp., graminoids, herbs, 18.vii.2009, 1 ♀; ~13.5 km S Cochrane, 48°56.65'N 81°00.18'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 22.vi.2013, 4 ♂♂ 5 ♀♀ (2 ♀♀ genit. prep.), 12.vii.2013, 31 ♂♂ 6 ♀♀ (1 ♀ genit. prep.), 13.vii.2013, 1 ♂, 18.viii.2013, 3 ♂♂ 1 ♀, 7.vii.2014, 10 ♂♂ 3 ♀♀, Dryden, 49°47.27'N 92°48.62'W, sweeps, mixed graminoids/herbs, 17.vii.2008, 1 ♀; ~35 km WSW Dubreuilville, 2 km SE jct. Hwys.#17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside vegetation incl. wet ditch, 31.vii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 1 ♂, J. Roháček leg. (SMOC, genit. prep.); ~3.8 km ENE Dugwal, 48°35.33'N 80°57.90'W, sweeps, wet ditch, *Carex utriculata*, *Equisetum fluviatile*, *Scirpus*, 23.vi.2013, 1 ♀, 13.vii.2013, 4 ♂♂; Echo Bay, Echo Bay Marsh, near lookout, 46°29.66'N 84°04.12'W, sweeps, mostly *Carex utriculata*, 15.vi.2013, 1 ♂ (genit. prep.); same locality but 46°29.71'N 84°04.04'W, sweeps, mostly *Carex* incl. *Carex utriculata*, 24.vi.2012, 1 ♂ 1 ♀ (pair in copula); Elliot Lake, 46°22.23'N 82°36.49'W, sweeps, mixed graminoids incl. *Carex utriculata*, 29.vi.2013, 1 ♂; ~14.5 km SSE Elliot Lake, ~3.7 km NNE jct Hwys 17&108, 46°14.71'N 82°33.53'W, sweeps, mostly *Carex utriculata*, 29.vi.2013, 1 ♀ (genit. prep.), all K. N. Barber leg. (all CNCI); ~59 km NNW Elliot Lake, S of Rocky Island Lake, 46°50.16'N 83°03.05'W, 455 m, sweeping, mostly *Carex rostrata*? [more likely *C. utriculata*], in fen, 3.vii.2010, 1 ♂ 3 ♀♀ (all genit. prep.); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, 405 m, sweeping *Scirpus* sp. [*S. microcarpus*] on dried shoreline, 4.vii.2010, 1 ♀ (genit. prep.), all J. Roháček leg. (all SMOC); Erin, 25.vi.1979, 1 ♂, Jessica Ernst leg. (DEBU); Fergus nr. Guelph, Grand River, riverside vegetation, 30.vii.1994, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); ~7.0 km E Foleyet, 48°14.34'N 82°20.75'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 13.vii.2013, 5 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); Finland, S of Caliper Lake, sweep sedge at beaver dam, 10.vii.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0040127); Goulais River, Sand Bay, 46°44.81'N 84°32.68'W, sweeping *Juncus* and *Carex* at margins of fen pools, 10.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp., graminoids, *Caltha*, 21.vii.2009, 2 ♂♂ (DEBU 01502087, -88); Greenwater P. Pk., 49°10.91'N 81°16.28'W, sweeps, *Carex*, *Calamagrostis*, *Phalaris* in creek

floodplain, 21.vii.2009, 1 ♂ (DEBU 01502176), all K. N. Barber leg.; Guelph, 23.vi.1976, 1 ♀, J. M. Cumming leg., 2.viii.1980, 2 ♀♀, 3.viii.1980, 2 ♂♂ 1 ♀, 22.viii.1980, 1 ♀, pan traps, 24.vi.–14.vii.1981, 1 ♂ 1 ♀, Malaise trap, 5–30.vi.1982, 1 ♂, 1–20.vii.1982, 1 ♀, 23–30.vi.1985, 1 ♀, 1–7.vii.1985, 1 ♂, 8–14.vii.1985, 2 ♂♂, 29.vii.–3.viii.1985, 1 ♂, K. N. Barber leg. (DEBU); ~2.0 km W Hallebourg, 49°40.36'N 83°32.11'W, sweeps, wet ditch, mostly *Carex utriculata*, 22.vi.2013, 1 ♂; Hurkett, dock area, 48°50.42'N 88°29.38'W, sweeps, emergent *Equisetum fluviatile*, 31.vii.2008, 4 ♂♂; ~25 km WNW Ignace, 49°29.52'N 92°00.83'W, sweeps, fen, mostly *Carex utriculata* with grasses, 4.vii.2012, 1 ♀, 6.vii.2012, 2 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Innisfil, 44°19.346'N 79°35.009'W, sweep around pond embankment, 28.vii.2011, 1 ♀; Innisfil, 44°19.396'N 79°35.048'W, Malaise in fence row, 28.vii.–2.viii.2011, 1 ♀, both J. E. Swann & D. R. Edwards leg. (both BDUK); Lake Superior P. Pk., Hwy 17 near jct. Agawa Rock, 47°22.31'N 84°41.23'W, sweeps, mostly *Carex utriculata*, 12.vii.2014, 2 ♀♀, K. N. Barber leg. (DEBU 01503959, -60, 1 ♀ genit. prep.); ~6.3 km E Macleod, 49°41.37'N 86°51.41'W, sweeps, graminoids incl. *Carex utriculata* & *C. aquatilis substricta*, 6.vii.2012, 4 ♂♂ 4 ♀♀; Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.5'N 82°06.2'W, sweeps/pooter, graminoids in fen flat, 28.vii.1997, 1 ♂; Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck @ Hwy 540, 45°53.2'N 82°06.3'W, sweeps, various grasses/sedges in floodplain, 5.vii.1998, 1 ♂ 2 ♀♀, sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 2 ♀♀; same locality but 45°53.1'N 82°06.2'W, sweeps/pooter, *Calamagrostis canadensis*, 4.vii.1999, 6 ♂♂ 1 ♀ (1 ♂ genit. prep.), sweeps, various grasses/sedges in floodplain, 4.vii.1999, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); Manitoulin Is., Poplar, 45°46'N 82°28'W, sweep along grassy trail, 27.vi.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0040128); Manitoulin Is., 3.3 km E Spring Bay, Hwy 542 @ Tracy Rd., 45°43.90'N 82°16.48'W, pooter, roadside/fenceline grasses, 30.viii.2004, 1 ♀; Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex. *Equisetum fluviatile*, dry stalks on surface, bulk pails, [reared] misted daily, 22°C, 16L:8D, 60–70% RH, emerged: 23.v.2012, 1 ♂; Moosonee, 51°16.68'N 80°38.65'W, sweeps, mostly *C[arex] utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 7 ♂♂ 6 ♀♀ (1 ♀ genit. prep.); Moosonee, 51°16.36'N 80°39.11'W, sweeps, railside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 10.vii.2014, 1 ♂; Moosonee, 51°16.17'N 80°39.10'W, sweeps, mostly *Carex utriculata*, *Scirpus*, in wet hydro cut, 10.vii.2014, 1 ♂ 3 ♀♀; Moosonee, 51°16.55'N 80°39.01'W, sweeps, mostly *Carex* spp., wet forest trail, 11.vii.2014, 2 ♂♂ 1 ♀; ~8 km SSW Nipigon, Hwy #628, 48°57.09'N 88°19.71'W, sweeps, damp roadside, mixed graminoids, 16.vii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); Ottawa, 4.vii.1956, 1 ♂, 12.vii.1956, 1 ♂ 4 ♀♀, 13.vii.1963, 1 ♀ (genit. prep.), J. R. Vockeroth leg. (CNCI); Pancake Bay P. Pk., 46°57.74'N 84°42.63'W, sweeps, beach grasses [*Ammophila breviligulata*], 7.viii.2004, 1 ♀, K. N. Barber leg. (DEBU 01501214); same locality but sweeping *Ammophila breviligulata* on beach sand, 9.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 3 ♂♂ 1 ♀ (DEBU 01500722–25), sweeps, mostly *Carex utriculata* in fen near boardwalk, 19.vii.2014, 1 ♂ (DEBU 01503988); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 24.vii.2004, 1 ♀ (DEBU 01500575), 2.viii.2004, 1 ♂ (DEBU 01500872), 7.viii.2004, 3 ♂♂ 1 ♀ (DEBU 01501088–91), 27.vi.2005, 3 ♂♂ 1 ♀ (DEBU 01501610–13, 1 ♀ genit. prep.), 7.vii.2007, 1 ♂ (DEBU 01501895), all K. N. Barber leg.; 10 km NW Penetanguishene, Awenda P. Pk., Second Lake, sweep sedge at shoreline, 13.vii.1992, 3 ♂♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0040120–22, -18); ~1 km NW Ponsonby, 43°38.2'N 80°22.9'W, sweeps/pooter, roadside, mostly *Poa pratensis* & *Poa compressa*, 17.vii.1997, 2 ♂♂ 1 ♀; Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 2 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); Kent Co., Rondeau P. Pk., South Point Trail East, 42°15'35"N 81°50'53"W, oak savanna, sweep, 9.viii.2003, 1 ♂, M. Buck leg. (DEBU 01139614); S[ault] S[te.] Marie, Algoma U[niversity] College, sweeps, 20.vii.1987, 1 ♀ (CNCI); same locality but 46°29.9'N 84°17.2'W, sweeps, mixed graminoids, 18.vi.1998, 2 ♂♂ 3 ♀♀, sweeps, graminoids mostly *Carex aquatilis*, 11.vi.1997, 3 ♂♂ 1 ♀, sweeps/pooter, *Calamagrostis canadensis*, 12.vii.1997, 2 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), 3.viii.1997, 1 ♀, 26.viii.1997, 3 ♂♂ 4 ♀♀, sweeps, *Calamagrostis canadensis* & *Carex aquatilis*, 23.vii.1997, 1 ♂ 3 ♀♀ (1 ♀ genit. prep.), sweeps, *Calamagrostis canadensis*, 28.viii.1997, 1 ♂ 1 ♀, 29.viii.1997, 3 ♂♂ 4 ♀♀ (incl. pair in copula) (CNCI), 26.vi.1998, 2 ♂♂ 2 ♀♀ (LACM), sweeps, mostly *Calamagrostis canadensis*, 28.vii.2001, 2 ♂♂ (CNCI), 29.vii.2001, 2 ♂♂ 2 ♀♀ (LACM), 6.viii.2001, 3 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), sweeps, mostly *Calamagrostis canadensis* & *Carex aquatilis*, 28.viii.1997, 2 ♀♀, sweeps, *Carex/Calamagrostis*, 3.viii.2002, 3 ♂♂ 4 ♀♀, sweeps, *Carex/Calamagrostis*, 6.viii.2002, 2 ♂♂, sweeps, *Carex aquatilis*, 12.vii.1997, 2 ♂♂ 1 ♀ (1 ♂ genit. prep.) (CNCI), 22.vi.1998, 2 ♂♂ 1 ♀ (AMNH), 26.vi.1998, 2 ♂♂, 28.vi.2002, 1 ♂ 3 ♀♀ (CASC), 29.vi.2002, 1 ♂ 2 ♀♀ (AMNH), 1.vii.2002, 3 ♂♂ 3 ♀♀ (2 ♀♀ genit. prep.), 5.vii.2002, 1 ♀, 9.vii.2002, 1 ♂ 4 ♀♀, 12.vii.2002, 6 ♂♂ 4

♀♀, 31.vii.2002, 5 ♀♀, sweeps, mostly *Carex aquatilis*, 12.vi.2001, 1 ♂, 14.vi.2001, 1 ♀, 14–17.vi.2001, 2 ♀♀ (CNCI), 21.vi.2001, 1 ♂, 21–22.vi.2001, 2 ♂♂ 3 ♀♀ (INHS), 25.vi.2001, 5 ♂♂ 7 ♀♀ (USNM), 28–30.vi.2001, 4 ♂♂ 5 ♀♀ (1 ♀ genit. prep.), 29.vi.2001, 1 ♂ 1 ♀ (CNCI), 11.vii.2001, 3 ♂♂ 1 ♀, 15.vii.2001, 2 ♂♂ 3 ♀♀ (SMOC), 17.vii.2001, 12 ♂♂ 11 ♀♀, 18.vii.2001, 6 ♂♂ 12 ♀♀ (CNCI), 21.vii.2001, 1 ♂ 3 ♀♀ (USNM), 28.vii.2001, 4 ♂♂ 1 ♀, 29.vii.2001, 1 ♀, 2.viii.2002, 1 ♂, 4.viii.2002, 1 ♂ 1 ♀ (CNCI), all K. N. Barber leg.; same locality but 46°29.88'N 84°17.19'W, sweeps, *Phalaris arundinacea*, 18.vi.2005, 2 ♂♂, sweeps, mostly *Calamagrostis canadensis*, 18.vii.2004, 1 ♂, sweeps, *Calamagrostis*, 26.viii.2003, 1 ♂, sweeps, *Carex aquatilis*, 1.vii.2003, 1 ♂ 7 ♀♀, 26.viii.2003, 1 ♂, 21.vii.2005, 3 ♂♂ 4 ♀♀ (1 ♀ genit. prep.), 27.vii.2005, 8 ♂♂ 1 ♀, sweeps, mostly *Carex aquatilis*, 18.vii.2004, 1 ♂ 5 ♀♀ (1 ♀ genit. prep.), 2.vii.2007, 3 ♂♂, 12.viii.2007, 1 ♂, pooter, mostly *Carex aquatilis*, 21.viii.2004, 1 ♀ (genit. prep.), sweeps, trampled graminoids, mostly *Carex aquatilis*, 5.ix.2004, 1 ♂ 1 ♀, 7.ix.2004, 1 ♂ (CNCI), 1.viii.2005, 6 ♂♂ 3 ♀♀ (USNM), sweeps, *Calamagrostis canadensis*, 18.vii.2004, 1 ♀; same locality but 46°29.82'N 84°17.17'W, sweeps, mostly *Carex aquatilis* near river, 21.vii.2005, 1 ♀ (both CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, mostly *Carex aquatilis*, 29.vi.2008, 1 ♀, sweeps, mostly *Phalaris arundinacea*, 6.viii.2008, 4 ♂♂, but sweeps, *Carex aquatilis*, *Calamagrostis canadensis*, 5.vii.2008, 1 ♂ 1 ♀, sweeps, *Calamagrostis canadensis*, *Carex aquatilis*, 31.viii.2008, 1 ♂, sweeps, *Carex aquatilis*, *Typha latifolia*, 6.viii.2008, 1 ♂ 1 ♀, sweeps, mostly *Calamagrostis canadensis*, 6.viii.2008, 3 ♂♂ 1 ♀; same locality but 46°29.81'N 84°17.15'W, sweeps, *Carex aquatilis*, *Calamagrostis canadensis* (by river), 5.vii.2008, 2 ♂♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, *Aster* [*Doellingeria*], *Rubus*, *Equisetum*, *Carex*, ferns under aspen, 18.vii.2005, 1 ♀; same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 1 ♀, 29.vii.2005, 1 ♂; same locality but w. of creek, 46°31.52'N 84°24.63'W, sweeps, *Carex* under ash/aspen, 22.vii.2005, 1 ♀; same locality but 46°31.61'N 84°24.68'W, sweeps, *Calamagrostis canadensis*, 20.viii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Bellevue Pk., 46°30.1'N 84°18.1'W, sweeps, mostly *Calamagrostis*, 7–8.vii.2000, 4 ♂♂ 4 ♀♀ (1 ♀ genit. prep.); S[ault] S[te.] Marie, Birchwood Pk., 46°30.7'N 84°15.6'W, sweeps, mostly *Impatiens* under *Betula/Acer*, 23.vi.1998, 1 ♀; S[ault] S[te.] Marie, Bristol Pl[ace] Pk., 46°30.8'N 84°16.6'W, sweeps/pooter, *Phalaris arundinacea*, 8.viii.1997, 1 ♂, sweeps, *Phalaris arundinacea*, 28.vi.1998, 1 ♀; same locality but 46°30.77'N 84°16.66'W, sweeps, *Phalaris arundinacea* under *Populus*, 7.viii.2008, 2 ♂♂ 1 ♀; S[ault] S[te.] Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 14.viii.2005, 3 ♂♂ 2 ♀♀, 25.viii.2005, 1 ♂ 1 ♀, 12.ix.2005, 2 ♂♂ 3 ♀♀, 17.ix.2005, 1 ♀, sweeps, mostly *Scirpus microcarpus*, *Impatiens*, 27.vi.2007, 1 ♀, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 4 ♂♂ 2 ♀♀ (2 ♂♂ 2 ♀♀ genit. prep.), 12.vii.2010, 1 ♂ (genit. prep.), J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Finn Hill, 46°31.6'N 84°17.3'W, sweeps, graminoids/composites, 19.vii.2005, 1 ♂ 3 ♀♀; same locality but 46°31.63'N 84°17.29'W, sweeps, *Scirpus microcarpus*, 19.vii.2004, 1 ♂ 1 ♀, 8.vii.2006, 1 ♀ (all CNCI); same locality but 46°31.63'N 84°17.33'W, sweeps, *Calamagrostis canadensis*, 26.vi.2007, 1 ♂ 1 ♀, 6.vii.2008, 1 ♀, 6.vii.2008, 2 ♂♂ 2 ♀♀, sweeps, *Carex stipata stipata*, 19.vii.2004, 4 ♀♀ (CNCI), 20.vii.2004, 3 ♂♂ 3 ♀♀ (NMPC), 6.vii.2008, 1 ♂ 1 ♀, 22.vii.2004, 1 ♂, 19.vii.2005, 1 ♀, sweeps, mostly *Carex stipata stipata*, 26.vi.2007, 14 ♂♂ 8 ♀♀ (1 ♀ genit. prep.), 13.vii.2007, 1 ♂, 16.vi.2013, 2 ♂♂, sweeps, graminoids, herbs, composites, edge of *Populus tremuloides*, 25.vi.2009, 7 ♂♂ 1 ♀ (1 ♀ genit. prep.), 4.vii.2009, 1 ♀ (genit. prep.), sweeps, mostly *Carex/Calamagrostis*, edge of *Populus tremuloides*, 25.vi.2009, 1 ♀, sweeps, mostly *Calamagrostis*, edge of *Populus tremuloides*, 4.vii.2009, 3 ♂♂ 2 ♀♀, sweeps, graminoids, herbs, composites, including *Equisetum sylvaticum*, 4.vii.2009, 2 ♀♀ (CNCI), all K. N. Barber leg.; Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 11 ♂♂ 8 ♀♀ (3 ♂♂ 5 ♀♀ genit. prep., 2 ♂♂ photographed), 12.vii.2010, 4 ♂♂ 2 ♀♀ (1 ♂ 2 ♀♀ genit. prep.), J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Finn Hill, 46°31.66'N 84°17.34'W, sweeps, mostly *Calamagrostis canadensis*, 8.viii.2008, 3 ♂♂ 4 ♀♀ (1 ♀ genit. prep.); same locality but 46°31.7'N 84°17.5'W, sweeps, mostly sedges in trail, 4.vii.2002, 1 ♀, sweeps, mostly sedges in trail, 6.vii.2002, 1 ♀, sweeps, mostly sedges in trail, 11.vii.2002, 1 ♂, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, *Calamagrostis canadensis* in wet area, 16.viii.2004, 3 ♂♂ 2 ♀♀, sweeps, mostly *Carex/Calamagrostis* in wet area, 16.viii.2004, 1 ♀ (genit. prep.), sweeps, *Carex/Calamagrostis* in wet area, 23.viii.2004, 2 ♂♂ 1 ♀; S[ault] S[te.] Marie, 1072 Old Garden R. Rd., 46°33.64'N 84°17.11'W, sweeps, *Equisetum fluviatile*, graminoids, *Typha* in wet ditch, 30.vii.2007, 1 ♂; S[ault] S[te.] Marie, 2nd Line E, 46°32.3'N 84°16.6'W, sweeps, graminoids in open meadow, 26.vi.1999, 3 ♂♂; S[ault] S[te.] Marie,

Thayers Acres, 46°35.54'N 84°15.53'W, sweeps, emergent *Carex* sp., 1.vii.2007, 1 ♂; S[ault] S[te.] Marie, Whitefish Is./St. Mary's Is., 46°30.68'N 84°21.20'W, riparian graminoids, sweeps, 8.viii.2004, 1 ♂ 3 ♀♀; ~10 km W S[ault] S[te.] Marie, Airport Rd., 46°29.72'N 84°28.96'W, natural gas r[igh]t-of-way, sweeps, mostly *Scirpus/Calamagrostis*, 4.viii.2004, 1 ♂, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 4 ♂♂, sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns, 14.vii.2010, 3 ♀♀, all K. N. Barber leg. (all CNCI); ~10 km W Sault Ste. Marie, Airport Rd., natural gas r[igh]t-of-way, 46°29.72'N 84°28.96'W, sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); Smooth Rock Falls, 49°16.04'N 81°36.08'W, hydro right-of-way, sweeps, *Carex utriculata*, 22.vi.2013, 2 ♂♂ 1 ♀; ~74 km NNE Thessalon, shore of Mississagi R., 46°53.94'N 83°16.23'W, sweeps, graminoids, herbs, *Equisetum* spp., 17.vii.2010, 1 ♂ 2 ♀♀; ~34 km N Timmins, 48°45.88'N 81°21.71'W, sweeps, *Carex* spp., 18.vii.2009, 1 ♀, all K. N. Barber leg. (all CNCI); Waubamick [sic Waubamik], [-].vi.1915, 1 ♂, [-].vii.1915, 1 ♂, H. S. Parish leg. (USNM); Essex Co., Windsor, Ojibway Prairie, 42°15'51" N 83°04'30"W, 20.vii.2002, 1 ♀, S. A. Marshall leg. (DEBU 00222430). **PRINCE EDWARD ISLAND:** Eglington Bay, sweep, vegetation, 20.vii.1996, 1 ♂, N. deVillie leg. (LEMQ 0040125); Greenwich N. Pk., 46°26.6'N 62°41.7'W, sweep, open areas on trail and parking area, 3.viii.2004, 1 ♂, S. Boucher leg. (LEMQ 0040466); Victoria P. Pk., 46°12.6'N 63°28.9'W, sweep at picnic area, 2.viii.2004, 1 ♂, S. Boucher leg. (LEMQ 0040477). **QUEBEC:** Chemin-du-Lac Bog, 47°46'11.4"N 69°30'43.9"W, Malaise trap, abandoned site, 4–6.vii.2006, 1 ♀, A. G. Taillefer leg. (LEMQ 0040322); Gaspésie, Parc Forillon, Secteur Nord, route de banc, sweep near marsh, 18.viii.2006, 1 ♀, S. Boucher leg. (LEMQ 0040301); Gaspé, Plage Haldimand, 48°47'N 64°22'W, sweep vegetation, 4.viii.2000, 3 ♂♂, H. Varady-Szabo leg. (LEMQ 0040111–13), 2 ♂♂ 1 ♀, D. Raby leg. (LEMQ 0040114–16); Gatineau Pk., Harrington L., 3.vii.1963, 1 ♀, J. R. Vockeroth leg. (CNCI); Ile Bonaventure, 48°30'N 64°10'W, 3 km from Côte de Percé, sweep grass, 28.vii.2000, 1 ♀, H. Varady-Szabo leg. (LEMQ 0040126); Îles de la Madeleine, Cap-aux-Meules, Chemin du Rivage, 47°21.54'N 61°57.19'W, sweep grass near marsh, 6.viii.2004, 2 ♂♂, S. Boucher leg. (LEMQ 0040311, -12); Îles de la Madeleine, Cap-aux-Meules, 47°21.7'N 61°55.86'W, 6.viii.2004, Chemin Chiasson, sweep alfalfa field by road, 2 ♂♂, V. Dion leg. (LEMQ 0040296, -298), Chemin du Chiasson, sweep field along road, 1 ♀, S. Boucher leg. (LEMQ 0040510); Îles de la Madeleine, Île de la Grande Entrée, Chemin Pealey, 47°32.86'N 61°33.54'W, sweep grasses in parking lot at beach, 9.viii.2004, 1 ♂, V. Dion leg. (LEMQ 0040295); La Trappe, 9.vii.1935, 1 ♀, J. Ouellet leg. (AMNH); Old Chelsea, Summit King Mt., 1150', 14.vi.1963, 1 ♀, J. R. Vockeroth leg. (CNCI); Percé, Pointe-St.-Pierre, 48°37'N 64°10'W, sweep vegetation, 8.viii.2000, 1 ♂, H. Varady-Szabo leg. (LEMQ 0040110); St-Jean-Port-Joli, 31.vii.1952, 1 ♂, G. Steyskal leg. (USNM); Ste-Anne-de-Bellevue, Stoneycroft Pond, 45°25.8'N 73°56.4'W, sweep grasses, 19.vi.2001, 1 ♂, H. Varady-Szabo leg. (LEMQ 0040123). **SASKATCHEWAN:** Assiniboia, 27.vi.1955, 1 ♂, J. R. Vockeroth leg.; Christopher Lake, 11.vii.1959, 1 ♀, A. & J. Brooks leg.; ~6.5 km SE Langham, Hwy#16, 52°19.10'N 106°53.07'W, sweeps, mostly *Carex* sp., 21.vii.2008, 1 ♂ 2 ♀♀; same locality but 52°19.13'N 106°53.03'W, sweeps, mostly *Elymus glaucus*, 21.vii.2008, 7 ♂♂ 4 ♀♀ (1 ♀ genit. prep.), all K. N. Barber leg.; nr. Saskatoon, 44°19.346'N 79°35.009'W, sweep, roadside, 19.vii.2012, 1 ♀, J. E. Swann & D. R. Edwards leg. (BDUC); Scout Lake, 49°20'N 106°0'W, 17.vi.1955, 2 ♂♂, J. R. Vockeroth leg.; Weyburn, 49°39.55'N 103°51.09'W, along fence next to railway, pooter, Triticeae, 28.vii.2008, 1 ♂; Yorkton, city park, 51°13.39'N 102°28.96'W, sweeps, lake margin, mostly *Carex* spp., 29.vii.2011, 1 ♂, both K. N. Barber leg. (all CNCI). **UNITED STATES OF AMERICA:** **IOWA:** Lake Amana, 23.vi.1928, 1 ♂, G. O. Hendrickson leg. (USNM). **MASSACHUSETTS:** Dennisport, Cape Cod, 1.viii.1964, 2 ♀♀, 4.viii.1964, 1 ♀, 7.viii.1964, 1 ♂, J. R. Vockeroth leg. (CNCI); Sandwich, 22.vi.1924, 1 ♂, A. H. Sturtevant leg. (USNM); Woods Hole, [-].vii.1918, 2 ♂♂ (USNM 1 ♂, AMNH 1 ♂, genit. prep., with Sturtevant det. label as *A. variegata* Loew), 5–21.vii.1922, 1 ♂ (USNM), A. H. Sturtevant leg.; Woods Hole, [-].vii.1923, 1 ♂, [no collector] (AMNH, genit. prep.). **MICHIGAN:** Livingston Co., E. S. George Reserve, 23.vii.1943, 1 ♂, G. Steyskal leg.; Rapid City, 10.vii.1941, 1 ♂, C. W. Sabrosky leg. (both USNM). **NEW YORK:** Buffalo, 25.vi.1909, 1 ♀, M. C. Van Duzee leg. (CASC, with det. as *Anthyomyza variegata* (Loew)); Roch, 22.vii.1942, 2 ♀♀, H. Stalker leg. (AMNH, 2 ♀♀ genit. prep.). **WASHINGTON:** Dewatto, 7.vi.1906, 1 ♀, A. L. Melander leg. (USNM, genit. prep.); Pearce Co., Tacoma, 22.vi.1982, 1 ♀, T. L. Whitworth leg. (LACM). **WISCONSIN:** Washburn Co., T39N R13W B30, 4.vii.1953, 1 ♀, R. H. Jones leg. (USNM, genit. prep.).

Other material examined (not included in type series). **CANADA:** **ONTARIO:** S[ault] S[te.] Marie, S. of Algoma U[niversity] Collee, 46°29.88'N 84°17.19'W, sweeps, trampled graminoids, mostly *Carex aquatilis*, 7.ix.2004, 1 ♂, K. N. Barber leg. (CNCI, headless, wing illustration); Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 12.vii.2010, 1 ♂; same locality but 46°31.48'N 84°17.36'W, sweeping

graminoid vegetation, 7.vii.2010, 1 ♂, both J. Roháček leg. (both SMOC, both used for molecular analysis). SASKATCHEWAN: Assiniboia, 49°38.17'N 106°00.18'W, low wet area next to railway, sweeps, Triticeae, 1 ♂, 27.vii.2008, K. N. Barber leg. (CNCL, abdomen lost). UNITED STATES OF AMERICA: MASSACHUSETTS: Woods Hole, [-]. viii.1922, 1 ♂, [-].vii.1923, 1 ♀, A. H. Sturtevant leg. (USNM, 1 ♀ genit. prep., both headless). WASHINGTON: Pearce Co., Tacoma, 22.vi.1982, 1 ♀, T. L. Whitworth leg. (LACM, missing wings).

Description. Male. Total body length 2.22–2.78 mm; colour generally resembling that of *A. variegata*, thus largely (at least ventrally) yellow with highly variable ochreous to greyish brown darkenings on head, mesonotum and preabdominal terga (thus dichroic, with pale and dark forms), always with brownish dorsal band on pleuron (Figs 383, 419, 420). Head distinctly longer than high, hence more elongate than in *A. variegata* and *A. dichroa* (most resembling that of *A. orthogibbus*), and anteriorly angular in profile because of receding face. Head markedly dichroic. Pale form has head almost completely yellow (with only ocellar triangle brownish), while dark form has face, 1st antennal flagellomere and sides of occiput brown to dark brown; also frons can be partly brownish patterned in dark form (see also below). Occiput slightly concave; yellow or with faint darker stripes laterally and above foramen (pale form), or broadly brown laterally, only medially yellow (dark form); in yellow medial area there are two elongate silvery white microtomentose spots as in *A. variegata*. Frons relatively narrow, entirely yellow (pale form) or medially orange ochreous with brownish markings anteromedially and along orbits (dark form); ocellar triangle always brown; frontal triangle relatively dull but slightly glittering in contrast to entirely dull adjacent areas. Orbits pale yellow in both forms; silvery whitish microtomentose, less so behind posterior ors. Frontal triangle narrow, reaching about to anterior third of frons. Frontal lunule small, pale yellow. Face narrow, medially concave or folded; dull yellow and separated from parafacialia by relatively wide golden orange marginal stripe (pale form), or brown to blackish brown with darker, dull and wide marginal stripe (dark form); parafacialia and gena whitish yellow to white, with silvery white microtomentum; ventral marginal stripe of gena narrower and yellow in pale form, wider and at least anteriorly brown in dark form. Postgena and mouthparts yellow in pale form but postgena partly brown and mouthparts more or less ochreous to brownish-darkened in dark form. Cephalic chaetotaxy not distinctly different from that of *A. variegata*, and palpus setose as in the latter species. Eye ovoid, more elongate than in *A. variegata*, with longest diameter oblique and about 1.6 times as long as shortest. Shortest genal height 0.18–0.20 times as long as shortest eye diameter. Antenna flattened, geniculate; yellow with 1st flagellomere either entirely yellow in pale form or brown (also on inner side) with only basal part yellow to a variable extent in dark form; white pilosity relatively long (longer than on arista) but distinctly shorter than in *A. variegata*. Arista with basal segments ochreous yellow and distal seta blackish brown, 1.9–2.0 times as long as antenna, relatively shortly pubescent, with cilia markedly shorter than in *A. variegata* or *A. dichroa*.

Thorax slightly narrower than head, largely yellow, with different brown pattern in pale and dark forms; scutum in pale form yellow with pale ochreous brown sublateral bands (sometimes almost indistinct), in dark form largely brown to brownish grey with more or less distinct longitudinal ochreous yellow stripes along dc and prs-sa lines (rarely also a faint medial one) but, in contrast to *A. variegata*, without yellow area in front of scutellum. Humeral and notopleural areas yellow in both forms; scutellum yellow in pale form, brown in dark form. Dorsum of thorax pale grey microtomentose and relatively dull. Pleural part



Figs 419–421. Living *Anthomyza gibbiger* sp. nov. and its habitat. 419 – *A. gibbiger* sp. nov., male, pale form, dorsally, body length ca. 2.6 mm; 420 – same specimen, laterally (Canada: Ontario: Sault Ste. Marie, Finn Hill); 421 – wet meadow at Sault Ste. Marie (Finn Hill), habitat of three species of the *A. neglecta* group, viz. *A. gibbiger*, *A. orthogibbus* and *A. dichroa*. Photo by J. Roháček.

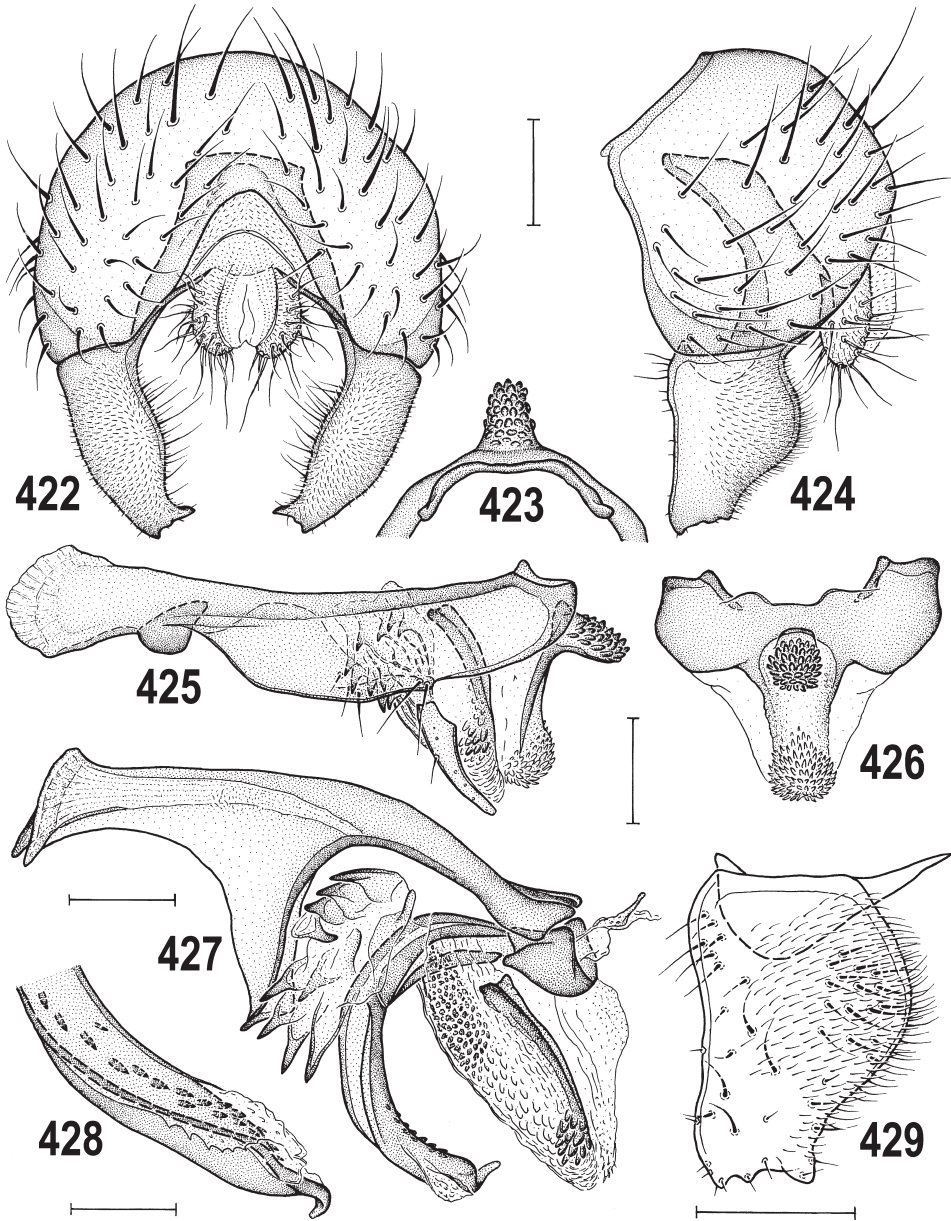
of thorax more shining than scutum, yellow to pale yellow (ventrally), always with brown dorsal band (narrow in pale form, wider in dark form) extended from cervix almost to haltere. Postscutellum and postnotum darker than scutellum, ochreous in pale form, brown in dark form. Thoracic chaetotaxy as in *A. variegata* but prs, sa and pa subequal and about as long as hu; the smaller anterior dc about as long as anterior npl, and 5–7 dc microsetae in front of anterior dc; 4 or 5 rows of ac microsetae on suture, only 2 medial rows between dc ending usually in front of posterior dc; apical sc subequal to posterior dc (both longest thoracic setae); no additional small setulae on scutellum; 2 long stpl (anterior slightly to distinctly shorter) and 4–5 upcurved setulae in dorsal half of sternopleuron plus (sometimes) 1 additional setula in front of anterior stpl, its ventral part with a cluster of 7–8 longer setae. Scutellum narrower (more elongate) than in *A. variegata*. Legs coloured as those of *A. variegata*. f_1 with ctenidial spine longer than maximum width of t_1 but usually shorter and weaker than in *A. variegata*; other pedal chaetotaxies as in the latter species. Wing (Fig. 439) more elongate and narrower than that of *A. variegata*, thus most similar to that of *A. orthogibbus*, with pale yellowish ochreous veins and membrane. C with very small and sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} long, bent parallel to C with apex very slightly upcurving; R_{4+5} very slightly bent to straight and parallel with (usually) straight M. Cell dm long and narrow; r-m situated in front of the middle of cell dm. Apical portion of CuA_1 longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula well developed but narrow. Wing measurements: length 2.22–2.66 mm, width 0.63–0.78 mm, $Cs_3 : Cs_4 = 1.12–1.52$, $rm \setminus dm-cu : dm-cu = 2.50–3.43$. Haltere dirty yellow, both stem and knob with distinct brownish tinge.

Abdomen dorsally dichroic, dorsally differently coloured in pale and dark form. Preabdominal terga of pale form yellow-and-brown variegated (Fig. 383): T1 brown with only anterior corners yellow, T2–T5 yellow with posterior transverse brown band (covering fourth to half of tergum) not reaching posterior corners, thus with sides of terga yellow. Dark form with T2–T5 either entirely brown (T4 and T5 often lighter brown) or only narrowly anteriorly and laterally yellow (most often on T4 and T5 only). T1–T5 subshining, relatively shortly and sparsely setose as in *A. variegata*. T1 and T2 distinctly separate, only laterally fused. T2–T4 transverse, subequal in size, T5 somewhat longer. Preabdominal sterna pale yellow, relatively narrow and becoming markedly wider posteriorly (S5 more than twice wider than S2); S1 short and slightly transverse, S2 slightly longer than wide, S3 as long as wide or somewhat wider than long, S4 and S5 (widest sternum) trapezoidal, distinctly transverse. S2–S5 densely setose, only S1 bare and with darker posterior marginal stripe. T6 bare, strongly transverse, very short and unpigmented on left, slightly longer and somewhat pigmented on right side. S6 and S7 yellow, both with brownish anterior marginal ledge; S6 with 1–3, S7 with 1–2 setae; S8 as long as but distinctly narrower than epandrium, anteriorly yellow, posteriorly brown (more extensively in dark form) and setose in posterior two-thirds.

Genitalia. Epandrium (Figs 422, 424) pale yellow (contrasting with brown posterior part of S8), longer than in *A. variegata* or *A. dichroa* and broader than S8, densely setose, dorso-laterally with several longer and thicker setae (1 usually longest); anal fissure not large, rounded subtriangular. Cercus rather small and setose as in related species. Medandrium (see Fig. 422) relatively high, dorsally narrowed, with dorsolateral corners simple, ventrally slightly emarginate, bare. Gonostylus (Figs 422, 424, 429) shortest and widest of all Nearctic species of the group, much shorter than epandrial height, relatively convex posteroexternally, of roughly

(posteriorly rounded) pentagonal outline, widest in basal two-thirds, distally tapered but its apex truncate, with 2 small blunt teeth and 1 larger, more acute, internally bent posteroventral tooth, micropubescent on outer side except for anterior and apical parts, with longer setae on concave inner side, mainly posteriorly. Hypandrium (Fig. 425) as in *A. variegata* and other relatives. Transandrium (Figs 423, 426) straight and relatively robust medially (in caudal view; Fig. 426), with narrow flat caudal process that is medially pale and weakly sclerotized but dorsally provided with peculiar hump-shaped projection densely covered with short dark spines (Figs 423, 425); a similar, but smaller version of this distinctive structure is otherwise seen only in *A. orthogibbus*. Distal part of caudal process is sparsely spinulose and transilient to more densely but shortly spinose basal membrane. Pregonite (Fig. 425) completely fused to hypandrium as in relatives, posterior process reduced and carrying 2 longer setae, anterior section simple, relatively straight ventrally and with 3 short setae. Postgonite (Fig. 425) relatively small, slender and very slightly bent, pale-pigmented and distally tapered with blunt apex; with several sensillae and 1 setula in basal two-fifths of anterior margin. Basal membrane (Figs 425, 426) densely covered by small, short and flat spines (as in *A. orthogibbus*). Aedeagal part of folding apparatus with small, dark grain-like tubercles (Fig. 427), and with thorn-like spines (larger than in *A. orthogibbus*) dorsally on hyaline striae (visible in Fig. 425 above postgonite). Connecting sclerite slender, dark, dorsally more sclerotized (Fig. 427) and ventrally provided with a group of small dark blunt spines. Phallopodeme somewhat more robust than in *A. variegata*, basal part darker and forked, and distal part (including fulcrum) pale-pigmented and robust, with distinctly bicuspidate apex. Aedeagus (Fig. 427) with small phallopore. Saccus also small compared to filum, membranous and with short basal sclerite as in relatives, armed with some 10 robust and dark-pigmented spines as typical for the group. Filum robust, generally formed as in relatives but distally thicker, with terminal projection shortly curved and with rounded apex; tooth-like spines along dorsal surface dark but not very numerous (Fig. 428). Ejacapodeme (Fig. 427) very reduced, slender, pale-pigmented, with fine digitiform projection.

Female. Similar to male unless mentioned otherwise. Total body length 2.70–3.49 mm. Head not dichroic, face always and occiput usually pale (occasional darker specimens have a diffuse brown area on the postgena that can extend onto the occiput, which is never apparent in *A. orthogibbus*); 1st flagellomere variably coloured, ranging from almost uniformly yellow to partly or largely ochreous to brownish-darkened on outer side. Pattern of thoracic scutum different from that of males, largely yellow to dark yellow or with very faint lateral ochreous orange darkening (the latter sometimes more strongly darkened in those females with a darkened postgena); also dorsal brownish band on pleural part of thorax usually narrower and paler than in males, usually not widened anteriorly to bottom of spiracular plate (often so in *A. orthogibbus* and darker *A. gibbiger* females). Wing measurements: length 2.58–3.31 mm, width 0.75–1.03 mm, $Cs_3 : Cs_4 = 1.12–1.36$, $rm \setminus dm-cu : dm-cu = 2.60–3.36$. Abdomen with T2–T6 entirely yellow, or with only very narrow and often faint pale brown to ochreous stripes at posterior margin (usually somewhat darker on more posterior tergites and often medially interrupted on T4–T6, but more strongly developed in females with a darkened postgena), only T1 may be largely pale brown or ochreous with anterior corner pale yellow. T2–T5 shorter and more transverse than in male, subequal in size, wider than T6. Preabdominal sterna pale yellow, slightly narrower than in male, S2 as long as wide, S3 slightly, S4 more, S5 distinctly

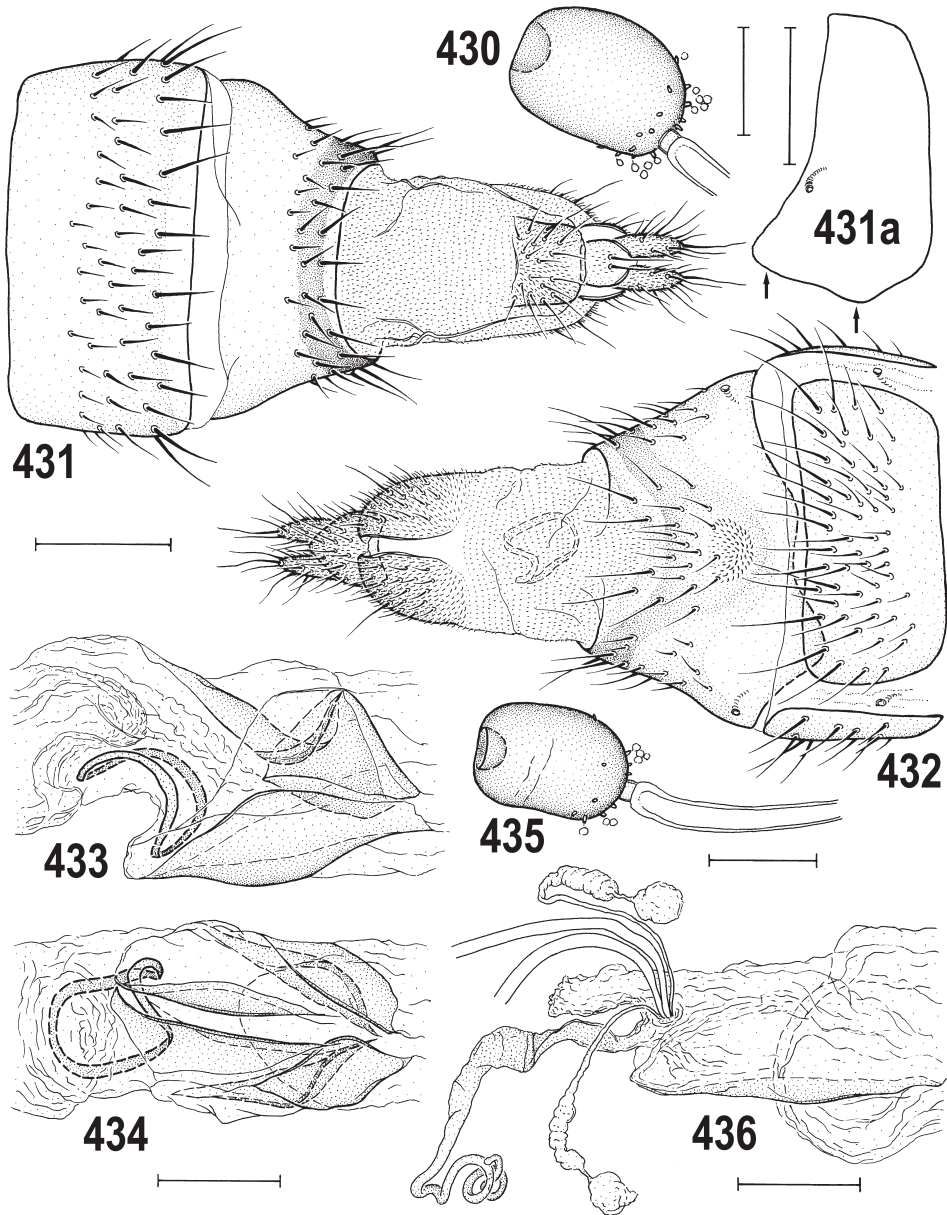


Figs 422–429. *Anthomyza gibbiger* sp. nov., paratype male (Canada: Ontario). 422 – external genitalia, caudally; 423 – transandrium, dorsally; 424 – external genitalia, laterally; 425 – hypandrial complex, laterally; 426 – transandrium, caudally; 427 – aedeagal complex, laterally; 428 – apex of filum, subventrally; 429 – gonostylus, laterocaudally (widest extension). Scales = 0.05 mm (Fig. 428) and 0.1 mm (others).

transverse and trapezoidal. S5 largest and widest but narrower than postabdominal S6.

Postabdomen (Figs 431, 432) moderately long, tapered posteriorly, telescopic, with sclerites yellow to pale yellow, T6 often and T7+S7 usually with posterior brown stripe. T6 simple, large (but narrower than T5), suboblong with rounded corners, entirely yellow or with variously developed narrow posterior stripe, with dense setae in posterior two-thirds, marginal longest. S6 transversely suboblong to slightly trapezoidal with corners rounded, broader and more transverse than S5, pale yellow and finely densely setose. Tergosternum T7+S7 conically tapered, shorter dorsally, longer ventrally, yellow with distinct (rarely missing) brown stripe along posterior margin (Fig. 431) reaching onto ventral side where faded (Fig. 432); T7+S7 ventrolaterally less expanded than in *A. variegata* and anteriorly forming smaller and more ventrally situated lobes (Fig. 432, see left side; on right side the lobe is somewhat malformed and hence atypically small), largely yellow or with faint darkening at poorly defined posterior margin; medioventral raised area (Figs 431a, see ventral arrow, 432) pronounced (bulging) in contrast to that of *A. orthogibbus*; in lateral view the segment is distinctly shorter medially because its anterior lobes are situated ventrally (Fig. 431a, see anteroventral arrow), and not anteriorly angular as in *A. orthogibbus*. Dorsal parts of T7+S7 (Fig. 431) with characteristic short setae at posterior dark margin (shared with *A. orthogibbus*), ventral part setose medially in posterior two-thirds (Fig. 432). 8th segment elongate, micropubescent laterally. T8 yellow, narrow but only slightly longer than wide (Fig. 431), thus shorter than in relatives, with indistinct anterior margin, posteriorly rounded, distinctly micropubescent, with fine but less exclinate setae than in *A. variegata*; S8 (Fig. 432) markedly wider and longer than T8, medially divided into 2 convex, finely hirsute and micropubescent sclerites as usual. Genital chamber (uterus) posteriorly with pale-pigmented internal sclerotizations (Figs 433, 434) composed of 3 pairs of flat, pale and poorly defined, partly fused sclerites (obviously longer than those of *A. orthogibbus*) situated posterior to 1 suboval, strongly asymmetrically bent annular sclerite. Membranous part of genital chamber (Fig. 436) long, without small grain-like sclerotizations but with pale and poorly visible ventral plate in front of insertion of ducts. Ventral receptacle (Fig. 436) tube-like, hyaline, basally somewhat widened, distally tapered and terminally with strongly twisted vermicular apex. Accessory gland small, hyaline and poorly visible, with simple surface, on distally dilated and somewhat ringed duct. Spermathecae (1+1) rounded cylindrical (Figs 430, 435), each with small terminal cup-shaped invagination (shallower than in *A. orthogibbus*) and several minute blunt spinulae in basal quarter; duct very long and ending in short but visible hyaline cervix inserted centrally in spermathecal body. T10 very small (Fig. 431), slightly longer than broad, with 1 posteromedial pair of long setae and very reduced micropubescence. S10 longer and wider than T10, subpentagonal in ventral view (Fig. 432), finely setulose and micropubescent. Cercus moderate, slender, with numerous fine setae, apical and dorsopreapical longest (Figs 431, 432).

Discussion. This new species forms a sister pair with *A. orthogibbus* sp. nov., best characterized by a unique synapomorphy, the peculiar hump-shaped projection on the caudal process of the transandrium (cf. Figs 423, 425). Additional (possibly apomorphic) characters shared by *Anthomyza gibbiger* sp. nov. and *A. orthogibbus* include the thorn-like spines on the hyaline striae in the aedeagal part of the folding apparatus, a group of short dark spines on the distal end of the connecting sclerite, shortened setae at the dorsal posterior margin of the female



Figs 430–436. *Anthomyza gibbiger* sp. nov., paratype female (Canada: Ontario). 430 – spermatheca; 431 – postabdomen, dorsally; 431a – lateral outline of T7+S7; 432 – postabdomen, ventrally; 433 – female internal sclerites, laterally; 434 – the same, ventrally; 435 – spermatheca; 436 – distal part of female genital chamber, laterally. Scales = 0.2 mm (Figs 431, 431a, 432), 0.05 mm (Figs 430, 435) and 0.1 mm (others).

T7+S7 and 3 pairs of (albeit weakly sclerotized) posterior sclerites in the female genital chamber. Other characters that are plesiomorphic or of uncertain polarity include shorter ciliation of the 1st flagellomere, narrower wings, a longer epandrium and a female T7+S7 that is dorsally complete and with small anterolateroventral lobes.

In the male sex, *A. gibbiger* is easily recognizable by its short and broad gonostylus (Fig. 429), unique in the *A. neglecta* group. It also differs from its nearest relative, *A. orthogibbus*, by the presence of male dichroism (having a dark form) and by the long male ctenidial spine on f_1 (both as in *A. variegata* and *A. dichroa*). By contrast, the female ctenidial spine of *A. gibbiger* is similar to that of *A. orthogibbus* females (not shortened in the latter as in the male) making their differentiation difficult, particularly because they often occur syntopically (see below). The female of *A. gibbiger* can be distinguished from that of *A. orthogibbus* mainly by a collection of details in the postabdomen, particularly by the less distinct transverse stripe on T1–T6 and the dorsal part of T7+S7, the shorter T8, the more transverse S6, the smaller annular sclerite and the shallower terminal invagination of the spermathecae, but all of these differences are rather subtle due to variability of these structures. The best character by which to differentiate females is the lateral view of the T7+S7, which in *A. gibbiger* is relatively short and without an angularly projecting anteromedial margin (Fig. 431a). Furthermore, the females of *A. gibbiger* with a diffuse darkening on the postgena, though rare and not consistently dark in all aspects of striping on the notum and abdomen, include the darkest of the *A. gibbiger* females and are unlike any female of *A. orthogibbus* and readily diagnosed by this character alone.

Etymology. The species name *gibbiger* is a Latin adjective (= carrying a hump) referring to the peculiar hump on the dorsal part of the caudal process of the transandrium in the male internal genitalia.

Biology. This is a species that often occurs in moist sites most often in association with sedges (often along with *A. orthogibbus*) including *Carex aquatilis*, *C. stipata* var. *stipata*, and *Scirpus microcarpus* as at Ontario: Sault Ste. Marie (e.g. Fig. 421), and *C. utriculata*, as at many Ontario sites, as well as mixtures of some of these species, as at Ontario: Moosonee. *Anthomyza gibbiger* is usually more commonly encountered in these habitats in Ontario than is *A. orthogibbus*. In addition, field collections obtained from the grass *Calamagrostis canadensis* on moist sites (Ontario: Sault Ste. Marie, Manitoulin Island) yielded these two species, again with *A. gibbiger* present in larger numbers. This all suggests a capacity in both species to use a range of plant hosts with physical factors like moisture possibly acting as more important determinants of acceptable habitat. A single male was reared from stalks of *Equisetum fluviatile* (Ontario: Marathon) that were principally collected for the rearing of *A. vockerothi* and *A. equiseti*. This singular rearing however could be the result of contamination with *Carex aquatilis* which grew in close association with the *E. fluviatile* even though similar low-frequency rearings of *A. orthogibbus* were made from larvae extracted directly from the nodes of *E. fluviatile* (see discussion under that species). As a contrast, dry roadside habitat was also successfully sampled (Saskatchewan: Langham, *Elymus glaucus* Buckley; Ontario: Ponsonby, *Poa* spp.) for *A. gibbiger*, the latter site also yielding *A. dichroa*. *Anthomyza gibbiger* flies at least from 7 June (Washington: Dewatto) to 17 September (Ontario: Sault Ste. Marie).

Distribution. With an extensive western distribution, this is the only transcontinental species

of the *A. neglecta* group. It was also the only member of the species group encountered in Ontario: Moosonee, which is a relatively northern site. Canada: Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan; United States of America: Iowa, Massachusetts, Michigan, New York, Washington, Wisconsin (see Table 2).

Anthomyza orthogibbus sp. nov.

(Figs 384, 440–455)

Type material. HOLOTYPE: ♂, "CAN:ON:SSMarie, Sault Coll.Outdoor Lab, 17.vii.2005, KNBarber, sweeps, *Carex lacustris* in opening 46°32.08'N 84°18.21'W" and "HOLOTYPUS ♂ *Anthomyza orthogibbus* sp. n., J. Roháček & K. N. Barber det. 2013" (red). The specimen is in perfect condition, with well visible exposed genitalia (see Fig. 384) (CNCI, intact). PARATYPES: CANADA: MANITOBA: ~14 km SW Falcon Lake, jct. Hwy#1 & Rd.86E, 49°38.24'N 95°29.89'W, sweeps, graminoids, mostly *Carex* spp., 30.vii.2008, 2 ♂♂ 2 ♀♀, 29.vii.2011, 3 ♂♂ 3 ♀♀ (2 ♀♀ genit. prep.), K. N. Barber leg. (CNCI). ONTARIO: Batchawana P. Pk., 46°56.67'N 84°33.30'W, sweeps, mostly *Carex* spp. in wet trench under mixed canopy, 19.vii.2014, 3 ♂♂, K. N. Barber leg. (DEBU 01503961–63); Beverly Swamp, 7 km SSE Guelph, swept/eclector, forest & swamp, (Universität Bielefeld, X978), 18.viii.1994, 1 ♂ 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); ~40 km NE Chapleau, 47°59.76'N 82°55.04'W, wet roadside sweeps, mostly *Carex utriculata*, 23.vi.2013, 1 ♂; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, nr. lookout, sweeps, mostly *Carex* incl. *C. utriculata*, 24.vi.2012, 1 ♂; same locality but 46°29.66'N 84°04.12'W, near lookout, sweeps, mostly *Carex utriculata*, 15.vi.2013, 3 ♂♂ 3 ♀♀, 29.vi.2013, 3 ♂♂ 3 ♀♀, sweeps, mixed graminoids incl. *Carex utriculata*, 21.vii.2013, 8 ♂♂ 4 ♀♀; same locality but 46°29.71'N 84°04.04'W, sweeps, mostly *Equisetum fluviatile*, *Typha latifolia*, 12.vi.2007, 1 ♀, sweeps, mostly *Equisetum fluviatile*, *Schoenoplectus acutus*, 12.vi.2007, 2 ♂♂ 3 ♀♀, 18.vi.2007, 2 ♀♀, sweeps, mostly *Equisetum fluviatile*, 18.vi.2007, 2 ♀♀, 12.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*?, moist ground cover including *E. fluviatile*, 10.v.2008, [reared at] 20°C, L:D 16:8, emerged: 3.vi.2008, 1 ♀, 5.vi.2008, 1 ♀; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 10.v.2008, [reared at] 20°C, L:D 16:8, emerged: 27.v.2008, 1 ♂, 28.v.2008, 1 ♂, 2.vi.2008, 1 ♂; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 17.v.2008, 20°C, L:D 16:8, emerged: 1.vi.2008, 1 ♂, 2.vi.2008, 2 ♂♂, 5.vi.2008, 2 ♂♂ 1 ♀, 7.vi.2008, 1 ♂ 1 ♀, 12.vi.2008, 2 ♀♀; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 4.iv.2009, [reared at] 6°C, L:D 0:24, instar 3 dissected 10.iv.2009, 20°C, L:D 16:8, [each with empty puparium in gelatin capsule], puparium: 25.iv.2009, emerged: 9.v.2009, 1 ♂, puparium: 30.iv.2009, emerged: 15.v.2009, 1 ♂, puparium: 1.v.2009, emerged: 16.v.2009, 1 ♀, puparium: 6.v.2009, emerged: 20.v.2009, 1 ♂, puparium: 9.v.2009, emerged: 24.v.2009, 1 ♀, puparium: 11.v.2009, emerged: 25.v.2009, 1 ♂, puparium: 14.v.2009, emerged: 29.v.2009, 1 ♂, puparium: 18.v.2009, emerged: 31.v.–1.vi.2009, 1 ♀, puparium: 19.v.2009, emerged: 2.vi.2009, 1 ♀, all K. N. Barber leg. (all CNCI); Elliot Lake, 46°22.23'N 82°36.49'W, sweeps, mixed graminoids incl. *Carex utriculata*, 29.vi.2013, 4 ♂♂ 7 ♀♀ (2 ♀♀ genit. prep.) (CNCI); ~14.5 km SSE Elliot Lake, ~3.7 km NNE jct Hwys 17&108, 46°14.71'N 82°33.53'W, sweeps, mostly *Carex utriculata*, 29.vi.2013, 23 ♂♂ 14 ♀♀ (USNM 5 ♂♂ 5 ♀♀, CNCI 18 ♂♂ 9 ♀♀, 2 ♀♀ genit. prep.), all K. N. Barber leg.; Goulais River, Sand Bay, 46°44.81'N 84°32.68'W, sweeping *Juncus* and *Carex* at margins of fen pools, 10.vii.2010, 1 ♂, J. Roháček leg. (SMOC); Lake Superior P. Pk., Hwy 17 near jct. Agawa Rock, 47°22.31'N 84°41.23'W, sweeps, mostly *Carex utriculata*, 30.vi.2013, 1 ♀ (DEBU 01503844, genit. prep.), 12.vii.2014, 2 ♂♂ 3 ♀♀ (DEBU 01503954–58), K. N. Barber leg.; Manitoulin I[sland], nr. Evansville, Campbell Bay, 45°49'32"N 82°33'14"W, sweeping lake shore graminoid vegetation, 2.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck at Hwy 540, 45°53.1'N 82°06.2'W, sweeps/pooter, *Calamagrostis canadensis*, 4.vii.1999, 1 ♂ 2 ♀♀ (1 ♀ genit. prep.); same locality but 45°53.2'N 82°06.3'W, sweeps, various grasses/sedges in floodplain, 5.vii.1998, 1 ♀ (genit. prep.), all K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 2.viii.2004, 2 ♂♂ 1 ♀ (DEBU 01500873–75), 7.viii.2004, 3 ♂♂ 2 ♀♀ (DEBU 01501092–96), 3.ix.2004, 1 ♂ (DEBU 01501324), 4.ix.2004, 1 ♂ (DEBU 01501431), 27.vi.2005, 4 ♂♂ 2 ♀♀ (DEBU 01501614–19), 7.vii.2007, 1 ♀ (DEBU 01501896), 29.v.2010, 1 ♂ (DEBU 01502435);

same locality but 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 1 ♂ 3 ♀♀ (DEBU 01500726–29), 2.viii.2004, 1 ♀ (DEBU 01500903), sweeps, mostly *Carex utriculata* in fen near boardwalk, 19.vii.2014, 6 ♂♂ 3 ♀♀ (DEBU 01503979–87, 1 ♀ genit. prep.); same locality but 46°58.06'N 84°42.69'W, sweeps, mostly *Carex utriculata* in fen, 19.vii.2014, 6 ♂♂ 6 ♀♀ (DEBU 01503989–4000), all K. N. Barber leg.; ~2 km SW Richmond, along railway 2.9 km NE Kettles Rd., 45°08.54'N 75°51.09'W, sweeps, *Equisetum fluviatile*, *Typha*, *Carex*, *Impatiens*, ditch, 25.vii.2007, 1 ♂; ~4 km SW Richmond, Jct. Munster Rd./Kettles Rd., 45°06.83'N 75°52.76'W, sweeps, sedges, *Equisetum fluviatile*, flooded ditch/fen, 23.vii.2007, 1 ♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Carex aquatilis*, 12.vii.1997, 1 ♂ (genit. prep.), 22.vi.1998, 1 ♂ (genit. prep.), 9.vi.2001, 2 ♀♀, 10.vi.2001, 1 ♂, 28.vi.2002, 2 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), 29.vi.2002, 2 ♂♂ 3 ♀♀ (2 ♀♀ genit. prep.) (CNCI), 1.vii.2002, 1 ♂ 1 ♀ (CASC), 5.vii.2002, 2 ♂♂ 1 ♀ (1 ♀ genit. prep.), 9.vii.2002, 1 ♂ 5 ♀♀ (3 ♀♀ genit. prep.) (CNCI), 12.vii.2002, 1 ♀ (CASC), 31.vii.2002, 2 ♀♀ (1 ♀ genit. prep.), 18.vi.2005, 2 ♂♂ (CNCI), sweeps, mostly *Carex aquatilis*, 12.vi.2001, 2 ♂♂, 13.vi.2001, 1 ♀, 14.vi.2001, 1 ♂ 2 ♀♀ (LACM), 14–17.vi.2001, 2 ♂♂ 7 ♀♀ (1 ♀ genit. prep.), 21–22.vi.2001, 3 ♀♀, 22.vi.2001, 1 ♂, 25.vi.2001, 2 ♂♂ 10 ♀♀ (1 ♀ genit. prep.), 28–30.vi.2001, 5 ♀♀ (1 ♀ genit. prep.) (CNCI), 15.vii.2001, 1 ♀, 17.vii.2001, 4 ♂♂ 3 ♀♀ (AMNH), 18.vii.2001, 5 ♀♀ (1 ♀ genit. prep.), 2.viii.2002, 1 ♀, 4.viii.2002, 1 ♂ 1 ♀ (1 ♀ genit. prep.), sweeps, *Carex lacustris*, 12.vii.1997, 1 ♀, sweeps, mostly *Calamagrostis canadensis*, 29.vii.2001, 1 ♀, sweeps/pooter, mostly *Calamagrostis canadensis*, 12.vii.2002, 1 ♂, sweeps, graminoids mostly *Carex aquatilis*, 11.vi.1997, 2 ♀♀ (CNCI); same locality but 46°29.88'N 84°17.19'W, sweeps, *Carex aquatilis*, 1.vii.2003, 2 ♂♂ 1 ♀ (CASC), 18.vi.2005, 1 ♂ 1 ♀, sweeps, mostly *Carex aquatilis*, 18.vii.2004, 2 ♀♀, sweeps, *Phalaris arundinacea*, 18.vi.2005, 1 ♂ (CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, mostly *Carex* spp., *Scirpus cyperinus*, 5.vii.2008, 4 ♂♂ 1 ♀; S[ault] S[te.] Marie, Birchwood Pk., mixed forest, 28.vi.1986, 1 ♀; S[ault] S[te.] Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 18.vi.2005, 8 ♂♂ 1 ♀, 14.viii.2005, 1 ♂, 25.viii.2005, 1 ♀, 8.vii.2006, 1 ♀, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 5 ♂♂ 7 ♀♀ (2 ♂♂ 7 ♀♀ genit. prep.), 12.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Finn Hill, 46°31.63'N 84°17.29'W, sweeps, *Scirpus microcarpus*, 19.vii.2004, 1 ♂, 27.vi.2007, 2 ♂♂, 13.vii.2007, 1 ♂ 2 ♀♀, 6.vii.2008, 1 ♂; same locality but 46°31.63'N 84°17.33'W, sweeps, *Carex stipata stipata*, 19.vii.2004, 1 ♀, 26.vi.2007, 1 ♂, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 12.vii.2010, 1 ♂, J. Roháček leg. (SMOC); S[ault] S[te.] Marie, Kinsmen Pk., 46°35.7'N 84°16.7'W, sweeps, mostly *Carex*, 11.viii.2002, 1 ♀ (CNCI); S[ault] S[te.] Marie, Sault Coll[ege] Outdoor Lab, 46°32.08'N 84°18.21'W, sweeps, *Carex lacustris* in opening, 17.vii.2005, 16 ♂♂ 20 ♀♀ (1 ♀ genit. prep.) (CNCI), 2.viii.2005, 24 ♂♂ 22 ♀♀ (USNM 5 ♂♂ 5 ♀♀, CNCI 19 ♂♂ 17 ♀♀, 3 ♀♀ genit. prep.), 24.viii.2005, 1 ♂ 1 ♀, sweeps, *Carex lacustris*, 8.vii.2006, 6 ♂♂ 5 ♀♀ (1 ♀ genit. prep.) (CNCI), 28.viii.2006, 5 ♂♂ 6 ♀♀ (SMOC), 16.ix.2006, 2 ♂♂, 17.vii.2007, 7 ♂♂ 16 ♀♀, 12.vii.2008, 2 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), sweeps, *Carex gynandra*, opening edge, 2.viii.2005, 2 ♀♀ (CNCI); ~5 km SE Searchmont, km6.2 Ranger Lk. Rd., 46°45.52'N 83°59.51'W, sweeps, sedges at beaver dam outflow, 23.vi.2007, 1 ♂ (CNCI), all K. N. Barber leg.; Walpole Is., 13.vii.1980, 1 ♀ (genit. prep.), K. N. Barber leg. (DEBU). **QUEBEC:** Gatineau Park, Champlain Outlook, 21.vii.1986, 1 ♂, R. Danielsson leg. (MZLU, genit. prep.); La Trappe, 4.vi.1936, 1 ♀, J. Ouellet leg. (CNCI, genit. prep.); Lac St-Francois Nat. Wildlife Area, NW of Aménage, Therrien, close to Ruisseau Th[errien], 45°00.39'N 74°30.99'W, *Carex* meadow, sweeping, T1a, 5.vi.1999, 1 ♂ 2 ♀♀ (LEMQ 0040135, -41, -42), 7.viii.1999, 2 ♂♂ (LEMQ 0040132, -38), T1b, 5.vi.1999, 2 ♂♂ 5 ♀♀ (LEMQ 0040136, -37, -40, -41, -44, -48, -49, 1 ♀ genit. prep.), 2.viii.1999, 1 ♂ 1 ♀ (LEMQ 0040134, -46), 3–11.ix.1999, 1 ♀ (LEMQ 0040140), T1c, 5.vi.1999, 1 ♂ 2 ♀♀ (LEMQ 0040133, -45, -47); same locality but 45°02.40'N 74°28.03'W, ex. *Carex lacustris*, under sheath leaf at 10–15 cm from roots, (F2.#157), 19.x.1999, emerged 9.ii.2000, 1 ♀ (LEMQ 0040151), all F. Beaulieu leg. **UNITED STATES OF AMERICA:** **ILLINOIS:** Champaign Co., 25.v.1925, 1 ♀, M. W. Shackleford leg. (CNCI). **MASSACHUSETTS:** Sandwich, 22.vi.1924, 1 ♀ (genit. prep.), A. H. Sturtevant leg.; Woods Hole, 6.vi.1913, 1 ♂, [no collector] (both USNM). **NEW YORK:** Bemus Pt., Chautauqua Lake, swampy woods, 31.v.1963, 1 ♀ (genit. prep.); Chautauqua Co., S. Dayton, marsh area, 1.vi.1963, 1 ♀ (genit. prep.), both W. W. Wirth leg. (both USNM); Roch, 22.vii.1942, 1 ♂, H. Stalker leg. (AMNH). **NORTH CAROLINA:** Highlands, 3800', 17.viii.1957, 1 ♂, J. G. Chillcott leg. (CNCI). **OHIO:** Portage Co., Kent, 41°09'N 81°30'W, 17.vi.2006, 1 ♀; Portage Co., 4 mi NE of Kent, Battaglia Bog, swept from *Carex oligosperma*, 15.v.1999, 1 ♂ 3 ♀♀ (3 ♀♀ genit. prep.); Portage Co., 3 mi NE of Kent, Towners Woods Marsh,

1.vi.2005, 1 ♀; Portage Co., NE of Kent, Towners Woods Marsh, swept from *Scirpus cyperinus*, 8.vi.2005, 2 ♂♂ 3 ♀♀, 16.vi.2005, 1 ♂, 25.vi.2005, 1 ♂, 26.vii.2005, 1 ♂; Portage Co., NE of Kent, Towners Woods Marsh, 41°10'N 81°18'W, swept from *Leersia oryzoides* (L.) Sw., 14.v.2007, 1 ♀, swept from *Scirpus cyperinus*, 20.v.2007, 1 ♂ 3 ♀♀; Portage Co., 4.0 mi E of Kent, 41°08'11"N 81°16'44"W, 1.vi.2005, 1 ♂ 1 ♀, all B. A. Foote leg. (all CMNH). VIRGINIA: Chain Bridge, 10.ix.1922, 1 ♂, J. R. Malloch leg. (USNM).

Other material examined (not included in type series). CANADA: ONTARIO: Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 17.v.2008, 20°C, L:D 16:8, emerged: 5.vi.2008, 1 ♀, K. N. Barber leg. (CNCI, shriveled, genit. prep.); ~14.5 km SSE Elliot Lake, ~3.7 km NNE jct Hwys 17&108, 46°14.71'N 82°33.53'W, sweeps, mostly *Carex utriculata*, 29.vi.2013, 1 ♂, K. N. Barber leg. (CNCI, head crushed, wing illustration); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC, used for molecular analysis). QUEBEC: Lac St-Francois Nat. Wildlife Area, NW of Aménag. Therrien, close to Ruisseau Th[errien], 45°00.39'N 74°30.99'W, *Carex* meadow, sweeping, T1b, 5.vi.1999, 1 ♀, F. Beaulieu leg. (LEMQ 0040150, headless, genit. prep.).

Description. Male. Total body length 2.26–3.09 mm; colour resembling that of pale form of *A. gibbiger*, generally yellow (Fig. 384) with variable ochreous to pale brown darkenings on head and thorax (always with brownish dorsal band on pleuron) and more distinctly yellow-and-brown variegated preabdominal terga; no dichroism recognized (dark form absent). Head similar to that in *A. gibbiger*, distinctly longer than high (thus more elongate than in *A. variegata*) and anteriorly angular in profile with somewhat receding face. Head almost completely yellow, with only ocellar triangle and some marginal darkenings on occiput brownish (see below). Occiput slightly concave, largely yellow but usually with narrow faint darker stripes dorsolaterally and above foramen; medially with two elongate silvery white microtomentose spots meeting above foramen (as in *A. variegata*). Frons narrow as in relatives, yellow, usually darker yellow to orange ochreous anteromedially and along orbits, mostly dull; ocellar triangle pale brown to brown; frontal triangle relatively dull yellow but slightly glittering in contrast to entirely opaque and paler yellow adjacent areas. Orbits pale yellow, silvery whitish microtomentose, less distinctly beyond posterior ors. Frontal triangle narrow, reaching midpoint to anterior third of frons. Frontal lunule small, transverse, pale yellow. Face narrow, medially concave or with longitudinal furrow; dull yellow and separated from parafacialia by wide golden orange marginal stripe (as in pale form of *A. gibbiger*); parafacialia and gena whitish yellow to white, with silvery white microtomentum; ventral marginal stripe of gena yellow and wider than in most relatives. Postgena and mouthparts yellow to light yellow. Cephalic chaetotaxy generally as in *A. variegata*, except vte often as long as vt_i and posterior ors (thus these setae subequal); middle ors sometimes reaching length of posterior ors. Eye ovoid, more elongate than in *A. variegata*, with longest diameter 1.5–1.6 times as long as shortest. Shortest genal height 0.13–0.15 times as long as shortest eye diameter. Antenna flattened, geniculate, yellow; 1st flagellomere usually darker on outer side than on inner, and with white pilosity distinctly shorter than in *A. variegata*. Basal segments of arista ochreous yellow to pale yellow and distal seta blackish brown; arista 1.8–1.9 times as long as antenna, relatively shortly pubescent (as in *A. gibbiger*), with cilia markedly shorter than those on 1st flagellomere.

Thorax very slightly narrower than head, largely yellow, with rather faint brownish pattern on scutum, and darker band on pleuron. Scutum yellow, usually with darker yellow to pale ochreous brown sublateral bands, sometimes with a pair of medial darker stripes in addition.

Humeral and notopleural areas pale yellow; scutellum yellow to dark yellow. Dorsum of thorax somewhat pale ochreous grey microtomentose and relatively dull. Pleural part of thorax more shining than scutum, yellow to pale yellow (ventrally), always with pale brown to brown dorsal band. Postscutellum distinctly darker than postnotum and scutellum, ochreous yellow to ochreous brown. Thoracic chaetotaxy as in *A. variegata* but prs usually shorter and weaker than hu, sa or pa; the smaller anterior dc about as long as or shorter than anterior npl, and 6–8 dc microsetae in front of anterior dc; 4–5 rows of ac microsetae at suture, only 2 medial rows between dc ending usually at level of posterior dc; apical sc subequal to posterior dc (both longest thoracic setae); no additional small setulae on scutellum, laterobasal short sc situated more dorsally on disc (as in *A. gibbiger*); stpl setae and setulae as in *A. gibbiger* including occasional occurrence of 1 additional setula in front of anterior stpl. Scutellum broader than in *A. gibbiger*, thus more similar to that of *A. variegata*. Legs coloured as in *A. variegata* and other relatives; also pedal chaetotaxies very similar but f_1 with ctenidial spine not longer (often shorter) than maximum width of t_1 , thus markedly shorter than in all Nearctic relatives. Wing (Fig. 440) narrow, elongate and coloured as in *A. gibbiger*. Also venation very similar to that of the latter species, including R_{2+3} with apex very slightly upcurving; R_{4+5} very slightly bent and parallel, M almost straight, dm cell long, with r-m situated in front of its middle and apical portion of CuA_1 longer than dm-cu. Wing measurements: length 2.24–2.74 mm, width 0.65–0.85 mm, $Cs_3 : Cs_4 = 1.12–1.38$, $rm \setminus dm-cu : dm-cu = 2.62–3.69$. Haltere dirty yellow with some ochreous to pale brown tinge.

Abdomen ventrally pale yellow, dorsally yellow-and-pale brown variegated (Fig. 384), thus its transverse striping usually less distinct, resembling that of pale forms of dichroic relatives. T1 pale brown with anterior corners light yellow. T2–T5 more or less yellow in anterior half, posteriorly with transverse pale brown band covering half or more of tergum and almost reaching onto posterior corners but lateral margins of terga largely yellow. T1–T5 subshining with setae relatively short and sparse compared to *A. variegata*. T1 and T2 distinctly separate, only laterally fused. T2–T5 transverse, subequal in size. Preabdominal sterna pale yellow, relatively narrow and becoming distinctly wider posteriorly, similar to those of *A. gibbiger* including chaetotaxies. T6 bare, short, strongly transverse and very pale to unpigmented. S6 and S7 pale yellow, both with fine brownish anterior marginal ledge and each with 1–(usually)2 setae; S8 as long as but distinctly narrower than epandrium, with about anterior third yellow, and posterior two-thirds brownish and more setose.

Genitalia. Epandrium (Figs 441, 443) pale yellow, about as long as, but slightly wider and higher than that of *A. gibbiger*, densely setose, dorsolaterally with 2 or 3 longer and thicker setae (most dorsomedial one longest); anal fissure rounded triangular but smaller than in *A. gibbiger*. Cercus rather small and setose as in the latter species. Medandrium (see Fig. 441) also as in *A. gibbiger* or dorsally more narrowed. Gonostylus (Figs 441, 443, 448) distinctly different from that of *A. gibbiger*, elongate, almost as long as epandrial height, not expanded posteroproximally but gradually tapered towards apex and ending in two (anterior stronger) teeth; outer side of gonostylus covered by micropubescence except for anterior and apical parts; longer setae inserted mainly on inner side, most densely posteroproximally. Hypandrium (Fig. 444) as in *A. gibbiger* and other relatives. Transandrium (Figs 442, 445) closely

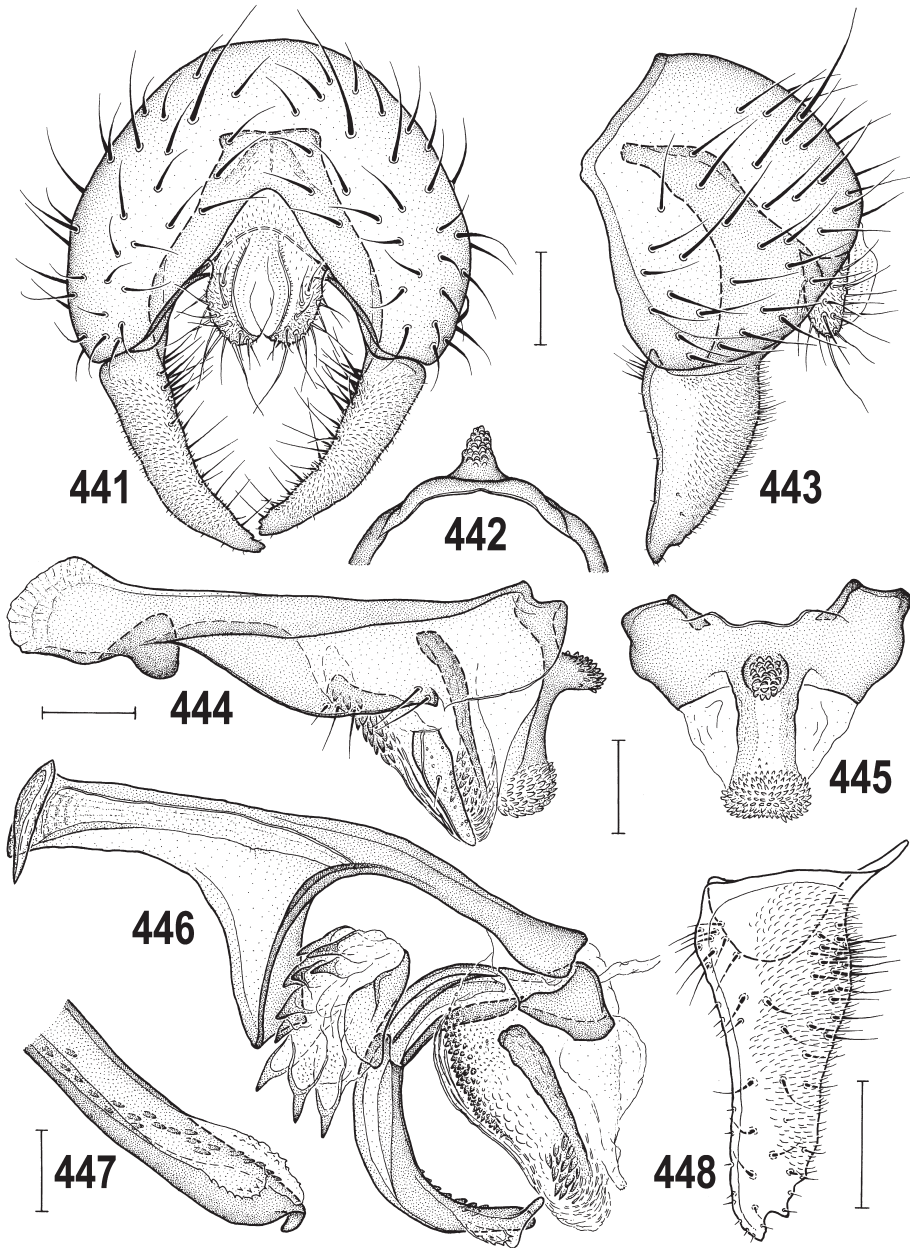
resembling that of *A. gibbiger*, including caudal process having dorsally a hump-shaped projection overgrown by short dark spines, but this projection smaller (Figs 444) and more slender (Fig. 442). Distal part of caudal process almost bare, only (ventral) basal membrane densely shortly spinose. Pregonite (Fig. 444) completely fused to hypandrium, with posterior process reduced and carrying 2 longer setae, anteriorly simple, slightly convex ventrally and with 3 short setae. Postgonite (Fig. 444) pale-pigmented, relatively small, slender and almost straight, distally somewhat tapered and with rather acute apex; its outer side with 1 setula in basal two-fifths plus several sensillae. Basal membrane (Figs 444, 445) covered by a dense group of small, short (shorter than in *A. gibbiger*) and flat spines. Aedeagal part of folding apparatus provided besides small dark spine-like tubercles (Fig. 446) also with series of bigger spines (distinctly smaller than in *A. gibbiger*) on hyaline striae (visible in Fig. 444 above postgonite). Connecting sclerite as in *A. gibbiger*, dark, dorsally more sclerotized (Fig. 446) and ventrally provided by a group of short dark but pointed spines. Phallapodeme of the same construction as that of *A. gibbiger*. Aedeagus (Fig. 446) differing from that of *A. gibbiger* only as follows. Saccus with more distinct basal sclerite attached to base of filum but otherwise armed as in *A. gibbiger*. Filum differing mainly by thicker apex with terminal curved projection short and blunt; also tooth-like spines alongside dorsal surface of terminal part of filum smaller (Fig. 447). Ejacapodeme (not figured) reduced, very slender, pale and formed as in *A. gibbiger*.

Female. Similar to male unless mentioned otherwise. Total body length 2.50–3.57 mm. Antenna with 1st flagellomere darker than in male (resembling that of darker specimens of *A. gibbiger*), with ochreous brown area covering most of outer side except for yellow basal and ventral marginal parts; inner side of 1st flagellomere yellow. Darker pattern of thoracic scutum usually paler and less discernible than in males; usually with at least a short, brownish lateral darkening in front of transverse suture, sometimes very distinct and extending beyond suture, but rarely absent. Dorsal dark band on pleural part of thorax usually widened anteriorly to ventral margin of spiracular plate (usually not so in *A. gibbiger* females). Ctenidial spine on f_1 long and strong, markedly longer than maximum width of t_1 , thus similar to those of females of related species. Wing relatively wider than in males. Wing measurements: length 2.54–3.45 mm, width 0.85–1.11 mm, $Cs_3 : Cs_4 = 1.08–1.53$, $rm \setminus dm-cu : dm-cu = 2.41–3.68$. Preabdominal terga T2–T6 with posterior dark transverse bands usually more distinct and shorter than in males, and usually larger and more distinct than in *A. gibbiger* females; stripes on T3–T6 may be medially narrowed, with stripe on T6 sometimes narrowly divided. T2–T5 subequal in size but shorter and more transverse than in male, wider than T6. Preabdominal sterna pale yellow, becoming wider posteriorly but (particularly S4 and S5) somewhat narrower than in male. S2 as long as wide, S3 slightly, S4 more, S5 distinctly transverse and trapezoidal. S5 largest and widest, about as wide as postabdominal S6.

Postabdomen (Figs 450, 451) very similar to that of *A. gibbiger*, moderately long, tapered

Figs 437–440. Wings of the Nearctic species of the *Anthomyza neglecta* group. 437 – *A. variegata* (Loew, 1863) male, wing length 2.4 mm (USA: Tennessee); 438 – *A. dichroa* sp. nov., male, wing length 2.5 mm (Canada: Ontario); 439 – *A. gibbiger* sp. nov., male, wing length 2.3 mm (Canada: Ontario); 440 – *A. orthogibbus* sp. nov., male, wing length 2.5 mm (Canada: Ontario). Photo by K. N. Barber.



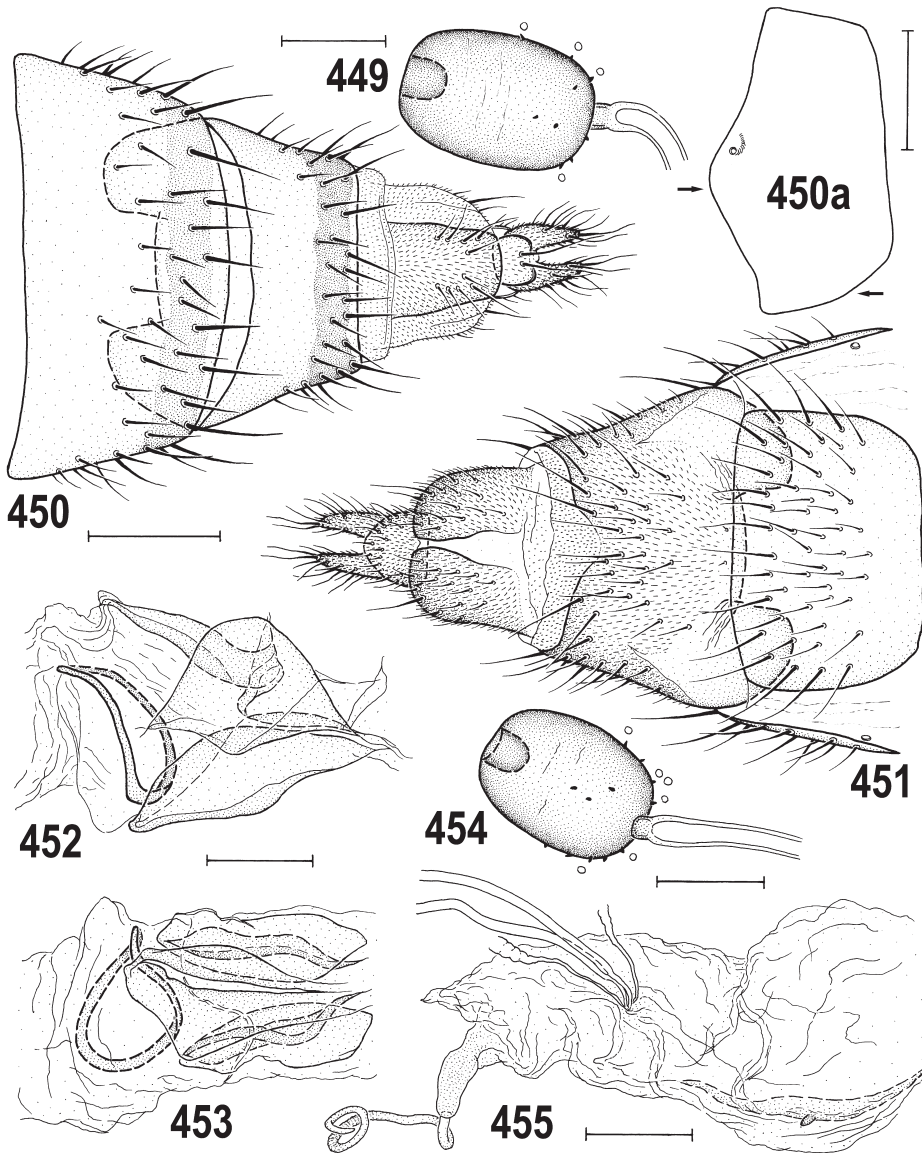


Figs 441–448. *Anthomyza orthogibbus* sp. nov., paratype male (Canada: Ontario). 441 – external genitalia, caudally; 442 – transandrium, dorsally; 443 – external genitalia, laterally; 444 – hypandrial complex, laterally; 445 – transandrium, caudally; 446 – aedeagal complex, laterally; 447 – apex of filum, subventrally; 448 – gonostylus, lateroventrocaudally, widest extension. Scales = 0.05 mm (Fig. 447) and 0.1 mm (others).

posteriorly, telescopic, with most sclerites yellow, only T6 and T7+S7 with posterior brown band. T6 simple, large, slightly tapered posteriorly with rounded posterior corners, yellow, with more distinct dark band at posterior margin, with most of setae in posterior half, those at posterior margin longest. S6 slightly transversely suboblong to trapezoidal (thus longer than in *A. gibbiger*), pale yellow and finely densely setose. Tergosternum T7+S7 conical, distinctly shorter dorsally than ventrally, yellow with distinct brown stripe (slightly wider than in *A. gibbiger*) at posterodorsal margin (Fig. 450) reaching lateral surface; T7+S7 anteroventrolaterally somewhat expanded as in *A. gibbiger* to form anteroventral lobes (Fig. 451) though not pouch-like as in *A. variegata*, largely yellow but often with faint darkening at ventral posterior margin (but not medially); medioventral area (Figs 450a, 451) hardly pronounced in contrast to that of *A. gibbiger* (Figs 450a, see ventral arrow, 451); in lateral view the segment is distinctly longer and anteriorly in the middle more angular (Fig. 450a, see anterior arrow) than in the latter species. Dorsal parts of T7+S7 with short setae at posterior dark margin (Fig. 450) as in *A. gibbiger*, ventral part (= original S7) most densely setose medially (Fig. 451). 8th segment micropubescent laterally. T8 yellow, narrow and elongate, much longer than wide, posteriorly rounded (Fig. 450), distinctly micropubescent and setose (setae slightly exclinate as in *A. gibbiger*) in posterior half; S8 (Fig. 451) markedly wider than T8, medially divided into 2 convex, finely hirsute and micropubescent sclerites as in relatives. Genital chamber (uterus) long, posteriorly with pale-pigmented internal sclerotization (Figs 452, 453) formed by 3 pairs of crooked, poorly defined and partly fused sclerites (similar to those of *A. gibbiger*), and 1 suboval, asymmetrical and bent annular sclerite (somewhat larger than in latter species). Distal membranous part of genital chamber (Fig. 455) with pale and poorly defined ventral plate as in *A. gibbiger*. Ventral receptacle (Fig. 455) also resembling that of the latter species, with basal broad part shorter and vermicular apex less twisted. Accessory gland as in *A. gibbiger* (not figured). Spermathecae (1+1) rounded cylindrical (Figs 449, 454), very similar to those of *A. gibbiger* but usually more elongate and with terminal invagination deeper. T10 very small (Fig. 450), slightly shorter than broad, with usual posteromedial pair of long setae and reduced micropubescence. S10 longer and wider than T10, rounded pentagonal in ventral view (Fig. 451), finely setulose and micropubescent. Cercus moderate, slender (basally somewhat wider than in *A. gibbiger*), with usual setae, apical and dorsopreapical longest (Figs 450, 451).

Discussion. As stated above, *A. orthogibbus* forms with *A. gibbiger* a distinct sister pair (for shared characters see the discussion under the latter species). It seems to be the only Nearctic species of the *A. neglecta* group where non-sexual dichroism has not been found (even in the male sex), thus resembling in this way the Palaearctic members of this species group. The male of *A. orthogibbus* can be easily distinguished from all Nearctic relatives not only by the elongate and distally tapered shape of the gonostylus (Fig. 448) but also by the strikingly short ctenidial spine on the f_1 (being as long as or shorter than the maximum width of t_1). For other differences from the related *A. gibbiger*, see the above description; the most diagnostic characters of the (often difficult to identify) female are also enumerated in the discussion under *A. gibbiger*.

Etymology. The name *orthogibbus* is a Latin noun in apposition with a Greek prefix *ortho* (= upright hump). It refers to the hump-like structure of the caudal process of the transandrium shared with its closest relative, *A. gibbiger*.



Figs 449–455. *Anthomyza orthogibbus* sp. nov., paratype female (Canada: Ontario). 449 – spermatheca; 450 – post-abdomen, dorsally; 450a – lateral outline of T7+S7; 451 – postabdomen, ventrally; 452 – female internal sclerites, laterally; 453 – the same, ventrally; 454 – spermatheca; 455 – distal part of female genital chamber, laterally. Scales = 0.05 mm (Figs 449, 454), 0.2 mm (Figs 450, 450a, 451) and 0.1 mm (others).

Biology. *Anthomyza orthogibbus* is most often associated with sedges, including repeated records from *Carex lacustris* (Ontario: Sault Ste. Marie; Quebec: Lac St-Francois Nat. Wildlife Area, latter reared from larva), *C. aquatilis* (Ontario: Sault Ste. Marie), and *C. utriculata* (Ontario: Echo Bay, Elliot Lake & environs, Lake Superior P. Pk., Pancake Bay P. Pk.). Other sedges include *Carex stipata* var. *stipata* (Fig. 421), *C. gynandra* (Ontario: Sault Ste. Marie), *C. oligosperma* Michx. (Ohio: Battaglia Bog), *Scirpus cyperinus* (Ontario: Sault Ste. Marie; Ohio: Kent environs) and *S. microcarpus* (Ontario: Sault Ste. Marie, Fig. 421).

Anthomyza orthogibbus was encountered several times as adults in the Ontario: Echo Bay Marsh site where *A. equiseti* was studied (see details under that species). It was assumed that these swept adults were associated with another plant in the mixture dominated by *Equisetum fluviatile*. Subsequent rearings from bulk samples of organic substrate and overwintered *E. fluviatile* stems again suggested that there might have been some *Carex* component or contaminant present in the samples serving as a source of these adults (wet organic substrate – 2 ♀♀; dry overwintered stems – 3 ♂♂ in boxes and 6 ♂♂ 5 ♀♀ in pails; see under *A. equiseti* for details). However, nine adults (5 ♂♂ 4 ♀♀) emerged from puparia obtained in the spring as larvae, directly from the nodes of *E. fluviatile*, so this plant species must be considered at least an incidental (sufficient) host at certain sites or densities. The possibility that these larvae moved from *Carex* to the nodes of *E. fluviatile* in the fall for one reason or another we think is remote. The pupariation period for eight of these adults was 14.6 ± 0.2 days for males ($n = 5$) and 14.7 ± 0.3 days for females ($n = 3$) at 20°C .

Anthomyza orthogibbus is often found syntopically with the usually more numerous *A. gibbiger* (see discussion under that species). This species has been collected from 14 May (Ohio: Towners Woods Marsh) to 16 September (Ontario: Sault Ste. Marie).

Distribution. This species has the most restricted range of the four Nearctic species of the *A. neglecta* group but it is also the least frequently encountered species. The available records are from Canada: Manitoba, Ontario, Quebec and United States of America: Illinois, Massachusetts, New York, North Carolina, Ohio, Virginia (see Table 2).

The *Anthomyza tschirnhausi* group

The group is established here for three species of *Anthomyza*, the E. Palaearctic *A. tschirnhausi* Roháček, 2009 and two Nearctic species described below, *A. shewelli* sp. nov. and *A. gilviventris* sp. nov. ROHÁČEK (2009a) tentatively associated *A. tschirnhausi* with the *A. collini* group but claimed that this affiliation is poorly supported because *A. tschirnhausi* is strikingly different from the other two (exclusively Palaearctic) members of the *A. collini* group. The *A. tschirnhausi* group can be diagnosed as follows (probable apomorphies, although sometimes not unique, are marked by A in parentheses): (1) t_2 with very short (posterior) ventroapical seta being paired with small (setuliform) to almost equally thick but shorter anterior seta (A); (2) epandrium high and narrow; (3) medandrium high, narrow and tapered dorsally (A); (4) hypandrium with distinct flat internal lobes (A); (5) postgonite very slender, elongate, directed ventrally and with 1 long fine seta; (6) basal membrane with lateral parts adjacent to caudal process of transandrium secondarily sclerotized and distinctly pigmented (A) (note: this character was apparently overlooked in *A. tschirnhausi* due to alcohol-fading of paratype

male illustrated, see ROHÁČEK 2009a: Figs 60, 62); (7) saccus with laterobasal lobe (bulge) (A); (8) filum finely spinulose along most of its length (A); (9) female postabdomen very narrow and elongate (A); (10) female tergosternum T7+S7 posteriorly tapered, long, very narrow, and somewhat laterally flattened (A); (11) T8 extremely narrow and elongate (A), with most of setosity reduced to microsetae or setiform sensillae and without micropubescence; (12) S8 (medially divided to form a pair of sclerites) also unusually long, narrow, devoid of micropubescence and with reduced setosity (A); (13) female genital chamber with one pair of very elongate sclerites besides the usual annular sclerite; (14) spermathecae subovoid and transversely striated, without terminal invagination; (15) female cercus with shortened setae and reduced micropubescence (the latter only on ventral side) and with apical seta exclinate (A).

The relationship of the *A. tschirnhausi* group has not been clearly defined; however, the formation of some genitalic structures (e.g. high medandrium, elongate postgonite, distinct caudal process of transandrium, and, particularly, the number and form of female internal sclerites) indicate that it may be more closely related to the *A. gracilis* group than to the *A. collini* group. Particularly, the finely spinulose filum of the distiphallus and the very elongate internal paired sclerites in the female genital chamber are the most distinctive synapomorphies linking the *A. tschirnhausi* and *A. gracilis* groups because they are unique within the genus *Anthomyza*. The affinities of species within the *A. tschirnhausi* group are not very obvious because *A. gilviventris* more closely resembles *A. tschirnhausi* in the male genitalia (gonostylus in particular) while in the formation of the female postabdomen it more closely resembles *A. shewelli*. The Palaearctic *A. tschirnhausi* could possibly be a sister group to the Nearctic pair *A. shewelli* + *A. gilviventris*, if the more narrowed and prolonged female postabdominal sclerites with more reduced setosity are interpreted as synapomorphic in the latter pair.

Key to identification of the Nearctic species of the *Anthomyza tschirnhausi* group

- 1 Male. 2
- Female. 3
- 2(1) Gonostylus (in widest extension view, Figs 466, 473, 508, 509) with anterior margin distinctly convex. Thorax less densely grey to greyish brown microtomentose (Fig. 481) and with mesonotum usually subshining anteriorly. ***A. shewelli* sp. nov.**
- Gonostylus (in widest extension view, Figs 493, 510–512) with anterior margin concave to almost straight. Thorax with dense grey microtomentum (Fig. 483), often with some bluish tinge (including mesonotum anteriorly). ***A. gilviventris* sp. nov.**
- 3(1) T7+S7 entirely orange yellow to pale orange brown, sometimes with only a very narrow diffuse darkening on posterior margin and small brown marks on anterolateral lobes, OR only dorsolaterally narrowly brownish-darkened at posterior margin and ventrally with distinct and contrasting dark brown anterolateral lobes (Figs 484, 496, 517). ***A. gilviventris* sp. nov.** (in part)
- T7+S7 dorsolaterally with at least posterior quarter (Figs 458, 474), largely (Fig. 515) to entirely (Figs 482, 502) dark brown, never as above. 4
- 4(3) Spermathecae relatively large, the larger one 0.9–1.2 times as long as medial length of S10, usually more elongately ovoid and with sparsely striated surface (Figs 479, 480). T7+S7 with microtomentose area below 7th spiracle unpigmented, narrowly depressed

and usually separated from dorsal darker part by a more or less distinct lateral ridge (Fig. 516). Thorax usually less densely grey to greyish brown microtomentose (as in Fig. 481) and with mesonotum usually subshining anteriorly (Figs 2, 458).

- **A. shewelli sp. nov.**
 – Spermathecae relatively small, 0.6–0.8 times as long as medial length of S10, usually more broadly ovoid and with more densely striated surface (Figs 494, 498, 501, 505, 514). T7+S7 with microtomentose area below 7th spiracle pale- to dark-pigmented, flat, usually without lateral ridge (Fig. 517). Thorax with dense grey (often with some bluish tinge) microtomentum and, including mesonotum anteriorly, almost dull (Figs 482, 484). **A. gilviventris sp. nov.** (in part)

Anthomyza shewelli sp. nov.

(Figs 2, 456–458, 460–481, 485, 508, 509, 516)

Type material. HOLOTYPE: ♂, “CAN: ON: ~74kmNNE The-ssalon, shore of Mississagi R., 17.vii.2010, KNBarber, sweeps, graminoids, herbs, *Equisetum* spp. 46°53.94'N 83°16.23'W” and “Holotypus ♂ *Anthomyza shewelli* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in perfect condition, with exposed genitalia and well-exposed gonostyli (see Fig. 481) (CNCI, intact). PARATYPES: **CANADA: MANITOBA:** Aweme, Criddle farm, spring nr. Assiniboine River, 49°42'N 99°36'W, sweep vegetation at spring, 13.vi.1999, 1 ♀, T. A. Wheeler leg. (LEMQ 0039606); ~14 km SW Falcon Lake, jct. Hwy#1 & Rd.86E, 49°38.24'N 95°29.89'W, sweeps, graminoids, mostly *Carex* spp., 29.vii.2011, 1 ♂ 1 ♀, K. N. Barber leg.; 5 mi SW Shilo, 28.vi.1958, 1 ♀, R. Hurley leg., 2.viii.1958, 1 ♂, J. G. Chillcott leg.; ~6 km SW Shilo, 49°45.19'N 99°41.28'W, edge of wet area, sweeps, incl. *Equi-
[setum] fluviatile*, *Carex*, *Calamagrostis*, *Impatiens*, 10.vii.2011, 1 ♀, K. N. Barber leg. (all CNCI). **NEW BRUNSWICK:** Chamcook, 30.vi.1965, 1 ♂; Chamcook, Glebe Road, 14.vii.1965, 2 ♀♀, all G. E. Shewell leg.; Kouchibouguac N. P., Code 5433Y, 27.vi.1977, 1 ♂ 3 ♀♀, J. R. Vockeroth leg. (all CNCI). **NEWFOUNDLAND:** Aspen Br[oo]k Cp. [P. Pk.], 18.vii.1961, 1 ♂, C. P. Alexander leg. (USNM); Bay d’Espoir, low veg. on bog, 11.vii.1985, 1 ♀, L. Hollett leg.; Black Head, 21.vii.1967, 1 ♀, J. F. McAlpine leg.; Coal Brook, 24.vi.1983, 3 ♂♂ 1 ♀, A. Borkent leg.; Little H[arbour] East, moist veg. nr. stream, 10.vii.1984, 1 ♂ 1 ♀, L. Hollett leg. (all CNCI); Junction Pond, Notre Dame Cp. [P. Pk.], 11.vii.1961, 2 ♂♂, C. P. Alexander leg. (USNM); Avalon Pen[insula], Portugal Cove, Indian Meal Line, 15.vii.1982, 1 ♀, 31.vii.1982, 1 ♂, b. l., 15.vii.1982, 2 ♀♀ (1 ♀ genit. prep.), [no collector] (NFRIC); Portugal Cove, Northeast Pond, 11.vii.1987, 1 ♂; Portugal Cove, sedge fen, 27.vi.1987, 1 ♂ (genit. prep.), both T. A. Wheeler leg. (both DEBU); St. John’s, Agric. Exp. Stn., 26.vii.1967, 1 ♀, J. F. McAlpine leg. (CNCI, genit. prep.). **NOVA SCOTIA:** CBHnt. [Cape Breton Highlands National] Pk., Cheticamp R., PG563688, forest floodplain, 1.vi.1984, 1 ♀, B. E. Cooper leg.; same locality but Lone Shieling, PG731861, swept along fast rocky stream, 28.vi.1983, 1 ♀, J. R. Vockeroth leg.; same locality but Pleasant Bay, PG684871, wet hardwood forest, 10.vii.1984, 2 ♀♀, H. J. Teskey leg.; Cape Breton, 2 mi W Lone Shieling, Anse R., 29.v.1983, 2 ♀♀, H. Goulet leg.; Kentville, 6.viii.1958, 1 ♂, J. R. Vockeroth leg.; Lawrencetown, Halifax Co., 19–20.vii.1967, 1 ♂, D. M. Wood leg. (all CNCI); Lockeport, 18.vii.1958, 16 ♂♂ 9 ♀♀ (1 ♀ genit. prep.), 25.vii.1958, 3 ♂♂; Cranberry I., Lockeport, 24.vii.1958, 1 ♂, 25.vii.1958, 1 ♀; Mount Uniacke, 5.viii.1958, 1 ♂; Petit Étang, PG565677, marshy river shore, fresh water, 25.vi.1983, 1 ♀; S. Harbour, PG929935, marshy lake shore, brackish water, *Carex*, *Iris*, *Juncus*, 27.vi.1983, 1 ♂ 1 ♀; S. Harbour, beach, PG949958, damp ground with *Carex* & *Iris*, 3.vii.1983, 1 ♂, all J. R. Vockeroth leg. (all CNCI). **ONTARIO:** Algonquin Park, 26–30.vi.1955, 3 ♂♂ 5 ♀♀ (1 ♀ genit. prep.), Sabrosky leg. (USNM); Algonquin Pk., 23.vi.1962, 1 ♂ 1 ♀, R. J. Pilfrey leg., 20.vi.1978, 2 ♀♀, 4.vii.1978, 2 ♀♀, D. McCorquodale leg.; Algonquin Pk., Swan Lake Stn., Scott Lake Survey, 45°29'15"N 78°43'20"W, forested slope, 17.vi.1993, 1 ♀, S. A. Marshall leg.; Algonquin P. Pk., nr. Crossbar Lake, 45.3271°N 78.2990°W, Malaise trap, hardwood forest, canopy gap (CR-GAP), 4–17.vii.2008, 1 ♂, E. Proctor leg. (all DEBU); Algonquine [sic], mixed wood, 1.vi.1991, 1 ♀, M. Barták leg. (MBPC, genit. prep.); 10 km NW Penetanguishene, Awenda P. Pk., Second Lake, sweep sedge at shoreline, 13.vii.1992, 1 ♂ 3 ♀♀, T. A. Wheeler leg. (LEMQ 0039598–600, 603); 10 km N Bobcaygeon, “Nogie’s Creek”, sweep creekside veg., 1.vii.1995, 1 ♂, J. M. Dow leg. (DEBU); Britannia, 17.vi.1938, 1 ♀, G. E. Shewell leg. (CNCI); Bruce Co., Cramer Rd., 29.vii.1997, 1 ♂, S. A. Marshall leg.; Bruce Co., Crane River & Hwy#6, sweep, 23.vi.1995, 1 ♀, both

S. A. Marshall leg.; Bruce Co., Hwy#6 @ Crane River, 45°08.91'N 81°28.30'W, sweeps, *Carex aquatilis*, 21.vi.2008, 1 ♂, K. N. Barber leg. (all DEBU); Bruce Co., Dorcas Bay, 45°11'N 81°35'W, 22.vi.2008, 2 ♂♂ 2 ♀♀, S. A. Marshall leg. (DEBU 00299106, -12, -15, -16, 1 ♂ 1 ♀ genit. prep.); Bruce Co., Hwy#6 @ Willow River, 45°10.39'N 81°31.23'W, sweeps, mostly *Carex*, *Equisetum*, 21.vi.2008, 3 ♂♂ 5 ♀♀, J. Klymko leg. (DEBU); Bruce Co., Bruce Pen. Natl. Pk., Lower Andrew Lk., portage trail, sweep, 8.vi.2000, 1 ♂, C. S. Onodera leg. (DEBU 00080050); Bruce Peninsula N. P., Bartley Lake, 45°12.9'N 81°29.3'W, sweeps, shoreline graminoids, 2.vii.1999, 2 ♂♂ 1 ♀, K. N. Barber leg.; Bruce Peninsula N. P., bank of Crane River nr. Hwy 6, 45°08.9'N 81°28.1'W, sweeps/pooter, *Calamagrostis* & *Carex*, 31.vii.1997, 3 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), K. N. Barber leg., sweeps, grasses/sedges, 31.vii.1997, 1 ♂, S. A. Marshall leg.; Bruce Peninsula N. P., Crane River below Lake Scugog, 45°07.0'N 81°32.1'W, sweeps, riverside vegetation, 3.vii.1999, 2 ♂♂ 1 ♀ (1 ♂ genit. prep.), K. N. Barber leg. (all DEBU); Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 20.vi.1999, 1 ♂, S. A. Marshall leg., 3.vii.1999, 5 ♂♂ 6 ♀♀, K. N. Barber leg.; same locality but 45°09.39'N 81°34.43'W, sweeps, *Carex aquatilis*, 22.vi.1999, 2 ♀♀, K. N. Barber leg. (all DEBU); Bruce Peninsula N. P., Emmett Lake, 45°13.1'N 81°29.0'W, sweeps, graminoids, wet area under *Acer*, 2.vii.1999, 1 ♀; same locality but 45°13.4'N 81°28.3'W, sweeps, graminoids, edge of marsh, 2.vii.1999, 1 ♂ 1 ♀; Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.4'W, sweeps, grasses along dry ditch, 31.vii.1997, 1 ♂ 4 ♀♀, 4.vii.1998, 1 ♂ 4 ♀♀; same locality but 45°11.50'N 81°34.61'W, sweeps, sedges in fen, 20.vi.2008, 1 ♂, 22.vi.2008, 8 ♂♂ 1 ♀ (1 ♂ genit. prep.), all K. N. Barber leg. (all DEBU); Bruce Co., Singing Sands, 45°11.5'N 81°34.9'W, 27.vii.1997, 1 ♀, S. A. Marshall leg. (DEBU 00075282); ~40 km NE Chapleau, 47°59.76'N 82°55.04'W, wet roadside sweeps, mostly *Carex utriculata*, 23.vi.2013, 1 ♂ (genit. prep.), 13.vii.2013, 4 ♂♂ 2 ♀♀, wet roadside sweeps, mostly *Carex utriculata*, grasses, 23.vi.2013, 3 ♂♂ 1 ♀; ~5 km SE Cochrane, 49°01.16'N 80°57.93'W, sweeps, raiiside *Equisetum* spp., graminoids, herbs, 18.vii.2009, 1 ♂; ~13.5 km S Cochrane, 48°56.65'N 81°00.18'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 22.vi.2013, 1 ♂, 18.viii.2013, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); Crieff Bog, 3 km W Puslinch, C3bC, pt3b, sedge island, 28.v.–4.vi.1987, 1 ♂, D. Blades leg. (DEBU); Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, 10.vii.2010, 5 ♀♀, K. N. Barber leg. (CNCI); same locality but sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 8 ♂♂ 14 ♀♀, J. Roháček leg. (SMOC, 5 ♂♂ 3 ♀♀ genit. prep., 1 ♂ 1 ♀ photographed); ~35 km WSW Dubreuilville, 2 km SE jct. Hwys.#17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside vegetation incl. wet ditch, 31.vii.2008, 1 ♂ 1 ♀, sweeps, *Equisetum* sp., 31.vii.2008, 2 ♀♀; ~3.8 km ENE Dugwal, 48°35.33'N 80°57.90'W, sweeps, wet ditch, *Carex utriculata*, *Equisetum fluviatile*, *Scirpus*, 23.vi.2013, 1 ♂, 13.vii.2013, 2 ♀♀, all K. N. Barber leg. (all CNCI); ~55 km NNW Elliot Lake, S of Rocky Island Lake, 455 m, 46°49.32'N 82°59.54'W, sweeping, vegetation with predominant *Scirpus* sp., 3.vii.2010, 1 ♀, J. Roháček leg. (SMOC); ~59 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°50.16'N 83°03.05'W, sweeps, mostly *Carex aquatilis* in fen, 3.vii.2010, 2 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); same locality but 455 m, sweeping, mostly *Carex rostrata*? [more likely *C. utriculata*] in fen, 3.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC); ~63 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°49.80'N 83°09.08'W, sweeps, streamside graminoids, 4.vii.2010, 3 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); same locality but 425 m, sweeping streamside graminoids, 4.vii.2010, 3 ♀♀, J. Roháček leg. (SMOC); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, sweeps, *Scirpus [microcarpus]* on dried shoreline, 4.vii.2010, 2 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI); same locality but 405 m, sweeping *Scirpus* sp. [*S. microcarpus*] on dried shoreline, 4.vii.2010, 6 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC, 1 ♂ genit. prep.); Fathom Five Nat. Pk., N. Cove Island, dry cedar, p.m. sweeps, 25.vi.1995, 1 ♂, fen, Bass Bay shore, p.m. sweeps, 25.vi.1995, 4 ♂♂ 5 ♀♀; Fathom Five Nat. Pk., [N.] Cove Island, shore of Bass Bay, sweep, 26.vii.1995, 1 ♂, all S. A. Marshall leg. (all DEBU); Finland, S of Caliper Lake, sweep sedge at beaver dam, 10.vii.1992, 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039601, -602, 2 ♀♀ genit. prep.); ~7.0 km E Foleyet, 48°14.34'N 82°20.75'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 13.vii.2013, 1 ♀; ~2.8 km SE Fraserdale, 49°49.96'N 81°35.03'W, sweeps, mostly *Equisetum fluviatile* in wet ditch, 20.vii.2009, 1 ♂; Goulais River, end of Island Rd., 46°43.57'N 84°24.45'W, sweeps, mud flats, *Equisetum fluviatile*, *Dulichium arundinaceum*, 9.vii.2007, 1 ♂ 1 ♀; Goulais River, Pine Shores Rd., 46°41.67'N 84°25.47'W, sweeps, *Thalictrum*, *Clematis*, sedges, edge of Cranberry Ck., 4.vii.2007, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); Goulais River, Sand Bay, 46°44.81'N 84°32.68'W, sweeping *Juncus* and *Carex* at margins of fen pools, 10.vii.2010, 9 ♂♂ 3 ♀♀, J. Roháček leg. (SMOC, 4 ♂♂ 1 ♀ genit. prep.); ~7.5 km NE Goulais River, Robertson Rd. below Robertson Cliffs, 46°45.89'N 84°18.40'W, sweeps, *Carex gynandra* under *Acer*, 4.vii.2016, 8 ♂♂ 16 ♀♀, K. N. Barber leg. (CNCI); Greenwater P. Pk., 49°11.05'N 81°16.04'W, sweeps, mostly emergent *Equi-*

setum fluviatile, 18.vii.2009, 2 ♂♂ (DEBU 01501989, -90); Greenwater P. Pk., 49°10.91'N 81°16.28'W, sweeps, *Carex*, *Calamagrostis*, *Phalaris*, in creek floodplain, 21.vii.2009, 2 ♂♂ 9 ♀♀ (DEBU 01502129–39); Greenwater P. Pk., 49°10.93'N 81°16.37'W, sweeps, *Phalaris arundinacea* in creek floodplain, 21.vii.2009, 1 ♀ (DEBU 01502107); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp., graminoids, *Caltha*, 21.vii.2009, 3 ♂♂ 6 ♀♀ (DEBU 01502090–98, 1 ♀ genit. prep.), all K. N. Barber leg.; Guelph, 14.vi.1973, 1 ♀, D. H. Pengelly leg., 31.v.1982, 1 ♀, A. W. Schaafsma leg. (DEBU); ~85 km W Hearst, 49°46.14'N 84°49.10'W, gas right-of-way, sweeps, sedges and *Equisetum fluviatile*, 21.vi.2013, 1 ♀; ~5 km NE Heyden, Hwy #17 base of "Mile Hill", 46°41.74'N 84°20.60'W, sweeps, graminoids under alder, 7.viii.2005, 1 ♂ 1 ♀; ~13 km N Heyden, ~3.8 km E Robertson Lake Rd., 46°45.7'N 84°18.4'W, sweeps, *Carex*, *Impatiens*, *Aster*, 1.viii.2005, 1 ♀, all K. N. Barber leg. (all CNCI); Hwy 17N & Trout Lake Road, 46°37.563'N 84°17.019'W, sweep, roadside, 23.vii.2011, 1 ♂ 1 ♀, J. E. Swann & D. R. Edwards leg. (BDUC); Hurkett, dock area, 48°50.42'N 88°29.38'W, sweeps, emergent *Equisetum fluviatile*, 31.vii.2008, 1 ♀; Icewater Creek WS [Watershed], 46°53.72'N 84°03.39'W, sweeps, riparian ferns, graminoids, 5.viii.2006, 1 ♂ 1 ♀; same locality but 12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., alder thicket, 21.vi.1986, 6 ♂♂ 10 ♀♀ (1 ♀ genit. prep.), 23.vi.1986, 2 ♂♂ 3 ♀♀, 7.vii.1986, 1 ♀, 21.vii.1986, 1 ♂, all K. N. Barber leg.; same locality but ~12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., riparian meadow/alder thicket, Malaise, 24–29.vi.1986, 1 ♂, [K. N. Barber] leg.; same locality but 13.5 km NNE Searchmont, mi.15 Whitman Dam Rd., sandy access road, 20.vi.1986, 2 ♀♀, K. N. Barber leg.; Iroquois Falls, overgrown wet shrubby *Sphagnum* bog, 18.vi.1987, 2 ♂♂ 13 ♀♀, swept over small sandy stream, 24.vi.1987, 1 ♂, *Carex*, grass, on unshaded wet soil, 24.vi.1987, 1 ♂, J. R. Vockeroth leg. (all CNCI); ~11.9 km N Kejick, 49°43.89'N 95°04.14'W, sweeps, wet ditch, graminoids/*Equisetum*, 30.vii.2008, 2 ♂♂ 2 ♀♀, sweeps, wet ditch, *Equisetum fluviatile*, 30.vii.2008, 2 ♂♂ 1 ♀, sweeps, wet ditch, *Calamagrostis canadensis*, 30.vii.2008, 1 ♀; King Mt., 26 km N S[ault] S[ainte] Marie, riparian sweeps, 16.vi.1987, 12 ♂♂ 18 ♀♀ (1 ♀ genit. prep.), all K. N. Barber leg. (all CNCI); Lake Superior P. Pk., Crescent Lk. campground, 47°16.66'N 84°33.00'W, sweeps, shoreline sedges, 29.v.2010, 1 ♂, K. N. Barber leg. (DEBU 01502430); same locality but Crescent Lake Trail, 47°16.73'N 84°33.12'W, sweeping *Clin-tonia*, ferns, *Aralia*, *Maianthemum* under *Betula/Acer*, 9.vii.2010, 1 ♂, J. Roháček leg. (SMOC); Lake Superior P. Pk., Hwy 17 near jct. Agawa Rock, 47°22.31'N 84°41.23'W, sweeps, mostly *Carex utriculata*, 30.vi.2013, 3 ♂♂ 2 ♀♀ (DEBU 01503939–43, 2 ♂♂ genit. prep.), 12.vii.2014, 1 ♂ 3 ♀♀ (DEBU 01503950–53), K. N. Barber leg.; Algoma District, Lake Superior Prov. Pk., Rabbit Blanket Lake, 43°41'24"N 80°23'12"W [coordinates do not match locality], 400 m, 20.vi.2001, 1 ♂, S. A. Marshall leg. (DEBU 00170277); Luther Marsh Bog, sweeps, 27.vi.1985, 1 ♂ 4 ♀♀, K. N. Barber leg. (DEBU); ~6.3 km E Macleod, 49°41.37'N 86°51.41'W, sweeps, graminoids incl. *Carex utriculata* & *aquatilis stricta*, 6.vii.2012, 1 ♂, K. N. Barber leg. (CNCI); Manitoulin I., nr. Evansville, Campbell Bay, 45°49'32"N 82°33'14"W, sweeping, lake shore graminoid vegetation, 2.vii.2010, 2 ♀♀, J. Roháček leg. (SMOC); Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck. @ Hwy 540, 45°53.1'N 82°06.2'W, sweeps, various grasses/sedges in floodplain, 4.vii.1999, 2 ♂♂; same locality but 45°53.2'N 82°06.3'W, sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 1 ♀, K. N. Barber leg. (CNCI); Manitoulin Island, 10 km W Gore Bay, 45°53'N 82°34'W, sweep in grassland alvar, 20.vi.1996, 5 ♂♂ 4 ♀♀, P. Bouchard leg. (LEMQ 0039586–94, 1 ♀ genit. prep.); Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.0'N 82°06.3'W, sweeps, lakeside grasses, 4.vii.1999, 1 ♀; same locality but 45°36.5'N 82°06.2'W, sweeps/pooter, graminoids in fen flat, 28.vii.1997, 1 ♂ 4 ♀♀, 30.viii.2004, 1 ♂, sweeps, *Carex/Calamagrostis* in fen flat, 5.vii.1998, 1 ♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); Manitoulin I., Misery Bay Nature Reserve 45°47.64'N 82°44.93'W, sweeping, mostly *Carex* from wetlands boardwalk, 2.vii.2010, 11 ♂♂ 12 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 3 ♀♀ genit. prep.), sweeps, mostly *Carex stricta* from wetlands boardwalk, 2.vii.2010, 2 ♂♂ 1 ♀, K. N. Barber leg. (DEBU 01502488–90); Manitoulin I., nr. Misery Bay Nat. Reserve, Little Lake Huron Road, 45°47.93'N 82°45.52'W, sweeping, mostly *Carex*, *Juncus* on wet alvar, 2.vii.2010, 1 ♂ 11 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.), sweeps, mostly *Carex*, *Juncus*, on wet alvar, 2.vii.2010, 3 ♂♂ 6 ♀♀, K. N. Barber leg. (CNCI); Manitoulin Island, Poplar, 45°46'N 82°28'W, sweep along grassy trail, 27.vi.1992, 1 ♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039604, -05, 1 ♂ genit. prep.); Manitoulin I., Sand Bay, 45°48'06"N 82°47'36"W, dunes, sweep grassy area by stream, 25.vi.2003, 1 ♀, M. Buck leg. (DEBU 01131800); Marmorra, 7.vi.1952, 1 ♀; Mattawa, wet alder thicket, rich undergrowth, 16.vi.1987, 2 ♀♀ (1 ♀ genit. prep.), all J. R. Vockeroth leg.; Hwy#17, ~7 km W Mattawa, 46°17.3'N 78°49.0'W, sweeps, *Carex gynandra*, 30.vi.2005, 5 ♂♂ 4 ♀♀, K. N. Barber leg.; Maynooth, 19.vi.1953, 2 ♀♀, J. F. McAlpine leg.; Mer Bleue, 23.vi.1952, 2 ♂♂, G. E.

Shewell leg.; Midland, 30.vii.1950, 1 ♂ 2 ♀♀ (1 ♀ genit. prep., hind legs in microvial), swampy woods, balsam poplar, 2.v.1959, 1 ♀, J. G. Chillcott leg. (all CNCI); Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, pan traps, 16–19.vi.2010, 1 ♂; Moosonee, 51.24690°N 80.68102°W, Repl. 3 mesic, Malaise trap, 23–26.vi.2010, 1 ♂; Moosonee, 51.28034°N 80.64252°W, Repl. 1 wet, Malaise trap, 15–18.vi.2010, 1 ♂; Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, Malaise trap, 19–22.vi.2010, 1 ♂, all NBP Field Party leg. (all LEMQ); Moosonee, 51°16.07'N 80°38.66'W, sweeps, shoreline graminoids, 9.vii.2014, 1 ♂; Moosonee, 51°16.63'N 80°38.87'W, sweeps, *Calamagrostis*, *Carex*, drier edge of sedge meadow, 9.vii.2014, 2 ♂♂ 2 ♀♀; Moosonee, 51°16.69'N 80°38.86'W, general sweeps, sedge meadow, 9.vii.2014, 11 ♂♂ 9 ♀♀ (1 ♂ genit. prep., 2 pairs in copula); Moosonee, 51°16.75'N 80°38.76'W, sweeps, *Equisetum [fluviatile]* & graminoids, wet edge of sedge meadow, 9.vii.2014, 5 ♂♂ (1 ♂ genit. prep.); Moosonee, 51°16.68'N 80°38.65'W, sweeps, mostly *C[arex] utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 2 ♂♂ 2 ♀♀ (1 ♂ genit. prep.); Moosonee, 51°16.54'N 80°39.00'W, sweeps, *Equisetum*, *Rubus*, *Cornus*, graminoids, edge of wet forest trail, 9.vii.2014, 2 ♀♀, 10.vii.2014, 3 ♂♂, 11.vii.2014, 2 ♂♂ 2 ♀♀; Moosonee, 51°16.55'N 80°39.01'W, sweeps, mostly *Carex* spp., wet forest trail, 11.vii.2014, 1 ♂ 1 ♀ (1 ♀ genit. prep.); Moosonee, 51°16.99'N 80°38.37'W, sweeps, mostly *Equisetum fluviatile*, *Carex* spp., wet sedge meadow, 10.vii.2014, 7 ♂♂ 9 ♀♀; Moosonee, 51°16.36'N 80°39.11'W, sweeps, roadside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 10.vii.2014, 5 ♂♂ 4 ♀♀, 11.vii.2014, 1 ♂ 1 ♀; Moosonee, 51°16.17'N 80°39.10'W, sweeps, mostly *Carex utriculata*, *Scirpus*, in wet hydro cut, 10.vii.2014, 1 ♀, all K. N. Barber leg. (all CNCI); Obatanga P. Pk., 48°20.60'N 85°02.03'W, sweeps, *Carex* sp., *Equisetum fluviatile*, 7.vii.2007, 1 ♂, K. N. Barber leg. (DEBU 01501890); One-Sided [= Caliper] Lake, 26.vi.1960, 1 ♀, Kelton & Whitney leg.; Ottawa, 19.vii.1954, 1 ♂, W. R. M. Mason leg. (both CNCI); Otter Rapids, 50°10.80'N 81°38.59'W, sweeps, *Carex* spp., 19.vii.2009, 1 ♀, sweeps, *Equisetum fluviatile*, 19.vii.2009, 2 ♂♂ 1 ♀, sweeps, roadside *Equisetum* spp., 19.vii.2009, 1 ♂ 1 ♀; Otter Rapids, 50°10.85'N 81°38.65'W, sweeps, grasses in hydro cut, 20.vii.2009, 3 ♂♂ 2 ♀♀ (1 ♀ genit. prep.); Otter Rapids, 50°10.96'N 81°37.88'W, sweeps, mostly *Schedonorus arundinaceus*, on roadside slope, 20.vii.2009, 1 ♂, all K. N. Barber leg. (all CNCI); 1 km S Quimet Canyon, sweeping grass/sedge along river, 1.vii.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0039597); Pancake Bay P. Pk., 46°58.00'N 84°42.47'W, Black Creek floodplain, sweeps, *Carex/Calamagrostis*, 17.vii.2004, 2 ♂♂ 3 ♀♀, K. N. Barber leg. (DEBU 01500246–50); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 17.vii.2004, 2 ♂♂ (DEBU 01500314, -15), 24.vii.2004, 4 ♂♂ (DEBU 01500552–55), 2.viii.2004, 5 ♂♂ 2 ♀♀ (DEBU 01500841–47, 1 ♂ genit. prep.), 7.viii.2004, 1 ♂ 3 ♀♀ (DEBU 01501070–73, 1 ♀ genit. prep.), 27.vi.2005, 2 ♂♂ 1 ♀ (DEBU 01501680–82), 26.v.2007, 1 ♂ (DEBU 01501796), 16.vi.2007, 2 ♂♂ (DEBU 01501799, -800), 7.vii.2007, 1 ♂ 1 ♀ (DEBU 01501897, -98), all K. N. Barber leg.; Pancake Bay Prov. Park, 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 7 ♂♂ 8 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep., 1 ♂ 1 ♀ photographed); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 2 ♂♂ 3 ♀♀ (DEBU 01500697–701), 2.viii.2004, 1 ♂ 1 ♀ (DEBU 01500901, -02); Pancake Bay P. Pk., 46°58.12'N 84°42.75'W, sweeps, mostly graminoids/*Typha* near wetland boardwalk, 2.viii.2004, 1 ♂ 1 ♀ (DEBU 01500961, -62), all K. N. Barber leg.; Petawawa, 7.vi.1961, 2 ♂♂ 1 ♀, J. R. Vockeroth leg.; Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 1 ♂ 1 ♀; Hwy #17 at Prairie River mouth, 48°48.32'N 86°46.64'W, sweeps, grasses, composites, *Rubus*, forest edge, 16.vi.2007, 1 ♀, all K. N. Barber leg.; Puslinch Tsp. [Township], S Lot. 31, Gore Conc[ession], 1 ♂, 26.vi.1981, H. J. Teskey leg. (all CNCI); ~10.8 km W Jct Hwys 556 & 129, km 64.3 Ranger Lk. Rd., 46°53.46'N 83°27.01'W, sweeps, *Equisetum fluviatile* and *Carex* sp., 23.vi.2007, 3 ♂♂ 1 ♀ (♀ genit. prep.), sweeps, *Equisetum fluviatile* and *Dulichium arundinaceum*, 23.vi.2007, 1 ♀, K. N. Barber leg.; 10 km S Richmond, ex. fen, 29.v.1987, 1 ♂, J. M. Cumming leg.; ~4.5 km E Rosseau, on Aspdin Rd., 45°15.88'N 79°34.88'W, sweeps, mostly *Carex* in sedge meadow, 7.vii.2005, 1 ♂ 2 ♀♀, K. N. Barber leg.; St. Ignace II. [Island], Sturgeon Bay, 2.v.1959, 1 ♀, J. G. Chillcott leg. (all CNCI); S[ault] S[ainte] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Carex aquatilis*, 12.vii.1997, 4 ♀♀ (1 ♀ genit. prep.), 26.vi.1998, 1 ♂ 1 ♀, 9.vi.2001, 2 ♂♂ 3 ♀♀, 10.vi.2001, 5 ♂♂ 4 ♀♀ (1 ♀ genit. prep.), 28.vi.2002, 1 ♂ 2 ♀♀, 29.vi.2002, 3 ♂♂ 5 ♀♀ (1 ♀ genit. prep.), 1.vii.2002, 1 ♂ 1 ♀, sweeps, mostly *Carex aquatilis*, 5.vi.2001, 1 ♂ 4 ♀♀ (1 ♂ wing illustration), 12.vi.2001, 2 ♂♂ 5 ♀♀ (1 ♀ genit. prep.) (CNCI), 13.vi.2001, 4 ♂♂ 9 ♀♀ (CNCI 2 ♂♂ 7 ♀♀, 1 ♀ genit. prep.), SMOC 2 ♂♂ 2 ♀♀, 14.vi.2001, 3 ♂♂ 10 ♀♀, 15–16.vi.2001, 5 ♂♂ 6 ♀♀ (incl. 2 pairs in copula), 21.vi.2001, 3 ♂♂ 4 ♀♀, 22.vi.2001, 2 ♂♂, 25.vi.2001, 4 ♂♂ 7 ♀♀, 15.vii.2001, 1 ♂ 3 ♀♀ (1 ♀ genit. prep.), 17.vii.2001, 4 ♂♂ 2 ♀♀, 18.vii.2001, 1 ♂ 4 ♀♀ (1 ♀ genit. prep.), 21.vii.2001, 1 ♂, 29.vii.2001, 1 ♂, sweeps, trailside *Carex/Scirpus*,

14.vii.1998, 1 ♀, sweeps, *Calamagrostis canadensis* & *Carex aquatilis*, 23.vii.1997, 1 ♂ 1 ♀, sweeps, *Calamagrostis canadensis*, 26.vi.1998, 2 ♂♂ 2 ♀♀, sweeps, mixed graminoids, 18.vi.1998, 1 ♀, sweeps/pooter, *Calamagrostis canadensis*, 12.vii.1997, 1 ♀, sweeps/pooter, grassy edge *Populus/Betula*, 11.vii.1997, 1 ♀ (CNCI), K. N. Barber leg.; same locality but 46°29.88'N 84°17.19'W, sweeps, *Carex aquatilis*, 1.vii.2003, 1 ♂ 1 ♀, 18.vi.2005, 5 ♂♂ 2 ♀♀, 27.vii.2005, 1 ♀, sweeps, mostly *Carex aquatilis*, 18.vii.2004, 1 ♀, 2.vii.2007, 1 ♂, sweeps, mostly *Calamagrostis canadensis*, 12.vi.2008, 1 ♂; same locality but 46°29.82'N 84°17.17'W, sweeps, mostly *Carex aquatilis* near river, 21.vii.2005, 1 ♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, *Carex aquatilis*, 29.vi.2008, 2 ♂♂, sweeps, mostly *Carex aquatilis*, 18.vi.2016, 1 ♀, sweeps, mostly *Carex* spp., *Scirpus cyperinus*, 5.vii.2008, 1 ♀, sweeps, mostly *Carex aquatilis*, *Calamagrostis canadensis*, 5.vii.2008, 1 ♀; same locality but 46°29.81'N 84°17.15'W, sweeps, *Carex aquatilis*, *Calamagrostis canadensis* by river, 5.vii.2008, 3 ♂♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Baseline Rd., 46°31.40'N 84°24.40'W, sweeps, *Thalictrum*, *Rubus*, *Equisetum*, *Carex*, ferns, under aspen, 9.vi.2005, 1 ♂ 2 ♀♀, 10.vi.2005, 1 ♀, sweeps, *Rubus*, *Equisetum*, *Thalictrum*, *Impatiens*, ferns, under aspen, 17.vi.2005, 1 ♂ 1 ♀, sweeps, *Carex gynandra*, 8.vii.2006, 1 ♀; same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 1 ♀; same locality but 46°31.61'N 84°24.68'W, w. of creek, sweeps, *Carex* edge of alder thicket, 22.vii.2005, 1 ♂ 1 ♀ (1 ♀ genit. prep.), all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Bellevue Pk., 46°30.1'N 84°18.1'W, sweeps, mostly *Calamagrostis*, 7–8.vii.2000, 2 ♂♂; S[ault] S[ainte] Marie, Birchwood Pk., mixed forest, 28.vi.1986, 3 ♂♂ 4 ♀♀, 5.vii.1986, 1 ♀; same locality but 46°30.7'N 84°15.6'W, sweeps, including *Impatiens*, under *Betula/Acer*, 19.vi.1998, 1 ♀; S[ault] S[ainte] Marie, Bristol Pl[ace] Pk., 46°30.8'N 84°16.6'W, sweeps, *Phalaris arundinacea*, 28.v.1999, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Finn Hill, 46°31.6'N 84°17.3'W, sweeps, graminoids/composites, 19.vii.2005, 1 ♂ 1 ♀; same locality but 46°31.6'N 84°17.4'W, sweeps, mostly graminoids under *Populus*, 4.vii.2002, 1 ♂ 1 ♀, sweeps, graminoids in wet area under *Populus*, 1.vii.2002, 1 ♀; same locality but 46°31.7'N 84°17.5'W, sweeps, mostly sedges in trail, 4.vii.2002, 1 ♂ 5 ♀♀, sweeps, mostly sedges in trail, 7.vii.2002, 2 ♀♀; same locality but 46°31.7'N 84°17.3'W, sweeps, meadow graminoids, 1.vii.2002, 1 ♂, sweeps/pooter, *Calamagrostis canadensis*, 1.vii.2002, 1 ♀; same locality but 46°31.63'N 84°17.33'W, sweeps, *Scirpus cyperinus*, 19.vii.2004, 6 ♂♂ 4 ♀♀, sweeps, *Carex stipata stipata*, 19.vii.2004, 5 ♂♂ 3 ♀♀, 20.vii.2004, 2 ♂♂ 5 ♀♀, 6.vii.2008, 1 ♂ 2 ♀♀, 25.vi.2009, 9 ♂♂ 7 ♀♀, 18.vi.2016, 3 ♂♂ 2 ♀♀, 29.vi.2016, 2 ♂♂ 3 ♀♀, 2.vii.2016, 1 ♂ 1 ♀, pooter, *Carex stipata stipata*, 21.vii.2004, 1 ♂, 22.vii.2004, 1 ♂, 23.vii.2004, 1 ♀, 25.vii.2004, 1 ♂ 1 ♀, sweeps, mostly *Carex stipata stipata*, 26.vi.2007, 17 ♂♂ 21 ♀♀, 13.vii.2007, 1 ♀, all K. N. Barber leg. (all CNCI), sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 1 ♂, 12.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC); sweeps, mostly *Carex/Calamagrostis*, edge of *Populus tremuloides*, 25.vi.2009, 17 ♂♂ 12 ♀♀ (incl. 2 pairs in copula, 2 ♀♀ genit. prep.), sweeps, graminoids, herbs, composites, edge of *Populus tremuloides*, 6.vii.2008, 2 ♀♀, 8.viii.2008, 1 ♀, 25.vi.2009, 1 ♀, 18.vi.2016, 1 ♂ 4 ♀♀, 2.vii.2016, 1 ♂ 2 ♀♀; same locality but 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 18.vi.2005, 1 ♀, sweeps, mostly *Scirpus microcarpus*, *Impatiens*, 27.vi.2007, 1 ♂, all K. N. Barber leg. (all CNCI), sweeping graminoid vegetation, 7.vii.2010, 1 ♀, J. Roháček leg. (SMOC); same locality but 46°31.63'N 84°17.29'W, sweeps, *Scirpus microcarpus*, 19.vii.2004, 5 ♀♀, 4.viii.2004, 1 ♀, 29.vi.2016, 2 ♂♂; same locality but 46°31.63'N 84°17.43'W, sweeps, *Impatiens*, ferns, *Carex gynandra*, 15.vii.2006, 1 ♂ 1 ♀; same locality but 46°31.67'N 84°17.32'W, sweeps, *Calamagrostis canadensis*, 30.vii.2004, 1 ♂; same locality but 46°31.66'N 84°17.34'W, sweeps, mostly *Calamagrostis canadensis*, 12.vi.2008, 1 ♀ (genit. prep.), all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Fish Hatchery Road, near Coldwater Creek, 46°34.29'N 84°17.21'W, sweeping graminoids, *Impatiens*, 9.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC); S[ault] S[ainte] Marie, Landslide Rd., Coldwater Ck. floodplain, 46°33.8'N 84°16.6'W, sweeps/pooter, *Calamagrostis canadensis*, 7.viii.1997, 1 ♀, sweeps, mostly *Carex* sp., 7.viii.1997, 2 ♂♂ (CNCI), sweeps, mostly *Carex aquatilis*, 13.vi.2001, 7 ♂♂ 16 ♀♀ (CNCI 5 ♂♂ 14 ♀♀, 1 ♀ genit. prep., SMOC 2 ♂♂ 2 ♀♀), K. N. Barber leg.; same locality but Coldwater Ck., 46°33.94'N 84°16.66'W, sweeps, graminoids in wet ditch, 26.viii.2008, 2 ♀♀, K. N. Barber leg. (CNCI); S[ault] S[ainte] Marie, River Road, 46°30.4'N 84°15.3'W, sweeps, mostly *Carex* spp., 11.vi.2001, 3 ♂♂ 5 ♀♀; same locality but 2nd Line E, 46°32.3'N 84°16.6'W, sweeps, graminoids in open meadow, 26.vi.1999, 1 ♀; same locality but 2nd Line Ext., 46°32.5'N 84°17.0'W, sweeps, mostly *Carex* sp., 13.vi.2001, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Sault Coll[ège] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, short trail grasses, *Acer/Betula*, 25.vii.1997, 1 ♂ 1 ♀, sweeps, *Carex* sp., 25.vii.1997, 3 ♀♀ (1 ♀ genit. prep.), sweeps, mixed meadow veg., 18.vi.1998, 4 ♀♀, sweeps, trailside graminoids under *Acer/Betula*, 19.vi.2002, 1 ♂, sweeps,

trailside *Carex* under *Acer/Betula*, 30.vi.2002, 1 ♀; same locality but hydro cut nr. Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.0'W, sweeps, mostly sedges, 10.vii.2002, 3 ♂♂ 3 ♀♀ (1 ♀ genit. prep.), all K. N. Barber leg. (all CNCI); [Sault] [Sainte] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, mostly riparian sedges, 16.viii.2004, 2 ♂♂ 1 ♀, sweeps, *Calamagrostis canadensis* in wet area, 16.viii.2004, 1 ♂ 3 ♀♀, sweeps, mostly *Carex/Calamagrostis* in wet area, 16.viii.2004, 1 ♂, 23.viii.2004, 1 ♀, sweeps, mostly *Carex/Calamagrostis* in wet area, 19.vii.2008, 6 ♂♂ 2 ♀♀, 13.viii.2008, 3 ♂♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); same locality but 46°36.62'N 84°17.85'W, sweeps, mixed graminoids in alder thicket, 4.vii.2016, 2 ♂♂ 5 ♀♀ (CNCI), sweeps, *Carex gynandra* in alder thicket, 4.vii.2016, 31 ♂♂ 39 ♀♀ (AMNH, BDUC, CMNH, CASC, CSCA, INHS, KNWR, LACM, LEMQ 3 ♂♂ 3 ♀♀ each; CNCI 4 ♂♂ 12 ♀♀), 7.vii.2016, 29 ♂♂ 31 ♀♀ (MCZN, NMPC, OSAC, PMAE, RBCM, SEMC, UBCZ, USNM 3 ♂♂ 3 ♀♀ each; CNCI 5 ♂♂ 7 ♀♀), all K. N. Barber leg.; [Sault] [Sainte] Marie, Voyageur Trail, 46°35.48'N 84°15.23'W, sweeps, *Calamagrostis canadensis*, 9.vii.2006, 2 ♀♀, [K. N. Barber] leg.; same locality but Wishart Pk., 46°33.86'N 84°17.57'W, sweeps, graminoids/ferns under canopy, 23.vii.2005, 1 ♀; same locality but Whitefish Is./St. Mary's Is., 46°30.68'N 84°21.20'W, sweeps, riparian graminoids, 8.viii.2004, 4 ♂♂ 4 ♀♀, all K. N. Barber leg. (all CNCI); ~10 km W [Sault] [Sainte] Marie, Airport Rd., 46°29.72'N 84°28.96'W, natural gas r[igh]t-of-way, sweeps, mostly ferns, graminoids, 5.viii.2009, 1 ♀, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 2 ♀♀, K. N. Barber leg. (CNCI), sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 2 ♂♂ 1 ♀, J. Roháček leg. (SMOC, 1 ♂ genit. prep.); ~10 km W [Sault] [Sainte] Marie, Sunnyside Beach Rd., 46°29.70'N 84°31.87'W, sweeps, emergent *Equisetum fluviatile* in wet ditch, 22.vi.2007, 2 ♂♂ 1 ♀, K. N. Barber leg. (CNCI); Searchmont, N Hwy #552, 46°50.3'N 84°04.4'W, sweeps, roadside sedges/grasses, 10.vii.1998, 1 ♂ 2 ♀♀; ~5 km SE Searchmont, km6.2 Ranger Lk. Rd., 46°45.52'N 83°59.51'W, sweeps, sedges at beaver dam outflow, 23.vi.2007, 1 ♂; 18 km NNE Searchmont, mi.15 Whitman Dam Rd., grassy access road, 19.vi.1986, 3 ♂♂ 7 ♀♀, 24.vi.1986, 1 ♂, all K. N. Barber leg.; Simcoe, 13.vi.1939, 1 ♂, G. E. Shewell leg. (all CNCI); Smooth Rock Falls, 49°16.04'N 81°36.08'W, sweeps, *Carex utriculata*, 22.vi.2013, 1 ♂; ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, *Equisetum fluviatile* in wet ditch, 19.vii.2009, 2 ♂♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Thessalon, 16.vi.1963, 1 ♂, R. G. Brumpton leg. (DEBU); ~61.5 km N Thessalon, Hwy#129, 47°05.00'N 83°09.40'W, sweeps, emergent *Equisetum fluviatile*/sedges, 23.vi.2007, 1 ♀; ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp. [*E. fluviatile* & *E. palustre*], 5.vii.2010, 5 ♂♂ 4 ♀♀, 17.vii.2010, 17 ♂♂ 13 ♀♀, all K. N. Barber leg. (all CNCI), sweeping graminoids with *Equisetum* spp. on muddy shore, 5.vii.2010, 6 ♂♂ 8 ♀♀ (1 ♂ 1 ♀ genit. prep.); ~92 km NNE Thessalon, nr. Mountain Ash Lake, 47°02.98'N 83°10.88'W, sweeping *Carex aquatilis* on edge of wetland, 4.vii.2010, 6 ♂♂ 13 ♀♀ (1 ♂ genit. prep.), all J. Roháček leg. (all SMOC); ~34 km N Timmins, 48°45.88'N 81°21.71'W, sweeps, *Carex* spp., 18.vii.2009, 1 ♂; ~29 km SW Timmins, 48°19.12'N 81°44.79'W, sweeps, *Carex* spp./*Calamagrostis*, 18.vii.2009, 1 ♀, both K. N. Barber leg. (both CNCI); Wolf Lake env. nr. Dorset, peat-bog, sweeping over peat-bog meadow, 5.viii.1994, 1 ♂ 1 ♀, J. Roháček leg. (SMOC); Wylde Lk. Bog, 8 km E Arthur, W2bE, pt2b, sedge meadow hollow, 16–22.vi.1987, 1 ♀, D. Blades leg. (DEBU). QUEBEC: Beech Grove, 7.vi.1955, 1 ♂ 1 ♀ (1 ♀ genit. prep.), beaver grass, 7.vi.1955, 1 ♀, J. F. McAlpine leg.; Beechgrove, 45°39'N 76°08'W, 29.vii.1962, 1 ♂ 5 ♀♀, 27.vi.1984, 2 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), 24.vi.1988, 2 ♂♂ 2 ♀♀; Farnham, 5.vi.1963, 11 ♂♂ 8 ♀♀ (1 ♂ 1 ♀ genit. prep.), all J. R. Vockeroth leg.; Fairy L. Crk., 30.v.1965, 1 ♀, [no collector] (all CNCI); Gaspesie, near Percé, 48°37'N 64°11'W, sweep, 1.viii.2001, 4 ♂♂, V. Dion & S. Boucher leg. (LEMQ 0039576–79); Gatineau Co., Masham Township, 27.vii.1995, 2 ♂♂ 1 ♀, E. Ikeda leg. (LEMQ 0039580–82, 1 ♂ genit. prep.); Gatineau Park, 8.vi.1954, 1 ♂, W. R. M. Mason leg.; Gatineau Pk., Black Lk., 48°29'28"N 75°51'31"W, streams E and below, 24.vi.2009, 2 ♂♂ 1 ♀, B. J. Sinclair leg.; Gracefield, 20.vi.1937, 1 ♂, O. Peck leg.; Gatineau Pk., Harrington L., 8.vi.1954, 1 ♀ (genit. prep.), H. J. Huckel leg., 7.vi.1954, 1 ♀, W. R. Richards leg., 3.vii.1963, 1 ♀, J. R. Vockeroth leg.; Knowlton Ldg., 11.vii.1968, 1 ♀, J. R. Vockeroth leg.; Lac Megantic, 22–24.vi.1982, 1 ♀, H. J. Teskey leg.; Lac Phillippe, 45°37'N 76°W, 7.vii.1968, 1 ♂, J. R. Vockeroth leg. (all CNCI); Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 1 ♂, M. Barták leg. (MBPC, genit. prep.); Mt. Ste. Marie, Low, 1800', 22.vi.1965, 1 ♀, J. R. Vockeroth leg. (CNCI, genit. prep.); Meach [sic Meech] Lake, Old Chelsea, 1 ♂ 3 ♀♀, 24.vi.1980, K. N. Barber leg. (DEBU); Old Chelsea, Summit King Mt., 1150', 14.vi.1963, 1 ♀ (genit. prep.), 18.vi.1963, 1 ♀, 21.vi.1963, 1 ♂, J. R. Vockeroth leg. (CNCI); St. Charles Bog, 46°45'48.0"N 70°59'34.4"W, sweeping, abandoned site, T2, 22.vi.2006, 1 ♂ 1 ♀, A. G. Taillifer leg. (LEMQ 0040323, -24, 1 ♀ genit. prep.); near Schefferville, 54°49.507'N 66°51.393'W, sweep, grass/sedge meadow, 8.vii.2008, 1 ♀, A. Rogic leg. (LEMQ, genit. prep.). SASKATCHEWAN: Beaver Creek Cons. Area, ~13 km S Saskatoon, 51°58.6'N 106°43.0'W, sweeps,

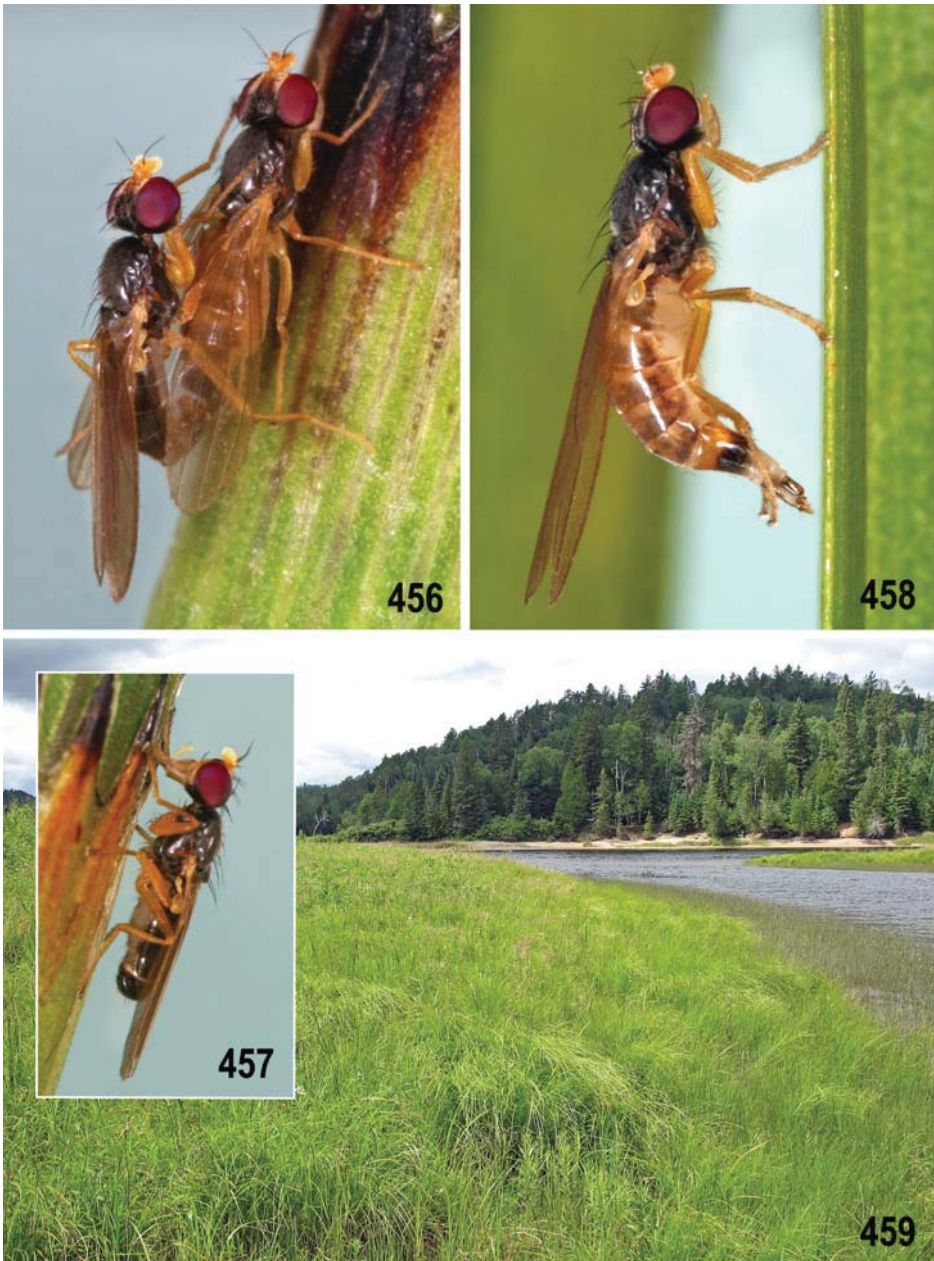
mostly grasses under *Betula/Populus*, 17.vii.1999, 1 ♂, K. N. Barber leg. (CNCI, genit. prep.). **UNITED STATES OF AMERICA: IDAHO:** Boundary [Co.], Perkins Lake, 48°45.6'N 116°05.5'W, 760 m, 3.vi.2006, 1 ♂, W. N. Mathis leg. (USNM, genit. prep., hind leg in microvial). **INDIANA:** Lafayette, 17.vi.1915, 1 ♀, J. M. Aldrich leg. (USNM, genit. prep.). **MASSACHUSETTS:** Concord, marshy pond, 27.vii.1961, 1 ♂ 6 ♀♀ (1 ♀ genit. prep.), W. W. Wirth leg.; Middlesex Co., Belmont, Rock Meadow, 12.vi.1981, 1 ♀, N. E. Woodley leg. (all USNM). **MICHIGAN:** Cheboygan Co., 17.vii.1942, 1 ♀, C. W. Sabrosky leg. (USNM); Cheboygan Co., Roberts Road nr. U. Michigan Biol. Stn., 45°32.56'N 84°39.78'W, sweeps, roadside ditch, mostly *Equisetum* spp., 25.vi.2010, 1 ♀, K. N. Barber leg. (CNCI); Hunt Ck. Exp. Sta., nr. Lewiston, 20.vii.1942, 3 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), C. W. Sabrosky leg.; Keweenaw Co., 27.vii.1953, 1 ♂ 2 ♀♀ (1 ♀ head glued to point, missing wing), G. Steyskal leg.; Leelanau Co., 21.vi.1937, 1 ♂, C. W. Sabrosky leg. (S. W. Frost det. as *Tethina maritima* Melander); Midland Co., 10–11.vi.1951, 1 ♂, R. R. Dreisbach leg. (all USNM). **MINNESOTA:** Eaglesnest, 25.v.1959, 1 ♀, W. V. Balduf leg. (INHS 40,085, Sabrosky det. as *Anthomyza gracilis* Fallén). **MONTANA:** 15 mi S Big Fork, 26.vi.1967, 2 ♂♂ 1 ♀ (all genit. prep.), D. Allen leg.; 1.0 mi S Swan Lake, 30.vi.1967, 1 ♂, 2.viii.1966, 1 ♂ (genit. prep.); 20 mi S Swan Lake, 14.vii.1967, 1 ♂ 1 ♀, all B. A. Foote leg. (all USNM). **NEW HAMPSHIRE:** Pinkham Notch, 9.vii.1931, 2 ♀♀ (1 ♀ genit. prep.), A. L. Melander leg.; White Mtns., Stinson Lake, 23.vii.1961, 1 ♀, W. W. Wirth leg. (all USNM); White Mts. Nat. For., Fabyan, 6.viii.1980, 1 ♂, A. E. Stubbs leg. (BMNH, BM. 1983-250, genit. prep.). **NEW YORK:** Bemus Pt., Chautauqua Lake, swampy woods, 31.v.1963, 1 ♀; Lewis Co., Brantingham L., lake margin, 22.vi.1963, 3 ♂♂ 1 ♀, all W. W. Wirth leg. (all USNM); Franklin Co., Paul Smiths, 20.vii.1962, 1 ♂ 1 ♀, J. R. Vockeroth leg. (CNCI); St. Lawrence Co., Colton, Raquette R., 24.vii.1963, 1 ♂; Chautauqua Co., S. Dayton, marsh area, 1.vi.1963, 1 ♀; Lewis Co., Whetstone Gulf, 20–23.vi.1963, 1 ♂ 1 ♀, all W. W. Wirth leg. (all USNM); Whiteface Mt., 4600–4872', 19.vii.1962, 1 ♀, J. R. Vockeroth leg. (CNCI); Wilmington Notch, Adirondacks, “vii-3”, 1 ♀, J. M. Aldrich leg. (USNM). **NORTH CAROLINA:** Highlands, 31.v.1957, 1 ♂, W. R. M. Mason leg., 3800', 1.vi.1957, 1 ♀, J. R. Vockeroth leg. (CNCI, both genit. prep.). **OHIO:** 3.0 mi N. Kent, Herrick Fen, 16.vii.1986, 1 ♂, B. A. Foote leg. (CNCI). **VIRGINIA:** Giles Co., M[oun]t[ain] Lake Biol. Stn., 37°23'33"N 80°33'05"W, cranberry bog, 1469 m, 26.v.1999, 1 ♂ 2 ♀♀, S. A. Marshall leg. (DEBU). **WEST VIRGINIA:** Pocahontas Co., Cranberry Glades, 16.vii.1955, 1 ♂, W. W. Wirth leg.; Pocahontas Co., Hills Creek, Rt. 39, 30.vi.1982, 3 ♂♂ 2 ♀♀, O. S. Flint & W. Mathis leg. (all USNM). **WISCONSIN:** Washburn Co., T39N R12W B32, 13.vi.1953, 1 ♀ (genit. prep.), 4.vii.1953, 2 ♂♂, T39N R12W B33, 29.vi.1953, 1 ♀, 8.vii.1953, 1 ♂, 19.vii.1953, 1 ♂, R. H. Jones leg. (USNM).

Other material examined (not included in type series). **CANADA: NEWFOUNDLAND:** St. Anthony, 8.vii.1951, 1 spec., J. B. Wallis leg. (CNCI, abdomen missing). **ONTARIO:** Algonquin Pk., 4.vii.1978, 1 ♀, D. McCorquodale leg. (DEBU, missing 3 legs); Algonquin Park, 26–30.vi.1955, 1 ♂, C. W. Sabrosky leg. (USNM, headless); Manitoulin I., Misery Bay Nature Reserve 45°47.64'N 82°44.93'W, sweeping, mostly *Carex* from wetlands boardwalk, 2.vii.2010, 1 ♀, J. Roháček leg. (SMOC, headless); Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, Malaise trap, 19–22.vi.2010, 1 ♂ (damaged genit. prep.); Moosonee, 51.28288°N 80.63926°W, Repl. 2 wet, Malaise trap, 16–19.vi.2010, 1 ♂ (crushed), both NBP Field Party leg. (both LEMQ); [Sault] [Sainte] Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeps, *Scirpus cyperinus*, 19.vii.2004, 1 ♀, K. N. Barber leg. (CNCI, headless, genit. prep.); ~74 km NNE Thessalon, shore of Mississagi River, 46°53.94'N 83°16.23'W, sweeping graminoids with *Equisetum* spp. on muddy shore, 5.vii.2010, 3 ♂♂, J. Roháček leg. (SMOC, used for molecular work, 1 ♂ headless). **UNITED STATES OF AMERICA: MASSACHUSETTS:** Concord, marshy pond, 27.vii.1961, 1 ♀, W. W. Wirth leg. (USNM, headless). **WISCONSIN:** Washburn Co., T39N R12W B32, 13.vii.1953, 1 spec., R. H. Jones leg. (USNM, abdomen missing).

Description. Male. Total body length 2.04–2.78 mm; general colour dark brown to brown, distinctly but not densely grey to brownish grey microtomentose (more sparsely on abdomen), subshining to partly dull (Figs 2, 456, 457, 481). Head as long as high or slightly higher than long, anteriorly (in profile) almost rectangular because face very little receding (Fig. 481). Occiput dorsomedially slightly concave, uniformly dark brown and grey microtomentose, at most with small medial area above foramen paler brown. Frons (Fig. 456) yellow only anterolaterally; rest of frons of subtriangular shape (more or less narrowed anteriorly) dark brown to brown, microtomentose and dull, in darkest specimens with this dark area expanded up to anterior frontal margin and covering most of surface of frons. Frontal triangle including

ocellar triangle dark brown and both grey microtomentose; orbit and adjacent forefrons pale yellow to brightly yellow and silvery whitish microtomentose up to posterior ors, in darkest specimens only orbit yellow to dirty ochreous yellow slightly behind the anterior long ors (but silvery white microtomentum extended up to posterior ors), dark brown and greyish microtomentose more posteriorly. V-shaped area between frontal triangle and orbits dark brown (posteriorly) to pale brown (anteriorly), with fine darker longitudinal striations particularly in paler anterior area; extent of this dark V-shaped area variable, reaching up to anterior margin of frons in darkest specimens. Frontal triangle relatively small and narrow, with acutely pointed anterior corner, reaching to anterior two-fifths to one-third of frons. Ocellar triangle and/or adjacent parts of frontal triangle often more shining than rest of the latter. Frontal lunule distinct, yellow. Face narrow, pale yellow to deep yellow, often with darker ochreous midline, sparsely whitish microtomentose and dull; parafacialia and gena pale yellow and with distinct and rather broad bordering stripe being pale ochreous and narrower on parafacialia and dark brownish and wider on gena and with golden somewhat glittering microtomentum, rest of gena silvery white microtomentose; postgena dark yellow to ochreous but posteriorly darkened, brownish as adjacent occiput. Mouthparts largely yellow, but palpus paler, clypeus brownish and prementum often partly darkened, ochreous to pale brown. Cephalic chaetotaxy generally as in *A. tschirnhausi*: pvt moderate to relatively long and slightly (rarely) to strongly crossed; vti and oc longest of cephalic setae; vte and posterior (or both) ors slightly to distinctly shorter than oc; 3 ors but only 2 long, middle subequal or slightly shorter than posterior; 1 shorter anterior ors setula well developed (rarely up to half length of anterior ors) but no microsetula in front of the latter; 1–2 pairs of medial microsetulae in anterior third of frons; 1 weak setula behind vte; postocular setulae (7–8) relatively long, in single row; postgena with several setulae and 2 short (ventral distinctly longer) setae; 1 long vi (about as long as anterior ors); subvibrissa greatly reduced, only as long as anterior peristomal setula; only 3–5 small peristomal setulae. Palpus of moderate width, yellow, with 1 relatively short ventroepical seta and 6–7 ventral setulae. Eye broadly subovoid, with longest diameter oblique and about 1.3–1.4 times as long as the shortest. Smallest genal height 0.17–0.20 times as long as shortest eye diameter. Antenna distinctly geniculate, normally entirely yellow (in darkest specimens with darker yellow scape and pedicel); 1st flagellomere with moderate (medium-long) white marginal pilosity. Arista 1.8–1.9 times as long as antenna, with both basal segments ochreous yellow and terminal seta brown, both shortly ciliate (cilia shorter than those on 1st flagellomere).

Thorax very slightly narrower than head, unicolourous brown to dark brown (always darker than abdomen), greyish (but not heavily) microtomentose, subshining (particularly on anterior part of mesonotum) to almost dull (on pleura). Propleuron sometimes with small paler (ochreous) spot above fore coxa. Thoracic chaetotaxy closely resembling that of *A. tschirnhausi*: 1 relatively long hu (almost as long as anterior npl) and 1 microseta on humeral callus; 1 weak prs (only as long as or shorter than sa); 2 npl, anterior distinctly longer than posterior; 1 sa (shorter than pa) and 1 pa; 2 postsutural dc, anterior dc usually longer and thicker than anterior npl, posterior dc very long, longest of thoracic setae; 5–6 dc microsetae in front of anterior dc but the hindmost (situated in front of anterior dc) variably enlarged, sometimes even resembling a 3rd (but thinner) dc macroseta (as in *A. tschirnhausi*); ac microsetae relatively sparse, in 2–4



Figs 456–459. *Anthomyza shewelli* sp. nov. and its habitat. 456 – *A. shewelli* sp. nov. in copula on *Equisetum* stem, body length ca. 2.4 mm and 3.1 mm; 457 – same, male laterally, body length ca. 2.5 mm (Canada: Ontario: Pancake Bay Prov. Park); 458 – female on leaf of *Carex*, body length ca. 3.2 mm (Ontario: Dubreuilville env.); 459 – marshy riverbank of Mississagi River (Canada: Ontario) with predominant *Carex* and *Equisetum*, habitat of *A. shewelli* in the type locality. Photo by K. N. Barber (Fig. 459) and J. Roháček (others).

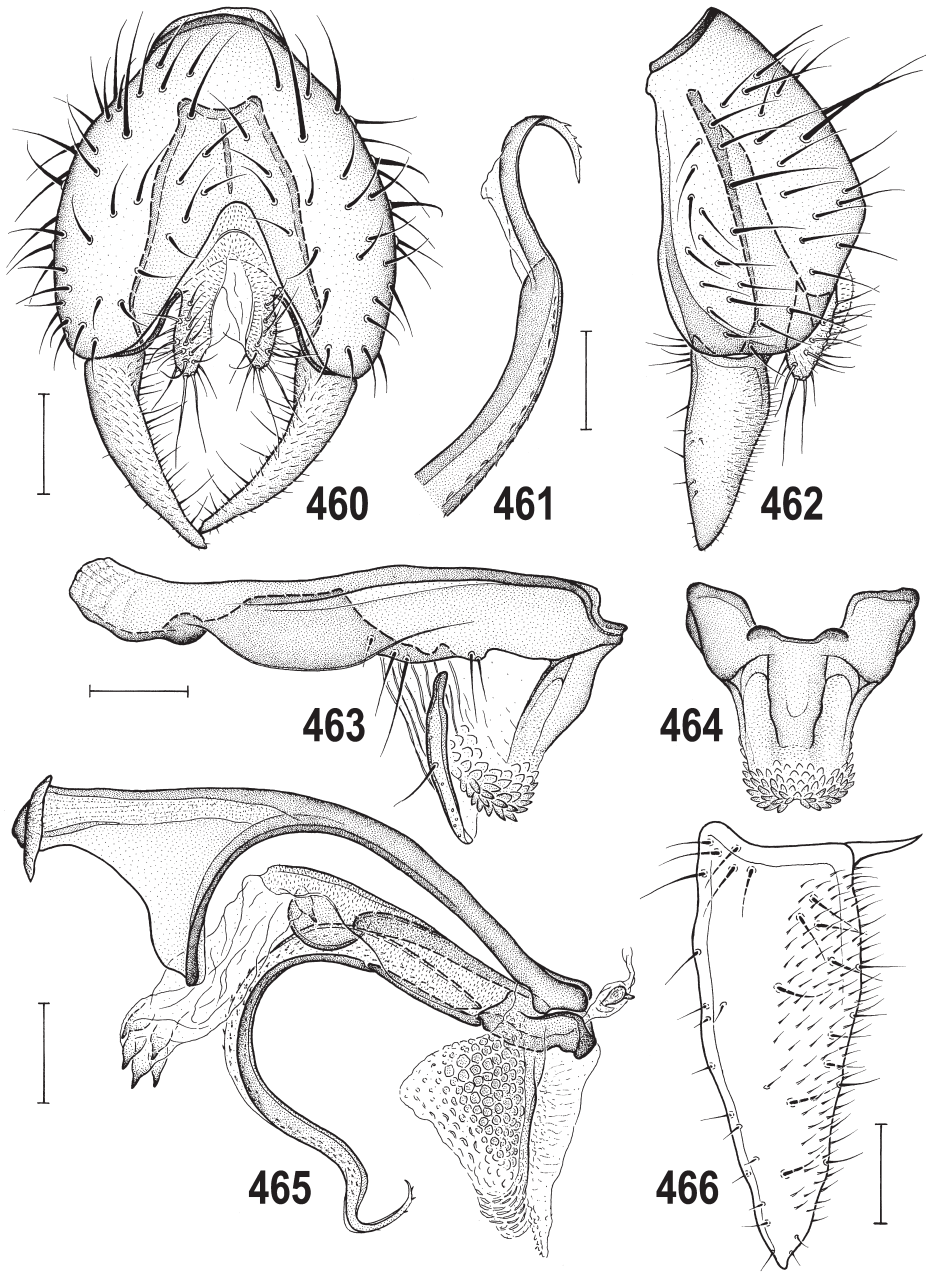
rather irregular rows on suture, in 2 rows more posteriorly but never reaching beyond level of posterior dc; ppl microseta relatively long though pale and very fine; 2 sc, laterobasal weak (about as long as prs), apical almost as long as posterior dc; 2 relatively strong stpl, anterior very slightly to distinctly shorter than posterior, plus a few (1–3) upcurved pale setulae below stpl and 3–5 longer setae on ventral corner of sternopleuron. Scutellum rounded triangular, distinctly convex dorsally. Legs bright to pale yellow, usually with only last tarsal segment of all tarsi (variably) darkened (often only distally), ranging from dark yellow to pale brown but in darkest specimens with tarsi gradually brownish-darkened towards apex (2 or 3 distal segments darkest). f_1 with ctenidial spine variable, ranging from as long as to distinctly longer than maximum width of t_1 ; t_2 with very short but distinct posterior ventroapical seta but the other of the pair (anterior) reduced to small setula (in contrast to that of *A. tschirnhausi*); f_3 posteroventrally with a row of fine, unmodified setae; fore and hind basitarsus with slightly longer proximoventral setulae. Claws relatively long (as in *A. tschirnhausi*). Wing (Fig. 485) elongate and relatively narrow; both veins and membrane pale brown to ochreous. C with distinct sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} very long, bent parallel to C and apically slightly to distinctly upcurved to it; R_{4+5} very slightly sinuous, bent in the middle and apically somewhat upcurved to almost straight, distally slightly divergent from M; the latter almost straight or very slightly bent posteriorly; dm cell medium long, with r-m situated distinctly in front of its middle; apical portion of CuA_1 slightly to distinctly longer than dm-cu, almost reaching wing margin and A_1 ending far from it. Alula small but not very narrow. Wing measurements: length 2.18–2.80 mm, width 0.68–0.91 mm, $Cs_3 : Cs_4 = 0.98–1.31$, $rm \setminus dm-cu : dm-cu = 2.58–3.47$. Haltere whitish yellow to dirty yellow, in darkest specimens with bases of knob and stem more or less ochreous grey darkened.

Abdomen with preabdominal terga brown but usually paler, less microtomentose and more shining than thorax (Fig. 481). T1 short (less than two-thirds of T2), narrower and distinctly separate from T2 (only laterally partly fused), the latter almost as wide as T3; T3 and T4 subequal in size; T5 somewhat longer than T4 and posteriorly slightly tapered; T3–T5 often darker than T1 and T2. All preabdominal terga relatively shortly and sparsely setose. Preabdominal sterna light ochreous to pale brown. S1 pale ochreous with narrowly darkened posterior margin, transversely trapezoidal (wider posteriorly) to suboblong, distinctly shorter and slightly wider than S2. S2–S5 relatively large, slightly trapezoidal with anterior corners rounded, about as long as wide or slightly wider than long and becoming larger posteriorly, all shortly and more densely setose than associated terga. S2 usually darker (only in darkest specimens almost concolourous with) than S3–S5, with pale brown to brown pigmentation being darkest in anterior third and the widest and most transverse S5 sometimes (in dark specimens) laterally more or less brown-darkened. T6 relatively large (as characteristic for the *A. tschirnhausi* group; thus distinctly larger and less transverse than in congeners of other groups), about half length of T5, bare, usually paler brown than T5 and dorsomedially partly or completely narrowly desclerotized and unpigmented. Pregenital sterna S6–S8 relatively long, pale brown (S6) to brown (S7, S8 darkest); S6 and S7 with narrow dark brown anterior marginal ledge; S6 with 1 (rarely)–5, S7 with 1 (rarely)–4 short setae. S8 longer than S7 and about as long as epandrium, tapered posteriorly and setose in posterior two-thirds.

Genitalia. Epandrium (Figs 460, 462, 467, 469) blackish brown, relatively large, high

and distinctly tapered dorsally but usually shorter than in both closest relatives, densely but shortly setose and with 2 or 3 pairs of longer and thicker dorsolateral setae; anal fissure small, narrow, rounded triangular (narrower than that of *A. tschirnhausi*). Cercus small, with fine setae, apical and subapical longest. Medandrium very high, dorsally tapered and with narrow end dorsally emarginate as in relatives, with darkened medial ledge of variable length (Figs 460, 467). Gonostylus (Figs 460, 466, 467, 473, 508, 509) largely yellow to distinctly darkened apically, somewhat shorter than epandrial height, slender, elongate, gradually tapered but apically variable, ranging from elongately pointed (Fig. 466), shortly pointed (Fig. 508) to distinctly blunt (cut) with small anterior tooth (Figs 473, 509) in darkest specimens; always with anterior side convex, in contrast to both *A. tschirnhausi* and *A. gilviventris*; micropubescence restricted to posterior half of outer side of gonostylus and longer setae situated on its inner side. Hypandrium (Figs 463, 470) of moderate size, with anterior internal lobes distinct, dark and sclerotized, larger than in *A. tschirnhausi* and sometimes projecting above dorsal hypandrial margin (Fig. 470). Transandrium narrow (Figs 464, 471), medially with a pair of small, low, dark dorsal lobes (but not tubercle-like projecting as those of *A. tschirnhausi*); caudal process distinctly developed but rather variable (Figs 464, 471), narrow, flat, ventrally slightly narrowed and cut or rounded on tip and medially somewhat less sclerotized, in lateral view more (Fig. 470) or less (Fig. 463) bulging. Pregonite (Figs 463, 470) fused with hypandrium, low, posteroventrally with a small, inconspicuous lobe carrying 2 (1 longer) setae; anterior flat part of pregonite with 3 setae (all on inner side, posterior seta longest). Postgonite (Fig. 463) very slender and elongate, dark proximally and pale distally, slightly bent but apically not pointed (sometimes almost lanceolate – Fig. 470), with 1 longer seta at middle of anterior margin. Basal membrane ventrally slightly bilobed, covered with flat spines being pigmented laterally and hyaline medially (Figs 464, 471), sometimes also with a group of setiform spines in lateral membrane (Fig. 470); dorsolateral parts of basal membrane adjacent to caudal process of transandrium more or less distinctly secondarily sclerotized, pigmented and dorsally connected with transandrium (Figs 463, 464, 470, 471) as characteristic for the *A. tschirnhausi* group. Aedeagal part of folding apparatus with numerous, dense but flat spine-like excrescences (Figs 465, 472); connecting sclerite slender and rather weakly sclerotized, bordering the former. Phallapodeme slender with robust fulcrum, ventrolaterally projecting apex and shortly forked base. Aedeagus slender (Figs 465, 472), with small (but rather elongate) phallopore indistinctly separate from large distiphallus. Saccus relatively slender, shorter than filum, sclerotized in proximal half where it is terminated by a lateral rounded sclerite, distally membranous and armed with 5 thick spines on apex; an additional spine is hidden also behind the rounded basal sclerite (i.e. most similar to that of *A. gilviventris*). Filum formed by single, long, twisted and largely dark sclerite terminating in curved, acutely pointed (Fig. 461) to finely bicuspid (Fig. 468) apex provided with 3–6 small subterminal spines; most of filum (including its membranous proximal part) with a double to triple row of spinulae (less numerous than in *A. gilviventris*). Ejacapodeme very small, slender, with a small, relatively pointed projection (Figs 465, 472).

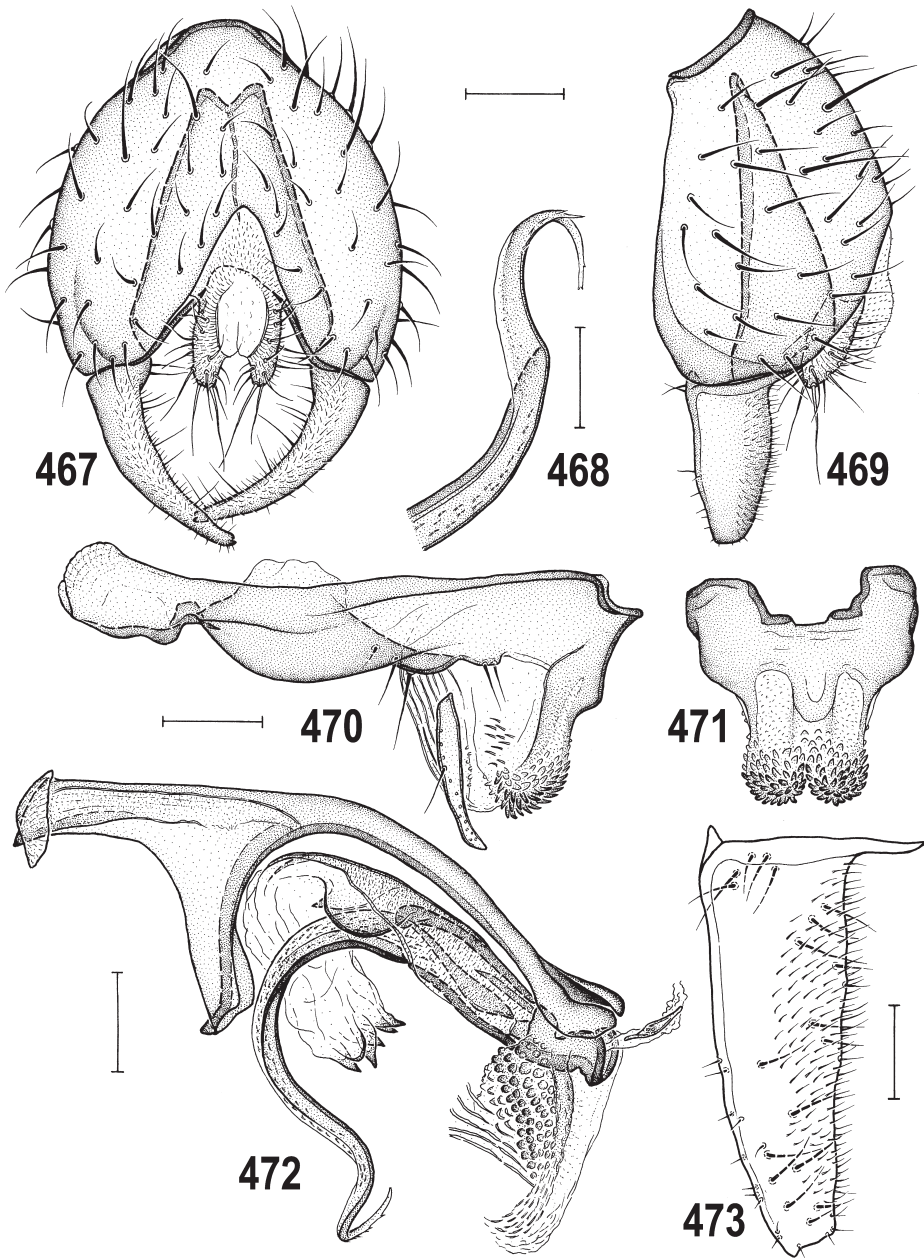
Female (Figs 2, 456, 458). Similar to male unless mentioned otherwise. Total body length 2.38–3.41 mm. Face often with stripe bordering parafacialia darker. Antenna with 1st flagellomere more or less orange-ochreous to orange-brown darkened (at least anterodorsally), usually



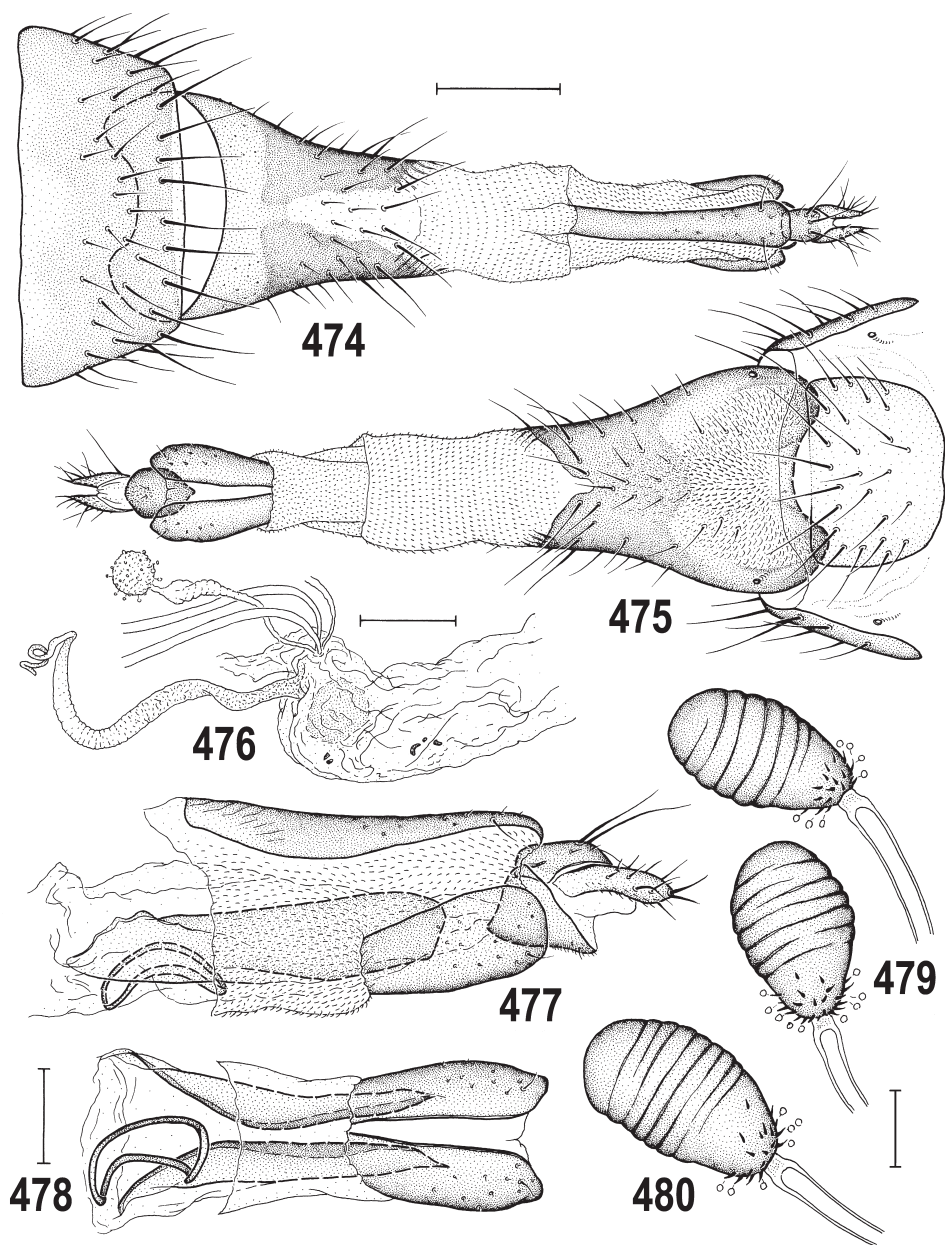
Figs 460–466. *Anthomyza shewelli* sp. nov., paratype male, typical form (Canada: Ontario). 460 – external genitalia, caudally; 461 – apex of filum, subventrally; 462 – external genitalia, laterally; 463 – hypandrial complex, laterally; 464 – transandrium, caudally; 465 – aedeagal complex, laterally; 466 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Figs 461, 466) and 0.1 mm (others).

more extensively on inner side with only base remaining narrowly yellow. Ctenidial spine on f_1 variable in length, as long as to markedly longer than maximum width of t_1 , but usually more robust than in male. Wing measurements: length 2.62–3.39 mm, width 0.85–1.05 mm, $Cs_3 : Cs_4 = 1.03\text{--}1.31$, $rm\backslash dm\text{-}cu : dm\text{-}cu = 2.48\text{--}3.09$. Abdomen with preabdominal terga (T1–T5) slightly to distinctly paler than in male, with variable pattern. Typical specimens have terga uniformly brown to partly or largely pale ochreous, each brownish posteriorly and laterally (though sometimes only narrowly) and usually also with a darker medial spot (cf. Figs 2, 458). In very rare extremely pale specimens T1–T5 can be almost completely orange ochreous with these brownish darkenings reduced. All preabdominal terga more transverse than in male; T1 distinctly separate and narrower than T2; T2–T5 subequal in length but T2 and T5 usually slightly narrower than T3–T4; all rather shortly and sparsely setose, with longest setae on posterior margin of T5 (and T6). Preabdominal sterna pale ochreous to yellow, only S2 brownish-darkened in anterior half or third and S1 (entirely bare) with very narrowly darkened posterior margin; S1 relatively long but distinctly shorter than wide, trapezoidal (wider posteriorly); S2–S5 more transverse than in male, becoming wider posteriorly, S2–S4 about as long as wide or slightly wider than long, S5 largest and distinctly transverse (up to more than 1.5 times wider than long).

Postabdomen (Figs 474, 475) very long, slender and elongate as characteristic for the *A. tschirnhausi* group, tapered posteriorly, telescopic, resembling in form that of *A. gilviventris* thus generally more slender than that of *A. tschirnhausi*. T6 broad, tapered posteriorly, transversely trapezoidal, completely brownish or brown spotted (Fig. 474) to uniformly ochreous in lightest specimens, setose in posterior two-thirds (longest setae posteriorly). S6 narrower and less transverse than in *A. tschirnhausi*, pale ochreous yellow (Fig. 475) to brownish in darkest specimens, sometimes with posterolateral margins darkened, with setae usually sparser than in both relatives. Tergosternum T7+S7 yet longer and narrower than in *A. tschirnhausi*, conical, emarginate anterodorsally, typically with posterior third to three-fourths dark brown (Fig. 474), very rarely almost entirely yellow with posterior dark ring reduced to about apical one fourth, usually with pale brown to ochreous orange (broader) anterior part and posteriorly with variable unpigmented medial narrow area reaching up to half or more of original T7; ventral part of T7+S7 distinctly prolonged to form anterolateral lobes (Figs 475, 516) and with variable (usually large – Fig. 475, reduced in dark specimens) paler area in anterior half being covered by distinctive whitish micropubescence – this area is unpigmented and depressed below 7th spiracle and somewhat projecting anteriorly, where it is usually separated from darker dorsal part by a more or less elevated ridge (Fig. 516). T7+S7 otherwise without micropubescence, shining, and with setae largely in posterior two-thirds, longest at posterior margin. T8 (Figs 474, 477) yet more elongate than that of *A. tschirnhausi*, very narrow and usually slightly widened posteriorly and dark brown; without micropubescence and with most of setae reduced to microsetulae or setiform sensillae, thus with only a single pair of exclinate setae. S8 (Figs 477, 478) also longer and narrower than in *A. tschirnhausi*, almost half length of T8, convex, longitudinally divided into two dark brown and largely bare (lacking micropubescence) sclerites except for sparse microsetulae or setiform sensillae and only 1–2 short and weak setae, all in posterior half; their posterior ends somewhat bent inside the 8th segment. Genital chamber (Figs 476–478) with one pair of posterior elongate flattened sclerites (also longer than those of *A. tschirnhausi*); annular sclerite somewhat bent



Figs 467–473. *Anthomyza shewelli* sp. nov., paratype male, darkest form (USA: Idaho). 467 – external genitalia, caudally; 468 – apex of filum, subventrally; 469 – external genitalia, laterally; 470 – hypandrial complex, laterally; 471 – transandrium, caudally; 472 – aedeagal complex, laterally; 473 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Figs 468, 473) and 0.1 mm (others).



Figs 474–480. *Anthomyza shewelli* sp. nov., paratype female, typical form (Canada: Ontario). 474 – postabdomen, dorsally; 475 – the same, ventrally; 476 – distal part of female genital chamber, laterally; 477 – end of postabdomen with internal sclerites, laterally; 478 – internal sclerites and S8, ventrally (micropubescence omitted); 479 – spermathecae; 480 – spermatheca of another specimen. Scales = 0.2 mm (Figs 474, 475), 0.1 mm (Figs 476–478) and 0.05 mm (Figs 479, 480).

and asymmetrical, situated ventrally, below anterior part of flat sclerites. Ventral receptacle (Fig. 476) membranous, tubular, with longer and broader proximal sinuous part being distally attenuated and ending in slender twisted vermicular distal part. Accessory gland vesicular, subglobular, finely granulose, on a subterminally dilated and partly ringed duct. Spermathecae (1+1) elongately subovoid (Figs 479–480), one usually somewhat larger than other, the larger as long as or longer (0.9–1.2 times) than S10 medially, on very long ducts, well sclerotized and blackish brown, with sparsely transversely striated surface except basal part bearing a number of short spinulae (usually shorter and thicker than in relatives). T10 (Figs 474, 477) small, elongately suboblong to pentagonal (with poorly defined posterior margin), brown, with a pair of long medial setae (rarely with 3 setae, Fig. 474) and 1–2 pairs of short setulae, otherwise without micropubescence. S10 (Figs 475, 477) larger than T10, also brown, distinctly longer than wide, posteriorly rounded, bare except for a pair of moderate to short (sometimes very short, Fig. 477) setae and a few microsetulae and some micropubescence in posterior third. Cercus (Figs 474, 477) small, moderate, slender, somewhat laterally flattened, with several short setae (including apical, distinctly exclinate setae) and with very reduced micropubescence restricted to ventral side (Fig. 477).

Variability. This widespread species displays considerable variability in the brown colouration of the frons, terminal tarsal segments, preabdominal sclerites and other structures (cf. the description above) but also in the colouration and sclerotization of some male and female genitalic structures. Interestingly, the darkest male specimens from populations at the southwestern limit of the known distribution of the species (United States of America: Idaho, Montana) have the apex of the gonostylus roundly to flatly blunt. This variant (Figs 473, 509) is considered to represent the extreme limit of the variability of this structure because intermediate forms (with shortly pointed apex of gonostylus, Fig. 508) were found in the United States of America (Colorado) and Canada (Ontario). Typical specimens that have the gonostylus elongately acute (Fig. 466) occur across the entire species range. The darkest males with the blunt gonostylus also have a more sclerotized basal membrane with spines and darker armature of the aedeagal part of the folding apparatus. The females with a darker frons and terminal tarsal segments (syntopic with males discussed above) do not seem to have particularly darkened postabdominal sclerites (including T7+S7 having only the posterior dark brown ring longer). As given in the description above, female T1–T6 and T7+S7 rarely have the brown colour reduced to become largely to almost entirely orange ochreous, thereby resembling in colour typical females of *A. gilviventris*, although they lack the anteroventrolateral pigmented spots as do the palest *A. gilviventris* females from populations in Canada: Alberta (see below). A singularly dark male (Nova Scotia: Cranberry I., Lockeport) has the scape and pedicel brown, the 1st flagellomere is anterodorsally brown on the medial surface, the tarsi are gradually brownish-darkened apically, the distal third of the tibiae is also somewhat darkened, the haltere is almost entirely brownish, and the darkened gonostylus is flatly blunt apically (as in Fig. 473).

Discussion. *Anthomyza shewelli* sp. nov. is one of three species (see above) forming the *A. tschirnhausi* group. Because all these species are very similar in male and female postabdominal structures, and because of a similar variability in colour and other external features, it is sometimes difficult to differentiate them. In the male sex, *A. shewelli* can be recognized

safely by the shape of the gonostylus, more precisely by its convex anterior margin (usually visible also in air-dried specimens), despite its variably ending apex (see also the key). The identification of females is complicated by the high variability of pigmentation of the abdominal sclerites, including T7+S7. Females of *A. shewelli* and *A. gilviventris* differ from the Palearctic *A. tschirnhausi* structurally in the narrower (and more tapered) and less setose postabdominal 7th and 8th segments. Furthermore, dark females of *A. shewelli* and the darkest females of *A. gilviventris* have postabdominal sclerites very similarly formed and pigmented (see Figs 502, 503, 515), and the palest females of *A. shewelli* (particularly those dried from specimens preserved in alcohol) with largely ochreous preabdominal terga very closely resemble the palest females of *A. gilviventris*. In these cases, *A. shewelli* females can be differentiated from those of *A. gilviventris* by their spermathecae, which are as long as or longer than S10, relatively narrower and more densely striated (Figs 479, 480 vs. Figs 494, 498, 501, 505, 514); see also below. Because the identification of *A. shewelli* based on characters of the spermathecae is not practical (requiring study under high magnification, although relative size can sometimes be seen through the pale tergites of intact specimens), external characters are often useful and can be examined first, if exposed and visible. *Anthomyza shewelli* females are typically smaller, less densely microtomentose and hence more shining (particularly anteriorly on mesonotum), with relatively dark or dark-spotted preabdominal terga, T7+S7 blackish brown posteriorly with the lateroventral lobes not darkened, and a lateral ridge present on T7+S7. If the lateral ridge on T7+S7 is not evident, only the remaining specimens that are duller, larger and with either a pale abdomen or with a completely dark T7+S7, need to be dissected.

As given above under the diagnosis of the *A. tschirnhausi* group, *A. shewelli* is most closely related to *A. gilviventris* based on the shared strongly narrowed terminal segments of the female postabdomen, a relatively longer (compared with T8) female S8, more reduced setae on the female T8 and S8, and 5–8 spines on the saccus of the distiphallus.

Etymology. This common species is named in honour of G. E. Shewell, whose preliminary work on Nearctic Anthomyzidae has influenced species concepts in the present monograph and previous published revisions by the authors.

Biology. Those collection records with habitat details are mostly from the east (see Distribution) and frequently mention damp to wet sites supporting a variety of plants. Open wet areas are represented by “cranberry bog”, “overgrown wet shrubby *Sphagnum* bog”, “peat bog meadow”, “fen”, “sedge fen”, “fen flat”, “margins of fen pools”, and “riparian”, areas. Specific mention is made of sedges (*Carex*, *Scirpus*) and grasses (*Calamagrostis*, *Phalaris*), horsetails (*Equisetum*) or other plants (*Juncus*, *Iris*) of open wet sites. The type locality (Ontario: ~74 km NNE Thessalon, Fig. 459) for *A. shewelli* (and *A. furvifrons*) is probably representative of these sites where various *Carex* spp. predominate the shoreline plant community, with *C. aquatilis* being most abundant. But there are also several references to wooded areas such as “forest floodplain”, “wet hardwood forest”, “forested slope”, “wet forest trail”, “forest edge”, “mixed wood”, and “swampy woods”. These latter collections include a wider variety of plants of which the graminoids are probably the most likely host plants.

A particularly large pair of series was taken from *Carex gynandra* within an alder (*Alnus*) thicket (Ontario: Sault Ste. Marie, city limits), and is notable for the absence of *A. gilvi-*

ventris since these two species are often represented in mixed series. There are three additional independent collections of *A. shewelli* from *C. gynandra* while there are no records for *A. gilviventris* on this plant. There is a suggestion of spatial separation of these two species at one of these three sites (Ontario: Sault Ste. Marie – Finn Hill, Fig. 421). Here, both species occurred together in an open meadow on *Carex stipata* var. *stipata* but *A. gilviventris* heavily predominated in a neighbouring open area with a thick growth of *Scirpus microcarpus* and soil that was usually at or near saturation. On the opposite side of the meadow, bordering the aspen (*Populus tremuloides*) woodlot, *A. shewelli* predominated where *C. gynandra* was found in a graminoid and herb mix. Altogether this might suggest that, in the east, *A. shewelli* is more likely to be found in more sheltered or shaded areas on sedges such as *C. gynandra* while *A. gilviventris* is more likely to be found in the open on coarser species of sedge. However, exceptions include collections of *A. shewelli* from the open type locality where only a single female *A. gilviventris* was found, and those specimens swept from rather isolated clumps of *Scirpus cyperinus* (a slightly finer species of *Scirpus*) in open meadow (Sault Ste. Marie – Finn Hill, Fig. 421) where *A. gilviventris* was not found. The dried shoreline of a drained reservoir (Ontario: ~66 km NNW Elliot Lake, Fig. 548) supported almost exclusively *S. microcarpus* but *A. shewelli* was the only species of the *A. tschirnhausi* group collected here. Factors such as light intensity, soil saturation, and available plant species may contribute to spatial separation of these two species but their relative importance may only become apparent where strong populations of both flies occur in close proximity.

Of the collections from western regions where *A. shewelli* is either absent or poorly sampled, only those from Manitoba have provided suggestions of habitat and these similarly involve graminoids alone (Falcon Lake) or mixed with *Equisetum* and *Impatiens* (Shilo), as well as “vegetation at spring” (Aweme). A single male was collected in Saskatchewan (Beaver Creek Cons. Area) from “mostly grasses under *Betula/Populus*”. The flight period for *A. shewelli* runs from 2 May (Ontario: Midland; St. Ignace Island) to 30 August (Ontario: Manitoulin Is., 0.7 km N Michael’s Bay Pk.).

Distribution. *Anthomyza shewelli* has a fairly broad distribution in eastern North America from Newfoundland to North Carolina, but only as far west as Saskatchewan, Montana and Idaho. Records are available for Canada: Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Quebec, Saskatchewan; United States of America: Idaho, Indiana, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New York, North Carolina, Ohio, Virginia, West Virginia, Wisconsin (see Table 2).

Anthomyza gilviventris sp. nov.

(Figs 482–484, 486–507, 510–515, 517)

Type material. HOLOTYPE: ♂, “CAN: BC: Fernie, Annex Pk, 17.vii.2011, KNBar-ber, sweeps, wet ditch, *Carex utriculata* 49°30.72’N 115°04.13’W” and “Holotypus ♂ *Anthomyza gilviventris* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in good condition, with well-exposed gonostyli (see Fig. 483) (CNCI, intact). CANADA: ALBERTA: Banff N. P., 15 mi E Mt. Eisenhower Jct., 27.vii.1967, 2 ♀♀, S. P. Whitney leg. (USNM); 7.0 mi W Banff, 11.vii.1966, 1 ♀, K. Valley leg. (all USNM); ~22.7 km S Bellevue, Hwy 774, 49°22.62’N 114°22.58’W, sweeps, roadside ditch, mostly *Carex* spp., *Equisetum*, grasses, 17.vii.2011, 3 ♂♂ 5 ♀♀; ~18.3 km NW Cadomin, Hwy#40, 53°10.02’N 117°29.72’W, sweeps, edge of roadside pond, *Carex* spp., 22.vii.2008, 16 ♂♂ 10 ♀♀, all K. N. Barber leg. (all CNCI); Elkwater Lk., 10.vi.1956, 3 ♂♂ 4 ♀♀, swept from sedge, 9.vii.1956, 1 ♀, O. Peck leg.;

~0.9 km WNW Exshaw, 51°03.78'N 115°10.99'W, sweeps, mostly emergent *Carex* sp., 25.vii.2008, 1 ♀, K. N. Barber leg. (all CNCI); Calgary, Fish Creek Prov. Pk., pond near Shannon Terrace, 50°55.60'N 114°07.427'W, swept from sedges and *Equisetum*, 12.viii.2011, 2 ♂♂, J. E. Swann leg. (BDUC); Calgary, Fish Creek Prov. Pk., Shannon Terrace, sweep around pond by 2nd bridge, 9.vii.2010, 1 ♀, J. E. Swann leg. (BDUC); Fish Creek P. Pk., 50°55.61'N 114°07.43'W, sweeps, mostly *Carex utriculata* and *Equisetum fluviatile*, 12.vii.2011, 3 ♂♂ 3 ♀♀; Fish Creek P. Pk., 50°55.74'N 114°07.32'W, sweeps, mostly *Carex utriculata* and *Equisetum* sp., 12.vii.2011, 4 ♂♂ 4 ♀♀, all J. E. Swann & K. N. Barber leg. (all BDUC); ~22.5 km NW Highwood House, ~4 km W Mist Ck, 50°31.40'N 114°53.12'W, sweeps, *Carex* sp. (small), 25.vii.2008, 1 ♂ 1 ♀, K. N. Barber leg. (DEBU); ~3.4 km SSW Hinton, Hwy.#40, 53°21.27'N 117°37.32'W, sweeps, *Equisetum fluviatile*, 22.vii.2008, 3 ♂♂; ~4.4 km SSW Hinton, Hwy#40, 53°20.77'N 117°36.83'W, sweeps, *Equisetum fluviatile*, *Carex* sp. [*C. aquatilis* Wahlenb.], 22.vii.2008, 1 ♀; ~15 km SSW Hinton, gas right-of-way nr. Wildhorse Lake P[rovincial] R[ecreation] A[rea], 53°16.65'N 117°44.57'W, sweeps, roadside *Equisetum palustre*, 23.vii.2008, 4 ♂♂; Kananaskis Country, Sibbald Area, Hwy.68, 3.1 km W Powderface Trail, 51°03.10'N 114°54.72'W, sweeps, mostly *Carex utriculata*, 15.vii.2011, 7 ♂♂ 6 ♀♀ (2 ♂♂ genit. prep.), all K. N. Barber leg. (all CNCI); ~4.4 km NNE Kananaskis Village, Mt. Lorette Ponds, 50°58.11'N 115°06.59'W, sweeps, mostly *Equisetum fluviatile*, 25.vii.2008, 1 ♂, K. N. Barber leg. (DEBU); ~14.4 km E Obed, Range Rd. 213 @ RR crossing, 53°32.19'N 117°01.02'W, sweeps, mostly *Carex utriculata*, 25.vii.2011, 4 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); Peter Loughheed P. Pk., 50°41.82'N 115°06.92'W, sweeps, fen, *Carex utriculata* with cf. *Poa pratensis*, 13.vii.2011, 98 ♂♂ 30 ♀♀ (DEBU 01502929–3056, 2 ♂♂ 1 ♀ genit. prep.), 14.vii.2011, 2 ♂♂ 2 ♀♀ (DEBU 01503292–95), 15.vii.2011, 1 ♂ 1 ♀ (DEBU 01503333, -34), 16.vii.2011, 2 ♂♂ 3 ♀♀ (DEBU 01503390–94); Peter Loughheed P. Pk., Upper Lake Drive, 50°36.98'N 115°07.13'W, sweeps, edge of fen, *Carex utriculata*, 14.vii.2011, 1 ♀ (DEBU 01503314); same locality but 50°36.94'N 115°07.16'W, sweeps, edge of fen, *Carex utriculata*, 16.vii.2011, 3 ♂♂ 2 ♀♀ (DEBU 01503647–51), all K. N. Barber; ~20 km SSE Robb, Hwy#40, Lovett River P[rovincial] R[ecreation] A[rea], 53°03.89'N 116°49.02'W, sweeps, streamside, mostly grasses, 23.vii.2008, 1 ♂, K. N. Barber leg. (DEBU); Spray Valley P. Pk., 50°48.95'N 115°09.84'W, sweeps, fen, *Carex utriculata?* and *Poa* sp., 13.vii.2011, 39 ♂♂ 40 ♀♀ (DEBU 01502773–851); W. A. Switzer P. Pk., Beaver Ranch Trail, 53°29.80'N 117°48.02'W, sweeps, edge of Jarvis Ck., *Carex utriculata*, 22.vii.2011, 13 ♂♂ 2 ♀♀ (DEBU 01503707–21); same locality but 53°29.67'N 117°48.00'W, sweeps, sedge-filled oxbow, *Carex utriculata?*, 22.vii.2011, 1 ♂ (DEBU 01503777); W. A. Switzer P. Pk., off Hay River Rd. W, 53°33.44'N 117°48.43'W, sweeps, mostly *Carex utriculata*, 22.vii.2011, 8 ♂♂ 2 ♀♀ (DEBU 01503792–801), 24.vii.2011, 22 ♂♂ 7 ♀♀ (DEBU 01503847–75, 1 ♀ genit. prep.), all K. N. Barber leg.; Waterton Lakes Nat. Pk., 14–20.vii.1980, 1 ♀, H. J. Teskey leg. (CNCI). **BRITISH COLUMBIA:** Brisco, 19.vi.1932, 2 ♀♀, O. B[ryant] leg. (USNM, 1 ♀ missing one wing); Buckingham Provincial Campground, Alaska Highway, DC-175 (281.6 km), 27.vi.1978, 2 ♀♀, P. H. Arnaud Jr. leg. (CASC); Fernie, Annex Pk., 49°30.72'N 115°04.13'W, sweeps, wet ditch, mostly *Equisetum arvense* & *E. laevigatum*, 17.vii.2011, 1 ♂ 1 ♀, sweeps, wet ditch, *Carex utriculata*, 17.vii.2011, 13 ♂♂ 14 ♀♀, 18.vii.2011, 13 ♂♂ 16 ♀♀, 19.vii.2011, 16 ♂♂ 8 ♀♀; Fernie, Annex Pk., 49°30.66'N 115°04.16'W, sweeps, pond margin, *Carex utriculata*, 18.vii.2011, 14 ♂♂ 4 ♀♀ (1 ♂ genit. prep.), all K. N. Barber leg. (all CNCI); 4 km NW Field, CD1416, 31.v.1992, 1 ♂, A. Borkent leg.; ~3.5 km NNW Fort Steele, Hwy 95 rest area, 49°38.90'N 115°38.82'W, sweeps, graminoids, mostly *Carex pellita*, 18.vii.2011, 1 ♀, K. N. Barber leg. (both CNCI); Graham Is., Slatechuck Mt., roadside sweep, 12.vii.1988, 1 ♀, T. A. Wheeler leg. (DEBU, genit. prep.); Kaslo Cr., 18.vi.[-], 1 ♀, R. P. Currie leg. (USNM); Kinbasket Lake, BC Hydro drawdown study, Malaise trap, 13.vi.2008, (WIL08-01), 1 ♀, (WIL08-15), 1 ♂, Cooper Beauchesne & Assoc. Ltd. leg. (RBCM); ~8.0 km SE Valemount, edge of Kinbasket Lake, 52°46.65'N 119°10.38'W, sweeps, mostly *Carex utriculata*, 23.vii.2011, 18 ♂♂ 9 ♀♀, K. N. Barber leg.; King Salmon L., 58°43'N 132°54'W, 1750', *Carex*, grass, *Equisetum* beside lake, 17.vii.1960, 5 ♂♂ 4 ♀♀, W. W. Moss leg. (all CNCI); Merritt, 1.5 km NE Lundbom L., 1.vii.1988, 1 ♀, G. E. Hutchings leg. (RBCM, ENT991-6166); Moresby Camp, Q[ueen] C[hariotte] Islands, 29.vi.1957, 1 ♀, E. E. MacDougall leg. (CNCI); Mt. Robson Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 5 ♂♂ 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Nanaimo Lakes, forested area, 11.vi.1988, 1 ♂ 1 ♀, G. E. Hutchings leg. (RBCM); Parson, Crestbrook Rd., 51°03.68'N 116°39.06'W, sweeps, wet ditch, *Carex utriculata* with *Equisetum palustre* & *E. ×litorale*, 18.vii.2011, 2 ♂♂ 5 ♀♀, K. N. Barber leg. (CNCI, 1 ♂ 1 ♀ genit. prep.); Pete Lake, 57°56'N 131°56'W, 4000', 19.viii.1960, 1 ♂ 2 ♀♀, R. Pilfrey leg.; Revelstoke, 2.vii.1973, 1 ♀, H. J. Teskey leg. (all CNCI); Robson, 3.vi.1958, 1 ♀, 6.vi.1967, 1 ♀, 5.vii.1967, 1 ♀, H. R. Foxlee leg. (UBCZ); Qualicum Beach, Little Qualicum River Estuary Regional Conser-

vation Area, ex. *Carex* 4, aspirator, 4.vi.1980, 1 ♀, Canadian Wildlife Service leg. (RBCM, ENT991-17202); Salmon Arm, CD980, 8.vi.1988, 1 ♀, CD1210, 8.vi.1990, 1 ♀, A. Borkent leg.; ~27 km N Sparwood, Lower Elk Valley Rd., 49°50.24'N 114°53.29'W, sweeps, edge of creek, *Carex utriculata*?, 20.vii.2011, 1 ♂ 1 ♀, K. N. Barber leg.; Summit Lake, mi.392 Alaska Hwy., 4500', 23–24.vi.1959, 1 ♀, E. E. MacDougall leg. (all CNCI); Vancouver 50 km E, 3.vii.1988, 1 ♂ 2 ♀♀, A. Freidberg leg. (TAU). **LABRADOR:** Cartwright, 9.vii.1955, 1 ♂, 12.vii.1955, 3 ♀♀ (1 ♀ genit. prep.), E. F. Cashman leg. 17.vii.1955, 5 ♂♂ 6 ♀♀ (3 ♂♂ 3 ♀♀ genit. prep.), 19.vii.1955, 1 ♂, E. E. Sterns leg. (CNCI). **МАНРОБА:** 10 km SE Churchill, Farnworth Lake (Landing L.), 58.7045°N 94.0525°W, 14 m a.s.l., tundra, 14.vii.2010, 1 ♀ (Sample ID:10PROBE-14241, BOLD ID:JWDCI851-11), 1 ♂ (Sample ID:10PROBE-14244, BOLD ID:JWDCI854-11), 1 ♀ (Sample ID:10PROBE-14245, BOLD ID:JWDCI855-11), 23.vii.2010, 1 ♀ (Sample ID:10PROBE-16182, BOLD ID:JWDCK227-11), 1 ♂ (Sample ID:10PROBE-16183, BOLD ID:JWDCK228-11), 28.vii.2010, 1 ♂ (Sample ID:10PROBE-15878, BOLD ID:JWDCJ1443-11), 1 ♂ (Sample ID:10PROBE-15879, BOLD ID:JWDCJ1444-11), 31.vii.2010, 1 ♂ (Sample ID:10PROBE-12448, BOLD ID:JWDCH242-10), 6.viii.2010, 1 ♀ (Sample ID:10PROBE-13043, BOLD ID:JWDCH837-10), 1 ♀ (Sample ID:10PROBE-13045, BOLD ID:JWDCH839-10); 26 km SE Churchill, Twin Lakes, 58.6332°N 93.7871°W, 29 m a.s.l., fen, 1.viii.2010, 1 ♂ (Sample ID:10PROBE-12672, BOLD ID:JWDCH466-10), 7.viii.2010, 1 ♀ (Sample ID:10PROBE-13220, BOLD ID:JWDCH020-10); 12 km ESE Churchill, Launch Road, 58.7541°N 93.9974°W, 10 m a.s.l., fen, 14.vii.2010, 1 ♀ (Sample ID:10PROBE-14512, BOLD ID:JWDCJ172-11), 19.vii.2010, 1 ♂ (Sample ID:10PROBE-16713, BOLD ID:JWDCL663-11), 1 ♀ (Sample ID:10PROBE-16714, BOLD ID:JWDCL664-11); 23 km E Churchill, Ramsay Creek, 58.7306°N 93.7804°W, 10 m a.s.l., boreal forests, 23.vii.2010, 1 ♀ (Sample ID:10PROBE-16481, BOLD ID:JWDCL241-11), all J. Wang leg. (all BIOUG, Barcode of Life, in ethanol); ~14 km SW Falcon Lake, jct. Hwy#1 & Rd. 86E, 49°38.24'N 95°29.89'W, sweeps, graminoids, mostly *Carex* spp., 29.vii.2011, 1 ♀, K. N. Barber leg. (CNCI); 5 km N Gardenton, Tallgrass Prairie Reserve, 49°10.71'N 96°40.76'W, sweep in tallgrass prairie, 17.vi.1999, 1 ♀, V. Crecco leg. (LEMQ 0039607); Int. Peace Gardens, Turtle Mtn. For. Res., 17.vii.1958, 1 ♀; 5 mi N Minnedosa, 8.vii.1958, 1 ♀, both R. L. Hurley leg. (both CNCI). **NEWFOUNDLAND:** Bay d'Espoir, low veg. nr. river, 11.vii.1985, 1 ♂, L. Hollett leg.; Coal Brook, 24.vi.1983, 1 ♀ (genit. prep.), A. Borkent leg. (both CNCI); Avalon Pen[insula], Portugal Cove, Indian Meal Line, 15.vii.1982, 1 ♂ 3 ♀♀, 15.vii.1982, b. l., 1 ♀, [no collector] (all genit. prep.); N branch St. George's R., 17.vi.1979, 1 ♀ (genit. prep.), Larson & Swales leg. (all NFRC); St. John's, Agric. Exp. Stn., 26.vii.1967, 3 ♂♂ 4 ♀♀, J. F. McAlpine leg. (CNCI, 1 ♀ genit. prep.). **NORTHWEST TERRITORIES:** Norman Wells, 23.vi.1969, 1 ♀, G. E. Shewell leg. (CNCI). **NOVA SCOTIA:** Paquette Lk., 5 km S South Harbour, 5.vii.1983, 1 ♀, A. Borkent leg. (CNCI, genit. prep.). **ONTARIO:** Algonquin P. Pk., nr. Sitting Duck Lake, 45.4522°N 78.4713°W, Malaise trap, hardwood forest (SD-MAT), 5–21.v.2008, 1 ♀, E. Proctor leg. (DEBU); 10 km NW Penetanguishene, Awenda P. Pk., Second Lake, sweep in kettle marsh, 3.vii.2001, 1 ♀, M. Pollett leg. (LEMQ 0040381); Bruce Peninsula N. P., Crane River below Lake Scugog, 45°07.0'N 81°32.1'W, sweeps, riverside vegetation, 3.vii.1999, 2 ♀♀ (1 ♀ genit. prep.); Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.39'N 81°34.43'W, sweeps, *Carex aquatilis*, 22.vi.2008, 1 ♂; Bruce Peninsula N. P., Singing Sands, 45°11.50'N 81°34.61'W, sweeps, sedges in fen, 22.vi.2008, 5 ♀♀ (4 ♀♀ genit. prep), all K. N. Barber leg. (all DEBU); ~13.9 km W Chapleau, 47°49.20'N 83°35.42'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, grasses, 13.vi.2013, 1 ♀, 23.vi.2013, 1 ♀ (genit. prep.); ~40 km NE Chapleau, 47°59.76'N 82°55.04'W, wet roadside sweeps, mostly *Carex utriculata*, 23.vi.2013, 2 ♂♂ 1 ♀; ~13.5 km S Cochrane, 48°56.65'N 81°00.18'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 9.vii.2012, 3 ♂♂ 1 ♀, 22.vi.2013, 7 ♂♂ 3 ♀♀, 12.vii.2013, 5 ♂♂ 1 ♀ (1 ♂ genit. prep.), 13.vii.2013, 1 ♂ 1 ♀, 18.viii.2013, 1 ♂ 2 ♀♀, all K. N. Barber leg. (all CNCI); Grey Co., Dornoch, Anderson Lake, 1.vii.1992, 1 ♀, R. A. Cannings leg. (RBCM); Dryden, 49°47.27'N 92°48.62'W, sweeps, mixed graminoids/herbs, 17.vii.2008, 1 ♀; Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, 10.vii.2010, 1 ♀, both K. N. Barber leg. (both CNCI); same locality but sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 2 ♂♂ 2 ♀♀, J. Roháček leg. (SMOC, 2 ♂♂ 1 ♀ genit. prep.); ~3.8 km ENE Dugwal, 48°35.33'N 80°57.90'W, sweeps, wet ditch, *Carex utriculata*, *Equisetum fluviatile*, *Scirpus*, 23.vi.2013, 1 ♂ 2 ♀♀; Echo Bay, Echo Bay Marsh, 46°29.66'N 84°04.12'W, sweeps, near lookout, mostly *Carex utriculata*, 8.vi.2013, 1 ♂ 1 ♀, 15.vi.2013, 2 ♂♂ 2 ♀♀; same locality but 46°29.71'N 84°04.04'W, sweeps, nr. lookout, mostly *Carex* incl. *C. utriculata*, 24.vi.2012, 1 ♂ 1 ♀ (pair in copula); Elliot Lake, 46°22.23'N 82°36.49'W, sweeps, mixed graminoids incl. *Carex utriculata*, 29.vi.2013, 1 ♂; ~14.5 km SSE Elliot Lake, ~3.7 km NNE jct Hwys 17&108, 46°14.71'N 82°33.53'W, sweeps, mostly *Carex utriculata*, 29.vi.2013, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); ~59 km NNW

Elliot Lake, s. of Rocky Is. Lake, 46°50.16'N 83°03.05'W, sweeps, mostly *Carex aquatilis* in fen, 3.vii.2010, 1 ♀, K. N. Barber leg. (CNCI), 455 m, sweeping, mostly *Carex rostrata*? [more likely *C. utriculata*] in fen, 3.vii.2010, 5 ♂♂ 10 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 2 ♀♀ genit. prep.); Finland, S of Caliper Lake, sweep sedge at beaver dam, 10.vii.1992, 1 ♂, T. A. Wheeler leg. (LEMQ 0039596, genit. prep.); ~7.0 km E Foleyet, 48°14.34'N 82°20.75'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 23.vi.2013, 2 ♂♂, 13.vii.2013, 2 ♀♀; Goulais River, end of Island Rd., 46°43.57'N 84°24.45'W, sweeps, mud flats, *Equisetum fluviatile*, *Dulichium arundinaceum*, 9.vii.2007, 1 ♀ (genit. prep.); same locality but 46°43.33'N 84°24.72'W, sweeps, oxbow flats, *Equisetum fluviatile*, sedges, herbs, 16.vii.2007, 1 ♀ (genit. prep.); all K. N. Barber leg. (all CNCI); Goulais River, Sand Bay, 46°44.81'N 84°32.68'W, sweeping *Juncus* and *Carex* at margin of fen pools, 10.vii.2010, 5 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp., graminoids, *Caltha*, 21.vii.2009, 3 ♀♀, K. N. Barber leg. (DEBU 01502099–101); ~2.0 km W Hallebourg, 49°40.36'N 83°32.11'W, sweeps, wet ditch, mostly *Carex utriculata*, 22.vi.2013, 1 ♂; ~43 km W Hearst, hydro right-of-way opposite Forde Lk., 49°44.07'N 84°14.74'W, sweeps, mostly *Carex utriculata*, 21.vi.2013, 2 ♀♀; Icewater Creek WS [Watershed], 12.7 km NNE Searchmont, mi.10.5 Whitman Dam Rd., alder thicket, 21.vi.1986, 1 ♂, all K. N. Barber leg. (all CNCI); Lake Superior P. Pk., Hwy 17 near jct. Agawa Rock, 47°22.31'N 84°41.23'W, sweeps, mostly *Carex utriculata*, 12.vii.2014, 2 ♂♂ (DEBU 01503948, -49); Lake Superior P. Pk., Crescent Lk. campground, 47°16.66'N 84°33.00'W, sweeps, shoreline sedges, 29.v.2010, 2 ♂♂ 2 ♀♀ (DEBU 01502431–34), all K. N. Barber leg.; Manitoulin Island, 10 km W Gore Bay, 45°53'N 82°34'W, sweep in grassland alvar, 20.vi.1996, 2 ♀♀, P. Bouchard leg. (LEMQ 0039584, -85, 1 ♀ genit. prep.); Manitoulin I., Misery Bay Prov. Nat. Res., 45°47'48" 82°44'58"W, alvar, 27.v.2010, 1 ♀, S. A. Marshall leg. (DEBU 00324518, genit. prep.); Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, sweeps, emergent *Equisetum fluviatile* with *Carex* sp., 16.vi.2007, 3 ♂♂ 1 ♀, sweeps, emergent *Carex* sp., 16.vi.2007, 2 ♂♂ 1 ♀, sweeps, emergent *Equisetum fluviatile*, 16.vi.2007, 1 ♀ (genit. prep.); same locality but 48°47.69'N 86°26.07'W, sweeps, roadside graminoids, 31.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex. *Equisetum fluviatile*, wet stalks on [sic "near"] surface, [reared] bulk pails, misted daily, 22°C, 16L:8D, 60–70% RH, emerged: 12.v.2012, 1 ♀, K. N. Barber leg. (CNCI); Mer Bleue, 7.vi.1923, 2 ♂♂ 1 ♀, C. H. Curran leg. (CNCI); Moosonee, 51.24622°N 80.67281°W, Repl. 1 mesic, Malaise trap, 18–21.vi.2010, 1 ♂; Moosonee, 51.27717°N 80.64778°W, Repl. 3 wet, Malaise trap, 19–22.vi.2010, 1 ♀, both NBP Field Party leg. (both LEMQ); Moosonee, 51°16.68'N 80°38.65'W, sweeps, mostly *[Carex] utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 6 ♂♂ 2 ♀♀ (1 ♀ genit. prep.); Moosonee, 51°16.69'N 80°38.86'W, general sweeps, sedge meadow, 9.vii.2014, 1 ♀; Moosonee, 51°16.36'N 80°39.11'W, sweeps, railside ditch, mostly *Equisetum fluviatile*, *Carex* spp., 10.vii.2014, 2 ♂♂ 1 ♀; Moosonee, 51°16.55'N 80°39.01'W, sweeps, mostly *Carex* spp., wet forest trail, 11.vii.2014, 5 ♂♂; Otter Rapids, 50°10.80'N 81°38.59'W, sweeps, *Carex* spp., 19.vii.2009, 3 ♂♂, sweeps, *Equisetum fluviatile*, 19.vii.2009, 1 ♀, sweeps, roadside *Equisetum* spp., 19.vii.2009, 2 ♂♂ 1 ♀; ~7 km SSE Otter Rapids, 50°07.52'N 81°35.92'W, sweeps, *Scirpus* sp., 20.vii.2009, 1 ♂, all K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 24.vii.2004, 5 ♂♂ 4 ♀♀ (DEBU 01500556–64), 2.viii.2004, 6 ♂♂ 5 ♀♀ (DEBU 01500848–58, 2 ♀♀ genit. prep.), 7.viii.2004, 2 ♂♂ 1 ♀ (DEBU 01501074–76), 4.ix.2004, 1 ♀ (DEBU 01501430), 27.vi.2005, 2 ♂♂ 7 ♀♀ (DEBU 01501683–91, 3 ♀♀ genit. prep.), 7.vii.2007, 3 ♀♀ (DEBU 01501899–901), all K. N. Barber leg.; Pancake Bay Prov. Park, 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 2 ♀♀, J. Roháček leg. (SMOC, 1 ♀ genit. prep.); Pancake Bay P. Pk., 46°58.12'N 84°42.75'W, sweeps, mostly graminoids/*Typha* near wetland boardwalk, 2.viii.2004, 1 ♂ (DEBU 01500963); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 11 ♂♂ 7 ♀♀ (DEBU 01500702–19), sweeps, mostly emergent *Carex/Equisetum* nr. boardwalk, 16.vi.2007, 2 ♀♀ (DEBU 01501853, -54, both genit. prep.), all K. N. Barber leg.; Petawawa, 7.vii.1961, 1 ♂, J. R. Vockeroth leg. (CNCI); Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 5 ♂♂ (1 ♂ genit. prep.); ~10.8 km W Jct Hwys 556 & 129, km64.3 Ranger Lk. Rd., 46°53.46'N 83°27.01'W, sweeps, *Carex* sp., 23.vi.2007, 1 ♀, sweeps, *Equisetum fluviatile* and *Carex* sp., 23.vi.2007, 2 ♀♀, sweeps, *Equisetum fluviatile* and *Dulichium arundinaceum*, 23.vi.2007, 1 ♂, all K. N. Barber leg. (all CNCI); Richmond Fen, ex. forest, 45°05'48.73"N 75°50'39.70"W, 11.vi.2010, 1 ♀ (genit. prep.); J. B. Sinclair [sic B. J. Sinclair] leg.; ~4.5 km E Rosseau, on Aspdlin Rd., 45°15.88'N 79°34.88'W, sweeps, mostly *Carex* in sedge meadow, 7.vii.2005, 1 ♀, K. N. Barber leg. (both CNCI); S[ault] S[ainte] Marie, S. of Algoma U[niversity] College, 46°29.9'N

84°17.2'W, sweeps, graminoids mostly *Carex aquatilis*, 11.vi.1997, 4 ♂♂ 5 ♀♀ (1 ♂ genit. prep.), sweeps, *Carex aquatilis*, 12.vii.1997, 1 ♂ 3 ♀♀, 3.viii.1997, 1 ♂, 22.vi.1998, 1 ♂, 9.vi.2001, 1 ♂, sweeps, mostly *Carex aquatilis*, 5.vi.2001, 1 ♂, 12.vi.2001, 1 ♂, 15–16.vi.2001, 1 ♂, sweeps, *Carex lacustris*, 12.vii.1997, 2 ♂♂ 9 ♀♀, sweeps, *Scirpus* sp., 12.vii.1997, 1 ♂ 5 ♀♀, sweeps, *Calamagrostis canadensis*, 26.vi.1998, 1 ♀; S[ault] S[ainte] Marie, S. of Algoma University, 46°29.88'N 84°17.19'W, sweeps, mostly *Carex* spp., *Scirpus cyperinus*, 5.vii.2008, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[ainte] Marie, Finn Hill, 46°31.63'N 84°17.29'W, sweeps, *Scirpus microcarpus*, 19.vii.2004, 12 ♂♂ 9 ♀♀ (1 ♂ wing illustration), 4.viii.2004, 3 ♂♂ 2 ♀♀, 12.vi.2005, 1 ♂, 9.vii.2005, 1 ♂ 2 ♀♀ (1 ♂ genit. prep.), 27.vi.2007, 2 ♂♂, 13.vii.2007, 4 ♂♂, 12.vi.2008, 15 ♂♂ 9 ♀♀, 6.vii.2008, 1 ♂ 2 ♀♀, 18.vi.2016, 2 ♂♂ 4 ♀♀ (CNCI), 29.vi.2016, 126 ♂♂ 92 ♀♀ (AMNH, BDUC, CMNH, CASC, CSCA, INHS, KNWR, LACM, LEMQ, MCZN, NMPC, OSAC, PMAE, RBCM, SEMC, SMOC, UBCZ, USNM 5 ♂♂ 4 ♀♀ each; CNCI 36 ♂♂ 20 ♀♀), sweeps, *Carex stipata stipata*, 25.vi.2009, 1 ♂ (CNCI), K. N. Barber leg.; same locality but 46°31.63'N 84°17.33'W, sweeps, mostly *Carex stipata stipata*, 4.vi.2013, 1 ♀, sweeps, *Carex stipata stipata*, 18.vi.2016, 2 ♂♂ 3 ♀♀, 29.vi.2016, 4 ♂♂ 2 ♀♀, 2.vii.2016, 1 ♂; same locality but 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 18.vi.2005, 1 ♀, all K. N. Barber leg. (all CNCI); same locality but sweeping, mostly *Scirpus microcarpus*, 7.vii.2010, 2 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); S[ault] S[ainte] Marie, Landslide Rd., Coldwater Ck. floodplain, 46°33.8'N 84°16.6'W, sweeps, mostly *Carex aquatilis*, 13.vi.2001, 1 ♂; S[ault] S[ainte] Marie, River Road, 46°30.4'N 84°15.3'W, sweeps, mostly *Carex* spp., 11.vi.2001, 1 ♀; S[ault] S[ainte] Marie, 2nd Line Ext., 46°32.5'N 84°17.0'W, sweeps, mostly *Carex* sp., 13.vi.2001, 1 ♂; ~10 km W S[ault] S[ainte] Marie, Sunnyside Beach Rd., 46°30.51'N 84°32.56'W, sweeps, *Equisetum fluviatile*, sedges, 22.vi.2007, 2 ♂♂ 1 ♀; Searchmont, N Hwy #552, 46°50.3'N 84°04.4'W, sweeps, roadside sedges/grasses, 10.vii.1998, 1 ♂; Smooth Rock Falls, 49°16.04'N 81°36.08'W, sweeps, *Carex utriculata*, 22.vi.2013, 1 ♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); Sudbury, 22.vii.1922, 1 ♀, A. L. Melander leg. (USNM); ~61.5 km N Thessalon, Hwy#129, 47°05.00'N 83°09.40'W, sweeps, emergent *Equisetum fluviatile*/sedges, 23.vi.2007, 1 ♀ (genit. prep.); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp. [*E. fluviatile* & *E. palustre*], 5.vii.2010, 1 ♀ (genit. prep.), 17.vii.2010, 1 ♀ (genit. prep.), all K. N. Barber leg. (all CNCI); Toronto, 16.v.1896, 1 ♀, A. L. Melander leg. (USNM); 60 km S White River, 30.vi.1992, 1 ♂, T. A. Wheeler leg. (LEMQ 0039595). **QUEBEC:** Beechgrove, 45°39'N 76°08'W, 27.vi.1984, 2 ♂♂ 1 ♀, J. R. Vockeroth leg. (CNCI); Lac St-Francois Nat. Wildlife Area, NW of Aménag. Therrien, close to Ruisseau Th[errien], 45°00.39'N 74°30.99'W, *Carex* meadow, sweeping, T1a, 5.vi.1999, 4 ♂♂ 3 ♀♀ (LEMQ 0039559, -63–65, -70, -71, -74), T1b, 5.vi.1999, 5 ♂♂ 2 ♀♀ (LEMQ 0039561, -62, -66, -67, -69, -72, -75), T1c, 5.vi.1999, 1 ♂ 1 ♀ (LEMQ 0039568, -73), T2c, 5.vi.1999, 1 ♂ (LEMQ 0039560), all F. Beaulieu leg.; La Trappe, 27.v.1934, 1 ♀, J. Ouellet leg. (AMNH); Mistassini, 3.vii.1956, 1 ♂ 1 ♀ (♀ genit. prep.), 7.vii.1956, 1 ♀ (genit. prep.), J. R. McGillis leg.; Mistassini Post, 23.vi.1956, 1 ♀, 4.vii.1956, 1 ♂, J. R. Lonsway leg.; Old Chelsea, Summit King Mt., 1150', 11.vii.1971, 1 ♀, J. R. Vockeroth leg. (all CNCI); near Scheferville, 54°49.507'N 66°51.393'W, sweep, grass/sedge meadow, 8.vii.2008, 1 ♂ 1 ♀, A. Rogic leg. (LEMQ, 1 ♀ genit. prep.). **SASKATCHEWAN:** Kenosee, 15.vi.1958, 1 ♀, A. R. Brooks leg.; Saskatoon, S. Sask[atchewan] R. Valley, off Central Ave., 52°10.4'N 106°36.2'W, sweeps, riverside graminoids, 17.vii.1999, 1 ♀, K. N. Barber leg.; Uranium City, 21.vi.1962, 1 ♂ (genit. prep.), J. G. Chillcott leg. (all CNCI). **YUKON:** Alaska Highway at Yukon River crossing, 60°34'N 134°40'W, sweep grass/sedges along river margin, 2.vii.1997, 1 ♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039608, -609); Alaska Highway at Yukon River crossing, sweep sedges and grasses along river, 2.vii.1997, 1 ♀, S. Boucher leg. (LEMQ 0039610); Dawson, 1300', 29.vii.1962, 1 ♂ 2 ♀♀, R. E. Leech leg. (CNCI). **UNITED STATES OF AMERICA:** **ALASKA:** Anchorage, 18.vii.1951, 1 ♂ 1 ♀, R. S. Bigelow leg. (CNCI); Kenai NWR [National Wildlife Reserve], ~0.5 mi E of Berg Lk., LTEMP site 3271, wetland, sweep net sample, 20.vi.2004, 1 ♂, S. Grimes leg. (KNWR, ID:3884); King Salmon, Naknek River, 4.viii.1952, 1 ♂, W. R. Mason leg. (CNCI); Knik Lake, NW of Wasilla, sweeping vegetation edge of lake, 18.vii.1978, 4 ♂♂ 4 ♀♀ (1 ♂ 1 ♀ genit. prep.); Moon Lake, Alaska Highway, DC-1331, 8.vii.1978, 1 ♂, all P. H. Arnaud Jr. leg. (all CASC); Unalakleet, 13.vii.1961, 1 ♂, R. Madge leg. (CNCI). **COLORADO:** Rio Grande Co., Beaver Creek, 10000', Malaise trap, 21.vi.1972, 1 ♂ 1 ♀ (1 ♀ genit. prep.), W. W. Wirth leg.; Boulder Co., Nederland, 24.vi.1961, 1 ♀, G. C. Steyskal leg. (all USNM); Electra Lake, F4367E, ~37°33'N 107°48'W, ~8400', 28.vi.–1.vii.1919, 1 ♂ 1 ♀, [no collector] (AMNH); Teller Co., 3.5 mi S Florissant, Sanborn Ranch, along tributary of Plum Creek, 14.vii.2004, 1 ♂ 6 ♀♀, B. A. Foote leg. (CMNH, 3 ♀♀ genit. prep.); 2 mi S Gould, 13.viii.1968, 1 ♀, Oman leg. (OSAC, genit. prep.); 3 mi N Nederland, 8500', marshy stream margin, 2.vii.1961, 5 ♂♂ 2 ♀♀, J. G. Chillcott leg. (CNCI, 1 ♂ 1 ♀ genit. prep.); Platte Canyon, nr. Idlewild, 10.vi.1927, 1

♂, J. M. Aldrich leg. (USNM). **IDAHO:** Boundary [Co.], Perkins Lake, 48°45.6'N 116°05.5'W, 760 m, 3.vi.2006, 1 ♂ 2 ♀♀, W. N. Mathis leg. (USNM, 2 ♀♀ genit. prep.); Idaho Co., Pollock, 1.v.1959, 1 ♂, 2.v.1959, 1 ♀, [no collector] (WFBM, each with empty puparial case in gelatin capsule). **MICHIGAN:** Clinton Co., Bath, 6.vi.1940, 1 ♀, C. W. Sabrosky leg. (USNM). **MONTANA:** 2 mi E Babb, 19.vii.1967, 2 ♀♀, B. A. Foote leg.; 15 mi S Big Fork, 26.vi.1967, 4 ♀♀ (3 ♀♀ genit. prep.), D. Allen leg. (all USNM); Granite Co., 14 mi S Clinton, 4000', 27.vi.1971, 1 ♀, J. R. Powers leg. (CASC); Gallatin Co., Gallatin R., 2 mi N Gallatin Gtwy [Gateway], 4100', 23.vi.2001, 1 ♂, J. B. Runyon leg. (MTEC); 33.0 mi W Kalispell, 30.vi.1966, 1 ♂ 1 ♀; 33 mi W Kalispell, 3.viii.1966, 1 ♀; 1.0 mi S Swan Lake, 1.vii.1966, 1 ♀ (genit. prep.), 2.viii.1966, 2 ♂♂ 1 ♀ (1 ♀ genit. prep.), 20 mi S Swan Lake, 7.vii.1967, 2 ♂♂ 1 ♀, 14.vii.1967, 1 ♀ (genit. prep.), all B. A. Foote leg. (all USNM); 33.0 mi N West Glacier, 5.vii.1966, 3 ♀♀, K. Valley leg. (USNM, 1 ♀ with puparial case in gelatin capsule). **NEW YORK:** Whiteface Mt., 19.vii.1962, 4600–4872', 1 ♀, J. R. Vockeroth leg. (CNCD). **WASHINGTON:** Pacific Co., Ft. Canby St. Park, 29.vi.1988, 1 ♀, W. N. & D. Mathis leg.; Pend Oreille Co., Ione, ca. 10 km W, Rt. 20, 48°40.4'N 117°28.2'W, 975 m, 5.vi.2006, 4 ♀♀, W. N. Mathis leg.; Mt. Constitution, 17.vii.1909, 1 ♂, [no collector], 1 ♂, J. M. Aldrich leg., 2 ♂♂ 2 ♀♀, A. L. Melander leg., 22.vii.1909, 2 ♂♂, A. L. Melander leg., 1 ♂, C. F. Baker leg. (all USNM). **WISCONSIN:** Washburn Co., T39N R12W B32, 4.vii.1953, 1 ♀, R. H. Jones leg. (USNM, genit. prep.). **WYOMING:** Yellowstone Pk., Twin Lakes, 10.vii.1923, 2 ♂♂ 2 ♀♀, A. L. Melander leg. (USNM).

Other material examined (not included in type series). **CANADA:** **ALBERTA:** W. A. Switzer P. Pk., Beaver Ranch Trail, sweeps, 53°29.80'N 117°48.02'W, edge of Jarvis Ck., *Carex utriculata*, 22.vii.2011, 1 ♀, K. N. Barber leg. (DEBU 01503722, thorax crushed). **ONTARIO:** Bruce Peninsula N. P., Crane River below Lake Scugog, 45°07.0'N 81°32.1'W, sweeps, riverside vegetation, 3.vii.1999, 1 ♀, K. N. Barber leg. (DEBU, headless, genit. prep.); ~59 km NNW Elliot Lake, s. of Rocky Is. Lake, 46°50.16'N 83°03.05'W, 455 m, sweeping, mostly *Carex rostrata*? [more likely *C. utriculata*] in fen, 3.vii.2010, 2 ♂♂ 1 ♀, J. Roháček leg. (SMOC, 2 ♂♂ used for molecular work, 1 ♀ headless); Manitoulin Island, 10 km W Gore Bay, 45°53'N 82°34'W, sweep in grassland alvar, 20.vi.1996, 1 ♂, P. Bouchard leg. (LEMQ 0039583, headless); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum*, 7.viii.2004, 1 ♀, K. N. Barber leg. (DEBU 01501077, abdomen lost); Sault Ste. Marie, Finn Hill, 46°31.48'N 84°17.36'W, sweeping, mostly *Scirpus microcarpus*, 7.vii.2010, 1 ♂, J. Roháček leg. (SMOC, used for molecular work). **QUEBEC:** Mistassini, 3.vii.1956, 1 ♀, J. R. McGillis leg. (CNCD, headless). **UNITED STATES OF AMERICA:** **ALASKA:** Fairbanks, 2.vii.1921, 1 ♀, J. M. Aldrich leg. (USNM, headless). **COLORADO:** Summit Co., Frisco, 3.viii.2001, 1 ♀, I. S. Winkler leg. (BYUC, headless). **WASHINGTON:** Mt. Constitution, 17.vii.1909, 1 ♀, 22.vii.1909, 1 ♀, A. L. Melander leg. (USNM, both headless).

Description. Male. Total body length 2.22–2.94 mm; externally (including colouration) extremely similar to both relatives, the Palaearctic *A. tschirnhausi* and the above described *A. shewelli* (though usually more robust than the latter species), therefore mainly differences against these species are stressed in the description below. Head (Fig. 483) slightly higher than long, with face somewhat more receding than that of *A. shewelli* and hence more angular in profile (as in *A. tschirnhausi*). Occiput and frons closely resembling that of *A. shewelli* in form, colour and microtomentum, but dark V-shaped area on frons often paler and anteromedially (above frontal lunule) usually interrupted by small pale (ochreous to yellow) area or short stripe. Frontal lunule, face, parafacialia, gena and postgena hardly different from those of *A. shewelli*. Mouthparts coloured as in *A. shewelli* but clypeus usually paler brown to ochreous. Cephalic chaetotaxy largely as described above for *A. shewelli* but both long ors distinctly shorter than oc, anterior ors setula in front of the middle ors often situated closer to the latter, postocular setulae (up to 10) and peristomal setulae (up to 6, sometimes some of them can be duplicated) usually more numerous, and palpus with preapical seta and ventral setulae longer. Eye broadly subovoid, with longest diameter strongly oblique and 1.3–1.5 times as long as the shortest. Smallest genal height about 0.14–0.16 times as long as shortest eye diameter. Antenna entirely yellow as in both relatives, but arista darker than in *A. shewelli* having basal

segments pale brown and terminal seta blackish brown.

Thorax (Fig. 483) generally as in both relatives but more densely microtomentose (grey, often with some bluish tinge) and duller than that of *A. shewelli*, hence more resembling that of *A. tschirnhausi*. Small pale ochreous to ochreous yellow spot on propleuron above fore coxa usually more distinct than that in *A. shewelli*. Thoracic chaetotaxy not particularly different from that of relatives although ac microsetae (particularly in larger specimens) usually more numerous, in up to 6 rows in front of suture. Holotype somewhat aberrant in having 3 strong stpl setae (posterior stpl duplicated) otherwise there are only 2 stpl as in both allied species. Legs with the same colouration as those of typical specimens of *A. shewelli* including the variably darkened (usually rather pale) last tarsal segments. Pedal chaetotaxy as in *A. shewelli*, having ctenidial spine of f_1 similarly variable in length, ranging from only as long as to distinctly longer than maximum width of t_1 ; t_2 with usual (for the *A. tschirnhausi* group) short posterior ventroapical seta and rather variable anterior ventroapical setula being small and fine to thicker and longer, although always markedly shorter than the former seta. Wing (Fig. 486) largely as described above for *A. shewelli* but generally broader, R_{2+3} less upcurved apically, and R_{4+5} and M usually straighter and more parallel distally. Wing measurements: length 2.36–3.20 mm, width 0.74–0.99 mm, $Cs_3 : Cs_4 = 1.00\text{--}1.44$, $rm/dm-cu : dm-cu = 2.26\text{--}3.78$. Haltere pale to whitish yellow as that of pale specimens of *A. shewelli*.

Abdomen with preabdominal terga brown but paler than thorax, and, particularly, T1 (sometimes partly also T2) paler than T3–T5, all similarly shaped to those of *A. shewelli*. Colouration of preabdominal sterna variable, ranging from pale ochreous yellow to light brown. S1 bare, with very narrow, brownish-darkened posterior margin, transversely trapezoidal, and wider and shorter than S2 (as in *A. shewelli*). S2–S5 setose as in *A. shewelli*, becoming wider, larger and sometimes also darker posteriorly. S2 about as long as wide and with more or less darkened anterior third. S3–S5 wider than long, transversely trapezoidal (broader posteriorly), all generally wider than those of *A. shewelli*; S5 widest, most transverse and more or less brownish-darkened laterally. T6 very similar to that of relatives but somewhat shorter, being less than half length of T5. S6 and S7 always paler (up to ochreous yellow) than S8 and both with usual brown anterior marginal ledge. S6 with 2–4, S7 with 3–4 short setae. S8 long, tapered posteriorly and setose as that of *A. shewelli*, similarly brown to T5, thus not as dark as epandrium.

Genitalia externally more resembling those of *A. tschirnhausi* than those of *A. shewelli*. Epandrium (Figs 487, 489) blackish brown, high and distinctly tapered dorsally, about as long as *A. tschirnhausi* but slightly narrower and more densely setose than that of the latter species, with several (2–4 pairs) only slightly longer and thicker dorsolateral setae; anal fissure small, narrow, rounded (often asymmetrically) triangular, and narrower than that of *A. tschirnhausi*. Cercus small, with fine setae, as in relatives. Medandrium (Fig. 487) very high, dorsally tapered and with narrow end dorsally emarginate as in relatives, resembling that of *A. shewelli* (dorsally somewhat narrower than in *A. tschirnhausi*). Gonostylus (Figs 487, 489, 493, 510–512) most similar to that of *A. tschirnhausi*, yellow but with apex more or less darkened (brownish, particularly in large specimens), slightly shorter than epandrial height, slender, elongate, tapered and pointed apically, with anterior side concave (Fig. 510) to almost straight (Figs 493) and posterior side always strongly convex and with micro-



Figs 481–484. Primary types and females of the Nearctic species of the *Anthomyza tschirnhausi* group. 481 – *A. shewelli* sp. nov., holotype male, laterally, body length 2.30 mm; 482 – *A. gilviventris* sp. nov., dark form, paratype female, laterally, body length 3.42 mm (USA: Colorado); 483 – *A. gilviventris* sp. nov., holotype male, laterally, body length 2.89 mm; 484 – same species, topotypic paratype female, laterally, body length 3.57 mm. Photo by J. Roháček.



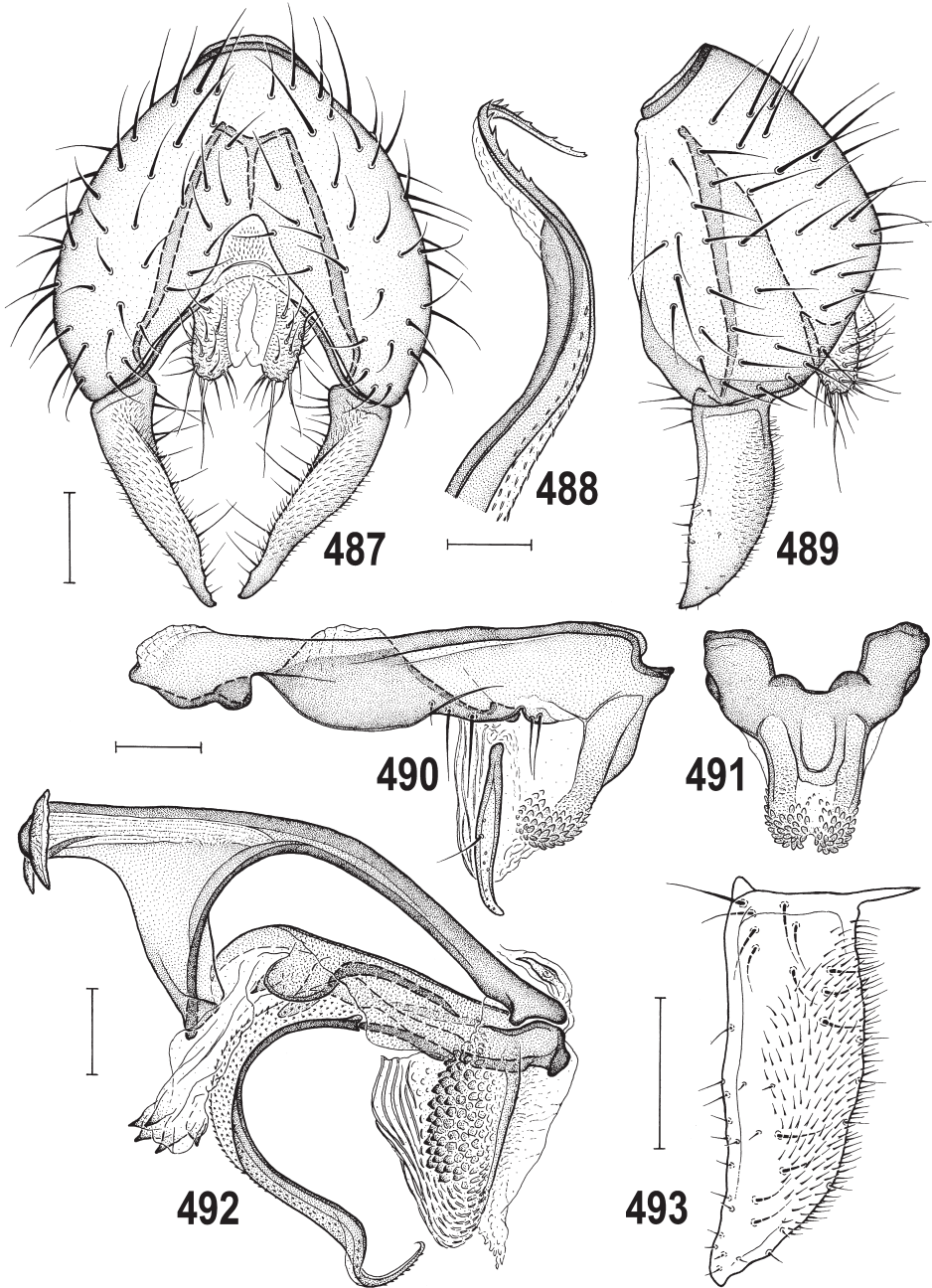
Figs 485–486. Wings of the Nearctic species of the *Anthomyza tschirnhausi* group. 485 – *A. shewelli* sp. nov., paratype male, wing length 2.7 mm (Canada: Ontario); 486 – *A. gilviventris* sp. nov., paratype male, wing length 3.0 mm (Canada: Ontario). Photo by K. N. Barber.

pubescence usually covering larger portion of its outer side. Hypandrium (Fig. 490) of moderate size, distally slightly larger than that of *A. tschirnhausi* and with anterior internal lobes much larger, darker, more heavily sclerotized and often projecting above dorsal hypandrial margin. Transandrium narrow (Fig. 491), medially more robust than in *A. tschirnhausi* and with a pair of small, low, dark dorsal lobes (as in *A. shewelli*); caudal process distinctly developed, narrow, flat, ventrally slightly narrowed, medially somewhat less sclerotized and laterally coalesced to secondary sclerotizations of basal membrane. Pregonite (Fig. 490) fused with hypandrium, low, posteroventrally with a small, inconspicuous lobe carrying 2 (subequal or 1 slightly longer) setae; anterior flat part of pregonite with 3 setae (all on inner side, posterior seta longest, as in both relatives). Postgonite (Fig. 490) very slender and elongate, darker proximally and paler distally where bent, apically more acute than in *A. shewelli* but not as pointed as in *A. tschirnhausi*, with 1 longer seta at middle of anterior margin, outer side with several sensillae. Basal membrane ventrally somewhat bilobed, with flat spines being pigmented ventrolaterally, and less numerous and hyaline medially (Figs 490, 491); lateral parts adjacent to caudal process of transandrium secondarily sclerotized and amber yellow pigmented as in *A. shewelli*. Aedeagal part of folding apparatus (Fig. 492) with numerous,

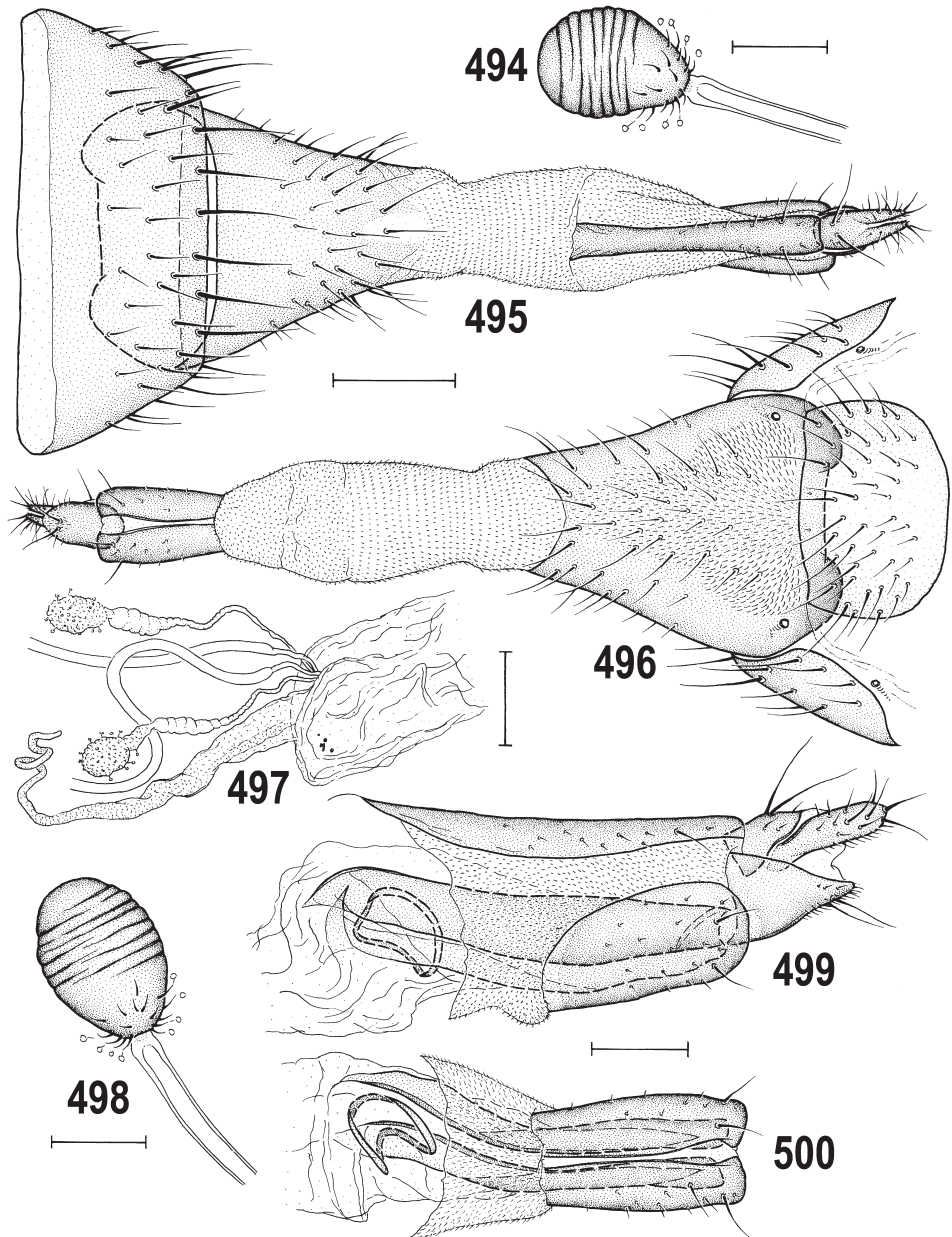
dense, flat spine-like excrescences, often darker than in relatives; connecting sclerite inconspicuous, very slender, weakly sclerotized, bordering the former. Phallapodeme slender with robust fulcrum, ventrolaterally projecting apex and shortly forked base as in *A. shewelli*. Aedeagus slender (Fig. 492), with small elongate phallopore similar to that of *A. shewelli*, indistinctly separated from large distiphallus. Saccus relatively slender, shorter than filum, sclerotized in proximal half where it originates by lateral rounded sclerite with 1 internal spine; distally membranous and normally with 5 (rarely up to 8) thick spines on apex, thus armature resembling that of *A. shewelli* (not that of *A. tschirnhausi* with only 3 terminal spines). Filum formed by single, long, twisted and largely dark sclerite terminating in curved, pointed and finely bicuspid apex (Fig. 488) provided with a number (more than 10) subterminal spines; most of filum (particularly its membranous proximal part) with numerous spinulae (yet more than in *A. shewelli*). Ejacapodeme very small, with a small, pointed projection (Fig. 492).

Female. Similar to male unless mentioned otherwise. Total body length 2.50–3.89 mm. 1st antennal flagellomere more or less darkened anterodorsally (more extensively on inner side) as in females of *A. shewelli*. Peristomal setulae usually yet more numerous (up to 9) than in male; also palpus often with more setulae (up to 15). f_1 with ctenidial spine variable as in male. Wing measurements: length 2.56–3.73 mm, width 0.77–1.21 mm, $Cs_3 : Cs_4 = 0.97\text{--}1.42$, $rm/dm\text{-}cu : dm\text{-}cu = 2.15\text{--}3.15$. Abdomen in typical specimens with preabdominal terga (T1–T5) very pale (Fig. 484), dirty yellow to orange ochreous, at most somewhat brownish-darkened on lateral sides and/or posterior corners. More rarely (see below) abdomen is markedly darkened, with T1–T5 (and also postabdominal T6, T7+S7) largely brown to dark brown (Fig. 482) or brown-spotted laterally and medially and hence resembling that of *A. shewelli*. T1–T5 more transverse than in male; T1 distinctly narrower than T2; T2–T5 subequal in length but T2 slightly narrower than T3–T5, all relatively shortly setose (as in *A. shewelli*). Preabdominal sterna light ochreous to pale yellow, only S2 with somewhat darkened anterior third to two-thirds and S1 (bare) with narrowly darkened posterior margin; S2–S5 becoming distinctly larger and wider posteriorly, only S2 as long as wide, S3–S5 slightly to distinctly wider than long, all slightly trapezoidal to suboblong; S5 widest and largest of them, as wide as postabdominal S6 but usually paler than the latter.

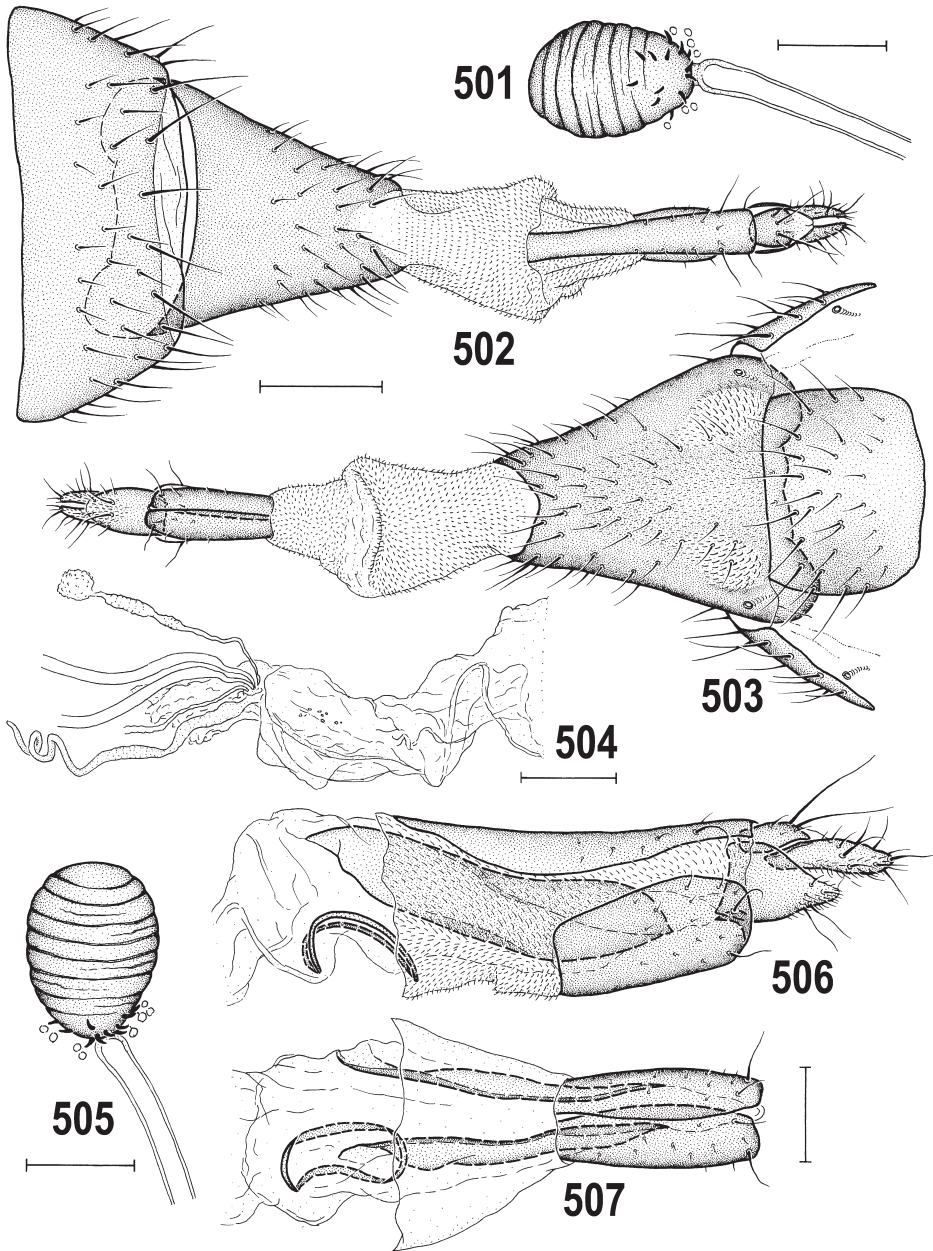
Postabdomen (Figs 495, 496, 502, 503, 515), interestingly, more similar to that of *A. shewelli*, thus longer, more slender and elongate than that of *A. tschirnhausi*. T6 trapezoidal, wider and more transverse than in *A. shewelli*, setose as in *A. shewelli*; typical specimens with T6 completely yellow, dark specimens with T6 brown-darkened to almost completely dark brown (Fig. 502). S6 narrower than in *A. tschirnhausi* but wider than in *A. shewelli*, with setae relatively dense (as in the former species); yellow (Fig. 496) to brown-darkened (Fig. 503), rarely with darkened lateral margins. Conical tergo sternum T7+S7 (Fig. 495, 496, 502, 503, 515) long and very slender as in *A. shewelli*, somewhat emarginate anterodorsally; in typical specimens largely dark yellow to orange ochreous (Fig. 495) or narrowly brownish-darkened at posterior margin (Fig. 484), often with a pair of submedial brown stripes (Fig. 484) and usually with narrow unpigmented posteromedial area (of variable size); ventral part of T7+S7 (Fig. 496) mostly yellow to orange, prolonged, forming distinctly darker (orange brown to contrastingly brown) anterolateral pouch-like lobes, and with variably paler to unpigmented areas in anterior third that are usually not (below 7th spiracle) depressed and/



Figs 487–493. *Anthomyza gilviventris* sp. nov., paratype male (Canada: Ontario). 487 – external genitalia, caudally; 488 – apex of filum, subventrally; 489 – external genitalia, laterally; 490 – hypandrial complex, laterally; 491 – transandrium, caudally; 492 – aedeagal complex, laterally; 493 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Fig. 488) and 0.1 mm (others).



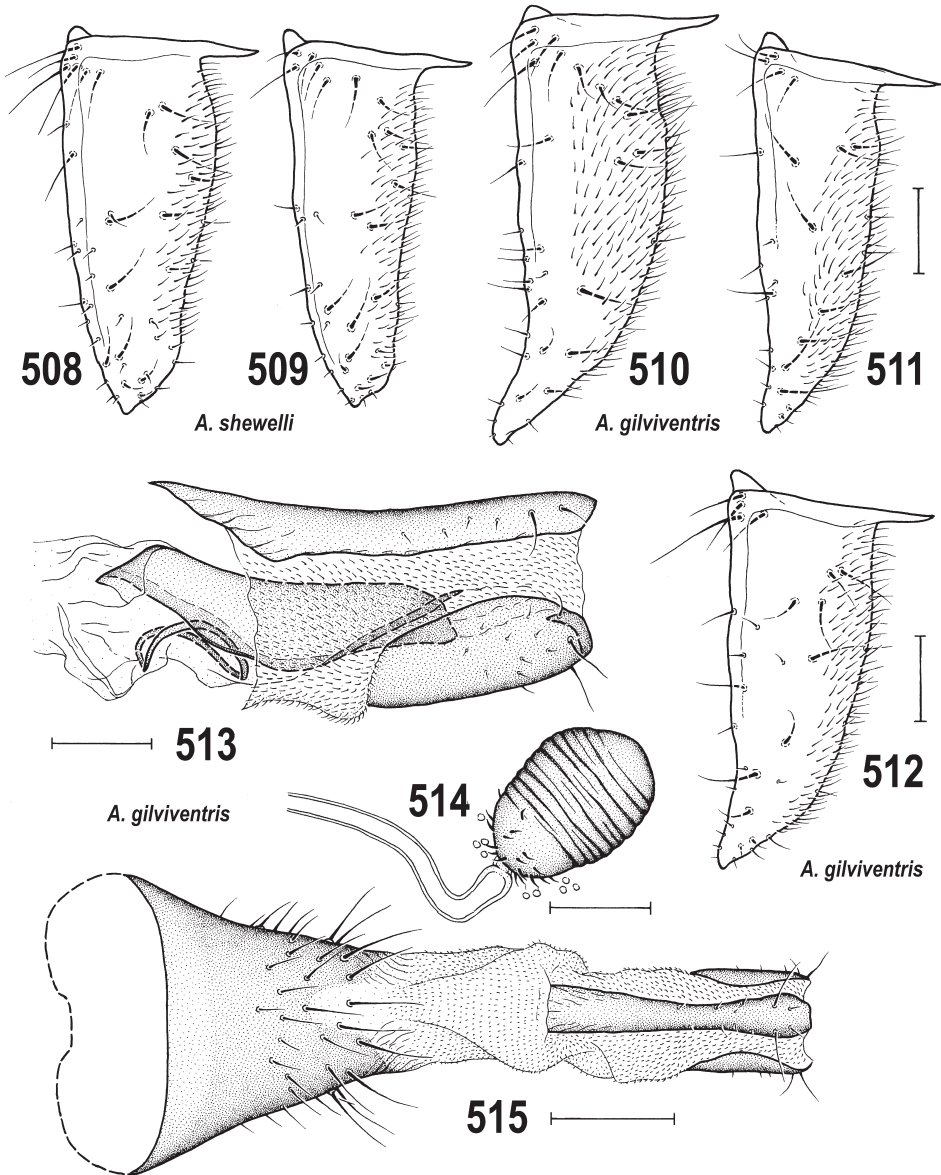
Figs 494–500. *Anthomyza gilviventris* sp. nov., paratype female (Canada: Ontario). 494 – spermatheca; 495 – postabdomen, dorsally; 496 – the same, ventrally; 497 – distal part of female genital chamber, laterally; 498 – spermatheca; 499 – end of postabdomen with internal sclerites, laterally; 500 – internal sclerites and S8, ventrally. Scales = 0.05 mm (Figs 494, 498), 0.2 mm (Figs 495, 496) and 0.1 mm (others).



Figs 501–507. *Anthomyza gilviventris* sp. nov., dark form, paratype female (USA: Montana). 501 – spermatheca; 502 – postabdomen, dorsally; 503 – the same, ventrally; 504 – distal part of female genital chamber, laterally; 505 – spermatheca; 506 – end of postabdomen with internal sclerites, laterally; 507 – internal sclerites and S8, ventrally (micropubescence omitted). Scales = 0.05 mm (Figs 501, 505), 0.2 mm (Figs 502, 503) and 0.1 mm (others).

or separated from darker dorsal part by a lateral ridge (compare Fig. 517 to Fig. 516); most of ventral side of T7+S7 covered by whitish micropubescence that is denser and stronger anterolaterally than medially (Fig. 496); other parts of tergosternum without micropubescence and glossy; setae largely as in *A. shewelli*. In dark variant T7+S7 is largely brown (Fig. 502, 503, 515), paler only anterodorsally or completely brown, and with anterolateral lobes dark. On the other extreme, in paler specimens (e.g. some southwestern Alberta populations) with orange yellow T7+S7, the anteroventral lobes are pale or only slightly darkened, and the apical marginal band is very narrow, diffuse, or absent, often with a submedial pair of ventral stripes (as in Fig. 484). T8 (Figs 495, 499, 502, 506, 513, 515) elongate, very narrow and dark brown as in *A. shewelli*, without micropubescence, setulae longer than in the latter species. S8 (Figs 496, 499, 500, 503, 506, 507, 513) slightly longer and often narrower than that of *A. shewelli*, half length or more of T8, longitudinally divided into two dark brown sclerites and lacking micropubescence as in *A. tschirnhausi*, with longer setulae and with 2 pairs of setae in posterior half. Genital chamber (Figs 497, 499, 500, 504, 506, 507, 513) with one pair of posterior elongate flat sclerites, variable in length, usually as long as or longer than T8 (Figs 499, 506), but sometimes shorter (Fig. 513); annular sclerite asymmetrical and situated as in *A. shewelli*. Ventral receptacle (Figs 497, 504) membranous, tubular as in *A. shewelli*, with wider proximal part and attenuated distal part terminated by spirally vermicular apex. Accessory gland also closely resembling that of *A. shewelli*, including duct. Spermathecae (1+1) relatively small, the larger 0.6–0.8 times as long as medial length of S10, more broadly subovoid and with more densely transversely striated surface (Figs 494, 498, 501, 505, 514) than in *A. shewelli*, less elongate and with surface less densely striated than in *A. tschirnhausi* (cf. ROHÁČEK 2009a: Figs 66, 67) and its smooth basal part with numerous fine setiform (Figs 494, 498) to somewhat thickened (Figs 501, 505) spinulae. T10 (Figs 495, 499, 502, 506) small, elongately subpentagonal (as in *A. shewelli*), brown, with a pair of long medial setae and 1–2 pairs of short setulae, otherwise without micropubescence. S10 (Figs 496, 499, 503, 506) distinctly larger than T10, also brown, relatively narrow and elongate, longer than in both relatives, and largely bare, with a single pair of medial setae, a few setulae at posterior margin and reduced micropubescence restricted to posterior fourth. Cercus (Figs 495, 499, 502, 506) slightly longer than in *A. shewelli*, but similarly shortly setose including distinctly exclinate apical setae, and with limited micropubescence that is restricted to its ventral side.

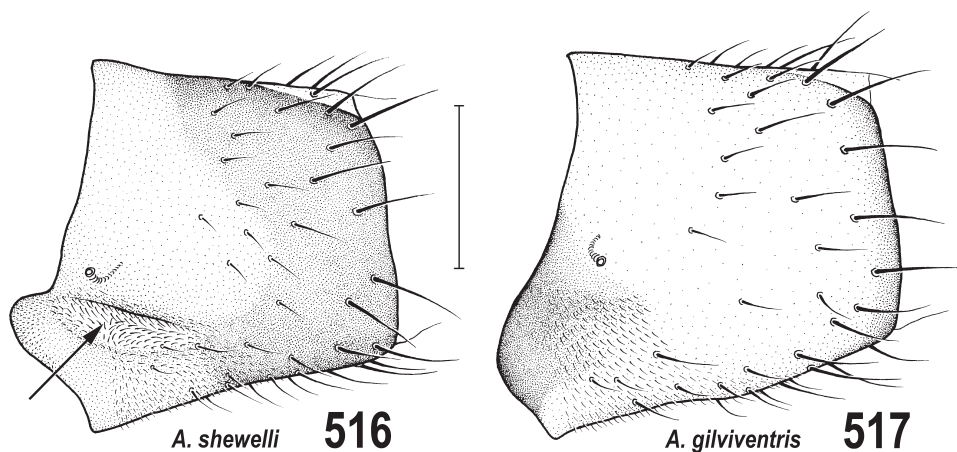
Variability. Some variability of the male gonostylus is shown in Figs 493, 510–512. Compared to *A. shewelli*, the variability in shape of the gonostylus is less extreme, but there is more variation in the extent of the micropubescence. On the other hand, the dorsal colouration of the female abdomen is more variable than in *A. shewelli*, ranging from almost completely orange yellow (including T7+S7) to largely blackish brown, but it is to be stressed that the extreme colour variants do not occur in all populations. Only the dark form is known from Alaskan populations, but females with brown-darkened preabdominal terga have been recognized in some northeastern (Labrador, Newfoundland) and northwestern (British Columbia, Alaska) areas, as well as in Montana (Swan Lake, Big Fork, both ~1000–2000 m) and Colorado, including high-montane areas in the latter (Nederland, 8500 ft [~2600 m], Beaver Creek, 10000 ft [~3000 m]). The frequency of occurrence of the dark females may be increased in colder climates. On the other extreme, those smaller females with an entirely orange yellow



Figs 508–515. Gonostyli (Figs 508–512) of paratypes ventrolaterocaudally (in widest extension) and female postabdominal structures (Figs 513–515) of the Nearctic species of the *Anthomyza tschirnhausi* group. 508 – *A. shewelli* sp. nov. (Canada: Ontario); 509 – same species (USA: Montana); 510 – *A. gilviventris* sp. nov. (Canada: British Columbia); 511, 512 – same species (USA: Colorado); 513 – *A. gilviventris* sp. nov., paratype female, dark form (USA: Colorado), 8th abdominal segment with internal sclerites, laterally; 514 – same specimen, spermatheca; 515 – same specimen, 7th and 8th abdominal segments, dorsally. Scales = 0.1 mm (Fig. 513), 0.2 mm (Fig. 515) and 0.05 mm (others).

preabdomen and reduced or no darkening on the anterolateral lobes and posterior margin of T7+S7, seem to occur infrequently among most populations, but are predominant in several populations in southwestern Alberta (Peter Lougheed P. Pk. [~1600 m]) and Churchill, Manitoba (10–14 m).

Discussion. *Anthomyza gilviventris* sp. nov., appears to be very similar and closely allied to both the Nearctic *A. shewelli* and the Palaearctic *A. tschirnhausi*. Apart from *A. shewelli* having a clearly dissimilar gonostylus, the differentiation of males of *A. gilviventris* and *A. tschirnhausi* is more problematic because they both have a similarly formed gonostylus with convex posterior and concave to almost straight anterior margins (cf. Figs 510–512 and ROHÁČEK 2009a: Fig. 57). However, the Palaearctic *A. tschirnhausi* differs from the Nearctic *A. gilviventris* in having a broader epandrium and anal fissure, lower anterior internal lobes of the hypandrium, a less-developed caudal process of the transandrium, and, most importantly, a saccus with only 3 terminal spines. Identification of females of *A. gilviventris* is more difficult because of a wide colour variability of the abdomen. Typical specimens can be distinguished from those of the above relatives by a strikingly orange yellow to orange ochreous abdomen that is usually accompanied by a pair of contrasting anteroventrolateral dark spots (see Fig. 484) on the pouch-like lobes of T7+S7. Because these spots can sometimes be reduced or missing (especially in some populations in Alberta), these specimens can closely resemble the (albeit very rare) palest females of *A. shewelli*. On the other hand, the darkest females of *A. gilviventris* have an abdomen with T1–T6 brown to blackish-brown, darkened as in typical females of *A. shewelli*, but the T7+S7 of *A. gilviventris* is almost completely (also anteriorly) dark. In these extreme cases they can be best distinguished from *A. shewelli* females by the relative size and shape of the spermathecae (in *A. gilviventris* the larger spermatheca is only 0.6–0.8 times as long as S10 and more broadly ovoid) and T7+S7 is usually lacking the lateral



Figs 516–517. T7+S7 of typical female specimens of the Nearctic species of the *Anthomyza tschirnhausi* group, laterally. 516 – *A. shewelli* sp. nov., paratype (Canada: Ontario); 517 – *A. gilviventris* sp. nov., paratype (Canada: Ontario). Scale = 0.2 mm. Arrow indicates position of lateral ridge above depressed microtomentose area.

ridge and the depressed unpigmented micropubescent area below the 7th spiracle. Also, the microtomentum of the mesonotum is characteristically denser, paler and often with a bluish tinge. It is to be stressed that the *A. gilviventris* females with dark abdomens are also very similarly coloured to those of *A. tschirnhausi*, but the latter species differs by its less posteriorly tapered T7+S7, a wider T8 and S8 (this also shorter) and more elongate spermathecae with striae covering a larger part of their surface (cf. ROHÁČEK 2009a: Figs 63–69).

Etymology. The new species is named for the largely yellow abdomen of most females (an adjective compounded from *gilvus* (= Latin yellow) and *venter* (= Latin abdomen)).

Biology. As discussed for *A. shewelli*, the habitat of *A. gilviventris* is also primarily characterized by moist areas including various wetland areas including “fen”, “edge of fen”, and “margin of fen pools”. There are fewer references to wooded areas such as “forest floor”, “forested area”, “boreal forest”, and “wet forest trail”. The most commonly referenced plants are the sedges *Carex* and *Scirpus*, but other plants are commonly (*Equisetum*) or occasionally (*Typha*, *Caltha*) found intermixed. Grasses are also present in these habitats and are sometimes even predominating.

Particularly large collections at one site (Ontario: Sault Ste. Marie – Finn Hill; see *A. shewelli* – Biology) were made from *Scirpus microcarpus*, which was a perennially reliable habitat for *A. gilviventris*, yielding only a few *A. shewelli*. This portion of the sedge meadow receives and retains significant runoff from the bordering wooded ridge to the west leading to soil saturation over an extended period of the growing season. A western site (Alberta: Spray Valley P. Pk.) was predominated by a *Carex* that was not identified to species, but matched other identified specimens of *C. utriculata* from similar sites sampled in southwestern Alberta (e.g. Peter Lougheed P. Pk.). The flies from this southwestern Albertan locality include those *A. gilviventris* that are smaller in body size and do not have the darkened anteroventral lobes of T7+S7 in the female. All the specimens from Manitoba: Churchill, a northern site, were similarly pale and were taken in open areas of tundra and fen, but also boreal forest, although the latter might include wet openings.

A single female emerged from a pair of overwintered stalks of *Equisetum fluviatile* collected in the spring of 2012 (Ontario: Marathon; see *A. vockerothi* – Biology). This was a rare event and the local population of *A. gilviventris* is more likely to be associated with the intermixed *Carex aquatilis*, as is also likely for the single reared male of *A. gibbiger*. The flight period for *A. gilviventris* runs from 1 May (Idaho: Pollock) to 4 September (Ontario: Pancake Bay P. Pk.).

Distribution. *Anthomyza gilviventris* has a much more extensive distribution compared to that of *A. shewelli*. Though it is known from fewer eastern jurisdictions from Newfoundland and Labrador to New York, it ranges west to British Columbia and Washington, and then south to Colorado and north to Alaska, Yukon, and Northwest Territories. Records are available for Canada: Alberta, British Columbia, Labrador, Manitoba, Newfoundland, Northwest Territories, Nova Scotia, Ontario, Quebec, Saskatchewan, Yukon; United States of America: Alaska, Colorado, Idaho, Michigan, Montana, New York, Washington, Wisconsin, Wyoming (see Table 2, Fig. 598).

The *Anthomyza gracilis* group

The *Anthomyza gracilis* group was erected by ROHÁČEK (2006a) to include two Palaearctic species, *A. gracilis* Fallén, 1823 and *A. elbergi* Andersson, 1976, and was characterized by several apomorphic features, two of which were considered strong synapomorphies by ROHÁČEK (2009a), viz. the peculiar dentate ventral appendage of the caudal process of the transandrium (Figs 18–21, 530–532) and the spermathecae with a long digitiform invagination (Figs 29, 32, 540, 541). In the Nearctic Region three more species belonging to this group were found that are described below as *A. furvifrons* sp. nov., *A. vulgaris* sp. nov. and *A. equiseti* sp. nov. These additions have not necessitated substantial modification of the diagnosis of this species group which includes the following apomorphic characters (unique synapomorphies marked with U in parentheses behind the character): (1) body densely grey to brownish grey microtomentose and largely dull; (2) medandrium high and narrow; (3) dorsal internal sclerite at base of postgonite usually large and bearing some spines; (4) caudal process of transandrium ventrally with large toothed appendage (U); (5) aedeagal part of folding apparatus with clusters of dark spines, different on each side (U), cf. also Figs 15, 22; (6) female T7+S7 ventrally with desclerotized area that is often widened anteriorly; (7) paired internal sclerites in female genital chamber large, long and flat; (8) spermathecae with long digitiform invagination and eccentrically inserted duct (U); (9) female T10 with 1 pair of long setae and a few shorter setae in addition.

Based on morphological data, the *A. gracilis* group seems to be most closely allied to the *A. tschirnhausi* group (as defined here, see above). This relationship is supported by the following (obviously apomorphic) characters: medandrium high; postgonite slender and elongate; caudal process of transandrium strongly sclerotized; female T8 long and slender; and, particularly, female genital chamber with paired internal sclerites very elongate.

Two clades can be recognized in the *A. gracilis* group. The first includes both Palaearctic species (*A. gracilis*, *A. elbergi*) plus the Nearctic *A. furvifrons* sp. nov. (synapomorphies: aedeagal part of folding apparatus with strong spines also ventrally; internal paired sclerites in female genital chamber doubled), while the second includes only two Nearctic species, *A. vulgaris* sp. nov. and *A. equiseti* sp. nov. (synapomorphy: female T7+S7 ventrally with posteromedial lappet-shaped appendage). Additional notes on relationships for Nearctic taxa are elaborated upon below under each species. The most interesting of them appears to be the sister-species pairing of *A. furvifrons* and the Transpalaearctic *A. elbergi*.

Notes. *Anthomyza gracilis* has been repeatedly recorded from the Nearctic Region (see MELANDER 1913; JOHNSON 1925; PROCTER 1946; SABROSKY 1965; COLE 1969; ARNETT 1993, 2000; FOOTE 2002). Because this Palaearctic species has not been confirmed as occurring in North America in this study of the holdings of major North American collections, all these records must be based on misidentified specimens of other species of the *A. gracilis* group (i.e. *A. furvifrons*, *A. vulgaris*) or of members of the *A. pallida* group (i.e. *A. concolor*, *A. vockerothi*) and the *A. tschirnhausi* group (i.e. *A. shewelli*) as evidenced by determination labels listed in the respective sections on paratypes or material examined.

The illustration of an adult male *Anthomyza gracilis* in the Manual of Nearctic Diptera, Vol. 2 (VOCKEROTH 1987: Fig. 75.1), which was also used in ROHÁČEK (1998b: Fig. 22.1), was based on European specimens but unfortunately not of true *A. gracilis*. They represent *A. collini* Andersson, 1976, which belongs to a species group not occurring in the Nearctic Region. This shortcoming results from the fact that, before ANDERSSON's (1976) revision, *A. collini* had been misunderstood to be *A. gracilis*, while the true *A. gracilis* had been recorded under the synonymous name of *A. sordidella* (Zetterstedt, 1848) (for more detail see ROHÁČEK 2006a). The CNCI specimens [England: Devon: Newton Abbot, 22.vi.1960, 1 ♂ (genit. prep.) and Sweden: Sk: Bjerred, 2 ♂♂ (1 ♂ genit. prep.), 29.v.1951, all J. R. Vockeroth leg.], upon which R. Idema based his illustration in VOCKEROTH (1987), have been examined and they all belong to *A. collini*.

Key to identification of the Nearctic species of the *Anthomyza gracilis* group

- 1 Head in profile slightly higher than long; eye broad, little narrowed posterodorsally (Fig. 518); orbit dark from vertex beyond posterior ors, usually to about midway between posterior and middle ors (Fig. 519); in lateral view, narrow area above postgena anteriorly greyish but abruptly becoming shiny brown to black on occiput (Fig. 518); caudal process of male with ventral appendage more elongate (Fig. 532) and thin in lateral profile (Fig 530) and lacking anteroventral angularity; aedeagal part of folding apparatus with strong spines ventrally (Figs 528, 534); female T7+S7 with ventral anteromedial area triangular and distinctly domed (medially convex), ventral desclerotized area small and without sclerotized posteromedial appendage (Figs 536, 538). *A. furvifrons* sp. nov.
- Head in profile more depressed, longer than high; eye elongate, narrowed posterodorsally (Figs 520, 522); orbit dark only from vertex to posterior ors and abruptly yellow in front of it (Figs 521, 523); in lateral view, area above postgena somewhat broader and generally continuously greyish from margin of eye onto occiput (Figs 520, 522); caudal process of transandrium with ventral appendage less elongate (Figs 555, 584) and thicker in lateral profile (Figs 553, 582) and anteroventrally more or less angular; aedeagal part of folding apparatus without strong spines ventrally (Figs 556, 558, 585, 587); female T7+S7 with ventral anteromedial area shorter and longitudinally grooved (Fig. 565, arrow) often producing a chordate posterior margin, ventral desclerotized area large and posteromedial appendage behind it well sclerotized (Figs 564–566, 568, 570, 589, 591). 2
- 2(1) Thorax brownish grey to dark bronze microtomentose; midline sternal setae predominantly black. f_1 usually with at least some grey to brown darkening on posterior surface (Fig. 522), at least basal corner of cx_1 always dull grey- to brown-darkened, sometimes also other femora and tibiae partly darkened (Fig. 574) especially t_1 opposite the ctenidial spine; frons with medial darkening extending anteriorly to at least middle ors (Fig. 523) and as far as anterior margin; male preabdominal sterna dark, ochreous brown; caudal process of transandrium with ventral appendage widely flaring ventrally (Fig. 582) and posteriorly (Figs 583, 584); female T7+S7 with pale-pigmented anteroventral strip broadly extended dorsolaterally (Fig. 591), reaching above 7th spiracle

- (Fig. 589), and shiny secondary posterolateral sclerotization prominent (Fig. 589, arrow); associated with horsetails (*Equisetum* spp.). **A. equiseti sp. nov.**
- Thorax usually pale grey microtomentose; midline sternal setae predominantly pale (very rarely all black). All femora and tibiae entirely yellow (Figs 520, 545), cx_1 sometimes with a shiny brown darkening basally; frons with anterior margin usually broadly yellow (Fig. 521), rarely with medial darkening extending beyond middle ors; male preabdominal sterna pale, dirty yellowish; caudal process of transandrium with ventral appendage moderately flaring ventrally (Figs 553, 561) and posteriorly (Figs 554, 555); female T7+S7 with pale-pigmented anteroventral strip not extended dorso-laterally (Figs 564, 565, 568), and shiny posterolateral sclerotization absent (Figs 564, 566); associated with grasses or sedges. **A. vulgaris sp. nov.**

***Anthomyza furvifrons* sp. nov.**

(Figs 518, 519, 524, 527–543)

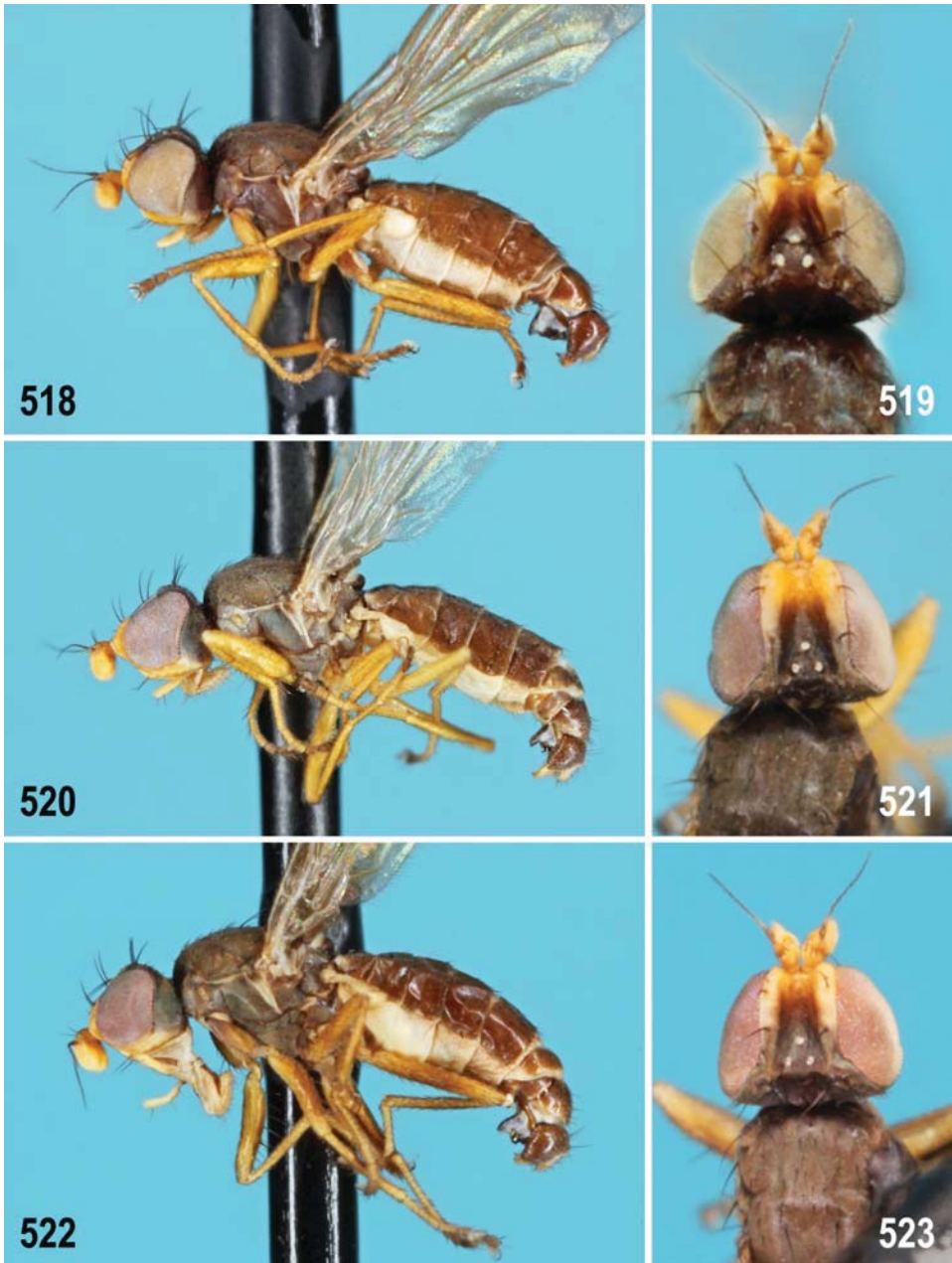
Type material. HOLOTYPE: ♂, “CAN: ON: ~74kmNNE The-ssalon, shore of Mississagi R., 17.vii.2010, KNBarber, sweeps, graminoids, herbs, *Equisetum* spp. 46°53.94'N 83°16.23'W” and “Holotypus ♂ *Anthomyza furvifrons* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in perfect condition, with exposed genitalia and highly visible gonostyli (see Fig. 518) (CNCI, intact). PARATYPES: CANADA: NEW BRUNSWICK: Birch Cove, nr. Chamcook, 4.vii.1965, 1 ♂ 1 ♀ (1 ♂ most of legs missing); Chamcook, 30.vi.1965, 1 ♀, on goldenrod, 7.viii.1957, 1 ♀, *Centaurea*, 7.viii.1957, 1 ♀, all G. E. Shewell leg.; Maces Bay, Hwy 790, 9.vii.1971, 1 ♂ 3 ♀♀ (1 ♀ genit. prep.), B. V. Peterson leg. (all CNCI); Middle Sackville, 45°55.4'N 64°21.4'W, sweep vegetation along old rail line, 19.vii.2002, 1 ♂ 1 ♀, J. Forrest & T. Wheeler leg. (LEMQ 0039175, -40345, 1 ♀ genit. prep.); Musquash, 10.viii.1956, 1 ♀, A. H. Sturtevant leg. (USNM); Sackville, near Mt. Allison Univ., 45°53.9'N 64°22.5'W, sweep old garden in vacant lot, 19.vii.2002, 4 ♀♀, J. Forrest & T. Wheeler leg. (LEMQ 0040333, -36, -39, -41); Woodstock, 8.viii.1956, 1 ♀, A. H. Sturtevant leg. (USNM). NEWFOUNDLAND: Pasadena, sweeping low veg., 24.viii.1984, 1 ♂, low veg. in field, 1.viii.1984, 1 ♂, L. Hollett leg. (CNCI). ONTARIO: Algonquin Park, 26–30.vii.1955, 2 ♀♀, Sabrosky leg. (USNM); Baptiste Lake, 45°10'N 78°00'W, sweep near lake shore, 25.vii.2000, 1 ♀, J. Forrest leg. (LEMQ 0039493); Bruce Co., Spring Creek at Hwy 6, grass – *Typha*, 22.vii.2000, 1 ♂, S. A. Marshall leg. (DEBU 00079576); Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 3.vii.1999, 1 ♀; same locality but Singing Sands, 45°11.6'N 81°34.7'W, sweeps, *Calamagrostis canadensis*, 29.vii.1997, 1 ♀, sweeps, *Agropyron/Calamagrostis*, 30.vii.1997, 1 ♂, 5.vii.1998, 3 ♀♀, all K. N. Barber leg. (all DEBU); Cochrane, 49°03.54'N 81°04.41'W, sweeps, grasses on edge of hwy. pulloff, 21.vii.2009, 2 ♀♀; ~5 km SE Cochrane, 49°01.16'N 80°57.93'W, sweeps, railside *Equisetum* spp., graminoids, herbs, 18.vii.2009, 8 ♂♂ 15 ♀♀ (1 ♂ genit. prep.); Dryden, 49°47.1'N 92°48.4'W, sweeps, grasses in low area, 10.vii.1999, 1 ♂ 1 ♀ (1 ♀ left wing missing); Dryden, 49°47.27'N 92°48.62'W, sweeps, mixed graminoids/herbs, 17.vii.2008, 1 ♂, all K. N. Barber leg. (all CNCI); Dubreuilville, 48°21.09'N 84°33.90'W, sweeping undergrowth of *Pinus/Populus* forest, with *Clintonia*, *Vaccinium*, ferns, graminoids, 10.vii.2010, 1 ♂, J. Roháček leg. (SMOC, genit. prep.); Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, 10.vii.2010, 1 ♂; ~35 km WSW Dubreuilville, 2 km SE jct. Hwys.#17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside *Calamagrostis/Scirpus*, 23.vii.2003, 1 ♂, both K. N. Barber leg. (both CNCI); ~55 km NNW Elliot Lake, S of Rocky Island Lake, 46°49.32'N 82°59.54'W, 455 m, sweeping, vegetation with predominant *Scirpus* sp., 3.vii.2010, 2 ♂♂ 1 ♀ (1 ♂ 1 ♀ genit. prep.); ~61 km NNW Elliot Lake, Three Lakes, 46°49.94'N 83°06.31'W, 425 m, sweeping grasses nr. lakeshore, 3.vii.2010, 4 ♂♂ 1 ♀ (3 ♂♂ genit. prep.), all J. Roháček leg. (all SMOC); Finland, 17.vii.1960, 1 ♀, 21.vii.1960, 2 ♂♂, S. M. Clark leg. (CNCI); ~7.0 km E Foleyet, 48°14.34'N 82°20.75'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 13.vii.2013, 2 ♂♂ 1 ♀; Fraserdale, 49°50.71'N 81°36.99'W, sweeps, graminoids, herbs in disturbed area, 19.vii.2009, 2 ♀♀, all K. N. Barber leg. (all CNCI); Greenwater P. Pk., 49°10.91'N 81°16.28'W, sweeps, *Carex*, *Calamagrostis*, *Phalaris*, in creek floodplain, 21.vii.2009, 2 ♂♂ 1 ♀ (DEBU 01502126–28); Greenwater P. Pk., 49°11.05'N 81°16.04'W, sweeps, mostly lakeside *Calamagrostis canadensis*, 18.vii.2009, 1 ♀ (DEBU 01502104, -05); Green-

water P. Pk., 49°11.34'N 81°17.04'W, sweeps, grasses/herbs in hydro cut, 21.vii.2009, 2 ♂♂ 8 ♀♀ (DEBU 01502244-53); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp., graminoids, *Caltha*, 21.vii.2009, 2 ♀♀ (DEBU 01502104, -05), all K. N. Barber leg.; 6 km W Hagar, 46.47°N 80.48°W, sweep river edge at rest area, 29.vi.2007, 2 ♀♀, T. A. Wheeler leg. (LEMQ 0040285, -86); Hwy 17N & Trout Lake Road, 46°37.563'N 84°17.019'W, sweep, roadside, 23.vii.2011, 1 ♂ 1 ♀, J. E. Swann & D. R. Edwards (BDUC, 1 ♀ genit. prep.); Icewater Creek WS [Watershed], 13.5 km NNE Searchmont, mi.11.5 Whitman Dam Rd., sandy access road, 1.vii.1986, 1 ♀; ~25 km WNW Ignace, 49°29.52'N 92°00.83'W, sweeps, fen, mostly *Carex utriculata* with grasses, 4.vii.2012, 1 ♂ 1 ♀; 40 km S Ignace, Hwy#17, 49°15.6'N 91°07.9'W, sweeps/pooter, roadside *Bromus inermis*, 10.vii.1999, 1 ♀; ~11.9 km N Kejick, 49°43.89'N 95°04.14'W, sweeps, wet ditch, graminoids/*Equisetum*, 30.vii.2008, 1 ♀, all K. N. Barber leg.; Kenora, 22.viii.1958, 1 ♀, J. G. Chillcott leg. (all CNCI); Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.5'N 82°06.2'W, sweeps, roadside grasses, 28.vii.1997, 1 ♂, sweeps/pooter, graminoids in fen flat, 30.viii.2004, 1 ♀; Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.07'W, sweeps, roadside graminoids, 31.vii.2008, 1 ♂, all K. N. Barber leg.; One-Sided [=Caliper] Lake, 13.vii.1960, 1 ♂, 19.vii.1960, 1 ♂, S. M. Clark leg., 26.vi.1960, 2 ♀♀, 29.vi.1960, 1 ♀, Kelton & Whitney leg. (all CNCI); Otter Rapids, 50°10.91'N 81°38.54'W, sweeps, mostly *Calamagrostis canadensis* in hydro cut, 19.vii.2009, 2 ♂♂ 3 ♀♀, 20.vii.2009, 2 ♂♂ 5 ♀♀; Otter Rapids, 50°10.96'N 81°37.88'W, sweeps, grasses, herbs on roadside slope, 20.vii.2009, 1 ♂ 1 ♀, sweeps, mostly *Schedonorus arundinaceus*, on roadside slope, 20.vii.2009, 10 ♂♂ 16 ♀♀, all K. N. Barber leg. (all CNCI); Thunder Bay Distr., mouth of Pic River, N side, 48°36'N 86°18'W, 20.vii.2001, 1 ♀, M. Buck leg. (DEBU 00169254); René Brunelle P. Pk., 49°25.89'N 82°08.44'W, sweeps, roadside *Equisetum* spp., 19.vii.2009, 1 ♂ 1 ♀ (DEBU 01502002, -03); ~2 km E Rosspport, Hwy#17, picnic area, 48°50.3'N 87°29.4'W, sweeps of graminoids, 9.vii.1999, 2 ♂♂ 1 ♀ (CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Calamagrostis canadensis* & *Carex aquatilis*, 23.vii.1997, 3 ♂♂ 4 ♀♀ (CNCI 2 ♂♂ 3 ♀♀, SMOC 1 ♂ 1 ♀), sweeps, *Calamagrostis canadensis*/*Carex aquatilis*, 6.viii.2002, 1 ♀ (CNCI), sweeps/pooter, *Calamagrostis canadensis*, 3.viii.1997, 4 ♂♂ 6 ♀♀ (CNCI 3 ♂♂ 5 ♀♀, 1 ♂ genit. prep.; SMOC 1 ♂ 1 ♀), 12.vii.2002, 1 ♂, sweeps, *Calamagrostis canadensis*, 29.vii.1999, 2 ♀♀, sweeps, mostly *Calamagrostis canadensis*, 28.vii.2001, 2 ♀♀ (1 ♀ genit. prep.), 29.vii.2001, 1 ♂ 1 ♀, 6.viii.2001, 3 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), sweeps/pooter, *Carex aquatilis*, 3.viii.1997, 1 ♀, sweeps, *Carex aquatilis*, 12.vii.2002, 1 ♀, 27.vii.2005, 1 ♀, sweeps, mostly *Carex aquatilis*, 15.vii.2001, 1 ♂, 17.vii.2001, 1 ♂, 18.vii.2001, 1 ♂ 3 ♀♀ (1 ♀ with wing glued to pin); same locality but 46°29.88'N 84°17.19'W, sweeps, *Scirpus cyperinus*, 21.viii.2004, 2 ♂♂ (all CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, Baseline Rd., 46°31.41'N 84°24.57'W, sweeps, sparse veg. on disturbed site, 26.vi.2005, 1 ♀; same locality but w. of creek, 46°31.61'N 84°24.68'W, sweeps, *Carex* edge of alder thicket, 22.vii.2005, 1 ♂; S[ault] S[te.] Marie, Bristol Pl. Pk., 46°30.8'N 84°16.6'W, sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 2 ♂♂ 1 ♀ (1 ♂ genit. prep.), sweeps/pooter, *Phalaris arundinacea*, 1.viii.1997, 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Finn Hill, 46°31.6'N 84°17.3'W, sweeps, graminoids/composites, 19.vii.2005, 1 ♂ 1 ♀; same locality but 46°31.48'N 84°17.36'W, sweeps, mostly *Scirpus microcarpus*, 8.vii.2006, 1 ♀; same locality but 46°31.57'N 84°17.37'W, sweeps, *Calamagrostis*, *Rubus*, ferns, 15.vii.2006, 1 ♀; same locality but 46°31.67'N 84°17.32'W, sweeps, *Calamagrostis canadensis*, 30.vii.2004, 1 ♂ 2 ♀♀; same locality but 46°31.63'N 84°17.33'W, sweeps, graminoids, herbs, composites, edge of *Populus tremuloides*, 8.viii.2008, 2 ♂♂ 2 ♀♀, 10.viii.2008, 1 ♂ 1 ♀, all K. N. Barber leg. (all CNCI); Sault Ste. Marie, Fish Hatchery Road, near Coldwater Creek, 46°34.29'N 84°17.21'W, sweeping graminoids, *Impatiens*, 9.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC, both genit. prep.); S[ault] S[te.] Marie, Ft. Creek Cons[ervation] Area, 46°32.5'N 84°20.8'W, sweeps, mixed meadow veg., 9.viii.1997, 1 ♂; S[ault] S[te.] Marie, Landslide Rd., Coldwater Ck. floodplain, 46°33.8'N 84°16.6'W, sweeps/pooter, *Calamagrostis canadensis*, 7.viii.1997, 1 ♀, sweeps, mostly *Carex* sp., 7.viii.1997, 2 ♀♀; S[ault] S[te.] Marie, Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, mixed meadow veg., 25.vii.1997, 2 ♀♀, sweeps, *Phalaris arundinacea*, 25.vii.1997, 1 ♀; S[ault] S[te.] Marie, hydro cut nr. Sault Coll[ege] Outdoor Lab, 46°32.1'N 84°18.0'W, sweeps, mostly sedges, 10.vii.2003, 1 ♀; S[ault] S[te.] Marie, Whitefish Is./St. Mary's Is., 46°30.68'N 84°21.20'W, riparian graminoids, sweeps, 8.viii.2004, 1 ♀ (genit. prep.); S[ault] S[te.] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, mostly *Carex*/*Calamagrostis* in wet area, 23.viii.2004, 2 ♂♂ 2 ♀♀; same locality but 46°36.62'N 84°17.85'W, sweeps, *Carex gynandra* in alder thicket, 4.vii.2016, 1 ♂, all K. N. Barber leg. (all CNCI); ~10 km W S[ault] S[te.] Marie, Airport Rd., 46°29.9'N 84°28.9'W, natural gas r[igh]t-of-way, sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns, 25.viii.2008, 1 ♂; same locality but 46°29.72'N 84°28.96'W, sweeps, graminoids,

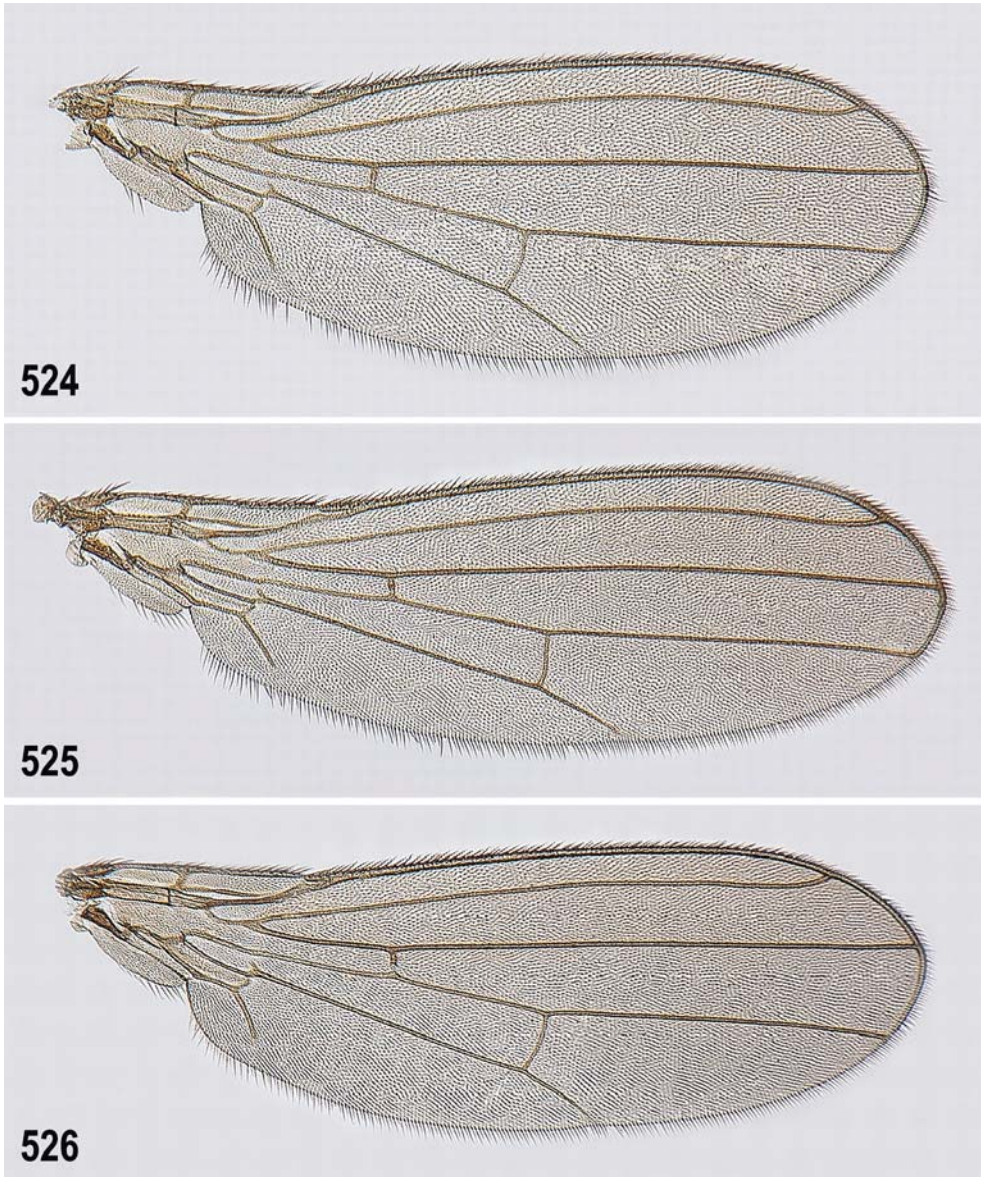
composites, *Equisetum*, *Rubus*, ferns, 14.vii.2010, 5 ♂♂ 3 ♀♀, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 1 ♂ 2 ♀♀, sweeps, mostly *Scirpus/Calamagrostis*, 4.viii.2004, 1 ♂, all K. N. Barber leg. (all CNCI), sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 10 ♂♂ 14 ♀♀, J. Roháček leg. (SMOC, 5 ♂♂ 5 ♀♀ genit. prep.); 20 km W S[ault] S[te.] M[arie], Pt. de[s] Chenes Pk., 14.vii.1986, 1 ♂, K. N. Barber leg. (CNCI); MacIntyre Road, north of Sault Ste. Marie, 46°37.403'N 84°18.320'W, sweep, roadside, 23.vii.2011, 1 ♂ 2 ♀♀, J. E. Swann & D. R. Edwards (BDUC); Searchmont, N Hwy #552, 46°51.3'N 84°02.4'W, sweeps, graminoids around gravel pit, 24.vii.1998, 1 ♀; 12.4 km NNE Searchmont, mi.15 Whitman Dam Rd., herb/grass meadow by Goulais R., 23.vi.1986, 2 ♀♀; 18 km NNE Searchmont, mi.15 Whitman Dam Rd., grassy access road, 19.vi.1986, 1 ♂, 29.vi.1987, 1 ♂ 4 ♀♀; ~18.8 km NNE Searchmont, Goulais River WS [Watershed], ~mi.15 Whitman Dam Rd., 46°55.7'N 83°56.2'W, sweeps, jackpine plantation, 29.vii.1999, 1 ♀ (abdomen glued to pin), all K. N. Barber leg.; Sioux Narrows, 25.vi.1960, 1 ♂ (genit. prep.), Kelton & Whitney leg. (all CNCI); Thunder Bay Distr., Sleeping Giant Prov. Pk., Sawbill Lk. Trail, 48°21'N 88°50'W, 13.vii.2002, 1 ♂ 1 ♀, M. Buck leg. (DEBU 00199157, -170, 1 ♂ genit. prep.); ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, *Equisetum fluviatile* in wet ditch, 19.vii.2009, 2 ♂♂ 1 ♀, sweeps, ditchside *Equisetum* spp. [including *E. fluviatile*], grasses, herbs, 19.vii.2009, 1 ♂ 2 ♀♀, K. N. Barber leg. (CNCI); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp., 5.vii.2010, 9 ♂♂ 12 ♀♀ (CNCI, 1 ♀ genit. prep.), 17.vii.2010, 38 ♂♂ 54 ♀♀ (AMNH, CASC, DEBU, LACM, MCZC, USNM 4 ♂♂ 6 ♀♀ each; CNCI 14 ♂♂ 18 ♀♀ incl. pair in copula, 1 ♀ genit. prep.), sweeps, *Equisetum* spp. on mud bank, 17.vii.2010, 1 ♂ (CNCI, wing illustration), K. N. Barber leg., sweeping graminoid with *Equisetum* spp. on muddy shore, 5.vii.2010, 8 ♂♂ 8 ♀♀, J. Roháček leg. (SMOC, 4 ♂♂ 4 ♀♀ genit. prep.); ~92 km NNE Thessalon, nr. Mountain Ash Lake, 47°02.98'N 83°10.88'W, sweeping *Carex aquatilis* on edge of wetland, 4.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); White River, 48°35.5'N 85°16.6'W, sweeps, mixed grasses edge of parking lot, 9.vii.1999, 4 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI). **QUEBEC:** Charlevoix, Ste-Aimé-des-Lacs, 47°41'N, 70°18.5'W, sweep vegetation, 5.viii.2001, 1 ♀, V. Dion leg. (LEMQ 0039190); Forillon N. P., Anse Saint-Georges, 48°46'N 64°12'W, sweep at roadside, 16.viii.2001, 1 ♂ 2 ♀♀ (LEMQ 0039172, -78, -79); Gaspé, Forillon N. P., Cap des Rosiers, 48°50'N 64°12'W, sweep grass, 6.viii.2000, 2 ♂♂ (LEMQ 0039262, -63); Gaspé, Forillon N. P., Haldiman St.-Jean R., 48°47'N 64°22'W, sweep salt marsh vegetation, 31.vii.2000, 1 ♂ (LEMQ 0039366); Gaspé, Forillon N. P., Ruisseau Petit Gaspé, 48°54'N 64°21'W, sweep muddy area, 6.viii.2000, 1 ♂ 1 ♀ (LEMQ 0039402, -04), all H. Varady-Szabo leg.; Ile Bonaventure, 3 km from Côte de Percé, 48°30'N 64°10'W, sweep grass, 28.vii.2000, 5 ♀♀, H. Varady-Szabo leg. (LEMQ 0039254, -257, -336, -338, -339), 2 ♀♀, A. Thibault leg. (LEMQ 0039207, -284, 1 ♀ genit. prep.); Îles de la Madeleine, Île de la Grande Entrée, Chemin du Bassin Ouest, 47°32.96'N 61°32.64'W, sweep field at road, 9.viii.2004, 1 ♀, V. Dion leg. (LEMQ 0040481), sweep field along road, 9.viii.2004, 1 ♀, S. Boucher leg. (LEMQ 0040505); Laniel, 1.vii.1944, 1 ♂ 4 ♀♀, A. R. Brooks leg.; La Verendrye Prov. Pk., mi.139 Rte.58, 29.vi.1965, 1 ♂, D. M. Wood leg. (all CNCI). **UNITED STATES OF AMERICA: MAINE:** Greenville, 1.viii.1930, 1 ♀; Pittston, 3.viii.1950, 1 ♂, both A. L. Melander leg. (both USNM). **MICHIGAN:** Delta Co., 3.vii.1955, 1 ♀, R. R. Dreisbach leg.; Keweenaw Co., Isle Royale, 11., 13.vii.1938, 2 ♂♂, 13., 15.vii.1938, 1 ♂ 1 ♀, G. Steyskal leg. (all USNM); Berrien Co., St. Joseph, 19.vi.1975, 1 ♀, D. D. Wilder leg. (CASC). **MINNESOTA:** Eaglesnest, 30.vi.1959, 2 ♂♂ 4 ♀♀ (INHS 40,087-089, -105-107, 1 ♀ genit. prep.), 16.vii.1959, 2 ♀♀ (INHS 40,108, -109), 6.vii.1959, 1 ♀ (INHS 40,094), 11.vii.1959, 1 ♂ 3 ♀♀ (INHS 40,095, -111-113), 11.vii.1952, 1 ♀ (INHS 40,098), 25.viii.1958, 1 ♂ (INHS 40,099), 12.viii.1958, 1 ♀ (INHS 40,100), 30.vi.1954, 1 ♂ (INHS 40,102), 6.vii.1954, 1 ♂ (INHS 40,103, genit. prep.), 13.vii.1957, 2 ♂♂ (INHS 40,119, -121), 28.vi.1957, 1 ♀ (INHS 40,126), 5.vii.1957, 1 ♀ (INHS 40,128), 23.vii.1958, 5 ♂♂ 1 ♀ (INHS 40,140, -142-144, -146, -147), all W. V. Balduf leg. (all part of mixed series [with *A. vulgaris*] with Sabrosky det. as *Anthomyza gracilis*); Aitkin Co., 14 mi W Willow River, 46.334°N 93.096°W, 27.vii.1997, 1 ♂, D. E. Hansen leg. (CNCI). **NEW YORK:** Franklin Co., Paul Smiths, 20.vii.1962, 2 ♂♂, J. R. Vockeroth leg. (CNCI). **Other material examined (not included in type series). CANADA: ONTARIO:** One-Sided [= Caliper] Lake, 1.viii.1960, 1 ♀, S. M. Clark leg. (CNCI, broken, abdomen, wing, 3 legs in gelatin capsule); ~10 km W Sault Ste. Marie, Airport Rd., 46°29.72'N 84°28.96'W, natural gas [f]igh]-of-way, sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 2 ♂♂, 12.vii.2010, J. Roháček leg. (SMOC, used for molecular work); ~74 km NNE Thessalon, shore of Mississagi River, 46°53.94'N 83°16.23'W, sweeping graminoids with *Equisetum* spp. on muddy shore, 5.vii.2010, 1 ♀, J. Roháček leg. (SMOC, headless, genit. prep.). **UNITED STATES OF AMERICA: MINNESOTA:** Eaglesnest, 5.vii.1957, 2 ♀♀, W. V. Balduf leg. (INHS 40,129, -130, 1 ♀ missing wings & 2 legs, 1 ♀ missing tip of abdomen).

Description. Male. Total body length 2.06–2.62 mm; general colour brown to blackish brown (abdomen usually lighter than thorax) brownish grey microtomentose, although less densely than in *A. vulgaris*. Head somewhat higher than long (Fig. 518), quadrangular and with face distinctly receding in profile, dark brown and yellow. Occiput dorsomedially very slightly concave, shiny blackish brown due to very sparse microtomentum. Frons relatively narrow, medially largely dull brown, only frontal triangle grey microtomentose and anterior fourth to third of frons orange yellow; orbits (Fig. 519) anteriorly yellow and sparsely narrowly silvery white microtomentose, posteriorly (behind middle of distance between anterior and posterior ors) dark, brownish, with silvery grey microtomentum at eye margin. Frontal triangle narrow, reaching to anterior third of frons. Frontal lunule distinct, yellow, whitish microtomentose. Face narrow, medially less sclerotized and often with darker narrow stripe, otherwise yellow to orange-yellow and dull; parafacialia relatively broad and like gena yellow with sparse whitish microtomentum. Both parafacialia and gena with rather broad ochreous to pale brown marginal stripe; ventral angle of postgena yellow, whitish microtomentose; its dorsal part brown and greyish microtomentose, abruptly contrasting posteriorly with shiny occiput (Fig. 518); mouthparts (except for palpi) ochreous to pale brown, clypeus (small) and prementum darkest. Cephalic chaetotaxy: pvt small, convergent but usually not crossed; vti longest of cephalic setae; oc often as long as vti but finer; vte and posterior ors slightly shorter than vti; 3 ors but only 2 long, widely spaced, middle ors slightly to distinctly shorter than posterior, and anterior ors reduced to setula (sometimes enlarged); 1–2 (rarely 3) pairs of medial microsetulae in the anterior third of frons; 1 small setula behind vte (slightly longer than postoculars); postocular setulae (6–7) short, sparse, in single row; postgena with several setulae and 2 (1 longer) usual posteroventral setae; 1 long but thin vi (about as long as middle ors); subvibrissa small and weak, slightly longer than foremost peristomal setula; only 3–4 fine peristomal setulae. Palpus well developed, elongately clavate, yellow, with 1 ventral pre-apical seta and about 5 shorter subapical and ventral setulae. Eye moderately convex, large, of rounded quadrangular outline (Fig. 518), anteroventrally slightly widened, with longest diameter oblique and 1.3–1.4 times as long as the shortest. Smallest genal height about 0.14 times as long as shortest eye diameter. Antenna strongly geniculate, entirely yellow; 1st flagellomere flattened laterally, with short white pilosity on anteroventral margin. Arista brown to dark brown including basal segments, about 1.9 times as long as antenna, shortly ciliate.

Thorax very slightly or not narrower than head, entirely blackish brown (mesonotum usually darker) and densely brownish grey microtomentose (Fig. 518), almost dull. Thoracic chaetotaxy (all macrosetae relatively weak): 1 hu (shorter than anterior npl); 2 npl (anterior longer); 1 small prs (shorter than hu); 1 sa (shorter than pa); 1 moderate pa; 2 postsutural dc (the shorter anterior about as long as anterior npl) and 4–6 dc microsetae in front of them; ac microsetae sparse, in 4 rows on suture, in 2 rows between anterior dc and reaching only slightly beyond them (no ac microsetae between posterior dc); 2 sc, laterobasal sc weak, about as long as prs, apical sc as long as posterior dc (longest thoracic setae); 1 hair-like ppl; 2 relatively long stpl (posterior longer than anterior npl, anterior usually shorter) and a few (1–2) setulae in dorsal half of sternopleuron; its ventral part with 3–5 longer setae. Scutellum rounded triangular, distinctly convex dorsally. Legs bright yellow (Fig. 518), only 2 terminal tarsal segments of all tarsi pale brown to brown;



Figs 518–523. Primary types of the Nearctic species of the *Anthomyza gracilis* group. 518 – *A. furvifrons* sp. nov., holotype male, laterally, body length 2.30 mm; 519 – same specimen, head dorsally; 520 – *A. vulgaris* sp. nov., holotype male, laterally, body length 2.50 mm; 521 – same specimen, head dorsally; 522 – *A. equiseti* sp. nov., holotype male, laterally, body length 2.35 mm; 523 – same specimen, head dorsally. Photo by J. Roháček.

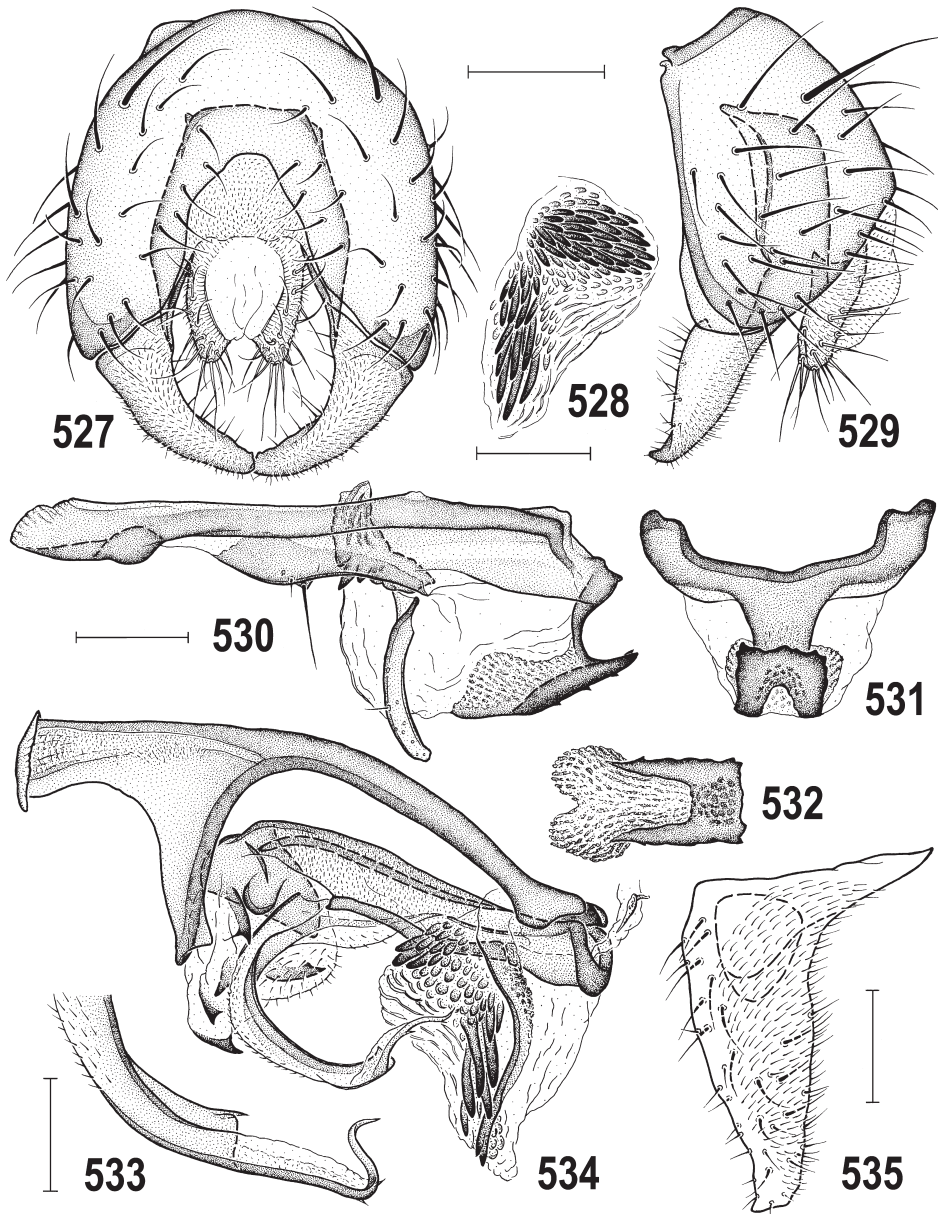


Figs 524–526. Wings of the Nearctic species of the *Anthomyza gracilis* group. 524 – *A. furvifrons* sp. nov., paratype male, wing length 2.4 mm (Canada: Ontario); 525 – *A. vulgaris* sp. nov., paratype male, wing length 2.5 mm (Canada: Ontario); 526 – *A. equiseti* sp. nov., paratype male, wing length 2.4 mm (Canada: Ontario). Photo by K. N. Barber.

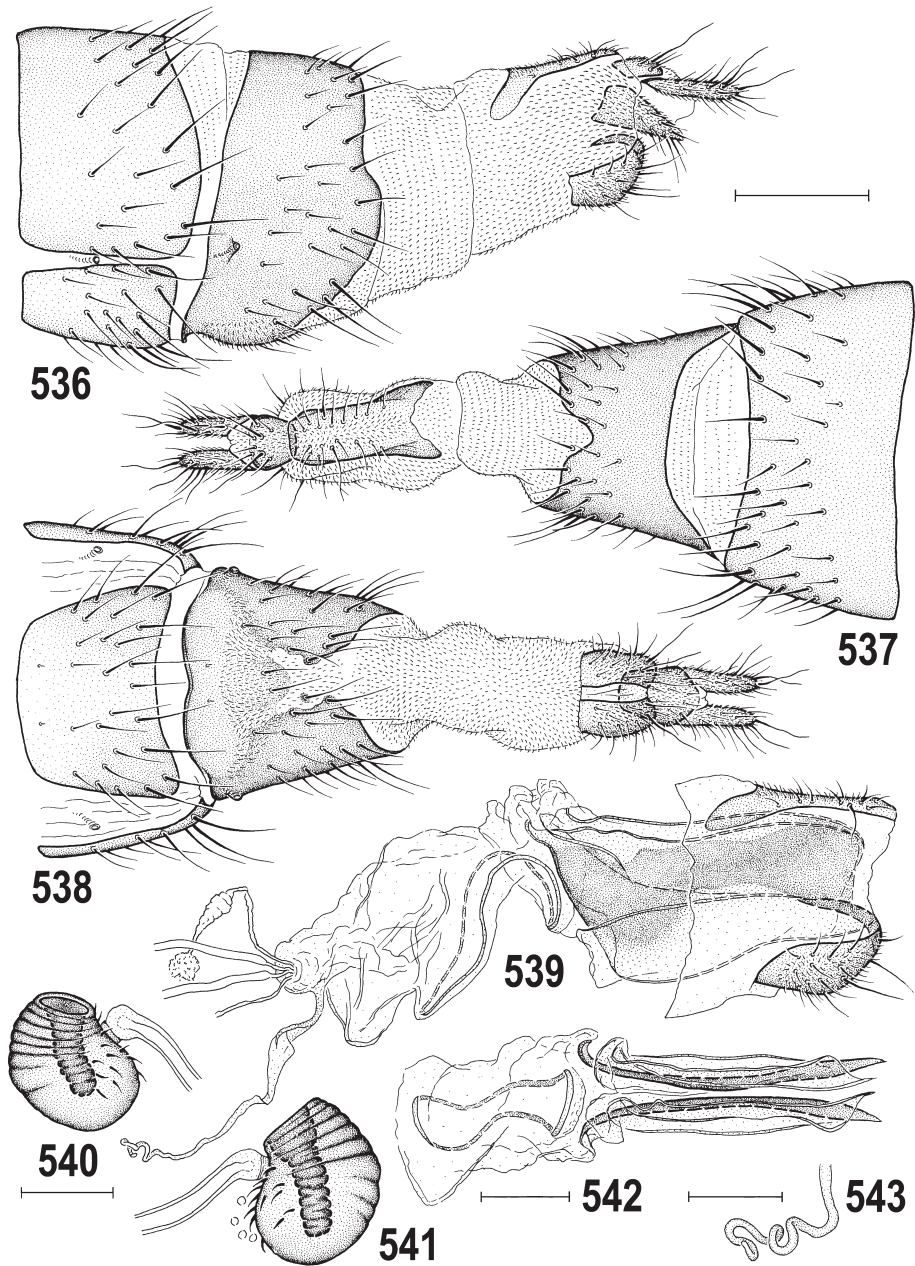
sometimes also coxae partly darkened, ochreous (never brown). f_1 with ctenidial spine rather variable, as long as to distinctly longer than maximum width of t_1 and with long thin setae in posteroventral (longer setae) and posterodorsal row; both f_2 and f_3 uniformly setulose; t_2 with relatively short and weak ventroapical seta; t_1 , t_3 and all tarsi simply setulose. Wing (Fig. 524) relatively long and narrow but usually wider than that of *A. vulgaris*, with pale brown veins and hyaline unicolourous membrane (light ochreous brown). C with very small and sparse spinulae between apices of R_1 and R_{2+3} . R_{2+3} long, slightly sinuous, parallel to C but with apex distinctly upcurving to it; R_{4+5} almost straight to very slightly sinuous, parallel to or slightly divergent from M apically. Discal (dm) cell long, narrow proximally, somewhat widened distally, with r-m situated distinctly in front of the middle of dm cell. Apical portion of CuA_1 usually slightly longer than dm-cu and almost reaching wing margin; A_1 short, ending far from it. Alula small, narrow. Wing measurements: length 2.14–2.74 mm, width 0.63–0.83 mm, $Cs_3 : Cs_4 = 0.97–1.30$, $rm \setminus dm-cu : dm-cu = 2.62–3.12$. Haltere whitish yellow, with knob slightly darker.

Abdomen slender, elongate, lighter (brown) than thorax (Fig. 518). Preabdominal terga brown, shortly and relatively sparsely setose. T1 and T2 dorsally separate, the former paler on anterolateral corners. T3–T5 subequal or T5 somewhat longer, broad, reaching onto ventral side of abdomen. Preabdominal sterna paler than terga, ochreous brown (S5 sometimes darker), narrow, as long as or slightly longer than wide, becoming slightly larger posteriorly (S5 largest), finely setose, only S1 bare and with bipartite dark pigmentation separated by transverse pale stripe. Spiracles situated near ventral margin of terga. T6 well developed, about half length of T5 and hence transverse, not always bare, often with a few setae at posterior margin. S6 and S7 strongly asymmetrical, brown; S6 slightly shorter and paler, and both with strongly sclerotized and blackish brown anterior margin, each with 2–3 setae; S8 situated dorsally, long, tapered posteriorly and strongly convex dorsally, with a number of setae in posterior two-thirds.

Genitalia. Epandrium (Figs 527, 529) closely resembling that of *A. elbergi*. Dark brown, relatively small compared to preabdomen (as usual in *A. gracilis* group, cf. Fig. 14), ventrally shorter than in the latter species and more densely setose, usually with 1 pair of longer and thicker setae; anal fissure moderately narrow, irregularly rounded subtriangular. Cercus of moderate size, narrow, with numerous fine setae, the longest apical not much longer than subapical one. Medandrium (Figs 527, 529) narrow and high as in *A. elbergi* but with dorsolateral corners less projecting. Gonostylus (Figs 527, 529, 535) small compared to epandrium (as in all species of the group), very similar to that of *A. elbergi*, thus relatively slender and elongate, apically gradually tapered and strongly bent medially but with apex less pointed, rather truncate, with small anteroapical tooth, largely micropubescent on outer side, and finely setose on inner side both anteriorly and posteriorly. Hypandrium (Fig. 530) moderate, relatively long and narrow, with anterior internal lobes low, reduced; posterior parts of hypandrium firmly fused with transandrium. Transandrium (Fig. 531) heavily sclerotized and posteromedially projecting into robust caudal process that is ventrally terminated by conspicuous trough-like appendage having serrate margins (Figs 530–532) as in *A. elbergi* but this appendage distinctly shorter and wider and with fewer teeth laterally. Pregonite (Fig. 530) fused to hypandrium, with anterior part more projecting ventrally than in *A. elbergi* and



Figs 527–535. *Anthomyza furvifrons* sp. nov., paratype male (Canada: Ontario). 527 – external genitalia, caudally; 528 – armature of right wall of aedeagal part of folding apparatus; 529 – external genitalia, laterally; 530 – hypandrial complex, laterally; 531 – transandrium, caudally; 532 – caudal process of transandrium, ventrally; 533 – apex of filum, subventrally; 534 – aedeagal complex, laterally; 535 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Figs 533, 535) and 0.1 mm (others).



Figs 536–543. *Anthomyza furvifrons* sp. nov., paratype female (Canada: Ontario). 536 – postabdomen, laterally; 537 – the same, dorsally; 538 – the same, ventrally; 539 – female genital chamber and S8, laterally (pleural micropubesence omitted); 540, 541 – spermathecae; 542 – internal sclerites, ventrally; 543 – apex of ventral receptacle, ventrally. Scales = 0.2 mm (Figs 536–538), 0.1 mm (539, 542) and 0.05 mm (others).

ending in a small triangular (inclinate) tooth and bearing 3 setae (seta on tooth-like process long); posterior part of pregonite reduced and bare. Postgonite (Fig. 530) slender, elongate, distinctly bent and with blunt apex, with 1 anterior setula in distal third in addition to a number of granular sensillae; its proximal part connected with relatively large dark basal sclerite provided with a few (usually 3) anteroventral spines, thus more resembling those of the other two Nearctic species of the group than that of *A. elbergi*. Basal membrane seemingly without armature or sculptures which are instead incorporated into the ventral appendage of caudal process of transandrium. Aedeagal part of folding apparatus huge, with rich spinose armature on its walls extremely similar to that of *A. elbergi*: right wall with two (dorsal and ventral) clusters of spines (more numerous in dorsal group but longer in ventral group, Fig. 528); left wall dorsally with a few strong spines and a number of spine-like tubercles, ventrally with several longer and robust spines (Fig. 534). Connecting sclerite slender but well sclerotized and armed with 2 spines on apex and several adjacent tubercles (Fig. 534). Phallapodeme relatively slender but its basal part widened and deeply forked, fulcrum rather strong and apex with shortly projecting ventrolateral corners. Aedeagus with short, frame-like phallopore that is fused to large distiphallus, the latter basally reinforced by several elongate sclerites and bifid from basal third. Saccus proximally well sclerotized (more so on right side) and its larger distal part (Fig. 534) armed with 5 robust black spines (thus, distinctly fewer than in *A. elbergi* having 7–8 such spines) and a group of fine spinulae. Filum (Fig. 534) formed by single sclerite, only partly pigmented, particularly in its ventral spinulose part and in its distal third, where it is subterminally widened and with a projecting spine on the dorsal corner (Fig. 533); apical part of filum slender, tapering into sinuate, very slender and acute point with 2–3 spinulae (Fig. 533). Ejacapodeme (Fig. 534) very small, with slender digitiform projection, as in *A. elbergi*.

Female. Similar to male unless mentioned otherwise. Total body length 2.38–3.10 mm. Antenna with 1st flagellomere anterodorsally (on both sides) brownish or ochreous darkened, with only proximal and ventral parts yellow. Palpus rarely very slightly darkened apically. Wing measurements: length 2.58–3.14 mm, width 0.81–1.05 mm, $Cs_3 : Cs_4 = 0.97–1.53$, $rm \setminus dm-cu : dm-cu = 2.29–2.86$. Abdomen with terga brown but paler and with sparser microtomentum than thorax. T1 separate and smaller (also shorter) than T2; T3–T5 slightly longer than T2, subequal in length but becoming slightly narrower posteriorly, all shortly setose. Preabdominal sterna somewhat wider than in male, finely setose. S2–S5 becoming larger and wider posteriorly, S2–S4 about as long as broad, S5 somewhat wider than long.

Postabdomen (Figs 536–538) long, slender, tapered posteriorly, telescopic. T6 large, broad (but longer and narrower than that of *A. elbergi*), uniformly brown, setose in posterior two-thirds. S6 slightly wider than long, wider posteriorly (distinctly longer than in *A. elbergi*), pale ochreous but often brownish-darkened, particularly laterally. Tergosternum T7+S7 conically ring-shaped, blackish brown; posteromedially narrowly incised dorsally (Fig. 537) (as in relatives); venter more broadly desclerotized posteromedially; anteroventrally with characteristically domed, narrow, brown-pigmented (often somewhat triangular) area (Fig. 538), thus markedly different from that of *A. elbergi*. 7th spiracle can sometimes be more or less protruding (particularly visible on cleared abdomen of air-dried specimens, cf. Fig. 538). Membranous posterolateral area posterior to T7 can be secondarily sclerotized in some spec-

imens (but much less so than that of *A. equiseti*). 8th segment (Figs 536, 538), narrow, long, largely membranous and densely micropubescent. T8 narrow, elongate, with fine exclinate setae but differing from that of *A. elbergi* in having anterior corners laterally expanded and anterior margin emarginate (Fig. 537); S8 much shorter than T8, medially divided to form 2 narrow, finely setose sclerites (Fig. 538), each having posterior end anterodorsally curved and invaginated (Fig. 539), thus closely resembling that of *A. elbergi*. Genital chamber (uterus) with internal sclerotization distinctive (Figs 539, 542), formed by 2 pairs of long, flat, partly fused sclerites (the darker medial pair with characteristic sinuous pigmentation, Fig. 539) and 1 anterior, narrow, strongly posteriorly curved annular sclerite, narrower and longer than that of *A. elbergi*. Ventral receptacle (Fig. 539) narrow, tube-like, long, hyaline and terminally twisted as in relatives but distinctly shorter and less vermicular apically (Fig. 543) than in *A. elbergi*; accessory gland hyaline, with poorly defined grains in surface, borne on slightly distally dilated duct. Spermathecae (1+1) irregularly suboval, with long digitiform invagination, surface distinctly ringed (in contrast to plain surface in *A. elbergi*) with dark spinulae (longer than in *A. elbergi*) asymmetrically distributed around duct insertion, the latter situated eccentrically close to opening of invagination (Figs 540, 541) and with very short, pale-pigmented cervix. T10 (Fig. 537) small, dark, rounded trapezoidal (wider posteriorly), with 4–5 pairs of setae including 1 long pair and with sparse micropubescence. S10 narrow (Fig. 538), elongately pentagonal, tapered anteriorly, finely setulose and micropubescent. Cercus slender, relatively long, with numerous fine setae, apical and dorsopreapical the longest.

Discussion. As noted in the above description, *A. furvifrons* sp. nov. is most closely allied to the northern Palaearctic *A. elbergi*. This sister-species relationship is clearly demonstrated by the highly similar male and female terminalia, including the following probable synapomorphies: gonostylus with apex somewhat truncate; triangular process of pregonite reduced; ventral appendage of caudal process of transandrium elongate and thin. The *Anthomyza furvifrons* + *A. elbergi* pair is considered to be related to another Transpalaearctic species, *A. gracilis* Fallén, 1823, because all share the following apomorphies: aedeagal part of folding apparatus with strong spines also ventrally; female genital chamber with paired internal sclerites doubled.

Anthomyza furvifrons can be distinguished from *A. elbergi* (and both Nearctic relatives *A. vulgaris* sp. nov. and *A. equiseti* sp. nov.) in having the posterior half of the orbit dark up to the midpoint between the middle and posterior ors; it further differs from *A. elbergi* by the medially dark anterior half of the frons, having only 2 dc and the yellow hind femora in the male (not darkened). There are additional genitalic features distinguishing *A. furvifrons* from *A. elbergi* in the male genitalia (appendage of caudal process distinctly shorter and wider and with fewer teeth laterally; pregonite with small triangular tooth anteriorly; postgonite with large and spinose basal sclerite; saccus with only 5 robust spines; filum subterminally with a dorsal spiniform corner) and female terminalia (both T6 and S6 longer and narrower; T7+S7 with anteroventral pale brown area domed and desclerotized posteroventral area small; spermatheca with characteristic morphology).

Etymology. The new species name (a noun in apposition) refers to its darkened frons (furvus = Latin dark, swarthy), differing in this feature from its closest relative *A. elbergi*.

Biology. *Anthomyza furvifrons* is the least frequently collected of the three Nearctic species in the *A. gracilis* group. In some respects, its habitat is somewhat intermediate between the



Figs 544–546. Habitats of Nearctic species of the *Anthomyza gracilis* group and *A. vulgaris* sp. nov. 544 – riverbank of Mississagi River (Canada: Ontario) with rich graminoid communities, habitat in the type locality of *A. furvifrons* sp. nov.; 545 – *A. vulgaris* sp. nov., female on leaf of sedge, body length ca. 2.8 mm (Canada: Ontario: Sault Ste Marie); 546 – sandy beach with growth of *Ammophila breviligulata* (Canada: Ontario: Pancake Bay), extreme habitat of *A. vulgaris*. Photo by K. N. Barber (Fig. 544) and J. Roháček (others).

often dry habitat of *A. vulgaris* predominated by grasses and the wet habitat of *A. equiseti* supporting *Equisetum fluviatile*. The host plant(s) of *A. furvifrons* remain(s) unknown.

Many sites support both *A. furvifrons* and *A. vulgaris* but there are two sites that yielded all three Nearctic species of the *A. gracilis* group. The type locality (Ontario: ~74 km NNE Thessalon – shore of Mississagi R., Fig. 544) singularly yielded more than 100 specimens of *A. furvifrons* over two visits to the site in July 2010. The portion of this riparian strip that proved most productive for *A. furvifrons* adults received drainage from the hillside and highway above and supported a thick growth of grasses, sedges, horsetails and herbs. The other two species of the *A. gracilis* group were less abundant – *A. equiseti* (n = 87) presumably utilizing the *E. fluviatile* component and *A. vulgaris* (n = 12) most likely using the grass component. The other site, ~21 km NNE Smooth Rock Falls, Ontario, was a roadside ditch with *E. fluviatile* growing in shallow standing water at its bottom. The slope of the road bed supported a complex mix of mostly grasses, horsetails and herbs. Separate collections made on 19 July 2009 from these two areas yielded 26 *A. equiseti*, 3 *A. furvifrons*, and 2 *A. vulgaris* specimens from the wet bottom while the drier slope yielded 2 *A. equiseti*, 3 *A. furvifrons*, and 18 *A. vulgaris* specimens.

A railside site (Ontario: ~5 km SE Cochrane) that was predominated by horsetails (though not including *E. fluviatile*), graminoids, and herbs yielded 23 specimens of *A. furvifrons* and 75 of *A. vulgaris*. Another roadside slope (Ontario: Otter Rapids) had a notable seep feeding a localized growth of the grass *Schedonorus arundinaceus* (Schreb.) Dumort. Sweep samples concentrating on this grass produced 26 specimens of *A. furvifrons* and 15 of *A. vulgaris*, while the area immediately surrounding the seep that supported a mix of grasses and herbs (but not *S. arundinaceus*) provided only 2 specimens of *A. furvifrons* but 30 of *A. vulgaris*. A natural gas right-of-way (Ontario: ~10 km W Sault Ste. Marie–Airport Rd.) with a mix of graminoids, composites, *Equisetum*, *Rubus*, and ferns next to a wooded margin yielded 26 *A. furvifrons* and only 1 *A. vulgaris*.

There are other simpler plant mixes such as a sandy site (Ontario: Bruce Peninsula N. P.–Singing Sands) supporting *Calamagrostis* and “*Agropyron*” (likely *Elymus repens* (L.) Gould) which was shared with *A. vulgaris*. Shorter *Equisetum* spp. can be easily overlooked at many sites with thick graminoid growth but at this site there was clearly none.

References to “goldenrod” (*Solidago*) and “ex. *Centaurea*” are most likely indicators of roadside or meadow habitat and not a specific larval host. Otherwise, grasses, sedges and/or horsetails often appear in the label data and cursory habitat descriptions include “sandy access road”, “grassy access road”, “vegetation along old rail line”, “herbs in disturbed area” and “mixed grasses edge of parking lot”. *Anthomyza furvifrons* is known to fly from at least 19 June (Ontario: 18 km NNE Searchmont; Michigan: St. Joseph) to 30 August (Ontario: 0.7 km N Michael’s Bay).

Distribution. *Anthomyza furvifrons* has the most restricted range of the three species in this group. It is known only from a few jurisdictions in eastern North America as far west as Minnesota (Canada: New Brunswick, Newfoundland, Ontario and Quebec; United States of America: Maine, Michigan, Minnesota and New York) (see Table 2, Fig. 600).

Anthomyza vulgaris sp. nov.

(Figs 520, 521, 525, 545, 547, 550–573)

Type material. HOLOTYPE: ♂, "CAN: ON: ~25kmWNW Ignace, 05.vii.2012, KN Barber, sweeps, fen, mostly *Carex utriculata* with grasses 49°29.52'N 92°00.83'W" and "Holotypus ♂ *Anthomyza vulgaris* sp. n., J. Roháček & K. N. Barber det. 2014" (red). The specimen is in good condition, with exposed genitalia and highly visible gonostyli (see Fig. 520) (CNCI, intact). PARATYPES: **CANADA: ALBERTA:** Grand Prairie, ex. *Ulmus* sp., 21.viii.2008, 1 ♂, J. Donnelly leg. (CNCI, 1 ♂ genit. prep.). **BRITISH COLUMBIA:** Mt. Robson Prov. Pk., Hwy #16, small road towards Mt. Robson, 53°03'N 119°15'W, forest floor, swamp, (Universität Bielefeld, Ca1519), 6.viii.2002, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Revelstoke, 2.vii.1973, 1 ♀, H. J. Teskey leg.; Robson, 1–20.vii.1949, 1 ♀, 7.vii.1950, 3 ♀♀ (1 ♀ genit. prep.), H. R. Foxlee leg. (all CNCI); Salmon Arm, Shuswap Lk., shore, 13.vii.1949, 2 ♂♂, H. B. Leech leg. (CASC, 1 ♂ genit. prep.); Sicamous, sweep near rail tracks, 50°50.427'N 118°59.097'W, 26.vi.2011, 1 ♀, J. E. Swann & D. R. Edwards leg. (BDUC). **LABRADOR:** 0.25–1 mi SE, 1 mi up Kenemich R., vegetation on boggy trail, 13–15.viii.1958, 1 ♂ 1 ♀, B[ritish] S[chools] E[xplo]ring] S[ociety] Expedition leg. (BMNH, both genit. prep.). **MANITOBA:** Aweme, 19.vii.1917, 1 ♀, 10.viii.1917, 1 ♀, 28.viii.1917, 1 ♀, N. Criddle leg. (CNCI); Aweme, Criddle farm, 49°42.5'N 99°36.1'W, sweep grasses near house, 15.viii.1999, 1 ♂, T. A. Wheeler leg. (LEMQ 0039427), 8.vii.2000, 11 ♂♂ 6 ♀♀, V. Crecco leg. (LEMQ 0039411–422, -424, -484, -485, -496, -512), sweep prairie near house, 13.vi.1999, 1 ♀ (LEMQ 0039515), 8.vii.2000, 3 ♂♂ (LEMQ 0039189, -96, -97), 19.vi.1999, 4 ♂♂ 2 ♀♀ (LEMQ 0039342–45, -351, -475), T. A. Wheeler leg.; Bald Head Hills, 13 mi N Glenboro, 12.vii.1958, 1 ♀; 9 mi N Forrest, 29.vi.1958, 1 ♂, both R. L. Hurley leg. (both CNCI); 5 km N Gardenton, Tallgrass Prairie Reserve, 49°10.71'N 96°40.76'W, sweep roadside, 13.vii.2000, 3 ♂♂ 3 ♀♀, Crecco & Wheeler leg. (LEMQ 0039163–65, -69–71), sweep prairie at roadside, 6.vii.2000, 5 ♂♂ 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039198–203, -208), sweep in tallgrass prairie, 12.vi.1999, 1 ♀ (LEMQ 0039530), 17.vi.1999, 2 ♀♀ (LEMQ 0039434, -543), 20.vi.1999, 1 ♂ 1 ♀, J. Perusse leg. (LEMQ 0039438, -517), 6.vii.2000, 1 ♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039204, -513); Ninette, 15.vii.1958, 1 ♀, N. B. Chillcott leg., ex. *Betula glandulosa*, 15.vii.1958, 1 ♂ 3 ♀♀ (1 ♂ genit. prep.), J. G. Chillcott leg., 1 ♀, R. L. Hurley leg.; 3 mi S Shilo, ex. leafy spurge, 30.vi.1958, 2 ♂♂ 5 ♀♀, R. L. Hurley leg.; 5 mi SW Shilo, 22.vii.1958, 2 ♂♂ 4 ♀♀, C. D. F. Miller leg., 13.viii.1958, 1 ♀, swept from open prairie, 11.vii.1958, 7 ♂♂ 6 ♀♀ (1 ♀ genit. prep.), *Andropogon-Stipa* prairie community, 22.vii.1958, 4 ♂♂ 4 ♀♀, at margin of grain field, 22.vii.1958, 3 ♂♂ 2 ♀♀, tamarack, 2.viii.1958, 1 ♀, J. G. Chillcott leg., floodplain community nr. tamarack bog, 11.vii.1958, 1 ♀, J. G. Chillcott leg., 22.vii.1958, 1 ♂, R. L. Hurley leg. (all CNCI); 1 km E Stuartburn, 49°08'N 96°44.7'W, sweep vegetation along roadside, 12.vi.1999, 1 ♀, V. Crecco leg. (LEMQ 0039516); Treesbank, 20.vii.1915, 1 ♂ 1 ♀, 27.viii.1915, 1 ♀ (USNM), 6.viii.1915, 1 ♂ 4 ♀♀ (CNCI, 1 ♂ 1 ♀ with Aldrich det. as *Anthomyza gracilis*), N. Criddle leg.; Whitemouth, 10.vii.1958, 1 ♂, J. G. Chillcott leg. (CNCI); Winnipeg, St. Charles Rifle Range, 49°54.2'N 97°20.3'W, sweep in tallgrass prairie, 4.vii.1997, 1 ♀, D. Pollock leg. (LEMQ 0039532), 24.vi.1998, 2 ♂♂ 4 ♀♀ (LEMQ 0039433, -439, -442, -444, -452, -549), 1.vii.1998, 4 ♂♂ 4 ♀♀ (LEMQ 0039537–40, -45–48), 3.vii.1998, 1 ♀ (LEMQ 0039533), 8.vii.1998, 8 ♂♂ 9 ♀♀ (LEMQ 0039425, -426, -428, -432, -436, -461, -466, -467, -527, -528, -531, -550, -554–558), 10.vii.1998, 1 ♂ 4 ♀♀ (LEMQ 0039446, -463, -468, -469, -551), 15.vii.1998, 1 ♂ 2 ♀♀ (LEMQ 0039541, -52, -53), 17.vii.1998, 1 ♂ 2 ♀♀ (LEMQ 0039529, -35, -44), 22.vii.1998, 4 ♂♂ 7 ♀♀ (LEMQ 0039462, -453, -456, -457, -464, -465, -534, -524–526, -536), P. Bouchard leg.; Winnipeg, St. Charles Rifle Range, Go Back Prairie, 49°54.6'N 97°20.3'W, sweep in tallgrass prairie, 18.vi.1999, 1 ♀ (LEMQ 0039431), 13.viii.1999, 1 ♂ (LEMQ 0039450), V. Crecco leg.; Winnipeg, St. Charles Rifle Range, Arrowhead block, 49°54.6'N 97°20.5'W, sweep in tallgrass prairie, 30.vi.1999, 1 ♀ (LEMQ 0039499), 7.vii.1999, 4 ♂♂ 3 ♀♀ (LEMQ 0039440, -443, -445, -447–449, -454), 14.vii.1999, 4 ♂♂ 1 ♀ (LEMQ 0039451, -55, -58–60), S. McMillan leg., 13.viii.1999, 3 ♀♀ (LEMQ 0039435, -41, -42), 18.viii.1999, 1 ♂ (LEMQ 0039437), T. A. Wheeler leg., 11.viii.1999, 3 ♀♀ (LEMQ 0039423, -429, -430), V. Crecco leg., 14.vii.2000, 7 ♂♂ 15 ♀♀ (LEMQ 0039494, -495, -497, -498, -500–502, -504–511, -514, -518–523), Crecco & Wheeler leg. **NEW BRUNSWICK:** Birch Cove, nr. Chamcook, 14.viii.1957, 1 ♀, G. E. Shewell leg. (CNCI); Cape Pelée, 46°13.79'N 64°14.5'W, sweep vegetation at chalet, 31.vii.2004, 1 ♂ 1 ♀, S. Boucher leg. (LEMQ 0040524, -26); Chamcook, 9.viii.1957, 2 ♀♀; Chamcook, Glebe Road, 14.vii.1965, 1 ♀, all G. E. Shewell leg. (all CNCI); Grand Falls, 8.viii.1956, 1 ♂ 1 ♀, A. H. Sturtevant leg. (USNM); Ingonish, North Bay, 7–8.vii.1984, 1 ♂ 1 ♀, H. J. Teskey leg.; Kouchibouguac N. Pk., Code 6030X, 7.vii.1977, 8 ♂♂ 6 ♀♀ (1 ♀ genit. prep.), J. F. McAlpine leg.; Halifax Co., Lawrencetown, 19–20.vii.1967, 2 ♀♀, D. M. Wood leg.; Maces Bay, Hwy 790, 9.vii.1971, 5 ♂♂ 8 ♀♀ (1 ♂ genit. prep.), B. V. Peterson leg. (all CNCI); near McGraw

Brook, Road 108, 46.8°N 66.2°W, sweeping, 30.vii.2001, 1 ♂ 1 ♀, M. Giroux leg. (LEMQ 0039188, -95); Middle Sackville, 45°55.4'N 64°21.4'W, sweep vegetation along old rail line, 19.vii.2002, 6 ♂♂ 3 ♀♀, J. Forrest & T. Wheeler leg. (LEMQ 0039173, -39186, -39187, -39192, -39194, -40343, -40346-40348); Pt. Lepreau, 10.viii.1956, 1 ♂, A. H. Sturtevant leg. (USNM); Sackville, near Mt. Allison Univ., 45°53.9'N 64°22.5'W, sweep old garden in vacant lot, 19.vii.2002 3 ♂♂ 5 ♀♀, J. Forrest & T. Wheeler leg. (LEMQ 0040330-32, -34, -35, -37, -38, -40); Sackville, Tanramar Marsh, 14.vii.1983, 1 ♂ 6 ♀♀, J. R. Vockeroth leg. (CNCI). **NOVA SCOTIA:** Crescent Beach, 44°13.8'N 64°23.2'W, sweep dune vegetation, 24.vii.2002, 2 ♀♀, J. Forrest & T. Wheeler leg. (LEMQ 0039166, -67); Hampton, 44°54.7'N 65°20.5'W, sweep dense vegetation along path above ocean beach, 26.vii.2002, 6 ♂♂ 4 ♀♀, J. Forrest & T. Wheeler leg. (LEMQ 0040350-57, -59, -64); Lockeport, 18.vii.1958, 4 ♂♂ 7 ♀♀, 24.vii.1958, 1 ♀, 25.vii.1958, 2 ♂♂ 2 ♀♀, J. R. Vockeroth leg. (CNCI); Moser River, sweep vegetation along salt shore, 18.viii.1996, 4 ♂♂ 3 ♀♀, T. A. Wheeler leg. (LEMQ 0039352-55, -58-60); Paquette Lk., 5 km S South Harbour, 5.vii.1983, 1 ♂ 1 ♀, A. Borkent leg. (CNCI); Peggy's Cove, sweep grasses near shore W of lighthouse, 19.viii.1996, 1 ♀, T. A. Wheeler leg. (LEMQ 0039219); S. Harbour, PG961944, 11.vii.1984, 1 ♀, H. J. Teskey leg., PG929935, marshy lake shore, brackish water, *Carex*, *Juncus*, *Iris*, 27.vi.1983, 1 ♀, J. R. Vockeroth leg.; S. Harbour Beach, PG949958, sand beach, *Ammophila* & *Lathyrus*, 3.vii.1983, 2 ♂♂ 1 ♀, J. R. Vockeroth leg.; Springfield, 6.viii.1958, 1 ♀, J. R. Vockeroth leg. (all CNCI). **ONTARIO:** Algoma Mills, Lauzon Village Rd., 0.5 km N Hwy.17, 46°11.71'N 82°48.37'W, sweeps, *Carex*, *Calamagrostis*, edge of fen, 21.vii.2007, 5 ♂♂ 5 ♀♀, K. N. Barber leg. (CNCI); Algonquin Pk., 23.vi.1962, 1 ♀, R. J. Pilfrey leg., 27.vii.1981, 1 ♀, D. J. Mountjoy leg. (DEBU); Algonquin Park, 26-30.vii.1955, 2 ♂♂ 9 ♀♀, Sabrosky leg. (USNM); Algonquin, mixed wood, 1.vi.1991, 1 ♀, M. Barták leg. (MBPC, genit. prep.); Algonquin P. Pk., nr. Brent, Cedar Lake, 46°01'39"N 78°29'58"W, 29.vi.2008, 2 ♂♂ 2 ♀♀; Nipissing Co., Algonquin P. Pk., Tea Lk. Dam, Oxtongue River, 19.vii.1991, 1 ♀, all B. J. Sinclair leg. (all CNCI); 4 mi W Arthur, weedy ditch, 25.vii.1985, 14 ♂♂ 25 ♀♀, K. N. Barber leg. (DEBU); Atikokan, 14 mi E on Hwy.11, 3-4.vii.1978, 1 ♀, H. J. Teskey leg. (CNCI); 10 km E Atikokan, on Hwy.11, grass/sedge/*Typha* along roadside, 11.vii.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0039334); Atwood Twp., clearing, raspberry, 24.vii.1992, 1 ♂, S. Hughson leg. (DEBU); Baptiste Lake, 45°10'N 78°00'W, sweep near lake shore, 25.vii.2000, 1 ♂ (LEMQ 0039364), sweep at edge of forest, 23.vii.2000, 3 ♀♀ (LEMQ 0039216, -217, -363), sweep old railway line, clearings in forest, 15.vii.2001, 1 ♀ (LEMQ 0039370), J. Forrest leg.; Batchawana, 10.vii.1955, 1 ♀, J. Gustafson leg. (LEMQ 0039214); Belwood, 8.vii.1972, 1 ♀, 16.vii.1972, 1 ♂ 2 ♀♀, D. H. Pengelly leg. (DEBU); Bergland, 4.viii.1960, 1 ♀, S. M. Clark leg. (CNCI); Bissett, [-].vi.1954, 1 ♀, H. D. Stalker leg. (AMNH); Blackburn, 12.vii.1954, 4 ♂♂ 8 ♀♀; Blackburn, Mer Bleue, 29.vi.1954, 1 ♀, 27.vi.1955, 1 ♂ 4 ♀♀, all W. R. M. Mason leg.; 1.5 km E Bruce Mines, 46°18.1'N 83°46.4'W, sweeps, short roadside grasses, 1.viii.1997, 1 ♀, K. N. Barber leg. (all CNCI); Bruce Co., Dorcas Bay, 45°11'N 81°35'W, 22.vi.2008, 1 ♀, S. A. Marshall leg. (DEBU 00299114); Bruce Co., Bruce Pen. N. P., George Lake, 15.viii.2007, 1 ♀, S. M. Paiero leg. (DEBU 00286986); Bruce Co., Dunks Bay, 45°14.8'N 81°38.5'W, 30.vii.1997, sweeps, roadside veg., 1 ♂ 1 ♀; Bruce Co., Hwy#6 @ Willow River, 45°10.43'N 81°31.21'W, sweeps, mostly *Carex aquatilis*, 21.vi.2008, 1 ♀; Bruce Peninsula N. P., Bartley Lake, 45°12.9'N 81°29.3'W, sweeps, shoreline graminoids, 2.vii.1999, 1 ♀; Bruce Peninsula N. P., Cameron Lk. Rd., 45°12.9'N 81°33.0'W, sweeps, roadside grasses, 3.vii.1997, 1 ♀; Bruce Peninsula N. P., Crane River, 45°07.0'N 81°32.1'W, sweeps, grass/sedge fen meadow, 3.vii.1999, 2 ♀♀; Bruce Peninsula N. P., Crane River below Lake Scugog, 45°07.0'N 81°32.1'W, sweeps, riverside vegetation, 3.vii.1999, 3 ♀♀, all K. N. Barber leg.; Bruce [Pen.] N. P., Cyprus Lake campground, trail nr. Horse Lake, 24-25.vi.1996, 1 ♀, S. A. Marshall leg.; Bruce Peninsula N. P., Dorcas Bay Rd. at Willow Creek, 45°09.4'N 81°34.4'W, sweeps, mostly creekside graminoids, 3.vii.1999, 2 ♂♂ 1 ♀, K. N. Barber leg. (all DEBU); Bruce Co., Bruce Pen. N. P., Lower Andrew Lk., portage trail, sweep, 8.vi.2000, 1 ♂ 1 ♀, C. S. Onodera leg. (DEBU 00080038, -56); same locality but 45°13'N 81°27'W, 24.viii.2003, 2 ♂♂, S. A. Marshall leg. (DEBU 00298601, -27); Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.7'W, sweeps, *Agropyron* sp., 29.vii.1997, 1 ♂ 11 ♀♀, sweeps, *Calamagrostis canadensis*, 29.vii.1997, 2 ♂♂ 5 ♀♀, sweeps, *Agropyron/Calamagrostis*, 30.vii.1997, 4 ♂♂ 13 ♀♀, 5.vii.1998, 10 ♂♂ 39 ♀♀; same locality but 45°11.51'N 81°34.66'W, sweeps, grasses on sand, 22.vi.2008, 3 ♂♂ 6 ♀♀, all K. N. Barber leg. (all DEBU); Bruce Peninsula N. P., Dorcas Bay, Singing Sands, 45°11'N 81°35'W, sweep shore, 2.vii.2001, 1 ♂, M. Pollet leg. (LEMQ 0039185); 1 km S Chalk River, St. Andrew's UC, Forest View Cemetery, 46°00.4'N 77°25.9'W, sweeps, mostly grasses, 6.vii.2001, 2 ♂♂ 11 ♀♀; ~13.9 km W Chapleau, 47°49.20'N 83°35.42'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, grasses, 23.vi.2013, 1 ♂, 13.vii.2013, 6 ♂♂ 1 ♀, 7.vii.2014, 5 ♂♂ 1 ♀ (all CNCI); ~5 km SE Cochrane, 49°01.16'N 80°57.93'W, sweeps, rai-side *Equisetum* spp.,

graminoids, herbs, 18.vii.2009, 27 ♂♂ 48 ♀♀ (AMNH, CASC, LACM, USNM 5 ♂♂ 7 ♀♀ each; 7 ♂♂ 20 ♀♀ CNCI), all K. N. Barber leg.; Deux Riv[ieres], 8.vii.1954, 1 ♀, A. H. Sturtevant leg. (USNM); ~32 km NW Dowling Hwy #144 @ Moncrieff Ck., 46°46.53'N 81°36.50'W, sweeps, graminoids on muddy floodplain, 29.vii.2007, 1 ♀; Dryden, 49°47.1'N 92°48.4'W, sweeps, grasses in low area, 10.vii.1999, 3 ♂♂ 9 ♀♀ (all CNCI, 1 ♂ genit. prep.); Dryden, 49°47.27'N 92°48.62'W, sweeps, mixed graminoids/herbs, 17.vii.2008, 11 ♂♂ 14 ♀♀ (BDUC, BYUC 4 ♂♂ 6 ♀♀ each; CNCI 3 ♂♂ 2 ♀♀); ~35 km WSW Dubreuilville, 2 km SE Jct. Hwys.#17 & #519, 48°17.16'N 84°53.34'W, sweeps, *Calamagrostis/Scirpus*, 23.vii.2003, 4 ♀♀, sweeps, roadside vegetation incl. wet ditch, 31.vii.2008, 2 ♂♂ 14 ♀♀, sweeps, *Equisetum* sp., 31.vii.2008, 2 ♀♀ (CNCI), all K. N. Barber leg.; Dundas, 25.vi.1980, 4 ♂♂ 2 ♀♀, S. Beierl leg. (DEBU); 5 km W Dyer Bay, Crane Lake Rd., 45°10.9'N 81°23.8'W, sweep alvar savanna, 18.vii.2000, 4 ♂♂ 16 ♀♀, V. Crecco & T. Wheeler leg. (LEMQ 0039470–74, -76–83, -86–92); Elliot Lake, 46°22.23'N 82°36.49'W, sweeps, mixed graminoids incl. *Carex utriculata*, 29.vi.2013, 7 ♂♂ 3 ♀♀, K. N. Barber leg. (CNCI); ~55 km NNW Elliot Lake, S of Rocky Island Lake, 46°49.32'N 82°59.54'W, 455 m, sweeping vegetation with predominant *Scirpus* sp., 3.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, sweeps, *Scirpus [microcarpus]* on dried shoreline, 4.vii.2010, 1 ♂, K. N. Barber leg. (CNCI), 405 m, sweeping *Scirpus* sp. on dried shoreline, 4.vii.2010, 5 ♂♂ 8 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); Elora, 27.vi.1977, 1 ♀, K. N. Barber leg., 1 ♀, E. A. Innes leg. (DEBU); ~11 km ESE English River, Hwy#17, 49°09.42'N 90°50.11'W, sweeps, *Equisetum fluviatile*, 17.vii.2008, 1 ♀, K. N. Barber leg. (CNCI); Erin, 25.vi.1979, 2 ♂♂, 19.vii.1979, 1 ♂ 1 ♀, J. Ernst leg. (DEBU); 8 km NE Espanola, Hwy 17 at Spanish R., 46.3°N 81.67°W, sweep veg. at rest area, 28.vi.2007, 1 ♀, J. Mlynarek leg. (LEMQ 0040529), 2 ♀♀, T. A. Wheeler leg. (LEMQ 0040284, -533); Finland, 28.vi.1960, 1 ♂ 5 ♀♀, Kelton & Whitney leg., 28.vi.1960, 1 ♀, 17.vii.1960, 2 ♀♀, S. M. Clark leg. (all CNCI); Finland, S of Caliper Lake, sweep sedge at beaver dam, 10.vii.1992, 9 ♂♂ 10 ♀♀, T. A. Wheeler leg. (LEMQ 0039289, -312–314, -316–326, -328–331); Fitzroy Harbour, 11.vii.1938, 2 ♂♂, O. Peck leg. (CNCI, 1 ♂ genit. prep.); Flinton, St. John the Evangelist RC Church, 44°41.3'N 77°12.8'W, sweeps, mowed grasses on stable sand, 9.vii.2001, 1 ♀; ~7.0 km E Foleyet, 48°14.34'N 82°20.75'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, 13.vii.2013, 1 ♂; Fraserdale, 49°50.71'N 81°36.99'W, sweeps, graminoids, herbs in disturbed area, 19.vii.2009, 1 ♂ 9 ♀♀, all K. N. Barber leg. (all CNCI); Goderich, 22.vi.1977, 1 ♂ (DEBU); Greenwater P. Pk., 49°11.05'N 81°16.04'W, sweeps, mostly emergent *Equisetum fluviatile*, 18.vii.2009, 1 ♀ (DEBU 01501988); Greenwater P. Pk., 49°11.34'N 81°17.04'W, sweeps, grasses/herbs in hydro cut, 21.vii.2009, 8 ♂♂ 23 ♀♀ (DEBU 01502254–84), all K. N. Barber leg.; Goulais River, Pine Shores Rd, G. R. Cemetery, 46°41.91'N 84°25.71'W, sweeps, mowed grasses on stable sand, 30.vi.2007, 1 ♂ 3 ♀♀; Goulais River, end of Island Rd., 46°43.57'N 84°24.45'W, sweeps, mud flats, *Equisetum fluviatile*, *Dulichium arundinaceum*, 9.vii.2007, 1 ♂, all K. N. Barber leg. (all CNCI); Goulais River, Sand Bay, 46°44.81'N 84°32.68'W, sweeping *Juncus* and *Carex* at margin of fen pools, 10.vii.2010, 1 ♂, J. Roháček leg. (SMOC, genit. prep.); Wellington Co., Guelph, UG campus, sweep, 17.viii.1992, 1 ♀, H. Nadel leg. (RBCM); Wellington Co., Guelph, U of G Arboretum (north), field sweep, 12.vii.1993, 2 ♂♂, (south), field sweep, 17.vii.1993, 2 ♂♂ 2 ♀♀, D. C. Caloren leg.; U of Guelph Arboretum, sweep, young goldenrod, 18.vii.1995, 1 ♂, J. M. Dow leg. (all DEBU); Guelph, University Arboretum, sweeping over boggy meadow, 19.viii.1994, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); Guelph, 23.vi.1976, 1 ♀, J. M. Cumming leg., 18.viii.1976, 1 ♀, D. Levin leg., 21.vi.1976, 1 ♀, 3.vii.1980, 1 ♀, S. A. Marshall leg., 20.vi.1977, 1 ♀, 21.vi.1977, 1 ♂, 5.vii.1977, 1 ♂ 1 ♀, W. A. Atwater leg., 23.vi.1977, 1 ♀, 5.vii.1977, 1 ♂ 2 ♀♀, 16.vi.1978, 1 ♀, 22.vi.1978, 1 ♀, 28.vi.1978, 1 ♂ 3 ♀♀, 11.vii.1978, 1 ♂, 1.viii.1980, 1 ♀, 2.viii.1980, 9 ♂♂ 11 ♀♀, K. N. Barber leg., 12.vii.1978, 1 ♀, N. Pierce leg., 8.vi.1978, 1 ♂, 13.vii.1978, 1 ♂ 2 ♀♀, B. Warner leg., 6.vii.1979, 1 ♀, K. L. Bailey leg., 26.vii.1979, 2 ♀♀, 27.vii.1979, 1 ♀, D. Lewis leg., 11.vii.1979, 1 ♀, 30.vii.1980, 1 ♀, S. Beierl leg., 18.vii.1980, 3 ♀♀, K. H. Harvey leg., 17.vii.1980, 1 ♂ 1 ♀, L. L. Krailo leg., 13.vii.1983, 2 ♂♂ 5 ♀♀, R. Damaio Smith leg., 31.vii.1986, 1 ♀, Z. Y. Huang leg., pan traps, 18–26.vii.1980, 1 ♀, 24.vi.–14.vii.1981, 1 ♂, Malaise trap, 1–7.vii.1985, 1 ♀, K. N. Barber leg.; Havlock, 4.vii.1977, 1 ♀, J. W. McCreadie leg. (all DEBU); Hawk Jct., 48°05.39'N 84°33.62'W, 17.vi.2004, sweeps, mowed grasses on stable sand, Community Centre, 2 ♂♂ 7 ♀♀, Pine Grove Cemetery, 1 ♀, K. N. Barber leg. (CNCI); Hepworth, 4.vii.1979, 1 ♀, D. L. Krailo leg. (DEBU), 26.vii.1997, 1 ♀, S. A. Marshall leg. (DEBU 00075280); ~1.9 km E MB border, Hwy#17, 49°44.42'N 95°07.61'W, sweeps, mixed graminoids, 30.vii.2011, 4 ♂♂ 3 ♀♀; Jct. Hwys 17 & 108, 46°12.8'N 82°34.3'W, sweeps, roadside graminoids near wet area, 1.viii.1997, 1 ♂ 3 ♀♀, all K. N. Barber leg. (all CNCI); Hwy 17N & Trout Lake Road, 46°37.563'N 84°17.019'W, sweep, roadside, 23.vii.2011, 2 ♀♀, J. E. Swann & D. R. Edwards leg. (BDUC); Hills, 11.vii.1978,

1 ♀, M. Lichtenberg leg.; Hilton Township, Malaise at edge of hardwood forest & field, 4.ix.1992, 1 ♂ (genit. prep.), J. E. Swann leg. (both DEBU); Hilton Twp., 46°14.874'N 83°53.739'W, abandoned field, Malaise, 21–26.vii.2011, 1 ♂, J. E. Swann & D. R. Edwards (BDUC); Icewater Creek WS [Watershed], 13.5 km NNE Searchmont, mi.11.5 Whitman Dam Rd., sandy access road, 17.vi.1986, 1 ♂, 19.vi.1986, 1 ♀, [D. J.] M. Harvey leg., 21.viii.1985, 1 ♀, 20.vi.1986, 4 ♀♀, 1.vii.1986, 1 ♂ 3 ♀♀; ~25 km WNW Ignace, 49°29.49'N 92°00.71'W, sweeps, wet area, mostly *Calamagrostis canadensis*, 30.vii.2008, 7 ♂♂ 17 ♀♀, sweeps, fen, mostly *Carex utriculata* with grasses, 30.vii.2011, 1 ♂ 1 ♀; same locality but 49°29.48'N 92°00.75'W, sweeps, fen, mostly *Carex utriculata* with grasses, 30.vii.2011, 1 ♂ 2 ♀♀; same locality but 49°29.52'N 92°00.83'W, sweeps, fen, mostly *Carex utriculata* with grasses, 4.vii.2012, 9 ♂♂ 14 ♀♀, 5.vii.2012, 14 ♂♂ 7 ♀♀, 6.vii.2012, 2 ♂♂ (1 ♂ genit. prep.), all K. N. Barber leg. (all CNCI); Innisfil, 44°19.346'N 79°35.009'W, sweep around pond embankment, 28.vii.2011, 1 ♂, J. E. Swann & D. R. Edwards leg. (BDUC); Bruce Co., Inverhuron P. Pk., sweep rocky stream bank and vegetation, 5.vii.2001, 1 ♀, M. Pollet leg. (LEMQ 0040467); Iroquois Falls, overgrown wet shrubby *Sphagnum* bog, 18.vi.1987, 2 ♂♂, J. R. Vockeroth leg. (CNCI); Kirkland Lk., 25.vi.1980, 1 ♂, J. Cashaback leg. (DEBU); Lake Duncan, 1.5 mi N, 30.vi.1991, 1 ♀, Pont leg. (BMNH); Muskoka Distr., Lake Kahshe, 5 km S Gravenhurst, 20–26.vi.2003, 2 ♂♂ 4 ♀♀, O. Lonsdale leg. (DEBU 00226770, -773, -778, -808, -822, -830); Kenora Distr., Lake of the Woods, 6 km NNW Sioux Narrows, N side Long Bay, Bur Oak prairie remnant, sweep, 22.vi.1998, 1 ♂, Oldham & Bakowsky leg. (DEBU 00154994); Killarney P. Pk., near Hwy 637, 46°02.66'N 81°19.83'W, sweep net in sedge meadow with grasses & *Rubus*, 11.vii.2004, 1 ♂ 2 ♀♀, J. Forrest leg. (LEMQ 0040317–19); Lake Superior P. Pk., Agawa Bay Campgd., 47°20.3'N 84°37.2'W, sweeps, grasses on sand along trail, 4.vii.2000, 1 ♀ (DEBU); Lake Superior P. Pk., Hwy 17 near jct. Agawa Rock, 47°22.31'N 84°41.23'W, sweeps, mostly *Carex utriculata*, 12.vii.2014, 1 ♀ (DEBU 01503947), both K. N. Barber leg.; Algoma District, Lake Superior Prov. Pk., Rabbit Blanket Lake, 43°41'24"N 80°23'12"W [coordinates do not match locality], 400 m, 20.vi.2001, 1 ♂, S. A. Marshall leg. (DEBU 00170278); 6 km S Langton Concession Rd. 8, S Hwy 45, 42°42.01'N 80°31.93'W, sweep clearing near Carolinian forest, 30.vi.2002, 1 ♀, S. Boucher leg. (LEMQ 0040476); Lefroy, 16.vi.1982, 2 ♂♂ 2 ♀♀, D. Morris leg.; Luther Marsh Bog, sweeps, 27.vi.1985, 1 ♀, K. N. Barber leg. (all DEBU); ~6.3 km E Macleod, 49°41.37'N 86°51.41'W, sweeps, graminoids incl. *Carex utriculata* & *C. aquatilis stricta*, 6.vii.2012, 1 ♂; Manitoulin Is., Carter Bay, 45°36.3'N 82°08.5'W, sweeps, roadside vegetation, 30.vi.1999, 1 ♂; Manitoulin Is., ~2.2 km N Cold Springs, Perch Ck. at Hwy 540, 45°53.2'N 82°06.3'W, sweeps/pooter, *Calamagrostis canadensis*, 1.viii.1997, 2 ♀♀, sweeps, various grasses/sedges in floodplain, 3.vii.1998, 4 ♂♂ 37 ♀♀, 5.vii.1998, 3 ♂♂ 47 ♀♀ (1 ♂ genit. prep.); same locality but 45°53.1'N 82°06.2'W, sweeps, various grasses/sedges in floodplain, 4.vii.1999, 5 ♂♂ 28 ♀♀ (1 ♂ 1 ♀ genit. prep.), all K. N. Barber leg. (all CNCI); Manitoulin Is., 10 km SW Gore Bay, 45°51.6'N 82°31.5'W, sweep dry meadow at roadside, 17.vii.2000, 1 ♀, V. Crecco & T. Wheeler leg. (LEMQ 0039191); Manitoulin I., ditch at Honord [sic Honora], 3.vii.1998, 1 ♂, S. A. Marshall leg. (DEBU 00075281); Manitoulin I., Kip Fleming Tract, ~8 km SW Gore Bay, 45°52'13"N 82°32'31"W, oak savannah/alvar, 2–3.vii.2010, 7 ♂♂ 12 ♀♀, S. M. Paiero leg. (DEBU 00329614, -622, -623, -629, -652, -674, -675, -682, -684, -685, -719, -726, -733, -734, -741, -744, -746, -749, -765); Manitoulin I., Michael's Bay, 8.viii.2003, 1 ♀ (DEBU 01131678), nr. boat launch, 9.viii.2003, 1 ♂ 8 ♀♀ (DEBU 00253642–649, -653), S. A. Marshall leg.; Manitoulin Is., Michael's Bay Pk., 45°36.0'N 82°06.2'W, sweeps, grasses near shore, 28.vii.1997, 1 ♂ 3 ♀♀; same locality but 45°36.0'N 82°06.3'W, sweeps, lakeside grasses, 4.vii.1999, 2 ♂♂ 10 ♀♀; Manitoulin Is., 0.7 km N Michael's Bay Pk., 45°36.5'N 82°06.2'W, sweeps, *Carex/Calamagrostis* in fen flat, 5.vii.1998, 1 ♀, all K. N. Barber leg. (all CNCI); Manitoulin Is., Misery Bay [Prov.] Nature Reserve, 45°47.42'N 82°44.07'W, sweeps, trailside graminoids, 27.vii.2004, 4 ♂♂ 3 ♀♀, K. N. Barber leg. (DEBU 01501485–91); Manitoulin I., Misery Bay Prov. Nat. Res., 45°47'28"N 82°44'58"W, alvar, 4–5.vii.2010, 3 ♂♂ 3 ♀♀, S. M. Paiero leg. (DEBU 00329436, -449, -451, -458, -466, -467); Manitoulin Is., Misery Bay [Prov.] Nature Reserve, 45°47.64'N 82°44.93'W, sweeps, mostly *Carex stricta* from wetlands boardwalk, 2.vii.2010, 2 ♀♀, K. N. Barber leg. (DEBU 01502491, -92), sweeping, mostly *Carex [stricta]* from wetland boardwalk, 2.vii.2010, 2 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); Manitoulin Is., nr. Misery Bay [Prov.] Nature Reserve, Little Lake Huron Road, 45°47.93'N 82°45.52'W, sweeps, mostly *Carex, Juncus* on wet alvar, 2.vii.2010, 1 ♂ 1 ♀, K. N. Barber leg. (CNCI), sweeping, mostly *Carex, Juncus* on wet alvar, 2.vii.2010, 3 ♂♂ 3 ♀♀, J. Roháček leg. (SMOC, 1 ♂ genit. prep.); Manitoulin Is., Providence Bay at Mindemoya R., 26.vi.1992, 1 ♂, T. A. Wheeler leg. (LEMQ 0039307); Manitoulin I., Sand Bay, 45°48'06"N 82°47'36"W, dunes, sweep grassy area by stream, 25.vi.2003, 1 ♂, M. Buck leg. (DEBU 01131826); Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.07'W, sweeps, roadside graminoids, 31.vii.2008,

3 ♂♂ 9 ♀♀, K. N. Barber leg.; Marmora, 26.vi.1952, 2 ♀♀, J. R. Vockeroth leg., 16.vi.1952, 1 ♂, J. R. McGillis leg., 27.vi.1952, 1 ♀, 4.vii.1952, 1 ♂, C. Boyle leg. (all CNCI); Marten River, 8.vii.1954, 1 ♂ 1 ♀, A. H. Sturtevant leg. (USNM); Mattawa, 16.vi.1987, wet alder thicket, rich undergrowth, 1 ♀, J. R. Vockeroth leg.; Maynooth, 2.viii.1952, 1 ♀, J. F. McAlpine leg.; Metcalf, 15.vii.1982, 1 ♀, 12.vii.1983, 1 ♀, 11.vii.1985, 1 ♀, B. E. Cooper leg.; 2 mi N Metcalf, 28.vi.1982, 1 ♂ 3 ♀♀, 4.vii.1984, 1 ♂ 1 ♀, B. E. Cooper leg. (all CNCI); Midland, 8.vii.1970, 1 ♀, J. T. Huber leg.; Peterboro[ugh] Co., Miller Creek C[onservation] A[rea], 1.vii.2000, 1 ♀, W. J. Crins leg. (both DEBU); Dufferin Co., Mono Cliffs Prov. Pk., Spillway Trail, 44°02'53"N 80°04'35"W, sweeping, 21.vi.2003, 26 ♂♂ 20 ♀♀ (DEBU 00225619, -20, -22, -24, -26, -30-34, -36-38, -40-43, -45, -46, -48-53, -55-58, -62, -63, -65-70, -83-88, -90-92); Thunder Bay Distr., Neys Prov. Pk., beach nr. Little Pic River, sweeping, 16.vii.2002, 1 ♂ 1 ♀ (DEBU 00253173, -74), all M. Buck leg.; ~8 km SSW Nipigon, Hwy#628, 48°57.09'N 88°19.71'W, sweeps, damp roadside, mixed graminoids, 16.vii.2008, 18 ♂♂ 60 ♀♀ (CLEV, CMNH, CSCA 4 ♂♂ 6 ♀♀ each; 6 ♂♂ 42 ♀♀ CNCI), K. N. Barber leg.; North Bay, 8.vii.1954, 2 ♂♂ 1 ♀; N[orth] Bay, 18.vi.1964, 2 ♀♀, all A. H. Sturtevant leg. (all USNM); North Branch, 18.vii.1960, 2 ♀♀, S. M. Clark leg.; Lanark Co., N. Burgess Twp., 23.vi.198[-], 1 ♂ 2 ♀♀, D. M. Wood leg.; Norway Point, Lake of Bays, 2.viii.1919, 1 ♀, J. McDunnough leg.; One-Sided [= Caliper] Lake, 19.vii.1960, 1 ♂, S. M. Clark leg., 26.vi.1960, 2 ♀♀, 29.vi.1960, 1 ♀, 16-17.vi.1960, 1 ♀ (genit. prep.), Kelton & Whitney leg. (all CNCI); Orangeville, 25.vi.1976, 1 ♀, 29.vi.1976, 1 ♂, E. A. Innes leg. (DEBU); Ottawa, 11.vii.1938, 1 ♀, A. Brooks leg., 22.vii.1954, 2 ♀♀, W. R. M. Mason leg., 26.vii.1955, 2 ♀♀, J. G. Chillingworth leg., 4.vii.1964, 1 ♂, J. R. Vockeroth leg. (CNCI), 17.vii.1980, 1 ♂, Shelley Neilson leg. (DEBU); Ottawa, Mer Bleu[e] Bog, 14.vi.1980, 11 ♂♂ 12 ♀♀, 15.vi.1980, 2 ♂♂ 1 ♀, 24.vi.1980, 23 ♂♂ 10 ♀♀, K. N. Barber leg. (DEBU); Ottawa, Mer Bleu Bog, 45°23.7'N 75°30.8'W, sweeps, grasses on sand, 6.viii.2000, 1 ♀, K. N. Barber leg.; 5 mi E Ottawa, Mer Bleu[e], taken in *Sphagnum* bog, Malaise trap, 25.vi.1964, 1 ♀, D. D. Munroe leg. (both CNCI); Otter Rapids, 50°11.04'N 81°38.34'W, sweeps, grasses, herbs in disturbed area, 19.vii.2009, 4 ♂♂ 12 ♀♀; Otter Rapids, 50°10.91'N 81°38.54'W, sweeps, mostly *Calamagrostis canadensis* in hydro cut, 19.vii.2009, 6 ♂♂ 2 ♀♀, sweeps, mostly *C. canadensis*, *E. fluviatile* in hydro cut, 20.vii.2009, 9 ♂♂ 10 ♀♀; Otter Rapids, 50°10.87'N 81°38.56'W, sweeps, mostly *Calamagrostis canadensis* in hydro cut, 20.vii.2009, 1 ♀; Otter Rapids, 50°10.85'N 81°38.65'W, sweeps, grasses in hydro cut, 20.vii.2009, 1 ♂ 4 ♀♀; Otter Rapids, 50°10.96'N 81°37.88'W, sweeps, grasses, herbs on roadside slope, 20.vii.2009, 15 ♂♂ 15 ♀♀, sweeps, mostly *Schedonorus arundinaceus*, on roadside slope, 20.vii.2009, 7 ♂♂ 8 ♀♀, all K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°57.74'N 84°42.63'W, sweeps, beach grasses, 7.viii.2004, 20 ♂♂ 61 ♀♀ (DEBU 01501125-205, 2 ♂♂ genit. prep.), sweeps, *Ammophila breviligulata* on beach sand, 9.vii.2010, 8 ♂♂ 11 ♀♀ (DEBU 01502501-19), K. N. Barber leg., sweeping, *Ammophila breviligulata* on beach sand, 9.vii.2010, 29 ♂♂ 31 ♀♀, J. Roháček leg. (SMOC, 2 ♂♂ 2 ♀♀ genit. prep.); Pancake Bay P. Pk., 46°58.13'N 84°42.70'W, sweeps, open grassy area near highway, 7.viii.2004, 4 ♂♂ 6 ♀♀ (DEBU 01501108-17); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 1 ♀ (DEBU 01500696), all K. N. Barber leg.; Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeping from boardwalk, mostly emergent sedges/*Equisetum*, 9.vii.2010, 1 ♂ 2 ♀♀, J. Roháček leg. (SMOC, all genit. prep.); 10 km NW Penetanguishene, Awenda P. Pk., Second Lake, sweep sedge at shoreline, 13.vii.1992, 2 ♀♀, T. A. Wheeler leg. (LEMQ 0039302, -09); Petawawa, 4.vii.1938, 2 ♀♀, H. S. Parish leg. (USNM); Thunder Bay Distr., mouth of Pic River, N side, 48°36'N 86°18'W, 20.vii.2001, 1 ♂, M. Buck leg. (DEBU 00169253); Pinery P. Pk., Grand Bend, 6.vii.1983, 1 ♂ 1 ♀, K. N. Barber leg. (DEBU); ~1 km NW Ponsonby, 43°38.2'N 80°22.9'W, sweeps/pooter, roadside, mostly *Poa pratensis* & *Poa compressa*, 17.vii.1997, 13 ♂♂ 38 ♀♀ (CSUC, EMEC 4 ♂♂ 6 ♀♀ each; CNCI 5 ♂♂ 26 ♀♀), K. N. Barber leg.; Lambton Co., Port Franks, Karner Blue Sanctuary, 15.viii.1996, 1 ♀, Malaise, 13-15.vi.1996, 1 ♂, 25-30.vii.1996, 1 ♂, J. Skevington leg. (DEBU); Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 1 ♀, K. N. Barber leg.; Prescott, 19.vi.1963, 1 ♀, J. R. Vockeroth leg. (both CNCI); Priceville, 15.vi.1959, 1 ♂, 5.vii.1960, 1 ♀; Primrose, 7.vii.1960, 1 ♂ 1 ♀, all D. H. Pengelly leg. (all DEBU); Pukaskwa N. P., SW of Admin. Bldg., 48°36'06"N 86°17'19"W, *Vaccinium*/lichen clearing, Malaise, 19-22.vii.2001, 1 ♂, M. Buck leg. (DEBU 00182608); Puslinch, 16.vii.1979, 1 ♀, B. Merchant leg. (DEBU); Rainy River, 22.vi.1960, 1 ♀, Kelton & Whitney leg. (CNCI); 10 km S of Richmond, sweep in fen, 15.vii.1999, 1 ♀, S. E. Brooks leg. (LEMQ 0040468); Wellington Co., Rockwood, sweeps, 17.vii.2004, 2 ♂♂ 3 ♀♀, M. Buck leg. (DEBU 00335657, -58, -63, -65, -67); ~4.5 km E Rosseau, on Aspdin Rd., 45°15.88'N 79°34.88'W, sweeps, mostly *Carex* in sedge meadow, 7.vii.2005, 1 ♀; ~2 km E Rosspoint, Hwy#17, picnic area, 48°50.3'N 87°29.4'W, sweeps of graminoids, 9.vii.1999, 4 ♂♂ 6 ♀♀; ~2.4 km E Rutherglen, 46°16.1'N 79°00.0'W,

sweeps, grasses on disturbed sand hill, 6.vii.2001, 1 ♂ 17 ♀♀; St. Joseph Island, Beech Beach, 46°07.1'N 83°53.5'W, sweeps, grasses on stable sand, 9.vii.2000, 4 ♀♀, all K. N. Barber leg. (all CNCI); St. Lawrence Is. N. Pk. [now Thousand Islands N. Pk.], Grenadier [Information] Centre, [each with] Code: 1-244K-132, -245, -252, -357, 26.vi.1975, 3 ♂♂ 1 ♀, H. J. Teskey leg., [each with] Code: 1-241H-9 to -13, 26.vi.1975, 1 ♂ 4 ♀♀, E. Sigler leg. (CNCI); Hald[imand]-Norfolk Reg., Manester Tract, 6 km NNW St. Williams, 30.vi.2000, 2 ♂♂ 1 ♀, M. Parchami-Araghi leg. (DEBU 00137124, -25, -43), 8.vii.2000, 1 ♀, M. Buck leg. (DEBU 00137198), sandy field, sweep, 8.vi.2001, 8 ♂♂ 12 ♀♀, M. Buck leg. (DEBU 00158292-296, -299, -301, -303, -305, -308, -309, -312-314, -320, -321, -327, -334-336), 15.vi.2001, 3 ♂♂ 3 ♀♀, S. M. Paiero leg. (DEBU 00158674, -684, -692, -694, -703, -708), sandy field, yellow pans, 15.vi.2001, 1 ♀, Buck, Paiero & McKendry leg. (DEBU 00158401); SSM [Sault Ste. Marie], 14.viii.1981, 1 ♂, G. Aiudi leg. (DEBU); S[ault] S[te.] Marie, S. of Algoma U[niversity] College, 46°29.9'N 84°17.2'W, sweeps, *Carex aquatilis*, 28.vi.2002, 1 ♀, 29.vi.2002, 1 ♀, 1.vii.2002, 1 ♀, 31.vii.2002, 1 ♂, sweeps, mostly *Carex aquatilis*, 25.vi.2001, 1 ♀, 18.vii.2001, 1 ♀, 2.viii.2002, 1 ♀, 6.viii.2002, 1 ♀, sweeps, *Calamagrostis canadensis*, 26.vi.1998, 1 ♀, 2.viii.2002, 1 ♀, sweeps/pooter, *Calamagrostis canadensis*, 12.vii.2002, 1 ♀; same locality but 46°29.88'N 84°17.19'W, sweeps, mostly *Carex aquatilis*, 18.vii.2004, 1 ♀; same locality but 46°29.93'N 84°17.21'W, sweeps, *Elymus repens*, disturbed snow dump site, 6.viii.2008, 1 ♂ 2 ♀♀; S[ault] S[te.] Marie, Allen's Side Road, 46°31.66'N 84°24.13'W, meadow sweeps above creek, 14.viii.2004, 2 ♂♂ 1 ♀, all K. N. Barber leg. (all CNCI); S[ault] S[te.] Marie, Baseline Rd., 46°31.41'N 84°24.57'W, sweeps, sparse veg. on disturbed site, 26.vi.2005, 15 ♂♂ 11 ♀♀ (KNWR, MEMU 4 ♂♂ 4 ♀♀ each; CNCI 7 ♂♂ 3 ♀♀, 4 ♂♂ genit. prep.); same locality but 46°31.40'N 84°24.45'W, sweeps, edge of forest, *Solidago*, *Rubus*, *Equisetum*, grasses, 25.vi.2005, 3 ♂♂ 2 ♀♀, 10.vii.2005, 2 ♀♀; S[ault] S[te.] Marie, Bristol Pl. Pk., 46°30.8'N 84°16.6'W, sweeps/pooter, *Phalaris arundinacea*, 27.vii.1997, 2 ♀♀, 8.viii.1997, 1 ♂ (all CNCI), all K. N. Barber leg.; S[ault] S[te.] Marie, Finn Hill, 46°31.6'N 84°17.3'W, sweeps, graminoids/composites, 19.vii.2005, 7 ♂♂ 13 ♀♀, sweeps, meadow graminoids, 1.vii.2002, 2 ♂♂ 1 ♀, sweeps, meadow graminoids/herbs, 20.vii.2004, 2 ♂♂ 36 ♀♀; same locality but 46°31.66'N 84°17.34'W, sweeps, mostly *Calamagrostis canadensis*, 6.vii.2008, 3 ♂♂ 3 ♀♀, 8.vii.2008, 5 ♂♂ 3 ♀♀, 10.vii.2008, 1 ♂ 2 ♀♀, sweeps, graminoids, herbs, composites, 6.vii.2008, 7 ♀♀, 10.vii.2008, 3 ♂♂ 12 ♀♀; same locality but 46°31.65'N 84°17.34'W, sweeps, graminoids, herbs, composites, 19.viii.2008, 8 ♂♂ 21 ♀♀ (all CNCI); same locality but 46°31.67'N 84°17.32'W, sweeps, *Calamagrostis canadensis*, 20.vii.2004, 6 ♀♀ (CNCI), 30.vii.2004, 11 ♂♂ 26 ♀♀ (MCZC, MTEC 4 ♂♂ 6 ♀♀ each; CNCI 3 ♂♂ 14 ♀♀); same locality but 46°31.63'N 84°17.33'W, sweeps, graminoids, herbs, composites, edge of *Populus tremuloides*, 6.vii.2008, 10 ♂♂ 16 ♀♀ (CNCI), 8.viii.2008, 16 ♂♂ 18 ♀♀ (NMPC, OSAC 4 ♂♂ 6 ♀♀ each; CNCI 8 ♂♂ 6 ♀♀), 10.vii.2008, 8 ♂♂ 14 ♀♀ (CNCI), 25.vi.2009, 20 ♂♂ 25 ♀♀ (PMAE, RBCM, SEMC 4 ♂♂ 6 ♀♀ each; CNCI 8 ♂♂ 7 ♀♀, incl. pair in copula), sweeps, *Juncus effusus*, 19.vii.2004, 1 ♀, sweeps, *Scirpus cyperinus*, 19.vii.2004, 2 ♂♂ 4 ♀♀, sweeps, *Carex stipata stipata*, 19.vii.2004, 1 ♂ 3 ♀♀, 20.vii.2004, 2 ♂♂ 6 ♀♀, 9.vii.2005, 1 ♀, 1.viii.2005, 3 ♂♂ 2 ♀♀ (1 ♂ genit. prep.), 25.vi.2009, 1 ♂, sweeps, mostly *Carex stipata stipata*, 26.vi.2007, 9 ♂♂ 13 ♀♀, 13.vii.2007, 1 ♂ 2 ♀♀ (CNCI), K. N. Barber leg.; Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 19 ♂♂ 21 ♀♀ (2 ♂♂ 2 ♀♀ genit. prep., 2 ♀♀ photographed alive), 12.vii.2010, 4 ♂♂ 2 ♀♀ (1 ♂ 1 ♀ genit. prep.); same locality but 46°31.48'N 84°17.36'W, sweeping graminoid vegetation, 7.vii.2010, 1 ♂, sweeping, mostly *Scirpus microcarpus*, 7.vii.2010, 3 ♂♂ (1 ♂ genit. prep.), all J. Roháček leg. (all SMOC); S[ault] S[te.] Marie, nr. Greenwood P[ublic] S[chool], 46°34.1'N 84°21.2'W, sweeps, trail and railside vegetation, 17.vi.1999, 3 ♂♂ 4 ♀♀; S[ault] S[te.] Marie, Kinsmen Pk., 46°35.5'N 84°16.6'W, sweeps, trailside graminoids in mixed forest, 7.viii.1997, 1 ♀; S[ault] S[te.] Marie, Landslide Rd., Coldwater Ck. floodplain, 46°33.8'N 84°16.6'W, sweeps, mostly *Carex* sp., 7.viii.1997, 2 ♂♂ 3 ♀♀, sweeps/pooter, *Calamagrostis canadensis*, 7.viii.1997, 1 ♂ 2 ♀♀; S[ault] S[te.] Marie, Sault Coll[lege] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, trailside grasses, *Acer/Betula*, 25.vii.1997, 1 ♀, sweeps, mixed meadow veg., 25.vii.1997, 3 ♀♀; S[ault] S[te.] Marie, 2nd Line E, 46°32.3'N 84°16.6'W, sweeps, graminoids in open meadow, 26.vi.1999, 1 ♂, sweeps, trailside grasses, 26.vi.1999, 3 ♀♀; S[ault] S[te.] Marie, Hwy #17 city limits, 46°36.58'N 84°17.83'W, sweeps, *Calamagrostis canadensis*, in wet area, 16.viii.2004, 2 ♂♂ 5 ♀♀, sweeps, *Calamagrostis canadensis*, in wet area, 13.viii.2008, 3 ♀♀, sweeps, mostly *Carex/Calamagrostis* in wet area, 16.viii.2004, 3 ♀♀, 23.viii.2004, 4 ♂♂ 6 ♀♀ (1 ♂ genit. prep.), sweeps, mostly *Carex/Calamagrostis* in wet area, 19.vii.2008, 3 ♂♂ 3 ♀♀, sweeps, *Carex/Calamagrostis*, in wet area, 13.viii.2008, 1 ♀; same locality but 46°36.62'N 84°17.85'W, sweeps, *Carex gynandra* in alder thicket, 4.vii.2016, 2 ♀♀, all K. N. Barber leg. (all CNCI); ~10 km W S[ault] S[te.] Marie, Airport Rd., airport entrance, 46°29.7'N 84°29.2'W, sweeps, mowed

grass, 1.viii.1999, 3 ♀♀, 19.vi.2000, 1 ♂ 3 ♀♀, 30.vi.2002, 1 ♂ 11 ♀♀ (CNCI), 8.vi.2001, 31 ♂♂ 32 ♀♀ (UBCZ, UCRC, UGCA, WFBM 4 ♂♂ 6 ♀♀ each; SMOC 4 ♂♂ 4 ♀♀, CNCI 11 ♂♂ 4 ♀♀, 1 ♂ genit. prep. & wing illustration, 1 ♂ 2 ♀♀ genit. prep.); ~10 km W [Sault] [S[te.]] Marie, Airport Rd., 46°29.0'N 84°29.2'W, sweeps, grasses in dry, sandy ditch, 25.vii.1999, 2 ♀♀; same locality but 46°29.9'N 84°28.9'W, natural gas r[igh]t-of-way, sweeps, low veg. sandy area, 1.vii.1999, 3 ♀♀, all K. N. Barber (all CNCI); same locality but 46°29.72'N 84°28.96'W, natural gas r[igh]t-of-way, sweeps, mostly *Scirpus/Calamagrostis*, 4.viii.2004, 4 ♂♂ 2 ♀♀, sweeps, mostly ferns, *Equisetum arvense*, 23.vii.2009, 1 ♀, sweeps, graminoids, *Equisetum*, herbs, 5.viii.2009, 1 ♂ 3 ♀♀, K. N. Barber leg. (CNCI), sweeps, graminoids, composites, *Equisetum*, *Rubus*, ferns, 14.vii.2010, 6 ♂♂ 8 ♀♀, K. N. Barber leg. (CNCI), 12.vii.2010, 14 ♂♂ 11 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 4 ♀♀ genit. prep.); MacIntyre Road, north of Sault Ste. Marie, 46°37.403'N 84°18.320'W, sweep, roadside, 23.vii.2011, 4 ♀♀, J. E. Swann & D. R. Edwards (BDUC); Searchmont, N Hwy #552, 46°50.3'N 84°04.4'W, sweeps, roadside sedges/grasses, 10.vii.1998, 1 ♀; same locality but 46°51.3'N 84°02.4'W, sweeps, graminoids around gravel pit, 24.vii.1998, 1 ♀, both K. N. Barber leg.; 12.4 km NNE Searchmont, mi.10 Whitman Dam Rd., herb/grass meadow by Goulais R., 23.vi.1986, 2 ♀♀, 3.vii.1986, 1 ♀, D. J. M. Harvey leg., 23.vi.1986, 11 ♂♂ 13 ♀♀, K. N. Barber leg. (all CNCI); 18 km NNE Searchmont, mi.15 Whitman Dam Rd., grassy access road, 19.vi.1986, 1 ♀, 24.vi.1986, 1 ♀, 10.vii.1986, 2 ♀♀, 29.vi.1987, 2 ♀♀; ~18.8 km NNE Searchmont, Goulais River WS [Watershed], ~mi.15 Whitman Dam Rd., 46°55.7'N 83°56.2'W, sweeps, jackpine plantation, 29.vii.1999, 1 ♀, all K. N. Barber leg.; Sioux Narrows, 25.vi.1960, 2 ♀♀ (1 ♀ genit. prep.), Kelton & Whitney leg. (all CNCI); 20 km SW Smith's Falls, sweeping meadow, 7.viii.1992, 2 ♂♂ 1 ♀, T. A. Wheeler leg. (LEMQ 0039327, -32, -33); ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, *Equisetum fluviatile* in wet ditch, 19.vii.2009, 2 ♀♀, sweeps, ditchside *Equisetum* spp. [including *E. fluviatile*], grasses, herbs, 19.vii.2009, 8 ♂♂ 10 ♀♀, 8.vii.2012, 11 ♂♂ 11 ♀♀, K. N. Barber leg.; S[outh] March, 31.vii.1968, 1 ♂, J. R. Vockeroth leg. (all CNCI); Thunder Bay Distr., Stanley, roadside nr. oaks, sweep, 23.vi.2001, 6 ♂♂ 2 ♀♀, S. A. Marshall leg. (DEBU 00169950, -53-55, -60, -61, -44, -59); Thunder Bay District, Stanley Cemetery Prairie, 4.4 km SE Kakabeka Falls, grassy field [*Festuca hallii*], sweep, 27.vi.1998, 1 ♂ 5 ♀♀, Oldham & Bakowsky leg. (DEBU 00155001, -05, -06, -09, -11, -12); 0.4 km S Stonecliffe, Pine Valley Rd. @ RR crossing, 46°11.9'N 77°52.8'W, sweeps, graminoids, 9.vii.2001, 9 ♂♂ 14 ♀♀, K. N. Barber leg.; Sydney Field Sta., nr. Foxboro, 8.vii.1970, 4 ♂♂ 12 ♀♀, J. F. McAlpine leg. (all CNCI); Algoma District, Thessalon, 12.vi.1965, 1 ♂ 1 ♀, K. P. Butler leg. (LEMQ); Thessalon, 15.vi.1963, 1 ♀, R. G. Brumpton leg. (DEBU); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp., 5.vii.2010, 1 ♂, 17.vii.2010, 2 ♂♂ 9 ♀♀, K. N. Barber leg. (CNCI), sweeping graminoids and *Equisetum* spp. on muddy shore, 5.vii.2010, 1 ♀, J. Roháček leg. (SMOC, genit. prep.); ca. 100 km W Thunder Bay at Portage Bay Rd., swept along road, 11.vii.1992, 1 ♂ 4 ♀♀, T. A. Wheeler leg. (LEMQ 0039310, -365, -373, -374, -382); ~29 km SW Timmins, 48°19.12'N 81°44.79'W, sweeps, *Carex* spp./*Calamagrostis*, 18.vii.2009, 3 ♂♂ 7 ♀♀; ~25 km W Upsala, 49°08.83'N 90°48.20'W, sweeps, wet area, mostly *Calamagrostis canadensis*, 30.vii.2008, 4 ♂♂ 6 ♀♀, all K. N. Barber leg. (all CNCI); Waubamic [sic Waubamik], 14.vi.1915, 2 ♂♂; Waubamic [sic Waubamik], [-].vi.1915, 2 ♀♀, [-].vii.1915, 2 ♂♂ 4 ♀♀, H. S. Parish leg. (all USNM); ~5 km S Wawa, Kinniwabi Pines Motel, 48°46.93'N 86°37.07'W, sweeps, mowed grasses on stable sand, 17.vi.2003, 1 ♀, K. N. Barber leg. (CNCI); 100 km S Wawa, sweeping grass/*Typha* along road, 30.vi.1992, 1 ♂ 8 ♀♀, T. A. Wheeler leg. (LEMQ 0039296-301, -306, -371, -372); White River, 48°35.5'N 85°16.6'W, sweeps, mixed grasses edge of parking lot, 9.vii.1999, 1 ♂ 2 ♀♀; White River, "Black's Cabin", 48°36.71'N 85°15.61'W, sweeps, mowed grass/herbs on stable sand, 14.vi.2003, 2 ♂♂, all K. N. Barber leg. (all CNCI); 60 km S White River, sweeping grass/*Typha* along road, 30.vi.1992, 1 ♀, T. A. Wheeler leg. (LEMQ 0039311); Wiarton, 1.vii.1962, 1 ♀, G. Thorpe leg. (CNCI); Wolf Is., 25.vii.1980, 1 ♂ 2 ♀♀, S. Beierl leg. (DEBU); Wolf Lake env. nr. Dorset, peat-bog, sweeping over peat-bog meadow, 5.viii.1994, 1 ♀, J. Roháček leg. (SMOC). **PRINCE EDWARD ISLAND:** Eglinton Bay, sweep vegetation, 20.vii.1996, 3 ♂♂ 2 ♀♀, N. deVille leg. (LEMQ 0039211-13, -218, -356); Greenwich N. P., 46°26.6'N 62°41.7'W, sweep open areas on trail and parking area, 3.viii.2004, 2 ♂♂ 3 ♀♀, S. Boucher leg. (LEMQ 0040462-65, -91, 1 ♂ genit. prep.), 3.viii.2004, 1 ♀, V. Dion leg. (LEMQ 0040522); Red Point, 10.viii.1963, 1 ♀, R. L. Randell leg. (LEMQ 0040478). **QUEBEC:** Aylwin Twp., between Aylwin Stn. & Marks Crossing, ~46°00'00"N 76°05'00"W, mixed forest with jack pine, sandy soil, 21.vi.2012, 1 ♂ 2 ♀♀, O. Lonsdale leg.; Beechgrove, 27.vi.1984, 2 ♂♂ 2 ♀♀, B. M. Bissett leg., 23.vi.1951, 4 ♂♂ 8 ♀♀, J. F. McAlpine leg., 7.vi.1955, 1 ♂, R. Lambert leg., 7.vi.1955, 1 ♂ 1 ♀, D. G. F. Cobb leg.; Beechgrove, 45°39'N 76°08'W, 29.vi.1962, 35 ♂♂ 33 ♀♀ (1 ♀ genit. prep.), 27.vi.1984, 1 ♂, 24.vi.1988, 3 ♂♂ 2 ♀♀, J. R. Vockeroth leg.; Chandler, 2.vii.1971, 1 ♀, B. V.

Peterson leg. (all CNCI); Charlevoix, Ste-Aimé-des-Lacs, 47°41'N, 70°18.5'W, sweep vegetation, 5.viii.2001, 2 ♂♂ 1 ♀, S. Boucher leg. (LEMQ 0039161, -62, -68); Ferland-et-Boileau belvédère du Lac Ha! Ha!, 47°59.85'N 70°46.7'W, 518 m, sweep, 16.viii.2004, 1 ♀, M. Giroux leg. (LEMQ 0040280); Gaspésie, l'Anse à Griffon, near Parc Forillon, 48°55'N 64°19'W, sweep, 31.vii.2001, 2 ♂♂ 2 ♀♀ (LEMQ 0039176, -77, -80, -81); Gaspésie, Parc Forillon, Plage de Penouille, 48°51'20.9"N 64°24'45.3"W, sweep along trail, 16.viii.2006, 2 ♂♂ 3 ♀♀ (LEMQ 0040302, -03, -05, -06, -08), all S. Boucher leg.; Gaspé, Forillon N. P., Cap des Rosiers, 48°50'N 64°12'W, sweep grass, 6.viii.2000, 2 ♀♀, H. Varady-Szabo leg. (LEMQ 0039260, -61); Gaspé, Plage Haldimand, 48°47'N 64°22'W, sweep vegetation, 4.viii.2000, 6 ♂♂ 13 ♀♀, D. Raby leg. (LEMQ 0039220–223, -226–233, -241, -242, -246, -379, -403, -409, -410), 8 ♂♂ 18 ♀♀, H. Varady-Szabo leg. (LEMQ 0039357, -367–369, -375–378, -380, -381, -384–389, -392–399, -401, -405); Gaspé, Haldiman[d], St.-Jean R., 48°47'N 64°22'W, sweep salt marsh vegetation, 31.vii.2000, 1 ♀, H. Varady-Szabo leg. (LEMQ 0039383); Gaspésie, near Routhierville, 48°10.9'N 67°08.8'W, sweep picnic area, 4.viii.2001, 1 ♂ 2 ♀♀, S. Boucher leg. (LEMQ 0039184, -82, -83); Gatineau Pk., Harrington Lk., 10.vi.1954, 1 ♀, E. E. Sterns leg., 12.vi.1954, 1 ♂ 1 ♀, 16.vi.1954, 1 ♀, 22.vi.1954, 1 ♀, H. J. Huckel leg., 3.vii.1963, 17 ♂♂ 10 ♀♀, J. R. Vockeroth leg.; Gat[ineau] Nat. Pk., Ramsey Lake, 16.vii.1982, 4 ♂♂ 3 ♀♀ (1 ♂♂ genit. prep.); Gat[ineau] Nat. Pk., Ridge Road, 16.vii.1982, 1 ♀, all H. C. W. Walther leg. (all CNCI); Godbout, dunes near ferry dock, swept, eclector. (Universität Bielefeld, X988), 24.viii.1994, 1 ♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); Ile Bonaventure, 3 km from Côte de Percé, 48°30'N 64°10'W, sweep grass, 28.vii.2000, 21 ♂♂ 17 ♀♀, A. Thibault leg. (LEMQ 0039205, -206, -209, -210, -244, -264–283, -285–288, -290–295, -303–305), 15 ♂♂ 10 ♀♀, H. Varady-Szabo leg. (LEMQ 0039224, -225, -234–240, -243, -245, -247–253, -255, -256, -258, -259, -335, -337, -340); Îles de la Madeleine, Cap-aux-Meules, 47°22.04'N 61°52.26'W, sweep picnic area on coast of Cap-aux-Meules, 8.viii.2004, 1 ♀, S. Boucher leg. (LEMQ 0040300); Îles de la Madeleine, Cap-aux-Meules, Chemin Chiasson, 47°21.7'N 61°55.86'W, sweep alfalfa field by road, 6.viii.2004, 2 ♂♂, V. Dion leg. (LEMQ 0040297, -99); Îles de la Madeleine, Cap-aux-Meules, Chemin du Chiasson, 47°21.7'N 61°55.86'W, sweep field along road, 6.viii.2004, 6 ♂♂ 4 ♀♀ (LEMQ 0040511–20); Îles de la Madeleine, Cap-aux-Meules, L. Aucoin nr. Baie du Cap-Vert, 47°24.57'N 61°52.44'W, sweep field, 9.viii.2004, 1 ♀ (LEMQ 0040509); Îles de la Madeleine, Cap-aux-Meules, Havre-Aubert, “collines de la Demoiselle”, 47°14.17'N 61°51.43'W, sweep, 5.viii.2004, 5 ♀♀ (LEMQ 0040282, -283, -527, -528, -530), all S. Boucher leg.; Îles de la Madeleine, Havre-aux-Maisons, Chemin de la Pointe Basse, 47°23.93'N 61°48.65'W, sweep grass slope, 8.viii.2004, 1 ♂, V. Dion leg. (LEMQ 0040508), 1 ♀, S. Boucher leg. (LEMQ 0040309); Îles de la Madeleine, road 199 between Havre-aux-Maisons and Point-aux-Loups, 47°30.36'N 61°44.14'W, sweep *Ammophila* at dunes, #6, 9.viii.2004, 1 ♀, S. Boucher leg. (LEMQ 0040521); Îles de la Madeleine, Île de la Grande Entrée, Chemin du Bassin Ouest, 47°32.96'N 61°32.64'W, sweep field at road, 9.viii.2004, 4 ♂♂ 7 ♀♀, V. Dion leg. (LEMQ 0040479, -80, -82–90), sweep field along road, 9.viii.2004, 3 ♂♂ 8 ♀♀, S. Boucher leg. (LEMQ 0040492–496, -498, -499, -501, -504, -506, -507); Îles de la Madeleine, Sentiers au Havre-Aubert, Parc des bois brûlés, 47°14.03'N 61°54.99'W, 5.viii.2004, 2 ♀♀ (LEMQ 0040281, -535), S. Boucher leg., 3 ♂♂ 6 ♀♀ (LEMQ 0040268, -87–94), V. Dion leg.; Lac Brulé, swept from “rugosa”, 25.vii.1947, 1 ♀, O. Peck leg.; Lac Phillippe, 45°37'N 76'W, 7.vii.1965, 3 ♂♂ 5 ♀♀, J. R. Vockeroth leg. (all CNCI); Lac Roddic, 16 km S Maniwaki, 22.vi.1991, 3 ♂♂ 3 ♀♀, M. Barták leg. (MBPC, 1 ♂ genit. prep.); Gatineau Co., 3 mi SE Lake Duncan, near Masham, 8.vii.1979, 1 ♂, A. C. Pont leg. (BMNH); Laniel, 1.vii.1944, 2 ♂♂ 2 ♀♀, A. R. Brooks leg., 1–3.vii.1963, 1 ♂, W. Gagne leg. (CNCI); Laurentide Pk., 6.viii.1956, 1 ♀, A. H. Sturtevant leg. (USNM); La Verendrye P. Pk., mi.139, Rte.58, 28.vi.1965, 1 ♂ 2 ♀♀, D. M. Wood leg. (CNCI); Gatineau Co., Masham Township, 27.vii.1995, 2 ♂♂ 2 ♀♀, E. Ikeda leg. (LEMQ 0039361, -62, -90, -91); Meach [sic Meech] Brook, Old Chelsea, 24.vi.1980, 3 ♂♂ 2 ♀♀, K. N. Barber leg. (DEBU, 1 ♂ genit. prep.); Newport, 14.viii.1983, 2 ♂♂, B. M. Bissett leg. (CNCI); Old Chelsea, 14.vi.1980, 1 ♂, K. N. Barber leg. (DEBU); Old Chelsea, 24.vi.1956, 1 ♀; Old Chelsea, Summit King Mt., 1150', 18.vii.1961, 1 ♀, both J. R. Vockeroth leg. (both CNCI); Terrebonne Co., Lac Carre, Lot-31, Range 8, 19–23.viii.1968, 1 ♂, W. Boyle & R. Lalonde leg. (LEMQ); Saguenay, Monts Valin, trail to Pic de la Tête de Chien, 48°34.89'N 70°52.23'W, sweep, 20.viii.2004, 1 ♀, M. Giroux leg. (LEMQ 0040473). SASKATCHEWAN: Christopher Lake, 11.vii.1959, 1 ♀, A. & J. Brooks leg. (CNCI); 50 mi E Regina, 1.vii.1980, 1 ♂, S. A. Marshall leg. (DEBU, genit. prep.); Sturgis, 1.vii.1955, 51°56'N 102°32'W, 1 ♀, J. R. Vockeroth leg. (CNCI). UNITED STATES OF AMERICA: GEORGIA: Rabun Co., Addie Branch, E. Fork Chattooga River, 2400', 1.viii.1957, 1 ♂; Rabun Co., Pine Mt., 1500', 1.viii.1957, 1 ♂, both J. G. Chillcott leg.; Rabun Bald, 9.viii.1957, 1 ♂ 1 ♀, W. R. Richards leg. (all CNCI). MAINE: Hancock Co., 800 m from Bass Harbor Head lighthouse, sweep wet clearing, 6.viii.2006, 1 ♀, J. Mlynarek leg. (LEMQ 0040525);

Caratunk, 2.viii.1950, 1 ♂ 1 ♀; Chebeag[ue] Is., 17.vii.1962, 1 ♂ 4 ♀♀, all A. H. Sturtevant leg. (all USNM); Lincoln Co., East Boothbay, 43°51'N 69°35'W, sweep stream at roadside, 9.viii.2000, 1 ♂ 3 ♀♀, T. A. Wheeler leg. (LEMQ 0039341, -46-48), 2 ♀♀, J. Savage leg. (LEMQ 0039349, -50), 1 ♀, J. Forrest leg. (LEMQ 0039406); Eddington, 11.viii.1956, 1 ♂ 1 ♀; Mt. Desert, 19.vii.1962, 2 ♀♀, all A. H. Sturtevant leg.; Pittston, 3.viii.1930, 1 ♂; Seal Harbor, 29.vii.1930, 1 ♀, both A. L. Melander leg. (all USNM); Seal Harbor, Mt. Desert, 13.viii.1958, 3 ♀♀, J. R. Vockeroth leg. (CNCI); Weld, 15-17.viii.1940, 2 ♂♂ 1 ♀, A. Stone leg. (USNM, 1 ♀ with Sabrosky det. as "*gracilis* auctt."); Hancock Co., Winter Harbor-Schoodic, Diptera Blitz, Lot #32, 15-16.vii.2006, 1 ♀, [no collector] (CLEV). MASSACHUSETTS: Middlesex Co., Belmont, Rock Meadow, 24.vii.1981, 2 ♀♀, N. E. Woodley leg.; Middlesex Co., Lincoln, Malaise trap, 10.viii.1982, 1 ♂ 1 ♀, E. T. Armstrong leg.; Pelham, 10.vii.1954, 2 ♀♀ (1 ♀ with det. as *Anthomyza gracilis*), A. H. Sturtevant leg. (all USNM). MICHIGAN: Brevort, 2.viii.1936, 1 ♀; Champion, 27.vi.1940, 3 ♂♂ 1 ♀, all C. W. Sabrosky leg.; Cusino, 26-27.vi.1940, 2 ♀♀, T. F. Boyce leg. (all USNM, all with S. W. Frost det. as *Anthomyza gracilis*); Cheboygan Co., 25.vi.1934, 1 ♂, Dobrovolny leg. (USNM, with Steyskal det. as *Anthomyza gracilis*); Cheboygan Co., 24.vii.1955, 1 ♂, W. J. Hanson leg., 1.viii.1933, 1 ♀, 29.vi.1936, 1 ♀, H. B. Hungerford leg., 1 ♀, H. Leighton leg., 26.vii.1935, 1 ♀, L. R. Penner leg., 11.vii.1933, 2 ♀♀, H. Peters leg. (SEMC), 6.vii.1933, 1 ♀, H. Peters leg. (USNM), 4.vii.1940, 1 ♂ 2 ♀♀ (1 ♂ genit. prep.), 22.vii.1940, 1 ♀, R. I. Sailer leg. (SEMC); Cheboygan Co., Douglas Lake, 1.viii.1950, 1 ♀, R. I. Sailer leg. (USNM); Douglas Lake, 9.vii.1931, 2 ♀♀, C. W. S[abrosky] leg. (with S. W. Frost det. as *Anthomyza gracilis*), 18.vii.1943, 1 ♂, C. W. Sabrosky leg.; Houghton Co., 11.viii.1953, 1 ♀, R. R. Dreisbach leg.; Hunt Ck. Exp. Sta., nr. Lewiston, 20.vii.1942, 3 ♂♂ 1 ♀, C. W. Sabrosky leg. (all USNM); Ironwood, 46°27.9'N 90°10.1'W, sweeps, grasses/herbs, 22.vii.1999, 2 ♂♂ 16 ♀♀, K. N. Barber leg. (CNCI); Keweenaw Co., 26.vi.1955, 1 ♂, R. R. Dreisbach leg.; Keweenaw Co., Isle Royale, 15., 17.vii.1938, 1 ♂, 16., 18.vii.1938, 1 ♂, G. Steyskal leg.; Midland Co., 15.vii.1947, 1 ♂; Otsego Co., 24.vii.1955, 1 ♂, both R. R. Dreisbach leg.; Rapid City, 10.vii.1941, 1 ♀, C. W. Sabrosky leg. (all USNM); Sault Ste. Marie, 27.vii.1960, 1 ♀, Kelton & Whitney leg. (CNCI). MINNESOTA: Eaglesnest, 11.vii.1952, 1 ♀ (INHS 40,086), 30.vi.1959, 1 ♀ (INHS 40,090), 4.viii.1958, 1 ♂ 2 ♀♀ (INHS 40,091, -116, -117), 10.viii.1957, 1 ♀ (INHS 40,093), 11.vii.1959, 2 ♀♀ (INHS 40,096, -110), 3.ix.1958, 1 ♀ (INHS 40,097), 22.vii.1957, 1 ♀ (INHS 40,101), 6.vii.1959, 1 ♀ (INHS 40,104), 30.vii.1959, 2 ♀♀ (INHS 40,114, -115), 13.vii.1957, 2 ♀♀ (INHS 40,118, -120), 12.vii.1957, 1 ♂ 1 ♀ (INHS 40,123, -124), 28.vi.1957, 2 ♀♀ (INHS 40,125, -127), 20.viii.1958, 7 ♀♀ (INHS 40,132-138), 23.vii.1958, 1 ♂ 1 ♀ (INHS 40,139, -141), 30.vii.1958, 1 ♂ 4 ♀♀ (INHS 40,145, -148-150, -151), 1.vii.1957, 1 ♂ 8 ♀♀ (INHS 40,152-160), all W. V. Balduf leg. (all part of mixed series [with *A. furvifrons*] with Sabrosky det. as *Anthomyza gracilis*); Stearns Co., 1 mi E Saulk Center, 4.vii.1994, 1 ♀, D. E. Hansen leg. (CNCI); Clearwater Co., #15, Sucker Lake, 3 mi W Lake Itasca P. O., 1550', 7.vii.1970, 1 ♀, G. W. Byers leg. (SEMC); Aitkin Co., 14 mi W Willow River, 46.334°N 93.096°W, 8.vii.1993, 1 ♀, 19.vii.1995, 2 ♀♀, 1.vii.1995, 2 ♀♀, 28.vii.1995, 4 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), 29.vi.1997, 1 ♂, 5.vii.1997, 1 ♀, 20.vii.1997, 1 ♀, 3.viii.1997, 1 ♂, D. E. Hansen leg. (CNCI). NEW HAMPSHIRE: Alstead, 4.viii.1956, 1 ♂, A. H. Sturtevant leg.; Benton, 6.vii.1931, 1 ♂, A. L. Melander leg.; Grafton Co., Easton, 24.vi.1976, 1 ♂, F. C. & B. J. Thompson leg.; Franconia, 6.vii.1936, 1 ♂, A. L. Melander leg. (all USNM); Franconia, [no date], 2 ♀♀, Mrs. Slosson leg. (USNM, 1 ♀ with det. as *Anthomyza gracilis*), 2 ♀♀, Mrs. A. T. Slosson leg. (AMNH Ac. 26226, with detts. as *Anthomyza gracilis* and *A. flavipes*); Gorham, 15.vii.1957, 2 ♀♀, J. R. Vockeroth leg.; Mt. Madison, Dolly Copp Campground, 8-9.vii.1986, 1 ♂ 2 ♀♀ (1 ♀ genit. prep.), J. M. & S. H. Cumming leg.; Mt. Washington, el. 5000', 13.viii.1951, 1 ♀, G. S. Walley leg. (all CNCI); Mt. Washington, tundra at summit, 29.vii.1961, 1 ♀, W. W. Wirth leg. (USNM); Mt. Washington, Summit Flats, 5900-6200', 2.viii.1954, 1 ♀, Becker, Munroe & Mason leg. (CNCI); Peterborough, 10.vi.1950, 2 ♂♂, E. C. Zimmermann leg. (BMNH, 1 ♂ genit. prep.); Rindge, 27.vi.1979, 1 ♂, B. Mather leg. (MEMU); Coos Co., 1 km E Stark, 44°36'N 71°24'W, sweep along Ammonoosuc R., 8.viii.2000, 1 ♀, J. Savage leg. (LEMQ 0039408); Grafton Co., White Mountain N. Forest, Kancamagus Pass, 44°01'N 71°29'W, sweep, 10.viii.2000, 1 ♂ 1 ♀, J. Forrest leg. (LEMQ 0039400, -407); White Mts., Dolly Copp, 11.vii.1931, 4 ♂♂ 2 ♀♀, A. L. Melander leg. (USNM). NEW YORK: Adirondacks, Avalanche Trail, 30.vii.1929, 1 ♀, A. L. Melander leg. (USNM); Adirondack Pk., Blue Mountain, 43°52.5'N 74°25.8'W, sweep grasses at summit, 31.vii.2002, 1 ♂, J. Forrest & T. A. Wheeler leg. (LEMQ 0040379); Lake Placid, 28.vii.1929, 2 ♂♂, A. L. Melander leg. (USNM); Lake Placid, 2000', 19.vii.1962, 2 ♂♂ 2 ♀♀; Franklin Co., Paul Smiths, 20.vii.1962, 1 ♀, all J. R. Vockeroth leg.; St. Lawrence Co., ~25 km SE S. Colton, 44°19.07'N 74°43.42'W, sweeps, mostly *Carex*, edge of wetland, 27.vii.2006, 6 ♂♂ 4 ♀♀ (2 ♂♂ genit. prep.), K. N. Barber leg. (all CNCI); Schoharie Co., 32, 6.vii.1974, 1 ♀, P. Gargiullo leg. (UGCA); Whiteface Mt., 4600-4872', 19.vii.1962, 1 ♂ 1 ♀, J. R. Vockeroth leg.; Whiteface Mt., summit, 5700', 19.vii.1962, 1 ♀, J. G. Chillcott leg. (all

CNCI); Wilmington, 30.vi.1922, 1 ♂, J. M. Aldrich leg. (USNM). **NORTH CAROLINA:** Clingman's Dome, 5.viii.1957, 1 ♂; Highlands, 31.v.1957, 1 ♂, 15.vi.1957, 1 ♂, 12.viii.1957, 1 ♀, 13.viii.1957, 2 ♂♂ 1 ♀, 21.viii.1957, 1 ♂ 1 ♀, 22.viii.1957, 2 ♀♀, all W. R. Richards leg.; Highlands, 3800', 17.viii.1957, 1 ♂ 1 ♀, 21.viii.1957, 1 ♀; Highlands, Horse Cove Bog, 3000', 18.vii.1957, 2 ♂♂, all J. G. Chillcott leg.; Highlands, Whiteside Mt., 21.viii.1957, 1 ♀, C. J. Durden leg.; Highlands, Whiteside Cove, 18.viii.1957, 6 ♂♂ 19 ♀♀ (1 ♂ genit. prep.), W. R. Richards leg.; Highlands, Whiteside Cove, 2600', 17.viii.1957, 1 ♀, 2800', 11.viii.1957, 1 ♂ 1 ♀; Mollie Gap, Blue Ridge Pkwy., Heintooga Road, 5350', on blossoms *Smilacina* sp., 8.vi.1965, 6 ♂♂ 2 ♀♀ (1 ♀ genit. prep.), all J. G. Chillcott leg.; Haywood Co., GSMNP [Great Smoky Mountains National Park], Purchase Knob, 17S 312178E 3939620N, 1463 m, forest edge, hillside between house & Ferguson Cabin, 11.vi.2008, 1 ♀, B. J. Sinclair leg. (all CNCI); Avery Co., Pisgah N. Forest, Grassy Ridge Bald, 1863 m, 36.10246°N 82.08066°W, sweep grassy bald, (GRAS S3), 26.v.2008, 1 ♀, T. A. Wheeler leg. (LEMQ). **PENNSYLVANIA:** Bradford Co. Wilawana, 21.vii.1991, 1 ♀, R. H. Crandall leg. (LACM ENT 329117). **TENNESSEE:** Blount Co., SW corner of Cades Cove, Great Smoky Mts. N. Pk., 23.v.2001, 1 ♂ 6 ♀♀ (1 ♀ genit. prep.), swept from marsh vegetation, 24.v.2001, 2 ♀♀ (1 ♀ genit. prep.), swept from *Eleocharis*, 24.v.2001, 1 ♂ (genit. prep.), all B. A. Foote leg. (all CMNH); Gregory Bald, GSMNP [Great Smoky Mts. N. Pk.], sweeps, 1.vi.1979, 1 ♂ 1 ♀, M. J. Sharkey leg. (DEBU); Colke [sic Cocke] Co., Hartford, 24.vi.1986, 1 ♀, J. D. Pinto leg. (CSCA); Indian Gap, 24.vii.1957, 1 ♀, W. R. Richards leg. (CNCI). **VERMONT:** Island Pond, 17.vi.1975, 1 ♂, H. J. Teskey leg. (CNCI). **WEST VIRGINIA:** Blackwater St. Pk., daisy sweep, 3.vii.1986, 1 ♂ 2 ♀♀, Davis leg. (DEBU, 1 ♂ genit. prep.). **WISCONSIN:** Columbia Co., Swan Lake, 4 mi E Portage, taken on *Andropogon* sp., 16.vii.1963, 3 ♂♂ 2 ♀♀, Stannard & Smith leg. (INHS 40,220–224); Washburn Co., T39N R12W B28, 28.vi.1953, 2 ♂♂, T39N R12W B32, 25.vi.1953, 1 ♂ 2 ♀♀, T39N R12W B32, 2.vii.1953, 1 ♂ 5 ♀♀, T39N R12W B32, 3.vii.1953, 1 ♀, T39N R12W B32, 4.vii.1953, 1 ♂, T39N R12W B32, 10.vii.1953, 1 ♀, T39N R13W B30, 4.vii.1953, 1 ♂, R. H. Jones leg. (USNM).

Other material examined (not included in type series). **CANADA:** **MANITOBA:** Aweme, 8.viii.1918, 1 ♀ 1 spec., N. Criddle leg. (CNCI, 1 ♀ missing wings, 1 spec. missing abdomen and most legs); Aweme, Criddle farm, 49°42.5'N 99°36.1'W, sweep grasses near house, 8.vii.2000, 1 spec., V. Crecco leg. (LEMQ 0039503, abdomen missing); 5 mi SW Shilo, swept from open prairie, 11.vii.1958, 1 ♂, J. G. Chillcott leg. (CNCI, headless). **ONTARIO:** Belwood, 23.vi.1968, 1 ♂ 1 spec., D. H. Pengelly leg. (DEBU, 1 ♂ bleached, 1 spec. tip of abdomen missing); Blackburn, 12.vii.1954, 1 ♂ (headless); Blackburn, Mer Bleue, 27.vi.1955, 2 ♀♀ (both headless) all W. R. M. Mason leg. (all CNCI); Bruce Peninsula N. P., Singing Sands, 45°11.6'N 81°34.7'W, sweeps, *Agropyron/Calamagrostis*, 5.vii.1998, 1 ♀, K. N. Barber leg. (DEBU, T7+S7 deformed); ~66 km NNW Elliot Lake, Rocky Island Lake, 46°50.82'N 83°08.76'W, 405 m, sweeping *Scirpus* sp. on dried shoreline, 4.vii.2010, 1 ♂, J. Roháček leg. (SMOC, without wings); Kenora Co., Kenora, UTM 183789, bur oak prairie sweep, 22.vi.1998, 1 spec. (abdomen missing), M. J. Oldham & W. D. Bakowsky leg.; Midland, 25.vi.1970, 1 ♀ (left wing missing, overglued), J. T. Huber leg. (both DEBU); Hald[imand]-Norfolk Reg., Manester Tract, 6 km NNW St. Williams, sandy field, sweep, 8.vi.2001, 1 ♀, M. Buck leg. (DEBU 00158331, wings missing); Pancake Bay Prov. Park, 46°57.74'N 84°42.63'W, sweeping *Ammophila breviligulata* on beach sand, 9.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC, both headless); Sault Ste. Marie, Finn Hill, 46°31.63'N 84°17.33'W, sweeping boggy meadows, mostly *Carex stipata stipata*, 7.vii.2010, 3 ♂♂, J. Roháček leg. (SMOC, used for molecular work, 1 ♂ genit. prep.); S[ault] S[te.] Marie, Sault Coll[ège] Outdoor Lab, 46°32.1'N 84°18.2'W, sweeps, mixed meadow veg., 18.vi.1998, 1 ♂, K. N. Barber leg. (CNCI, epandrium incompletely developed on left side); ~10 km W Sault Ste. Marie, Airport Rd., 46°29.72'N 84°28.96'W, natural gas r[igh]t-of-way, sweeping graminoids, composites, *Equisetum*, *Rubus*, ferns, 12.vii.2010, 1 ♀, J. Roháček leg. (SMOC, headless); Waubamic [sic Waubamik], Parry S[oun]d, 7.vii.1915, 1 ♀, J. M. Aldrich leg. (USNM, head & thorax crushed). **QUEBEC:** Beechgrove, 27.vi.1984, 1 ♂, B. M. Bissett leg. (CNCI, head crushed, left wing missing); Gaspesie, Parc Forillon, "Le castor", 48°50'30"N 64°14'25"W, sweep veg. near marsh, 16.viii.2006, 1 ♂, S. Boucher leg. (LEMQ 0040307, abdomen and wings dirty); Gatineau Pk., Harrington Lk., 3.vii.1963, 1 ♂, J. R. Vockeroth leg. (CNCI, headless); Grandes-Bergeronnes, 167 Route 138, 29.vi.1997, 1 ♂, N. Luth leg. (DEBU, dirty, wings tattered, genit. prep.). **UNITED STATES OF AMERICA:** **MAINE:** SW Harbor, 13.vii.1918, 1 spec. (abdomen missing, with det. as *Anthomyza gracilis*), C. W. Johnson leg.; SW Harbor, 14.vii.1918, 1 spec. (abdomen missing), [C. W. Johnson?] leg.; Weld, 21.viii.1952, 1 ♂ (missing legs), A. Stone leg. (all USNM). **MICHIGAN:** Cheboygan Co., 4.vii.1940, 1 ♀ (dirty), R. I. Sailer leg.; Cheboygan Co., 6.vii.1933, 1 ♀ (head and thorax damaged), H. Peters leg. (both SEMC); Cusino, 26–27.vi.1940, 1 ♀, T. F. Boyce leg. (USNM, left wing missing with other damage, abdomen glued to point, with S. W. Frost det. as *Anthomyza gracilis*). **MINNESOTA:** Clearwater Co., #15, Sucker Lake, 3 mi W Lake Itasca

P. O., 1550', 7.vii.1970, 1 ♀, G. W. Byers leg. (SEMC, bleached, right wing missing). **NEW HAMPSHIRE:** Alstead, 4.viii.1956, 1 ♀ (headless) 1 spec. (missing head & abdomen), A. H. Sturtevant leg.; White Mts., Dolly Copp, 11.vii.1931, 1 spec. (abdomen missing), A. L. Melander leg. (all USNM). **NEW YORK:** Adirondacks, Connerly Pond, 15.vii.1938, 1 ♀ (headless), A. L. Melander leg.; Lake Placid, 29.vii.1922, 1 ♂, J. M. Aldrich leg. (both USNM, dirty, wings missing or wrapped on pin). **TENNESSEE:** Gregory Bald, GSMNP [Great Smoky Mts. N. Pk.], sweeps, 1.vi.1979, 1 ♀, M. J. Sharkey leg. (DEBU, dirty, abraded).

Description. Male. Total body length 2.06–2.54 mm; general colour as in *A. furvifrons* but more densely and paler grey microtomentose (Fig. 520). Head more elongate than in all relatives, distinctly longer than high (Figs 520, 547), subquadrangular, with face strongly receding in profile and frons projecting in front of eye (Fig. 520), dark brown and yellow. Occiput dorsomedially slightly but distinctly concave, dark brown to black with distinct greyish microtomentum. Frons relatively narrow (Figs 521, 550), longer than in relatives, medially dull blackish brown (at most up to anterior third of frons), only frontal triangle dark grey microtomentose; anterior third or more of frons orange-yellow; orbits largely yellow and silvery white microtomentose, more posteriorly (behind posterior ors) gradually brownish-darkened and with silvery grey microtomentum. Frontal triangle narrow, reaching at most to midpoint of frons. Frontal lunule yellow, whitish microtomentose. Face, parafacialia and gena yellow to orange-yellow and mostly dull. Face very narrow, medially weakly sclerotized, more or less furrowed and somewhat darkened. Parafacialia relatively broad and (like gena) with silvery white microtomentum (most dense on vibrissal angle). Both parafacialia and gena with rather broad but relatively pale (dark yellow to ochreous) marginal stripe. Postgena ventrally yellow and whitish microtomentose, dorsally brown and greyish microtomentose merging with similar vestiture on occiput (Fig. 520). Mouthparts (including palpi) similarly coloured to those of *A. furvifrons*. Cephalic chaetotaxy (all macrosetae relatively short): pvt small, convergent, with apices meeting or crossed; vti, vte (sometimes shorter), oc (sometimes longer than others) and posterior ors subequal, longest of cephalic setae; 3 ors but only 2 long, widely spaced, middle ors slightly to distinctly shorter than posterior, and anterior ors reduced to setula (rarely somewhat enlarged); 1–2 pairs of medial microsetulae in the anterior third of frons; small setula behind vte not longer than postoculars, the latter (7–8) small, in single row; postgena with a few setulae and 2 (1 longer) usual posteroventral setae; vi about as long as middle ors but finer; subvibrissa very small, weak, slightly or not longer than foremost peristomal setula; only 3–4 fine peristomal setulae. Palpus slightly less clavate than that of *A. furvifrons* but similarly setose. Eye moderately convex, more elongate than in relatives, of almost pyriform outline (see Fig. 520), anteroventrally most widened, with longest diameter elongately oblique and 1.4–1.5 times as long as the shortest. Smallest genal height about 0.15–0.16 times as long as shortest eye diameter. Antenna with all segments yellow; 1st flagellomere flattened laterally, with very short white pilosity. Arista brown to dark brown including basal segments, 1.9–2.0 times as long as antenna, with cilia slightly longer than those on first flagellomere.

Thorax hardly narrower than head; mesonotum entirely blackish brown, pleural part of thorax usually brown except propleuron rarely yellow at least ventrally, sternal midline area also rarely yellow; mesonotum and pleurae (mostly) very densely pale grey (often with some bluish tinge) microtomentose and dull (Figs 520, 547). Thoracic chaetotaxy (all macrosetae relatively weak): 1 hu (slightly shorter than anterior npl) and 1–2 microsetae on humeral callus;

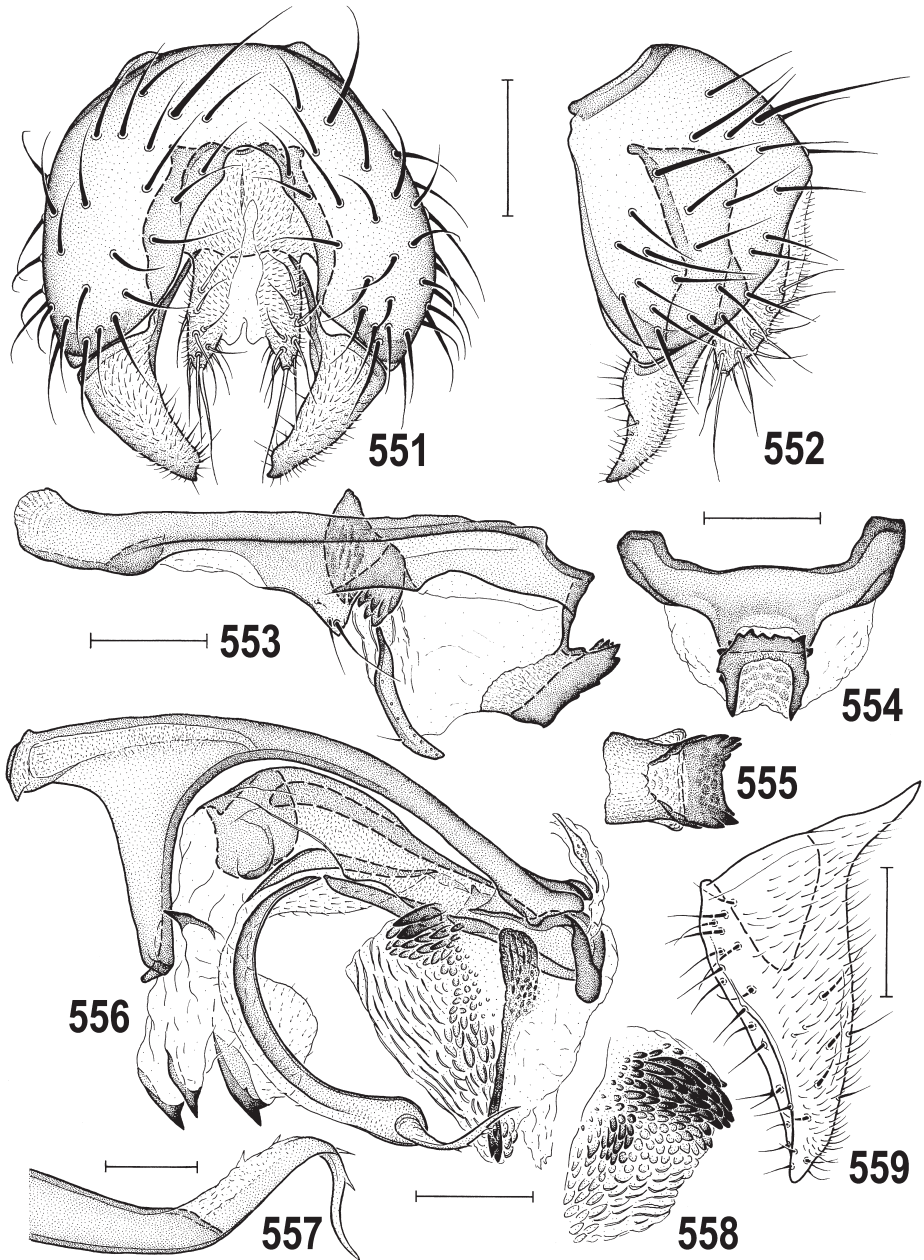


Figs 547–550. *Anthomyza vulgaris* sp. nov. and some of its habitats. 547 – bubbling female on *Carex* leaf laterally, body length ca. 2.8 mm (Canada: Ontario: Sault Ste Marie); 548 – pure growth of *Scirpus microcarpus* on exposed lake bottom (Canada: Ontario: Rocky Island Lake); 549 – graminoid vegetation on alvar near Misery Bay (Canada: Ontario: Manitoulin I.); 550 – anterior half of the same female as in Fig. 547, dorsally. Photo by J. Roháček.

2 npl (anterior longer); 1 small prs (shorter than hu); 1 sa (shorter than pa); 1 moderate pa; 2 postsutural dc (the shorter anterior about as long as or longer than anterior npl) and 5–8 dc microsetae in front of them, the hindmost dc microseta often longer than others; ac microsetae sparse, in 3–4 rows on suture, in 2 rows between anterior dc and usually no ac microseta beyond them; 2 sc, laterobasal sc very weak, about as long as but thinner than prs; apical sc subequal to posterior dc (both longest thoracic setae); 1 minute ppl; 2 long stpl (anterior usually slightly shorter) and 0–2 setulae in dorsal half of sternopleuron; its ventral part with 5–6 longer but pale setae. Scutellum rounded triangular, distinctly convex dorsally. Legs almost entirely brightly to light yellow, sometimes with shiny brownish darkening on base of cx_1 , only 1–2 terminal segments of all tarsi pale brown to brown. f_1 with ctenidial spine usually distinctly longer than (rarely equal to) maximum width of t_1 . Other pedal chaetotaxies as described for *A. furvifrons*. Wing (Fig. 525) long and narrow (usually slightly narrower than those of relatives), with pale brown veins and hyaline unicolourous (ochreous to brownish) membrane. Wing venation mostly as in *A. furvifrons* only R_{4+5} usually very slightly bent (re-curved) and running closer to M. Discal (dm) cell often narrower and less widened distally, with r-m situated somewhat in front of the middle of dm cell. Apical portion of CuA_1 usually longer than dm-cu and alula narrower. Wing measurements: length 2.14–2.62 mm, width 0.61–0.78 mm, $Cs_3 : Cs_4 = 1.16–1.68$, $rm/dm-cu : dm-cu = 2.44–3.53$. Haltere pale yellow to whitish yellow, sometimes with partial ochreous darkenings.

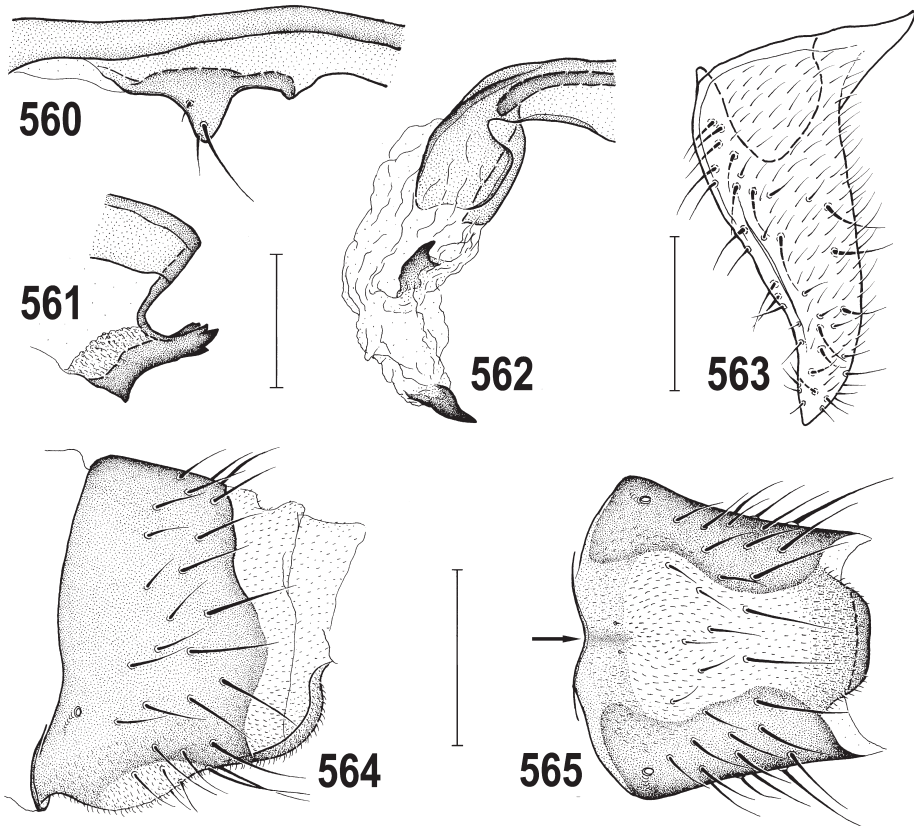
Abdomen slender, elongate (Fig. 520), generally formed, coloured and setose as that of *A. furvifrons* unless mentioned otherwise. Preabdominal sterna lighter than those of *A. furvifrons*, pale ochreous yellow, only S1, S2 (darkest) and S5 (partly, laterally) brownish. T6 yet larger (longer) than in *A. furvifrons*, usually more than half length of T5, largely brown but with a narrow unpigmented area anteromedially or medially across sclerite (hence sometimes seemingly divided into two sclerites), often with a few setae at posterior margin. S6 (paler) and S7 (darker) brown, both with more sclerotized and blackish brown anterior margin, each with 2 (rarely 3) setae; S8 as in *A. furvifrons*.

Genitalia most similar to those of *A. equiseti*. Epandrium (Figs 551, 552) about as broad as high thus slightly higher than that of *A. equiseti*, blackish brown and somewhat more densely setose than in latter species, with 1 dorsolateral pair of (not much) longer and thicker setae; anal fissure distinctly narrower (Fig. 551) than in *A. equiseti*. Cercus moderately narrow, with apex more or less pointed; setae fine and numerous, the longest apical slightly longer than subapical. Medandrium (Figs 551) wider and not as high as that of *A. furvifrons*, in profile somewhat constricted in the middle (Fig. 552), dorsolateral corners small. Gonostylus (Figs 551, 552, 559, 563) small, most similar to that of *A. equiseti* thus moderately bent medially, with simple acute apex, micropubescence on most of outer side and setae on inner side of both anterior (there more than in *A. equiseti*) and posterior margins (Figs 559, 563) but somewhat more elongate and with anterior margin more concave than in the latter species. Hypandrium (Fig. 553) relatively elongate, with anterior internal lobes reduced, membranous; its posterior arms firmly fused with transandrium. Transandrium (Fig. 554) relatively strong and well sclerotized, posteromedially with broad, flat but dorsomedially weakly sclerotized caudal process terminating in distinctive trough-like appendage (Figs 553–555, 561). This appendage smaller and narrower than in *A. equiseti* and with teeth on ventrolateral margins



Figs 551–559. *Anthomyza vulgaris* sp. nov., paratype male (Canada: Ontario). 551 – external genitalia, caudally; 552 – the same, laterally; 553 – hypandrial complex, laterally; 554 – transandrium, caudally; 555 – caudal process of transandrium, ventrally; 556 – aedeagal complex, laterally; 557 – apex of filum, subventrally; 558 – armature of right wall of aedeagal part of folding apparatus; 559 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Figs 557, 559) and 0.1 mm (others).

reduced or absent (Figs 553, 561), only those on posterior corners (Figs 554, 555) well developed. Pregonite (Figs 553, 560) with anterior part angularly projecting medioventrally (this process distinctly larger than in *A. equiseti*) and bearing 3 setae (as in relatives), 1 long, 1 shorter and 1 minute; posterior part of pregonite reduced and hairless. Postgonite (Fig. 553) slender, more elongate and bent than that of *A. equiseti*, with moderately pointed apex and 1 anterior setula in distal fourth in addition to granular sensillae; its proximal part attached to large basal sclerite provided with several (5–8) ventral spines. Armature of basal membrane incorporated into ventral appendage of caudal process of transandrium. Aedeagal part of folding apparatus with similarly spinose walls as those of *A. equiseti*: right wall dorsally with a



Figs 560–565. *Anthomyza vulgaris* sp. nov., paratypes, male and female (Canada: Ontario). 560 – male pregonite, lateroventrally, widest extension; 561 – caudal process of transandrium, laterally; 562 – saccus of distiphallus, laterally; 563 – gonostylus, ventrolaterocaudally (widest extension); 564 – female T7+S7, laterally; 565 – the same, ventrally. Scales = 0.1 mm (Figs 560–562), 0.05 mm (Fig. 563) and 0.2 mm (others).

large cluster of strong dark spines, ventrally with only a number of spine-like tubercles (Fig. 558); left wall with only 2–3 long and dark spines in dorsal cluster, ventrally there are only smaller spines and tubercles (Fig. 556). Connecting sclerite slender, only dorsally dilated and with granulous structure, well sclerotized on apex armed with 1–2 dark spines surrounded by a few pale tubercles (Fig. 556). Phallapodeme slender with basal part dilated and deeply forked, fulcrum rather long but relatively slender, apex with small lateroventral corners. Aedeagus with short, frame-like phallopore fused to distiphallus as in relatives. Distiphallus basally with dorsal and ventral elongate sclerites; bifid from about two-fifths. Saccus proximally well sclerotized (more on right side, Fig. 556) and its dilated distal membranous part provided with rather variable armature of 2 (Fig. 562) to 4 robust black spines (Fig. 556). Filum formed by single sclerite, only partly pigmented, very finely spinulose in proximal and middle part, subterminally only somewhat widened without corner or projection, with terminal part slender; apical part gradually tapered into sinuate, very slender and acute point with 3–4 spinulae (Fig. 557). Ejacapodeme small, slender and pale, with elongate digitiform projection (Fig. 556).

Female. Similar to male unless mentioned otherwise. Total body length 2.26–3.18 mm. Antenna with 1st flagellomere anterodorsally (on both sides) more or less extensively ochreous to brownish-darkened (Figs 545, 547), sometimes leaving only narrow proximal and ventral parts yellow. Palpus usually darkened to brown or grey apically. Marginal stripe of parafacialia and particularly gena darker ochreous to brown. Yellow areas on thoracic sternal midline and propleuron more common and more extensive in some populations, and may include margins of the humerus and margins and isolated spots on the mesopleuron. Wing measurements: length 2.46–3.26 mm, width 0.69–1.02 mm, $Cs_3 : Cs_4 = 1.23–1.47$, $rm/dm-cu : dm-cu = 2.25–3.27$. Abdomen (Fig. 547) similarly formed, coloured and setose to that of *A. fuvifrons* but T3–T5 not longer than T2, subequal in length but T4 slightly wider than T3 or T5. Preabdominal sterna S2–S5 somewhat narrower than in male; only S1 (wider than long) and S2 (as long as wide) brownish, S3–S5 (and S6) light ochreous yellow. S2–S4 becoming only slightly larger and wider posteriorly, S3–S5 as long as broad or slightly longer than broad, S5 usually narrower than S4.

Postabdomen (Figs 566–568) closely resembling that of *A. equiseti*, elongate, slender, gradually tapered posteriorly. T6 large, broad but narrower than T5, brown with posterior margin more or less extensively unpigmented, setose in posterior three-fourths. S6 slightly transverse, wider posteriorly, with anterior corners rounded, pale ochreous thus lighter than in *A. equiseti*, setose in posterior half. Tergosternum T7+S7 conically ring-shaped, blackish brown laterally (Figs 564, 566) and dorsally with narrow posteromedial incision (Fig. 567). Ventral part of T7+S7 with relatively large desclerotized area (Figs 565, 568) anteriorly delimited by short transverse (longitudinally grooved, see Figs 565, 570, arrows), pale brown strip connecting both blackish brown lateral parts of synsclerite (both yellowish brown in palest specimens); the groove often producing a chordate anterior margin to the membranous area. The ventral part of T7+S7 differing from that of *A. equiseti* in having desclerotized area with more setae and, particularly, in lacking narrow yellowish brown anterolateral areas reaching above 7th spiracle. Posterior to the ventral desclerotized area there is an additional pale brown, flat and distinctively micropubescent posteromedial appendage (Figs 564–566, 568, 570, often at least partly invaginated) shared with *A. equiseti*. 8th segment (Figs 566,

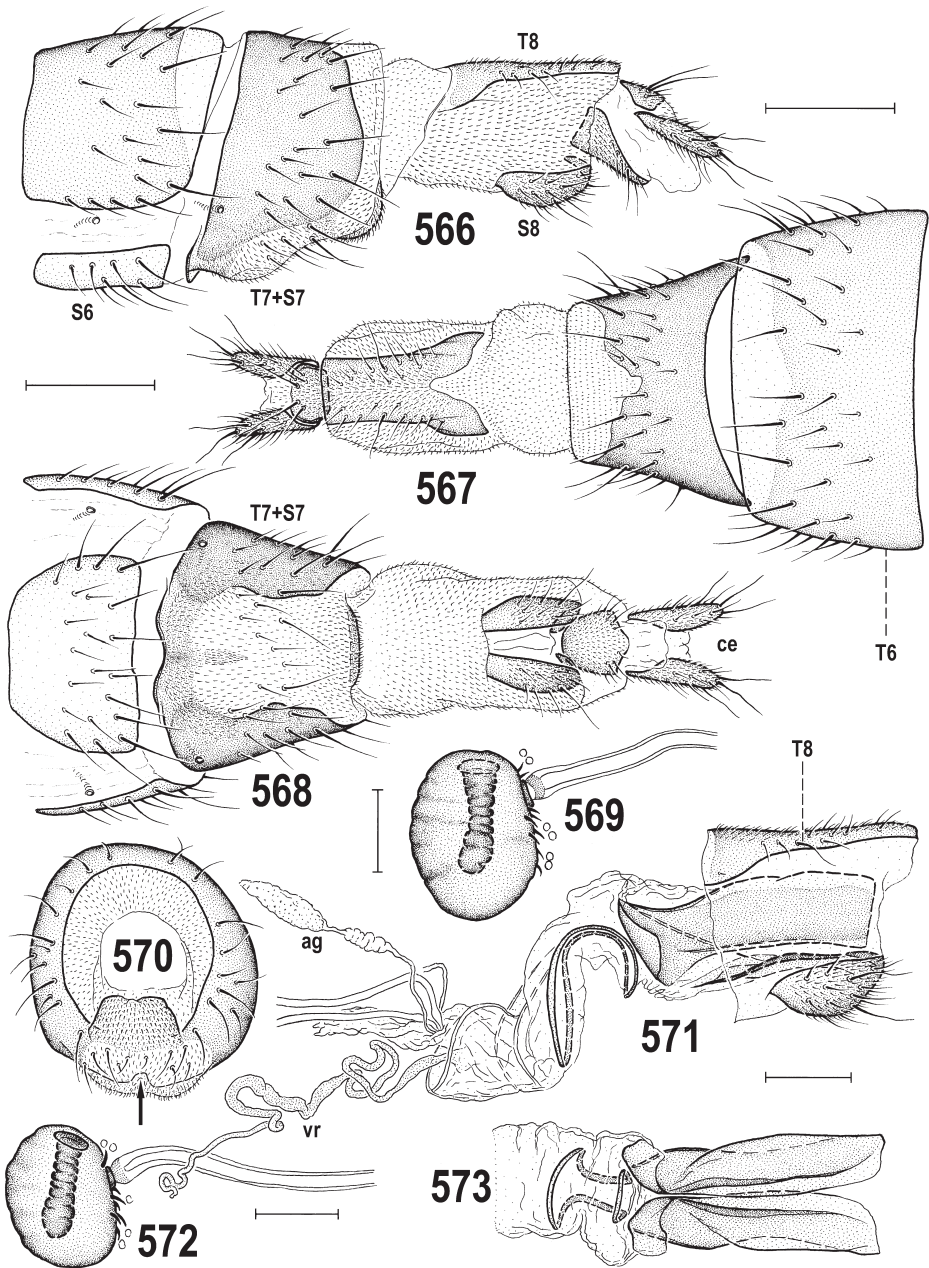
568), narrow, long, largely membranous, micropubescent. T8 narrow, elongate, posteriorly parallel-sided, with fine exclinate lateral setulae and anterior corners laterally wing-like dilated and separated by a deep narrow incision (Fig. 567); S8 (Fig. 568) much shorter than T8, medially divided to form 2 narrow, finely setose sclerites with posterior end curved and invaginated (as in relatives). Genital chamber (uterus) with internal sclerotization (Figs 571, 573) formed by 1 pair of long, flat, but rather crooked and complex sclerites with suboblong profile (cf. Fig. 571, in contrast to a more regularly oblong outline in *A. equiseti*) and 1 anterior annular sclerite that is wider anteriorly and posteriorly, down-curved posteriorly (usually more than in *A. equiseti*). Ventral receptacle (Fig. 571) very long, slender, tubuliform, hyaline and multiply twisted, distinctly longer than that of *A. equiseti*; accessory gland hyaline, elongate, with duct slightly dilated distally. Spermathecae (1+1) suboval, with long digitiform invagination (Figs 569, 572), indistinctly wrinkled surface and dark spinulae (more than in *A. equiseti*) near duct insertion; the latter situated close to opening of invagination; duct ending in very short, pigmented cervix. T10 (Fig. 567) small, dark, transversely oval, with 2–4 pairs of setae including 1 long pair and with sparse micropubescent. S10 (Fig. 568) small, longer than T10, somewhat tapered and rounded anteriorly, wider posteriorly, finely setulose and micropubescent. Cercus slender, relatively long, with numerous fine setae, apical and dorsopreapical longest, subequal in length (Figs 566–568).

Discussion. Based on a number of shared male and female genitalic characters, *A. vulgaris* sp. nov. is considered the sister species of *A. equiseti* sp. nov. Most of the male genitalic features are probably plesiomorphic (e.g. medandrium wider and more robust; gonostylus with simple apex; aedeagal part of folding apparatus without long spines ventrally) but the unique posteromedial ventral appendage of the female T7+S7 (see Figs 564, 565, 570, 589, 591) is considered a strong synapomorphy of this sister pair.

It is notable that *A. vulgaris* is variable in some structures of the male genitalia, particularly the form of the gonostylus (Figs 559, 563), the armature of the caudal process of the transandrium (cf. Figs 553, 561) and the number of spines in the saccus (Figs 556, 562), which ranges from two to four. This variability may reflect the extreme habitat and host-plant tolerance of *A. vulgaris* (see below) but this assumption should be experimentally tested. Nevertheless, *A. vulgaris* differs from all Nearctic species of the *A. gracilis* group in having lighter microtomentum of the thorax and a distinctly elongate head and eye. There are also a number of differences from its closest relative, *A. equiseti*, not only in the terminalia (epandrium narrower, pregonite more projecting, postgonite more slender, ventral appendage of caudal process with teeth reduced, saccus with fewer spines, female T7+S7 with paler anteroventral strip simple (not extended to 7th spiracle), female T8 with anterolateral wing-like dilations), but also in the form of the head (see above), the colouration of the frons and, particularly, the legs (in *A. vulgaris* uniformly yellow except for the sometimes shiny brown patch on the base of cx_1 and the 2 brownish terminal tarsal segments).

Etymology. The new species is named *vulgaris* (= common, a Latin adjective) to reflect its frequent occurrence in various communities of graminoid plants.

Biology. The habitat of *Anthomyza vulgaris* includes a wide range of sites from extremely dry to relatively wet sites with plant communities usually dominated by grasses. In at least Ontario, *A. vulgaris* is one of the most commonly encountered anthomyzids, particularly in open, disturbed grassy areas.



Figs 566–573. *Anthomyza vulgaris* sp. nov., paratype female (Canada: Ontario). 566 – postabdomen, laterally; 567 – the same, dorsally; 568 – the same, ventrally; 569 – spermatheca; 570 – T7+S7, caudally (end of postabdomen omitted); 571 – female genital chamber and S8, laterally (pleural micropubescence omitted); 572 – spermatheca; 573 – internal sclerites, ventrally. Scales = 0.2 mm (Figs 566–568, 570), 0.05 mm (Figs 569, 572) and 0.1 mm (others). For abbreviations see p. 11.

The driest sites include those collections made from the beach grass *Ammophila breviligulata* Fernald from three localities, namely Nova Scotia: South Harbour Beach – mixed with *Lathyrus* sp. (Fabaceae) not considered a potential host; Ontario: Pancake Bay P. Pk., Fig. 546; and Quebec: Îles de la Madeleine, road 199 between Havre-aux-Maisons and Point-aux-Loups. There are also similar records from a very sandy site (Ontario: Bruce Peninsula N. P.–Singing Sands) supporting *Calamagrostis* and “*Agropyron*” (likely *Elymus repens*) and from “dunes” (Nova Scotia: Crescent Beach; Ontario: Manitoulin Island–Sand Bay; Quebec: Godbout). An unusual sandy site was the exposed perimeter of a drained man-made lake (Ontario: ~66 km NNW Elliot Lake, Rocky Island Lake) where *Scirpus microcarpus* grew in isolated clumps (Fig. 548).

Multiple collections made from prairie habitat in Manitoba (Aweme), including tallgrass prairie (Gardenton, Winnipeg) and “*Andropogon-Stipa* prairie community” (5 mi SW Shilo), also suggest dry habitats, as does the collection from *Andropogon* (Wisconsin: Swan Lake–4 mi E Portage). A particular reference to “tundra at summit” (New Hampshire: Mt. Washington) may be another dry site.

There are several records indicating that roadsides and both dry and wet ditches yield this species. Fens, alvars (e.g. Ontario: Manitoulin Is., nr. Misery Bay [Prov.] Nature Reserve, Little Lake Huron Road, Fig. 549), and alvar savanna are also recorded, along with riparian habitats such as “shoreline” and “riverside”, along with “lakeside” and “marshy lake shore”. References such as “vegetation on boggy trail”, “floodplain community near tamarack bog”, “boggy meadow” and “*Sphagnum* bog” also indicate that wetter sites can support populations of this species.

Observations at one roadside ditch site supporting all three species of the *A. gracilis* group (Ontario: ~21 km NNE Smooth Rock Falls; discussed under *A. furvifrons*) suggest that *A. vulgaris* was more commonly collected on the drier slopes of the roadside ditch in a mix of grasses and herbs, though definitive segregation among the three species could not be made. There are a few specimens recorded from *Equisetum fluviatile*, but this host plant for *A. equiseti* is likely not a host for *A. vulgaris* and the specimens were likely part of a population emerged from nearby grasses. For example, the Marathon, Ontario site yielded large numbers of *A. equiseti* from mostly emergent *E. fluviatile*, and the only specimens of *A. vulgaris* were taken about 50 meters away on the other side of the highway among roadside graminoids (mostly grasses).

Specific graminoid plants that are mentioned include grasses (*Calamagrostis*, *Phalaris*, “*Agropyron*” (likely *E. repens*)), sedges (*Carex*, *Dulichium*, *Eleocharis*, *Scirpus*) and rushes (*Juncus*). Cattails (*Typha*) are not likely to be a host but indicate a wetter site. Collections that do not include grasses tend to be represented by small numbers of specimens. Unusual references include “ex. *Ulmus* sp.”, “ex. *Betula glandulosa*” Michx., and “ex. leafy spurge” (*Euphorbia esula* L.) but these are not considered likely hosts. A collection from the blossoms of *Smilacina* sp. suggests a pollen and nectar source for adults (North Carolina: Mollie Gap). Adults of *A. vulgaris* have been collected from 23 May (Tennessee: SW corner of Cades Cove) to 4 September (Ontario: Hilton Township).

Distribution. *Anthomyza vulgaris* ranges transcontinentally from British Columbia to Prince Edward Island (Alberta, British Columbia, Labrador, Manitoba, New Brunswick, Nova Scotia,

Ontario, Prince Edward Island, Quebec and Saskatchewan) in Canada. However, in the United States of America, this most commonly collected species of the *Anthomyza gracilis* group is restricted to the east from Minnesota to Maine and Pennsylvania to Tennessee and Georgia (Georgia, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, North Carolina, Pennsylvania, Tennessee, Vermont, West Virginia and Wisconsin) (see Table 2).

Anthomyza equiseti sp. nov.

(Figs 522, 523, 526, 574–576, 580–596)

Type material. HOLOTYPE: ♂, “CAN: ON: Pancake Bay PP, 02.viii.2004, KNBarber, sweeps from boardwalk, mostly emergent sedge / *Equisetum*, 46°58.11'N 84°42.72'W”, “debu 01500791” and “Holotypus ♂ *Anthomyza equiseti* sp. n., J. Roháček & K. N. Barber det. 2014” (red). The specimen is in perfect condition, with exposed genitalia and visible gonostyli (see Fig. 522) (DEBU, intact). PARATYPES: **CANADA: ALBERTA:** [Fort] McMurray, 14.vii.1953, 1 ♂, G. E. Ball leg. (CNCI); ~21.9 km W Bearberry, Hwy #734, 51°56.18'N 115°11.76'W, sweeps, wet roadside, *Equisetum fluviatile*, 24.vii.2008, 1 ♂; ~40.3 km WNW Bearberry, Hwy#734 @ Seven Mile Creek, 52°02.40'N 115°24.67'W, sweeps, mostly graminoids, 24.vii.2008, 1 ♀; ~3.4 km SSW Hinton, Hwy#40, 53°21.27'N 117°37.32'W, sweeps, *Equisetum fluviatile*, 22.vii.2008, 1 ♂; ~4.4 km SSW Hinton, Hwy#40, 53°20.77'N 117°36.83'W, sweeps, *Equisetum fluviatile*, *Carex* sp., 22.vii.2008, 2 ♀♀, all K. N. Barber leg. (all CNCI); W. A. Switzer P. Pk., Hay River Rd. W., 53°31.94'N 117°50.06'W, sweeps, *Equisetum fluviatile*, 22.vii.2011, 1 ♂, K. N. Barber leg. (DEBU 01503813). **BRITISH COLUMBIA:** 18 km ENE Cranbrook, 49°33'N 115°29'W, 2700', swept/aspirated, lake bank, dry coniferous forest, (Universität Bielefeld, Ca1527), 12.viii.2002, 3 ♂♂ 7 ♀♀, M. v. Tschirnhaus leg. (ZSMC, in ethanol); ~2.9 km NNW Golden, Anderson Rd., 51°19.49'N 116°58.81'W, sweeps, roadside, mostly *Equisetum fluviatile* & *E. palustre*, 19.vii.2011, 5 ♂♂ 9 ♀♀; Parson, Crestbrook Rd., 51°03.68'N 116°39.06'W, sweeps, wet ditch, *Carex utriculata* with *Equisetum palustre* & *E. xilitorale*, 18.vii.2011, 1 ♀, all K. N. Barber leg.; Revelstoke, 2.vii.1973, 1 ♂, J. H. Teskey leg.; Stagleap Prov. Pk., Hwy 3, 23.vi.1982, 1 ♀ (genit. prep.), B. V. Peterson leg.; Terrace, 6.vii.1960, 1 ♂ 1 ♀, W. R. Richards leg.; Lakelse Lake bog, S. of Terrace, on hemlock, 6.vii.1960, 2 ♀♀, B. Heming leg., 11.vii.1960, 1 ♂ 2 ♀♀ (1 ♂ genit. prep.), W. R. Richards leg.; Lakelse L. bog, nr. Terrace, 11.vii.1960, 1 ♂ 14 ♀♀, C. H. Mann leg., ex. *Cicuta occidentalis*, 11.vii.1960, 1 ♂ 5 ♀♀, J. G. Chillcott leg.; Lakelse L. bog, 18 mi S of Terrace, 11.vii.1960, 1 ♂, G. E. Shewell leg.; ~9.6 km SE Valemount, 52°45.74'N 119°09.68'W, edge of Kinbasket Lake, sweeps, mostly *Carex* spp., 23.vii.2011, 4 ♂♂ 1 ♀, K. N. Barber leg. (all CNCI). **MANITOBA:** ~20 km E Anola, 49°53.10'N 96°22.02'W, edge of Brokenhead R., sweeps, *Equisetum fluviatile*, 29.vii.2011, 1 ♀, K. N. Barber leg. (CNCI). **NEW BRUNSWICK:** Middle Sackville, 45°55.4'N 64°21.4'W, sweep vegetation along old rail line, 19.vii.2002, 2 ♂♂ 1 ♀, J. Forrest & T. Wheeler leg. (LEMQ 0039174, -39193, -40344). **NEWFOUNDLAND:** N branch St. George's R., Lot 4, 17.vi.1979, 1 ♀, Larson & Swales leg. (NFRFC). **ONTARIO:** Bruce Peninsula N. P., Halfway Log Dump Rd., 45°13.36'N 81°28.28'W, sweeps, mostly emergent *Equisetum fluviatile*, edge of fen, 21.vi.2008, 2 ♂♂ 3 ♀♀, K. N. Barber leg. (DEBU); ~13.9 km W Chappleau, 47°49.20'N 83°35.42'W, hydro right-of-way, sweeps, mostly *Carex utriculata*, grasses, 23.vi.2013, 1 ♂; Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeps, *Equisetum fluviatile*, *Carex*, 10.vii.2010, 1 ♂, all K. N. Barber leg. (all CNCI), sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 5 ♂♂ 5 ♀♀, J. Roháček leg. (SMOC, 1 ♂ photographed alive); ~35 km WSW Dubreuilville, 2 km SE Jct. Hwys.#17 & #519, 48°17.16'N 84°53.34'W, sweeps, roadside vegetation incl. wet ditch, 31.vii.2008, 3 ♂♂ 6 ♀♀, sweeps, *Equisetum* sp., 31.vii.2008, 1 ♂, sweeps, *Juncus* spp. in wet ditch, 31.vii.2008, 1 ♀, K. N. Barber leg. (CNCI); Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, sweeps, *Equisetum fluviatile*, 18.vi.2007, 9 ♂♂ 7 ♀♀, 7.viii.2007, 16 ♂♂ 7 ♀♀, 12.vii.2008, 8 ♂♂ 9 ♀♀, sweeps, emergent *Equisetum fluviatile*, 19.viii.2006, 8 ♂♂ 5 ♀♀ (2 ♂♂ genit. prep.) (CNCI), 27.viii.2006, 31 ♂♂ 24 ♀♀ (CNCI 27 ♂♂ 20 ♀♀, SMOC 4 ♂♂ 4 ♀♀), sweeps, mostly *Equisetum fluviatile*, 26.v.2007, 14 ♂♂ 25 ♀♀ (CNCI), 1.vi.2007, 25 ♂♂ 39 ♀♀ (AMNH, CASC, LACM, USNM 5 ♂♂ 7 ♀♀ each; CNCI 5 ♂♂ 11 ♀♀, 1 ♂ wing illustration), 12.vi.2007, 1 ♂ 6 ♀♀, 23.vi.2007, 1 ♂ 3 ♀♀, sweeps, mostly *Equisetum fluviatile*, *Schoenoplectus acutus*, 19.viii.2006, 28 ♂♂ 10 ♀♀ (2 ♀♀ genit. prep.), 27.viii.2006, 26 ♂♂ 13 ♀♀ (CNCI), 24.v.2007, 48 ♂♂ 55 ♀♀ (BDUC, BYUC, CLEV, CMNH, CSCA, CSUC 5 ♂♂ 5 ♀♀ each; CNCI 18 ♂♂ 25 ♀♀, 2 ♂♂ genit. prep.), 26.v.2007, 25 ♂♂ 30 ♀♀ (EMEC, INHS, KNWR, LEMQ 5 ♂♂ 5 ♀♀ each; CNCI 5 ♂♂ 10 ♀♀), 1.vi.2007,

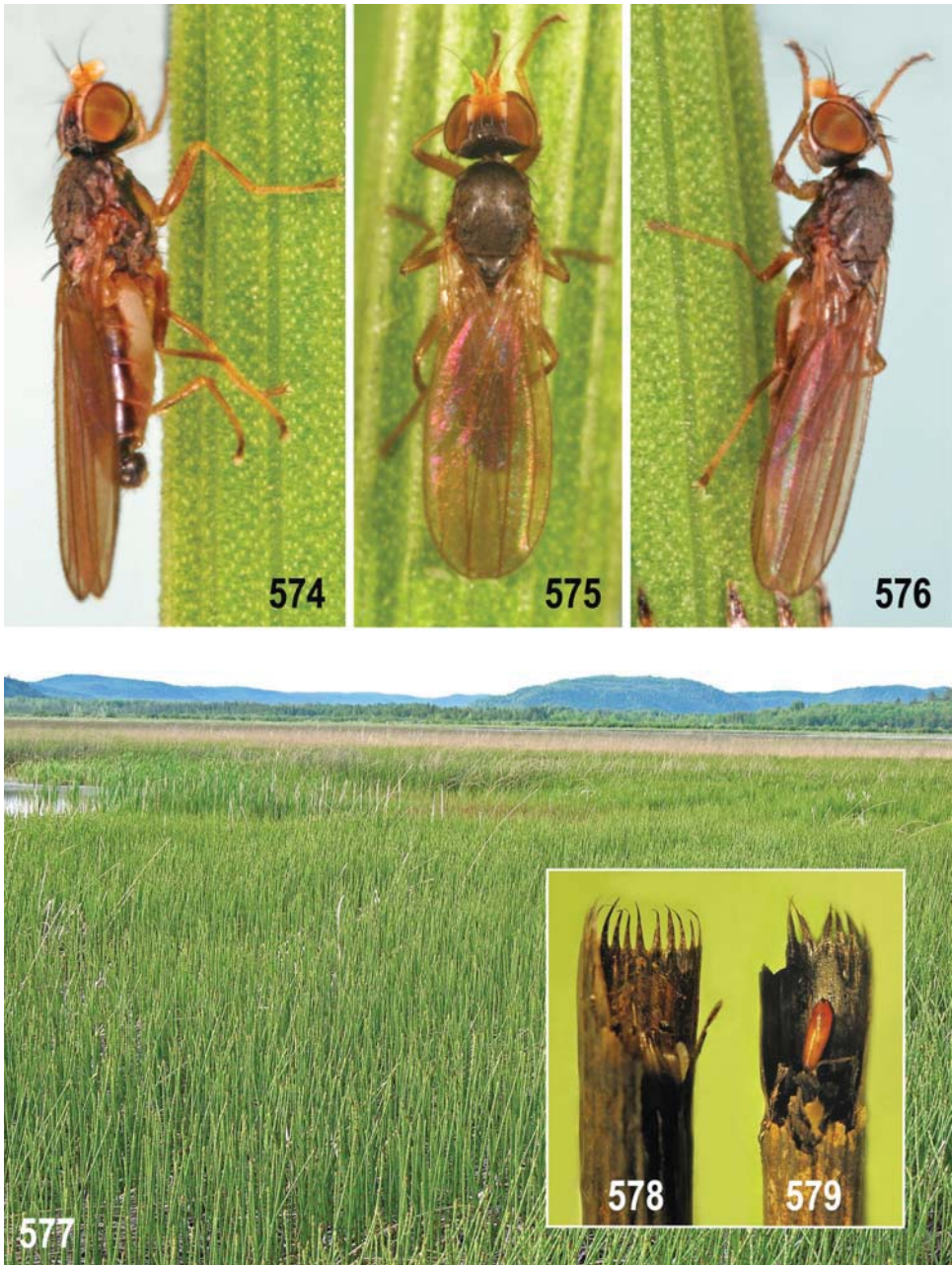
14 ♂♂ 32 ♀♀ (CNCI), 12.vi.2007, 17 ♂♂ 28 ♀♀ (MCZC, MEMU, MTEC 5 ♂♂ 5 ♀♀ each; CNCI 2 ♂♂ 13 ♀♀), 18.vi.2007, 9 ♂♂ 29 ♀♀, 23.vi.2007, 3 ♂♂ 5 ♀♀, sweeps, mostly *Equisetum fluviatile*, *Typha latifolia*, 26.v.2007, 7 ♂♂ 24 ♀♀, 12.vi.2007, 10 ♂♂ 8 ♀♀, sweeps, sedges/*Equisetum* [*fluviatile*], 19.viii.2006, 1 ♂, sweeps, mostly *Carex* sp., 24.v.2007, 1 ♂ 4 ♀♀, sweeps, mostly *Carex* spp. nr. lookout, 26.v.2007, 1 ♀, sweeps, mostly *Equisetum fluviatile*, used in rearing, 24.viii.2008, 8 ♂♂ 4 ♀♀, 7.ix.2008, 8 ♂♂ 8 ♀♀ (CNCI), K. N. Barber leg.; Lab-reared on *Equisetum fluviatile*, from adults – Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, sweeps, mostly *Equisetum fluviatile*, 24.viii. & 7.ix.2008, [reared at] 22°C, 16L:8D, [each with empty puparium in gelatin capsule], ovip: 27.viii.2008, hatch: 2.ix.2008, puparium: 27.ix.2008, adult: 9.x.2008, 1 ♀, ovip: 28–29.viii.2008, hatch: 4.ix.2008, puparium: 29.ix.2008, adult: 11.x.2008, 1 ♀, ovip: 28–29.viii.2008, hatch: 4.ix.2008, puparium: 3.x.2008, adult: 14.x.2008, 1 ♂, ovip: 1–4.ix.2008, hatch: 8.ix.2008, puparium: 2.x.2008, adult: 15.x.2008, 1 ♀, ovip: [-].2008, hatch: 2–7.ix.2008, puparium: 15.x.2008, adult: 27.x.2008, 1 ♂, ovip: [-].2008, hatch: 2–7.ix.2008, puparium: 15.x.2008, adult: 28.x.2008, 1 ♂, K. N. Barber leg. (CNCI); Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*?, moist ground cover including *E. fluviatile*, 10.v.2008, [reared at] 20°C, L:D 16:8, [various emergence dates 20.v.–12.vi.2008], 13 ♂♂ 11 ♀♀; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 10.v.2008, [reared at] 20°C, L:D 16:8, [various emergence dates 17.v.–5.vi.2008], 53 ♂♂ 75 ♀♀, 17.v.2008, [reared at] 20°C, L:D 16:8, [various emergence dates 22.v.–5.vi.2008], 38 ♂♂ 41 ♀♀; Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, ex. *Equisetum fluviatile*, dry stalks on surface, 4.iv.2009, [held at] 6°C, L:D 0:24, instar 3 dissected [various dates 4–24.iv.2009], [reared at] 20°C, L:D 16:8, [various pupariation dates 14.iv.–25.v.2009, emergence dates 1.v.–10.vi.2009], 101 ♂♂ 117 ♀♀ [each with empty puparium in gelatin capsule], all K. N. Barber leg. (all CNCI); ~11 km ESE English River, Hwy#17, 49°09.42'N 90°50.11'W, sweeps, *Equisetum fluviatile*, 17.vii.2008, 3 ♂♂ 3 ♀♀; ~2.8 km SE Fraserdale, 49°49.96'N 81°35.03'W, sweeps, mostly *Equisetum fluviatilis* [sic] in wet ditch, 20.vii.2009, 13 ♂♂ 8 ♀♀; ~20 km NE Fraserdale, 50°00.00'N 81°27.21'W, sweeps, *Equisetum fluviatilis* [sic] in wet ditch, 20.vii.2009, 1 ♀; Goulais River, end of Island Rd., 46°43.57'N 84°24.45'W, sweeps, mud flats, *Equisetum fluviatile*, *Dulichium arundinaceum*, 9.vii.2007, 13 ♂♂ 11 ♀♀; same locality but 46°43.33'N 84°24.72'W, sweeps, oxbow flats, *Equisetum fluviatile*, sedges, herbs, 16.vii.2007, 8 ♂♂ 5 ♀♀ (all CNCI); same locality but 46°43.54'N 84°24.80'W, sweeps, oxbow flats, *Equisetum fluviatile*, 16.vii.2007, 74 ♂♂ 56 ♀♀ (NMPC, OSAC, PMAE, RBCM, SEMC, UBCZ, UCRC, UGCA, WFBM 5 ♂♂ 5 ♀♀ each; CNCI 29 ♂♂ 11 ♀♀); Goulais River, Pine Shores Rd., 46°42.83'N 84°26.20'W, sweeps, *Equisetum fluviatile* in seasonal river channel, 30.vi.2007, 36 ♂♂ 38 ♀♀ (CNCI); same locality but 46°42.81'N 84°26.27'W, sweeps, *Equisetum fluviatile* in seasonal river channel, 30.vi.2007, 24 ♂♂ 19 ♀♀ (AMNH, CASC, LACM, USNM 5 ♂♂ 3 ♀♀ each; CNCI 4 ♂♂ 7 ♀♀), all K. N. Barber leg.; Greenwater P. Pk., 49°11.05'N 81°16.04'W, sweeps, mostly emergent *Equisetum fluviatile*, 18.vii.2009, 3 ♂♂ 1 ♀ (DEBU 01501984–87); Greenwater P. Pk., Sandbar Lk. Trail, 49°13.10'N 81°17.35'W, sweeps, lakeshore *Equisetum* spp. [including *E. fluviatile*], graminoids, *Caltha*, 21.vii.2009, 2 ♂♂ (DEBU 01502102, -03); Halfway Lake P. Pk., 46°54.22'N 81°37.94'W, sweeps, emergent *Equisetum fluviatile*, graminoids, 29.vii.2007, 7 ♂♂ 4 ♀♀ (DEBU 01501966–76), all K. N. Barber leg.; 60 mi W of Hearst, 5.vii.1954, 1 ♀, A. H. Sturtevant leg. (USNM); ~85 km W Hearst, 49°46.14'N 84°49.10'W, gas right-of-way, sweeps, sedges and *Equisetum fluviatile*, 21.vi.2013, 10 ♂♂ 4 ♀♀; ~8 km NE Heyden, Hwy. 552 @ Bellevue Valley Rd., 46°42.80'N 84°17.12'W, sweeps, *Equisetum fluviatile*/sedges in wet area, 23.vi.2007, 1 ♂ 1 ♀; ~10.8 km W jct. Hwys 556 & 129, km.64.3 Ranger Lk. Rd., 46°53.46'N 83°27.01'W, sweeps, emergent *Equisetum fluviatile*, 23.vi.2007, 19 ♂♂ 20 ♀♀, sweeps, *Equisetum fluviatile* and *Dulichium arundinaceum*, 23.vi.2007, 11 ♂♂ 7 ♀♀, sweeps, *Equisetum fluviatile* and *Carex* sp., 23.vi.2007, 8 ♂♂ 2 ♀♀, sweeps, *Carex* sp., 23.vi.2007, 2 ♂♂ 1 ♀; Hurkett, dock area, 48°50.42'N 88°29.38'W, sweeps, emergent *Equisetum fluviatile*, 31.vii.2008, 23 ♂♂ 13 ♀♀; ~11.9 km N Kejick, 49°43.89'N 95°04.14'W, sweeps, wet ditch, graminoids/*Equisetum*, 30.vii.2008, 2 ♂♂, sweeps, wet ditch, *Equisetum fluviatile*, 30.vii.2008, 5 ♂♂ 7 ♀♀, all K. N. Barber leg. (all CNCI); Manitoulin Is., Providence Bay at Mindemoya R., 26.vi.1992, 2 ♂♂, T. A. Wheeler leg. (LEMQ 0039308, -15); Hwy#17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, sweeps, *Equisetum fluviatile* on saturated gravel, 16.vi.2007, 5 ♂♂ 6 ♀♀, sweeps, emergent *Equisetum fluviatile*, 12.viii.2006, 1 ♀, 16.vi.2007, 12 ♂♂ 14 ♀♀, 31.vii.2008, 2 ♂♂ 4 ♀♀, sweeps, emergent *Equisetum fluviatile* with *Carex* sp., 12.viii.2006, 4 ♂♂ 10 ♀♀, 16.vi.2007, 5 ♂♂ 16 ♀♀, 26.viii.2007, 1 ♂ 1 ♀, emergent *Carex* sp., 16.vi.2007, 7 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI); Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex. *Equisetum fluviatile*, [reared] misted daily, 22°C, 16L:8D, 60–70% RH, dry stalks on surface, bulk pails, [various emergence dates 13.v.–11.vi.2012], 9 ♂♂ 2 ♀♀, wet stalks on [sic “near”] surface, bulk

pails, [various emergence dates 12.v.–4.vii.2012], 10 ♂♂ 9 ♀♀; same locality and date but ex. *Equisetum fluviatile*, dry stalks on surface, [reared – each with empty puparium in gelatin capsule] 22°C, 16L:8D, 60–70% RH, larva dissected: 29.iv.–1.v.2012, [various pupariation dates ≤2.v.–3.vi.2012, emergence dates 12.v.–16.vi.2012], 11 ♂♂ 9 ♀♀, wet stalks near surface, [reared – each with empty puparium in gelatin capsule] 22°C, 16L:8D, 60–70% RH, larva dissected: 29.iv.–1.v.2012, [various pupariation dates ≤8.v.–2.vi.2012, emergence dates 17.v.–13.vi.2012], 9 ♂♂ 5 ♀♀, all K. N. Barber leg. (all CNCI); Marmora, in marsh, 5.vii.1952, 2 ♂♂, J. R. Vockeroth leg. (CNCI); Moosonee, 51.28288°N 80.63926°W, Repl. 2 wet, Malaise trap, 16–19.vi.2010, 3 ♂♂, NBP Field Party leg. (LEMQ); Moosonee, 51°16.17'N 80°39.10'W, sweeps, mostly *Carex utriculata*, *Scirpus*, in wet hydro cut, 10.vii.2014, 3 ♀♀; Moosonee, 51°16.63'N 80°38.87'W, sweeps, *Calamagrostis*, *Carex*, drier edge of sedge meadow, 9.vii.2014, 1 ♀; Moosonee, 51°16.68'N 80°38.65'W, sweeps, *C. utriculata*, *C. aquatilis*, wet sedge meadow, 10.vii.2014, 2 ♂♂; Moosonee, 51°16.69'N 80°38.86'W, general sweeps, sedge meadow, 9.vii.2014, 1 ♂ 3 ♀♀; Moosonee, 51°16.75'N 80°38.76'W, sweeps, *Equisetum [fluviatile]* & graminoids, wet edge of sedge meadow, 9.vii.2014, 9 ♂♂ 9 ♀♀; Moosonee, 51°16.99'N 80°38.37'W, sweeps, mostly *Equisetum fluviatile*, *Carex* spp., wet sedge meadow, 10.vii.2014, 5 ♀♀, all K. N. Barber leg.; Ottawa, Mer Bleue, in marsh, 19.vii.1963, 2 ♂♂ 1 ♀, J. R. Vockeroth leg.; Otter Rapids, 50°10.80'N 81°38.59'W, sweeps, *Equisetum fluviatile*, 19.vii.2009, 5 ♂♂ 3 ♀♀, sweeps, roadside *Equisetum* spp. [including *E. fluviatile*], 19.vii.2009, 1 ♂, K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°57.74'N 84°42.63'W, sweeps, *Ammophila breviligulata* on beach sand, 29.viii.2010, 2 ♀♀ (DEBU 01502551–52); Pancake Bay P. Pk., 46°58.08'N 84°42.77'W, sweeps, open fen community incl. *E. fluviatile* & *C. utriculata*, 19.vii.2014, 3 ♂♂ 1 ♀ (DEBU 01503973–76); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 24.vii.2004, 28 ♂♂ 26 ♀♀ (DEBU 01500642–95), 2.viii.2004, 6 ♂♂ 7 ♀♀ (DEBU 01500887–99), 4.ix.2004, 3 ♂♂ 3 ♀♀ (DEBU 01501441–46), sweeps, mostly emergent *Carex/Equisetum [fluviatile]* nr. boardwalk, 16.vi.2007, 8 ♂♂ 12 ♀♀ (DEBU 01501855–74); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, emergent *Equisetum fluviatile*, 20.viii.2006, 2 ♂♂ 7 ♀♀ (DEBU 01501768–76), sweeps from boardwalk, mostly emergent sedges/*Equisetum [fluviatile]*, 17.vii.2004, 13 ♂♂ 16 ♀♀ (DEBU 01500285–313), 24.vii.2004, 46 ♂♂ 68 ♀♀ (DEBU 01500438–551), 2.viii.2004, 32 ♂♂ 48 ♀♀ (DEBU 01500760–790, -792–840), 7.viii.2004, 37 ♂♂ 48 ♀♀ (DEBU 01500985–1069), 3.ix.2004, 22 ♂♂ 30 ♀♀ (DEBU 01501271–322), 4.ix.2004, 31 ♂♂ 34 ♀♀ (DEBU 01501361–425), 27.vi.2005, 17 ♂♂ 42 ♀♀ (DEBU 01501621–79), 20.viii.2006, 7 ♂♂ 8 ♀♀ (DEBU 01501777–91), 26.v.2007, 1 ♂ (DEBU 01501795), 16.vi.2007, 25 ♂♂ 21 ♀♀ (DEBU 01501806–51), 7.vii.2007, 29 ♂♂ 27 ♀♀ (DEBU 01501907–62), 25.viii.2007, 4 ♂♂ 4 ♀♀ (DEBU 01502418–25), 14.vi.2008, 2 ♂♂ 4 ♀♀ (DEBU 01501877–82), 29.v.2010, 4 ♂♂ 6 ♀♀ (DEBU 01502444–53), all K. N. Barber leg., sweeping from boardwalk, mostly emergent sedges/*Equisetum [fluviatile]*, 9.vii.2010, 20 ♂♂ 21 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); Pancake Bay P. Pk., 46°58.12'N 84°42.75'W, sweeps, mostly graminoids/*Typha* near wetland boardwalk, 2.viii.2004, 14 ♂♂ 18 ♀♀, K. N. Barber leg. (DEBU 01500929–60); Prescott, 2.viii.1980, 1 ♂, K. N. Barber (DEBU); Hwy 101 at Prairie Bee River (west side bridge), 47°51.81'N 83°54.33'W, sweeps, mostly *Carex utriculata*, 14.vii.2013, 3 ♂♂ 2 ♀♀, K. N. Barber leg. (CNCI); Pukaskwa N. P., Coastal Trail, Hattie Cove–Playter Harbour, sweep, 21.vii.2001, 2 ♂♂ 1 ♀, M. Buck leg. (DEBU 00183008, -019, -925); ~2 km SW Richmond, along railway 3.2 km NE Kettles Rd., 45°08.54'N 75°51.09'W, sweeps, *Equisetum fluviatile*, *Typha*, *Calamagrostis*, *Impatiens*, ditch, 25.vii.2007, 3 ♂♂ 1 ♀; ~4 km SW Richmond, jct. Munster Rd./Kettles Rd., 45°06.83'N 75°52.76'W, sweeps, sedges, *Equisetum fluviatile*, flooded ditch/fen, 23.vii.2007, 25 ♂♂ 24 ♀♀; ~26 km SW Richmond, Jct. Roger Stevens Rd./Dwyer Hill Rd., 45°02.61'N 75°52.36'W, sweeps, emergent *Equisetum fluviatile*, *Eleocharis* sp., ditch, 23.vii.2007, 3 ♀♀, all K. N. Barber leg. (all CNCI); Richmond Fen, 45°05'48.73" N 75°50'39.70" W, ex. forest, 11.vi.2010, 1 ♂ 1 ♀, J. B. Sinclair [B. J. Sinclair] leg. (CNCI, 1 ♂ genit. prep.); Rydal Bank, Rydal Bank Park, 46°21.92'N 83°44.62'W, sweeps, mostly emergent *Equisetum fluviatile*/sedges, 20.viii.2006, 12 ♂♂ 8 ♀♀, sweeps, mostly emergent *Equisetum fluviatile*, 6.vii.2007, 3 ♂♂ 3 ♀♀; St. Joseph Is., 0.3 km W jct. Base Line & U-Line, 46°10.67'N 83°51.22'W, sweeps, *Equisetum fluviatile*, *Typha*, *Scirpus* in ditch, 19.viii.2007, 7 ♂♂ 1 ♀; St. Joseph Is., ~3.9 km SE Hilton Beach, Hwy 548 (W Line), 46°13.80'N 83°50.96'W, sweeps, mostly *Equisetum fluviatile* in dry ditch, 14.viii.2016, 1 ♂; S[ault] S[te.] Marie, 1072 Old Garden R. Rd., 46°33.64'N 84°17.11'W, sweeps, *Equisetum fluviatile*, graminoids, *Typha* in wet ditch, 30.vii.2007, 4 ♂♂ 3 ♀♀; ~10 km W S[ault] S[te.] Marie, Sunnyside Beach Rd., 46°30.51'N 84°32.56'W, sweeps, *Equisetum fluviatile*, sedges, 22.vi.2007, 1 ♂ 3 ♀♀; ~21 km NNE Smooth Rock Falls, 49°20.91'N 81°32.01'W, sweeps, *Equisetum fluviatile* in wet ditch, 19.vii.2009, 14 ♂♂ 12 ♀♀ (1 ♂ genit. prep.), sweeps, ditch-side *Equisetum* spp. [including *E. fluviatile*], grasses, herbs, 8.vii.2012, 3 ♂♂ 3 ♀♀, 19.vii.2009, 1 ♂ 1 ♀, all K. N.

Barber leg. (all CNCI); Sturgeon Falls, 15.v.1954, 1 ♂ 2 ♀♀, A. H. Sturtevant leg. (USNM); ~74 km NNE Thessalon, 46°53.94'N 83°16.23'W, shore of Mississagi R., sweeps, graminoids, herbs, *Equisetum* spp., 5.vii.2010, 3 ♂♂ 7 ♀♀, 17.vii.2010, 27 ♂♂ 50 ♀♀, sweeps, *Equisetum fluviatile* on vegetated bank, 17.vii.2010, 7 ♂♂ 4 ♀♀, K. N. Barber leg. (CNCI), sweeping graminoids with *Equisetum* spp. on muddy shore, 5.vii.2010, 19 ♂♂ 20 ♀♀, J. Roháček leg. (SMOC, 1 ♂ 1 ♀ genit. prep.); Hwy#17 @ Depew R., ~10 km SE White River, 48°32.18'N 85°10.32'W, sweeps, emergent *Eleocharis* sp., *Equisetum fluviatile*, 7.vii.2007, 1 ♂ 6 ♀♀, K. N. Barber leg. (CNCI). **QUEBEC:** Abitibi Co., 3 mi W L. Hebecourt, 21.viii.1972, 1 ♂, R. Hurley leg. (MTEC); Lac St-Francois Nat. Wildl. Area, Marais Fraser, 45°02.37'N 74°27.73'W, *Carex* meadow, sweeping F3a, 11.vi.1999, 3 ♂♂ 2 ♀♀ (LEMQ 0039135–37, -53, -55), sweeping F3b, 5.vi.1999, 3 ♀♀ (LEMQ 0039149, -51, -52), 11.vi.1999, 2 ♂♂ 1 ♀ (LEMQ 0039138, -40, -56), sweeping F3c, 20.v.1999, 1 ♀ (LEMQ 0039160), 28.v.1999, 1 ♀ (LEMQ 0039147), 11.vi.1999, 5 ♂♂ 5 ♀♀ (LEMQ 0039139, -41–44, -50, -54, -57–59), F. Beaulieu leg. **UNITED STATES OF AMERICA: MICHIGAN:** Cheboygan Co., Roberts Road nr. U. Michigan Biol. Stn., 45°32.56'N 84°39.78'W, sweeps, roadside ditch, mostly *Equisetum* spp. [incl. *E. fluviatile*], 25.vi.2010, 1 ♂, K. N. Barber leg. (CNCI); Keweenaw Co., 27.vii.1953, 8 ♂♂, G. Steyskal leg. (USNM).

Other material examined (not included in type series). **CANADA: ONTARIO:** Dubreuilville, along Magpie River, 48°21.12'N 84°34.04'W, sweeping *Equisetum fluviatile*, *Carex* spp. on muddy river bank, 10.vii.2010, 2 ♂♂, J. Roháček leg. (SMOC, used for molecular work); Echo Bay, Echo Bay Marsh, 46°29.71'N 84°04.04'W, sweeps, emergent *Equisetum fluviatile*, 19.viii.2006, 1 ♂ (genit. prep., deformed genitalia); same locality but ex. *Equisetum fluviatile*, dry stalks on surface, 4.iv.2009, [held at] 6°C, L:D 0:24, instar 3 dissected: 23.iv.2009, [reared at] 20°C, L:D 16:8, [each with empty puparium in gelatin capsule], puparium: 15.v.2009, emerged: 29.v.2009, 1 ♀ (teneral), puparium: 16.v.2009, emerged: 31.v.–1.vi.2009, 1 ♂ (deformed genitalia); Hwy #17, ~8.5 km NW Marathon, 48°47.69'N 86°26.11'W, 28.iv.2012, ex. *Equisetum fluviatile*, [reared] misted daily, 22°C, 16L:8D, 60–70% RH, dry stalks on surface, bulk pails, emerged: 15.v.2012, 1 ♀ (teneral), 19.vi.2012, 1 ♂ (head and thorax crushed), all K. N. Barber leg. (all CNCI); Pancake Bay P. Pk., 46°58.10'N 84°42.71'W, sweeps, mostly *Carex* nr. wetland boardwalk, 2.viii.2004, 1 ♀, K. N. Barber leg. (DEBU 01500900, crushed head and thorax); Pancake Bay P. Pk., 46°58.11'N 84°42.72'W, sweeps from boardwalk, mostly emergent sedges/*Equisetum fluviatile*, 24.vii.2004, 2 ♂♂ (DEBU 01500436–437, both with crushed heads, one with crushed thorax), 4.ix.2004, 1 ♀ (DEBU 01501426, thorax crushed), all K. N. Barber leg., sweeping from boardwalk, mostly emergent sedges/*Equisetum fluviatile*, 9.vii.2010, 1 ♂ 1 ♀, J. Roháček leg. (SMOC, both headless); Sturgeon Falls, 15.v.1954, 1 ♂, A. H. Sturtevant leg. (USNM, epandrium torn/missing). **QUEBEC:** Lac St-Francois Nat. Wildl. Area, Marais Fraser, 45°02.37'N 74°27.73'W, *Carex* meadow, sweeping F3a, 11.vi.1999, 1 ♀ (LEMQ 0039148, head and thorax crushed), sweeping F3c, 11.vi.1999, 2 ♂♂ (LEMQ 0039145, -46, 1 ♂ genit. prep., 1 ♂ abdomen missing, both with heads disassociated), F. Beaulieu leg.

Description. Male. Although the closest relative of *A. vulgaris*, this species is externally more similar to *A. furvifrons*. Total body length 1.92–2.62 mm; general colour as in *A. furvifrons* including brownish grey (or dark bronze) microtomentum (Figs 522, 576). Head about as long as high (Fig. 522) and similarly shaped to that of *A. furvifrons*, dark brown and yellow. Occiput dorsomedially distinctly concave, dark brown with greyish microtomentum. Frons relatively narrow (as in *A. vulgaris* but shorter), medially in front of frontal triangle with dull blackish brown to (anteriorly) pale brown and often striated area longer than in relatives, reaching to anterior fourth to almost the fore margin of frons (Figs 523, 575). Frontal triangle also blackish brown but greyish brown microtomentose (denser on ocellar triangle), hence only lateral parts of anterior two-fifths of frons orange-yellow. Orbits brightly yellow and silvery white microtomentose up to posterior ors, brown darkened and grey microtomentose behind the latter. Frontal triangle slightly wider than in *A. vulgaris* and reaching to about midpoint of frons. Frontal lunule, face, parafacialia and gena formed and coloured as in *A. vulgaris*. Postgena with yellow restricted to ventral margin. Mouthparts as in both *A. furvifrons* and *A. vulgaris*. Cephalic chaetotaxy very similar to that of *A. vulgaris* but oc often (slightly) longest of all frontal setae, rarely 1 additional microsetula in front of anterior ors setula, 1–3 pairs of medial microsetulae in anterior third of frons; 6–7 postoculars, vi usually longer but thinner



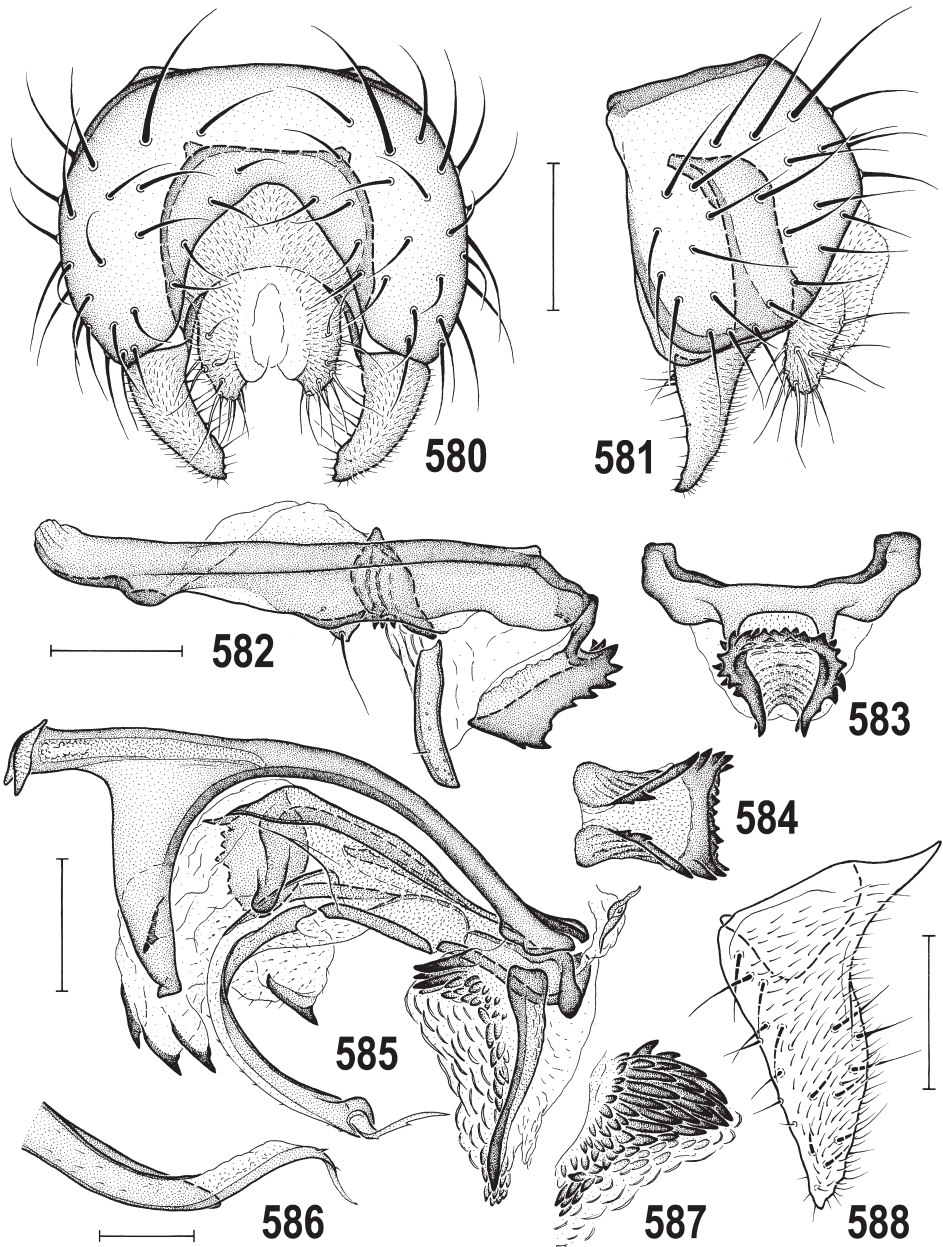
Figs 574–579. *Anthomyza equiseti* sp. nov., its habitat and microhabitat of immatures. 574 – male on *Equisetum fluviatile*, laterally, body length ca. 2.5 mm (Canada: Ontario: Pancake Bay); 575 – the same, dorsally; 576 – the same, dorsolaterally; 577 – large growth of emergent *Equisetum fluviatile*, host plant of *A. equiseti* (Canada: Ontario: Echo Bay); 578 – part of *Equisetum* stem, with larva; 579 – the same, with puparium. Photo by J. Roháček (Figs 574–576) and K. N. Barber (Figs 577–579).

than middle ors. Palpus as in *A. vulgaris*, including chaetotaxy. Eye moderately convex, less elongate (Fig. 522) than in *A. vulgaris* but similarly widened anteroventrally and narrowed posterodorsally (here distinctly wider in *A. furvifrons*, cf. Fig. 518), with longest diameter 1.30–1.35 times as long as the shortest. Smallest genal height about 0.14 times as long as shortest eye diameter. Antenna yellow but 1st flagellomere sometimes ochreous-brown darkened around base of arista; 1st flagellomere with short white pilosity. Arista brown, somewhat shorter than in relatives, about 1.7 times as long as antenna, with cilia slightly shorter than those on first flagellomere.

Thorax as wide as head; blackish brown (mesonotum) to brown (pleural part) and densely brownish grey to dark bronze microtomentose (Fig. 522). Thoracic chaetotaxy largely as in *A. vulgaris* but the hindmost dc microseta (in front of anterior dc) usually distinctly enlarged, sometimes even appearing like a third (foremost) dc macroseta; usually 2 distinct setulae in dorsal half of sternopleuron in addition to 2 usual stpl. Scutellum as in *A. vulgaris*. Legs distinctly darker (Figs 522, 574–576) than in both Nearctic relatives: largely dark yellow but cx_1 entirely or at least partly (in dorsal corner) brown and microtomentose, f_1 usually brownish on posterior side and often also cx_2 , cx_3 , f_3 , t_1 (opposite ctenidial spine), t_3 (less frequently also f_2 and t_2) more or less darkened (except for ends of femora and tibiae); 1–(usually) 2 terminal tarsal segments of all tarsi pale brown to brown. f_1 with ctenidial spine ranging from as long as (most frequently) to distinctly longer than maximum width of t_1 . Other pedal chaetotaxies as described above for *A. furvifrons* but t_2 with ventroapical seta stronger. Wing (Fig. 526) long but relatively wider (less elongate) than that of *A. vulgaris*, coloured as in the latter species. Wing venation closely resembling that of *A. vulgaris* but R_{4+5} usually more diverging from M distally, cross-vein r-m situated slightly in front of the middle of dm cell and apical portion of CuA_1 slightly longer than dm-cu. Wing measurements: length 1.94–2.62 mm, width 0.59–0.79 mm, $Cs_3 : Cs_4 = 1.20–1.63$, $rm \setminus dm-cu : dm-cu = 2.89–3.27$. Haltere dirty yellow with knob ochreous (or orange)-brown darkened (Fig. 574) but the latter often more or less faded in alcohol-preserved specimens (Fig. 522).

Abdomen similarly formed, coloured and setose to that of *A. vulgaris* unless stated otherwise. T1 with anterior corners yellow, contrasting with rest of brown tergum. Preabdominal sterna darker than those of *A. vulgaris*, all pale brown or S2 and S5 (mainly laterally) darker. T6 half length or less of T5, transverse, largely brown but medially narrowly unpigmented, bare or with a few setae at posterior margin. S6 and S7 subequally brown or S7 darker, both with blackish brown ledge-like anterior margin, each with 1 (rarely 2) setae; S8 as in *A. vulgaris* and *A. furvifrons*.

Genitalia most resembling those of *A. vulgaris*. Epandrium (Figs 580, 581) somewhat wider than high and with setae less dense than in latter species, with 1 (or more) dorsolateral pair(s) longer and more robust; anal fissure broadly rounded subtriangular, wider than in *A. vulgaris*. Cercus with apex rounded, setae relatively short and apical seta hardly longer others. Medandrium (Figs 580, 581) slightly wider (mainly dorsally) than in *A. vulgaris* and not constricted in the middle in lateral view. Gonostylus (Figs 580, 581, 588) small, very similar to that of *A. vulgaris* but with anterior margin not or only slightly concave and setae on inner side of anterior margin less numerous. Hypandrium (Fig. 582) generally as in *A. vulgaris* including the membranous anterior internal lobes. Transandrium (Fig. 583) also similar but caudal process shorter and basally wider, with medial desclerotized area well delimited; its ventral

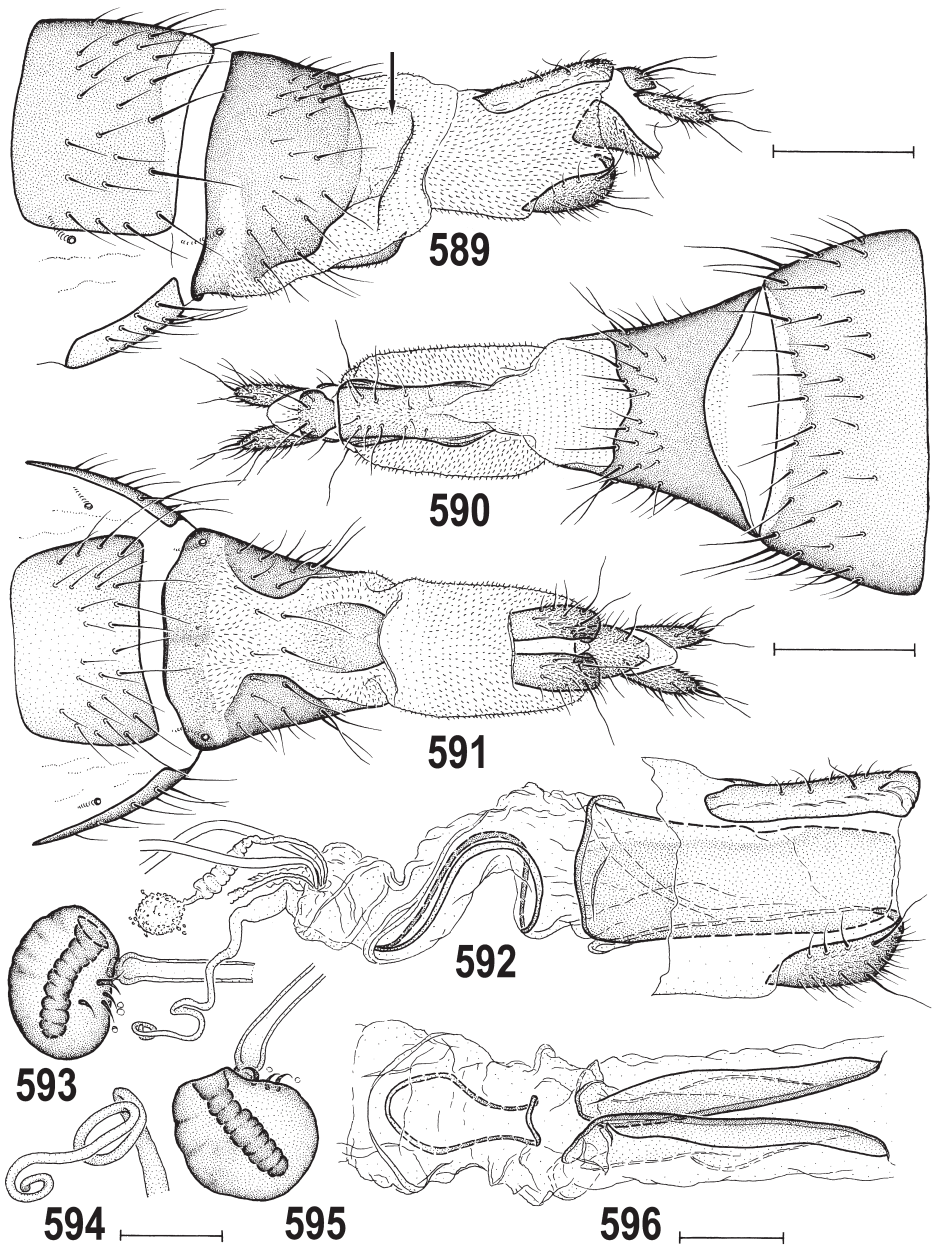


Figs 580–588. *Anthomyza equiseti* sp. nov., paratype male (Canada: Ontario). 580 – external genitalia, caudally; 581 – the same, laterally; 582 – hypandrial complex, laterally; 583 – transandrium, caudally; 584 – caudal process of transandrium, ventrally; 585 – aedeagal complex, laterally; 586 – apex of filum, subventrally; 587 – armature of right wall of aedeagal part of folding apparatus; 588 – gonostylus, ventrolaterocaudally (widest extension). Scales = 0.05 mm (Figs 586, 588) and 0.1 mm (others).

appendage distinctive with strongly flaring margins (Figs 582–584), much broader than that of *A. vulgaris*, particularly posteriorly (Fig. 584). Pregonite (Fig. 582) low, with anterior part less projecting medioventrally than that of *A. vulgaris*, but similarly setose, though 2 shorter setae often smaller. Postgonite (Fig. 582) thicker, less bent and with blunter apex than in *A. vulgaris*; its dark basal sclerite with fewer (usually 3–4) ventral spines. Basal membrane as in relatives. Aedeagal part of folding apparatus similarly spinose to that of *A. vulgaris* but right wall with spines in dorsal cluster longer (Fig. 587) and its left wall (Fig. 585) usually with fewer small spines (dorsally with 2–3 dark strong spines as in *A. vulgaris*). Connecting sclerite slender and sclerotized, gradually tapering towards apex, the latter usually terminated by only 1 spine and surrounded by a few short pale spines (Fig. 585). Phallapodeme most resembling that of *A. vulgaris* but its apex with more projecting ventrolateral corners. Aedeagus (Fig. 585) differing from that of *A. vulgaris* in the saccus having proximal sclerite with serrate margin on right side and more (usually 5) robust black spines in dilated membranous distal part. Filum as in *A. vulgaris*, with terminal slender part simple and with 2 minute spinulae (Fig. 586). Ejacapodeme small, with very slender digitiform projection (Fig. 585).

Female. Similar to male unless mentioned otherwise. Total body length 2.14–3.14 mm. Antenna with 1st flagellomere anterodorsally (on both sides) more or less ochreous brown, usually with only small proximal and ventral parts yellow. Marginal stripe of parafacialia and particularly gena darker ochreous to brown (as in *A. vulgaris*). Palpus yellow but with apex distinctly brownish-darkened. Legs usually paler than in male but brown or ochreous brown darkenings on cx_1 and usually also f_1 distinct. Wing measurements: length 2.16–3.10 mm, width 0.67–0.99 mm, $Cs_3 : Cs_4 = 1.16–1.40$, $rm \setminus dm-cu : dm-cu = 2.65–3.10$. Abdomen similarly formed, coloured and setose to that of *A. vulgaris*. Preabdominal sterna S2–S5 lighter but not narrower than in male; only S1 and S2 brownish, S3–S5 light ochreous yellow, becoming very slightly larger and wider posteriorly and as long as broad; S5 subequal to S4 in size.

Postabdomen (Figs 589–591) generally as in *A. vulgaris*. T6 broad, usually more transverse than in *A. vulgaris*, with narrowly unpigmented posterior margin and setae in posterior two-thirds. S6 transversely suboblong or trapezoidal (wider posteriorly), darker than that of *A. vulgaris*, particularly laterally. Tergosternum T7+S7 narrow, conical, blackish brown (Figs 589, 590) except for ventral part, the latter with the ochreous brown anterior strip with longitudinal groove medially (as in *A. vulgaris*), but the strip extending as a pale-pigmented (brown to yellowish) area a third of the way dorsolaterally (Figs 589, 591); the ventral desclerotized area similar to that of *A. vulgaris* or with anterolateral corners more projecting. Posterior to this area there is a pale brown flat posteromedial appendage (Fig. 591) being variably bent in profile, thus similar to that of *A. vulgaris*. In addition, T7+S7 has posterolateral secondary sclerotizations (Fig. 589, arrow) that are well developed in contrast to *A. vulgaris*. 8th segment (Figs 589, 590), elongate and largely membranous as in *A. vulgaris* but T8 not extended wing-like anterolaterally, with narrow, deep anterior incision and with longest exclinate setae situated more posteriorly (Fig. 590); S8 formed and setose as in *A. vulgaris*. Genital chamber (uterus) with internal sclerotizations very similar to those of *A. vulgaris* but pair of posterior flat sclerites slightly larger and of more regular elongately oblong form in lateral view (Fig. 592); anterior annular sclerite (Figs 592, 596) usually less strongly curved, rather sigmoid in lateral view. Ventral receptacle (Figs 592, 594) slender, simply tube-like, thicker basally and thinner



Figs 589–596. *Anthomyza equiseti* sp. nov., paratype female (Canada: Ontario). 589 – postabdomen, laterally; 590 – the same, dorsally; 591 – the same, ventrally; 592 – female genital chamber and S8, laterally (pleural micropubescence omitted); 593 – spermatheca; 594 – apex of ventral receptacle, ventrally; 595 – spermatheca; 596 – internal sclerites, ventrally. Scales = 0.2 mm (Figs 589–591), 0.05 mm (Figs 593–595) and 0.1 mm (others).

apically, distinctly shorter than that of *A. vulgaris*; accessory gland hyaline, subspherical, with finely granulate surface, on distally dilated and ringed duct. Spermathecae (Figs 593, 595) closely resembling those of *A. vulgaris* (including long invagination, hardly wrinkled surface and short cervix), but spinulae at opening of invagination fewer and more robust (some can be bicuspid). T10 (Fig. 590) yet smaller than that of *A. vulgaris*, narrower anteriorly, rounded posteriorly, with 3–4 pairs of setae including 1 long pair; micropubescence reduced. S10 (Fig. 591) narrow, elongately rounded triangular, tapered posteriorly, finely setulose and largely micropubescent. Cercus as in *A. vulgaris* including chaetotaxy (Figs 589–591).

Discussion. *Anthomyza equiseti* sp. nov. is considered to be the closest relative of *A. vulgaris* sp. nov. (for shared characters see discussion under the latter species). It is more specialized as to host plants than is *A. vulgaris* because it appears to be exclusively associated with some horsetail species (see below).

Anthomyza equiseti is rather easily distinguished from all other members of the *A. gracilis* group by its brownish-grey darkened legs (parts of fore coxae, usually fore femora and sometimes also other femora and tibiae), haltere and anteromedial part of the frons (see key). It also has a very distinctive, robust, broad and (also ventrally) strongly dentate (flared) ventral appendage of the caudal process of the transandrium and a characteristic female T7+S7 with the anteroventral pale-pigmented strip narrowly expanded dorsolaterally. For other differences from *A. vulgaris* see discussion under the latter species and the above description.

Etymology. The name of the new species is a Latin noun in genitive case which indicates its association with horsetails (*Equisetum* spp.).

Biology. *Anthomyza equiseti* is one of the few Nearctic species of Anthomyzidae for which we have strong evidence for a specific host. The rearings made from material collected at the Echo Bay, Ontario site are quite extensive and summarized here. This work was done before, and thus guided, the work done later at the Marathon, Ontario site (summarized under *A. vockerothi*, see Tab. 1).

An attempt at rearing from eggs was conducted in late 2008 before becoming aware, in early 2009, of the microhabitat of the larvae behind the nodal sheaths (Figs 578, 579). Thus this early rearing trial was fraught with high mortality. The adult flies were provided with short sections of stalks of *E. fluviatile* that had been stored in the freezer since collection in late August. These stalks were variously presented vertically (“planted”) in moist sand or horizontally as longitudinally split sections on top of the moist sand. Oviposition was very successful with 1400–1500 eggs laid from 27 August to 12 October across 10 oviposition cup cages populated by adults collected 24 August (25 ♂♂ 31 ♀♀) and 7 September (36 ♂♂ 56 ♀♀). However, more than 1000 of these eggs were laid on the surfaces of the plastic cup cage or in the crevices where the screen was glued to the roof. Eggs were handled in a standard way and more than 900 first-instar larvae were transferred to shallow plates with short sections of *E. fluviatile* stalks but without sand. Most larvae penetrated into the walls of the stalks through the severed ends. However, as in the oviposition cages, these stalks were very prone to mold and only 10 puparia were produced. From these, only six adults emerged after 11 (1 ♂), 12 (1 ♂ 2 ♀♀) or 13 (1 ♂ 1 ♀) days pupariation at 22°C which is 12.2 ± 0.3 days for the sexes combined ($n = 6$). Future rearing attempts will need to fill in the finer details of larval nutrition in the limited “external” space behind the nodal sheaths in order to improve

the success rate of rearing these flies.

Previously in the spring (10 May 2008), marsh litter and substrate (about 0.3 m²) composed mostly of moss and a few *E. fluviatile* stalks was cut out with a trowel from below the overwintered stalks of *E. fluviatile* (most of the latter had been removed/collected). This substrate was kept in vented plastic boxes at 20°C and yielded 13 ♂♂ 11 ♀♀ of *A. equiseti* emerging from 20 May to 12 June along with 2 ♀♀ of *A. orthogibbus*. A sample of the dried stalks of *E. fluviatile* (~15 L) was also taken on 10 May and held in five large plastic boxes while a second sample (~55 L) was taken on 17 June and held in five 20-L fabric-topped pails (as described under *A. vockerothi*). These samples of dried stalks yielded 53 ♂♂ 75 ♀♀ of *A. equiseti* from 17 May to 5 June (boxes) and 38 ♂♂ 41 ♀♀ from 22 May to 5 June (pails) plus 3 ♂♂ and 6 ♂♂ 5 ♀♀ of *A. orthogibbus*, respectively. All field samples were held until 18 June and then discarded.

The rearings of 2008 strongly implicated *E. fluviatile* as the host plant at the Echo Bay site, so on 4 April 2009, another sample was taken with the express purpose of searching for overwintered immatures. These stalks were maintained in the lab at 6°C until subsamples were searched for larvae as time permitted from 5 to 24 April. A majority of the total 268 larvae was found within the space between the nodal sheath and the stalk itself while a small number was found loose in the bottom of the containers. Occasionally there were two larvae in a single nodal sheath and no larvae were found within the hollow internal core of the internodes. Each day's batch of larvae was set up in small plastic petri plates with a short section of dry *E. fluviatile* stalk which was moistened and cleaned as needed. Of the first 68 larvae, 40 were set up individually on a plastic plate while 14 were paired, 6 were in 2 plates of 3 larvae each and one plate held a group of 8 larvae. The remaining 200 larvae were kept in groups of 10 per plate to reduce the total number of plates maintained. The smaller groupings were provided with a section of stalk including a node while the larger groups of 8 and 10 larvae were provided with a longitudinally split section of stalk. The 70 plates were checked daily whenever possible and puparia removed as formed. Larval plates from the same setup date and density were combined partway through as numbers of larvae decreased. Fourteen of the 18 larval deaths had occurred by 25 April with the last death recorded 25 May and holding larvae in larger groups did not increase mortality – 5/60 = 8.3% in small groups compared to 13/208 = 6.3% in groups of 8 or 10 larvae. Puparia were cleaned, dried and then placed individually in a plastic pill vial. In all, 247 puparia were produced beginning 14 or 15 April with the last recruited on 25 May, and the final 3 larvae were killed 29 May. The puparia produced 102 ♂♂ 118 ♀♀ of *A. equiseti* and 5 ♂♂ 4 ♀♀ of *A. orthogibbus* (data summarized under that species), 4 puparia were parasitized (Figitidae: Eucoilinae, 3 adults emerged while one died) and 14 died of unknown causes. There were complete data for 90 ♂♂ 108 ♀♀ of *A. equiseti* providing estimates of 15.5 ± 0.1 (males) and 15.1 ± 0.1 (females) days of pupariation at 20°C.

Adults of *A. equiseti* have been collected from *E. fluviatile*, or a plant community including this plant species, in Alberta, British Columbia, Manitoba and many sites in Ontario. One site (British Columbia: Parson) was a roadside ditch predominated by *Carex utriculata*, *E. palustre* and *E. xitorale*, but no *E. fluviatile* was observed in the immediate collection area. This ditch bordered an extensive protected marshy area that likely supported *E. fluviatile* so this collection of a single female may have been from a neighbouring source. Possible alternative host

species within *Equisetum* were listed in the Biology section under *A. vockerothi* but we do not have direct evidence yet of any host other than *E. fluviatile*. A mixture of *Equisetum* spp. that included *E. fluviatile* along Roberts Road near the University of Michigan Biological Station, Michigan, is one of only two collections of this species made in the United States of America.

Most other label data not specifically mentioning *Equisetum* refer to moist or wet habitats supporting such graminoid plants as *Carex*, *Scirpus*, *Juncus*, *Typha*, and *Calamagrostis*. The latter grass was on the edge of a sedge meadow (Ontario: Moosonee) that had pockets of *E. fluviatile*, especially in the perimeter ditches. There are singular references to “on hemlock” and ex. *Cicuta maculata* L. [= “*Cicuta occidentalis* Greene”] (British Columbia: Lakelse Lk. bog) but both likely refer to “water hemlock” in this wetland and possibly represent spillover of adult flies from nearby *E. fluviatile*. Similarly, “ex. forest” may be somewhat misleading given that the locality was the Richmond Fen (Ontario) where *E. fluviatile* is plentiful. *Anthomyza equiseti* has been collected from 15 May (Ontario: Sturgeon Falls) to 7 September (Ontario: Echo Bay Marsh).

Distribution. This species occurs transcontinentally in Canada from British Columbia to Newfoundland (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Ontario, Quebec) but in the United States of America it is known only from Michigan (see Table 2, Fig. 599). This apparent paucity of more southern records is likely an artefact of the habitat being under collected since the primary (sole?) host plant, *E. fluviatile*, is known to occur broadly in the northern states of the U.S.A. (Washington/Oregon to Maine/Virginia) (HAUKE 1993).

Distributional patterns of the Nearctic species of the *Anthomyza* clade

Table 2 summarizes the distribution of presence data for the 26 Nearctic and one Holarctic species of the *Anthomyza* clade. The jurisdictions are arranged generally from west to east with Alaska and the Canadian provinces and territories listed first. Alaska and the northern Canadian territories are referred to as AK+N-Can (Alaska, Yukon, Northwest Territories), the western provinces as W-Can (British Columbia, Alberta, Saskatchewan, Manitoba), and the eastern provinces as E-Can (Ontario, Quebec, Labrador, Newfoundland, New Brunswick, Nova Scotia, Prince Edward Island). Nunavut was the lone Canadian jurisdiction without any records and is excluded from the matrix. The states of the United States of America are broken into six groups from west to east, namely the northwest (NW-USA: Washington, Oregon, Idaho, Montana, Wyoming), southwest (SW-USA: California, Nevada, Utah, Colorado, Arizona, New Mexico), midwest (MW-USA: South Dakota, Minnesota, Wisconsin, Michigan, Iowa, Missouri, Illinois, Indiana, Ohio), south-central (SC-USA: Oklahoma, Texas, Arkansas, Louisiana, and Mississippi), northeast (NE-USA: New York, Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Pennsylvania, New Jersey, Kentucky, West Virginia, Virginia, Maryland, District of Columbia), and southeast (SE-USA: Tennessee, South Carolina, North Carolina, Alabama, Georgia, Florida). Reference is sometimes made to E-USA and W-USA which refer to NE-USA and SE-USA combined and NW-USA and SW-USA combined, respectively. All five states in SC-USA had no records and were excluded from the matrix. In addition, Delaware, Kansas, North Dakota, Nebraska, and Rhode Island were similarly excluded.

At 20 clusters, there were 14 distributions clustered into 7 pairs leaving 13 species distributions not yet clustered. This was not considered much of an improvement over the original 27 individual species distributions. At 15 clusters, there were three clusters of two species each (pairs), three clusters of three species each, and one cluster of four species distributions leaving eight distributions not yet clustered. The vertical grouping of species in Table 2 reflects the results of the cluster analysis at the level of ten clusters chosen as a moderate number of major groupings for discussion purposes. Each of them will be discussed separately and, within each, the analytical results at the level of 15 clusters and at 20 clusters will be mentioned and the additional clusters referred to as subclusters. The five subclusters recognized at the level of 15 analytical clusters (five steps prior to 10 clusters) are identified with a heavy box surrounding the species name(s) (in green type) while the final five subclusters (10 steps prior to 10 clusters) contributing to 20 analytical clusters appear within finer boxes (in purple type) in Table 2. The clusters are numbered according to the analytical output (the sequence of their demarcation) but in Table 2 they are arranged vertically in a more or less west to east concentration in the distributions for better comparison.

The absence of representatives of the *Anthomyza* clade in much of the southernmost Nearctic Region (including all states of the SC-USA) seems to be a general characteristic of the distribution of this temperate-adapted group. This may be the result of the relatively hot and dry climate limiting the availability of moist habitats with suitable host plants. At these latitudes only the more humid high-montane (grassland) habitats can host some species of this group, as found for *Arganthomyza acuticuspis* in Arizona and New Mexico. On the other hand, it is surprising that species of *Anthomyza*, *Arganthomyza* and *Ischnomyia* have not yet been found in Florida's marshlands or edges of swamps and waterlogged forests. One might also expect that the habitat at the single collection site in Alabama of *A. variegata* (Fig. 597) would support other species and that similar habitat would also be available in parts of Mississippi, Louisiana and even eastern Texas. Yet there seems to be a southern and western limit in the SE-USA roughly corresponding with a line extending down from the Appalachian Mountains. This latitudinal restriction agrees well with the distribution of these two genera in Europe and Asia (ROHÁČEK 2009a) where they are also largely distributed in the northern belt of the Palearctic with southernmost insular occurrences in high mountains of the Palearctic and Oriental Regions. A representative selection of species distributions, including the most distinctive, is provided in Figs 597–600.

Cluster 1. *Anthomyza dichroa*, *A. oblonga*, *A. orthogibbus*, *A. shewelli*, *A. sylvatica*, *A. variegata*, *Arganthomyza vittipennis*, *Ischnomyia albicosta*

This is the largest cluster at eight member species and the most heterogeneous (Table 2) as evidenced by the number of subclusters. Most species are widely represented in MW-USA, E-USA but less so in E-Can. None of these species has been recorded from AK+N-Can, only *A. sylvatica* reaches west to Alberta and British Columbia in W-Can, and only three species have been recorded from W-USA. All species are represented in at least two of the southern and eastern jurisdictions of MW-USA (namely Missouri, Illinois, Indiana and Ohio) where no other species has been recorded.

The pair of *I. albicosta* (Fig. 597) and *Arg. vittipennis* represents the shortest pairwise Jaccard distance in the matrix and the first cluster identified in the analysis (i.e. level of 26 clusters), hence the most similar pair of distributions. They are restricted to eastern North America including much of the MW-USA.

When the number of clusters is increased from nine to 15, *Anthomyza orthogibbus* is not yet clustered. Its distribution is fairly spotty in the E-USA and it is the only species of Cluster 1 not reaching into the western and northern jurisdictions of the MW-USA. It reaches Manitoba in W-Can but no further east than Quebec in E-Can. The subcluster of *A. dichroa*, *A. oblonga* and *A. shewelli* remains separate as well at 15 analytical clusters and is perhaps remarkable for its more extensive representation in E-Can and further penetration into W-Can (as far as Saskatchewan) and even NW-USA (Montana and Idaho) with *A. shewelli*.

At the level of 20 clusters, *A. dichroa* is not yet clustered with *A. oblonga* and *A. shewelli*, possibly as a result of its absence from Saskatchewan and North Carolina and unique or near unique presence in Maine and Vermont. *Anthomyza silvatica* and *A. variegata* are also not yet clustered at the level of 20 clusters and remain as individual distributions. The former is widely distributed in W-Can and transcontinental in Canada (Fig. 597). Its membership in Cluster 1 may be partly based on its shared presence in many jurisdictions of E-USA (and MW-USA as mentioned above) and this may speak to a bias for data from these more numerous, smaller jurisdictions. *Anthomyza variegata*, on the other hand, has a distribution that is very similar to those of *I. albicosta* and *Arg. vittipennis* (see Fig. 597 comparing *A. variegata* and *I. albicosta*). These latter two species distributions represented in Fig. 597 are very similar and suggest a northern limit at the Great Lakes – St. Lawrence River. What seems to be an outlier in Colorado has not excluded *A. variegata* from membership in Cluster 1. *Arganthomyza vittipennis* extends a little further north in Ontario above Lake Huron to Sault Ste. Marie and Fairbanks Provincial Park. Despite its apparent heterogeneity, Cluster 1 can still be considered a collection of distributions anchored particularly in E-USA and expanding broadly westward through MW-USA.

Cluster 2. *Anthomyza gilviventris*, *A. pengellyi*, *A. pullinotum*, *A. vockerothi*, *Arganthomyza duplex*, *Arg. disjuncta*

This group of six species in Cluster 2 is well represented in Canada (Table 2), especially AK+N-Can and W-Can, with various absences in E-Can. *Anthomyza vockerothi* is the only species that is not yet known to be fully transcontinental (most easterly record is Great Whale River, northeastern Quebec). In the USA, most species are well represented in NW-USA but less so in SW-USA and MW-USA (only the northwestern portion), scattered in NE-USA and absent from SE-USA.

The pair of *Arg. duplex* and *A. pengellyi* was the second to be clustered in the analysis and can be distinguished within Cluster 2, in particular, by its more extensive occurrence in NE-USA (New York, New Hampshire) but also its unique presence in New Mexico, Minnesota and New Brunswick.

At the level of 15 clusters, *A. pullinotum* and the trio of *A. vockerothi*, *A. gilviventris* and *A. disjuncta* are still recognized as discrete clusters. Records for *A. pullinotum* (Fig. 598) are

among the fewest for species treated here, likely a collecting artifact, leading to a very spotty distribution. Outside of the Yukon, British Columbia, Alberta and Colorado, all jurisdictional collections are based on single localities (Alaska, Labrador, Michigan) or even single specimens (Ontario, New Hampshire). However, in Fig. 598 it can be seen that *A. pullinotum* is distributed in a similar way to that of *A. gilviventris*. The trio of *A. vockerothi*, *A. gilviventris* and *A. disjuncta* are all present in the Northwest Territories, as is *A. pengellyi*, but otherwise it is difficult to see why this subcluster is distinguished from the remaining pair of *A. pengellyi* and *Arg. duplex* (besides the unique occurrences mentioned above for the latter pair). *Arganthomyza disjuncta* is not yet clustered with *A. gilviventris* and *A. vockerothi* when the number of analytical clusters is increased to 20. As in *A. pullinotum*, it is infrequently collected in E-Can but is unique within Cluster 2 for being completely absent from MW-USA and all of E-USA. The remaining pair of *A. vockerothi* and *A. gilviventris* (Fig. 598) was the third to be clustered in the analysis immediately after *Arg. duplex* and *A. pengellyi*. Cluster 2 is more homogeneous than is Cluster 1 and *Arg. disjuncta* probably represents the strongest candidate for recognition as a subcluster.

Cluster 3. *Anthomyza equiseti*, *A. gibbiger*, *A. mcalpinei*, *A. vulgaris*, *Arganthomyza bivittata*

There are two primary pairs in Cluster 3 – the pair of *Anthomyza mcalpinei* and *A. gibbiger* was the fourth to be clustered in the analysis so these distributions are considered very similar while the pair of *A. equiseti* and *Arg. bivittata* was the sixth clustered. All five members of Cluster 3 are absent from AK+N-Can but transcontinental in Canada (Table 2). Figure 599 illustrates the absence of members of this cluster (*A. equiseti*, *A. mcalpinei*) from AK+N-Can compared to members of Cluster 2 (Fig. 598).

However, in the USA there is much more heterogeneity and it is here where subclusters are best distinguished. At 15 clusters in the analysis, the *A. equiseti* and *Arg. bivittata* pair is not yet joined with the other three species. This pair of species is unique in the entire dataset where Michigan is the only jurisdiction in the USA where they occur and this produces a fairly narrow transcontinental band (see Fig. 599 for *A. equiseti*). This close congruence in distribution is in spite of the fact that their habitats are quite different – woodland (in the east) or open (in the west) sites for *Arg. bivittata* and marshy sites for *A. equiseti*. The broader distribution of its known host plant, *Equisetum fluviatile*, does not appear to be a limiting factor for that of *A. equiseti*. Neither do the distributions of *A. equiseti* and *A. vockerothi* coincide or cluster despite the sharing of this host plant – *A. vockerothi* appears to have a wider host range, at least in the west (see above Biology sections for each of these species).

The remaining subcluster is composed of the only three species (*A. vulgaris*, *A. mcalpinei*, *A. gibbiger*) known to occur in Prince Edward Island. They all have more extensive representation throughout the USA but particularly similar occurrences in the northwestern parts of MW-USA. However, at the level of 20 clusters, *A. vulgaris* remains as a cluster of one. This appears intuitive given that it is absent from NW-USA where both *A. mcalpinei* (Fig. 599) and *A. gibbiger* occur, while *A. vulgaris* is instead the only species in Cluster 3 found in SE-USA. The distribution for *A. vulgaris* in E-USA is very similar to several species in Clusters 1 and 4.

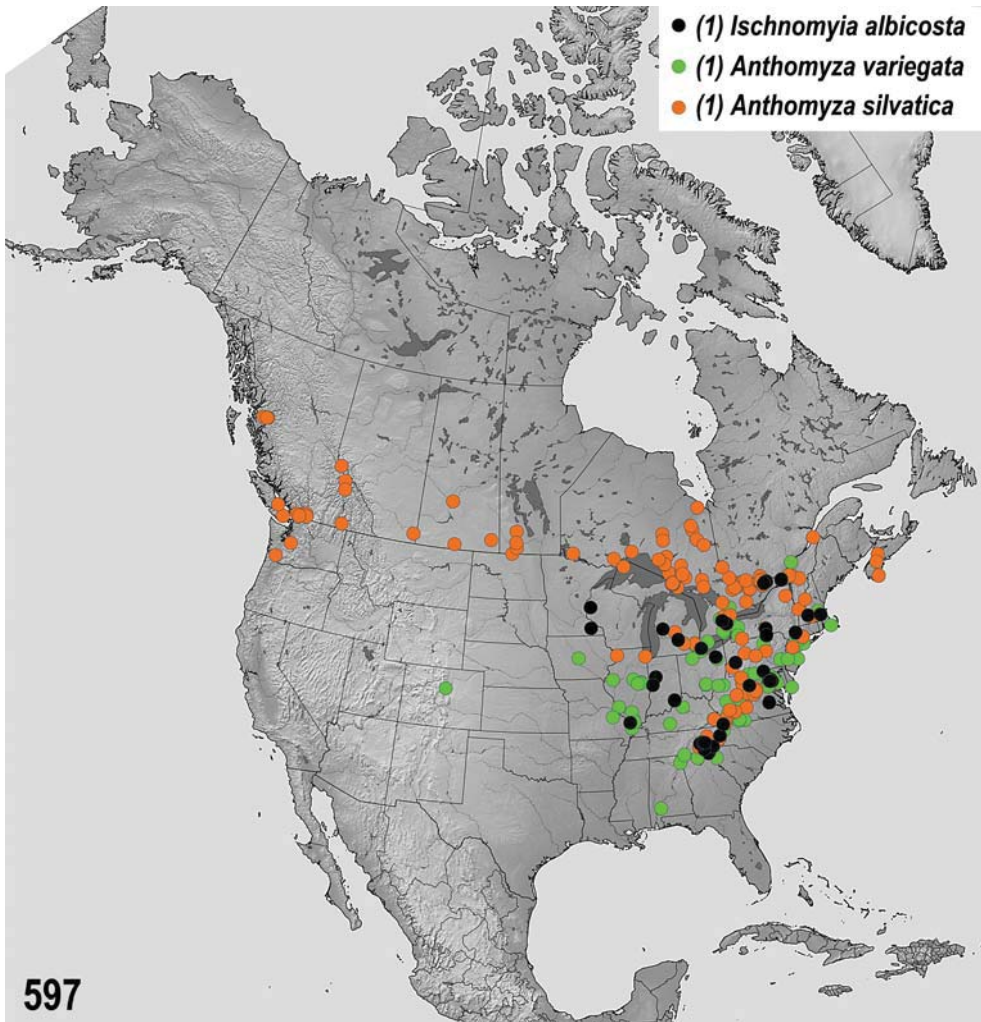


Fig. 597. Map of North America showing distributions of three members of Cluster 1: *Ischnomyia albicosta* (Walker, 1849), *Anthomyza variegata* (Loew, 1863), *A. silvatica* sp. nov. *Anthomyza variegata* and *A. silvatica* share a very dense, overlapping series of records (dots) in the Appalachian Mountains. See “Distributional patterns” for explanation of Clusters.

Cluster 4. *Anthomyza tenuis*, *Arganthomyza carbo*

The distribution of this cluster of two species is probably best typified by its complete absence from both SW-USA and MW-USA (Table 2), but both species are also very similarly represented in E-USA and E-Can. They differ in their western distribution where *Arg. carbo* is known only from a single locality in central Alberta (Figs 599, 604). On the other hand, *A. tenuis* occurs in 7 of 12 jurisdictions in AK+N-Can, W-Can, and NW-USA (Table 2). *Anthomyza tenuis* is the only other species present in AK+N-Can outside of *Arg. socculata* (see below) and members of Cluster 2. Both species in Cluster 4 are associated with woodland habitat in the east but *A. tenuis* is known from open habitats in Alberta (see Biology under each species). This pair of species is not recognized as individual distributions unless 21 or 22 clusters (a tie) are allowed.

Cluster 5. *Anthomyza concolor*

One of three species known from California (Table 2), *A. concolor*, is strictly western as it is not known to occur in MW-USA, E-USA, and E-Can (but see Distribution under *A. concolor* for a possible outlier in New York). It co-occurs with the west coastal *A. occidentalis* throughout the distribution of the latter (Fig. 600) but extends into the southern parts of British Columbia, Alberta, and Saskatchewan, including far northern Saskatchewan, and is unique in being present in all jurisdictions of W-USA.

Cluster 6. *Anthomyza occidentalis*

The distribution of *A. occidentalis* (Fig. 600) is restricted to the west coastal states of California, Oregon, and Washington with a single female known from southern British Columbia. This limited range is presumed to be the result of a specificity for the only known host plant, *Equisetum telmateia braunii*, that is itself limited to the west coast (see Biology under *A. occidentalis*).

Cluster 7. *Anthomyza furvifrons*

Anthomyza furvifrons is an eastern species given its absence from AK+N-Can, W-Can, and W-USA. It is present only in four jurisdictions in each of E-Can and NE-USA and is completely absent from SE-USA. As seen in Fig. 600, this could represent an incomplete distribution similar to that of *A. equiseti* (Fig. 599) as the habitat for this species is one of the most difficult to typify and therefore to predict where else it might occur.

Cluster 8. *Fungomyza buccata*

This clearly eastern species is restricted to the NE-USA and SE-USA (Figs 600, 603) with, as yet, only coastal states represented. It is the only species of the *Anthomyza* clade recorded from South Carolina and, more importantly, Florida. The distribution of *F. buccata* might well be limited by the availability of its host(s) but as yet we do not know the identity of the host fungi.

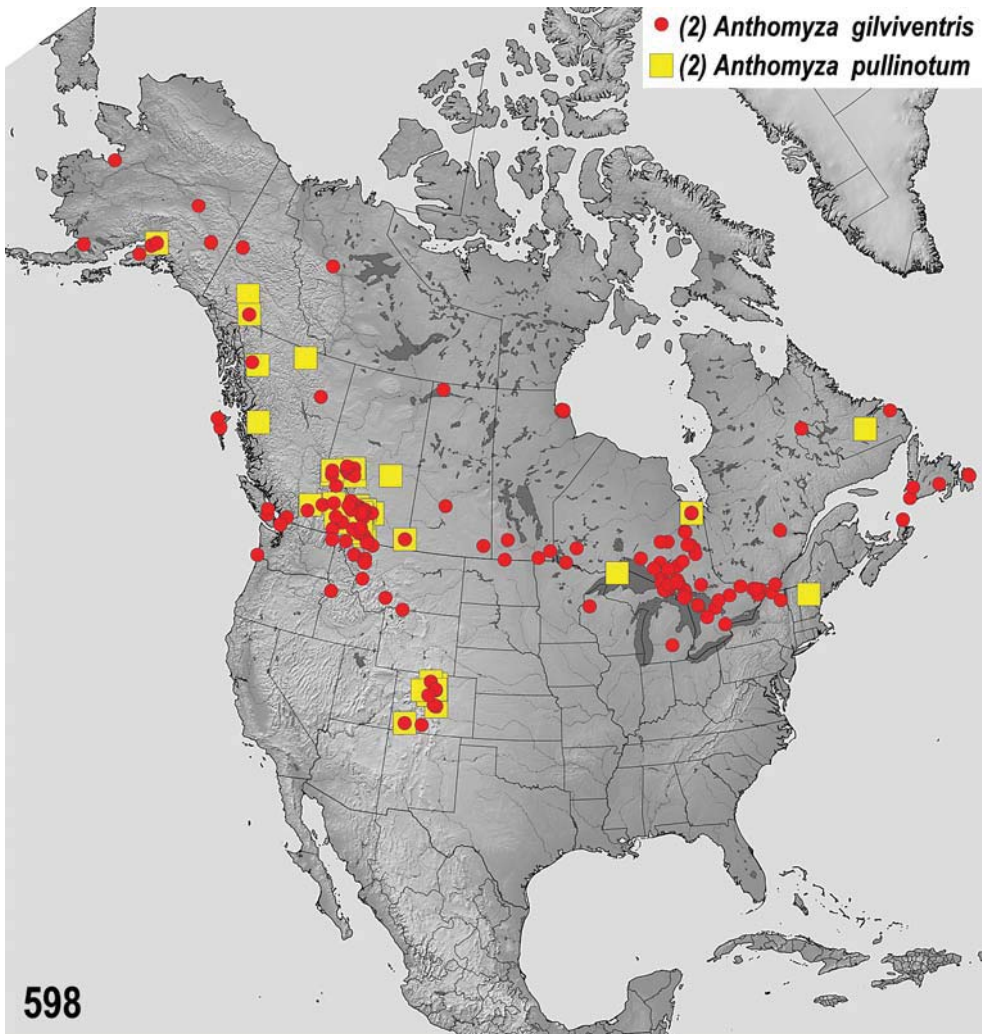


Fig. 598. Map of North America showing distributions of two members of Cluster 2: *Anthomyza gilviventris* sp. nov. and *A. pullinotum* sp. nov. The square symbols for *A. pullinotum* are enlarged to improve visibility at common localities. See “Distributional patterns” for explanation of Clusters.

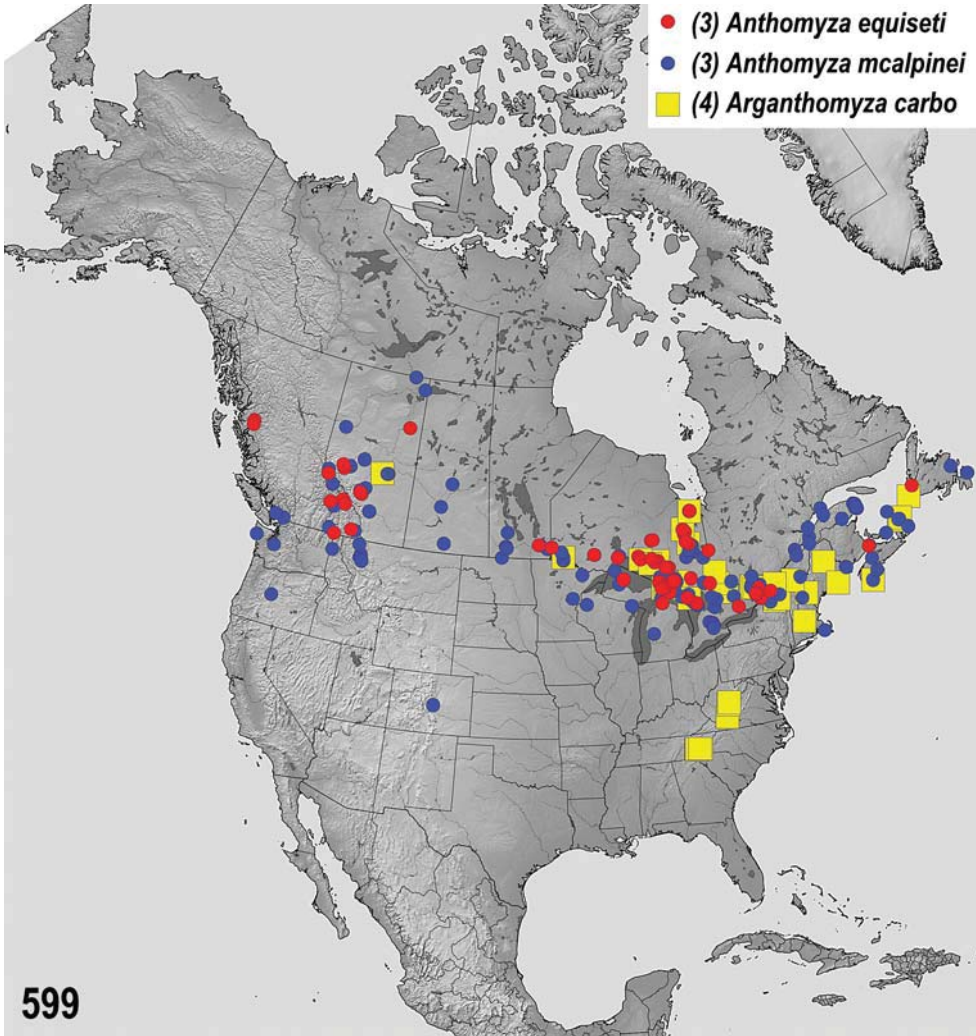


Fig. 599. Map of North America showing distributions of two members of Cluster 3 and one member of Cluster 4. Cluster 3: *Anthomyza equiseti* sp. nov. and *A. mcalpinei* sp. nov.; Cluster 4: *Arganthomyza carbo* Roháček & Barber, 2013. The square symbols for *A. carbo* are enlarged to improve visibility at common localities; there are several records (spots) common to *A. equiseti* and *A. mcalpinei* where the latter is not visible, particularly three records running south from James Bay (Ontario: Moosonee). See “Distributional patterns” for explanation of Clusters.

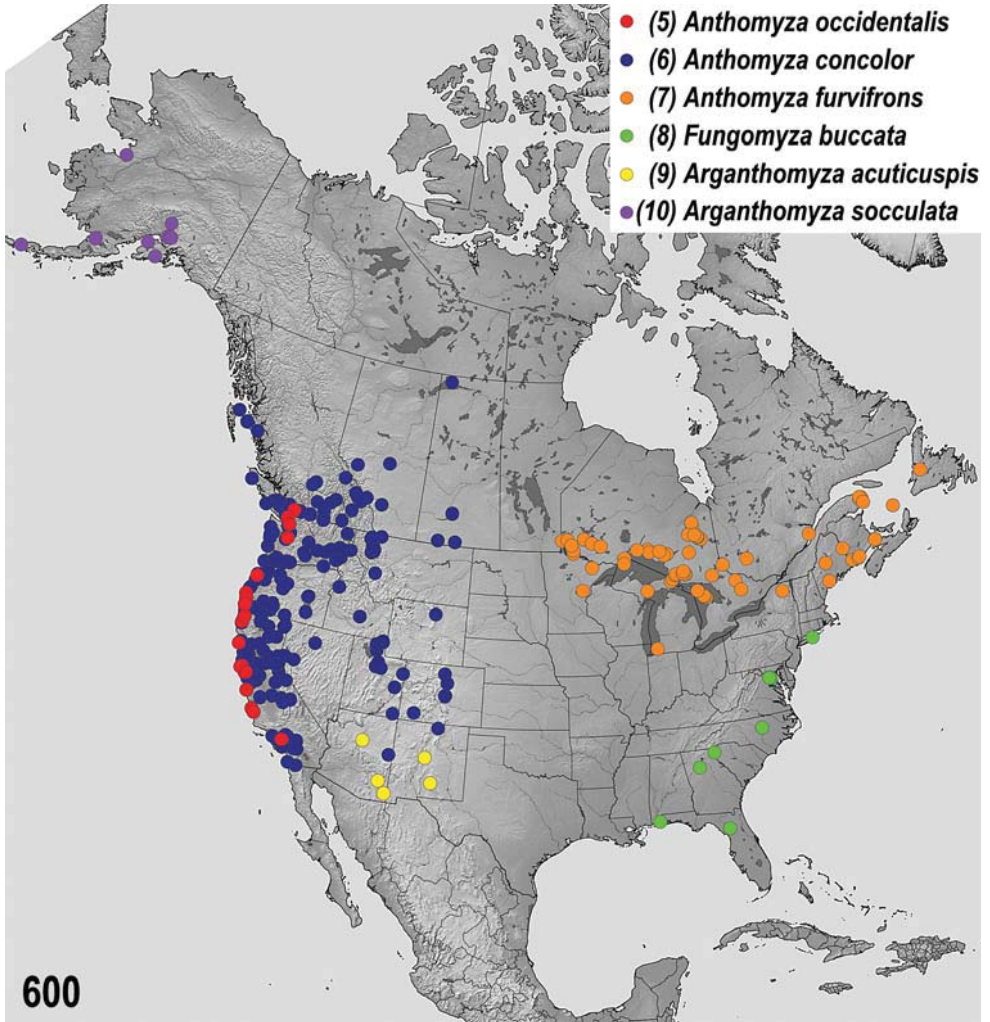


Fig. 600. Map of North America showing unique distributions of six species representing Clusters 5 to 10. Cluster 5: *Anthomyza occidentalis* sp. nov.; Cluster 6: *A. concolor* (Thomson, 1869); Cluster 7: *A. furvifrons* sp. nov.; Cluster 8: *Fungomyza buccata* Roháček & Barber, 2004; Cluster 9: *Arganthomyza acuticuspis* Roháček & Barber, 2013; Cluster 10: *Arg. socculata* (Zetterstedt, 1847). Many of the west coastal localities are shared between *A. occidentalis* and *A. concolor* with several records of the latter not visible. See “Distributional patterns” for explanation of Clusters.

Cluster 9. *Arganthomyza acuticuspis*

This species is still known only from higher elevations in Arizona and New Mexico in the SW-USA (Fig. 600).

Cluster 10. *Arganthomyza socculata*

This Holarctic species (northern transcontinental in the Palaearctic) seems to be restricted to Alaska in the Nearctic (Fig. 600). This may represent an introduction or a natural invasion from the eastern Palaearctic.

This survey of the distribution patterns exhibited by the species of the Nearctic *Anthomyza* clade is intended to provide only a preliminary sketch. Membership in a cluster does not correlate with phylogenetic relationship nor do general habitat associations provide clues, although species associated with woodland habitats in the east appear to be concentrated in Clusters 1 and 4. There are six unclustered or “unique” distributions recognized (Fig. 600) and all are relatively to very regionally restricted. All four strictly western species, namely *Arg. socculata*, *A. occidentalis*, *A. concolor*, and *Arg. acuticuspis*, are included here. The remaining two species include the eastern *F. buccata* which is restricted to the E-USA east of the Appalachians, and the mostly eastern *A. furvifrons* which is present in a narrow band from the Manitoba border to Minnesota, Michigan, Maine and Newfoundland. Clusters 2, 3, and 4 (Figs 598, 599) represent widely distributed species where members of Clusters 2 and 3 rarely reach into the SE-USA (only *A. vulgaris* in Cluster 3) and one of Cluster 3 (*A. mcalpinei*) reaches into the SW-USA. Cluster 4 has a strong presence in SE-USA and its extension west does not include the MW-USA or SW-USA. Cluster 1 is very heterogeneous and includes some species that look to have a Carolinian distribution stretched into the MW-USA (Fig. 597: *I. albicosta*; *A. variegata* has a record in Colorado). But Cluster 1 is a group with strong eastern and mid-western presence with a wide range of penetration further west, particularly in Canada, from virtually none (*Arg. vittipennis*, *I. albicosta*, *A. variegata*) to a pair reaching Manitoba (*A. orthogibbus*, *A. dichroa*) to one reaching as far as British Columbia and Washington (*A. sylvatica*).

Relationships of the Nearctic taxa of the *Anthomyza* clade

Studies of the phylogenetic relationships among taxa of Anthomyzidae have focused mostly on the European (ROHÁČEK et al. 2009, based on molecular data) and Palaearctic members of the family (ROHÁČEK 2009a, based on morphological data); only that of the *Chamaebosca* group of genera (ROHÁČEK & BARBER 2009) included Nearctic and Neotropical taxa. Other morphological analyses were narrower, aimed at the studies of relationships within certain genera, including *Margdalops* Roháček & Barraclough, 2003 (ROHÁČEK & BARRACLOUGH 2003, Afrotropical), *Amygdalops* Lamb, 1914 (ROHÁČEK 2004a: Afrotropical, ROHÁČEK 2008a: Oriental), *Stiphrosoma* Czerny, 1928 (ROHÁČEK & BARBER 2005, world) and *Arganthomyza* Roháček, 2009 (ROHÁČEK & BARBER 2013, world). The latter two papers included the Nearctic species but neither of them incorporated Nearctic members of *Anthomyza* (nor true *Ischnomyia*), which represent the bulk of the *Anthomyza* clade.

Most recently, ROHÁČEK & TÓTHOVÁ (2014) presented a new hypothesis of relationships among Anthomyzidae based on analysis of seven combined mitochondrial and nuclear gene markers with extensive sampling, including Nearctic representatives of the genera *Mumetopia* Melander, 1913, *Stiphrosoma* Czerny, 1928, *Quametopia* Roháček & Barber, 2011 and *Arganthomyza* Roháček, 2009, in addition to Palaearctic representatives of the majority of genera known from the Holarctic Region. Results of the latter analysis – particularly with regards to basal branching in the family – contrast with those based on analysis of morphological data that are discussed above in comments on the relationships of *Fungomyza* (see p. 32), *Arganthomyza* (see p. 58) and *Anthomyza* (see p. 107). The hypothesis presented below is the first attempt, based on morphological data, to uncover relationships among Nearctic species of the *Anthomyza* clade in a much broader context that includes all known genera and species of this clade.

The origin of the Anthomyzidae is to be sought in the early Cenozoic Era (Tertiary, Paleogene), as the oldest known fossils of the family are from Baltic amber inclusions (Lower to Middle Eocene, 38–50 mya), similar to those of the majority of other families of Acalyptratae (cf. EVENHUIS 1994; TSCHIRNHAUS & HOFFEINS 2009). In the Eocene epoch the group was already unexpectedly diverse (see ROHÁČEK 2013a, 2014c), containing not only representatives of the extinct subfamily Protanthomyzinae Roháček, 1998 (including the single genus *Protanthomyza* Hennig, 1965) but also those of the “modern” subfamily Anthomyzinae Czerny, 1903, which includes all extant species of the family. The recent discovery of *Reliquantha variipes* Roháček, 2013, an extant species from Great Britain (ROHÁČEK 2013c) congeneric with the extinct *R. eocena* Roháček, 2014, known only from Baltic amber (ROHÁČEK 2014c), demonstrates that at least some clades represented by recent species may have their origins in this epoch. These lineages apparently arose during a period of extremely rapid radiation in the Middle Eocene thermal optimum (SZWEDO 2012) shortly after the ancestor of the family evolved. Although we currently do not know of any fossil taxon that could belong to the *Anthomyza* clade (all known Anthomyzinae in Baltic amber are of the genera *Lacrimyza* Roháček, 2013 and *Reliquantha* Roháček, 2013 which are not closely related to the *Anthomyza* clade), it is not excluded that such taxa already existed in the Eocene because the recent genera *Fungomyza*, *Anthomyza* and *Arganthomyza* belong to the most basally branched clades of Anthomyzinae as shown in the phylogenetic hypothesis of ROHÁČEK & TÓTHOVÁ (2014).

Phylogenetic relationships of the genera within the *Anthomyza* clade (Fig. 601)

The hypothesis of inferred relationships among all known taxa of the *Anthomyza* clade is presented in Figs 601, 602A, 602B and 605. The latter three trees represent expansions of the more speciose generic branches from the basal tree (Fig. 601) illustrating the inter-relationships of species within genera. Terminations to species of branches within *Receptrixia* (1 species) and *Epischnomyia* (2 species) are therefore not illustrated but their species are named in the text below.

Six genera are currently assigned to the *Anthomyza* clade: *Fungomyza* Roháček, 1999, *Ischnomyia* Loew, 1864, *Arganthomyza* Roháček, 2009, *Receptrixia* Roháček, 2006, *Anthomyza* Fallén, 1810 and *Epischnomyia* Roháček, 2006, but two of them, viz. *Receptrixia* and *Epischno-*

myia, are not represented in the Nearctic fauna. The monophyly of the clade is supported by two synapomorphies in the female terminalia: [1] “long tubular ventral receptacle” and [2] “female S8 medially longitudinally divided”. However, it should be stressed that the normally membranous tube-like ventral receptacle was subsequently modified in *Epischnomyia* (having its curved apex sclerotized, ROHÁČEK 2006a: Fig. 462) and yet more so in *Receptrix* (having its terminal part extremely enlarged mushroom-like with a terminal curved finger-like process, see ROHÁČEK 2006a: Fig. 517). Also in *Epischnomyia*, the female S8 is secondarily widened and fused: this state is considered to be apomorphic in this genus (see character [31]), not a simple reversal (as interpreted by ROHÁČEK 2009a: Fig. 137) because of the distinctive widening of the sclerite (ROHÁČEK 2006a: 460). The longitudinally split S8 otherwise occurs as a (rare) homoplasy only in the distantly related genus *Carexomyza* Roháček, 2009 (see ROHÁČEK 2006a: Fig. 508, as *Paranthomyza*).

The *Anthomyza* clade can be split into two main branches, the first with *Fungomyza*, *Ischnomyia* and *Arganthomyza*, and possibly also embracing the enigmatic and poorly known Near East genus *Receptrix* (which shares with them female characters [3, 4, 12]), and the second with *Anthomyza* and *Epischnomyia* (Fig. 601). This topology differs distinctly from that in the hypothesis of ROHÁČEK (2009a: Fig. 137), particularly as regards the position of *Ischnomyia* and *Epischnomyia*, which were found not to be sister groups based on ROHÁČEK & TÓTHOVÁ (2014) and confirmed by results in this study. While the (here) redefined *Ischnomyia* is clearly a sister group of *Arganthomyza*, the E. Palaearctic genus *Epischnomyia* is postulated to be the closest but highly modified relative of *Anthomyza* (as defined here, Fig. 601) or it may even be an aberrant group within the latter genus as suggested by the results of ROHÁČEK & TÓTHOVÁ (2014), cf. also discussion on p. 107. The branch with *Fungomyza*, *Ischnomyia*, *Arganthomyza* and probably *Receptrix* (cf. below) is supported by three synapomorphies [3–5] but note that the character [3] “spermathecal ducts shortened” can also be found as a homoplasy in several unrelated genera of Anthomyzidae (e.g. *Anagnota* Becker, 1902, *Cercagnota* Roháček & Freidberg, 1993, *Carexomyza* Roháček, 2009, *Typhamyza* Roháček, 1992) although in most of these cases the ducts are not usually shortened to the same extent. The topological position of *Receptrix* in this otherwise monophyletic group remains uncertain inasmuch as the morphological data for this genus are incomplete (the male is unknown) and its only known species, *R. receptrix* Roháček & Freidberg, 1993, is very enigmatic (cf. ROHÁČEK 2006a). Its sister-group relationship with the *Ischnomyia* + *Arganthomyza* pair is therefore only poorly supported by homoplasy [12] “female T7+S7 fused”, a character that is distinctively modified ventrally in *R. receptrix* (cf. ROHÁČEK 2006a; Fig. 514). The above group of genera is also characterized by the widely homoplasious character [107] “male hind femora armed by a row of posteroventral shortened and thickened setae” which also occurs in *Epischnomyia* (Fig. 601) and in some groups of *Anthomyza* (Fig. 605), not to mention its scattered presence in various other genera outside the *Anthomyza* clade including all Baltic amber fossil species of *Lacrimyza* and *Reliquantha*. These specialized setae on the male f_3 are assumed to have evolved many times in the family as an adaptation for grasping the female wings during copulation, as discussed in ROHÁČEK & TÓTHOVÁ (2014: Fig. 2, in *Fungomyza albimana*); also see Fig. 146 (*Arganthomyza duplex*).

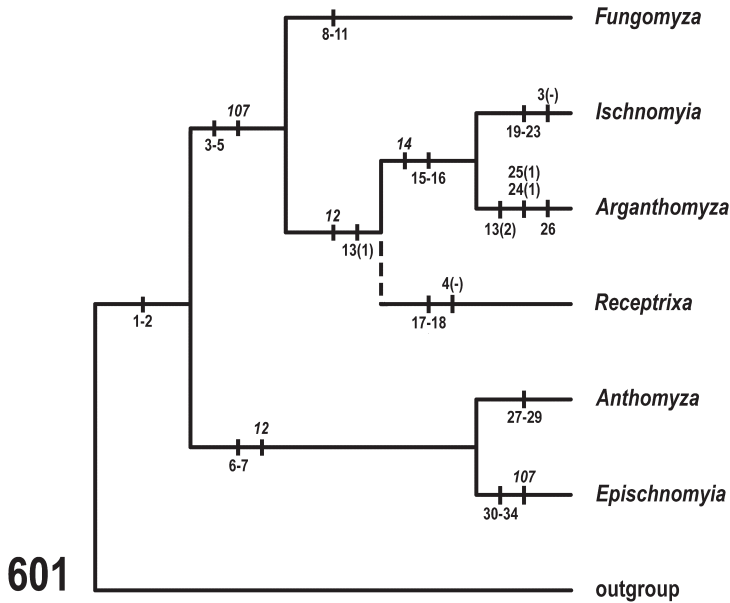


Fig. 601. Cladogram presenting the hypothesis of relationships among genera of the *Anthomyza* clade. Numbers below and/or above branches refer to apomorphic states of characters, those with 1, 2 or 3 in parentheses to states of transformation series, numbers above branches in *italics* denote homoplasious characters, and those with (-) reversals of characters; dashed line indicates questionable relationship. The outgroup is defined as a hypothetical taxon accumulating plesiomorphic characters used in the analysis. For characters mentioned in the cladogram see Appendix (p. 384).

The other branch bearing *Anthomyza* and *Epischnomyzia* is well supported by two apomorphic characters [6–7] and a homoplasious one [12]. The latter character “female T7+S7 partly to completely fused” can also be found in other genera of the *Anthomyza* clade except for *Fungomyza*, and also in the unrelated genera *Cercagnota*, *Stiphrosoma* and *Quametopia*, etc. Also note that in some species or groups of *Ischnomyza* (*I. albicosta*), *Arganthomyza* (*A. disjuncta*) and *Anthomyza* (*A. macra* group, *A. pallida*, *A. pengellyi*, *A. mcalpinei*, *A. vockerothi*, *A. drachma* Sueyoshi & Roháček, 2003, *A. umbrosa* group), S7 can be secondarily separated and even extended or otherwise modified. The character [6] “filum compact, formed by single sclerite” is considered a strong and unique synapomorphy of *Anthomyza* + *Epischnomyzia* because this condition apparently evolved independently from the character [13] in *Arganthomyza* species. In the latter, the almost compact filum in species of the *Arganthomyza socculata* group is a result of fusion of two longitudinal sclerites (demonstrated by a transformation series of character states [13(2–3)] found in this genus, cf. Figs 115, 193), while in *Anthomyza* + *Epischnomyzia* it probably evolved by the reduction or loss of one of the sclerites, as indicated by the presence of a membranous part paralleling the remaining sclerite in many *Anthomyza* species (Figs 264, 465, 556).

The monophyly of the most speciose genus *Anthomyza* is supported by three synapomorphic characters (Figs 601, 605), viz. [27] “ejacapodeme strongly reduced”, [28] “ventral receptacle terminally slender” and [29] “aedeagal part of folding apparatus with well-developed and sclerotized armature”. Its aberrant E. Palearctic sister group *Epischnomyia* is characterized by a number of unique characters (ROHÁČEK 2006a, 2009a) including the following five strong apomorphies used in this analysis: [30] “curved end of ventral receptacle sclerotized”, [31] “female S8 only posteromedially incised (secondarily fused) and broad”, [32] “phallopore projecting posteroventrally to form epiphallus”, [33] “membranous part of saccus of distiphallus reduced” and [34] “female genital chamber with paired internal sclerites strongly anterodorsally expanded”. This small group comprises only two known species, *E. triarmigera* (Sueyoshi & Roháček, 2003) and *E. merzi* Roháček, 2009.

Despite being characterized by the distinct apomorphies [8–11] (Figs 601, 602A), the genus *Fungomyza* is perhaps the most ancestral-looking group of the *Anthomyza* clade because its species retain plesiomorphic conditions of most characters. These include ancestral formation of the filum of the distiphallus (composed of two slender and distinctly separate band-like sclerites (see ROHÁČEK 2006a: Fig. 473; in Figs 38, 41 of male genitalia of *F. buccata* these sclerites are partially covered by each other in lateral view), the unmodified sclerites in the female 8th abdominal segment (Fig. 43), the plesiomorphic shape of the eye (longest diameter nearly vertical, Fig. 35) and the complete frontal (with three long ors, Fig. 35) and thoracic chaetotaxies. It represents the sister group to *Ischnomyia* + *Arganthomyza* plus possibly *Receptrix* (see above). The latter aberrant genus (diagnosed by unique apomorphies [17–18] and also the reversal of character [4]) could represent a sister group of the *Ischnomyia* + *Arganthomyza* pair (as discussed above). The monophyly of the latter pair is unequivocal (see apomorphies [14–16], Fig. 601 and also detailed discussions of their relationship under both these genera, p. 43, 58). Note: the character [14] “vertex with silvery microtomentose stripes or spots” is also found as a homoplasy (but usually more weakly developed) in species of the *Anthomyza macra* group and this feature has been lost (reversed) in *Arganthomyza vittipennis* (see Fig. 602B) and is less distinct in *Arg. carbo*. The monophyly of *Ischnomyia* is well supported by apomorphies [19–23], and reversal of character [3] (spermathecal ducts are very long as in *Anthomyza*). The genus *Arganthomyza* is also well supported by apomorphic characters 24–26, the first two representing first states of multistate characters. The three-state transformation series character [13] is hypothesized to proceed as follows: the first derived state has the filum of the distiphallus composed of two longitudinal sclerites that are widened and closely attached (in *Ischnomyia*, Fig. 58), then partly (mainly basally) fused (in most *Arganthomyza* species, Figs 75, 135) and finally almost completely fused (in the *Arganthomyza socculata* group, Figs 174, 193; see also their distribution in the cladogram (Fig. 602B). Discovery of the unknown male of *R. receptrix* will provide information on the respective state of this and other male characters and will test the present (uncertain) placement of this taxon.

Relationships of species within the genus *Fungomyza* (Fig. 602A)

The phylogenetic affinities of the three *Fungomyza* are hypothesized in Fig. 602A as presented in ROHÁČEK (2009a: Fig. 139). Molecular data are available only for the W. Palearctic *F. albimana* so its relationships to the other congeners, the E. Nearctic *F. buccata* and the E.

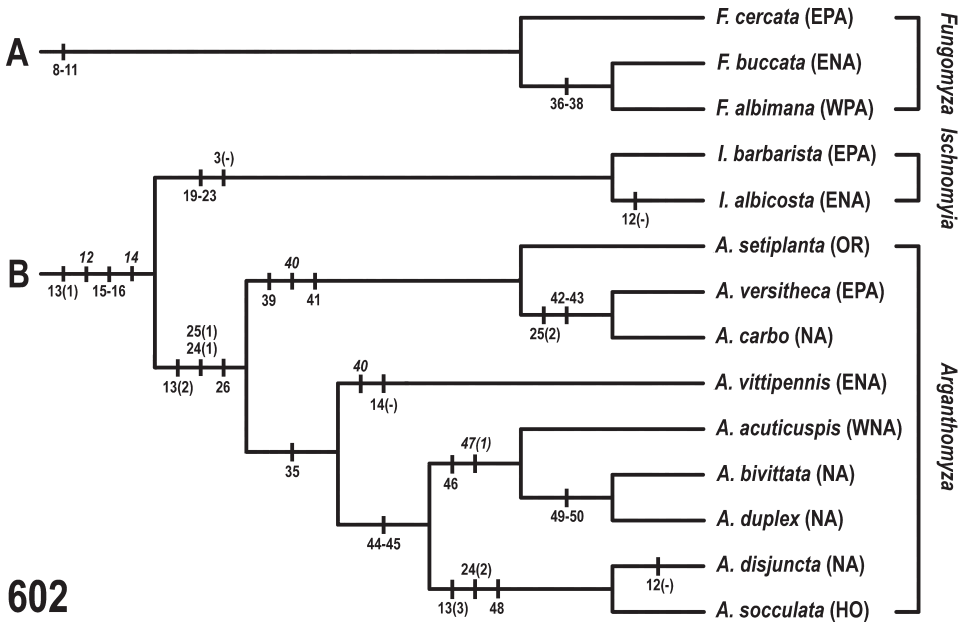


Fig. 602. Cladogram presenting the hypothesis of relationships within the genera *Fungomyza* [A] and *Ischnomyia* and *Arganthomyza* [B]. Numbers below and/or above branches refer to apomorphic states of characters, those with 1, 2 or 3 in parentheses to states of transformation series, numbers above branches in *italics* denote homoplasious characters, and those with (-) reversals of characters. For characters mentioned in the cladogram see Appendix (p. 384). Abbreviations of distributions: ENA – E Nearctic, EPA – E Palearctic, HO – Holarctic, NA – Nearctic, OR – Oriental, WNA – W Nearctic, WPA – W Palearctic.

Palearctic *F. cercata*, are inferred from morphological characters alone. *Fungomyza buccata* and *F. albimana* are recognized as sister species by synapomorphies [36–38] and form the sister group to the more ancestral *F. cercata*. Although the female characters cannot be taken into consideration because they are unknown in the latter species, *F. cercata* possesses more plesiomorphies (characters [36–38]) than the above sister pair along with the unmodified (not abruptly narrowed dorsally) medandrium. The resulting topology is highly interesting from a historical biogeography point of view (see Fig. 603). The transatlantic sister-species relationship of *F. buccata* + *F. albimana* suggests a very old origin for the *Fungomyza* clade if the ancestor of all its recent species had to be distributed across the northern hemisphere before its continents had been too widely separated. The last transatlantic connection (land bridge) between the western Palearctic and eastern Nearctic enabling such a distribution occurred in the early Tertiary (Thulean Land Bridge, ca. 56 mya, see BRIKIATIS 2014), i.e. distinctly before the first (Baltic Amber) fossils of Anthomyzinae are known (ca. 38–50 mya, see above). In an alternative scenario, it is known that much later, in the Middle Eocene (during the existence of Baltic amber forest), the climatic conditions of the far north (of today) were quite uniform in the Europe-Greenland-North America area which was then covered with more or less the

same type of forest (mixed mesophytic) vegetation (KVAČEK 2010) and the existing (rather narrow) sea barriers were not insurmountable for flying insects. The migration of acalyptrate flies, including anthomyzids, in this vast (now more northern) region could therefore be possible despite the separation of land masses in this period.

Relationships of species within the genus *Ischnomyia* (Fig. 602B)

Only two species of *Ischnomyia* are currently known, the E. Palaearctic *I. barbarista* and the E. Nearctic *I. albicosta*. Their close relationship and affiliation under the same genus are supported by a number of apomorphic characters including those used in the present analysis (Fig. 602B, characters [19–23]), despite their striking dissimilarities in outward appearance, particularly wing pattern (see also discussion under the genus, p. 54). The Nearctic *I. albicosta* appears to be the more modified (derived) species that could represent a New World derivative (descendant) of an originally E. Asian clade. Its restriction to eastern North America (see Fig. 597) is therefore somewhat peculiar and unexpected. However, a similar case of a (largely eastern) Nearctic species having its closest affinity to an E. Asian species has been found in *Arganthomyza carbo* (see below).

Relationships of species within the genus *Arganthomyza* (Fig. 602B)

The ingroup relationships of *Arganthomyza* have been hypothesized and discussed in detail by ROHÁČEK & BARBER (2013: Fig. 173) on the basis of morphological data analysis and also by ROHÁČEK & TÓTHOVÁ (2014: Fig. 1) using molecular data. Results of both these studies agree very well with the hypothesis presented here (Fig. 602B) despite differences in sampling: in ROHÁČEK & BARBER (2013), *A. vittipennis* was absent while in ROHÁČEK & TÓTHOVÁ (2014), *A. setiplanta*, *A. acuticuspis* and *A. disjuncta* were missing. The position of the aberrantly coloured *A. vittipennis* (under the name *Ischnomyia spinosa*) within *Arganthomyza* was first suggested by ROHÁČEK & TÓTHOVÁ (2014) on the basis of molecular data. As discussed above (p. 77), this species appears to be morphologically intermediate between the most basally branched *A. setiplanta* group and the remaining species (*A. duplex* group + *A. socculata* group) (see ROHÁČEK & TÓTHOVÁ 2014: Fig. 1 and Fig. 602B here).

The *A. setiplanta* group is basal within *Arganthomyza*, and its monophyly is particularly demonstrated by the unique formation of the ventral receptacle which is [39] “abruptly attenuated as a finger-like projection” distally (see Fig. 77). The character [40] “thickened ventral setae on hind basitarsus” is also a distinct synapomorphy of the group although it is present as a homoplasy in *A. vittipennis* and even in some species of the distantly related genus *Stiphrosoma* (cf. ROHÁČEK & BARBER 2005: Fig. 102). Character [41] “caudal process of transandrium reduced” is another synapomorphy of this group but it is only presupposed in the Nepalese *A. setiplanta*, known only from females. The latter species possesses more plesiomorphies than the two other members of the group, the E. Palaearctic *A. versitheca* and the Nearctic *A. carbo*, which are sister species as demonstrated by shared apomorphies [42–43] and also the “frontal triangle reaching anterior margin of frons” [25(2)]; character state [25(1)] “frontal triangle long but not reaching margin of frons” occurs in all other *Arganthomyza* species. The *A. setiplanta* group may have its origin in eastern Asia (or even in the Oriental

Region, as demonstrated by several unnamed species from China and Taiwan) with a single descendant (*A. carbo*) in North America which must have evolved from an ancestor that reached the Nearctic Region via one of the Beringian land bridges (cf. Fig. 604) or across the sea. Again, the distribution of *A. carbo* is peculiar with respect to this relationship because it does not reach to the west coast of N. America (Fig. 604).

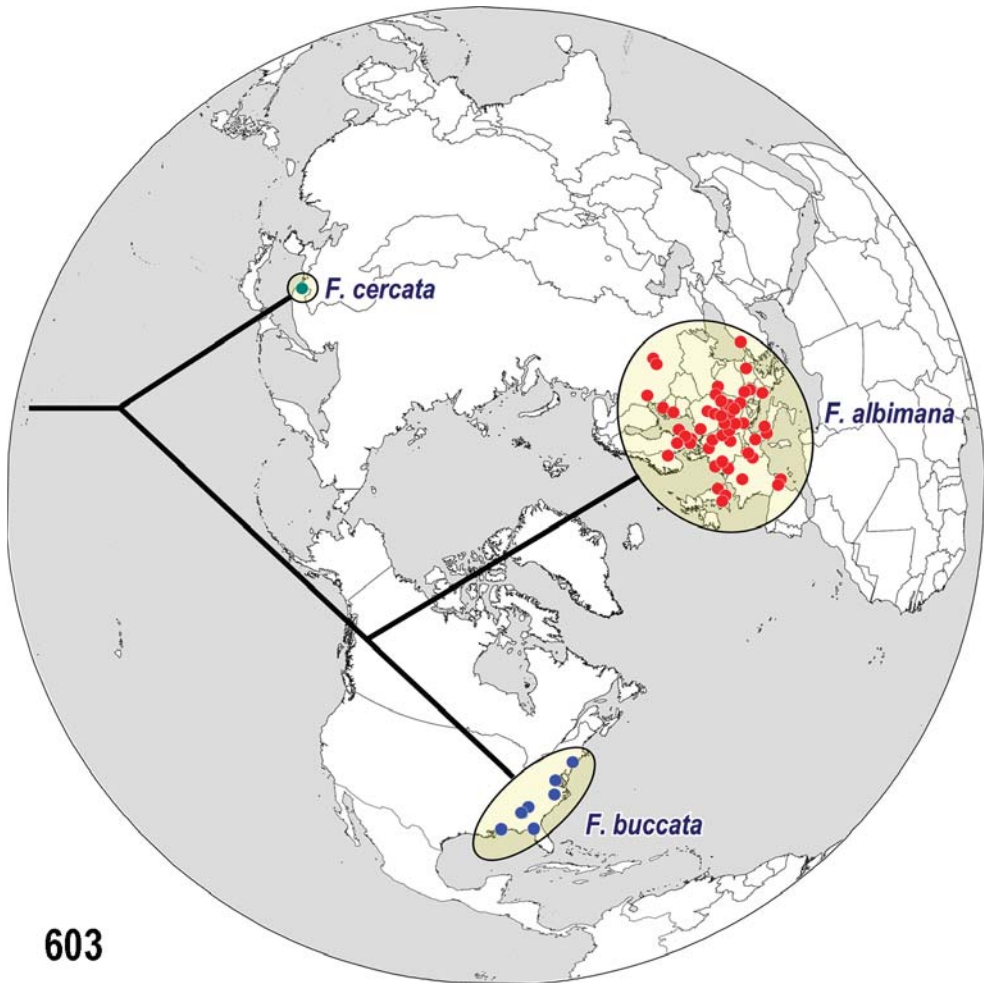
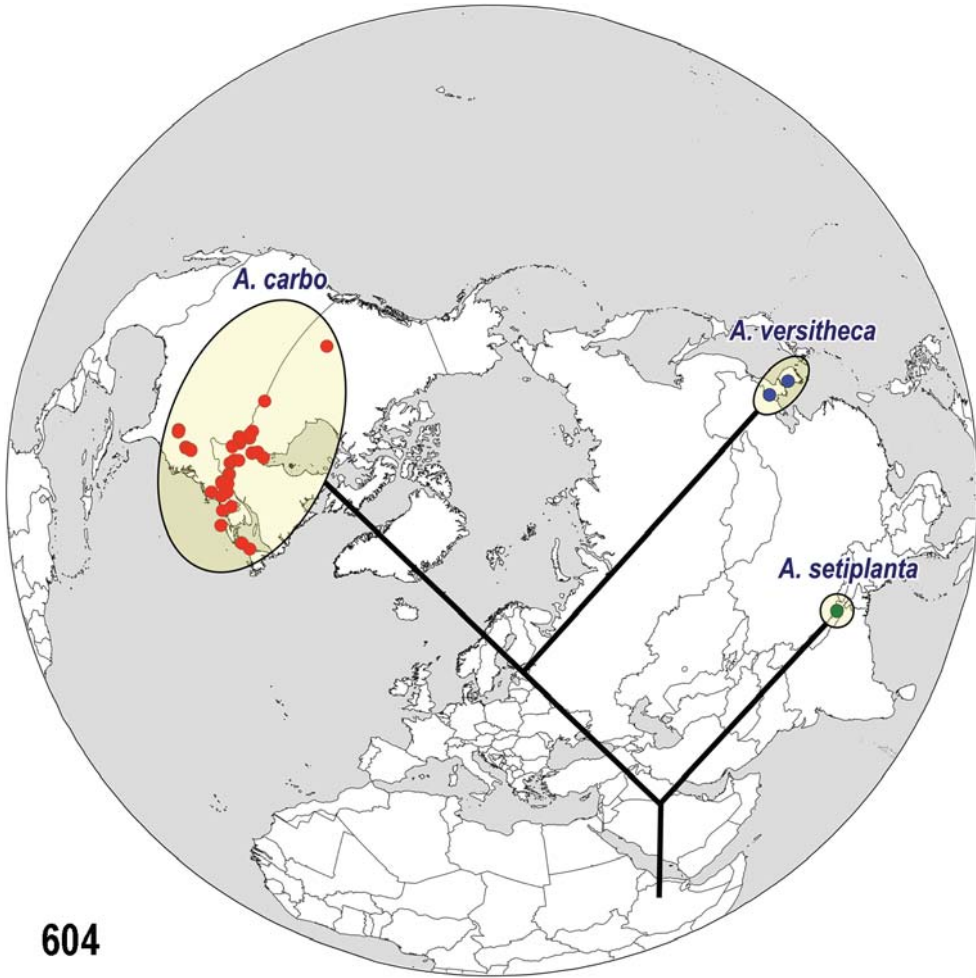


Fig. 603. Phylogeny and its biogeographic implication for species of the genus *Fungomyza*.



604

Fig. 604. Phylogeny and its biogeographic implication for species of the *Arganthomyza setiplanta* group.

As discussed above, the affinity of *A. vittipennis* to the *A. duplex* group + *A. socculata* group is demonstrated by published molecular data (ROHÁČEK & TÓTHOVÁ 2014) and, therefore, this topology (Fig. 602B) is preferred over two other equally parsimonious trees that could be interpreted by the present morphological data. There is only one distinct synapomorphy supporting this relationship, viz. [35] “spermatheca with robust transverse striae”. The monophyly of the clade with the remaining two groups (*A. duplex* and *A. socculata* groups) is supported by characters [44–45], although these are not unique: both [44] “anteroventral transverse dark ledge on female T7+S7” and [45] “grain-like tubercles in dorsal part of

aedeagal part of folding apparatus” can also be found in some species of *Anthomyza* but these are likely of independent origin.

The *A. duplex* group comprises three Nearctic species, *A. acuticuspis*, *A. bivittata* and *A. duplex* (Fig. 602B) and is supported by a basally dilated filum [46] and the homoplasious character of an apically twisted ventral receptacle [47(1)], which is also found in most *Anthomyza* species (excluding those of the *A. macra* group). Within the *A. duplex* group, the montane western Nearctic *A. acuticuspis* (see Fig. 602B) forms the sister group to the widespread Nearctic *A. bivittata* + *A. duplex* pair. The latter pair shares synapomorphies [49–50]. The relationships of species within the *A. duplex* group have been discussed in detail under the species entries above (see p. 79, 85 and 92).

The remaining *A. socculata* group contains two species, the Nearctic *A. disjuncta* and the Holarctic *A. socculata*. These species have highly derived modifications of the filum (see characters [13(3)] and [48]) and spermatheca (character [24(2)]). Because of their extreme similarity (see discussion on p. 104), they could be considered the product of a recent vicariance, possibly as a result of the separation of populations of its widespread common ancestor into disjunct Palaearctic (now *A. socculata*) and Nearctic (now *A. disjuncta*) populations, and where the originally Palaearctic *A. socculata* subsequently (and probably relatively recently) crossed the Bering Strait and reached Alaska where its only known populations in North America reside. This hypothetical scenario is suggested by the fact that the Alaskan specimens more closely resemble morphologically those from the E. Palaearctic than those from Europe (cf. also ROHÁČEK & BARBER 2013) but the degree of difference between these populations can only be demonstrated by molecular study of specimens from various parts of the vast geographic range of *A. socculata*.

Relationships of species within the genus *Anthomyza* (Fig. 605)

The interrelationships of *Anthomyza* species were previously analysed only for Palaearctic taxa (ROHÁČEK 2009a: Fig. 141, based on morphological characters) or selected/available European plus E. Palaearctic species (ROHÁČEK et al. 2009: Fig. 138; ROHÁČEK & TÓTHOVÁ 2014: Fig. 1, both based on molecular data). The hypothesis presented below (Figs 601, 605) includes all 39 known species of *Anthomyza*. In this widest possible species sampling, the morphological cladistic analysis revealed interesting relationships between Palaearctic and Nearctic species that are likely the products of repeated transoceanic vicariance events.

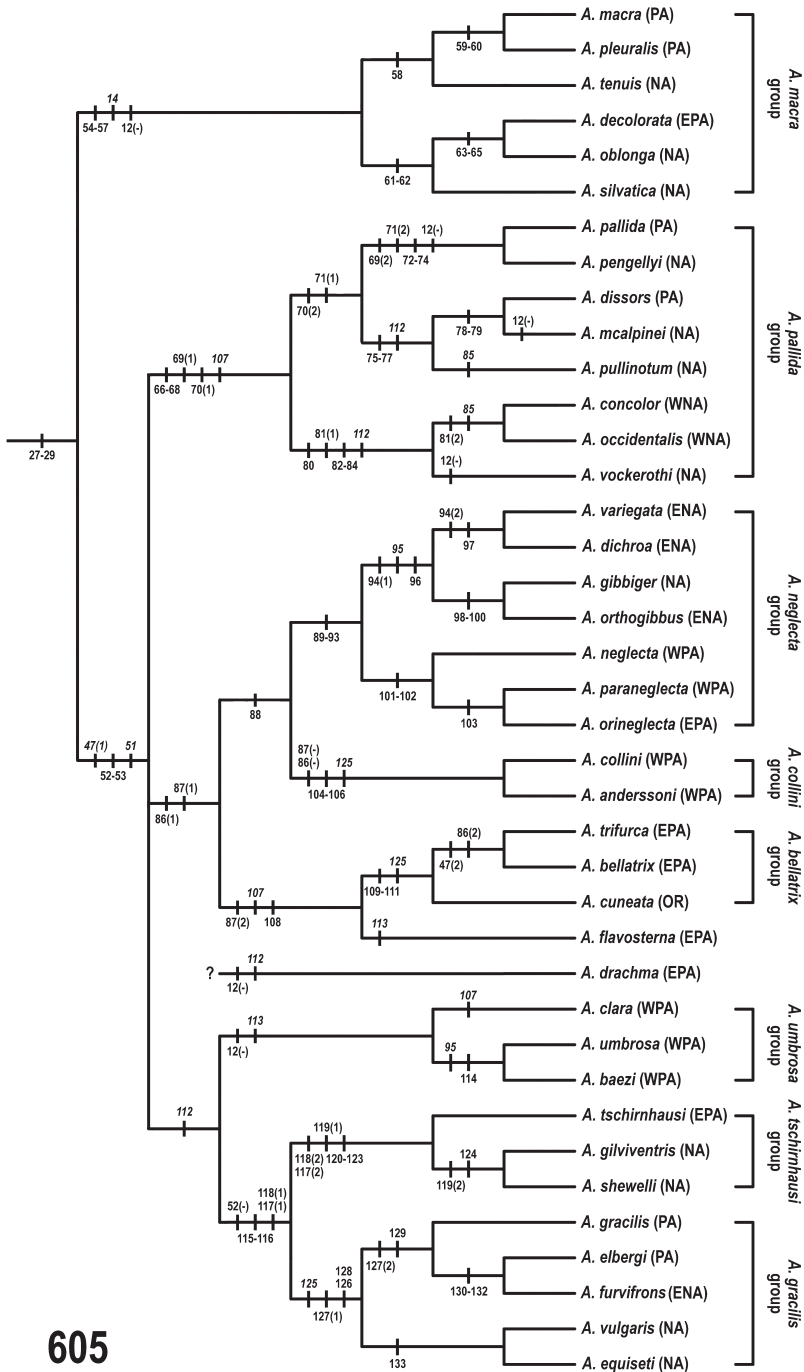
The most basal split of the cladogram separates the *Anthomyza macra* group from the rest of the genus. This is in agreement with previous analyses (see above) of Palaearctic species. The *Anthomyza macra* group is composed of morphologically very similar and obviously closely allied species (see synapomorphies [54–57]). They belong to two clusters (Fig. 605), each with three species (but for another interpretation, particularly as regards the position of *A. tenuis*, see discussion on p. 120). The first branch of the *A. macra* group is rather poorly supported by a single character [58] and includes the Nearctic *A. tenuis* and a sister pair of widespread Palaearctic species (*A. macra* + *A. pleuralis*) supported by characters [59–60]. The other branch, delimited by characters [61–62], is composed of two Nearctic (*A. oblonga*, *A. silvatica*) and one E. Palaearctic species (*A. decolorata*); the latter species proved to

be the sister species of *A. oblonga* (their relationship is supported by three synapomorphies [63–65]) while *A. silvatica* forms a sister group to this pair. These interesting relationships between Palaearctic and Nearctic species of the *A. macra* group suggest two or more temporally discrete transberingian interruptions of the continents leading to representation of two separate clades of the *A. macra* group in the Palaearctic.

The clade forming the sister group of the *A. macra* group comprises 31 species belonging to the remaining seven species groups plus two taxonomically unplaced species (see p. 109). The monophyly of this diverse cluster is supported by four synapomorphies, two of which occur as homplasies in some other taxa. While [47(1)] “apex of ventral receptacle twisted” is a distinct synapomorphy of this complex that evolved in parallel only in the *Arganthomyza duplex* group (see above), the character [51] “loss of setae on medandrium” is widely represented in various genera of Anthomyzidae and is, therefore, of rather low weight. The presence of [52] “silvery or whitish microtomentose medially divided patch above occipital foramen” is a strong synapomorphy of this cluster despite it sometimes being modified (in *A. collini* group) or reduced (interpreted as a reversal in Fig. 605) in the clade *A. tschirnhausi* group + *A. gracilis* group. Similarly, the strong spines in the saccus of the distiphallus (character [53]) is a strong, highly derived synapomorphy supporting the monophyly of the clade. Support for the interrelationships of the seven remaining species groups is rather weak, excluding relatively good support for the *A. tschirnhausi* + *A. gracilis* groups, and weaker support for the *A. neglecta* + *A. collini* + *A. bellatrix* groups (see below). Subsequently, there is an unresolved trichotomy whose branches will be discussed in sequence.

The first branch (cf. Fig. 605) of the trichotomy is the *A. pallida* group whose monophyly is strongly supported by a number of synapomorphies [66–68, 69(1), 70(1)], one of which, character [66] “pregonite with distinctive anterior tooth” (Fig. 282), is unique not only within the genus *Anthomyza* but also the whole family, as mentioned above under the group (p. 142). The homoplasious apomorphic character [107] “male f_3 with specialized posteroventral setae” is considered a rather important synapomorphy of the *A. pallida* group even though it also occurs in various other genera of Anthomyzinae, as mentioned above. However, in *Anthomyza* it is limited to only a few groups (besides *A. pallida* group only in *A. bellatrix* group + *A. flavosterna* and in *A. clara*, see also below) where it apparently evolved in parallel. The most basal dichotomy of the *A. pallida* group resulted in one branch with three exclusively Nearctic species belonging to the *A. concolor* subgroup, which is supported by synapomorphies [80, 81(1), 82–84]. Of its three species the two W. Nearctic, *A. concolor* and *A. occidentalis*, proved to be sister species (synapomorphies [81(2), 85] but the latter occurring as a homoplasy also in *A. pullinotum*), and together form the sister group to the more widespread Nearctic species *A. vockerothi*. The other branch bears five species that share only two synapomorphies:

Fig. 605. Cladogram presenting the hypothesis of relationships within the genus *Anthomyza*. Numbers below and/or above branches refer to apomorphic states of characters, those with 1, 2 or 3 in parentheses to states of transformation series, numbers above branches in *italics* denote homoplasious characters, and those with (-) reversals of characters, “?” indicates unresolved relationship. For characters mentioned in the cladogram see Appendix (p. 384). Abbreviations of distributions: ENA – E Nearctic, EPA – E Palaearctic, NA – Nearctic, OR – Oriental, PA – Palaearctic, WNA – W Nearctic, WPA – W Palaearctic.



[70(2)] “very anteriorly shifted annular sclerite in female genital chamber” (the second state of the transformation series, Fig. 273) and [71(1)] “filum with dorsal subterminal lobe” (Fig. 285), the latter state being further transformed in the *A. pallida* subgroup to the “subterminal tooth” (Fig. 266, see character [71(2)]). This branch is divided between two subgroups which are mostly Nearctic with one Palaearctic representative each (see also pp. 160, 175). The *A. pallida* subgroup is supported by synapomorphy [69(2)], “the very enlarged and prolonged membranous part of saccus” (Fig. 264), and by three more apomorphic characters [72–74], and contains a sister pair of widespread Palaearctic (*A. pallida*) and Nearctic (*A. pengellyi*) species. The sister group to the *A. pallida* subgroup is the *A. dissors* subgroup, the monophyly of which is well supported by synapomorphies [75–77], with character [77] (“female genital chamber with unpaired ventral sclerite”) (Fig. 292) is unique to this subgroup. In both the *A. dissors* subgroup and the *A. concolor* subgroup, a homoplasious apomorphy [112] “female T10 with surplus setae in addition to medial pair” (Figs 306, 330) is found. It is otherwise considered a synapomorphy demonstrating relationship of the *A. umbrosa*, *A. tschirnhausi* and *A. gracilis* groups (see below). Among the three species of the *A. dissors* subgroup, a sister-species relationship between the Palaearctic *A. dissors* and the Nearctic *A. mcalpinei* is supported by characters [78–79]; the remaining Nearctic species, *A. pullinotum* possesses a homoplasy [85] shared with *A. concolor* and *A. occidentalis*. Consequently, two Palaearctic–Nearctic sister-species relationships were found in the *A. pallida* group: *A. pallida* + *A. pengellyi* and *A. dissors* + *A. mcalpinei*. The proposed phylogeny supports a Nearctic origin for the group and each of its subgroups, and that the Palaearctic species *A. pallida* and *A. dissors* probably evolved only after the ancestors of the above sister pairs had reached the E. Palaearctic via one or more of the Beringian Land Bridges.

The monophyly of the second clade of the basal trichotomy (Fig. 605) is supported by the first apomorphic states of the transformation series of characters [86] and [87]. Both the [86(1)] “asymmetry of sclerites in female genital chamber” (Fig. 417) and [87(1)] “filum with apex broadened and not simply pointed” (Fig. 428) are unique characters within *Anthomyza* that have been further modified (as second states of the transformation series) in subsequent branches of this clade. The placement of the *A. collini* group within this clade is very poorly supported because both these apomorphies would have to be reversed in this group. Otherwise the *A. collini* group is allied to the *A. neglecta* group based on the synapomorphy [88] “female T7+S7 with anterolateroventral pouch-like bulges” (ROHÁČEK 2006a: Fig. 308) and strong molecular support (see ROHÁČEK & TÓTHOVÁ 2014: Fig. 1). Note: the anterolateral darkened (but less prominent) bulges on the ventral part of T7+S7 in species of the *A. tschirnhausi* group (see Figs 475, 496, 516, 517) somewhat resemble the pouch-like bulges [88] discussed above, but this character is not considered a homoplasy because the structure is formed differently here.

The *A. neglecta* group is currently the second most species-rich group of *Anthomyza*. Its monophyly is demonstrated by synapomorphies [89–93] and embraces four Nearctic species in one branch and three Palaearctic species in another. The Nearctic branch is discussed in detail above (p. 230), supported by three relatively strong synapomorphies, [94(1), 95–96] (Fig. 605), but note that character [95] “armature of aedeagal part of folding apparatus reduced to small tubercles” (Fig. 427) also occurs as a homoplasy in the *A. umbrosa* + *A. baezi* pair. A further split of the Nearctic branch of the *A. neglecta* group results in two distinctive sister

pairs, *A. variegata* + *A. dichroa* and *A. gibbiger* + *A. orthogibbus*, as discussed under the *A. neglecta* group above (p. 230) and under each of these species. We also discussed the origin of the *A. neglecta* group (p. 230) as being in the Nearctic Region because the species with the most ancestrally formed male genitalia (the simple gonostylus in particular, Fig. 391) is *A. variegata*, with support for eastern North America as being the evolutionary centre of the group. The sister pair *A. variegata* + *A. dichroa* is supported by two [94(2), 97] and that of *A. gibbiger* + *A. orthogibbus* by three characters [98–100]. The branch with the three Palaearctic species (*A. neglecta*, *A. paraneglecta*, *A. orineglecta*), supported by characters [101–102], could have diverged relatively long ago when their ancestor reached the Palaearctic Region and was subsequently separated from what would become the Nearctic clade. Its dispersal route via the Beringian area is more probable although the distributions of the two W. Palaearctic species seem to contradict this hypothesis. However, it should be kept in mind that the E. Palaearctic fauna of *Anthomyza* remains poorly known and, therefore, that some other unnamed species of the *A. neglecta* group could exist there. The W. Palaearctic *A. neglecta* proved to be the sister group to the *A. paraneglecta* (W. Palaearctic) + *A. orineglecta* (E. Palaearctic) sister pair and the relationship of the latter pair is supported by character [103]. The above scenario of the Nearctic origin of the *A. neglecta* group is, however, in variance with the Palaearctic and/or Asian origin of both most closely related groups, viz. the *A. collini* group and *A. bellatrix* group.

The *Anthomyza collini* group is composed of only two very closely related W. Palaearctic species, *A. collini* and *A. anderssoni*. This pair is considered to be the sister group of the *A. neglecta* group, following ROHÁČEK & TÓTHOVÁ (2014), despite the two groups sharing only a single synapomorphy [88] (see discussion above) and the presence of reversals of apomorphies [86–87] in the *A. collini* group. Previously (ROHÁČEK 2009a: Fig. 141), *A. tschirnhausi* was tentatively associated with the *A. collini* group but this species (plus its Nearctic relatives) is now considered distinctly closer to the *A. gracilis* group based on the hypothesis presented here (see below). The *A. collini* group differs in several respects from all other groups of *Anthomyza*, and its monophyly is supported by distinctive apomorphies in the female postabdominal structures (see characters [104–106]) and the very densely microtomentose thorax (apomorphic character [125]), but the latter has developed in parallel in the *A. bellatrix* and *A. gracilis* groups. It should be noted that the occipital silvery microtomentose patch [52] is somewhat modified in species of the *A. collini* group where it is more extensive but more greyish and not as contrasting with the rest of the occiput as in species of other groups.

The *A. neglecta* group + *A. collini* group together form the sister group to the *A. bellatrix* group + *A. flavosterna* clade. The E. Palaearctic *A. flavosterna* appears to be related to the *A. bellatrix* group because of the striking synapomorphy [87(2)] “filum with apex extremely dilated and provided with processes” (ROHÁČEK 2006a: Figs 360, 374) and a rather weak one [108] “reduced caudal process of transandrium” (ROHÁČEK 2006a: Fig. 378), but because its female postabdominal structures (T7, S7, simplified internal sclerites of genital chamber with annular sclerite situated posterior to paired ones, spermatheca, ventral receptacle) are so markedly different, this species is not treated as a member of the *A. bellatrix* group (cf. also ROHÁČEK 2006a, 2009a). The monophyly of the *A. bellatrix* group is well supported by synapomorphies [109–111]; within it, *A. cuneata* forms the sister group of the *A. bellatrix* +

A. trifurca sister pair, the latter supported by synapomorphies [47(2), 86(2)] (see Fig. 605). This group obviously has its origin in East Asia because *A. bellatrix* and *A. trifurca* are distributed in the E. Palaearctic and *A. cuneata* is Oriental (but montane, known from Nepal). Additional (unnamed) species of this group are therefore expected to occur in the intervening areas, e.g. in E. and SE. China, and other adjacent parts of the Oriental Region, in particular.

One of the most enigmatic *Anthomyza* species is *A. drachma*, known from Japan (Hokkaido, Honshu) and Iturup I. in the Kuril archipelago. Its peculiar modifications of the male genitalia (e.g. reduced pregonite, a few very large spines in aedeagal part of folding apparatus, small saccus with four robust dark spines, simply pointed filum) and female genitalia (well-developed separate female S7, lemon-shaped spermatheca and symmetrical but complex internal sclerites in the female genital chamber) (see ROHÁČEK 2006a: Figs 341–352) and also reduced thoracic microtomentum (reduced ac microsetae and C without spinulae among hairs), prevent its placement in any of the groups of *Anthomyza* recognized here. Consequently, its relationship remains unresolved in the present analysis as it was in that of ROHÁČEK (2009a), although ROHÁČEK (2006a: 161) mentioned the similarity of the spermatheca to that of *A. baezi*, and similarity of the apex of the filum to that of *A. clara* (i.e. to species of the *A. umbrosa* group). Moreover, species of the *A. umbrosa* group share with *A. drachma* the separate female S7 [12(-)], and *A. umbrosa* + *A. baezi* also share the additional setae on female T10 [112] (a homoplasious character also occurring in some species of the *A. pallida* group, see above). These similarities may not demonstrate actual ancestry, however, and molecular study is likely required to clarify phylogenetic affinities.

The third main branch of the unresolved trichotomy in the cladogram on Fig. 605 bears the three remaining groups of *Anthomyza*: the *A. umbrosa*, *A. tschirnhausi* and *A. gracilis* groups. However, the monophyly of this clade, with the inclusion of the *A. umbrosa* group, is very poorly supported by only a single apomorphic character [112] “female T10 with surplus setae in addition to medial long pair” (Fig. 537) that also occurs as a homoplasy in some species of the *A. pallida* group and also in *A. drachma* as discussed above. The exclusively W. Palaearctic *A. umbrosa* group is characterized by the reversal of character [12] “separate female S7”, which is here considered a synapomorphy because S7 seems to be not only secondarily divided from T7, but also expanded laterally to overlap T7 (ROHÁČEK 2006a: Fig. 211). The other synapomorphy of the *A. umbrosa* group is character [113] “anterior lobes of hypandrium enlarged and projecting dorsally” (ROHÁČEK 2006a: Fig. 216), but this feature is also not unique to this group, as a similar but less developed/sclerotized hypandrial lobes are present in *A. flavosterna*. Within the *A. umbrosa* group, *A. umbrosa* and *A. baezi* (both endemic to Madeira) are sister species, supported by characters [95, 114], and molecular sequence data (ROHÁČEK et al. 2009, ROHÁČEK & TÓTHOVÁ 2014). These species together form the sister group to the continental European species *A. clara*.

The branch with the two remaining groups, the *A. tschirnhausi* and *A. gracilis* groups (Fig. 605), is relatively well supported by several synapomorphies, most distinctively by [115] “filum finely spinulose along its length” (Figs 492, 534) and [116] “internal paired sclerites in female genital chamber very elongate” (Figs 478, 542, 573), both of which are unique within the *Anthomyza* clade. Other synapomorphies include the first apomorphic states of characters [117] and [118]; the second transformation states of both characters occur in species of the *A.*

tschirnhausi group (see below). In addition, the *A. tschirnhausi* and *A. gracilis* groups share a reversal of character [52], but this could also be treated as a synapomorphy because the original silvery white microtomentose patch above the occipital foramen has not vanished completely, but is reduced to a small remnant at the foramen margin (more readily seen in species of the *A. gracilis* group).

The monophyly of the *A. tschirnhausi* group is not in doubt because of the distinctive and unique modifications in the female postabdomen (see synapomorphies [117(2), 118(2), 119(1), 120, 123]), as well as by the unusual lateral sclerotization of the basal membrane in the hypandrial complex (character [121], see Figs 490, 491) and by the shortened paired ventroapical setae on t_2 (character [122]). The group is compact, composed of three morphologically very similar species, with the E. Palaearctic *A. tschirnhausi* basal to the two Nearctic (*A. shewelli*, *A. gilviventris*) characterized by synapomorphies [119(2), 124]). Because both Nearctic species are common and widespread throughout North America it seems more probable that the group originated in the Nearctic Region. If so, *A. tschirnhausi* could be derived from an ancestor that crossed Beringia and reached the Far East not very long ago. Interestingly, *A. tschirnhausi* is hitherto known only from Kamchatka (it has not been found in Japan, for example) where it apparently is an uncommon species (ROHÁČEK 2009a).

The *A. gracilis* group is strongly supported by synapomorphies: the uniquely formed caudal process of the transandrium with its peculiar ventral appendage [128] (Figs 530–532), the spermatheca with unusual eccentric invagination [126] (Fig. 541) and also the aedeagal part of the folding apparatus with clusters of spines on both sides [127(1)] (Figs 528, 534). Additional characters are provided in the group diagnosis on p. 313, including [125] the densely microtomentose body (in contrast to those of the related *A. tschirnhausi* group), which is also independently derived in the *A. bellatrix* and *A. collini* groups. Within the *A. gracilis* group there is a pair of Nearctic species (*A. vulgaris* + *A. equiseti*) that have split from a lineage containing one Nearctic (*A. furvifrons*) and two Palaearctic species (*A. gracilis*, *A. elbergi*). The latter branch is supported by characters [127(2)] “aedeagal part of folding apparatus with strong spines also ventrally” (Fig. 528) and [129] “paired sclerites doubled in female genital chamber” (Fig. 542). Within this clade, support for a relationship between the transpalaearctic *A. elbergi* and the E. Nearctic *A. furvifrons* is provided by characters [130–132]. This E. Nearctic-Palaearctic sister pair indicates that its ancestor may have once lived on both sides of the northern Atlantic Ocean including Greenland. The topology of the other transpalaearctic species, *A. gracilis*, forming the sister group to the above pair, also indicates the likely transatlantic contact of North American and West Palaearctic faunas. The exclusively Nearctic branch of *A. vulgaris* + *A. equiseti* is supported by a single but unique apomorphic character [133] “female T7+S7 ventrally with a posteromedial flat appendage” (Figs 564, 565). These two species share several other characters of the male and female terminalia, but all these appear to be plesiomorphic or of uncertain polarity with respect to the states occurring in the sister group.

Appendix

List of characters used in cladograms (Figs 601, 602, 605)

(A) – apomorphic state, (A1) (A2) (A3) – states of transformation series of multistate characters, (P) – plesiomorphic state

- 1 – ventral receptacle long, tube-like (A); ventral receptacle short (P)
- 2 – female S8 longitudinally medially divided (A); female S8 simple, undivided (P)
- 3 – spermathecal ducts shortened (A); spermathecal ducts very long (P)
- 4 – posterior parts of female S8 bare, recurved and deeply invaginated into 8th segment (A); posterior parts of female S8 unmodified or at most upcurved and shortly invaginated (P)
- 5 – male preabdominal sterna dark and strongly sclerotized (A); male preabdominal sterna pale and less sclerotized (P)
- 6 – filum of distiphallus compact, formed by single sclerite (A); filum formed by two longitudinal sclerites (P) [rarely fused in some *Arganthomyza* species, see character 13(3)].
- 7 – saccus of distiphallus with spines (A); saccus unarmed, at most with pale tubercles (P)
- 8 – female internal sclerites reduced (annular sclerite incomplete and membranous) (A); female internal sclerites (including annular sclerite) well developed (P)
- 9 – subvibrissa reduced and upcurved (A); subvibrissa well developed and proclinate (P)
- 10 – femora variegated (A); femora unicolorous, at most partly infuscated (P)
- 11 – anal fissure of epandrium small (A); anal fissure large (P)
- 12 – female T7+S7 partly to completely fused (A); female T7+S7 separate (P)
- 13 – filum of distiphallus with both sclerites widened and attached (A1); filum with sclerites partly fused (A2); filum with sclerites almost completely fused (A3); filum with sclerites slender and distinctly separate (P)
- 14 – vertex with silvery microtomentose stripes or spots (A); vertex without silvery microtomentose spots (P)
- 15 – ac microsetae reduced, in two rows or absent (A); ac microsetae in four or more rows (P)
- 16 – apex of filum broadened and complex, bearing various processes, spinulae and/or tubercles (A); apex of filum slender and simple (P)
- 17 – female cerci fused (A); female cerci separate (P)
- 18 – ventral receptacle terminally strongly expanded and sclerotized (A); ventral receptacle terminally slender and (sub)membranous (P)
- 19 – head longer than high, anteriorly angular (A); head higher than long, anteriorly rounded (P)
- 20 – arista densely to very densely haired (A); arista sparsely ciliate (P)
- 21 – caudal process of transandrium distally forked and its arms anteroventrally dilated (A); caudal process simple (P)
- 22 – postgonite without anterior setula (A); postgonite with one anterior setula (P)
- 23 – female genital chamber with internal sclerites distant from genital opening (A); genital chamber with internal sclerites close to genital opening (P)
- 24 – spermatheca with basal spine-like appendages (A1); spermatheca with basal appendages bell-shaped (A2); spermatheca with only basal spinulae (P)
- 25 – frontal triangle long, extending into anterior fifth of frons but not reaching its margin (A1); frontal triangle reaching to anterior margin of frons (A2); frontal triangle short, reaching to no more than anterior third of frons (P);
- 26 – postgonite with distal end dilated and bent posteriorly (A); postgonite distally simple (P)
- 27 – ejacapodeme strongly reduced (A); ejacapodeme larger (P)
- 28 – ventral receptacle terminally slender (A); ventral receptacle terminally as wide as basally (P)
- 29 – aedeagal part of folding apparatus with well-developed and sclerotized armature (A); aedeagal part of folding apparatus with structures submembranous (P)
- 30 – curved end of ventral receptacle sclerotized (A); end of ventral receptacle membranous (P)
- 31 – female S8 only posteromedially incised (secondarily fused) and broad (A); S8 medially longitudinally divided and narrow (P)

- 32 – phallopore projecting posteroventrally to form epiphallus (A); phallopore without epiphallus (P)
- 33 – membranous part of saccus of distiphallus reduced (A); membranous part of saccus large (P)
- 34 – female genital chamber with paired internal sclerites strongly anterodorsally expanded (A); paired internal sclerites not anterodorsally expanded (P)
- 35 – spermatheca with robust transverse striae (A); spermatheca finely striated (P)
- 36 – t_1 brown-and-yellow variegated (A); t_1 uniformly yellow (P)
- 37 – ejacapodeme modified, without digitiform projection (A); ejacapodeme with digitiform projection (P)
- 38 – male cercus small, reduced (A); male cercus of normal size (P)
- 39 – ventral receptacle abruptly attenuated distally as a finger-like projection (A); ventral receptacle gradually tapered distally (P)
- 40 – hind basitarsus with 1–3 short, thickened ventral setae (A); hind basitarsus uniformly finely setulose ventrally (P)
- 41 – caudal process of transandrium with sclerotization reduced, submembranous (A); caudal process distinct, sclerotized and flat although sometimes short (P)
- 42 – paired internal sclerites dorsally tapered (A); paired internal sclerites dorsally broad (P)
- 43 – spermatheca narrow and of irregular shape (A); spermatheca broad and subovoid (P)
- 44 – female T7+S7 anteroventrally with transverse dark ledge-like band (A); T7+S7 anteroventrally simple (P)
- 45 – aedeagal part of folding apparatus with grain-like tubercles dorsally (A); aedeagal part of folding apparatus without tubercles (P)
- 46 – filum of distiphallus basally dilated (A); filum basally narrow (P)
- 47 – apex of ventral receptacle twisted (A1); apex of ventral receptacle spirally coiled (A2); apex of ventral receptacle curved (P)
- 48 – apex of filum finely spinulose (A); apex of filum without spinulae (P)
- 49 – female S2–S6 pale-pigmented (A); female S2–S6 dark-pigmented (P)
- 50 – gonostylus with apex bent medially (A); gonostylus with apex relatively straight (P)
- 51 – medandrium bare (A); medandrium with some setae (P)
- 52 – occiput with silvery or whitish, usually medially divided, microtomentose patch above foramen (A); occiput without microtomentose patch (P)
- 53 – spines in saccus strong and dark-pigmented (A); spines in saccus small and/or pale-pigmented (P)
- 54 – spermatheca very elongate (A); spermatheca short and broad (P)
- 55 – saccus of distiphallus with internal coiled strip-like sclerite (A); saccus without coiled sclerite (P)
- 56 – epandrium very broad (A); epandrium narrower (P)
- 57 – gonostylus broad and distally enlarged, spatulate (A); gonostylus narrower and distally tapered (P)
- 58 – female T7 laterally concave (A); female T7 laterally straight to convex (P)
- 59 – female S6 narrow (A); female S6 broad (P)
- 60 – saccus with spines reduced and unpigmented (A); saccus with spines small but distinct and pale-pigmented (P)
- 61 – saccus with spines concentrated basally (A); saccus with spines scattered (P)
- 62 – spermatheca very densely striated (A); spermatheca less densely striated (P)
- 63 – posterior corner of gonostylus strongly projecting (A); posterior corner of gonostylus little projecting (P)
- 64 – female T1–T5 dorsally distinctly and contrastingly depigmented (A); female T1–T5 dorsally pigmented although sometimes paler than laterally (P)
- 65 – apex of filum slender but blunt (A); apex of filum slender lanceolate (P)
- 66 – pregonite with distinctive anterior tooth (A); pregonite without anterior tooth (P)
- 67 – fulcrum arising close to apex of phallopodeme (A); fulcrum arising far from apex of phallopodeme (P)
- 68 – filum with subterminal widening (A); filum not widened subterminally (P)
- 69 – saccus prolonged, with large distal membranous part (A1); saccus with membranous part very elongate and slender (A2); saccus not prolonged, with membranous part short (P)
- 70 – female genital chamber with annular sclerite situated more or less in front of posterior internal sclerites (A1); annular sclerite situated more anteriorly, distant from paired sclerites (A2); annular sclerite below posterior internal sclerites (P)

- 71 – filum with distinct dorsal subterminal lobe (A1); filum with dorsal subterminal tooth (A2); no dorsal subterminal lobe or tooth on filum (P)
- 72 – gonostylus short (A); gonostylus longer (P)
- 73 – pregonite with anterior tooth broad (A); pregonite with anterior tooth narrow (P)
- 74 – female genital chamber with anterior and posterior pair of internal sclerites (A); internal sclerites in dorsal and ventral pair (P)
- 75 – basal membrane with acute spines laterally and short flat spines medially (A); basal membrane uniformly spinulose (P)
- 76 – female T7+S7 with original T7 expanded lobe-like anteroventrally almost to meet medially (A); original T7 not extended anteroventrally (P)
- 77 – female genital chamber with unpaired ventral compact sclerite in addition to annular sclerite (A); genital chamber without unpaired ventral sclerite (P)
- 78 – unpaired ventral sclerite in female genital chamber anteriorly bent (A); unpaired ventral sclerite anteriorly straight (P)
- 79 – one dorsal pair of sclerites in female genital chamber (A); two dorsal pairs of sclerites in female genital chamber (P)
- 80 – body colouration very variable, ranging from yellow to dark brown (A); body colouration less variable (P)
- 81 – saccus with spines enlarged but reduced in number (A1); spines in saccus very large, with extended bases (A2); spines smaller and more numerous (P)
- 82 – filum subterminally with subventral tooth or spine (A); filum without subventral tooth or spine (P)
- 83 – apex of filum finely bicuspidate (A); apex of filum simply pointed (P)
- 84 – spermatheca with narrow and deep terminal invagination (A); spermatheca at most with shallow dish-like terminal invagination (P)
- 85 – female T7+S7 with T7 anteroventrally fused with S7 (A); S7 separate from T7 (P)
- 86 – posterior internal sclerites in female genital chamber more or less asymmetrical (A1); posterior internal sclerites extremely asymmetrical and partly fused (A2); posterior internal sclerites symmetrical (P)
- 87 – filum with apex broad and not simply pointed (A1); filum with apex extremely dilated and provided with teeth or processes (A2); filum with apex slender and pointed (P)
- 88 – female T7+S7 with anterolateroventral (more or less pouch-like) bulges (A); female T7+S7 anteroventrally simple (P)
- 89 – 1st antennal flagellomere with long marginal ciliation (A); 1st antennal flagellomere with short marginal ciliation (P)
- 90 – postgonite with seta situated laterally (A); postgonite with seta situated anteriorly (P)
- 91 – pregonite with posterior process reduced (A); pregonite with posterior process developed (P)
- 92 – end of filum robust, with blunt apical digitiform process (A); end of filum slender and pointed (P)
- 93 – female genital chamber with annular sclerite small and asymmetrical (A); annular sclerite larger and symmetrical (P)
- 94 – female T7+S7 dorsomedially strongly shortened (A1); female T7+S7 dorsomedially interrupted (A2); female T7+S7 dorsomedially longer and entire (P)
- 95 – armature of aedeagal part of folding apparatus reduced to small tubercles (A); tuberculate armature of aedeagal part of folding apparatus well developed (P)
- 96 – internal sclerites in female genital chamber weakly sclerotized (A); internal sclerites in female genital chamber well sclerotized (P)
- 97 – caudal process of transandrium prickly spinose (A); caudal process of transandrium shortly spinose (P)
- 98 – caudal process of transandrium with hump-shaped process dorsally (A); caudal process of transandrium dorsally simple (P)
- 99 – aedeagal part of folding apparatus with thorn-like spines on hyaline striae (A); hyaline striae simple, without spines (P)
- 100 – connecting sclerite with dark spines on distal end (A); no spines on distal end of connecting sclerite (P)
- 101 – annular sclerite in female genital chamber shifted posteriorly, far under paired sclerites (A); annular sclerite situated anteroventrally to paired sclerites (P)

- 102 – caudal process of transadrium with spinulae minute (A); spinulae on caudal process well developed (P)
- 103 – gonostylus with distinct external longitudinal keel (A); gonostylus without external longitudinal keel (P)
- 104 – female T8 strongly attenuated posteriorly (A); female T8 posteriorly simple (P)
- 105 – female S8 expanded dorsolaterally and transitional to pleural membrane (A); female S8 not expanded dorsolaterally and distinctly separated from pleural membrane (P)
- 106 – anterior pair of internal sclerites in female genital chamber outspread wing-like (A); anterior part of internal sclerites subparallel as usual (P)
- 107 – male f_3 with a row of short, thickened posteroventral setae in distal half (A); male f_3 posteroventrally uniformly finely setose (P)
- 108 – caudal process of transadrium reduced, short (A); caudal process well developed (P)
- 109 – basal end of phallapodeme dilated and strongly asymmetrically forked (A); phallapodeme basally less widened and its fork more symmetrical (P)
- 110 – annular sclerite elongate (A); annular sclerite shorter and wider (P)
- 111 – aedeagal part of folding apparatus with very strong spines (A); these spines smaller (P)
- 112 – female T10 with surplus setae in addition to long medial pair (A); T10 with only one medial pair of long setae (P)
- 113 – anterior hypandrial lobes large, strongly projecting dorsally (A); anterior hypandrial lobes smaller, not or little projecting dorsally (P)
- 114 – spermatheca with terminal evagination (A); spermatheca terminally simple (P)
- 115 – filum of distiphallus finely spinulose along its length (A); filum not spinulose along length (P)
- 116 – female genital chamber with internal paired sclerites very elongate (A); internal paired sclerites short (P)
- 117 – female T8 long and slender (A1); female T8 very narrow and elongate (A2), female T8 shorter and wider (P)
- 118 – medandrium high (A1); medandrium very high, narrow and tapered dorsally (A2); medandrium lower and wider (P)
- 119 – female S8 long, devoid of micropubescence and with reduced setae (A1); female S8 longer and its setae extremely reduced (A2); female S8 short, micropubescent and with usual longer setae (P)
- 120 – female T7+S7 narrow, elongately conical (A); female T7+S7 wider, less elongate (P)
- 121 – basal membrane with lateral parts sclerotized (A); lateral parts of basal membrane not sclerotized (P)
- 122 – t_2 with shortened and paired ventroapical setae (A); t_2 with single long ventroapical seta (P)
- 123 – female cercus with reduced micropubescence and apical seta short and exclinate (A); female cercus micropubescent and its apical seta long and directed posteriorly (P)
- 124 – female T8 with setae extremely reduced (A); female T8 with setae longer (P)
- 125 – thorax very densely microtomentose and dull (A); thorax less densely microtomentose, subshining (P)
- 126 – spermatheca with very long, digitiform, eccentric (lateral to basolateral) invagination (A); spermatheca without invagination (P)
- 127 – aedeagal part of folding apparatus with clusters of dark spines on both sides (A1); aedeagal part of folding apparatus with strong spines also ventrally (A2); aedeagal part of folding apparatus without dark spines (P)
- 128 – caudal process of transadrium with ventral toothed appendage (A); caudal process flat, simple ventrally (P)
- 129 – female genital chamber with paired sclerites doubled (A); female genital chamber with single pair of internal sclerites (P)
- 130 – gonostylus with apex truncate (A); gonostylus with apex pointed (P)
- 131 – ventral appendage of caudal process of transadrium elongate (A); ventral appendage of caudal process short (P)
- 132 – pregonite with anterior triangular process reduced (A); pregonite with anterior triangular process well developed (P)
- 133 – female T7+S7 with posteromedial flat appendage (A); T7+S7 without posteromedial appendage (P)

Acknowledgements

Because the present monograph is the result of an extended period (~20 years) of field collecting and subsequent research of the Nearctic Anthomyzidae, numerous colleagues, dipterists, curators, collectors, laboratory technicians and librarians are to be acknowledged for their kind help with our study. We would like to apologize to all who have not been listed below as a result of inadvertent omission or our forgetfulness.

We are grateful to all curators and owners of collections who facilitated our study of type and other specimens under their care, provided old literature and additional unpublished data on samples they collected: H. Andersson, R. Danielsson (MZLU), C. B. Barr (EMEC), M. Barták (MBPC), M. Bowser (KNWR), Y. Brodin (NHRS), B. V. Brown, G.-A. Kung (LACM), M. Buck (PMAE), S. M. Clark (BYUC), C. Copley, R. Cannings, K. Sendall (RBCM), D. A. Dmitriev, P. P. Tinerella, C. Favret (INHS), Z. H. Falin (SEMC), G. A. Foster (G AFC), A. Freidberg (TAUI), S. Gaimari (CSCA), K. Goodger, E. McAlister, D. Whitmore (BMNH), D. A. Grimaldi, L. Thayer, T. C. Nguyen (AMNH), B. C. Kondratieff (CSUC), M. Kotrba (ZSMC), V. Lévesque-Beaudin, J. deWaard (BIOUG), E. R. Loebeke (UGCA), C. J. Marshall, D. D. Judd (OSAC), S. A. Marshall, S. M. Paiero (DEBU), L. Leblanc, F. W. Merickel (WFBM), K. M. Needham, G. G. E. Scudder (UBCZ), N. D. Penny, B. L. Fisher, K. J. Ribardo (CASC), S. P. Cover, P. D. Perkins (MCZC), J. Pitts and the late W. J. Hanson (Utah State University, Logan, Utah), G. Pohl, D. Williams (NFRC), T. Pucci (CLEV), J. E. Rawlins, R. Davidson, and the late B. A. Foote (CMNH), J. B. Runyon, A. C. Dolan, M. I. Ivie, (MTEC), T. L. Schiefer (MEMU), the late H. Schumann (ZMHB), F. W. Shockley, A. L. Norrbom, Lucrecia Rodriguez, P. Gentili-Poole, D. Furth, W. N. Mathis (USNM), D. Sikes (UAMF), J. H. Skevington, J. E. O'Hara, J. M. Cumming (CNCI), J. E. Swann (BDUC), M. Tkoč (NMPC), M. v. Tschirnhaus (Bielefeld, Germany), T. A. Wheeler, Stéphanie Boucher (LEMQ), D. Yanega (UCRC).

R. Davis, W. J. Crins and B. Feilders (Ontario Ministry of Natural Resources, Peterborough, Canada), are thanked for arranging and authorizing access to provincially protected areas of Ontario for field collections. W. Dolan (Alberta Parks, Lethbridge, Canada) is similarly thanked for assistance with authorization of a collection permit for protected areas of Alberta. S. J. Meades (Great Lakes Forestry Centre (GLFC), Herbarium, Sault Ste. Marie, Canada) kindly provided assistance with all things botanical. W. J. Crins also provided valuable identifications of *Carex* species. Thanks also to B. V. Brown and K. V. Brown (LACM) for their hospitality to the junior author (K. N. B.) and assistance in pursuit of *Anthomyza occidentalis*, G. Wallace (Monrovia, California, U.S.A.) for his identifications of *Equisetum telmateia braunii* and *Delairea odorata*, and M. Barry and J. Royer (Los Osos, California) for tips on where to find western horsetails. Similarly, J. E. Swann (BDUC) and his family (Calgary, Canada) and M. Buck (PMAE) are thanked for their hospitality and assistance with access to collection sites in Alberta. J. Pedlar (GLFC) is thanked for his guidance, execution and discussion of the cluster analysis of species distributions.

A. Tóthová (Brno, Czech Republic) is cordially thanked for preliminary results of molecular data analysis of Holarctic Anthomyzidae, M. Deml (Morávka, Czech Republic) for excellent macrophotographs of preserved adults and J. Řehulka and J. Ševčík (SMOC) for their kind

loan of photographic equipment to senior author (J. R.) for his field trip to Ontario in 2010. E. F. Barber (Sault Ste. Marie, Canada), S. A. Marshall (DEBU) and his family (Fergus, Canada) are acknowledged for their kind assistance and hospitality during this research trip.

Our sincere gratitude is further extended to M. Tkoč and P. Kment (NMPC) for very careful and often difficult editorial work on this monograph.

We are very grateful to R. Rozkošný (Brno, Czech Republic) and, particularly, to O. Lonsdale (Ottawa, Canada), for a thorough review of this lengthy manuscript with numerous corrections, comments and critical objections including those which have not been finally accepted.

The junior author's contributions benefited from in-kind support from Natural Resources Canada, GLFC, in the form of use of laboratory space as well as field equipment and computing facilities.

The research of the senior author was financially supported by the grant P506/10/1666 of the Czech Science Foundation (2010–2013) and by the Ministry of Culture of the Czech Republic with institutional financing of long-term conceptual development of the research institution (the Silesian Museum, MK000100595), internal grants of the Silesian Museum No. IGS201103, IGS201303/2013, IGS201401/2014, IGS201505/2015 and IGS201607/2016, including the publication expenses of this monograph by the latter.

World bibliography of Anthomyzidae (updated)

- ABRAHAM R. & CARSTENSEN B. 1982: Die Schilfgallen von Lipara-Arten (Diptera: Chloropidae) und ihre Bewohner in Schilf der Haseldorfer Marsch bei Hamburg. *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg* **7**: 269–277.
- ALDRICH J. M. 1905: *A catalogue of the North American Diptera (or two-winged flies)*. Smithsonian Miscellaneous Collections, Vol. 46 (2 [= pub. 1444]), Smithsonian Institution, Washington, 680 pp.
- ANDERSSON H. 1976: Revision of the Anthomyza species of Northwest Europe (Diptera: Anthomyzidae) I. The gracilis group. *Entomologica Scandinavica* **7**: 41–52.
- ANDERSSON H. 1984a: Revision of the Anthomyza species of Northwest Europe (Diptera: Anthomyzidae) II. The pallida group. *Entomologica Scandinavica* **15**: 15–24.
- ANDERSSON H. 1984b: Family Anthomyzidae. Pp. 50–53. In: SOÓS Á. & PAPPL. (eds): *Catalogue of Palaearctic Diptera. Vol. 10*. Akadémiai Kiadó, Budapest, 402 pp.
- ARNETT R. H., Jr. 1993: *American insects. A handbook of the insects of America north of Mexico*. The Sandhill Crane Press, Inc., Gainesville, 850 pp.
- ARNETT R. H., Jr. 2000: *American insects. A handbook of the insects of America north of Mexico*. Second edition. CRC Press LLC, Boca Raton, xix + 1003 pp.
- ARNETT R. H., Jr., SAMUELSON G. A. & NISHIDA G. M. 1993: *Insect and spider collections of the world*. Flora & Fauna Handbook No. 11 (2. edition). The Sandhill Crane Press, Inc., Gainesville, vi + 310 pp.
- ASQUITH A. & MESSING R. H. 1992: Annotated insect distribution records for the Island of Kauai. *Proceedings of the Hawaiian Entomological Society* **31**: 151–156.
- BÁEZ M. & GARCÍA A. 2004: Orden Diptera. Pp. 261–281. In: IZQUIERDO I., MARTÍN J. L., ZURITA N. & ARECHAVALETA M. (eds): *Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres) 2004*. Consejería de Medio Ambiente y Ordenación Territorial Gobierno de Canarias, La Laguna, 500 pp.
- BÄHRMANN R. 1987: Untersuchungen der Dipterenfauna in natur- und industrienahen Rasenbiotopen Thüringens (DDR) mittels Bodenfallen (Diptera Brachycera). *Deutsche Entomologische Zeitschrift, Neue Folge* **34**: 85–105.
- BÄHRMANN R. 1988: Über den Einfluß von Luftverunreinigungen auf Ökosysteme. XIV. Ökofaunistische Untersuchungen an Zweiflüglern (Diptera Brachycera) industrienaher Agropyron- und Puccinellia-Rasen bei Jena/Thüringen. *Zoologische Jahrbücher, Abteilung Systematik, Ökologie und Geographie der Tiere* **115**: 49–68.
- BÄHRMANN R. 2006: Zur Kenntnis der Anthomyzidae (Diptera) Mitteldeutschlands. *Studia Dipterologica* **13**: 377–389.
- BALACHOWSKYA. & MESNIL L. 1935: *Les insectes nuisibles aux plantes cultivées. Leurs moeurs. Leur destruction*. Établissements Busson, Paris, 1137 pp.
- BAPTISTA A. R. & MATHIS W. N. 1994: A revision of New World Cyamops Melander (Diptera: Periscelididae). *Smithsonian Contributions to Zoology* **563**: 1–25.
- BARBER K. N. & ROHÁČEK J. 2010: 81. Anthomyzidae (Anthomyzid flies). Pp. 1073–1081. In: BROWN B. V., BORKENT A., CUMMING J. M., WOOD D. M., WOODLEY N. E. & ZUMBADO M. A. (eds): *Manual of Central American Diptera*. Vol. 2. NRC Research Press, Ottawa, xvi + 715–1442 pp.
- BARTÁK M. 1998: Diptera of the Bavarian forest. *Silva Gabreta* **2**: 239–258.
- BEARDSLEY J. W., ARAKAKI K. T., UCHIDA G. K., KUMASHIRO B. R. & PERREIRA W. D. 1999: New records for Diptera in Hawai'i. In: EVENHUIS N. L. & ELREDGE L. G. (eds): *Records of the Hawaii biological survey for 1998. Part 1: Articles*. *Bishop Museum Occasional Papers* **58**: 51–57.
- BEAULIEU F. & WHEELER T. A. 2001: Inventaire des espèces de brachycères (Diptera) des prés de laiches (Cyperaceae, Carex) de la Réserve nationale de faune du lac Saint-François, Québec. *Fabries* **26**: 57–74.
- BEAULIEU F. & WHEELER T. A. 2002: Insects (Diptera, Coleoptera, Lepidoptera) reared from wetland monocots (Cyperaceae, Poaceae, Typhaceae) in southern Quebec. *Proceedings of the Entomological Society of Washington* **104**: 300–308.
- BECKER T. 1902: Die Meigen'schen Typen der sogen. Muscidae aalpyterae (Muscaria holometopa) in Paris und Wien. *Zeitschrift für Systematische Hymenopterologie und Dipterologie* **2**: 289–320.
- BECKER T. 1905: Cyclorrhapha Schizophora: Holometopa. In: BECKER T., BEZZI M., KERTÉSZ K. & STEIN P. (eds): *Katalog der paläarktischen Dipteren*. Vol. 4. G. Wesselényi in Hódmezövásárhely, Budapest, 272 pp.

- BECKER T. 1920: Diptères brachycères. *Mission du Service Géographique de l'Armée pour la mesure d'un arc de Méridien Equatorial en Amérique du Sud, 1899–1906* **10(2)** [1919]: 163–215.
- BECKER T. & SCHNABL J. 1926: Dipteren von W. W. Sowinsky and den Ufern des Baikal-Sees im Jahre 1902 gesammelt. *Entomologische Mitteilungen* (Berlin-Dahlem) **15**: 33–46.
- BESCHOVSKI V. 1976: Acartophthalmidae, Anthomyzidae, Aulacigastridae, Camilidae and Diastatidae – new Diptera-Brachycera for the Bulgarian fauna. *Acta Zoologica Bulgarica* **5**: 93–96 (in Bulgarian with English summary).
- BESCHOVSKI V. L. 2009: Review of the species from some Opomyzoidea families (Insecta: Diptera: Acalyprata) established in Bulgaria. *Acta Zoologica Bulgarica* **61**: 205–208.
- BEZZI M. 1876: I Ditteri del Trentino. *Atti della Società Veneto-Trentina die Scienze Naturali, Serie II, 1*: 275–353.
- BLANCHARD E. 1840: Hemiptères. In: LAPORTE F. L. DE, COMPTE DE CASTELNAU (ed.): *Histoire naturelle des Insectes*. Vol. 3. Orthoptères, Neuroptères, Hémiptères, Hyménoptères, Lepidoptères et Diptères. Duméril, Paris, 671 pp.
- BOGUSCH P., MACEK J., JANŠTA P., KUBÍK Š., ŘEZÁČ M., HOLÝ K., MALENOVSKÝ I., BAŇAŘ P., MIKÁT M., ASTAPENKOVÁ A. & HENEBERG P. 2016: Industrial and post-industrial habitats serve as critical refugia for pioneer species of newly identified arthropod assemblages associated with reed galls. *Biodiversity and Conservation* **25**: 827–863.
- BOOTH V. & AUSDEN M. 2009: The invertebrate population of a created reedbed after seven years: Lakenheath Fen RSPB reserve, Suffolk, England. *Conservation Evidence* **6**: 105–110.
- BRANCSIK K. 1910: A Trencsénvármegyében talált Dipterák felsorolása. [List of Diptera found in Trenčín county]. *A Trencsén Vármegyéi Természettudományi Egylet* (Trencsén) **31–33** [1908–1910]: 127–158 (in Hungarian).
- BRIKIATIS L. 2014: The De Geer, Thulean and Beringia routes: key concepts for understanding early Cenozoic biogeography. *Journal of Biogeography* **41**: 1036–1054.
- BRUES C. T. & MELANDER A. L. 1932: Classification of insects. *Bulletin of the Museum of Comparative Zoology at Harvard College* (Cambridge) **73**: 1–672.
- BRUES C. T., MELANDER A. L. & CARPENTER F. M. 1954: Classification of insects. (Revised edition). *Bulletin of the Museum of Comparative Zoology at Harvard College* (Cambridge) **108**: 1–917.
- BRUYN L. DE 1985: The flies living in Lipara galls (Diptera: Chloropidae) on Phragmites australis (Cav.) Trin. ex Steud. *Bulletin et Annales de la Société Royale Belge d'Entomologie* **121**: 485–488.
- BRUYN L. DE 1991: Anthomyzidae. P. 149. In: GROOTAERT P., BRUYN L. DE & MEYER M. DE (eds): *Catalogue of the Diptera of Belgium*. Documents de travail de l'Institut royal des Sciences naturelles de Belgique, Bruxelles, 338 pp.
- BÜRGÉS G., FISCHL G., SZEGLÉ P. & BERKE J. 1998: Ecosystem researches in special view of the most important phytophagous insects in the reed of Lake Balaton. *Mededelingen van de Faculteit Landbouwkundige en Toegepaste Biologische Wetenschappen, Universiteit Gent* **63(2a)**: 379–384.
- CARLES-TOLRÁ M. 1992: New and interesting records of Diptera Acalyprata from Spain. Part I: Acartophthalmidae, Opomyzidae, Anthomyzidae, Asteiidae, Carnidae, Tethinidae, Milichiidae and Cryptochaetidae. *Bulletin et Annales de la Société Royale Belge d'Entomologie* **128**: 343–353.
- CARLES-TOLRÁ M. 1993: A new species of Geomyza, with new acalyprate records to the Iberian Peninsula (Diptera, Acalyprata). *Historia Animalium* **2**: 49–55.
- CARLES-TOLRÁ M. 1994: Lista preliminar de 34 familias de dípteros acalípteros de Cataluña (España) (Diptera, Acalyprata). *Sessió Conjunta d'Entomologia (Institució Catalana d'Historia Natural – Societat Catalana de Lepidopterologia)* **8** [1993]: 17–28.
- CARLES-TOLRÁ M. 2001: Datos taxonómicos y ecológicos de 304 especies de Dípteros Acalípteros (Diptera, Acalyprata). *Boletín de la Sociedad Entomológica Aragonesa* **28**: 89–103.
- CARLES-TOLRÁ M. & BÁEZ M. 2002: Anthomyzidae. P. 143. In: CARLES-TOLRÁ M. (ed.): *Catálogo de los Dípteros de España, Portugal y Andorra (Insecta)*. Monografías S.E.A., Vol. 8. Sociedad Entomológica Aragonesa, Zaragoza, 323 pp.
- CARLES-TOLRÁ M. & BLASCO-ZUMETA J. 2001: Estudio comparativo de veintinueve familias de dípteros colectados en un sabinar de Juniperus thurifera L. en Los Monegros (Zaragoza) (Diptera: Orthorrhapha y Cyclorrhapha). *Boletín de la Sociedad Entomológica Aragonesa* **29**: 49–64.
- CARLES-TOLRÁ M., GARCÍA ROMERA C. & BARRIENTOS J. A. 2000: Algunos dípteros capturados en un

- hayedo del Montseny mediante interceptores de vuelo (Diptera, Acalyprata). *Boletín de la Asociación Española de Entomología* **24**: 141–160.
- CARLES-TOLRÁ M. & SALOÑA M. 2004: Dípteros nocturnos y crepusculares (Insecta: Diptera) capturados con trampas Malaise y trampas de luz en la provincia de Vizcaya (Bizkaia, España). *Heteropterus Revista de Entomología* **4**: 41–49.
- CARLES-TOLRÁ M. & VENTURA D. 2001: Citas nuevas de dípteros para la península Ibérica (Diptera, Acalyprata). *Zapateri Revista Aragonesa de Entomología* **9**: 123.
- CARLES-TOLRÁ M. & VENTURA D. 2008a: Algunos dípteros nuevos para las Islas Baleares (Insecta: Diptera). *Heteropterus Revista de Entomología* **8**: 275–279.
- CARLES-TOLRÁ M. & VENTURA D. 2008b: Tres dípteros interesantes de humedales de España (Diptera: Anthomyzidae, Lauxaniidae, Xenasteiidae). *Heteropterus Revista de Entomología* **8**: 281–283.
- CHANDLER P. 1978: Associations with plants. Fungi. Pp. 199–210. In: STUBBS A. & CHANDLER P. (eds): *A dipterist's handbook*. The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Hanworth, Middlesex, 255 pp.
- CHANDLER P. 2000: Corrections and changes to the Diptera Checklist (3). *Dipterists Digest*, 2nd Series **7**: 50–52.
- CHANDLER P. 2008: Corrections and changes to the Diptera Checklist (20) – Editor. *Dipterists Digest* **15**: 195–196.
- CHANDLER P. 2010: Associations with Fungi and Mycetozoa. Pp. 417–441. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist. Vol. 15. The Amateur Entomologist's Society, Brentwood, Essex, 525 pp.
- CHANDLER P. J. (ed.) 2011: Dipterists Day Exhibits 2009 and 2010 – compiled by Editor from exhibitors' notes. [DRAKE C. M. (2010)]. *Dipterists Digest* **18**: 99–102.
- CHANDLER P. J. 2014a: Reliquantha variipes – a new genus and species of fungus-associated anthomyzid from Britain. *Bulletin of the Dipterists Forum* **77**: 14–15.
- CHANDLER P. J. 2014b: Corrections and changes to the Diptera Checklist 31 – Editor. *Dipterists Digest* **21**: 73–74.
- CHANDLER P. J. 2015: Diptera recording at Bushy Park, Middlesex. *Dipterists Digest* **22**: 69–110.
- CHANDLER P. & ISMAY J. 1978: Major habitats. Marshes and fens. Pp. 103–107. In: STUBBS A. & CHANDLER P. (eds): *A dipterist's handbook*. The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Hanworth, Middlesex, 255 pp.
- CHANDLER P., ISMAY J. & ISMAY B. 2010: Marshes and fens. Pp. 212–218. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Brentwood, Essex, 525 pp.
- CHANDLER P. J., O'CONNOR J. P. & NASH R. 2008: *An annotated checklist of the Irish two-winged flies (Diptera)*. The Irish Biogeographical Society, Dublin in association with The National Museum of Ireland, Dublin, 261 pp.
- CHUDZICKA E. & SKIBIŃSKA E. 2007: Anthomyzidae. P. 208. In: BOGDANOVICZ W., CHUDZICKA E., PILIPIUK I. & SKIBIŃSKA E. (eds): *Fauna Polski. Charakterystyka I wykaz gatunków. Fauna of Poland. Characteristics and checklist of species*. Vol. 2. Muzeum i Instytut Zoologii PAN, Warszawa, 505 pp. (in Polish and English).
- COCKERELL T. D. A. 1915: British fossil insects. *Proceedings of the United States National Museum* **49**: 469–499.
- COE R. L. 1958: Diptera taken in Jugoslavia from May to July, 1955, with localities and notes. Part 2. *Bulletin du Muséum d'Histoire Naturelle Belgrade, Series B* **12**: 181–206.
- COE R. L. 1960: A further collection of Diptera from Jugoslavia, with localities and notes. *Bulletin du Muséum d'Histoire Naturelle Belgrade, Series B* **16**: 44–67.
- COGAN B. H. 1976: 64. Anthomyzidae. Pp. 82–83. In: KLOET G. S. & HINCKS D. H. (eds): *A check list of British Insects*. Second edition (completely revised). Part 5: Diptera and Siphonaptera. Handbooks for the identification of British Insects, Vol. 11, Royal Entomological Society, London, 139 pp.
- COLE F. R. 1969: *The Flies of Western North America (with the collaboration of Evert I. Schlinger)*. University of California Press, Berkeley, xiv + 694 pp.
- COLLART A. 1941: Notes sur la faune des Hautes-Fagnes en Belgique. IV. Diptera: Clusiidae, Anthomyzidae, Opomyzidae. *Bulletin du Musée Royal d'Histoire Naturelle de Belgique* **17(22)**: 1–8.
- COLLESS D. H. & McALPINE D. K. 1970: 34. Diptera (flies). Pp. 656–740. In: WATERHOUSE D. F. (ed.): *The insects of Australia*. A textbook for students and research workers. Melbourne University Press, Carlton, Victoria, 1029 pp.

- COLLESS D. H. & McALPINE D. K. 1991: 39 Diptera (flies). Pp. 717–786. In: CSIRO, Division of Entomology (eds): *The insects of Australia. A textbook for students and research workers*. 2nd edition. Cornell University Press, Ithaca, 1135 pp.
- COLLIN J. E. 1911: Additions and corrections to the British list of Muscidae Acalypterae. *Entomologist's Monthly Magazine* **22**: 229–234.
- COLLIN J. E. 1944: The British species of Anthomyzidae (Diptera). *Entomologist's Monthly Magazine* **80**: 265–272.
- COLYER C. N. & HAMMOND C. O. 1951: *Flies of the British Isles*. Frederick Warne & Co. Ltd., London, New York, 383 pp.
- COOPER B. E. & CUMMING J. M. 2000: *Diptera types in the Canadian National Collection of Insects. Part 3. Schizophora (exclusive of Tachinidae)*. Agriculture and Agri-Food Canada, Research Branch, Minister of Supply and Services Canada, Ottawa, 132 pp.
- COQUILLET D. W. 1900: Report on a collection of Dipterous insects from Puerto Rico. *Proceedings of the United States National Museum* **22**: 249–270.
- COQUILLET D. W. 1910: The type-species of North American genera of Diptera. *Proceedings of the United States National Museum* **37**: 499–647.
- CRAMPTON G. C. 1944: Suggestions for grouping the families of Acalyptate Cyclorrhaphan Diptera on the basis of male terminalia. *Proceedings of the Entomological Society of Washington* **46**: 152–154.
- *CUMMING J. M., SINCLAIR B. J. & WOOD D. M. 1995: Homology and phylogenetic implications of male genitalia in Diptera – Eremoneura. *Entomologica Scandinavica* **26**: 121–151.
- *CUMMING J. M. & WOOD D. M. 2010: 2. Adult morphology and terminology. Pp. 9–50. In: BROWN B. V., BORKENT A., CUMMING J. M., WOOD D. M., WOODLEY N. E. & ZUMBADO M. A. (eds): *Manual of Central American Diptera*. Vol. 2. NRC Research Press, Ottawa, xvi + 715–1442 pp.
- CURRAN C. H. 1934: *The families and genera of North American Diptera*. First edition. American Museum of Natural History, The Ballou Press, New York, 512 pp.
- CURRAN C. H. 1965: *The families and genera of North American Diptera*. Second revised edition. Henry Tripp, Woodhaven, 515 pp.
- CZERNY L. 1902: Bemerkungen zu den Arten der Gattungen Anthomyza Fll. und Ischnomyia Lw. *Wiener Entomologische Zeitung* **21**: 249–256.
- CZERNY L. 1903a: Revision der Heteroneuriden. *Wiener Entomologische Zeitung* **22**: 61–107.
- CZERNY L. 1903b: Bemerkungen zu den Arten der Gattung Geomyza Fll. (Dipt.). *Wiener Entomologische Zeitung* **22**: 123–127.
- CZERNY L. 1928: 54b. Anthomyzidae. In: LINDNER E. (ed.): *Die Fliegen der palaearktischen Region*. Vol. 6, pt. 1. E. Schweizerbartsche Verlagsbuchhandlung, Stuttgart, 8 pp.
- CZIŽEK K. 1906: Beiträge zu einer Dipterenfauna Mährens. *Zeitschrift des Mährischen Landesmuseums* (Brünn) **6**: 182–234.
- CZIŽEK K. 1908: II. Nachtrag zu den “Beiträgen zu einer Dipterenfauna Mährens”. *Mitteilungen der Kommission zur Naturwissenschaftlichen Durchforschung Mährens, Zoologische Abteilung* (Brünn) **13**: 1–26.
- DANIELZIK J. 1988: Die Schilfgall-Fliege *Lipara rufitarsis* (Loew, 1858) (Diptera, Chloropidae) in Xanthen und die in ihren Gallen überwinterten Fliegen (Diptera, Chloropidae et Anthomyzidae). *Natur am Niederrhein, Neue Folge* (Krefeld) **3**: 55–58.
- DANIELZIK J. 1989: Literaturliste der Fliegenfauna Deutschlands 1964–1988. Faunistik, Ökologie, Sammlungen und Methodik (Diptera: Brachycera). *Mitteilungen des Internationalen Entomologischen Vereins e. V.* **14**: 223–274.
- DEEMING J. C. 2008: Order Diptera, family Anthomyzidae. Pp. 668–670. In: HARTEN A. VAN (ed.): *Arthropod fauna of the UAE*. Vol. 1. Dar Al Ummah Printing, Publishing, Distribution & Advertising, Abu Dhabi, 754 pp.
- DELY-DRASKOVITS Á. 1972: Systematische und ökologische Untersuchungen an der in Ungarn als Schädlinge der Hutpilze auftretenden Fliegen. IV. Trichoceridae, Scatopsidae, Helomyzidae, Anthomyzidae (Diptera). *Acta Zoologica Academiae Scientiarum Hungaricae* **18**: 283–290.
- DELY-DRASKOVITS Á. 1991: Contributions to the Cecidomyiidae, Anthomyzidae and Chloropidae fauna (Diptera) of the Bátorliget Nature Reserve. Pp. 585–592. In: MAHUNKA S. (ed.): *The Bátorliget Nature Reserve – after forty years*. Vol. 2. Akadémiai Kiadó, Budapest, pp. 499–848.
- DELY-DRASKOVITS Á. & BABOS M. 1993: Flies (Diptera) in macrofungi species in Hungary. *Folia Entomologica*

- logica Hungarica* **54**: 17–45.
- DELY-DRASKOVITS Á. & BÄCHLI G. 1998: Diptera species living in Lipara galls (Diptera: Chloropidae) in Switzerland. Über die in Lipara-Gallen (Diptera: Chloropidae) lebenden Dipteren in der Schweiz. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **71**: 413–421.
- DOSKOČIL J. 1962: Dvoukřídlí (skupiny Acalyprtrata) Rychlebských hor. Zweiflügler (Gruppe Acalyprtrata) des Gebirges Rychlebské hory. *Přírodovědný Časopis Slezský, Opava* **23**: 249–272 (in Czech with German summary).
- DOSKOČIL J. & HURKA K. 1962: Entomofauna der Wiese (Verband Arrhenatherion elatioris) und ihre Entwicklung. *Rozpravy Československé Akademie Věd, Praha, Řada Matematických a Přírodních Věd* **72(7)**: 1–99.
- DRAKE C. M. 2004: Small Diptera collected preferentially using a suction sampler. *Dipterists Digest, 2nd Series* **11**: 1–8.
- DRAKE C. M. 2011: The Diptera of a wet woodland in Devon. *Dipterists Digest, 2nd Series* **18**: 9–26.
- DRAKE C. M. 2016: The relative importance of Diptera of pasture and ditch margins on an English grazing marsh. *Dipterists Digest, 2nd Series* **23**: 1–22.
- DUMČIUS O. & PAKALNISKIS S. 2006: A contribution to the list of Lithuanian dipteran fauna. *New and Rare for Lithuania Insect Species* **17**: 50–58.
- ELBERG K. Ju. 1968: Novye dannye po faune dvukrylykh sem. Anthomyzidae (Diptera) Pribaltiki. (New data on the fauna of Anthomyzidae (Diptera) from Baltic area). *Entomologicheskoe Obozrenie* **47**: 629–632 (in Russian with English summary).
- ENDERLEIN G. 1936: 22. Ordnung. Zweiflügler, Diptera. In: BROHMER P., EHRMANN P. & ULMER G. (eds): *Die Tierwelt Mitteleuropas 6(2), Insekten, Teil 3*. Quelle & Meyer, Leipzig, 259 pp.
- EVENHUIS N. L. 1994: *Catalogue of the fossil flies of the world (Insecta: Diptera)*. Backhuys Publishers, Leiden, 600 pp.
- FALK S. 2010: Post-industrial sites. Pp. 299–306. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Brentwood, Essex, 525 pp.
- FALLÉN C. F. 1810: *Specimen entomologicum novam Diptera disponendi methodum exhibens quod Conf. Ampl. Facult. Phil. Lund, publicae disquisitioni subjiciunt...* In Lyceo Carolino die IX Junii MDCCX. Berlingianis, Lundae [= Lund], 26 pp.
- FALLÉN C. F. 1823: *Diptera Sveciae. Agromyzides*. Berlingianis, Lundae [= Lund], 10 pp.
- FAST E. & WHEELER T. A. 2004: Faunal inventory of Brachycera (Diptera) in an old growth forest at Mont Saint-Hilaire, Quebec. *Faberies* **29**: 1–15.
- FERNÁNDEZ J. 2005: Noticia de nuevos táxones para la ciencia en el ámbito Íbero-Balear y Macaronésico. *Gracillia* **61**: 261–282.
- FERRAR P. 1987: *A guide to the breeding habits and immature stages of Diptera Cyclorrhapha*. Entomonograph 8 (pt. 1 and pt. 2). E. J. Brill/Scandinavian Science Press, Leiden-Copenhagen, 907 pp.
- FOOTE B. A. 1991: Order Diptera, Anthomyzidae. P. 822. In: STEHR F. W. (ed.): *Immature Insects. Vol. 2*. Kendall/Hunt Publishing Company, Dubuque, 975 pp.
- FOOTE B. A. 2002: The acalyprate Diptera of a fen at the J. Arthur Herrick State Nature Preserve in Portage County, Ohio. *Great Lakes Entomologist* **35**: 131–148.
- FOOTE B. A. 2004: Acalyprate Diptera associated with stands of *Carex lacustris* and *C. stricta* (Cyperaceae) in northeastern Ohio. *Proceedings of the Entomological Society of Washington* **106**: 166–175.
- FRANZ H. 1989: *Die Nordost-Alpen im Spiegel ihrer Landtierwelt: eine Gebietsmonographie. Vol. 6, pt. 2. (Diptera Cyclorapha)*. Universitätsverlag Wagner, Innsbruck, 445 pp.
- FREIDBERG A. 1988: Zoogeography of the Diptera of Israel. Pp. 277–308. In: YOM-TOV Y. & TCHERNOV E. (eds): *The zoogeography of Israel*. Dr. W. Junk Publishers, Dordrecht, ix + 600 pp.
- FREY R. 1921: Studien über der Bau des Mundes der niederen Diptera Schizophora nebst Bemerkungen über die Systematik dieser Dipteren-Gruppe. *Acta Societatis pro Fauna et Flora Fennica* **48(3)**: 1–247.
- FREY R. 1958: Zur Kenntnis der Diptera brachycera p.p. der Kapverdischen Inseln. *Societas Scientiarum Fennica, Commentationes Biologicae* **18(4)**: 1–61.
- GAMMELMO Ø. & SØLI G. 2011: Notes on new and interesting Diptera from Norway. *Norwegian Journal of Entomology* **58**: 189–195.
- GIBBS D. 1992: Flies of the Essex coast. *Dipterists Digest* **11**: 4–16.
- GODFREY A. 1992: A survey of Diptera at Blackburn meadows. *Sorby Record* **28**: 34–46.

- GODFREY A. 1998: The Diptera of Moccas Park National Nature Reserve. *Dipterists Digest* **5**: 44–48.
- GRABO J. 1991: Ökologische Verteilungen phytophager Arthropoda an Schilf (*Phragmites australis*) im Bereich der Bornhöveder Seenkette. *Faunistisch-Ökologische Mitteilungen, Supplement* (Kiel) **12**: 1–60.
- GRANDI G. 1951: *Introduzione allo studio dell'entomologia. Vol. 2. Endopterygota*. Edizioni Agricole, Bologna, xvii + 1332 pp.
- GRIFFITHS G. C. D. 1972: *The phylogenetic classification of Diptera Cyclorrhapha with special reference to the structure of the male postabdomen*. Dr. W. Junk N.V., The Hague, 340 pp.
- GRÜNBERG K. 1910: Diptera, Zweiflügler. Erstes Teil: Diptera exkl. Tendipedidae (Chironomidae). In: BRAUER A. (ed.): *Die Süßwasserfauna Deutschlands. Eine Exkursionsfauna. Vol. 2A. Gustav Fischer, Jena*, iv + 312 pp.
- HACKMAN W. 1980: A check list of the Finnish Diptera. II. Cyclorrhapha. *Notulae Entomologicae* **60**: 117–162.
- HAENNI J. P. 2003: Fossil Diptera in Baltic amber: the collection of the Muséum d'histoire naturelle Neuchâtel. *Acta Zoologica Cracoviensia* **46** (Suppl. – Fossil Insects): 407–410.
- HALIDAY A. H. 1833: Catalogue of Diptera occurring about Holywood in Downshire. *Entomological Magazine* **1**: 147–180.
- HALIDAY A. H. 1837: Notes upon Diptera: characters of some undescribed species of family Muscidae. *Entomological Magazine* **4**: 147–152.
- HALIDAY A. H. 1855: Descriptions of insects figured, and references to plates illustrating the notes on Kerry insects. *Natural History Review* **2**: 59–64.
- HARDY D. E. & DELFINADO M. D. 1980: Anthomyzidae. Pp. 224–229. In: HARDY D. E. & DELFINADO M. D. (eds): *Diptera: Cyclorrhapha III, series Schizophora, section Acalypratae, exclusive of family Drosophilidae*. Insects of Hawaii, Vol. 13. The University Press of Hawaii, Honolulu, 451 pp.
- *HAUKE R. L. 1993: Equisetaceae. Pp. 76–84. In: FLORA OF NORTH AMERICA EDITORIAL COMMITTEE (eds): *Flora of North America North of Mexico. Vol. 2*. Oxford University Press, New York and Oxford, xvi + 475 pp.
- HELLÉN W. 1926: Verzeichnis der in den Jahren 1921–1925 für die Fauna Finlands neu hinzugekommenen Insektenarten. *Notulae Entomologicae* **6**: 90–96.
- HENDEL F. 1911: Über von Professor J. M. Aldrich erhaltene und einige andere amerikanische Dipteren. *Wiener Entomologischen Zeitung* **30**: 19–46.
- HENDEL F. 1916: Beiträge zur Systematik der Acalypraten Musciden. *Entomologische Mitteilungen* (Berlin-Dahlem) **5**: 294–299.
- HENDEL F. 1922: Die paläarktischen Muscidae acalypratae Girsch. = Haplostomata Frey nach ihren Familien und Gattungen I. *Konowia* **1**: 145–160.
- HENDEL F. 1928: Zweiflügler oder Diptera. II. Allgemeiner Teil. In: DAHL F. (ed.): *Die Tierwelt Deutschlands und der angrenzenden Meeresteile. Bd. 11*. G. Fischer Verlag, Jena, 135 pp.
- HENDEL F. 1936–1937: 26. Ordnung der Pterygogena (Dreissigste Ordnung der Insecta): Diptera – Fliegen. In: KÜKENTHAL W. & KRUMBACH T. (eds): *Handbuch der Zoologie. Band 4, 2 Hälfte, 2 Teil, Insecta 3, Lieferung 11*. W. De Gruyter & Co., Berlin, Leipzig, pp. 1729–2140.
- HENNIG W. 1939: Beiträge zur Kenntnis des Kopulationsapparates und der Systematik der Acalypraten. II. Tethinidae, Milichiidae, Anthomyzidae und Opomyzidae. *Arbeiten über Morphologische und Taxonomische Entomologie aus Berlin-Dahlem* **6**: 81–94.
- HENNIG W. 1952: *Die Larvenformen der Dipteren. Eine Übersicht über die bisher bekannten Jugendstadien der zweiflügeligen Insekten. 3. Teil*. Akademie-Verlag, Berlin, 628 pp.
- HENNIG W. 1955: Los insectos de las islas Juan Fernandez. 16. Phryneidae, Helomyzidae, Lonchaeidae, Piophilidae, Anthomyzidae und Muscidae (Diptera). *Revista Chilena de Entomología* **4**: 21–34.
- HENNIG W. 1958: Die Familien der Diptera Schizophora und ihre phylogenetischen Verwandtschaftsbeziehungen. *Beiträge zur Entomologie* **8**: 506–688.
- HENNIG W. 1965: Die Acalypratae des Baltischen Bernsteins und ihre Bedeutung für die Erforschung der phylogenetischen Entwicklung dieser Dipteren Gruppe. *Stuttgarter Beiträge für Naturkunde* **145**: 1–215.
- HENNIG W. 1967: Neue Acalypratae aus dem Baltischen Bernstein (Diptera: Cyclorrhapha). *Stuttgarter Beiträge für Naturkunde* **175**: 1–27.
- HENNIG W. 1969: Neue Übersicht über die aus dem Baltischen Bernstein bekannten Acalypratae (Diptera: Cyclorrhapha). *Stuttgarter Beiträge für Naturkunde* **209**: 1–42.
- HENNIG W. 1971: Neue Untersuchungen über die Familien der Diptera Schizophora (Diptera: Cyclorrhapha).

- Stuttgarter Beiträge für Naturkunde* **226**: 1–76.
- HENNIG W. 1973: 31. Diptera (Zweiflügler). In: HELMCKE J.-G., STARCK D. & WERMUTH H. (eds): *Handbuch der Zoologie, Band 4: Arthropoda – 2. Hälfte: Insecta, 2. Teil: Spezielles*. 2nd edition. Walter de Gruyter, Berlin, 337 pp.
- HERING E. M. 1943: Dipteren-Biologien I. *Mitteilungen der Deutschen Entomologischen Gesellschaft* **12**: 16.
- HINCKS W. D. 1953: XII. Diptera. In: HINCKS W. D. (ed.): *The entomology of Spurn Peninsula*. *Naturalist* **78**: 159–167.
- HOFFER A. & WAITZBAUER W. 2000: Beitrag zur Entomofauna des Naturschutzgebietes Eichkogel bei Mödling (Niederösterreich). 1. Ausgewählte Diptera (Insecta) der Trockenrasen. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Österreich* **137**: 1–30.
- HÖVEMEYER K. 1996: Die Dipteregemeinschaft eines Erlenuferwaldes in Südniedersachsen. *Braunschweiger Naturkundliche Schriften* **5**: 71–84.
- HOWE M. A. 2010: Coastal sand dunes. Pp. 269–276. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist's Society, Brentwood, Essex, 525 pp.
- HOWE M. A. & HOWE E. A. 2001: A review of the Dipterists Forum summer field meeting at Abergavenny, 1997. *Dipterists Digest, 2nd Series* **8**: 31–48.
- HOWE M. A., PARKER M. J. & HOWE E. A. 2001: A review of the Dipterists Forum summer field meeting in Dorset, 1998. *Dipterists Digest, 2nd Series* **8**: 135–148.
- IMMS A. D. A. 1957: *A general textbook of entomology including the anatomy, physiology, development and classification of insects*. Ninth edition entirely revised by O. W. Richards & R. G. Davies. Methuen & Co. Ltd., London, x + 886 pp.
- ISMAY J. W. 1981: Some Diptera from Wytham Wood. *Entomologist's Monthly Magazine* **117**: 26.
- JOHNSON C. W. 1925: List of the Diptera or two-winged flies. Fauna of New England, Part 15. *Occasional Papers of the Boston Society of Natural History* **7**: 1–326.
- KAHANPÄÄ J. 2014: Checklist of the smaller families of Opomyzoidea, Anthomyzidae, Asteiidae, Aulacigastridae, Clusiidae, Odiniidae, Opomyzidae and Periscolididae (Diptera) of Finland. *ZooKeys* **441**: 285–290.
- KARL O. 1930: Fliegen von der Insel Amrum. Ein Beitrag zur Fliegenfauna der nordfriesischen Inseln. (Dipt.). *Deutsche Entomologische Zeitschrift* **1930**: 193–206.
- KARPA A. 1995: Materiāli par dažu nelielo mušu dzimtu (Diptera) faunu Latvijā. [Materials on the fauna of some small fly families (Diptera) in Latvia]. *Latvijas Entomoloģijas Arhīvs* **2**: 37–40 (in Latvian with English title).
- KARPA A. 2000: Flies (Diptera, Brachycera) of the lake Engures (Engure) Nature Park, Latvia. *Proceedings of the Latvian Academy of Sciences, Section B* **54(5–6)**: 203–212.
- KARPA A. 2008: Catalogue of Latvian flies (Diptera: Brachycera). *Latvijas Entomologs* **46**: 4–43.
- KEIPER J. B., WALTON W. E. & FOOTE B. A. 2002: Biology and ecology of higher Diptera from freshwater wetlands. *Annual Review of Entomology* **47**: 207–232.
- KIEFFER J. J. 1906: Description d'un genre nouveau et de quelques espèces nouvelles de Diptères de l'Amérique du Sud. *Annales de la Société Scientifique de Bruxelles* **30**: 249–358.
- KOÇAK A. O. & KEMAL M. 2013: Diptera of Turkey. *Priamus, Supplement* **28**: ii + 1–411.
- KORNEEV V. A. & ZEJGERMAN A. G. 1985: K fauna nekotorych semeystv akaliptratnykh dvukrylykh (Diptera, Acalyprata) srednego Pridneprovya I. [To the fauna of several families of acalyptrate flies (Diptera, Acalyprata) of central Dnieper Basin I]. *Problems of General and Molecular Biology* (Kiev) **5**: 47–51 (in Russian).
- KOTRBA M. & BAPTISTA A. R. 2002: The internal female reproductive tract of Opomyzidae (Diptera, Schizophora). *Studia Dipterologica* **9**: 57–71.
- KOWARZ F. 1884: *Catalogus insectorum faunae bohemicae. – II. Fliegen (Diptera) Böhmens*. Verlag der Physiokratischen Gesellschaft, Prag, 42 pp.
- KRATOCHVÍL J. 1936: Další dvě dipterologické kapitoly. [Two further dipterological chapters]. *Věda Přírodní* **17**: 286–289 (in Czech).
- KRIVOSHEINA N. P., ZAITZEV A. I. & YAKOVLEV E. B. 1986: *Nasekomye – razrushiteli gribov v lesakh Evropejskoi chasti SSSR*. [Insects – destroyers of fungi in forests of the European part of the USSR]. Nauka, Moscow, 312 pp. (in Russian).
- KRÖBER O. 1935: Dipterenfauna von Schleswig-Holstein und den benachbarten westlichen Nordsee-gebieten.

- II. Teil: Diptera Brachycera: Pyrgotidae bis Milichiidae, nebst weiteren Nachträgen zum I. Teil (Bd. 22, 1930) und zum III. Teil (Bd. 23, 1931). *Verhandlungen des Vereins für Naturwissenschaftliche Heimatforschung zu Hamburg* **24**: 45–80.
- KROGERUS R. 1932: Ökologie und Verbreitung der Arthropoden der Triebsandgebiete and den Küsten Finlands. *Acta Zoologica Fennica* **12**: 1–309.
- KROGERUS R. 1960: Ökologische Studien über nordische Moorarthropoden. *Societas Scientiarum Fennica, Commentationes Biologicae* **21(3)**: 1–238.
- *KVAČEK Z. 2010: Forest flora and vegetation of the European early Palaeogene – a review. *Bulletin of Geosciences* **85**: 63–76.
- LAMB C. G. 1914: The Percy Sladen Trust expedition to the Indian Ocean in 1905, under the leadership of Mr J. Stanley Gardiner, M.A. Vol. 5, No. XV. – Diptera: Heteroneuridae, Ortalidae, Trypetidae, Sepsidae, Micropezidae, Drosophilidae, Geomyzidae, Milichidae). *Transactions of the Linnean Society of London, 2nd Series, Zoology* **16**: 307–372.
- LANDROCK K. 1910: Neuer Beitrag zu einer Dipterenfauna Mährens. *Zeitschrift des Mährischen Landesmuseums (Brünn)* **10**: 126–147.
- LINDNER E. 1969: Die Dipteren einer an einer Gartenrose durch eine Aleurodide in Ostafrika verursachten Bioceenose. *Memorie della Società Entomologica Italiana* **48**: 222–232.
- LINDROTH C. H., ANDERSSON H., BÖDVARSSON H. & RICHTER S. H. 1973: Surtsey, Iceland. The development of a new fauna, 1963–1970. Terrestrial Invertebrates. *Entomologica Scandinavica, Supplement* **5**: 2–280.
- LOEW H. 1863: Diptera Americae septentrionalis indigena. Centuria quarta. *Berliner Entomologische Zeitschrift* **7**: 275–326.
- LOEW H. 1866: Ueber einige bei Danzig gefangene Dipteren, bei denen die Flügel verkümmert sind oder ganz fehlen. *Schriften der Naturforschenden Gesellschaft in Danzig, Neue Folge*, **1**: 1–8.
- LOEW H. 1873: *Beschreibungen europäischer Dipteren*. Vol. 3. Verlag von H. W. Schmidt, Halle, 320 pp.
- LUTOVINOVAS E., PAKALNIŠKIS S., PETRAŠIŪNAS A. & RIMAŠAITĖ J. 2003: A supplement to the Diptera fauna of Lithuania. *Acta Zoologica Lituanica* **13**: 403–410.
- MACQUART J. 1835: *Histoire naturelle des Insectes. Diptères. Collection des suites à Buffon*. Vol. 2. N. E. Roret, Paris, 710 pp.
- MALLOCH J. R. 1913: A synopsis of the genera of Agromyzidae, with descriptions of new genera and species. *Proceedings of the United States National Museum* **46**: 127–154.
- MALLOCH J. R. 1933: Acalyprata. In: *British Museum (Natural History), Diptera of Patagonia and southern Chile*. Vol. 6(4). Oxford University Press, Oxford, pp. 177–392.
- MALLOCH J. R. 1936: Notes on Australian Diptera. No. 36. *Proceedings of the Linnean Society of New South Wales* **59**: 259–261.
- MARSHALL S. A. 2006: *Insects – their natural history and diversity: with a photographic guide to insects of eastern North America*. Firefly Books Ltd., Richmond Hill, 718 pp.
- MARSHALL S. A. 2012: *Flies. The natural history and diversity of Diptera*. Firefly Books Ltd., Richmond Hill & Buffalo, 616 pp.
- MARSHALL S. A., BUDDLE C. M., SINCLAIR B. J. & BUCKLE D. J. 2001: Spiders, flies and some other arthropods of the Fathom Five National Marine Park islands and the upper Bruce Peninsula. Pp. 191–229. In: PARKER S. & MUNAWAR M. (eds): *Ecology, culture and conservation of a protected area: Fathom Five National Marine Park, Canada*. Ecovision World Monograph Series, Backhuys Publishers, Leiden, 306 pp.
- MARTINEK V. 1971: Příspěvek k poznání některých dvoukřídlých (Diptera, Acalyprata) v oblasti Jižních Čech. (Contribution to the knowledge of some Diptera Acalyprata in the South Bohemia). *Sborník Jihočeského Muzea, Přírodní Vědy* **11**: 77–92 (in Czech with English summary).
- MARTINEK V. 1973: Nálezy zajímavějších druhů dvoukřídlých (Diptera) v okolí Dobrušky a v pásmu Orlických hor. [Records of more interesting species of Diptera in the vicinity of Dobruška and in the Orlické hory range]. *Sborník Orlické hory a Podorlicko* **5**: 33–58 (in Czech).
- MARTINEK V. 1974: Nové nálezy druhů skupiny Acalyprata (Diptera) v severních a severovýchodních Čechách. [New records of Diptera Acalyprata group in the northern and northeastern Bohemia]. *Sborník Severočeského Muzea, Přírodní Vědy* **6**: 151–175 (in Czech).

- MARTINEK V. 1984: K poznání jarního společenstva dvoukřídlých (Diptera – Acalyprata) v povodí řeky Moravy. [A contribution to the knowledge of the Diptera – Acalyprata spring assemblage on the Morava river banks, southern Moravia]. *Časopis Národního Muzea, Řada Přírodovědná* **153**: 49–54 (in Czech with English summary).
- MARTINEK V. 1987: Další nálezy dvoukřídlých (Diptera) některých čeledí skupiny Acalyprata v severních a severovýchodních Čechách. [Further findings of Diptera of some families of the group Acalyprata in northern and northwestern Bohemia]. *Sborník Severočeského Muzea, Přírodní Vědy* **16**: 185–198 (in Czech).
- MARTINEZ E., DUQUE P. & WOLFF M. 2007: Succession pattern of carrion-feeding insects in Paramo, Colombia. *Forensic Science International* **166**: 182–189.
- MAYER H. 1953: Bericht über das vorwiegend 1951 an den Ufern des Mauerbaches, Wien, NÖ, gesammelte Insektenmaterial, unter besonderer Berücksichtigung der Dipteren. *Wetter und Leben, Sonderheft* **2** [1953]: 156–162.
- McALPINE D. K. 1958: A key to the Australian families of Acalyprate Diptera (Insecta). *Records of the Australian Museum* **24**: 183–189.
- McALPINE D. K. 1978: Description and biology of a new genus of flies related to Anthoclusia and representing a new family (Diptera, Schizophora, Neurochaetidae). *Annals of the Natal Museum* **23**: 273–295.
- McALPINE D. K. 1990: A new apterous micropezid fly (Diptera: Schizophora) from Western Australia. *Systematic Entomology* **15**: 81–86.
- *McALPINE J. F. 1981a: 2. Morphology and terminology – adults. Pp. 9–63. In: McALPINE J. F., PETERSON B. V., SHEWELL G. E., TESKEY H. J., VOCKEROTH J. R. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Agriculture Canada Monograph No. 27, Vol. 1. Minister of Supply and Services Canada, Ottawa, vi + 674 pp.
- McALPINE J. F. 1981b: 4. Key to families – adults. Pp. 89–124. In: McALPINE J. F., PETERSON B. V., SHEWELL G. E., TESKEY H. J., VOCKEROTH J. R. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Agriculture Canada Monograph No. 27, Vol. 1. Minister of Supply and Services Canada, Ottawa, vi + 674 pp.
- McALPINE J. F. 1989: 116. Phylogeny and classification of the Muscomorpha. Pp. 1397–1518. In: McALPINE J. F. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Agriculture Canada Monograph No. 32, Vol. 3. Minister of Supply and Services Canada, Ottawa, vi + 1333–1581 pp.
- McALPINE J. F., DOWNES J. A., OLIVER D. R., PETERSON B. V., SHEWELL G. E., TESKEY H. J., VOCKEROTH J. R. & WOOD D. M. 1979: 42. Diptera. Pp. 389–424. In: DANKS H. V. (ed.): *Canada and its insect fauna*. Memoirs of the Entomological Society of Canada, Vol. 108, Entomological Society of Canada, Ottawa, 573 pp.
- *MEADES S. J., SCHNARE D., LAWRENCE K. & FAULKNER C. 2004+: Northern Ontario Plant Database Website. Version 1, January 2004. Algoma University College and Great Lakes Forestry Centre, Sault Ste. Marie, Ontario, Canada. [<http://northernontarioflora.ca/>]
- MEIGEN J. W. 1830: *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. Vol. 6. Schulzische Buchhandlung, Hamm, xi + 401 pp.
- MEIGEN J. W. 1838. *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. Vol. 7. Schulzische Buchhandlung, Hamm, xii + 434 pp.
- MEIJERE J. C. H. DE 1916: Studien über südasiatische Dipteren. XI. Zur Biologie einiger javanischen Dipteren nebst Beschreibung einiger neuen javanischen Arten. *Tijdschrift voor Entomologie* **59**: 184–213.
- MEIJERE J. C. H. DE 1927: Een 4e supplement op de Nieuwe Naamlijst van Nederlandsche Diptera in bewerking. [A fourth supplement to the New checklist of Dutch Diptera in preparation]. *Tijdschrift voor Entomologie* **70**: 69–70 (in Dutch).
- MEIJERE J. C. H. DE 1932: Einige Notizen zu Czerny: Anthomyzidae, Opomyzidae, Tethinidae; Lief. 28 von Lindner, Die Fliegen der palaearktischen Region. *Tijdschrift voor Entomologie* **75**: 284–288.
- MEIJERE J. C. H. DE 1939: Naamlijst van Nederlandsche Diptera afgesloten 1 April 1939. [Checklist of Dutch Diptera towards 1st April 1939]. *Tijdschrift voor Entomologie* **82**: 137–174 (in Dutch).
- MEIJERE J. C. H. DE 1944: Over de Metamorphose van *Metopia leucocephala* Rossi, *Cacoxenus indagator* Löw, *Palloptera saltuum* L., *Paranthomyza nitida* Mg. en *Hydrellia nigripes* Zett. (Dipt.). *Tijdschrift voor Entomologie* **86** [1943]: 57–61.
- MELANDER A. L. 1913: A synopsis of the dipterous groups Agromyzinae, Milichiinae, Ochthiphilinae and Geomyzinae. *Journal of the New York Entomological Society* **21**: 283–300.
- MELANDER A. L. 1924: Review of the dipterous family Piophilidae. *Psyche* **31**: 78–86.
- MERZ B. 2012: 8.36.29. Superfamille Opomyzoidea (excl. Agromyzidae). Pp. 398–400. In: MERZ B. (ed.): *Liste annotée des insectes (Insecta) du Canton de Genève*. Instrumenta Biodiversitatis, Vol. 8. Muséum d'histoire naturelle, Genève, 532 pp.

- MERZ B., BÄCHLI G. & HAENNI J.-P. 2001: Erster Nachtrag zur Checkliste der Diptera der Schweiz. *Mitteilungen der Entomologischen Gesellschaft Basel* **51**: 110–140.
- MERZ B., BÄCHLI G. & HAENNI J.-P. 2006: Zweiter Nachtrag zur Checkliste der Diptera der Schweiz. *Mitteilungen der Entomologischen Gesellschaft Basel* **56**: 135–165.
- *MERZ B. & HAENNI J.-P. 2000: 1.1. Morphology and terminology of adult Diptera (other than terminalia). Pp. 21–51. In: PAPP L. & DARVAS B. (eds): *Contributions to a manual of Palaearctic Diptera. Vol. 1. General and applied dipterology*. Science Herald, Budapest, 978 pp.
- MESSERSMITH D. H. 1982: A report on a collection of Diptera from Iceland and Greenland. *Fauna Norvegica, Series B* **29**: 36–39.
- MNHNL (ed.) 2006: *Mouches et moustiques – un album de familles. Fliegen und Mücken – ein Familien-album*. Musée national d'histoire naturelle, Luxembourg, 195 pp. + 14 pp. (petit cahier complémentaire).
- MOHRIG W. 1967: Beitrag zur Ökologie und Verbreitung brachypterer Dipteren in norddeutschen Biotopen. *Deutsche Entomologische Zeitschrift* **14**: 169–184.
- MORGE G. 1974: Eine unbekannte Dipteren-Kollektion Österreichs von ausgefallenen Fundorten. Fortsetzung und Schluß. *Naturkundliches Jahrbuch der Stadt Linz* **1974**: 89–127.
- MORGE G. 1975: Dipteren-Farbtafeln nach den bisher nicht veröffentlichten Original-Handzeichnungen Meigens: "Johan Wilhelm Meigen: Abbildung der europäischen Zweiflügeligen Insekten, nach der Natur". Pars I: Vorwort des Herausgebers – Faksimiles von Original-Legenden und -Index: "Erklärung der Fig." und "Alphabetisches Verzeichniss der Gattungen und Arten" – Farbtafeln I–LXXX. *Beiträge zur Entomologie* **25**: 383–500 + plates 1–80.
- MORGE G. 1976a: Dipteren-Farbtafeln nach den bisher nicht veröffentlichten Original-Handzeichnungen Meigens: "Johan Wilhelm Meigen: Abbildung der europäischen Zweiflügeligen Insekten, nach der Natur". Pars II: Farbtafeln LXXXI–CLX. *Beiträge zur Entomologie* **26**: 441 + plates 81–160.
- MORGE G. 1976b: Dipteren-Farbtafeln nach den bisher nicht veröffentlichten Original-Handzeichnungen Meigens: "Johan Wilhelm Meigen: Abbildung der europäischen Zweiflügeligen Insekten, nach der Natur". Pars III: Farbtafeln CLXI–CCCX. *Beiträge zur Entomologie* **26**: 543 + plates 161–305.
- MUNARI L. 1974: Insecta Diptera. In: RELINI G. (ed.): Checklist della flora e della fauna dei mari italiani / Checklist of the flora and fauna in Italian seas. Parte II. *Biologia Marina Mediterranea* **17**(supplement 1): 572–583.
- NARTSHUK (= NARCHUK) E. P. 1977: K evolyutsii fitofagii u dvukrylykh nasekomykh. [On the evolution of phytophagy in Diptera]. Pp. 70–77. In: SKARLATO O. A. & GORODKOV K. B. (eds): *Sistematika i evolyutsiya dvukrylykh nasekomykh*. Materialy Simpoziuma (6–8 aprelya 1976 g., Leningrad). Zoologicheskij Institut Akademii Nauk SSSR, Leningrad, 127 pp (in Russian).
- NARTSHUK (= NARCHUK) E. P. 1984a: Dvukrylye Bolshogo Berezovogo ostrova, svyazannye so zlakami, s opisaniem novogo vida semeystva Opomyzidae (Diptera). Materialy po faune Vyborgskogo zakaznika. [Flies of the Bolshoi Berezovoi island, associated with grasses, with the description of a new species of the family Opomyzidae (Diptera). Materials to the fauna of the Vyborgskoy zakaznik reserve]. *Trudy Zoologicheskogo Instituta AN SSSR (Leningrad)* **123**: 51–59 (in Russian).
- NARTSHUK (= NARCHUK) E. P. 1984b: Diptera and other insects connected with the common reed (*Phragmites australis*) in the Palaearctic and Nearctic regions. Pp. 164–165. In: O'HARA J. E. (ed.): *Third International Congress of Dipterology, 15-19 August 1994, University of Guelph; Abstract Volume*. Guelph, 270 pp.
- NARTSHUK (= NARCHUK) E. P. 1996: Sistema rasteniy – fitofag na primere trostnika i ego konsumentov. [System plant – phytophag on example of common reed and its consumers]. *Zhurnal Obshchey Biologii* **57**: 628–641 (in Russian).
- NARTSHUK (= NARCHUK) E. P. 1997: Tablica dlya opredeleniya semeystv vysshikh dvukrylykh serii Acalyprata (Diptera) fauny Rossii i sopredel'nykh stran. [Key to families of higher dipterans of the series Acalyprata (Diptera) of the fauna of Russia and neighbouring countries]. *Entomologicheskoe Obozrenie* **76**: 857–873 (in Russian with English summary).
- NARTSHUK (= NARCHUK) E. P. 2003: Opredelitel' semeystv dvukrylykh nasekomykh fauny Rossii i sopredel'nykh stran (s kratkim obzorom semeystv mirovoy fauny). [Key to families of Diptera (Insecta) of the fauna of Russia and adjacent countries (with a brief review of the world fauna)]. *Trudy Zoologicheskogo Instituta, Rossiyskaya Akademiya Nauk (Sankt-Peterburg)* **294**: 1–250 (in Russian).
- NEUN S. & WEBER G. 1985: Dipterenbesiedlung einer abgedeckten Bauschuttdeponie – Vergleich einer Rekultivierungsfläche mit verschiedenen alten Sukzessionsflächen. *Drosera* **1985**: 77–90.
- NOWAKOWSKI J. T. 1981: Acalyprata (Diptera). In: *Zoologiczne podstawy kształtowania środowiska przy-*

- rodniczego osiedla mieszkaniowego Białołęka Dworska w Warszawie. Część I. Skład gatunkowy i struktura fauny terenu projektowanego osiedla mieszkaniowego. [Zoological bases of forming the natural environment of a housing estate Białołęka Dworska in Warsaw. Part I. Species composition and structure of the fauna of the planned housing estate]. *Fragmenta Faunistica* **26**: 421–452 (in Polish).
- NOWAKOWSKI J. T. 1991: Anthomyzidae. P. 211. In: RAZOWSKI J. (ed.): *Checklist of animals of Poland [Wykaz zwierząt Polski]*, Vol. 2. Polska Akademia Nauk, Ossolineum, Wrocław, Warszawa, Kraków, 342 pp.
- NYE I. W. B. 1958: The external morphology of some of the dipterous larvae living in the Gramineae of Britain. *Transactions of the Royal Entomological Society of London* **110**: 411–487.
- NYE I. W. B. 1959: The distribution of shoot-fly larvae (Diptera, Acalypterae) within pasture grasses and cereals in England. *Bulletin of Entomological Research* **50**: 53–62.
- OKÁLI I. 1997: List of the type specimens in the collections of the Slovak National Museum – Natural History Museum, Bratislava X. *Zborník Slovenského Národného Múzea, Prírodné Vedy* **47**: 40–51.
- OLDENBERG L. 1927: *Anthomyza fasciipennis* sp.n. ♀ (Dipt.). *Entomologische Mitteilungen* **16**: 118–120.
- OOSTERBROEK P. 1998: *The families of Diptera of the Malay Archipelago*. Fauna Malesiana Handbook 1. Brill, Leiden, Boston, Köln, xii + 227 pp.
- OOSTERBROEK P. 2006: *The European Families of the Diptera. Identification, diagnosis, biology*. KNNV-Uitgeverij, Utrecht, 205 pp.
- OSTEN SACKEN C. R. 1878: *Catalogue of the described Diptera of North America*. 2nd edition. Smithsonian Miscellaneous Collections. Vol. 16 (2 [= publ. 270]). Smithsonian Institution, Washington, 276 pp.
- PAKALNIŠKIS S. 1989: Spisok dvukrylykh Litvy (do 1988 g. vključitelno). [The list of the Lithuanian Diptera (to 1988 inclusive)]. Pp. 32–85. In: JONAITIS V. (ed.): *Novye i redkie dlya Litvy vidy nasekomykh. Soobščeniya i opisaniya 1989 goda*. [New and rare for Lithuania insect species. Records and descriptions of 1989]. Institute of Zoology and Parasitology of the Academy of Sciences of the Lithuanian SSR, Vilnius, 87 pp (in Russian with English summary).
- PAKALNIŠKIS S., BERNOTIENĖ R., LUTOVINOVAS E., PETRAŠIŪNAS A., PODĖNAS S., RIMŠAITĖ J., SĖTHER O. A. & SPUNGIS V. 1997: Checklist of Lithuanian Diptera. *New and Rare for Lithuania Insect Species* **18**: 16–150.
- PAKALNIŠKIS S. & PODĖNAS S. 1992: 258 new to Lithuania Diptera species found in 1964–1992. Pp. 56–82. In: JONAITIS V. (ed.): *New and rare for Lithuania insect species. Records and descriptions of 1992*. Academia, Vilnius, 116 pp.
- PAKALNIŠKIS D., RIMŠAITĖ J., SPRANGAUSKAITĖ-BERNOTIENĖ R., BUTAUTAITĖ R. & PODĖNAS S. 2000: Checklist of Lithuanian Diptera. *Acta Zoologica Lituonica* **10**: 3–58.
- PANTELEEVA N. Yu. 1997: K faune i ekologii mukh antomizid (Diptera, Anthomyzidae) Tsentral'nogo Chernozem'ya. [To the fauna and ecology of the anthomyzid flies (Diptera, Anthomyzidae) of the Central Chernozem territory]. In: Sostoyanie i problemy ekosistem Srednego Podon'ya. [Structure and problems of the ecosystems of Central Podon'ye]. *Trudy Biologicheskogo Uchebno-Nauchnogo Tsentra Voronezhskogo Gosudarstvennogo Universiteta „Venevitinovo“* **10**: 84–87 (in Russian).
- PANTELEEVA N. Yu. 2005: Semeystvo Anthomyzidae. [Family Anthomyzidae]. Pp. 428–429. In: NEGROBOV O. P. (ed.): *Kadastr bespozvonochnykh zhivotnykh Voronezhskoy oblasti*. [Cadastre of invertebrate animals of the Voronezh region]. Voronezhkiy gosudarstvennyy universitet, Voronezh, 825 pp. (in Russian).
- PANTELEEVA N. Yu. & RAZVOROTNEV D. V. 1996: K izucheniyu nekotorykh semeystv korotkousykh dvukrylykh Tsentral'nogo Chernozem'ya. [To the knowledge of some families of brachycerous Diptera of the Central Chernozem territory]. In: Sostoyanie i problemy ekosistem Srednego Podon'ya. [Structure and problems of the ecosystems of Central Podon'ye]. *Trudy Biologicheskogo Uchebno-Nauchnogo Tsentra Voronezhskogo Gosudarstvennogo Universiteta „Venevitinovo“* **8**: 127–132 (in Russian).
- PAPE T., BEUK P., PONT A., SHATALKIN A., OZEROVA, WOŹNICA A., MERZ B., BYSTROWSKI C., RAPER C., BERGSTRÖM C., KEHLMAIER C., CLEMENTS D., GREATHEAD D., KAMENEVA E., NARTSHUK E., PETERSEN F., WEBER G., BÄCHLI G., GELLER-GRIMM F., WEYER G. VAN DE, TSCHORSNIG H., JONG H. DE, ZUIJLEN J. VAN, VAÑHARA J., ROHÁČEK J., ZIEGLER J., MAJER J., HŮRKA K., HOLSTON K., ROGNES K., GREVE-JENSEN L., MUNARI L., MEYER M. DE, POLLET M., SPEIGHT M., EBEJER M., MARTINEZ M., CARLES-TOLRÁ M., FÖLDVÁRI M., CHVÁLA M., BARTÁK M., EVENHUIS N., CHANDLER P., CERRETTI P., MEIER R., ROZKOŠNÝ R., PRESCHER S., GAIMARI S., ZATWARNICKI

- T., ZEEGERS T., DIKOW T., KORNEYEV V., RICHTER V., MICHELSEN V., TANASIJTSHUK V., MATHIS W., HUBENOV Z. & JONG Y. DE 2015: Fauna Europaea: Diptera – Brachycera. *Biodiversity Data Journal* **3** (e4187): 1–31.
- PAPP L. 1985: Acalyprate flies (Diptera) from sifted materials in the Geneva Museum. *Revue Suisse de Zoologie* **92**: 481–507.
- PAPP L. 1995: Famiglia Anthomyzidae. P. 14. In: MINELLI A., RUFFO S. & LA POSTA S. (eds): *Checklist delle specie della fauna Italiana. Fascicolo 75, Diptera Opomyzoidea, Carnoidea, Sphaeroceroidea*. Calderini, Bologna, 27 pp.
- PAPP L. 2001a: Cyclorrhaphan flies (Diptera) new for the fauna of Hungary. *Folia Entomologica Hungarica* **62**: 283–292.
- PAPP L. 2001b: Anthomyzidae. Pp. 310–311. In: PAPP L. (ed.): *Checklist of the Diptera of Hungary*. Hungarian Natural History Museum, Budapest, 550 pp.
- PAPP L., MERZ B. & FÖLDVÁRI M. 2006: Diptera of Thailand. A summary of the families and genera with references to the species representations. *Acta Zoologica Academiae Scientiarum Hungaricae* **52**: 97–269.
- PAPP L. & SCHUMANN H. 2000: 1.5. Key to families – adults. Pp. 163–200. In: PAPP L. & DARVAS B. (eds): *Contributions to a manual of Palaearctic Diptera. Vol. 1 General and applied dipterology*. Science Herald, Budapest, 978 pp.
- PERRIS E. 1853: Histoire des Métamorphoses de quelques Diptères. *Mémoires de la Société d'Agriculture et Arts de Lille, 1^e Série* **1850**: 118–133.
- PETERSEN F. T. & ROHÁČEK J. 2001: Anthomyzidae. In: PETERSEN F. T. & MEIER R. (eds): A preliminary list of the Diptera of Denmark. *Steenstrupia* **26**: 186.
- PODĚNAS S. & PAKALNIŠKIS S. 1997: Dvisparniai (Diptera). Pp. 152–163. In: LAPELĚ M. (ed.): *Lietuvos valstybinių rezervatų flora ir fauna. [Flora and fauna of strict nature reserves of Lithuania]*. Aplinkos Apsaugos Ministerija, Vilnius, 168 pp (in Lithuanian).
- POKORNÝ V. & SKUHRAVÝ V. 1981: The inquilins of the Lipara galls. In: SKUHRAVÝ V. (ed.): Invertebrates and vertebrates attacking common reed stands (*Phragmites communis*) in Czechoslovakia. *Studie ČSAV (Československá Akademie Věd)* **1981(1)**: 45–47.
- PONT A. C. 1995: *The type-material of Diptera (Insecta) described by G. H. Verrall and J. E. Collin*. Clarendon Press, Oxford, x + 223 pp.
- PRESCHER S. & BÜCHS W. 1997: Zum Einfluß abgestufter Extensivierungsmaßnahmen und selbst-begrünender Dauerbrache in Ackerbau auf funktionelle Gruppen der Brachycera (Diptera). *Verhandlungen der Gesellschaft für Ökologie* **27**: 385–393.
- PROCTER W. 1927: *Part I. The insect fauna with reference to the flora and other biological features*. Biological survey of the Mount Desert Region. Wistar Institute of Anatomy and Biology, Philadelphia, 247 pp.
- PROCTER W. 1938: *Part VI. The insect fauna with references to methods of capture, food plants, the flora and other biological features*. Biological survey of the Mount Desert Region. Wistar Institute of Anatomy and Biology, Philadelphia, 496 pp.
- PROCTER W. 1946: *Part VII. The insect fauna with references to methods of capture, food plants, the flora and other biological features*. Biological survey of the Mount Desert Region Incorporated. Wistar Institute of Anatomy and Biology, Philadelphia, 566 pp.
- REMM H. 1959: Avaste soo kahetiivaliste faunast. [About the Diptera fauna of the Avaste swamp]. *Entomoloogiline Kogumik* **1**: 102–113 (in Estonian).
- RICHARDS O. W. 1932: Some breeding and habitat records of British Diptera. *Journal of the Entomological Society of the South of England* **1(1)**: 11–14.
- RICHARDS O. W. 1962: Mission zoologique de l'I.R.S.A.C. en Afrique orientale. LXXI. Diptera. Two new East African species of *Alombus* Beck. and an apterous sepsid (Chloropidae and Sepsidae). *Annales du Musée Royal de l'Afrique Centrale, Tervuren, Série in 8^o (Sciences Zoologiques)* **107**: 464–468.
- RIEDEL M. O. 1919: Beitrag zur Kenntnis der Dipterenfauna des Niederrheins. *Entomologische Zeitschrift* (Frankfurt am Main) **33**: 36.
- RINGDAHL O. 1950: Dipterologiska anteckningar från sydsvenska mossar. [Dipterological notes on bogs in South Sweden]. *Entomologisk Tidskrift* **71**: 111–119 (in Swedish).
- RINGDAHL O. 1951: Flugor från Lapplands, Jämtlands och Härjedalens fjälltrakter (Diptera Brachycera). [Flies

- from montane areas of Lapland, Jämtland and Härjedalen (Diptera Brachycera)]. *Opuscula Entomologica* **16**: 113–186 (in Swedish with German summary).
- RINGDAHL O. 1954: Några dipterologiska anteckningar från Råå kärr och vassar. [Some dipterological notes from the swamp and reed bed of Råå]. *Entomologisk Tidskrift* **75**: 223–234 (in Swedish with German summary).
- ROHÁČEK J. 1983: Faunistics of the Czechoslovakian species of Anthomyzidae and Stenomericidae (Diptera). *Časopis Slezišského Muzea, Opava (A)* **32**: 125–135.
- ROHÁČEK J. 1984a: New species and records of Palaearctic species of the *Anthomyza gracilis*-group (Diptera, Anthomyzidae). *Acta Entomologica Bohemoslovaca* **81**: 384–394.
- ROHÁČEK J. 1984b: *Santhomyza* gen. n., a new genus of Anthomyzidae (Diptera) from the Mediterranean area. *Bollettino del Museo Regionale di Scienze Naturali (Torino)* **2**: 531–543.
- ROHÁČEK J. 1985: New and/or interesting records of Diptera Acalyprata (Strongylophthalmyiidae, Megamerinidae, Chamaemyiidae, Trixoscelididae, Chyromyidae, Anthomyzidae, Asteiidae, Milichiidae, Carnidae) from Czechoslovakia. *Časopis Slezišského Muzea, Opava (A)* **34**: 193–201 (in English with Czech introduction & summary).
- ROHÁČEK J. 1986a: Čel'ad' Anthomyzidae. Pp. 144–145. In: ČEPELÁK J. (ed.): *Diptera Slovenska II. [Diptera of Slovakia II.]*. Veda, Bratislava, 435 pp (in Slovak).
- ROHÁČEK J. 1986b: A revision of *Anthomyza macra* Czerny and *A. pleuralis* Czerny (Diptera, Anthomyzidae). *Annalen des Naturhistorischen Museums in Wien (B)* **88/89**: 593–606.
- ROHÁČEK J. 1987a: Two new species of the *Anthomyza gracilis*-group (Diptera, Anthomyzidae) from Nepal. *Acta Entomologica Bohemoslovaca* **84**: 48–59.
- ROHÁČEK J. 1987b: Druhý doplněk k faunistice Diptera Acalyprata v Československu. (Second supplement to the acalyprate Diptera fauna (Pseudopomyzidae, Strongylophthalmyiidae, Chamaemyiidae, Chyromyidae, Anthomyzidae, Aulacigastridae, Periscelididae, Carnidae, Milichiidae) of Czechoslovakia). *Časopis Slezišského Muzea, Opava (A)* **36**: 97–108 (in Czech with English summary).
- ROHÁČEK J. 1987c: Anthomyzidae. Pp. 253–254. In: JEŽEK J. (ed.): *Enumeratio insectorum bohemoslovakiae. Check list of Czechoslovak Insects II (Diptera)*. *Acta Faunistica Entomologica Musei Nationalis Pragae* **18**: 1–341.
- ROHÁČEK J. 1992: *Typhamyza* gen. n. for *Anthomyza bifasciata* Wood, with description of immature stages (Diptera, Anthomyzidae). *Bollettino del Museo Regionale di Scienze Naturali (Torino)* **10**: 187–207.
- ROHÁČEK J. 1993: Two new Afrotropical genera of Anthomyzidae (Diptera), with descriptions of seven new species. *Annals of the Natal Museum* **34**: 157–190.
- ROHÁČEK J. 1994: Classification and phylogeny of Anthomyzidae (Diptera): the present state of knowledge. Pp. 186–187. In: O'HARA J. E. (ed.): *Third International Congress of Dipterology, 15–19 August 1994, University of Guelph; Abstract Volume*. Guelph, 270 pp.
- ROHÁČEK J. 1995a: Third supplement to the acalyprate Diptera fauna of the Czech Republic and Slovakia. *Časopis Slezišského Zemského Muzea, Opava (A)* **44**: 171–174.
- ROHÁČEK J. 1995b: Anthomyzidae. Pp. 149–150. In: ROHÁČEK J., STARÝ J., MARTINOVSKÝ J. & VÁLA M. (eds): *Diptera Bukovských vrchov. [Diptera of the Bukovské Hills]*. SAŽP – Správa CHKO a BR Východné Karpaty, Humenné, 232 pp (in Slovak with English abstract & summary).
- ROHÁČEK J. 1996a: Revision of Palaearctic Stiphrosoma, including the *Anthomyza laeta*-group (Diptera: Anthomyzidae). *European Journal of Entomology* **93**: 89–120.
- ROHÁČEK J. 1996b: First records of Anthomyzidae (Diptera) from Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **60**: 489–494.
- ROHÁČEK J. 1997: Anthomyzidae. Pp. 78–79. In: CHVÁLA M. (ed.): *Check List of Diptera (Insecta) of the Czech and Slovak Republics*. Karolinum – Charles University Press, Praha, 130 pp.
- ROHÁČEK J. 1998a: Taxonomic limits, phylogeny and higher classification of Anthomyzidae (Diptera), with special regard to fossil record. *European Journal of Entomology* **95**: 141–177.
- ROHÁČEK J. 1998b: 3.22. Family Anthomyzidae. Pp. 267–278. In: PAPP L. & DARVAS B. (eds): *Contributions to a manual of Palaearctic Diptera. Vol. 3, Higher Brachycera*. Science Herald, Budapest, 880 pp.
- ROHÁČEK J. 1998c: 80. Anthomyzidae. Pp. 283–284. In: MERZ B., BÄCHLI G., HAENNI J.-P. & GONSETH Y. (eds): *Diptera - Checklist. Fauna Helvetica 1*. Centre suisse de cartographie de la faune & Sweiizerische Entomologische Gesellschaft, Neuschâtel, 369 pp.
- ROHÁČEK J. 1998d: Anthomyzidae. Pp. 141–142. In: CHANDLER P. (ed.): *Checklists of Insects of the British Isles*

- (New Series), Part 1: Diptera. Handbooks for the identification of British Insects, Vol. 12. Royal Entomological Society, London, 234 pp.
- ROHÁČEK J. 1998e: The fauna of Anthomyzidae in the Mediterranean and Macaronesian subregions. Pp. 184–185. In: ISMAY J. W. (ed.): *Fourth International Congress of Dipterology, 6–13th September 1998, Keble College, Oxford, UK; Abstract Volume*. Oxford, 279 pp.
- ROHÁČEK J. 1999a: Anthomyzidae. P. 134. In: SCHUMANN H., BÄHRMANN R. & STARK A. (eds): *Entomofauna Germanica 2, Checkliste der Dipteren Deutschlands*. Studia dipterologica, Supplement 2, Ampyx-Verlag, Halle an der Saale, 354 pp.
- ROHÁČEK J. 1999b: Anthomyzidae. Pp. 315–318. In: ROZKOŠNÝ R. & VAŇHARA J. (eds): Diptera of the Pálava Biosphere Reserve of UNESCO, II. *Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia* **100**: 221–458.
- ROHÁČEK J. 1999c: Taxonomy and distribution of West Palaearctic Anthomyzidae (Diptera), with special regard to the Mediterranean and Macaronesian faunas. *Bollettino del Museo Regionale di Scienze Naturali* (Torino) **16**: 189–224.
- ROHÁČEK J. 1999d: A revision and re-classification of the genus Paranthomyza Czerny, with description of a new genus of Anthomyzidae. *Studia Dipterologica* **6**: 373–404.
- ROHÁČEK J. 2000: 5.3.62. Anthomyzidae. In: ZIEGLER J. & MENZEL F. (eds): Die historische Dipteren-Sammlung Carl Friedrich Ketel. Revision einer zwischen 1884–1903 angelegten Sammlung von Zweiflüglern (Diptera) aus Mecklenburg-Vorpommern. *Nova Supplementa Entomologica* **14**: 152.
- ROHÁČEK J. 2004a: Revision of the genus Amygdalops Lamb, 1914 (Diptera, Anthomyzidae) of the Afrotropical Region. *African Invertebrates* **45**: 157–221.
- ROHÁČEK J. 2004b: Anthomyzidae. In: PAPE T. & BEUK P. (eds): *Fauna Europaea: Diptera, Flies*. Fauna Europaea version 2.5, <http://www.faunaeur.org>
- ROHÁČEK J. 2004c: New records of Clusiidae, Anthomyzidae and Sphaeroceridae (Diptera) from Cyprus, with distributional and taxonomic notes. In: KUBÍK Š. & BARTÁK M. (eds): Dipterologica bohemoslovaca 11. *Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia* **109**: 247–264.
- ROHÁČEK J. 2004d: Piophilidae, Anthomyzidae, Sphaeroceridae, Milichiidae, Aulacigastridae. Faunistic records from the Czech and Slovak Republics: Diptera. In: KUBÍK Š. & BARTÁK M. (eds): Dipterologica bohemoslovaca 11. *Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia* **109**: 343–346.
- ROHÁČEK J. 2005: Anthomyzidae (hloubilkovití). Pp. 331–332. In: FARKAČ J., KRÁL D. & ŠKORPÍK M. (eds): *Červený seznam ohrožených druhů České republiky. Bezobratlí. Red list of threatened species in the Czech Republic. Invertebrates*. Agentura ochrany přírody a krajiny České republiky, Praha, 760 pp (in Czech and English).
- ROHÁČEK J. 2006a: A monograph of Palaearctic Anthomyzidae (Diptera) Part 1. *Časopis Slezského Zemského Muzea, Opava (A)* **55(supplement 1)**: 1–328.
- ROHÁČEK J. 2006b: Anthomyzidae Czerny, 1903. In: JEDLIČKA L., STLOUKALOVÁ V. & KÚDELA M. (eds): *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://www.edvis.sk/diptera2006/Anthomyzidae.htm> + CD-ROM (ISBN 80-969629-0-6).
- ROHÁČEK J. 2007: *Zealantha thorpei* gen. et sp. nov. (Diptera: Anthomyzidae), first family representative from New Zealand. *Zootaxa* **1576**: 1–13.
- ROHÁČEK J. 2008a: Revision of the genus Amygdalops Lamb, 1914 (Diptera, Anthomyzidae) of the Oriental, Australasian and Oceanian Regions. *Acta Zoologica Academiae Scientiarum Hungaricae* **54**: 325–400.
- ROHÁČEK J. 2008b: Anthomyzidae. P. 329. In: BORGES P. A. V., ABREU C., AGUIAR A. M. F., CARVALHO P., JARDIM R., MELO I., OLIVEIRA P., SÉRGIO C., SERRANO A. R. M. & VIEIRA P. (eds): *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo, 440 pp.
- ROHÁČEK J. 2008c: Anthomyzidae. Pp. 117–122. In: ZIEGLER J. (ed.): Diptera Stelviana. A dipterological perspective on a changing alpine landscape. Vol 1. *Studia Dipterologica, Supplement* **16**: 117–122.
- ROHÁČEK J. 2009a: A monograph of Palaearctic Anthomyzidae (Diptera) Part 2. *Časopis Slezského Zemského Muzea, Opava (A)* **58(supplement 1)**: 1–180.
- ROHÁČEK J. 2009b: Anthomyzidae Czerny, 1903. In: JEDLIČKA L., KÚDELA M. & STLOUKALOVÁ V. (eds): *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 2. <http://www.edvis.sk/diptera2009/>

- families/anthomyzidae.htm + CD-ROM (ISBN 978-80-969629-4-5)
- ROHÁČEK J. 2009c: Anthomyzidae. Pp. 237–239. In: ROHÁČEK J. & ŠEVČÍK J. (eds): *Diptera of the Poľana Protected Landscape Area – Biosphere Reserve (Central Slovakia)*. SNC SR, Administration of the PLA – BR Poľana, Zvolen, 340 pp.
- ROHÁČEK J. 2010: A peculiar male genitalia monstrosity in *Anthomyza neglecta* (Diptera: Anthomyzidae). *Acta Entomologica Musei Nationalis Pragae* **50**: 619–628.
- ROHÁČEK J. 2011: New records of Anthomyzidae and Stenomericidae (Diptera) from Turkey. *Časopis Slezského Zemského Muzea, Opava (A)* **60**: 147–153.
- ROHÁČEK J. 2012a: The fauna of the opomyzoid families Clusiidae, Acartophthalmidae, Anthomyzidae, Opomyzidae, Stenomericidae, Perisclididae, Asteiidae (Diptera) in the Gemer area (Central Slovakia). *Časopis Slezského Zemského Muzea, Opava (A)* **61**: 97–111.
- ROHÁČEK J. 2012b: New amber fossil Anthomyzidae (Diptera): an unexpected Eocene diversity. *Journal of Systematic Palaeontology*, iFirst **2012**: 1–43.
- ROHÁČEK J. 2013a: New amber fossil Anthomyzidae (Diptera): an unexpected Eocene diversity. *Journal of Systematic Palaeontology* **11**: 431–473.
- ROHÁČEK J. 2013b: New host-plant, habitat and distributional records of West Palaearctic Anthomyzidae (Diptera). *Časopis Slezského Zemského Muzea, Opava (A)* **62**: 23–43.
- ROHÁČEK J. 2013c: *Reliquantha variipes* gen. & sp. nov., a peculiar new taxon of Anthomyzidae (Diptera) from Great Britain with uncertain relationships. *Acta Entomologica Musei Nationalis Pragae* **53**: 793–814.
- ROHÁČEK J. 2013d: The fauna of Acalyptrate families Micropezidae, Psilidae, Clusiidae, Acartophthalmidae, Anthomyzidae, Aulacigastridae, Perisclididae and Asteiidae (Diptera) in the Gemer area (Central Slovakia): supplement 1. *Časopis Slezského Zemského Muzea, Opava (A)* **62**: 125–136.
- ROHÁČEK J. 2014a: The identity and family affiliation of *Scelomyza hirticornis* (Diptera: Opomyzidae, Anthomyzidae), with a new checklist of Afrotropical Anthomyzidae. *Acta Entomologica Musei Nationalis Pragae* **54**: 383–398.
- ROHÁČEK J. 2014b: Tertiary Anthomyzidae (Diptera): a review of described taxa, with discussion on habitat association and diversity. P. 292. In: DORCHIN N., KOTRBA M., MENGUAL X. & MENZEL F. (eds): *8th International Congress of Dipterology, Potsdam 2014, Abstract Volume*, Potsdam, xxvii + 440 pp.
- ROHÁČEK J. 2014c: *Reliquantha eocena* sp. nov., first tertiary representative of an extant genus of Anthomyzidae (Diptera). *Acta Entomologica Musei Nationalis Pragae* **54**: 773–784.
- ROHÁČEK J. 2016: Acalyptrate flies (Diptera) on glacial sand deposits in the Hlučínsko region (NE Czech Republic): most interesting records. *Acta Musei Silesiae Scientiae Naturales* **65**: 33–46.
- ROHÁČEK J., ALMEIDA J. & ANDRADE R. 2009: First records of the family Anthomyzidae from peninsular Portugal. *Boletín de la Sociedad Entomológica Aragonesa* **45**: 546.
- ROHÁČEK J. & ANDRADE R. 2011: Additional records of Anthomyzidae (Diptera) from Portugal, with new data about habitat and host-plant association of *Paranthomyza nitida* (Meigen). *Časopis Slezského Zemského Muzea, Opava (A)* **59(3)** [2010]: 193–197.
- ROHÁČEK J. & BÁEZ M. 1988: *Santhomyza biseta* sp.n. (Diptera, Anthomyzidae) from the Canary Islands. *Bollettino del Museo Regionale di Scienze Naturali (Torino)* **6**: 295–304.
- ROHÁČEK J. & BARBER K. N. 2004: A new species of the genus *Fungomyza* from the Nearctic Region (Diptera: Anthomyzidae). *Časopis Slezského Zemského Muzea, Opava (A)* **53**: 131–141.
- ROHÁČEK J. & BARBER K. N. 2005: Revision of the New World species of *Stiphrosoma* Czerny (Diptera: Anthomyzidae). *Beiträge zur Entomologie* **55**: 1–107.
- ROHÁČEK J. & BARBER K. N. 2009: New reduced-winged species of *Mumetopia* Melander, with analysis of the relationships of this genus, *Chamaebosca* Speiser and allied genera (Diptera: Anthomyzidae). *Acta Societatis Zoologicae Bohemicae* **72(3–4)** [2008]: 191–215.
- ROHÁČEK J. & BARBER K. N. 2011: *Quametopia*, a new genus of Nearctic Anthomyzidae (Diptera), with description of two new species, immature stages and life history. *European Journal of Entomology* **108**: 287–326.
- ROHÁČEK J. & BARBER K. N. 2013: A worldwide review of the genus *Arganthomyza* Roháček, with revision of the Nearctic species (Diptera: Anthomyzidae). *Zootaxa* **3604(1)**: 1–72.
- ROHÁČEK J. & BARRACLOUGH D. 2003: *Margdalops*, a new African genus of Anthomyzidae (Diptera),

- comprising six new species. *African Invertebrates* **44**: 157–190.
- ROHÁČEK J. & BARTÁK M. 2000: Some families of Diptera Acalyprata of six peat-bogs in the Šumava Mts. (SW Bohemia, Czech Republic). *Časopis Slezského Zemského Muzea, Opava (A)* **48(2)** [1999]: 125–151.
- ROHÁČEK J. & BARTÁK M. 2001: Anthomyzidae. Pp. 369–373. In: BARTÁK M. & VAŇHARA J. (eds): Diptera in an industrially affected region (north-western Bohemia, Bílina and Duchcov environs), II. *Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia* **105**: 241–514.
- ROHÁČEK J., BARTÁK M. & KUBÍK Š. 2013: Anthomyzidae (Diptera) of Vráž nr. Písek (Czech Republic). Pp. 323–328. In: KUBÍK Š. & BARTÁK M. (eds): *Workshop on biodiversity, Jevany*. Česká zemědělská universita v Praze, Praha, 436 pp.
- ROHÁČEK J., BARTÁK M. & ZUSKA J. 1986: Faunistic records from Czechoslovakia. Diptera: Atelestidae, Micropezidae, Otitidae, Piophilidae, Sepsidae, Acartophthalmidae, Anthomyzidae, Asteiidae. *Acta Entomologica Bohemoslovaca* **83**: 230–231.
- ROHÁČEK J. & FREIDBERG A. 1993: The Anthomyzidae (Diptera) of Israel, with revision of Anagnota Becker. *Israel Journal of Entomology* **27**: 61–112.
- ROHÁČEK J. & KARPA A. 2003: Anthomyzidae (Diptera) of Latvia: a faunistic survey. *Časopis Slezského Zemského Muzea, Opava (A)* **52**: 121–126.
- ROHÁČEK J., KUBÍK Š. & BARTÁK M. 2005: Anthomyzidae. Pp. 302–305. In: BARTÁK M. & KUBÍK Š. (eds): *Diptera of Podyjí National Park and its Environs*. Česká zemědělská univerzita v Praze, Praha, 434 pp.
- ROHÁČEK J. & MÁČA J. 1982: Acalyprate Diptera of peat-bogs in North Moravia (Czechoslovakia). Part 2. Ecological classification, Opomyzidae, Anthomyzidae, Asteiidae, Diastatidae, Drosophilidae. *Časopis Slezského Muzea, Opava (A)* **31**: 193–213.
- ROHÁČEK J. & ŠEVČÍK J. 2013a: Diptera associated with sporocarps of *Meripilus giganteus* in an urban habitat. *Central European Journal of Biology* **8**: 143–167.
- ROHÁČEK J. & ŠEVČÍK J. 2013b: Dvoukřídlí (Diptera). Pp. 263–183. In: ROHÁČEK J., ŠEVČÍK J. & VLK P. (eds): *Příroda Slezska. [Nature of Silesia]*. Slezské zemské muzeum, Opava, 480 pp (in Czech).
- ROHÁČEK J. & TÓTHOVÁ A. 2014: Morphology versus DNA – what will bring clarity to the relationships of phylogenetically unclear genera of Anthomyzidae (Diptera)? *Arthropod Systematics & Phylogeny* **72**: 165–176.
- ROHÁČEK J., TÓTHOVÁ A. & VAŇHARA J. 2009: Phylogeny and affiliation of European Anthomyzidae (Diptera) based on mitochondrial 12S and 16S rRNA. *Zootaxa* **2054**: 49–58.
- ROHDENDORF B. B. 1951: Organy dvizeniya dvukrylykh nasekomykh i ikh proiskhozhdenie. [Organs of movement of Diptera and their origin]. *Trudy Paleontologicheskogo Instituta, Akademia Nauk SSSR* **35**: 1–180 pp. + 1 p. spisok ispravlenij (= Errata) (in Russian).
- ROHDENDORF B. B. 1977: Sistema i filogenez dvukrylykh. [The classification and phylogeny of Diptera]. Pp. 81–88. In: SKARLATO O. A. & GORODKOV K. B. (eds): *Sistematika i evolyutsiya dvukrylykh nasekomykh*. Materialy Simpoziuma (6–8 aprelya 1976 g., Leningrad). Zoologicheskii Institut Akademii Nauk SSSR, Leningrad, 127 pp (in Russian).
- RONDANI C. 1875: Species Italicae Ordinis Dipteriorum (Muscaria Rndn.) collectae et observatae. Stirps XXIII Agromyzinae. *Bullettino della Società Entomologica Italiana* **7**: 166–191.
- ROTHERAY G. E. 1991: E B Basden's collection of Diptera from bird and mammal nests and mammal runs, burrows and droppings. *National Museum of Scotland Information Series* **3**: 1–46.
- ROTHERAY G. E., BLAND K. B. & HANCOCK E. G. 2014: *Paranthomyza nitida* (Diptera: Anthomyzidae): life history in Scotland. *Entomologist's Monthly Magazine* **150**: 7–18.
- ROZKOŠNÝ R. & VAŇHARA J. 1992: Diptera (Brachycera) of the agricultural landscape in southern Moravia. *Acta Scientiarum Naturalium Academiae Scientiarum Bohemoslovacae Brno* **26(4)**: 1–64.
- ROZKOŠNÝ R. & VAŇHARA J. 1993: Diptera (Brachycera) of a forest steppe near Brno (Hády hill). *Acta Scientiarum Naturalium Academiae Scientiarum Bohemoslovacae Brno* **27(2–3)**: 1–72.
- SABROSKY C. W. 1958: New species and notes on North American Acalyprate Diptera. *Entomological News* **69**: 169–176.
- SABROSKY C. W. 1965: Family Anthomyzidae. Pp. 819–820. In: STONE A., SABROSKY C. W., WIRTH W. W., FOOTE R. E. & COULSON J. R. (eds): *A catalog of the Diptera of America north of Mexico*. U.S. Department of Agriculture Handbook 276, Washington, 1696 pp.

- SABROSKY C. W. 1980: 67. Family Anthomyzidae. Pp. 650. In: CROSSKEY R. W. (ed.): *Catalogue of the Diptera of the Afrotropical Region*. British Museum (Natural History), London, 1437 pp.
- *SAS 2010: *SAS/STAT 9.3 User's Guide*. SAS Institute Inc., Cary, NC, USA.
- SCHACHT W. & HEUK P. 2010: Zweiflügler aus Bayern XXVI mit Nachträgen (Acartophthalmidae, Odiniidae, Opomyzidae, Anthomyzidae, Aulacigastridae, Perisclididae, Asteiidae, Braulidae). *Entomofauna, Zeitschrift für Entomologie* **31**: 437–452.
- SCHINER J. R. 1864: *Fauna Austriaca. Die Fliegen (Diptera)*. Vol. 2. Verlag von Carl Gerold's Sohn, Wien, 5 + xxxii + 658 pp.
- SCHNEIDER O. 1898: Die Tierwelt der Nordsee-Insel Borkum unter Berücksichtigung der von den übrigen ostfriesischen Inseln bekannten Arten. *Abhandlungen vom Naturwissenschaftlichen Verein zu Bremen* **16**(1): 1–174.
- SÉGUY E. 1934: Anthomyzidae. Pp. 301–305. In: *Diptères (Brachycères) (Muscidae Acalypratae et Scatophagidae)*. Faune de France, Vol. 28. P. Lechevalier et fils, Paris, iv + 832 pp.
- SÉGUY E. 1938: Diptera I. Nematocera et Brachycera. Mission scientifique de l'Omo, 4 (Zool.). *Mémoires Muséum Nationale d'Histoire Naturelle, Nouvelle série* (Paris) **8**: 319–380.
- *SHORTHOUSE D. P. 2010: *SimpleMappr; an online tool to produce publication-quality point maps*. [Retrieved from <http://www.simplemappr.net>.]
- SILFVERBERG H. 2007: Changes in the list of Finnish insects during 2001–2005. *Entomologica Fennica* **18**: 82–101.
- *SINCLAIR B. J. 2000: 1.2. Morphology and terminology of Diptera male terminalia. Pp. 53–84. In: PAPP L. & DARVAS B. (eds): *Contributions to a manual of Palaearctic Diptera. Vol. 1, General and applied dipterology*. Science Herald, Budapest, 978 pp.
- SKIDMORE P. 2008a: A provisional list of the Diptera of Tiree. *Dipterists Digest* **15**: 53–65.
- SKIDMORE P. 2008b: A provisional list of the Diptera of Kerrera, Western Isles, Scotland. *Dipterists Digest* **15**: 66–72.
- SKIDMORE P. 2008c: A review of the Diptera of the Western Isles of Scotland. *Dipterists Digest* **15**: 99–194.
- SMITH K. G. V. 1952: On some Diptera from Dublin and Wicklow with notes on several species new to Ireland. *Entomologist's Monthly Magazine* **88**: 104–106.
- SMITH K. G. V. 1971: A revision of Francis Walker's types of North American Empididae (Diptera). *Bulletin of the British Museum (Natural History), Entomology* **26**: 345–370.
- SMITH K. G. V. 1989: *An introduction to the immature stages of British flies. Diptera larvae, with notes on eggs, puparia and pupae*. Handbooks for the Identification of British Insects, Vol. 10, pt. 14. Royal Entomological Society of London, 280 pp.
- SMITH K. G. V. & FERRAR P. 2000: 1.6. Key to families – larvae. Pp. 201–239. In: PAPP L. & DARVAS B. (eds): *Contributions to a manual of Palaearctic Diptera. Vol. 1, General and applied dipterology*. Science Herald, Budapest, 978 pp.
- SOÓS Á. 1943: Adatok a Balaton-környéke acalyprás Muscida faunájának ismeretéhez. [Contribution to the knowledge of the fauna of Muscidae Acalypratae of the Balaton vicinity]. *Magyar Biológiai Kutató Intézet Munkái* (Tihany) **15**: 309–323.
- SOÓS Á. 1946: Die acalypteren Musciden des Karpatenbeckens III. *Fragmenta Faunistica Hungarica* **9**: 2–10.
- SOÓS Á. 1981: 58. *család: Anthomyzidae – Tüskéscombú legyek*. Fauna Hungariae 149, Akadémiai Kiadó, Budapest, pp. 106–117.
- SOÓS Á. 1983: Data to Muscidae Acalypratae (Diptera) in the Hortobágy National Park, II. Pp. 309–312. In: MAHUNKA S. (ed.): *The fauna of the Hortobágy National Park. Vol. 2*. Akadémiai Kiadó, Budapest, 489 pp.
- SPEISER P. 1903: Eine neue Diptere ngattung mit rudimentären Flügeln, und andere dipterologische Bemerkungen. *Berliner Entomologische Zeitschrift* **48**: 65–72.
- STACKELBERG A. A. 1958: Materialy po faune dvukrylykh Leningradskoy oblasti. III. Diptera Acalyprata, ch. 1. [Materials about the fauna of Diptera of the Leningrad Region, III. Acalyprata, part 1.]. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR* **24**: 103–191 (in Russian).
- STACKELBERG A. A. 1970: 83. sem. Anthomyzidae. Pp. 326–329. In: BEI-BIENKO G. YA. (ed.): *Opredelitel nasekomykh evropeyskoy chasti SSSR. Vol. 5, pt. 2*. Nauka, Leningrad, 943 pp (in Russian).
- STATZ G. 1940: Neue Dipteren (Brachycera et Cyclorhapha) aus dem Oberoligocän von Rott. *Palaontographica* (A) **91**: 120–174.
- STONER A., BRYAN D. E. & DREW W. A. 1962: A partial inventory of insect populations in tallgrass prairie

- pastures in north central Oklahoma. *Proceedings of the Oklahoma Academy of Science* **42**: 143–157.
- STRAKA V. 2002: Dvojkrídlovce (Diptera) Prírodnej pamiatky Oravské hradné bralo. (The knowledge on Diptera fauna of the Oravské hradné bralo). *Zborník Oravského múzea* **19**: 207–216 (in Slovak with English summary).
- STRAKA V. 2005: Dvojkrídlovce (Diptera) Súľovských skál. (Flies (Diptera) of the protected nature reserve Súľovské skaly rocks). *Zborník Slovenského Národného múzea v Martine, Kmetianum* **10**: 198–218 (in Slovak with English abstract).
- STROBL G. 1880: Dipterologische Funde um Seitenstetten. Ein Beitrag zur Fauna Nieder-Österreichs. *Programm Kaiserlich-Königlich Ober-Gymnasiums der Benediktiner zu Seitenstetten* (Linz) **14**: 1–65.
- STROBL G. 1894: Die Dipteren von Steiermark. II. Theil. *Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark* **30** [1893]: 1–152.
- STROBL G. 1898: Die Dipteren von Steiermark, IV. Teil, Nachträge. *Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark* **34** [1897]: 192–298.
- STROBL G. 1901: Tief's dipterologischer Nachlass aus Kärnten und Oesterr.-Schlesien. *Jahrbuch des Naturhistorischen Landesmuseums von Kärnten* (Klagenfurt) **47**: 1–76.
- STROBL G. 1910: Dipteren von Steiermark, II. Nachtrag. *Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark* **46** [1909]: 45–293.
- STUBBS E. A. & FALK S. 2010: Lowland heath, bog and mire. Pp. 199–212. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Brentwood, Essen, 525 pp.
- STUKE J.-H. 2009: Die artenarmen Familien der acalypraten Zweiflügler in Niedersachsen und Bremen (Diptera: Acalypratae). *Drosera* **2008**: 77–106.
- STURTEVANT A. H. 1926: The seminal receptacles and accessory glands of the Diptera, with special reference to the Acalypterae. *Journal of the New York Entomological Society* **34**: 1–21.
- STURTEVANT A. H. 1954: Nearctic flies of the family Periscelididae (Diptera) and certain Anthomyzidae referred to the family. *Proceedings of the United States National Museum* **103**: 551–561.
- SUEYOSHI M. & ROHÁČEK J. 2003: Anthomyzidae (Diptera: Acalyprata) from Japan and adjacent areas. *Entomological Science* **6**: 17–36.
- SZADZIEWSKI R. 1983: Flies (Diptera) of the saline habitats of Poland. *Polskie Pismo Entomologiczne* **53**: 31–76.
- *SZWEDO J. 2012: Life in the Eocene forests. Pp. 56–70. In: PYTLOS R., SZADZIEWSKI R., ZBIERSKA A., ADAMSKA G. & DMOWSKA A. (eds): *World Amber Council. Światowa Rada Burszyny*. 7th Session of the World Amber Council, 18–19 May 2012, City Council in Gdańsk. Mayor's Office for City Promotion, City Hall of Gdańsk, Gdańsk, 76 pp.
- TESKEY H. J. 1981: 5. Key to families – larvae. Pp. 125–147. In: McALPINE J. F., PETERSON B. V., SHEWELL G. E., TESKEY H. J., VOCKEROTH J. R. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Agriculture Canada Monograph No. 27, Vol. 1. Minister of Supply and Services Canada, Ottawa, vi + 1–674 pp.
- THALHAMMER J. 1899: Ordo Diptera. In: *Fauna regni Hungariae, III. Animalium Hungaricae hucusque cognitum enumeratio systematica. Arthropoda (Insecta Diptera)*. Edidit regia societas scientiarum naturalium Hungarica, Akadémiai Kiadó, Budapest, 76 pp.
- THOMSON C. G. 1869: 6. Diptera. Species nova descripsit. Pp. 443–614. In: *Kongliga svenska fregatten Eugenies Resa omkring jorden under befäl af C. A. Virgin, åren 1851–1853*. Pt. 2 (Zoologie), Sec. 1 (Insecter) [Journey of the Royal Swedish frigate Eugenie around the Earth under the command of C. A. Virgin, years 1851–1853. Pr. 2 (Zoologie), Sect. 1 (Insects)]. Kongliga Svenska Vetenskaps-Akademien, P. A. Norstedt & Söner, Stockholm, 617 pp.
- TÓTHOVÁ A., ROHÁČEK J. & VAŇHARA J. 2009: What will the mitochondrial DNA tell us about the anthomyzid flies? Pp. 41–42. In: MEIER R. (ed.): *Proceedings of the XXVIII Hennig Annual Meeting, June 22-26, 2009*, Singapore, 49 pp.
- TROJAN P. 1962: Zeszyt 54–58 Odiiniidae, Clusiidae, Anthomyzidae, Opomyzidae, Tethinidae. In: *Klucze do oznaczania owadów Polski. Część XXVIII Muchówki – Diptera*. [Keys to the identification of insects of Poland. Part XXVIII Flies – Diptera]. Państwowe Wydawnictwo Naukowe, Warszawa, 68 pp (in Polish).
- TSCHARNTKE T. 1999: Insects on common reed (*Phragmites australis*): community structure and the impact of herbivory on shoot growth. *Aquatic Botany* **64**: 399–410.

- TSCHIRNHAUS M. VON 1981: Die Halm- und Minierfliegen im Grenzbereich Land-See der Nordsee. Eine ökologische Studie mit Beschreibung von zwei neuen Arten und neuen Fang- und Konservierungsmethoden (Diptera: Chloropidae et Agromyzidae). *Spixiana, Supplement* **6**: 1–416.
- TSCHIRNHAUS M. VON 2007: Acalyprate Fliegen (Diptera: Schizophora, „Acalypratae“) der jungen Dünneinseln Memmert und Mellum unter besonderer Berücksichtigung der Agromyzidae und Chloropidae. Ergebnisse der Untersuchungen von 1984–86 und 1993. *Drosera* **2007**: 99–136.
- TSCHIRNHAUS M. VON 2008: Die acalypraten Fliegen der Ostfriesischen Inseln (Diptera: Schizophora, „Acalypratae“). Kritisches Artenverzeichnis anhand von Literaturdaten, Neufunden und unter Mitarbeit von Fachkollegen. *Schriftenreihe Nationalpark Niedersächsisches Wattenmeer* **11**: 373–390.
- TSCHIRNHAUS M. VON & HOFFEINS C. 2009: Fossil flies in Baltic amber – insight in the diversity of Tertiary Acalypratae (Diptera, Schizophora), with new morphological characters and a key based on 1,000 collected inclusions. *Denisia* **26**: 171–212.
- UFFEN R. & CHANDLER P. 1978: 4. Associations with plants. Higher plants. Pp. 213–228. In: STUBBS A. & CHANDLER P. (eds): *A dipterist's handbook*. The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Hanworth, Middlesex, 255 pp.
- UFFEN R. & CHANDLER P. 2010: Associations with fungi, mycetozoa and plants. Higher plants. Pp. 443–467. In: CHANDLER P. (ed.): *A dipterist's handbook* (2nd Edition). The Amateur Entomologist, Vol. 15. The Amateur Entomologist's Society, Brentwood, Essen, 525 pp.
- VAŇHARA J. 1981: Lowland forest Diptera (Brachycera, Cyclorrhapha). *Acta Scientiarum Naturalium Academiae Scientiarum Bohemoslovacaе Brno* **15**(1): 1–32.
- VAŇHARA J. 1986: Impact of man-made moisture changes on floodplain forest Diptera. *Acta Scientiarum Naturalium Academiae Scientiarum Bohemoslovacaе Brno* **20**(7): 1–35.
- VIMMER A. 1913a: Seznam českého hmyzu dvoukřídleho (Catalogus Dipterorum). [Check list of Bohemian Diptera]. *Entomologické příručky. Vol. 8. Česká společnost entomologická, Praha*, 99 pp. (in Czech).
- VIMMER A. 1913b: Seznam českého hmyzu dvojkřídleho. [Check list of Bohemian Diptera]. Tribus 1. Eumyidae – A. Schizometopa. *Časopis České společnosti Entomologické* **10**: 38–80 (in Czech).
- VIMMER A. 1931: *Muší rody v Československé republice. Klíč k určování much a vypsání, která škodí lidem, zvířectvu i rostlinstvu*. [The genera of Diptera in Czechoslovak Republic. Key to the identification of flies and notes on their harmfulness to man, animals and plants]. Höfer & Klouček, Praha, 379 pp. (in Czech).
- VOCKEROTH J. R. 1977: Family Anthomyzidae. P. 241. In: DELFINADO M. D. & HARDY D. E. (eds): *A catalog of the Diptera of the Oriental Region*. Vol. 3. The University Press of Hawaii, Honolulu, 854 pp.
- VOCKEROTH J. R. 1987: 75. Anthomyzidae. Pp. 887–890. In: McALPINE J. F., PETERSON B. V., SHEWELL G. E., TESKEY H. J., VOCKEROTH J. R. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Agriculture Canada Monograph No. 28, Vol. 2. Minister of Supply and Services Canada, Ottawa, vi + 675–1332 pp.
- VOCKEROTH J. R. 1989: 72. Family Anthomyzidae. Pp. 548. In: EVENHUIS N. L. (ed.): *Catalog of Diptera of the Australasian and Oceanian Regions*. Bishop Museum Press and E. J. Brill, Honolulu, 1155 pp.
- WALKER F. 1849: *List of the specimens of dipterous insects in the collection of the British Museum*. Vol. 4. British Museum, London, pp. 688–1172.
- WALKER F. 1857: XIV. Characters of undescribed Diptera in the collection of W. W. Saunders, Esq., F.R.S., & c. *Transactions of the Entomological Society of London, New Series (Series 2)* **4**: 119–158.
- WESTWOOD J. O. 1840: Synopsis of the genera of British insects. 158 pp. (separately paginated). In: *An introduction to the modern classification of insects; founded on the natural habits and corresponding organization of the different families*. Vol. 2. Longman, Orme, Brown, Green & Longmans, London, xi + 587 pp.
- WHITELEY D., GARLAND S. P. & HANCOCK E. G. 1994: A survey of Diptera on South Uist, Benbecula and North Uist in August 1989. *Dipterists Digest* **14**: 32–43.
- WIEGMANN B. M., TRAUTWEIN M. D., WINKLER I. S., BARR N. B., KIM J.-W., LAMBKIN C., BERTONE M. A., CASSEL B. K., BAYLESS K. M., HEIMBERG A. M., WHEELER B. M., PETERSON K. J., PAPE T., SINCLAIR B. J., SKEVINGTON J. H., BLAGODEROV V., CARAVAS J., KUTTY S. N., SCHMIDT-OTT U., KAMPMEIER G. E., THOMPSON F. C., GRIMALDI D. A., BECKENBACH A. T., COURTNEY G. W., FRIEDRICH M., MEIER R. & YEATES D. K. 2011: Episodic radiations in the fly tree of life. *Proceedings of the National Academy of Sciences of the United States of America* **108**: 5690–5695.

- WILLISTON S. W. 1896: *Manual of the families and genera of North American Diptera*. Second edition. New Haven, 167 pp.
- WILLISTON S. W. 1908: *Manual of North American Diptera*. Third edition. James T. Hathaway, New Haven, 405 pp.
- WILLS H. J. 1968: Diptera from Monks Wood National Nature Reserve. *Entomologist's Record and Journal of Variation* **80**: 115–119, 137–140.
- WINKLER I. S., RUNG A. & SCHEFFER S. J. 2010: Hennig's orphans revisited: Testing morphological hypotheses in the "Opomyzoidea" (Diptera: Schizophora). *Molecular Phylogenetics and Evolution* **54**: 746–762.
- WINN A. F. & BEAULIEU G. 1932: *A preliminary list of the insects of the province of Quebec. Part II, Diptera*. Revised and Supplemented by C. E. Petch & J. B. Matais. Supplement to 24th report of the Quebec Society for the Protection of Plants. Dominion Entomological Laboratory, Hemmington, 100 pp.
- WIRTH W. W. 1955: Los insectos de les islas Juan Fernandez. 20. Ephydridae (Diptera). *Revista Chilena de Entomología* **4**: 51–72.
- WITHERS P. 2007: Towards an inventory of the flies (Diptera) of the nature reserve, Pierre Vérots Foundation, in Ain, France: the first 1000 taxa. *Dipterists Digest* **14**: 125–150.
- WOLF H. 1988: Bewohner von Schilfgallen in der Naturschutzgebieten „Am Berger Hang“ und „Enkheiner Ried“ in Frankfurt am Main (Insecta: Diptera, Hymenoptera). *Hessische Faunistische Briefe* **8**: 16–18.
- WOLTON R. J., BENTLEY H., CHANDLER P. J., DRAKE C. M., KRAMER J., PLANT A. R. & STUBBS A. E. 2014: The diversity of Diptera associated with British hedge. *Dipterists Digest* **21**: 1–36.
- *WOOD D. M. 1995: Homology and phylogenetic implications of male genitalia in Diptera. The ground plan. Pp. 255–284. In: WEISMANN L., ORSZÁGH I. & PONT A. C. (eds): *Proceedings of the Second International Congress of Dipterology*. SPB Academic Publishing bv, The Hague, 368 pp.
- WOOD J. H. 1911: A new species of *Anthomyza* (*A. bifasciata*). *Entomologist's Monthly Magazine, Series 2* **47**: 40–41.
- YAKOVLEV E. B. 1994: *Dvukrylye Palearktiki, svyazanye s gribami i miksomucetami. (Palaeartic Diptera associated with fungi and Myxomycetes)*. Karelian Research Center, Russian Academy of Sciences, Forest Research Institute, Petrozavodsk, 125 pp (in Russian with English title).
- YEATES D. K. & WIEGMANN B. M. 2005: Phylogeny and evolution of Diptera: recent insights and new perspectives. Pp. 14–44. In: YEATES D. K. & WIEGMANN B. M. (eds): *The Evolutionary Biology of Flies*. Columbia University Press, New York, 430 pp.
- YERBURY J. W. 1913: A list of the Diptera met within Wester Ross with notes on other species known to occur in the neighbouring areas. *Scottish Naturalist* **33**: 173–177.
- *ZATWARNICKI T. 1996: A new reconstruction of the origin of eremoneuran hypopygium and its implications for classification (Insecta: Diptera). *Genus* **7**: 103–175.
- ZETTERSTEDT J. W. 1837: Conspectus familiarum, generum et specierum Dipterorum, in Fauna Insectorum Lapponica descriptorum. *Isis* (Leipzig) **1**: 28–67.
- ZETTERSTEDT J. W. 1838: Section tertia: Diptera. Dipterologis Scandinaviae. Pp. 477–868. In: *Insecta Lapponica*. L. Voss, Lipsiae [= Leipzig], 1–868 pp.
- ZETTERSTEDT J. W. 1847: *Diptera Scandinaviae. Disposita et descripta. Vol. 6*. Officina Lundbergiana, Lundae [= Lund], 2163–2580 pp.
- ZETTERSTEDT J. W. 1848: *Diptera Scandinaviae. Disposita et descripta. Vol. 7*. Officina Lundbergiana, Lundae [= Lund], 2581–2934 pp.
- ZETTERSTEDT J. W. 1852: *Diptera Scandinaviae. Disposita et descripta. Vol. 11*. Officina Lundbergiana, Lundae [= Lund], vii + 4091–4545 pp.
- ZLOBIN V. V. 2007: The Cyclorrhaphous Diptera Limestone of the Isle of Wight. *An International Journal of Dipterological Research* **18**: 129–136.
- ZUIJLEN J. W. A. VAN 1996: Anthomyzidae. Pp. 39–40. In: ZUIJLEN J. W. A. VAN, PEETERS T. M. J., WIELINK P. S. VAN, ECK A. P. W. VAN & BOUVY E. H. M. (eds): *Brandstof. Een inventarisatie van der entomofauna van het natuur-reservaat 'De Brand' in 1990. [Brandstof. An inventarisatie of the entomofauna of the 'De Brand' Nature Reserve in 1990]*. Insektenwerkgroep K.N.N.V.-afdeling Tilburg, Tilburg, 228 pp. (in Dutch with English summary).
- ZUIJLEN J. W. A. VAN & ROHÁČEK J. 2002: Family Anthomyzidae. Pp. 267–268. In: BEUK P. L. TH. (ed.): *Checklist of the Diptera of the Netherlands*. KNNV Uitgeverij, Utrecht, 448 pp.

Index 1

(names of insects)

- acuticuspis* Roháček & Barber (*Arganthomyza*) 58, 61, **79–83**, 84, 85, 92, 100, 359, 361, 367, 368, 373, 374, 377
- albicosta* Walker (*Diastata*) 12, 45
- albicosta* (Walker) (*Ischnomyia*) 12, 13, 26, 41, 43, 44, **45–56**, 66, 72, 76, 77, 359–361, 363, 368, 371, 373, 374
- albimana* (Meigen) (*Fungomyza*) 32, 33, 37, 38, 40, 370, 372, 373, 375
- albinana* Meigen (*Opomyza*) 30
- Amygdalops* Lamb 18, 109, 368
- Anagnota* Becker 370
- anderssoni* Roháček (*Anthomyza*) 109, 379, 381
- Anthomyia* Meigen 12, 105
- Anthomyza* Fallén 3, 5, 12–14, 16, 19, 23, 29, 44, 54, 78, **105–110**, 359, 368–372, 377, 378, 380–382
- Anthophilina* Zetterstedt 12, 13, 105
- Anthomyzidae** 3, 5, 8, 9, 12–14, 26, 29, 32, 40, 44, 104, 107, 242, 295, 368–370, 378
- Anthomyzinae** 32, 369, 373, 378
- Apterosepsis* Richards 18, 19, 23
- Arganthomyza* Roháček 3, 14, 16, 18, 23, 26, 28, 29, 31, 32, 43, 44, 54, **56–59**, 66, 77, 92, 97, 107, 109, 114, 359, 368–374
- baezi* Roháček (*Anthomyza*) 109, 379, 380, 382
- balteatum* Roháček & Barber (*Stiphrosoma*) 78
- barbarista* Roháček (*Arganthomyza*) 29, 43, 57
- barbarista* (Roháček) (*Ischnomyia*) 43–46, 50, 52, 54, 55, 57, 58, 373, 374
- basilewskyi* Richards (*Apterosepsis*) 16, 18
- bellatrix* Roháček (*Anthomyza*) 109, 230, 379, 381, 382
- bivittata* Roháček & Barber (*Arganthomyza*) 6, 58, 60, 63, 66, 74, 77, 79, 80, **83–89**, 92, 97, 120, 361, 362, 373, 377
- buccata* Roháček & Barber (*Fungomyza*) 16, 27, 32, **33–40**, 361, 364, 367, 368, 372, 373, 375
- carbo* Roháček & Barber (*Arganthomyza*) 58, 60, **62–66**, 70, 77, 91, 96, 120, 361, 364, 366, 372–376
- Canacidae** 12
- Carexomyza* Roháček 3, 26, 28, 31, 32, 370
- caricis* Roháček (*Paranthomyza*) 28
- Cercagnota* Roháček & Freidberg 18, 19, 370, 371
- certata* Roháček (*Fungomyza*) 31–33, 373, 375
- Chamaebosca* Speiser 19, 368
- Cicadellidae** 44
- clara* Roháček (*Anthomyza*) 109, 378, 379, 382
- collini* Andersson (*Anthomyza*) 109, 314, 379, 381
- concolor* (Thomson) (*Anthomyza*) 109, 110, 142–144, 186, **187–200**, 201–205, 207, 209, 210, 219, 220, 222, 224–227, 313, 361, 364, 367, 368, 378–380
- concolor* Thomson (*Piophilina*) 12, 13, 187
- cuneata* Roháček (*Anthomyza*) 109, 379, 381, 382
- Cyamops* Melander 13
- decolorata* Roháček (*Anthomyza*) 109, 111, 116, 120, 130, 141, 377, 379
- Diastata* Meigen 12, 54
- dichroa* sp. nov. (*Anthomyza*) 4, 55, 109, 160, 229–231, 235, 238, 242, **243–255**, 260–262, 267, 272, 273, 359–361, 368, 379, 381
- disjuncta* Roháček & Barber (*Arganthomyza*) 59, 61, 79, 83, **95–99**, 100, 101, 104, 360–362, 371, 373, 374, 377
- dissors* Collin (*Anthomyza*) 109, 141, 142, 167, 168, 171, 173, 175, 176, 181, 183, 185, 187, 379, 380
- drachma* Sueyoshi & Roháček (*Anthomyza*) 109, 371, 379, 382
- duplex* Roháček & Barber (*Arganthomyza*) 14, 28, 58, 60, 63, 66, 74, 76, 77, 79, 80, 84, 85, **90–95**, 97, 120, 121, 360–362, 370, 373, 377
- elbergi* Andersson (*Anthomyza*) 109, 313, 321, 324, 325, 379, 383
- Empididae** 12
- eocena* Roháček (*Reliquanthes*) 369
- Epischnomyia* Roháček 3, 23, 29, 44, 50, 107, 109, 369–372
- equiseti* sp. nov. (*Anthomyza*) 6, 78, 109, 210, 227–229, 267, 277, 313, 315, 319, 320, 325, 327, 340, 342–344, 346, **347–358**, 361, 362, 364, 366, 379, 383
- flavoscuta* Gillette (*Eupteryx*) 44
- flavosterna* Sueyoshi & Roháček (*Anthomyza*) 109, 230, 378, 379, 381, 382
- Fungomyza* Roháček 3, 23, 27, 29, **30–33**, 36, 40, 58, 107, 109, 369–373, 375
- furvifrons* sp. nov. (*Anthomyza*) 109, 295, 313, 314, **315–327**, 338, 340, 343, 346, 350, 352, 361, 364, 367, 368, 379, 383
- Geomyzidae 5, 12
- Geomyzinae 12
- gibbiger* sp. nov. (*Anthomyza*) 6, 109, 110, 177, 229–231, 234, 235, 237, 242, 243, 249, **255–268**, 270–272, 275, 277, 312, 361, 362, 379, 381
- gilviventris* sp. nov. (*Anthomyza*) 6, 109, 229, 277–279, 289, 291, 294, 295, **296–312**, 360–362, 365, 379, 383
- gracilis* Fallén (*Anthomyza*) 14, 15, 17, 18, 20–22, 24, 25, 29, 105, 109, 313, 314, 325, 379, 383
- Hemiptera** 44
- Heteroneuridae 5, 12
- hirticornis* Séguéy (*Scelomyza*) 16
- Homoneura* sp. 77
- Ischnomyia* Loew 3, 5, 12, 13, 18, 26, 29, 31, **41–44**,

- 54, 55, 57, 58, 72, 77, 107, 109, 359, 368–374
- Lacrimyza* Roháček 369, 370
- Leptomomyza* Macquart 12, 105
- macra* Czerny (*Anthomyza*) 109, 111, 116, 118, 120, 377, 379
- Margdalops* Roháček & Barraclough 19, 368
- mcalpinei* sp. nov. (*Anthomyza*) 6, 7, 109, 142, 144, 160, **161–177**, 179–181, 183, 185, 195, 225, 227, 361, 362, 366, 368, 371, 379, 380
- meunieri* Roháček (*Protanthomyza*) 16
- Mumetopia* Melander 3, 5, 12, 13, 27, 369
- Mutiloptera* Coquillett 13
- neglecta* Collin (*Anthomyza*) 109, 229, 230, 236, 379, 381
- nigrimana* Coquillett (*Anthomyza*) 12
- nigrimana* (Coquillett) (*Mumetopia*) 3, 12, 13, 27
- nitida* (Meigen) (*Paranthomyza*) 23, 32
- oblonga* sp. nov. (*Anthomyza*) 14, 108, 109, 111, 112, 115, 116, 118, 120–122, **123–130**, 136, 138, 139, 141, 359–361, 377–379
- occidentalis* sp. nov. (*Anthomyza*) 109, 142–144, 186, 197, 199, 200, **201–210**, 222, 224–227, 361, 364, 367, 368, 378–380
- occipitalis* Melander (*Mumetopia*) 3, 13, 27
- Opomyzidae** 3, 5, 13
- Opomyzoidea** 3
- orineglecta* Roháček (*Anthomyza*) 109, 229, 230, 379, 381
- orthogibbus* sp. nov. (*Anthomyza*) 6, 109, 177, 229–231, 234, 235, 237, 242, 249, 255, 260–263, 265, 267, **268–277**, 357, 359–361, 368, 379, 381
- pallida* (Zetterstedt) (*Anthomyza*) 29, 109, 141, 142, 156, 157, 160, 371, 379, 380
- paraneglecta* Elberg (*Anthomyza*) 109, 229, 230, 251, 254, 379, 381
- Paranthomyza* Czerny 31, 370
- pengellyi* sp. nov. (*Anthomyza*) 14, 109, 142, **144–161**, 169, 176, 177, 179, 227, 360–362, 371, 379, 380
- pleuralis* Czerny (*Anthomyza*) 109, 111, 120, 377, 379
- Protanthomyza* Hennig 16, 18, 369
- pullinotum* sp. nov. (*Anthomyza*) 109, 142–144, 169, 175, 176, **177–187**, 225, 227, 360–362, 365, 378–380
- Quametopia* Roháček & Barber 3, 5, 6, 14, 19, 28, 31, 32, 369, 371
- receptrix* (Roháček & Freidberg) (*Receptrix*) 32, 370, 372
- Receptrix* Roháček 3, 23, 29, 31, 32, 58, 109, 369–372
- Reliquantha* Roháček 58, 369, 370
- Santhomyza* Roháček 23
- Scelomyza* Séguy 16
- setiplanta* (Roháček) (*Arganthomyza*) 58, 59, 61, 62, 373, 374, 376
- setipleurum* Roháček & Barber (*Stiphrosoma*) 16
- shewelli* sp. nov. (*Anthomyza*) 7, 109, 277, 278, **279–296**, 301–305, 309–313, 359–361, 379, 383
- silvatica* sp. nov. (*Anthomyza*) 92, 108, 109, 111, 112, 116, 120–122, 126, **130–141**, 359–361, 363, 377–379
- socculata* (Zetterstedt) (*Anthomyza*) 100
- socculata* (Zetterstedt) (*Arganthomyza*) 59, 61, 79, 83, 95, 97, **100–104**, 361, 364, 367, 368, 373, 377
- socculata* Zetterstedt (*Geomyza*) 56, 100
- sordidella* (Zetterstedt) 314
- spinosa* Hendel (*Ischnomyia*) 12, 29, 43, 54, 56, 57, 66, 71, 76, 77, 78, 374
- Stenomocra** Coquillett 13
- Stiphrosoma** Czerny 3, 18, 23, 26, 27, 44, 368, 369, 371, 374
- tenuis* (Loew) (*Anthomyza*) 14, 108, 109, 111, **112–123**, 125, 126, 128, 130, 135, 136, 138, 139, 141, 361, 364, 377, 379
- tenuis* Loew (*Anthophilina*) 12, 14, 112
- terminalis* Loew (*Anthophilina*) 12, 14
- terminalis* (Loew) (*Mumetopia*) 13
- terminalis* (Loew) (*Quametopia*) 14, 120, 141
- Tethinidae 13
- Tethininae** 12
- trifurca* Sueyoshi & Roháček (*Anthomyza*) 109, 230, 379, 382
- tschirnhausi* Roháček (*Anthomyza*) 109, 277, 278, 286, 288, 289, 291, 294, 295, 301, 302, 304, 305, 309, 311, 312, 379, 381, 383
- Typhamyza* Roháček 18, 23, 370
- umbrosa* Roháček (*Anthomyza*) 109, 379, 380, 382
- ungulata* Loew (*Anthomyza*) 100
- variegata* (Loew) (*Anthomyza*) 13, 55, 109, 229, 230, **231–243**, 248, 249, 251, 253–255, 260, 262, 263, 265, 267, 270–273, 275, 359–361, 363, 368, 379, 381
- variegata* Loew (*Anthophilina*) 12, 13, 231
- variipes* Roháček (*Reliquantha*) 19, 32, 40, 369
- versitheca* Roháček (*Arganthomyza*) 58, 60, 62, 373, 374, 376
- vittata* Loew (*Ischnomyia*), misspelling 12, 13, 45, 54, 66
- vittipennis* (Walker) (*Arganthomyza*) 6, 16, 26, 43, 44, 50, 54–56, 58, 59, 63, **66–78**, 92, 130, 359–361, 368, 372–374, 376
- vittipennis* Walker (*Tachydromia*) 12, 45, 54, 66
- vittula* Loew (*Ischnomyia*) 12, 13, 41, 45, 54
- vockerothi* sp. nov. (*Anthomyza*) 6, 78, 109, 110, 142, 143, 176, 187, 200, 203, 204, **210–229**, 267, 312, 313, 356, 357, 360–362, 371, 378, 379
- vulgaris* sp. nov. (*Anthomyza*) 109, 160, 313, 315, 318–321, 325–327, **328–347**, 350, 352, 354, 356, 361, 362, 368, 379, 383
- Zealantha* Roháček 16

Index 2

(names of plants)

- Acer* sp. 160
Agropyron sp. 327, 346
Alnus sp. 120, 130, 295
Andropogon sp. 346
Angelica sp. 200, 209
Apiaceae 120
aquatilis Wahlenb. (*Carex*) 6, 176, 177, 226, 267, 275, 295, 312
arundinacea L. (*Phalaris*) 6, 176, 177
arundinaceus (Schreb.) Dumort. (*Schedonorus*) 327
arvensis L. (*Equisetum*) 6, 85, 86, 226, 229
Balsaminaceae 120
Betula sp. 160, 296
breviligulata Fernald (*Ammophila*) 160, 326, 346
Calamagrostis sp. 78, 161, 170, 176, 295, 327, 346, 358
Caltha sp. 312
canadensis (Michx.) P. Beauv. (*Calamagrostis*) 6, 161, 176, 177, 187, 267
capensis Meerb. (*Impatiens*) 120, 141, 255
Carex sp. 6, 7, 55, 78, 85, 86, 123, 161, 170, 176, 186, 187, 200, 226, 227, 242, 277, 287, 295, 312, 339, 346, 358
carthusiana (Vill.) H. P. Fuchs (*Dryopteris*) 6, 85, 86
compressa L. (*Poa*) 160
Cornus sp. 161
Cyperaceae 3
cyperinus (L.) Kunth (*Scirpus*) 255, 277, 296
Dulichium sp. 346
Eleocharis sp. 200, 204, 226, 227, 346
Equisetum sp. 120, 121, 161, 176, 186, 187, 200, 227, 229, 287, 295, 296, 312, 315, 327, 351, 356, 358
esula L. (*Euphorbia*) 346
Eurybia sp. 161
Fabaceae 346
fluviale L. (*Equisetum*) 6, 161, 187, 218, 226–229, 267, 277, 312, 327, 346, 351, 356–358, 362
glandulosa Michx. (*Betula*) 346
glaucus Buckley (*Elymus*) 267
gynandra Schwein. (*Carex*) 255, 277, 295, 296
inermis Leyss. (*Bromus*) 96, 97, 154, 160, 187, 242
Impatiens sp. 161, 242, 296
innovatus (Beal) Pilg. (*Leymus*) 160
Iris sp. 295
Juncaceae 3
Juncus sp. 186, 200, 227, 295, 346, 358
laevigatum A. Braun (*Equisetum*) 226, 229
lacustris Willd. (*Carex*) 242, 255, 277
latifolia L. (*Typha*) 177
Lathyrus sp. 344
×litorale Kühlew. ex Rupr. (*Equisetum*) 226, 229
macrophylla (L.) Cass. (*Eurybia*) 6, 77, 78
maculata L. (*Cicuta*) 358
maximum W. Bartram (*Heracleum*) 120
microcarpus J. & C. Presl (*Scirpus*) 176, 255, 267, 277, 296, 312, 339, 346
occidentalis Greene (*Cicuta*) 358
odorata Lemaire (*Delairea*) 209
oligosperma Michx. (*Carex*) 277
palustre L. (*Equisetum*) 226, 229, 357
Phalaris sp. 78, 170, 295, 346
Poa sp. 161, 187, 227, 255, 267
Poaceae 3
Populus sp. 130, 296
pratense Ehrh. (*Equisetum*) 229
pratensis L. (*Poa*) 161
repens (L.) Gould (*Elymus*) 327, 346
Rubus sp. 120, 141, 161, 176, 327
Salix sp. 120, 130
Scirpus sp. 200, 209, 227, 295, 296, 312, 346, 358
Solidago sp. 176, 327
spicatum Lam. (*Acer*) 141
stipata Muhl. ex Willd. (*Carex*) 176, 267, 277, 296
striata (Lam.) Hitchc. (*Glyceria*) 160
stricta Lam. (*Carex*) 176, 242
sylvaticum L. (*Equisetum*) 229
telmateia braunii (Milde) Hauke (*Equisetum*) 186, 200, 209, 210, 226, 229, 364
Thalictrum sp. 6, 85
tremuloides Michx. (*Populus*) 66, 92, 121, 130, 296
Typha sp. 176, 312, 346, 358
Typhaceae 3
Ulmus sp. 346
umbellata (Mill.) Nees (*Doellingeria*) 6, 85
utriculata Boott in Hook. (*Carex*) 161, 176, 187, 226, 227, 267, 277, 312, 357

Abbreviated instructions for authors

Full version of the instructions available at <http://www.aemnp.eu>

Journal *Acta Entomologica Musei Nationalis Pragae* (AEMNP) publishes entomological papers focused on (i) insect taxonomy, (ii) nomenclature, (iii) morphology of adult and immature stages and/or their biology with possible applications in taxonomy and phylogeny, (iv) phylogeny at least partly based on morphological characters, (v) catalogues applicable for further taxonomy and biodiversity studies, and (vi) general papers on methodology of insect taxonomy. Manuscripts are reviewed by two peer reviewers and evaluated by the editorial board. Papers not conforming to the journal style may be returned without a review. Manuscripts submitted to AEMNP must contain unpublished work and cannot be simultaneously submitted elsewhere.

AEMNP will consider manuscripts of any length but the editorial board may decide to publish long contributions in a supplementary issue. No page charges are required for shorter papers with no more than two color plates. Costs of papers with high number of color plates and long papers published as supplements are subject to the editor's decision. Each author will receive 50 reprints and a PDF file for private use. Peer reviewers will receive the final PDF file of any manuscript reviewed by them.

AEMNP only accepts manuscripts in clear and concise English; papers requiring extensive linguistic corrections will be returned to the authors. Subject to the editor's approval, papers may contain a translation of the summary or identification keys into other languages. Authors must follow the latest edition of the International Code of Zoological Nomenclature and its important recommendations, especially Recommendation 16C on the deposition of the holotypes in institutional collections.

Text (in .doc standard text file or .rtf format, 12 pt font size) should be double spaced and left justified; do not divide words and avoid unusual fonts. Manuscript should be structured as follows: title, abstract, keywords, main text, acknowledgements, references, and figure legends. The main text should be divided into introduction, material and methods, results and discussion; some of them can be omitted where appropriate (e.g. in short notes). Page headings are supplied by the editors and approved by the authors in proofs.

Tables can be submitted in text format (MS Word files in .rtf and .doc formats) or in spreadsheets (MS Excel .xls format). Formatting should be kept simple; final layout assembled by the journal office will be approved by the authors in proofs.

Illustrations are accepted as original artwork or in TIFF format with at least 600 dpi resolution at print size for black-and-white illustrations and 300 dpi at print size for photographs.

The editors reserve the right to make minor editorial changes in line with the instructions for authors without the approval of authors.

Manuscripts should be submitted electronically to the journal office by e-mail or on a CD-ROM. Author(s) will receive one set of proofs. Requested original artwork and storage media will be returned together with the reprints.

All correspondence should be sent to the AEMNP journal office, Department of Entomology, National Museum, Cirkusová 1740, CZ-193 00 Praha 9 – Horní Počernice, Czech Republic or e-mailed to aemnp.editors@gmail.com.

