Zootaxa 4773 (3): 001–411
https://www.mapress.com/j/zt/
Copyright © 2020 Magnolia Press

Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4773.1.1
http://zoobank.org/urn:lsid:zoobank.org:pub:B1D8D67C-4FDC-477E-872F-E8BCD4D027FB

ZOOTAXA

4773

Illustrated key to genera and catalogue of Mymaridae (Hymenoptera) in America north of Mexico

JOHN T. HUBER[1], JENNIFER D. READ[1] & SERGUEI V. TRIAPITSYN[2]
[1]*Natural Resources Canada c/o Canadian National Collection of Insects, Arachnids and Nematodes, K.W. Neatby Building, 960 Carling Ave., Ottawa, ON, K1A 0C6, Canada.* *john.huber2@canada.ca* *https://orcid.org/0000-0003-2913-6772*
[2]*Entomology Research Museum, Department of Entomology, University of California, Riverside, California, 92521, USA.* *serguei.triapitsyn@ucr.edu* *https://orcid.org/0000-0002-5086*

Magnolia Press
Auckland, New Zealand

Accepted by G. Gibson: 5 Dec. 2019; published: 12 May 2020
Licensed under a Creative Commons Attribution 4.0 International License http://creativecommons.org/licenses/by/4.0/

JOHN T. HUBER, JENNIFER D. READ & SERGUEI V. TRIAPITSYN
ILLUSTRATED KEY TO GENERA AND CATALOGUE OF MYMARIDAE (HYMENOPTERA) IN AMERICA NORTH OF MEXICO
(*Zootaxa* 4773)

411 pp.; 30 cm.

12 May 2020

ISBN 978-1-77670-923-6 (paperback)

ISBN 978-1-77670-924-3 (Online edition)

FIRST PUBLISHED IN 2020 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: magnolia@mapress.com

https://www.mapress.com/j/zt

© 2020 Magnolia Press

All rights reserved.

No part of this publication may be reproduced, stored, transmitted or disseminated, in any form, or by any means, without prior written permission from the publisher, to whom all requests to reproduce copyright material should be directed in writing.

This authorization does not extend to any other kind of copying, by any means, in any form, and for any purpose other than private research use.

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Table of Contents

Abstract . . . 4
Introduction . . . 4
Methods . . . 5
Family diagnosis . . . 9
Hosts and biology . . . 9
Key to Nearctic genera of Mymaridae. Females . . . 10
Key to Nearctic genera of Mymaridae. Males . . . 14
ACMOPOLYNEMA Ogloblin, 1946 . . . 17
ALAPTUS Westwood, 1839 . . . 26
ANAGROIDEA Girault, 1915 . . . 38
ANAGRUS Haliday, 1833 . . . 44
ANAPHES Haliday, 1833 . . . 64
ARESCON Walker, 1846 . . . 79
CALLODICOPUS Ogloblin, 1955 . . . 79
CAMPTOPTERA Foerster, 1856 . . . 91
CAMPTOPTEROIDES Viggiani, 1974 . . . 101
CARAPHRACTUS Walker, 1846 . . . 109
CHRYSOCTONUS Mathot, 1966 . . . 115
CLERUCHUS Enock, 1909 . . . 118
CNECOMYMAR Ogloblin, 1963 . . . 127
COSMOCOMOIDEA Howard, 1908 . . . 133
DICOPOMORPHA Ogloblin, 1955 . . . 142
DICOPUS Enock, 1909 . . . 153
EOFOERSTERIA Mathot, 1966 . . . 158
ERYTHMELUS Enock, 1909 . . . 161
EUSTOCHUS Haliday, 1833 . . . 174
GASTROGONATOCERUS Ogloblin, 1935 . . . 178
GONATOCERUS Nees, 1834 . . . 184
KALOPOLYNEMA Ogloblin, 1960 . . . 191
KROKELLA Huber, 1993 . . . 201
LITUS Haliday, 1833 . . . 207
LYMAENON Walker, 1846 . . . 216
MACROCAMPTOPTERA Girault, 1910 . . . 225
MYMAR Curtis, 1829 . . . 232
NEOMYMAR Crawford, 1913 . . . 242
NEOSTETHYNIUM Ogloblin, 1964 . . . 251
OMYOMYMAR Schauff, 1983 . . . 256
OOCTONUS Haliday, 1833 . . . 267
PALAEONEURA Waterhouse, 1915 . . . 277
PLATYSTETHYNIUM (***PLATYPATASSON*** Ogloblin, 1946), **stat. rev.** . . . 289
POLYNEMA Haliday, 1833 . . . 293
PTILOMYMAR Annecke & Doutt, 1961 . . . 308
SCHIZOPHRAGMA Ogloblin, 1949 . . . 317
STEPHANOCAMPTA Mathot, 1966 . . . 326
STEPHANODES Enock, 1909 . . . 333
STETHYNIUM Enock, 1909 . . . 342
Mymaridae . . . 344
Nomen dubium . . . 344
Lapsus calami . . . 344
Nomina nuda . . . 344
Species excluded from Mymaridae . . . 344
Acknowledgements . . . 353
References . . . 353
Appendix . . . 409

Abstract

Identification keys for females, and for males where known, to the 39 genera and 11 subgenera of Mymaridae in America north of Mexico are given. The genera are illustrated with over 1010 photographs and/or scanning electron micrographs. The 202 currently named and valid species reported from America north of Mexico are catalogued. Reliable host records are reported for 16 genera and almost 90 species from rearings in the region. The five genera represented by more than one subgenus in the region are: *Anagrus* Haliday, *Anaphes* Haliday, *Erythmelus* Enock, *Kalopolynema* Ogloblin, and *Polynema* Haliday. Five other genera are represented only by unnamed and possibly undescribed species. About 1000 literature references, mainly the North American ones, are listed. Three new species are described: *Callodicopus floridanus* Huber, **sp. n.**, *Neostethynium americanum* Huber, **sp. n.**, and *Stephanocampta xanthogaster* Huber, **sp. n.** *Cosmocomoidea marilandica* (Girault), **stat. rev.**, is placed in synonymy under *C. dolichocerus* (Ashmead). *Platypatasson* Ogloblin is given subgeneric status as *Platystethynium* (*Platypatasson* Ogloblin), **stat. rev.** Corrections and additions to the mymarid fauna of Mexico by Guzmán-Larralde *et al*. (2017) are also given.

Key words: Chalcidoidea, egg parasitoid, Nearctic species, literature citations, images

Introduction

Since publication of the previous key to the genera of Mymaridae (Hymenoptera: Chalcidoidea) of America north of Mexico (Huber 1997) several genera not previously recorded from the region have been collected and regional species of *Gonatocerus* Nees were reclassified into four genera (Huber 2015a). In the 1997 key, *Anaphes* Haliday species with a 2-segmented clava, at that time classified in the *crassicornis* group of *Anaphes* but later classified in *Anaphes* (*Patasson* Walker) (Huber & Thuróczy 2018), were inadvertently omitted from the key; specimens of *A*. (*Patasson*) would key to couplet 17, together with *Omyomymar* Schauff and *Schizophragma* Ogloblin. An updated key is provided here to correct that mistake by adding an appropriate couplet, keying the subgenera to those genera represented by more than one subgenus in the Nearctic region, and including additional genera found in America north of Mexico since 1997.

In America north of Mexico the fauna of Mymaridae, commonly known as fairyflies, is well known at the generic level but nevertheless new genera or subgenera may eventually be recognized. This will more likely be due to introductions of species of these genera from other regions rather than discovery of indigenous species representing genera new to science. Males of several genera are unknown for North American species but are included in the key to males because they have been described from other regions. Likely, they will eventually be reported for North American species or specimens of species originating elsewhere but now present here. Users of the keys should be able to arrive to a correct genus provided one has clean, intact, well prepared specimens that preferably are critical-point dried or chemical dried to prevent shrivelling, and good slide preparations preferably preserved in a permanent mounting medium such as Canada balsam. Huber (2015) described his method of slide preparation, updated slightly from Noyes (1982, 1990).

Although America north of Mexico and Nearctic are not strictly the same area geographically, the term Nearctic will be used below for brevity; it is treated in this paper as Canada and United States of America (USA) only. Although a large part of Mexico is biogeographically in the Nearctic region, that country is excluded because Guzmán-Larralde *et al.* (2017) keyed the 36 genera and catalogued the species so far recorded there. Much work still remains to refine species limits of the species occurring in the Nearctic region, particularly those in the commonly collected genera *Alaptus* Westwood, *Anagrus* Haliday, *Anaphes*, *Camptoptera* Foerster, *Cosmocomoidea* Howard, *Erythmelus* Enock, *Gonatocerus*, *Lymaenon* Walker and *Polynema* Haliday even though fairly recent revisions exist for most of them. Molecular data obtained using non-destructive methods to extract DNA for analysis (Porco *et al*. 2010; Tin *et al*. 2014) before specimens are slide-mounted may help define the species, especially if combined with rearings from properly associated and correctly identified (to species if possible) hosts.

The increase in number of published nominal species/subspecies of Mymaridae, excluding species misclassified in Mymaridae, in each of the following catalogues in the Nearctic is: Girault (1911[96]) almost 60, Peck (1963) 114, Burks (1979) 119, and Poole & Gentili (1996) 143; and the present catalogue 202. This is about a threefold increase in nominal species in the past almost 100 years. For comparison, Guzmán-Larralde *et al*. (2017) catalogued 79 species of Mymaridae from Mexico; corrections and additions to that paper are provided at the end of the present catalogue.

Methods

Terms. Morphological terms used are mainly according to Gibson (1997). They are illustrated and again defined (sometimes somewhat differently) in Huber (2012, 2014, 2015) who added new features sometimes useful in characterizing a particular genus. In Mymaridae, the scutellum is often divided into two distinct areas. In order to align terms used in Mymaridae with those used in other families of Chalcidoidea we use the terms scutellum (anterior scutellum, of authors) and frenum (posterior scutellum, of authors). Unique to Mymaridae is the system of trabeculae (bars of inrolled cuticle) on the head. The transverse trabecula rather than the mid ocellus is treated as the dorsal margin of the face, a sclerite that is clearly and distinctly separated from another sclerite, the vertex. The term "frons" as defined and used in descriptions of other Chalcidoidea is inappropriate for Mymaridae so is not used. Abbreviations used in the keys, text or illustrations are as follows (see the "Literature" section for detailed explanation of where the abbreviations for geographical regions are used): A=Australian, AT=Afrotropical, fl=flagellum (in males), fu=funicle (in females), gs=gastral sternum, gt=gastral tergum, mps=multiporous plate sensillum or sensilla (longitudinal sensilla, of authors), NT=Neotropical, O=Oriental, P=Palaearctic, TL=type locality.

Measurements. These are given in micrometers (μm) and taken with an ocular micrometer attached to a Nikon compound microscope at 200× magnification or a Leitz-Wetzlar binocular microscope at 64× and 160× magnification, depending on specimen preparation (card or point mounted, or slide mounted). For each genus, the body length of critical-point dried and card-mounted specimens from the Nearctic is based mostly on specimens from the collections where the authors of this publication are employed. Except for genera represented usually by 1 or 2 species and fewer than about 30 specimens, not every specimen was examined to obtain the absolute smallest and largest body length. Instead, a visual inspection of drawers of specimens was made to find what appeared to be about the smallest and largest specimens—this is fairly easy to do if the specimens are card mounted but not if they are point mounted. The minimum and maximum measurements are to the nearest 5 micrometers and the ranges provided are to give the reader only a general idea of body length for each genus. If taxonomic revisions are available, e.g., for *Alaptus* and *Erythmelus*, the measurements were sometimes also taken from those for comparison. Measurements based on slide-mounted specimens are often different (longer) than those taken from critical-point dried specimens mounted on points or cards. For example, Triapitsyn (2018b) showed that the holotype of *Palaeoneura markhoddlei* Triapitsyn was measured about 16% longer after slide mounting compared to before, and Triapitsyn *et al.* (2018) and Triapitsyn *et al.* (2019) had 11–20% greater body lengths in the slide mounted *Anagrus* species studied compared to before slide mounting.

Illustrations. Both card and slide-mounted specimens were photographed with a ProgRes C14^{plus} digital camera attached to a Nikon Eclipse E800 compound microscope, and the resulting layers were combined electronically using Zerene Stacker™ and the images enhanced as needed with Adobe® Photoshop. No retouching of primary types was done. Layers were selected from the complete stack to show surfaces only. A combined image consisting of a complete stack of up to 80–90 layers that includes dorsal and ventral surfaces as well as all internal structures is much too confusing to interpret surface features properly. By combining layers into substacks, and using these substacks to retouch the output image it is possible to show only the structures needed for illustration. For wings, which are essentially flat surfaces, about 40 layers are sufficient to show both surfaces. For structures like the metasoma, parts of each substack image that have pixels in focus are combined to show either the dorsal or the ventral surface or, for genitalia, all the parts. Scanning electron micrographs were prepared originally from either gold coated specimens or, as the technology progressed, with uncoated specimens in an environmental scanning electron microscope. Bolte (1996) described his preparation methods.

More illustrations are given than are referred to in the keys and generic diagnoses. They are provided for comparison of particular body parts across the genera in the Nearctic region. Over 1000 images are included, where possible with both colour photographs and scanning electron micrographs for each genus. Unless otherwise stated in the captions, the images are from female specimens (in a few micrographs the sex was not recorded at the time so is unknown). This is done not only to make the genera recognizable but especially to show structural details that are normally not examined or seen, with the hope that these comparative figures can eventually be used to code characters states for analyses of relationships once as many as possible of the remaining genera of the world are similarly treated. For *Cosmocomoidea,* only a habitus figure is given because so many images are already published (Huber 2015a) and fewer images are given for several other genera for the same reason. Several specimens of a given genus sometimes representing more than one species (usually unidentified), may have been used to obtain the im-

ages. Where possible the views are: antenna (lateral), head (anterior, posterior, dorsal, lateral, ventral, mouthparts), mesosoma (dorsal, lateral and, occasionally, anterior, posterior and/or ventral), and metasoma (dorsal, lateral and, occasionally, anterior, posterior and/or ventral), ovipositor and associated structures, and sometimes male genitalia. Some internal structures, e.g., the ocular apodeme, the tentorium and/or the phragma are provided for many genera.

Genera and species catalogue. A diagnosis is provided for each genus and is based on females unless otherwise stated. Each diagnosis is followed by an annotated species catalogue with all the relevant Nearctic literature compiled from the following catalogues, all of which treated the geographical area of America north of Mexico only. Peck (1951) prepared the Chalcidoidea (including Mymaridae) catalogue, with supplements by Burks (1958, 1967). Burks' (1979) Chalcidoidea catalogue includes mostly nomenclatural information and a few significant references to taxonomy, morphology or biology up to the end of 1972. Peck's (1963) catalogue includes an exhaustive bibliography of literature (citing the abbreviated journal reference and pagination but not the article title) on Chalcidoidea up to end of 1959. In the early 1970s, much entomological literature started to be catalogued electronically and may now be found through internet searches; the applied literature on Mymaridae published in the 10–15 year period between Peck (1963) and Burks (1972), around the start of internet coverage, may not be as well captured as before 1960. Noyes (2001), with the help of D. Yu, produced an interactive catalogue as a CD-ROM, later modified as the Universal Chalcidoidea Database (Noyes 2019), accessible on line. This is the outstanding resource for anyone working on Chalcidoidea.

Arnold Förster spelled his name in two different ways (Förster and Foerster) in his various publications. In the references and for the author of the species, we used the spelling he used in his own publications; for other publications we use the current German spelling, with a dieresis over the "o".

Where known, type localities, primary type status (holotype, lectotype, neotype or syntypes) and type depositories are given for species originally described from the Nearctic. For extralimital synonyms of valid species recorded in the Nearctic only the original citation, type data and depository are given. Subsequent references to those extralimital synonyms are usually excluded. Authors of species described before Peck (1963) did not always designate holotypes so the type localities of the known syntypes are given, if lectotypes have not yet been designated.

Species and subspecies are arranged by valid name, accompanied by their author (without an initial except for S. Trjapitzin or S. Triapitsyn where he specifically stated this, and also I. Walker) and date. Listed under each valid name are the available names that pertain to it, i.e., the available name of the valid species and available names of synonyms. *Nomina nuda* are also listed, if it can be determined from the literature which species they refer to. Following the last valid name in a genus, records for unidentified species are listed. One reference and host record for an unidentified genus and species are also included after the identified genera.

Literature. The literature on Mymaridae in America north of Mexico is considerable, partly because about 50 regional species were described originally from extralimital specimens that clearly have a wider distribution than America north of Mexico. There are well over 1000 references when one includes original descriptions and subsequent literature on these, all extralimital synonyms, and the literature on species either deliberately introduced for biological control of invasive pests or accidentally introduced into the Nearctic, and the voluminous biological literature on species that apparently have naturally Holarctic or even wider distributions. Therefore, to avoid major duplication, only the relatively few references for studies on Nearctic records of extralimital or introduced species are given, with some exceptions as noted under those species. For example, Triapitsyn (2014b) cited 23 literature references for *Camptoptera papaveris* Foerster, so only the few he missed are listed here. Because the present work is mainly taxonomic, all relevant literature on taxonomy that could be found is given. Extralimital synonyms for the Nearctic species are listed alphabetically after valid names and their Nearctic synonyms. For literature citations other than original descriptions and subsequent nomenclatural changes Viggiani's (1988) quote still, unfortunately, applies: "Many of the literature records are inaccurate [he was referring to published host records] and the identification of most of the species in the most important genera (*Lymaenon* [*Gonatocerus*], *Anagrus* and *Polynema*) is troublesome because the taxonomy of all of them is in chaos." One example illustrates this point. Arnaldos *et al.* (2003, 2004) compiled a list of arthropods associated with carrion, including five Mymaridae identified to species: *Alaptus pallidicornis* Foerster, *Anagrus atomus* (L.), *Erythmelus panis* (Enock), *Gonatocerus litoralis* (Haliday) and *Stethynium triclavatum* Enock. Only the first of these is probably correctly associated with carrion because it parasitizes Psocoptera, whose eggs may well be found on carcasses, e.g., Fletchmann *et al.* (1982). The remainder are parasitoids of Cicadellidae or Tingidae on live plants and each is supposedly widespread (on more than one

continent), with a considerable list of literature references. If the specimens were correctly identified they must have accidentally been included in the samples, perhaps having drifted or blown in from elsewhere. Arnaldos *et al.* (2003) gave data to suggest this but Arnaldos *et al.* (2004) did not. Luckily, the taxonomy of several of the genera has been improved over the past 30 years. However, much still needs to be done, particularly to confirm that some species widely distributed over two or more biogeographic regions are indeed conspecific.

Several Ph. D. dissertations and M. Sc. theses are specifically on genera or species in *Anagrus*, *Anaphes*, *Erythmelus*, *Gonatocerus s.l.* and *Polynema* and are of actual or potential importance for biological control. For the Nearctic, these include Boyd (2007), Cormier (1998), Cournoyer (2003), Gould (1986), Jackson (1982), Manrique (2005), Rajakulendran (1986), Rhéaume (2009), Scott (1933), as well as Huber (1985) and Lakin (1985), the only two on taxonomy.

In the last decade a plethora of electronic references can be found, many apparently repetitions of one another. Web searches will yield most or all of them but each needs to be checked for content as many simply cite previous references. Some journals make available an electronic version before the hard copy version, sometimes with slightly different pagination or, worse, a different year of "publication." This greatly complicates cataloguing efforts because it becomes very difficult to determine unequivocally the correct year or pagination of some original descriptions despite explicit new rules in the International Code of Zoological Nomenclature (1999, and amendment 8.5 with effect from 1 January, 2012) that treat electronic publications. The year of publication and first page in which a species is mentioned may therefore not be correct for some papers published since about 2005. This frustrating problem is not new, however. Peck (1963: 7) noted similar examples from over a century beforehand.

Peck (1951, 1963), Burks (1958, 1967), Thompson (1958) and/or Herting (1971, 1972, 1973) are catalogues produced in the 1900s. Peck (1963) also listed the catalogues containing Chalcidoidea produced in the 1800s, the most useful of which is Dalla Torre (1898). They include, minimally, host and/or distributional information abstracted from the primary literature. Books that treat insects in general may mention species important for some reason, e.g., Essig (1926) and Arnett (1985) mentioned several species, some with host records. However, the host associations are not necessarily correct. Such book references are usually excluded here unless they give useful summary of the knowledge about particular species.

For non-taxonomic literature all references to the Nearctic fauna that could be found are included, using the above catalogues, the Universal Chalcidoidea Database (Noyes 2019) and online web searches. However, with four exceptions, species mentioned in the Cooperative Economic Insect Reports and the Canadian Pest Review are excluded, following Peck (1963). Part of the problem with the Reports is that the author(s) of the parts that include names of Mymaridae are given by initials only, so including them would result in many references listed as "anonymous." Such reports contain little information other than distribution and host records. The name used in each reference is cited exactly as it occurs, i.e., misspellings and the given generic combination if the genus is cited; if not, the species is placed in the genus under which it is listed or inferred. A few species were deliberately introduced into the Nearctic for biological control. Others were either accidentally introduced or apparently have a naturally wide (usually Holarctic) distribution. Thus, applied literature, e.g., for *Anagrus atomus*, *Anaphes flavipes* Foerster, *A. nitens* (Girault), and *Lymaenon litoralis* is over 100 citations each. Therefore, for these species usually only references relevant to the Nearctic are given. References to papers treating a species outside the Nearctic region are indicated by the following abbreviations in square brackets at the end of the text citation: A=Australian, AT=Afrotropical, NT=Neotropical, O=Oriental, P=Palaearctic. Instead of listing the literature chronologically by year after each nominal species the literature is listed by name to show more clearly how many different combinations and variant spellings occur for a given nominal species.

Geographic distributions. Records compiled from the literature are reported for each species by province and territory (Canada) and/or state (USA); we use the two letter symbols recognized by Canada Post (http://www.canadapost.ca/tools/pg/manual/PGaddress-e.asp). Published distributions based on non-type specimens may well be incorrect because the specimens may have been misidentified. Unless the voucher specimens for these records can be re-examined, there is little chance the species name can be corrected and the state or province record thus confirmed. The distributions are sometimes supplemented with data from specimens identified to species (reliably one hopes) in major collections. The first Nearctic publication that mentioned a named species of Mymaridae is by Howard (1881). Since then few people have collected and studied the family. The Nearctic distributions for each species are thus far from complete whether based on published records only or supplemented with unpublished records from specimens in collections Many species have wide, apparently natural distributions both within the

Nearctic (e.g., *Anaphes iole* Girault) and occasionally across two or more biogeographical regions because they are either fairly polyphagous or are easily dispersed. Some are widespread because of deliberate introductions for biological control. Distributions based on recent revisions (since about 1985) of a particular genus are probably the most reliable. Published distributions for all the described species are found in Noyes (2019).

Type depositories of Mymaridae native to or established in America north of Mexico and their extralimital synonyms [mostly following Evenhuis (2019)]

BPBM—Bernice P. Bishop Museum, Honolulu, HI, USA.
CAS—California Academy of Sciences, San Francisco, CA, USA.
CNC—Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, Ottawa, ON, Canada.
CUIC—Cornell University Insect Collection, Ithaca, NY, USA.
DEZA—Dipartimento di Entomología e Zoologia Agraria, University of Naples, Portici, Italy.
EMEC—Essig Museum of Entomology, University of California, Berkeley, CA, USA.
EUMJ —Ehime University, Matsuyama, Japan.
FMNH—Zoological Museum, Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland.
ICXU—Insect Collection of College of Life Science and Technology, Xinjiang University, Urumqi, Xinjiang Uyghur Autonomous Region, China.
INHS—Illinois Natural History Survey, Urbana, IL, USA.
INPC—National Pusa Collection, Indian Agricultural Research Institute, New Delhi, India.
ISNB—Institut Royal d'Histoire Naturelle de Belgique, Brussels, Belgium.
KUEC—Kyushu University, Fukuoka, Japan.
MCPM—Milwaukee City Public Museum, Milwaukee, WI, USA.
MHNG—Muséum d'Histoire Naturelle, Geneva, Switzerland.
MLPA—Museo de La Plata, La Plata, Argentina.
MMUE—Manchester Museum, University of Manchester, Manchester, UK.
MNCN—Museo Nacional de Ciencias Naturales, Madrid, Spain.
MVMA—Museum of Victoria, Abbotsford, Victoria, Australia.
NHMUK—Natural History Museum [formerly British Museum (Natural History)], Department of Entomology, London, UK.
NHMW—Naturhistorisches Museum Wien, Vienna, Austria.
NHRS—Naturhistoriska Riksmuseet, Stockholm, Sweden.
NMID—National Museum of Ireland, Dublin, Ireland.
NMPC—National Museum, Prague, Czech Republic.
NMVM—National Museum of Victoria, Melbourne, Victoria, Australia.
OUMNH—Oxford Museum of Natural History, Oxford, UK.
PPDD—Plant Protection Department, Ministry of Agriculture, Dokki, Cairo, Egypt.
QM—Queensland Museum, South Brisbane, Queensland, Australia.
SCAC—South China Agricultural University, Wushan (Fuoshan), Guangzhou, Guangdong, China.
TAMU—Texas A&M University, College Station, TX, USA.
UCBC—Essig Museum, University of California, Berkeley, CA, USA.
UCRC—Entomology Research Museum, University of California, Riverside, CA, USA.
USNM—National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.
UZIU—Museum of Evolution, Uppsala University, Uppsala, Sweden.
WAUE—Department of Entomology, Agricultural University, Wageningen, Netherlands.
ZIN—Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia.
ZMHB— Museum für Naturkunde der Humboldt-Universität zu Berlin, Berlin, Germany.
ZMUC—Zoological Museum, Copenhagen, Denmark.
ZMUN—Insect Collection, National Center for Insect Biodiversity, Natural History Museum, University of Oslo, Oslo, Norway.

Family diagnosis

Mymaridae is considered to be the sister group of the remaining Chalcidoidea (Heraty *et al*. 2013). It clearly belongs in Chalcidoidea because at least some of the flagellomeres have mps, the mesosomal spiracle is located between the lateral panel of the pronotum and lateral lobe of the mesoscutum, and an exposed, free prepectus is present (Gibson 1986). Mymaridae specimens are distinguished from other Chalcidoidea by the following derived feature: head with bars of inrolled cuticle (trabeculae) and associated sutures on vertex and dorsally on face lateral to each torulus, e.g., Figs 2, 4, 13, 16. The transverse trabecula above the toruli divides the frons, as defined and used in other Chalcidoidea (the term frons should not be used in Mymaridae), into two distinct and separate sclerites, the vertex and face. Other features that are found in most but not all species of Mymaridae but which are helpful in distinguishing them from species belonging to other families are: toruli closer to eyes than to each other (Figs 2, 13); wings, when present (several genera include wingless species, at least in one sex) with venation usually not more than half length of wing; fore wing with stigmal vein very short, postmarginal vein usually absent, marginal vein present or absent, and with a usually distinct, backwards projecting seta (hypochaeta) on the ventral surface of the costal cell just anterior to the parastigma, e.g., Figs 7b, 39, 65, 101, 167; hind wing basally stalked, the stalk consisting of the venation only (except in a few extralimital genera); wing membrane, when present (Fig. 7) beyond the stalk (absent in some *Mymar* Curtis), almost always narrow and parallel sided.

General features that can be used to recognize Nearctic Mymaridae include: body length averaging 0.5–1.0 mm (0.13 mm for some males of the shortest species to 2.5 mm for some specimens of the longest species); body black, brown, or yellow, almost always without metallic sheen, except in some species of *Dicopomorpha* Ogloblin; wings with long marginal setae; antenna much longer than head plus mesosoma, in females distinctly clavate, in males filiform.

Mymaridae are most likely to be confused with males of Diparinae (Pteromalidae). The similarity between *Dipara* spp. and *Polynema* spp. was noted over 160 years ago by Foerster (1856: 17). Excluding the absence of trabeculae, males of *Dipara* spp. appear superficially almost identical to males of *Polynema* and relatives except that they have whorls of long setae on the flagellomeres and the fore wing venation is longer, with distinct stigmal and postmarginal veins. Some Aphelinidae, Trichogrammatidae and small Eulophidae such as species of genera parasitizing Thysanoptera may also be confused with some Mymaridae because of their small size and more or less parallel-sided fore and/or hind wings but they are distinguished by having a short antenna, only rarely as long as the entire body and mostly not longer than head + mesosoma.

Hosts and biology

Species of Mymaridae are almost all parasitoids in insect eggs, with two well-documented exceptions (Huber *et al*. 2006) and occasional, usually doubtful records from Aphididae and Coccoidea. The hosts of specimens reared in the Nearctic are given, if considered to be likely correct; clearly incorrect hosts, and hosts recorded for specimens reared outside of the Nearctic are excluded. Unfortunately, too many published host associations are almost certainly wrong. This is because the substrate in which host eggs are laid is often placed in a rearing container instead of first removing and isolating the eggs individually for rearing in vials or gelatin capsules. Because the eggs of several taxa may be in the substrate where they are not noticed, several species or even genera of fairyfly may emerge and be incorrectly associated with what is seen to be the most obvious or most abundant host egg present. Obviously, egg removal is a tedious process and, for hosts that lay their eggs in plant tissue, may result in egg collapse or dehydration resulting in death of any parasitoid within; however, it is the only way to be certain of obtaining a correct host-parasitoid association. Erroneous host records are included in Thompson (1958), Peck (1963), Herting (1971, 1972, 1973), Burks (1979), Huber (1986), and Noyes (2001, 2019), as well as recent treatments of some genera. While it is possible that some of those host records may be correct we do not repeat them here until there is definite confirmation. There are relatively few reliable host records for species of Mymaridae in the Nearctic, and usually only for those of hosts of economic importance. This contrasts with Europe where a wider range of genera and species have associated host records. Extralimital host records are usually excluded. For some species with distributions over two or more biogeographic regions the extralimital hosts can be found in the catalogues listed above and other publications treating extralimital genera or species. There is at least one apparently reliable host record for almost 90 species in 16 genera in the Nearctic.

Much of the applied literature treats only a few species in some genera because they were reared from serious insect pests. For example, the California Department of Agriculture organized and published yearly symposia on Pierce's disease in grape vines, caused by the bacterium *Xylella fastidiosa*. Several *Cosmocomoidea* spp. were discovered on its main vector *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) in vineyards and orchards and were studied in great detail, resulting in at least 85 non-peer reviewed research summaries (including some duplications from year to year). Because these summaries provide useful biological information all are included below (using names of the principle investigators only) in addition to subsequently published peer-reviewed papers in various scientific journals. Thus, the applied literature on these genera of Mymaridae is considerable due to their actual or potential use in biological control. *Alaptus*, *Camptoptera*, *Erythmelus*, *Gonatocerus*, *Lymaenon*, and *Polynema* are the other common and speciose genera in the Nearctic region, some with at least one reliable host record from a host that is of some economic importance as a crop or tree pest. Otherwise, the hosts of other species and genera of Mymaridae are poorly known if at all, so the literature on them is limited mainly to taxonomy papers and subsequent catalogues or lists. About 40% of recorded hosts are Auchenorrhyncha (Hemiptera) (Huber 1986), which are important vectors of virus and mycoplasma diseases of crops (Nielson 1975; Nault 1989). Eggs of Auchenorrhyncha are parasitized principally by species of *Anagrus*, *Cosmocomoidea*, *Gonatocerus* and *Lymaenon*, the last three previously treated as species groups or subgenera of *Gonatocerus* (Huber 2015a). Species of *Anaphes* parasitize mainly Chrysomelidae and Curculionidae (Coleoptera) (Huber 2017), which include important root or leaf-feeding pests of some agricultural crops and trees (*Eucalyptus* spp.). Species of *Erythmelus* parasitize Miridae and Tingidae (Hemiptera) and species of *Alaptus* parasitize Psocoptera. Species of *Camptoptera*, *Cleruchus* Enock, *Eustochus* Haliday, and *Litus* Haliday parasitize eggs of Coleoptera. Two species, *Anagrus atomus* and *Anaphes iole*, are or were mass reared for pest control in greenhouses or even in fields (Jones & Jackson 1990; Cooper 1993).

Keys

Because keys with a large number of couplets are daunting, the key of Huber (1997) is split below into two keys, one for females and one for males. Females are recognized by the flagellum forming a distinct apical clava (club) of 1–3-segments (Fig. 6), and males by the flagellum being filiform (Fig. 95), at most with the apical 2 (rarely 3) segments more widely joined together but these otherwise similar in width to the preceding segments (Fig. 509). The key to females precedes the key to males.

Five genera (*Anagrus*, *Anaphes*, *Erythmelus*, *Kalopolynema* Ogloblin, and *Polynema*) contain subgenera, which are included at the appropriate places in the key. A sixth genus, *Camptopteroides* Viggiani, contains only one subgenus, *C*. (*Alalinda* Huber), in the Nearctic and thus is keyed out only once; the nominate subgenus occurs in the Australian and Oriental regions. Appropriate figure numbers are given for females; relatively few are given for males. The key feature(s) are often the same in both sexes so the female figure(s) may be cited in the key to males simply as "Fig." rather than "as in Fig."

Key to Nearctic genera of Mymaridae. Females.

1 Wings short, not extending beyond apex of gaster, or absent 2
- Wings fully developed, extending beyond apex of gaster 4
2(1) Tarsi 4-segmented . . . . . ***Cleruchus* Enock**, part
- Tarsi 5-segmented 3
3(2) Wings and ocelli absent (Fig. 274). . . . . ***Chrysoctonus* Mathot**
Fauna: 1 described species. **Distribution**: eastern Nearctic, mainly in bogs.
- Wings present, though sometimes minute and scarcely visible, and ocelli present . . . . . ***Ooctonus hemipterus* Haliday**
4(1) Tarsi 5-segmented 5
- Tarsi 4-segmented 19
5(4) Funicle 8-segmented 6
- Funicle at most 7-segmented 10
6(5) Face with subantennal sulcus extending from each torulus to mouth margin (Fig. 453); pronotum longitudinally divided medially, the two lobes either abutting (Fig. 445) or separated by membranous area (Fig. 551); propodeum without carinae (Fig. 458) or with 2 longitudinal submedian sulci or carinae, sometimes with additional lines between them (Fig. 445); metasoma with petiole at most about 2× as long as wide but usually much shorter and, in lateral view, with gt_1 at most only slightly longer than

gt_2; fore wing with hypochaeta about midway between proximal and distal macrochaetae (Figs 340, 450, 464, 554) 7

- Face without subantennal sulci (Figs 716, 730); pronotum entire (Figs 723, 736); propodeum with diamond-like pattern of carinae (Figs 723, 740); metasoma with petiole at least 2.7× as long as wide, and in lateral view with gt_1 distinctly longer than gt_2 (Figs 715, 726, 744); fore wing with hypochaeta next to proximal macrochaeta (Fig. 722) . . . . . ***Ooctonus*** **Haliday** **Key**: Huber (2012). **Fauna**: 14 described species. **Distribution**: widespread.

7(6) Vertex with 3 or, rarely, 4 setae between lateral ocelli (Fig. 547); pronotum with lobes widely separated medially by membranous area (Fig. 551); dorsellum narrow and strap-like, not longer than lateral panels of metanotum (Figs 551, 552); propodeum with 2 narrow, longitudinal, usually pale submedian lines (Fig. 551) often with minute denticles between them . . . . . ***Lymaenon*** **Walker** (= *Gonatocerus litoralis* group of authors) **Key**: Triapitsyn (2013b). **Fauna**: 11 described species. **Distribution**: widespread.

- Vertex with 2 setae between lateral ocelli (Figs 440, 441, 456); pronotum with lobes abutting medially (Fig. 445); dorsellum biconvex, rhomboidal, or triangular, and longer than lateral panels of metanotum (Figs 445, 458); propodeum not as above, without pale submedian lines and denticles between them but with or without carinae 8

8(7) Head posteriorly divided by distinct transverse or oblique suture (Fig. 441); propodeum with several incomplete, less distinct, longitudinal carinae between 2 submedian carinae (Fig. 445); propodeal spiracle huge (Figs 445, 446), much larger than pronotal spiracle; gaster more or less produced anteriorly under mesosoma (Figs 439, 448); fore wing with microtrichia relatively sparse beyond venation, the distance among the microtrichia mostly equal to or greater than their length (Figs 439, 450) . . . . . ***Gastrogonatocerus*** **Ogloblin** (= *Gonatocerus membraciphagus* group of authors) **Fauna**: Several undescribed species. **Distribution**: southern USA.

- Head posteriorly entire (Fig. 454) or, rarely, with a round or oval occipital constriction; propodeum smooth between 2 submedian carinae; propodeal spiracle at most subequal to pronotal spiracle; gaster not (rarely slightly) produced anteriorly under mesosoma; fore wing with microtrichia relatively dense beyond venation, the distance between them mostly less than their length 9

9(8) Funicle with apex of fu_1 usually oblique, its dorsal margin shorter than ventral margin; fu_2 and fu_3 usually slightly the longest segments (Fig. 457); fore wing relatively narrow, at least 3.6× as long as wide, rounded apically, with microtrichia almost always uniformly distributed to base of parastigma (Figs 452, 464); propodeum smooth medially (Fig. 458) or with 1 median carina . . . . . ***Gonatocerus*** **Nees** (= *Gonatocerus sulphuripes* group of authors) **Keys**: Huber (1988), Triapitsyn (2013b). **Fauna**: 8 described species. **Distribution**: widespread.

- Funicle with apex of fu_1 truncate, its dorsal margin as long as ventral margin; fu_2 and fu_3 at most as long as following segments; fore wing relatively wide, less than 3.8× as long as wide, usually somewhat truncated, with microtrichia usually absent behind venation (Fig. 340) or, if microtrichia present there, not uniformly distributed; propodeum with 2 submedian carinae . . . . . ***Cosmocomoidea*** **Howard** (= *Gonatocerus ater* group of authors) **Keys**: Huber (1988), Triapitsyn (2013b). **Fauna**: 23 described species. **Distribution**: widespread.

10(5) Fore wing with length of venation much greater than half length of wing (Figs 142, 146) . . . . . ***Arescon*** **Walker** **Fauna**: At least 1 (? undescribed) species. **Distribution**: southeastern USA.

- Fore wing with length of venation less than half length of wing 11

11(10) Metasoma broadly joined to mesosoma, the petiole apparently absent (Figs 40, 49, 168, 348a, 376, 377) 12

- Metasoma usually with narrow, short but distinctly visible petiole (Figs 195, 197, 210, 238–243) 16

12(11) Scutellum separated from frenum by straight, transverse sulcus (Figs 40, 348a, 376) 13

- Scutellum with frenum either not indicated (Fig. 178) or indicated by separated V-shaped sulci (Figs 525, 539) 15

13(12) Funicle 7-segmented, but if rarely 6-segmented then without a ring-like segment 14

- Funicle 5-segmented (Figs 35, 36) or if exceptionally 6-segmented the second segment minute and ring-like (Fig. 33); fore wing with posterior margin usually distinctly incised behind venation (Fig. 39) . . . . . ***Alaptus*** **Westwood** **Keys**: Girault (1908) [51], Girault (1929) [428], Triapitsyn (2017). **Fauna**: 11 described species. **Distribution**: widespread.

14(13) Head in anterior view relatively long and narrow below eyes, together with ventrally directed mandibles giving head a beak-like appearance (Fig. 371); mandible with 1 pointed tooth and small inner tooth (Fig. 371); fore wing extremely narrow medially, with posterior margin slightly concave (Fig. 379) . . . . . ***Dicopus*** **Enock** **Key**: Doutt (1974). **Fauna**: 3 described species. **Distribution**: widespread.

- Head in anterior view wider, rather truncate ventrally (Figs 342, 344); mandible with 2 subequal teeth or with dorsal tooth slightly longer; fore wing wider medially, with posterior margin almost straight (Figs 346, 347) . . . . ***Dicopomorpha*** **Ogloblin** **Fauna**: 1 described species. **Distribution**: mainly eastern.

15(12) Occiput entire (Figs 521, 530); gt_1 forming most of gaster, the remaining terga short (Figs 527a, 528a, 541); gaster strongly sclerotized, smooth, and laterally compressed, somewhat cynipoid-like (Fig. 519) . . . . . ***Litus*** **Haliday** **Key**: Triapitsyn & Berezovskiy (2004a). **Fauna**: 2 described species. **Distribution**: widespread.

- Occiput divided by distinct transverse suture above foramen magnum and extending between eyes (Figs 165, 173); gt_1 not much longer than each succeeding tergum; gaster weakly sclerotized and not laterally compressed (Figs 168a, 183) . . . . . ***Callodicopus*** **Ogloblin** **Fauna**: 1 described species. **Distribution**: southeastern.

16(11) Body larger, at least 740 μm long; mandible with 2 distinct equal teeth (Figs 231, 562); fore wing beyond venation usually with more or less distinct dark areas and several rows of microtrichia and posterior margin almost straight (Figs 221, 561); head and mesosoma or at least propodeum, with distinct reticulate sculpture (Figs 222, 232–237, 561, 568); scutellum separated from frenum by curved or almost straight, transverse row of foveae (Figs 232, 237, 567, 568, 584) 17

- Body smaller, at most 660 μm long; mandible apparently with 1 tooth or, if with 2 teeth, these short and indistinct (Figs 187, 203, 381); fore wing beyond venation with only faint, uniform, darker suffusion and usually only one or two rows of micro-

trichia (Figs 192, 380) but if with more rows then posterior margin concave (*Stephanocampta*); head and propodeum at most with rather faint, inconspicuous sculpture (Figs 185, 186, 188, 193, 194, 383, 386) but occasionally with submedian carinae or thin, raised, translucent areolate laminae (Figs 912, 917, 925, 926, 930); scutellum appearing entire, without line of foveae and without evident frenum (Figs 193, 204, 386) 18

17(16) Parastigma with macrochaetae, especially the distal macrochaeta, long and distinct (Fig. 221) . . . . . ***Camptopteroides* (*Alalinda* Huber)**
Fauna: 1 described species. **Distribution**: southeastern.

- Parastigma with macrochaetae short and scarcely visible (Fig. 569) . . . . . ***Macrocamptoptera* Girault**
Key: Triapitsyn (2012a). **Fauna**: 2 described species. **Distribution**: widespread.

18(16) Fore wing narrow, with few microtrichia arranged in 1 or 2 rows (Fig. 192); propodeum without translucent, areolate laminae (Fig. 193) . . . . . ***Camptoptera* Foerster**
Key: Triapitsyn (2014). **Fauna**: 4 described species. **Distribution**: widespread.

- Fore wing wider, with several rows of microtrichia (Figs 912, 916); propodeum with large, translucent, reticulate sublateral and submedian laminae (Figs 912, 917, 925, 926, 930) . . . . . ***Stephanocampta* Mathot**
Key: Aquino & Triapitsyn (2014). **Fauna**: 1 described species. **Distribution**: Florida.

19(4) Tarsomere 4 distinctly longer (about 2×) than tarsomere 3 (Figs 387, 851) 20

- Tarsomere 4 at most about same length as tarsomere 3 21

20(19) Funicle 6-segmented (Fig. 385); propodeum and gt_1 without translucent lamellae; propodeal seta not branched . . . . . ***Eofoersteria* Mathot**
Fauna: 1 (? undescribed) species. **Distribution**: Florida.

- Funicle 8-segmented (Fig. 857); propodeum and gt_1 each with large, translucent, reticulate submedian lamellae (Figs 859–861, 863, 864a, 871, 875, 879–881); propodeal seta branched (Figs 860, 873) . . . . . ***Ptilomymar* Annecke & Doutt**
Fauna: 1 described species. **Distribution**: eastern, usually in bogs.

21(19) Metasoma apparently widely joined to mesosoma by petiole at least half width of propodeal apex and usually only slightly narrower than gt_1 (petiole sometimes not visible unless metasoma removed) (Figs 90, 93, 110, 111, 131, 132, 135, 136) but if relatively narrowly joined (Fig. 287) then body dorsoventrally depressed; head in lateral view somewhat triangular (Figs 280, 284), both gaster and fore wing parallel-sided (Fig. 292) and petiole shorter than wide 22

- Metasoma narrowly joined to mesosoma, the petiole about one-third width of propodeal apex and distinctly narrower than gt_1, almost always much longer that wide (Figs 1, 11, 12, 24–26) but rarely (*Anagroidea*) only slightly longer than wide (Figs 64, 78–80) 35

22(21) Clava 2- or 3-segmented (Figs 420, 984) 23

- Clava 1-segmented 29

23(22) Clava 2-segmented (Figs 420, 805) 24

- Clava 3-segmented (Figs 504, 984) 27

24(23) Metasoma uniformly black or dark brown (Fig. 120); propodeum with median longitudinal sulcus and strongly sloping relative to scutellum (Fig. 131) . . . . . ***Anaphes* (*Patasson* Walker)**
Keys: Huber (2006), Huber & Thuróczy (2018). **Fauna**: 19 described species. **Distribution**: widespread.

- Metasoma usually light coloured (white, yellow) at base, in contrast to darker brown remainder of gaster but sometimes uniformly brown (Fig. 884); propodeum without median sulcus and almost in same plane relative to scutellum (Figs 677, 700, 800, 808, 884, 892, 904) 25

25(24) Clava with apical more or less distinct finger-like projection (Fig. 684); ovipositor usually distinctly exserted posterior to apex of gaster (Figs 677, 689, 690). . . . . ***Omyomymar* Schauff**
Keys: Schauff (1983), Lin Chiappini (1996). **Fauna**: 3 described species. **Distribution**: eastern.

- Clava without apical projection; ovipositor not or barely exserted posterior to apex of gaster 26

26(25) Fore wing narrow, almost parallel sided (Fig. 806); funicle segments all at most as long as wide (Fig. 805); propodeum with longitudinal V-shaped submedian carinae (Fig. 807) . . . . . ***Platystethynium* (*Platypatasson* Ogloblin)**
Fauna: 1 species. **Distribution**: eastern.

- Fore wing wide, the anterior and posterior margins clearly diverging (Fig. 895); funicle segments mostly longer than wide (Fig. 890); propodeum without carinae (Figs 891, 903) . . . . . ***Schizophragma* Ogloblin**
Key: Huber (1987). **Fauna**: 2 described species. **Distribution**: southern USA.

27(23) Funicle 5-segmented (Fig. 504); fore wing venation longer than half length of wing (Fig. 510) . . . . . ***Krokella* Huber**
Fauna: 1 described species. **Distribution**: southern Florida.

- Funicle 6-segmented; fore wing venation much shorter than half length of wing 28

28(27) Clava compact, with segments appressed against one another and sutures between them strongly oblique (Fig. 984); scutellum divided medially by a distinct longitudinal sulcus (Figs 985, 1001) . . . . . ***Stethynium* Enock**
Key: Huber (1987). **Fauna**: 2 described species, **Distribution**: mostly western.

- Clava loose, with segments clearly separated from one another and sutures perpendicular to long axis of clava (Fig. 665); scutellum entire (Fig. 666) . . . . . ***Neostethynium* Ogloblin**
Fauna: 1 species. **Distribution**: southeastern.

29(22) Hypopygium (apical sternum) long and conspicuous, much larger than preceding sterna, in lateral view ploughshare-shaped and extending to apex of gaster (Figs 398, 399) 30

- Hypopygium (apical sternum) relatively short and indistinct, similar in size to preceding sterna, not extending to apex of gaster 31

30(29) Funicle 6-segmented; fore wing with margins not parallel, the apex therefore wider than the base, membrane usually with nu-

merous microtrichiae, and 1 isolated microtrichia behind parastigma (Fig. 397) . . . . . ***Erythmelus* (*Erythmelus* Enock)**
Key: Triapitsyn *et al*. (2007). **Fauna**: 12 described species. **Distribution**: widespread.

- Funicle 5-segmented; fore wing with margins parallel, membrane almost without microtrichia, and without an isolated microtrichia behind parastigma (Fig. 389) . . . . . ***Erythmelus* (*Parallelaptera* Enock)**
Keys: Triapitsyn (2000), Triapitsyn *et al*. (2007). **Fauna**: 1 described species. **Distribution**: widespread.

31(29) Fore wing with 2 longitudinal hairless areas (the marginal and medial spaces) separated by row of microtrichia extending from venation (Fig. 120); propodeum strongly sloping relative to scutellum (Fig. 132) and with median longitudinal sulcus (Fig. 131); body black or very dark brown . . . . . ***Anaphes* (*Anaphes* Haliday)**
Keys: Huber (1992), Huber & Thuróczy (2018). **Fauna**: 9 described species. **Distribution**: widespread.

- Fore wing uniformly setose beyond venation (Fig. 91), with only a few rows of microtrichia or almost none (Figs 101, 279); propodeum in almost same plane as scutellum (Figs 96, 288); body yellow or brown (Fig. 279) often with base of gaster lighter (Figs 86, 98) 32

32(31) Scutellum, in SEM images at least, clearly divided by transverse suture into scutellum and frenum, and frenum divided by longitudinal sulcus into paramedian plates (Figs 90, 102, 103, 110); fore wing widening apically (Figs 86, 91, 98, 101) … 33

- Scutellum, in SEM images at least, undivided, with frenum at most only slightly distinguishable (Fig. 299) but in slide mounts more clearly visible (Fig. 287); fore wing parallel-sided, about as wide apically as basally (Fig. 292) . . . . . ***Cleruchus* Enock**
Fauna: 3 described species. **Distribution**: widespread.

33(32) Vertex with sulci (seen as light lines in slide mounts) surrounding ocellar triangle, forming a stemmaticum (crown) (Fig. 107); axilla distinctly advanced anterior to median portion of transscutal articulation (Figs 90, 110); fu_2 at most as long as pedicel, about the same length as remaining funicle segments (Fig. 89) 34

- Vertex without stemmaticum (Fig. 99); axilla slightly advanced, more in line with median portion of scutoscutellar suture (Figs 102, 103); fu_2 at least 2× as long as pedicel, much longer than remaining funicle segments (Fig. 100) . . . . . ***Anagrus* (*Anagrella* Bakkendorf)**
Fauna: 1 described species. **Distribution**: eastern Nearctic.

34(33) Fu_1 distinctly shorter than pedicel or fu_2 (Figs 86, 89); frenum with paramedian plates narrowly separated by median longitudinal sulcus (Fig. 114) . . . . . ***Anagrus* (*Anagrus* Haliday)**
Keys: Gordh & Dunbar (1977), Chiappini *et al*. (1996), Triapitsyn (2015b). **Fauna**: 11 described species. **Distribution**: widespread.

- Fu_1 about as long as pedicel or fu_2; frenum with paramedian plates widely separated by median longitudinal sulcus . . . . . ***Anagrus* (*Paranagrus* Haliday)**
Fauna: 1 described species. **Distribution**: southeastern USA.

35(21) Head, mesosoma, petiole, and coxae with strong, raised reticulate sculpture (Figs 247–250, 253, 254, 421–425, 427–431). . 36

- Head, mesosoma, petiole, and coxae smooth or, at most, with faint engraved sculpture (Figs 8–12, 49, 54) 38

36(35) Clava 2-segmented (Fig. 420) . . . . . ***Eustochus* Haliday**
Key: Huber & Baquero (2007). **Fauna**: 3 described species. **Distribution**: widespread, in forests.

- Clava 1-segmented 37

37(36) Flagellum elbowed between fu_2 and fu_3 (Figs 61, 63); fu_1 2× as long as fu_2 (Figs 61, 63); mandible narrow, directed mainly ventrally, with 1 or 2 apical teeth (Figs 62, 66, 67, 70–72); petiole slightly longer than wide (Figs 78–83) . . . . . ***Anagroidea* Girault**
Fauna: 1 described species. **Distribution**: southeastern and south central.

- Flagellum not elbowed; fu_1 not longer than fu_2 (Fig. 252); mandible wide, directed horizontally, with 3 apical teeth (Figs 247, 263); petiole about 2× as long as wide (Figs 271–273) . . . . . ***Caraphractus* Walker**
Key: Triapitsyn (2011). **Fauna**: 1 described species. **Distribution**: northern Nearctic, near or in water.

38(35) Fore wing oar-like, with basal half to two-thirds extremely narrow and apex suddenly widened, with dark spot at apex and sometimes also at base of widened area (Figs 593, 601, 623, 631); torulus almost touching transverse trabecula (Figs 594, 605, 624, 638) 39

- Fore wing gradually widening from base to apex (Fig. 311) and almost always without dark apical spot; torulus separated from transverse trabecula by at least half diameter of torulus (Figs 312, 322) 40

39(38) Scape about 7× as long as wide (Fig. 598); hind wing stalk-like, without membrane behind or beyond venation and at most with 1 long apical seta (Fig. 601) . . . . . ***Mymar* Curtis**
Keys: Annecke (1961a), Triapitsyn & Berezovskiy (2001), Triapitsyn (2018a). **Fauna**: 3 described species. **Distribution**: mainly eastern.

- Scape about 4× as long as wide (Fig. 628), hind wing with membrane and numerous marginal setae along both margins and apex (Fig. 631) . . . . . ***Neomymar* Crawford**
Key: Triapitsyn *et al*. (2006). **Fauna**: 5 described species. **Distribution**: mainly eastern.

40(38) Metatibia with conspicuous, semierect setae at least 3× as long as width of tibia (Fig. 311); body yellow to light brown . . . . . ***Cnecomymar* Ogloblin**
Fauna: 1 (undescribed) species. **Distribution**: eastern.

- Metatibia with setae relatively short and inconspicuous, mostly appressed, and not longer than width of tibia; body dark brown to black 41

41(40) Face dorsally strongly depressed between eyes (Fig. 957); vertex with large depression outside each ocellus (Figs 943, 945, 952, 955, 958); scape with rasp-like inner surface (Fig. 946); wings in preserved specimens often crossing each other horizontally and lying flat over body, scissor-like; mesosoma smooth and shiny (Figs 947, 948, 966); mesonotal spiracle advanced toward junction of anterior apex of notaulus and mesoscutal margin (Figs 948, 962) . . . . . ***Stephanodes* Enock**

Key: Huber & Lin (1997). **Fauna**: 3 described species. **Distribution**: widespread.

- Face dorsally not strongly depressed between eyes; vertex without depression outside each ocellus; scape with inner surface at most with slight reticulation; propodeum usually with 1 or 2 longitudinal carinae medially but sometimes smooth; wings in preserved specimens usually vertical, not crossing each other, extending away from body; mesosoma with some reticulation, not particularly shiny; mesonotal spiracle not advanced, at posterolateral apex of pronotum (Fig. 20) 42

42(41) Propodeum with V-shaped submedian carina (Figs 8, 19); fore wing with some basally thickened setae restricted mainly to brown spots, when these present (Fig. 7a), more uniformly scattered if fore wing (almost) hyaline (Fig. 7b) . . . . . ***Acmopolynema* Ogloblin**

Key: Schauff (1981). **Fauna**: 7 described species. **Distribution**: widespread.

- Propodeum with single, straight median carina (Figs 834, 835, 839) or dorsal elevation, or without carinae; fore wing without thickened setae and usually without spots 43

43(42) Face with subantennal sulcus extending from each torulus to clypeal margin (Figs 469, 778) 44

- Face without subantennal sulci, at most with slight depression extending from each torulus to clypeal margin 46

44(43) Notaulus uniformly wide along its entire length (Figs 776, 784); gaster in lateral view with first segment almost equally divided into upper tergum and lower sternum, so petiole clearly attached to gs_1 (Fig. 793); ovipositor slightly extending posteriorly beyond apex of gaster, by about length of gt_6 . . . . . ***Palaeoneura* Waterhouse**, part

Fauna: 2 described species. **Distribution**: eastern Nearctic.

- Notaulus narrow except for distinctly wider pit at anterior apex (Figs 474, 486, 760); gaster in lateral view with first segment apparently consisting mostly of tergum, so petiole apparently attached to gt_1 (Figs 496, 770, 844); ovipositor extending posteriorly beyond apex of gaster by at least two-thirds of its length (Figs 467, 468, 496) 45

45(44) Parastigma with 2 dorsal macrochaetae; propodeum without median dorsal elevation . . . . . ***Kalopolynema* (*Kalopolynema* Ogloblin)**

Key: Triapitsyn & Berezovskiy (2002c). **Fauna**: 1 described species. **Distribution**: eastern.

- Parastigma with 1 dorsal macrochaeta; propodeum with a median dorsal elevation . . . . . ***Kalopolynema* (*Floripolynema* Triapitsyn & Berezovskiy)**

Key: Triapitsyn & Berezovskiy (2002c). **Fauna**: 1 described species. **Distribution**: Florida.

46(43) Propleura anteriorly separated from each other by a distinct gap (Figs 820, 837, 838), the prosternum thus "open" towards head; propodeum with a short to long median carina or without a median carina . . . . . ***Polynema* (*Polynema* Haliday)**

Key: Girault (1929) [428] (for *Polynema s.l.*). **Fauna**: 25 described species. **Distribution**: widespread.

- Propleura abutting anteriorly (Figs 762, 764, 836), sometimes only barely so (Figs 786, 787), the prosternum thus "closed" towards head 47

47(46) Face with a pit next to inner margin of each torulus (Fig. 827); body mostly brown or black (Fig. 833) . . . . . ***Polynema* (*Doriclytus* Foerster)**

Key: Girault (1929) [428] (for *Polynema s.l.*). **Fauna**: 2 described species. **Distribution**: widespread.

- Face without a pit next to inner margin of each torulus (Figs 754, 778); body mostly yellow or brown (Fig. 750) . . . . . ***Palaeoneura* Waterhouse**, part

Key: Triapitsyn (2018). **Fauna**: 2 described species. **Distribution**: California, Nevada, eastern USA.

Key to Nearctic genera of Mymaridae. Males.

Note: Males are apparently unknown worldwide for *Eofoersteria* and *Platystethynium* (*Platypatasson*). Males are unknown in the Nearctic for *Arescon*, *Eustochus*, *Litus*, and *Stephanocampta* but are keyed based on features found in extralimital species; the assumption is that when congeneric males in the Nearctic are discovered they will resemble extralimital males in their key features.

1 Antenna consisting of 1 large, swollen segment (flagellum and pedicel reduced and fused with scape); eyeless and wingless; tarsi 1-segmented, consisting only of enlarged, bell-shaped arolium; mouthparts absent (Figs 356–369) . . . . . ***Dicopomorpha* Ogloblin**

- Antenna normal, with scape, pedicel and flagellum; eyes and usually wings present; tarsi normal, with several segments; mouthparts present 2

2(1) Tarsi 5-segmented 3

- Tarsi 4-segmented 16

3(2) Flagellum 11-segmented, without ring-like segments 4

- Flagellum at most 10-segmented, sometimes with 1 or 2 ring-like segments (Fig. 191) 10

4(3) Fore wing venation at most about one-third as long as wing 5

- Fore wing venation longer than half wing length (Figs 146, 275) 9

5(4) Face with subantennal sulcus between each torulus and mouth margin (Figs 440, 453); pronotum longitudinally divided medially (Figs 445, 551); propodeum at most with 2 longitudinal submedian sulci or carinae (Fig. 38); metasoma with petiole at most about 2× as long as wide but usually much shorter, ring-like, and in lateral view gt_1 only slightly longer than gt_2 6

- Face without subantennal sulci (Fig. 716); pronotum entire (Fig. 723); propodeum with several carinae in a diamond-like pattern (Figs 723, 740); metasoma with petiole at least 2× as long as wide and gt_1 distinctly longer than gt_2 (Figs 715, 741, 742, 744) . . . . . ***Ooctonus* Haliday**

6(5) Vertex with 3 or 4 setae between lateral ocelli (Fig. 547); pronotum with lobes widely separated medially by membranous area (Fig. 551); dorsellum narrow and strap-like, not longer than lateral panels of metanotum (Fig. 552); propodeum with 2 narrow longitudinal, usually pale submedian lines with minute denticles between them (Fig. 551) . . . . . ***Lymaenon*** **Walker** (= *Gonatocerus litoralis* group of authors)

- Vertex with 2 setae between lateral ocelli (Figs 440, 441, 454); pronotum with lobes abutting medially (Fig. 458); dorsellum biconvex, rhomboidal, or triangular, and longer than lateral panels of metanotum (Figs 445, 458); propodeum not as above, without pale submedian lines and denticles between them 7

7(6) Head posteriorly divided by curved transverse postgenal sulcus separating dorsal surface from ventral surface (Fig. 441); propodeum with several incomplete, less distinct, longitudinal carinae between 2 submedian carinae (Fig. 445); propodeal spiracle huge (Fig. 445), much larger than pronotal spiracle; gaster more or less produced anteriorly under mesosoma (Fig. 448); fore wing with microtrichia relatively sparse beyond venation, the distance between them mostly equal to or greater than their length (Fig. 450) . . . . . ***Gastrogonatocerus*** **Ogloblin** (= *Gonatocerus membraciphagus* group of authors)

- Head posteriorly entire (Fig. 454) or, rarely, with a round or oval postgenal sulcus; propodeum smooth or occasionally rugose between 2 submedian carinae (if present); propodeal spiracle smaller than or subequal to pronotal spiracle (Fig. 459); gaster not (rarely slightly) produced anteriorly under mesosoma; fore wing with microtrichia relatively dense beyond venation, the distance between them mostly less than their length 8

8(7) Fore wing relatively narrow, at least 3.6× as long as wide, rounded apically, with microtrichia almost always uniformly distributed to base of parastigma (Fig. 464); propodeum smooth medially (Fig. 458), occasionally with a median carina . . . . . ***Gonatocerus*** **Nees** (= *Gonatocerus sulphuripes* group of authors).

- Fore wing relatively wide, less than 3.8× as long as wide, usually somewhat truncated apically with microtrichia usually absent behind venation (Fig. 340) or, if microtrichia present there, not uniformly distributed; propodeum with 2 submedian carinae . . . . . ***Cosmocomoidea*** **Howard** (= *Gonatocerus ater* group of authors)

9(4) Antenna clearly longer than body and each flagellar segment at least 5× as long as wide (Fig. 278); vertex without stemmaticum (pale lines enclosing ocellar triangle) (Fig. 277); fore wing apparently without hypochaeta and with 1 distal macrochaeta . . . . . ***Chrysoctonus*** **Mathot**

- Antenna not much longer than body and each flagellar segment at most about 3× as long as wide; vertex with stemmaticum (in photographs, pale lines/sulci enclosing ocellar triangle) (Fig. 152); fore wing with short hypochaeta (sometimes apparently absent) closer to proximal than to distal macrochaeta, and apparently with 2 distal macrochaetae . . . . . ***Arescon*** **Walker**

10(3) Flagellum 8- or 9-segmented 11

- Flagellum 10-segmented, sometimes with fl_2 and occasionally fl_4 small or ring-like (Fig. 191) so appearing 9- or 8-segmented 12

11(10) Flagellum 8-segmented; fore wing with posterior margin distinctly excised behind apex of venation . . . . ***Alaptus*** **Westwood**

- Flagellum 9-segmented; fore wing with posterior margin at most slightly enlarged behind apex of venation . . ***Litus*** **Haliday**

Note: males have not yet been recorded from the Nearctic region. Viggiani (1973) described the male of the apparently Holarctic *L. cynipseus* Haliday . . . . .

12(11) Fl_2 and sometimes fl_4 ring-like (Fig. 191); metasoma with short but narrow and distinct petiole (Figs 193, 195–197, 210–214, 238–243, 572, 585–590) 13

- Fl_2 at least as long as wide, about one-third length of remaining segments; metasoma widely attached to mesosoma, the petiole scarcely visible (Figs 376–378) . . . . . ***Dicopus*** **Enock**

13(12) Mandibles each with 2 teeth 14

- Mandibles each apparently with 1 tooth (Figs 203, 562, 578) 15

14(13) Parastigma with macrochaetae, especially the distal macrochaeta, long and distinct (Fig. 221) . . . . . ***Camptopteroides*** **(*Alalinda* Huber)**

- Parastigma with macrochaetae short and scarcely visible (Fig. 569) . . . . . ***Macrocamptoptera*** **Girault**

15(14) Fore wing narrow, with a few microtrichia arranged in 1 or 2 rows (Fig. 192); propodeum without lamina . . . . . ***Camptoptera*** **Foerster**

- Fore wing wider, with many, evenly distributed microtrichia (Fig. 916); propodeum with large, whitish (translucent), reticulate sublateral and submedian lamina (Figs 917, 925–928, 930) . . . . . ***Stephanocampta*** Mathot

Note: males have not yet been recorded from the Nearctic region.

16(2) Propodeum and gt_1 with large, whitish, reticulate laminae (Figs 859, 860) . . . . . ***Ptilomymar*** **Annecke & Doutt**

- Propodeum and gt_1 without laminae 17

17(16) Metasoma with petiole inconspicuous, the petiole wider than long and at least half as wide as base of gt_1, the metasoma thus often appearing widely attached to mesosoma (petiole sometimes not visible unless metasoma removed) 18

- Metasoma distinctly petiolate, the petiole almost always much longer than wide (Figs 24–26, 253, 254) , though sometimes only as long as wide, and obviously narrower than gt_1 (Figs 78–83) 27

18(17) Flagellum 10- or 11-segmented; mandible usually normal in size and shape (Figs 18, 87, 109), rarely very small (Fig. 390a) 19

- Flagellum 9-segmented (Figs 500, 509); mandible massive, with long, curved, and serrate dorsal tooth (Fig. 508) . . . . . ***Krokella*** **Huber**

19(18) Flagellum 10-segmented (Fig. 286) or apparently so (fl_1 in *Anaphes* minute, easily overlooked and therefore not counted; the flagellum is actually 11-segmented) (Fig. 130) 20

- Flagellum 11-segmented (Fig. 95) 21

20(19) Mandible with 3 teeth, the dorsal one occasionally bifurcated apically (Fig. 126); pronotum entire (Fig. 134); dorsellum well defined (Fig. 131); propodeum sloping relative to scutellum (Fig. 132) and with median longitudinal sulcus (Fig. 131); gt_1

divided by median longitudinal sulcus (Fig. 135) . . . . . ***Anaphes* Haliday**

- Mandible with 2 teeth, the lower one longer (Fig. 298); pronotum divided medially (Figs 287, 299, 302); dorsellum barely defined (Figs 287, 299); propodeum less strongly sloping relative to scutellum and without median line (Figs 288, 300); gt_1 entire, without median sulcus (Figs 289, 304) . . . . . ***Cleruchus* Enock**

21(19) Scape with numerous short spines on inner surface (Fig. 685) . . . . . ***Omyomymar* Schauff**

- Scape without spines on inner surface 22

22(21) Frenum completely divided by distinct, median longitudinal sulcus (Figs 90, 102, 103, 114, 891, 985, 1001) 23

- Frenum entire (Figs 395a, 407) 25

23(22) Face with subantennal sulcus extending from inner margin of each torulus to mouth margin (Figs 885, 897, 991, 995); mandible with 4 or 5 teeth (Figs 902, 1000); frenum distinctly longer than half its width (Figs 891, 903, 985, 1001) 24

- Face without subantennal sulci (Figs 87, 104); mandible with 3 teeth; frenum about as long as half its width (Figs 90, 102, 114) . . . . . ***Anagrus* Haliday**

24(23) Scutellum brown; genitalia symmetrical and simple (Fig. 896) . . . . . ***Schizophragma* Ogloblin**

- Scutellum pale yellow (Figs 985, 986); genitalia asymmetrical and complex (Figs 993b, 1010) . . . . . ***Stethynium* Enock**

25(22) Mandible a minute stub without teeth (Fig. 390); maxilla narrow and much longer than wide (Fig. 391); dorsellum in lateral view projecting slightly as small triangular lobe over propodeum (Figs 395a, 396) . . . . . ***Erythmelus* Enock**

- Mandible of normal size, with at least 2 teeth; maxilla of normal size; dorsellum at most faint and band-like, in lateral view not projecting over propodeum (Figs 287, 299, 666) 26

26(25) Mandible with 2 teeth (Fig. 298); pronotum divided medially (Figs 287, 299) . . . . . ***Cleruchus* Enock**

- Mandible with 3 teeth; pronotum entire (Fig. 666) . . . . . ***Neostethynium* Ogloblin**

27(17) Head and mesosoma covered with distinctly raised sculpture (Figs 247–250, 253, 254, 421–425, 427–430) 28

- Head and mesosoma at most faintly sculptured, appearing almost smooth 30

28(27) Flagellum 9-segmented, the two apical segments with wider junction than junctions between more basal segments, thus somewhat club-like (fig. 25 in Huber & Baquero, 2007) . . . . . ***Eustochus* Haliday**

- Flagellum 10- or 11-segmented, with junction between apical two segments not wider than between more basal segments . 29

29(28) Flagellum 10-segmented; mandibles wide and crossing when closed, with 3 subequal, finely serrated teeth (Figs 247, 263) . . . . . ***Caraphractus* Walker**

- Flagellum 11-segmented; mandibles narrow and mainly directed ventrally, with 1 or 2 apical teeth (Figs 62, 67, 70–72) . . . . . ***Anagroidea* Girault**

30(27) Face dorsally strongly depressed between eyes (Fig. 957); vertex with large depression outside each ocellus (Fig. 958); mesosomal spiracle closed to anterior apex of notaulus than to dorsal apex of prepectus (Fig. 962); in preserved specimens, wings often crossing each other horizontally and lying flat over body, scissor-like . . . . . ***Stephanodes* Enock**

- Face dorsally at most slightly depressed between eyes; vertex usually flat, at most with small depression (not wider or longer than ocellus) outside each ocellus (Fig. 781); mesosomal spiracle next to dorsal apex of prepectus and far from anterior apex of notaulus; in preserved specimens, wings usually vertical, not crossing each other, extending away from body 31

31(30) Fore wing oar-like, with basal half to two-thirds extremely narrow and apex suddenly widened, with apex and sometimes also base of widened area with dark spot (Figs 593, 601, 623, 631); torulus almost touching transverse trabecula (Figs 594, 605, 624, 638) 32

- Fore wing gradually widening from base to apex and almost always without dark apical spot, though dark transverse band(s) sometimes present (Figs 1, 833); torulus separated from transverse trabecula by at least half diameter of torulus 33

32(31) Scape about 2× as long as wide . . . . . ***Neomymar* Crawford**

- Scape about 7× as long as wide . . . . . ***Mymar* Curtis**

33(31) Propodeum medially with V-shaped carinae (Figs 8, 19); fore wing with some thickened setae on disc and usually with 1 or 2 distinct, transverse, dark-coloured areas (Fig. 7a) but sometimes (almost) uniformly hyaline (Fig. 7b) . . . . . ***Acmopolynema* Ogloblin**

- Propodeum smooth or at most with 1 median, longitudinal carina; fore wing without thickened setae and usually without dark-coloured areas 34

34(33) Metatibia with prominent semi-erect setae at least 3× as long as width of tibia (Fig. 311) . . . . . ***Cnecomymar* Ogloblin**

- Metatibia with inconspicuous, subappressed setae at most about as long as width of tibia 35

35(34) Face without (Fig. 813), or with faint (Fig. 828) subantennal sulcus extending from each torulus to mouth margin 36

- Face with distinct subantennal sulcus extending almost from each torulus to mouth margin (Figs 469, 480, 778) 38

36(35) Axillar seta short, extending posteriorly at most one-third length of frenum (Figs 486, 784, 834); body mainly brown or black 37

- Axillar seta long, extending to posterior apex of frenum (Fig. 752); body mainly yellow . . . . . ***Palaeoneura* Waterhouse**, part

37(36) Face without a pit next to each torulus (Fig. 813) . . . . . ***Polynema* (*Polynema* Haliday)**

- Face with a pit next to each torulus (Fig. 828) . . . . . ***Polynema* (*Doriclytus* Foerster)**

38(35) Notaulus narrow except for distinctly wider pit at anterior apex (Figs 474, 486); gaster in lateral view with first segment apparently consisting mostly of tergum, so petiole apparently attached to gt_1 (Fig. 496); ovipositor extending posteriorly beyond apex of gaster by at least two-thirds of its length (Figs 467, 468, 496) . . . . . ***Kalopolynema* Ogloblin**

- Notaulus uniformly wide along its entire length (Figs 776, 784); gaster in lateral view with first segment almost equally divided into dorsal (gt_1) and ventral parts (gs_1), so petiole apparently attached to gs_1 (Fig. 793); ovipositor slightly extending posteriorly beyond apex of gaster, by about length of gt_6 . . . . . ***Palaeoneura* Waterhouse**, part

Catalogue of the Mymaridae in America north of Mexico

ACMOPOLYNEMA Ogloblin, 1946

(Figs 1–30)

Acmopolynema Ogloblin, 1946: 286. Type species: *Stichothrix bifasciatipennis* Girault, 1908, by original designation.

Grangeriella Soyka, 1956b: 17. Type species: *Grangeriella indochinensis*, 1956, by original designation. Synonymy by Hayat & Anis, 1999b: 297.

Neonarayanella Husain & Farooqi, 1996: 83. Type species: *Maidliella orientalis* Narayanan, Subba Rao & Kaur, 1960, by original designation. Synonymy by Hayat & Anis, 1999b: 297.

Baburia Hedqvist, 2004: 235. Type species: *Baburia narendrani* Hedqvist, 2004, by original designation. Synonymy by Triapitsyn & Berezovskiy, 2007: 6.

Diagnosis. Body length 760–2500 μm. Face with torulus separated from transverse trabecula by about twice its own diameter (Figs 2, 13); propleura abutting medially anterior to prosternum (Fig. 21); propodeum with V-shaped median carinae (Figs 8, 19, 23); fore wing usually with dark transverse bands (Figs 1, 7a), sometimes without (Fig. 7b) and with some discal setae (especially on dark bands when present) modified, with enlarged bases; petiole distinctly longer than wide (Figs 9, 12, 24–26), ventrally with longitudinal suture, and apparently attached to gs_1 (Figs 11, 12, 29).

Discussion. *Acmopolynema* belongs to the *Polynema* group of genera as defined and keyed by Triapitsyn & Berezovskiy (2007). Among the nine other Nearctic genera of the *Polynema* group (*Caraphractus*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Acmopolynema* is unique in having the propodeal carinae V-shaped. *Acmopolynema* species with clear wings, e.g., *A. immaculatum* Schauff, are most likely to be confused with *Polynema* species. The largest Nearctic species of Mymaridae, *A. varium* (Girault) at 2.5 mm in length, is classified in *Acmopolynema*.

Nearctic hosts. Cercopidae, Cicadellidae, Hemiptera: Orthoptera: Oecanthidae.

Important references. Schauff (1981) and Fidalgo (1989) treated the Nearctic and Neotropical faunas, respectively. Yoshimoto (1990) attempted to divide the Western Hemisphere species into species groups and keyed the groups. Although only slightly relevant to the Western Hemisphere fauna, Triapitsyn & Berezovskiy (2007) provided a useful key to *Polynema*-group genera and treated the Oriental and Australasian species.

Acmopolynema bifasciatipenne (Girault, 1908)

Stichothrix bifasciatipennis Girault, 1908 [55]: 9. Lectotype ♀ (USNM), designated by Schauff, 1981: 456. **TL:** USA, District of Columbia, Washington. Frison, 1927: 229 (paratype listing, host).

Polynema oecanthi Ashmead, 1900b: 562 [*nomen nudum*] (distribution); Pierce, 1907: 361 (host, distribution); Girault, 1910 [69]: 258 (distribution); Viereck, 1910: 637; Girault, 1911 [96]: 317; Tucker, 1917: 304.

Cosmocoma oecanthi: Crevecoeur, 1922: 386 [*nomen nudum*] (distribution).

Polynema bifasciatipenne: Girault, 1910 [69]: 254 (description, host); Girault, 1911 [72]: 23 (need for slide mounting); Girault, 1911 [87]: 151 (host); Girault, 1911 [89]: 139 (comparison with extralimital species); Girault, 1911 [96]: 317 (host), 318, 319 (key); Girault, 1912 [110]: 41 (mention); Girault, 1913 [135]: 14 (mention); Parrot & Fulton, 1914: 426 (host, distribution); Girault, 1916 [265a]: 60 (host); Wheeler, 1923: 3 (larva description); Girault, 1929 [428]: 15 (key), 19 (host); Dozier, 1932: 83 (comparison with *P. vittatipennis*); Udine & Pinckney, 1940: 81 (host, distribution); Brandhorst, 1943: 169, (biology, plant hosts, distribution); Thompson, 1958: 572 (host catalogue).

Acmopolynema bifasciatipenne: Ogloblin, 1946: 286 (generic transfer); Burks, 1958: 63 (catalogue); Burks, 1979: 1031 (catalogue, hosts); Schauff, 1981: 446 (key), 455 (host, distribution); Yoshimoto, 1990: 78 (list, species group placement); Xu & Lin, 2002: 141 (hosts), 144 (compared with extralimital species).

Acmopolynema bifasciatipennis bifasciatipennis: Peck, 1951: 416 (catalogue, distribution); Peck, 1963: 41 (catalogue, hosts).

Acmopolynema bifasciatipenne bifasciatipenne: Burks, 1967: 215 (catalogue).

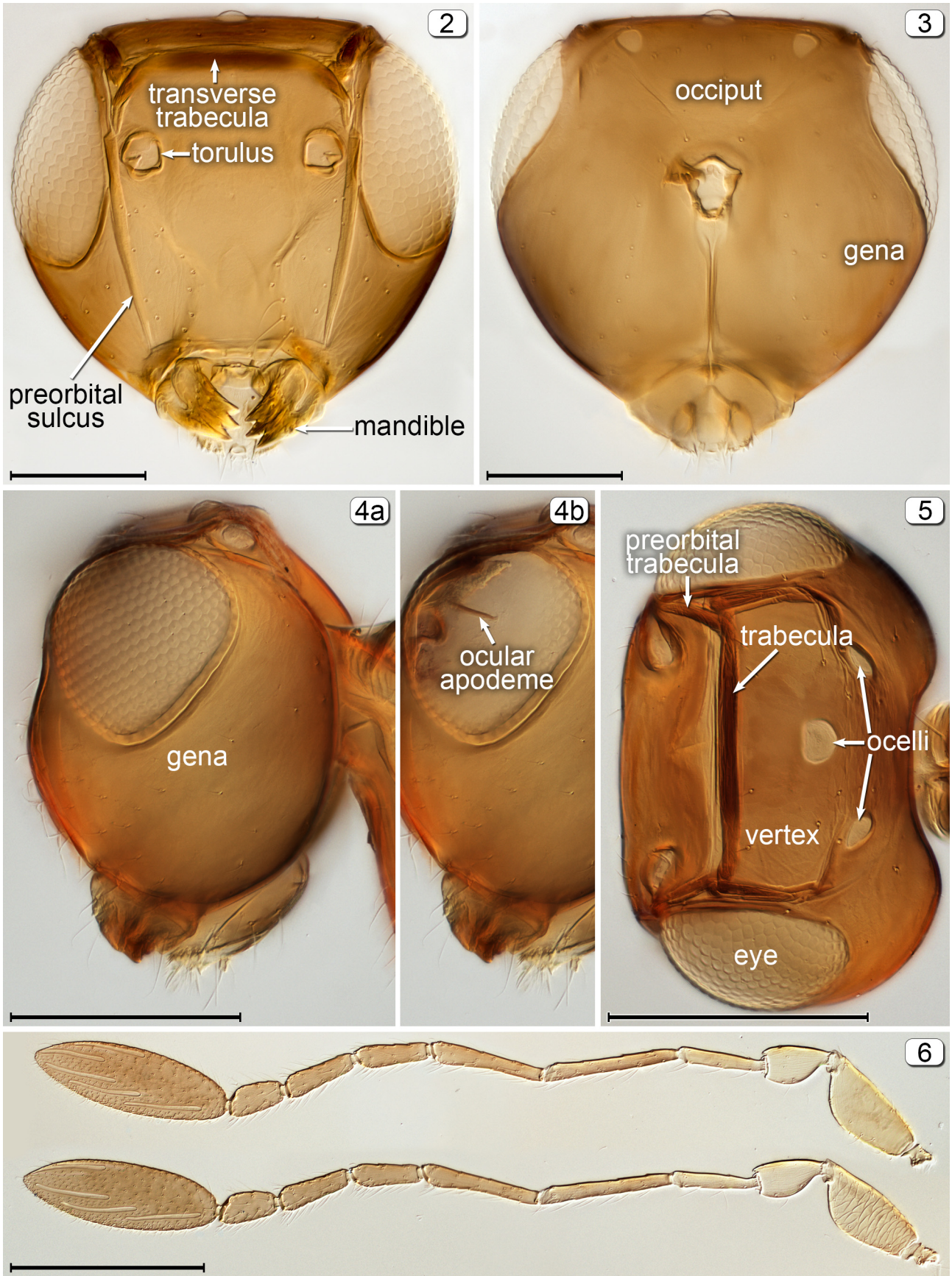
Acmopolynema bifasciatipennis: Triapitsyn & Berezovskiy, 2007: 35 (label on holotype of extralimital species).

Nearctic hosts. Oecanthidae: *Anaxiphia exigua* (Say), *Oecanthus nigricornis* Walker, *O. nigricornis quadripunctatus* Beutel, *O. niveus* (De Geer).

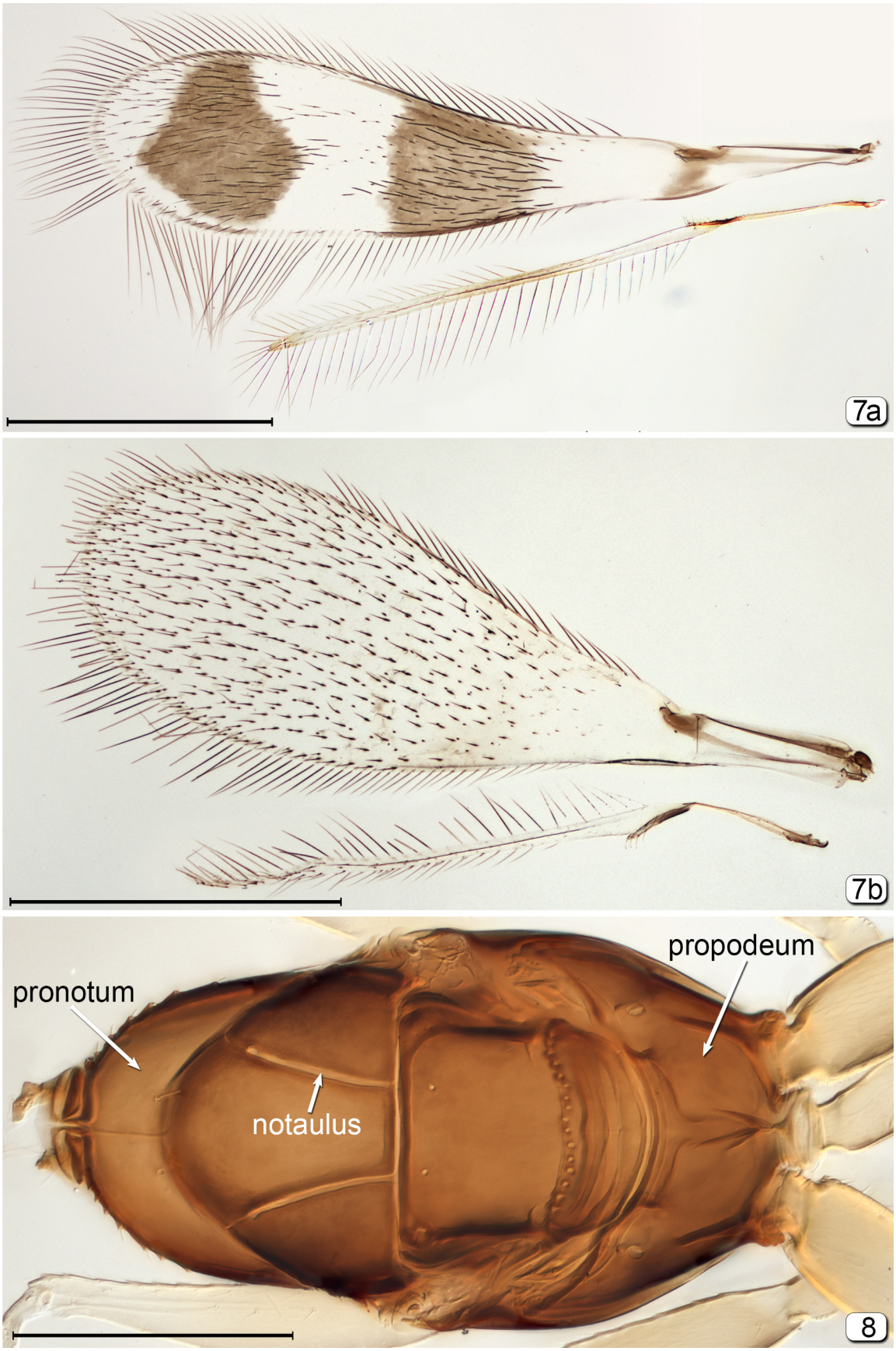
Distribution. USA: CA, DC, DE, KS, MA, NC, NJ, NY, PA, TX, VA.



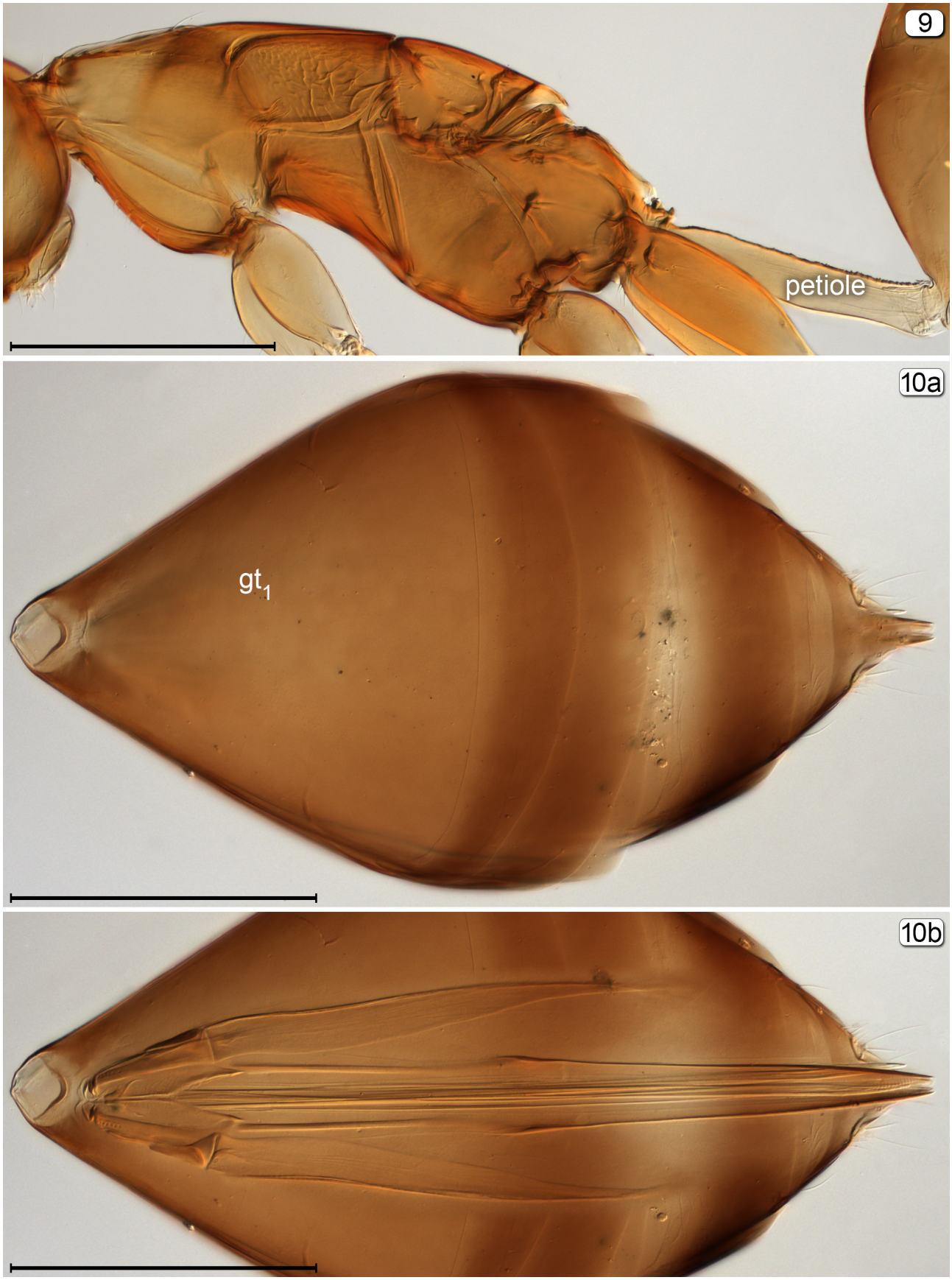
FIGURE 1. *Acmopolynema varium* (Girault), habitus. USA, Virginia, Montgomery Co., 8 km N. Blacksburg, 1–17.viii.1987, CNC Hymenoptera Team. Scale bar=2000 µm.



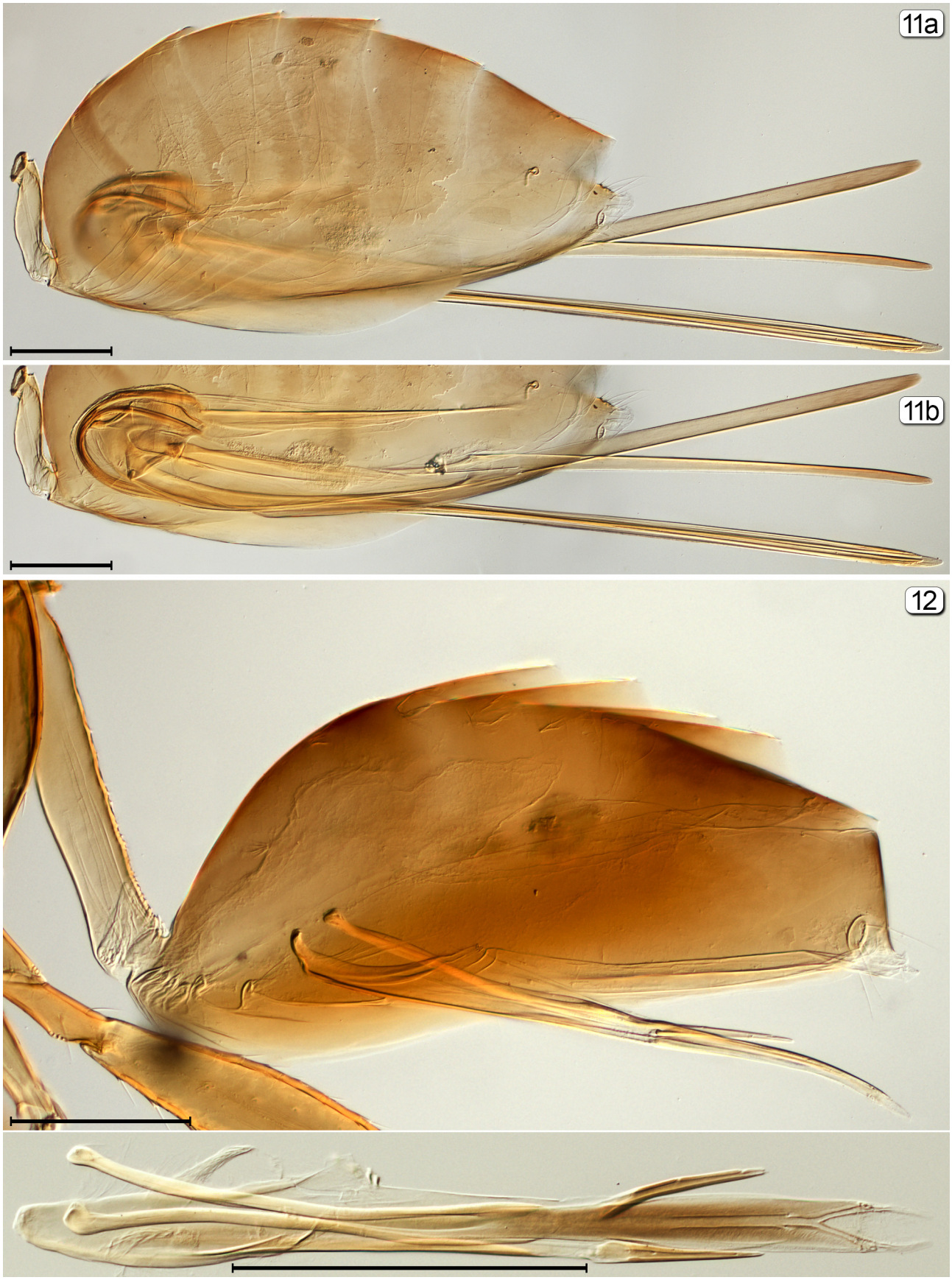
FIGURES 2–5. *Acmopolynema* spp., head except 6. 2, *A. sema* Schauff, anterior; 3, *A. sema* Schauff, posterior; 4a, *A. varium* (Girault), lateral; 4b, *A. varium*, lateral (internal) showing ocular apodeme; 5, *A. varium*, dorsal; 6, antennae, lower image medial surface, upper image lateral surface. Scale bars=200 µm.



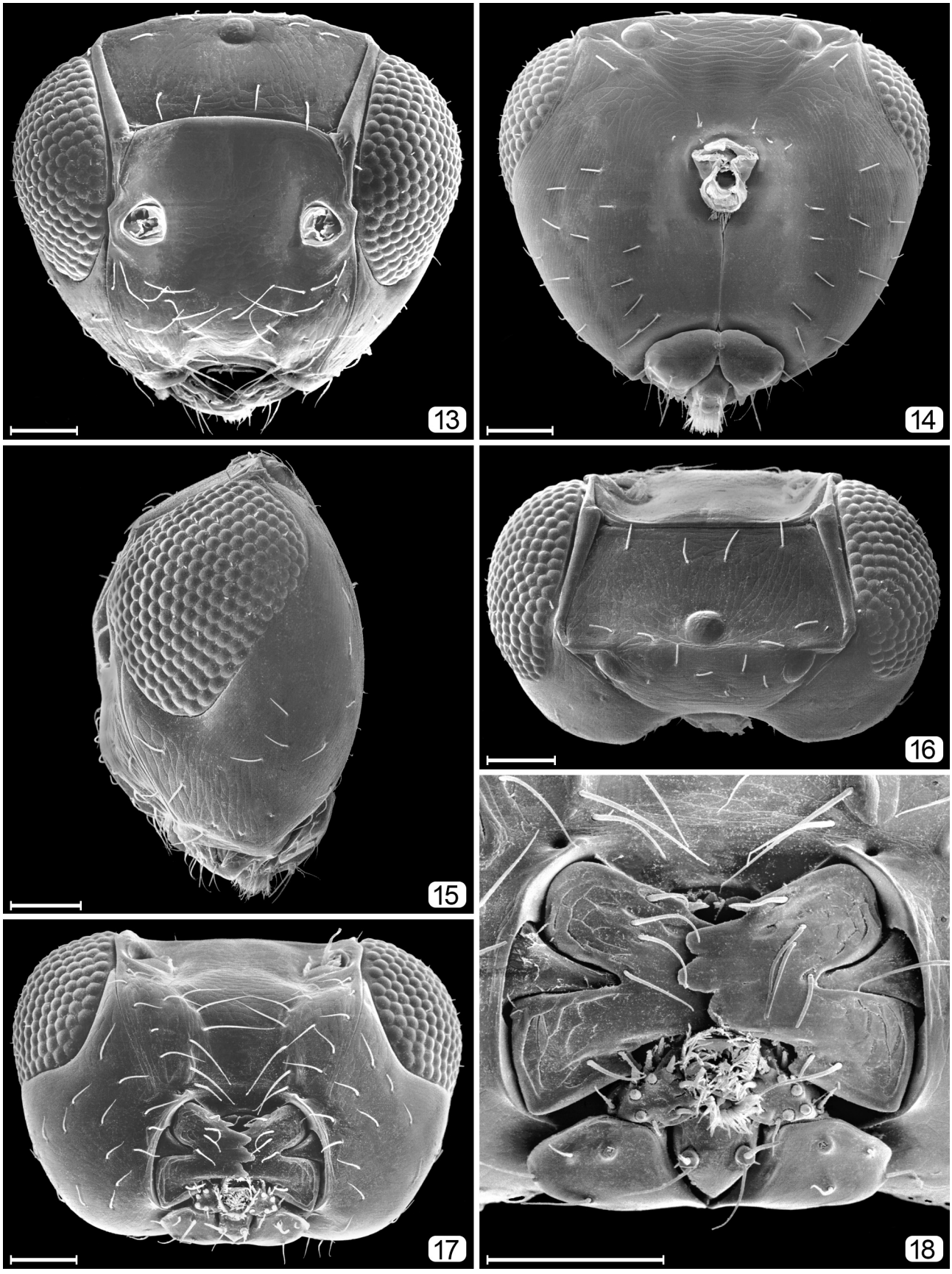
FIGURES 7, 8. *Acmopolynema* spp. 7a, *A. varium* (Girault), wings; 7b, *A. immaculatum S*chauff, wings; *A. sema* Schauff, mesosoma, dorsal. Scale bars: 7=500 µm; 8=200 µm.



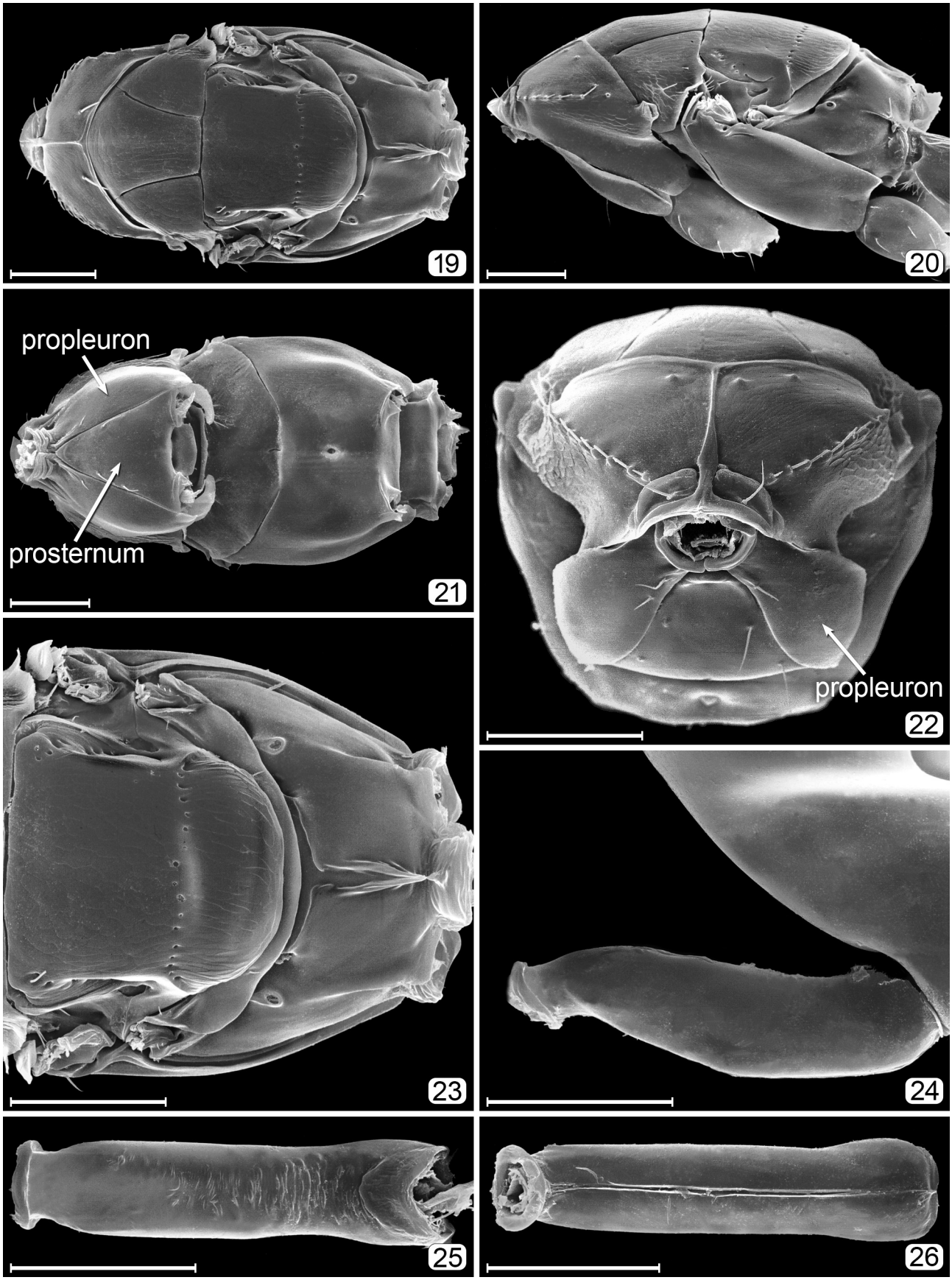
FIGURES 9, **10**. *Acmopolynema* spp. 9, *A. varium* (Girault), mesosoma + petiole, lateral; 10a, *A. sema* Schauff, gaster, dorsal; 10b, *A. sema* Schauff, ovipositor seen through gaster. Scale bars:=200 µm.



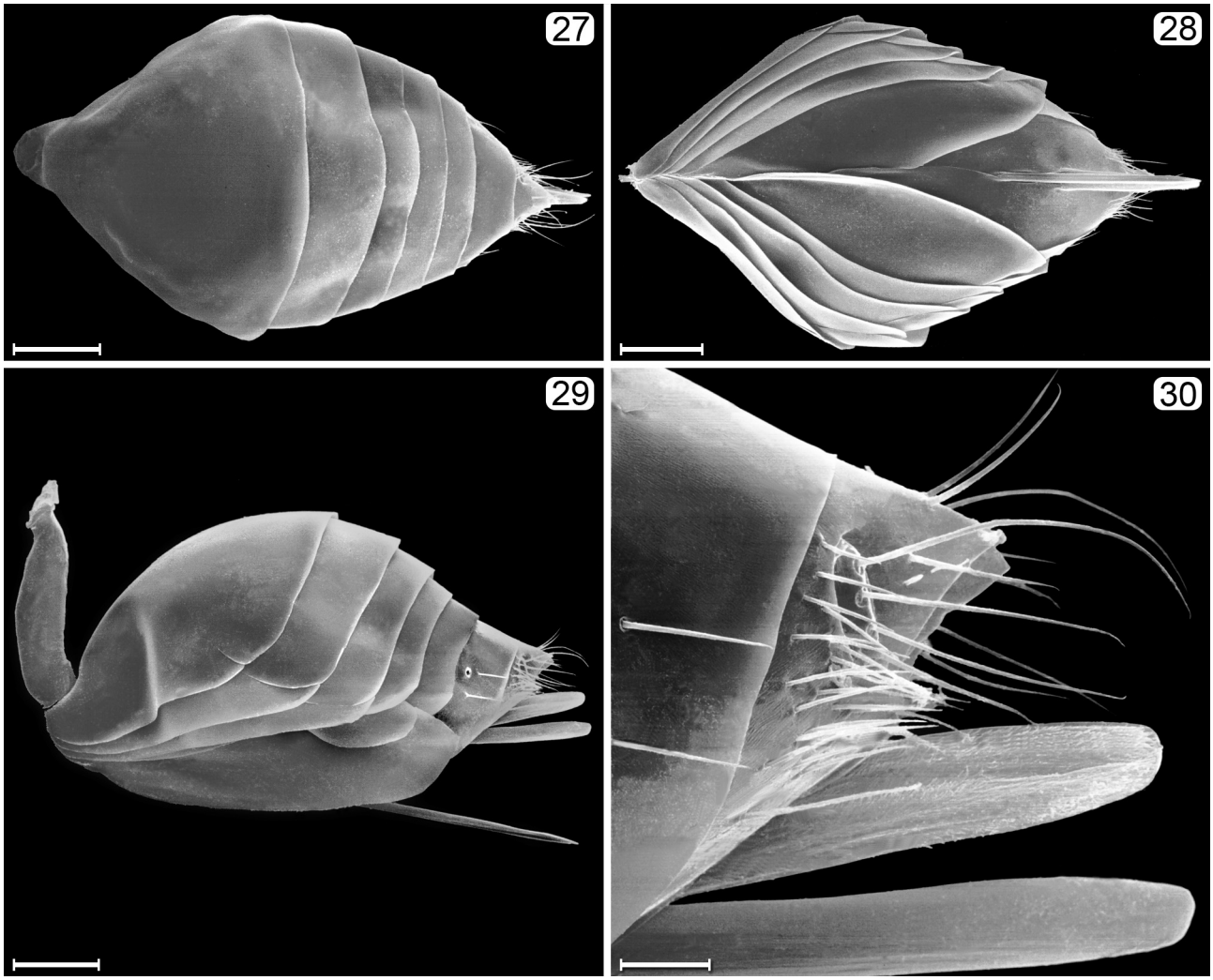
FIGURES 11, **12**. *Acmopolynema varium* (Girault). 11a, metasoma, lateral; 11b, ovipositor; 12, male metasoma, lateral and genitalia, dorsal. Scale bars=200 μm.



FIGURES 13–18. *Acmopolynema* sp., head. 13, anterior; 14, posterior; 15, lateral; 16, dorsal; 17, ventral; 18, mouthparts. Scale bars=50 μm.



FIGURES 19–26. *Acmopolynema* sp., mesosoma or petiole. 19, dorsal; 20, lateral; 21, ventral; 22, anterior; 23, scutellum–propodeum, dorsal; 24, petiole, lateral; 25, petiole, dorsal; 26, petiole, ventral. Scale bars=100 μm.



FIGURES 27–30. *Acmopolynema* sp., metasoma. 27, dorsal; 28, ventral; 29, lateral; 30, apex of gaster, lateral. Scale bars: 27–29=100 μm; 30=20 μm.

Acmopolynema immaculatum Schauff, 1981

Acmopolynema immaculatum Schauff, 1981: 453. Holotype ♀ (CNC). **TL:** Canada, Nova Scotia, Aldershot. Yoshimoto, 1990: 78 (list, species group placement).
Acmopolynema immaculatus: Xu & Lin, 2002: 141 (descriptive note).

Distribution. Canada: NS, ON, SK. USA: TX.

Acmopolynema miamiense Schauff, 1981

Acmopolynema miamiense Schauff, 1981: 449. Holotype ♀ (USNM). **TL:** USA, Florida, Miami. Yoshimoto, 1990: 78 (list, species group placement).

Distribution. USA: FL.

Acmopolynema sema Schauff, 1981

Acmopolynema sema Schauff, 1981: 447. Holotype ♀ (USNM). **TL:** USA, Georgia, Fort Valley. Yoshimoto, 1990: 78 (list, species group placement); Triapitsyn & Hoddle, 2001: 133 (propagation); Triapitsyn *et al*., 2002: 654 (host); Xu & Lin, 2002: 141 (host); Hoddle & Triapitsyn, 2004b: 343 (factitious host); Triapitsyn, 2005: 393 (key); Triapitsyn, 2006: 4 (key), 6 (description, host, lab. rearing); Triapitsyn, 2013c: 293 (host, distribution).

Nearctic hosts. Cicadellidae: *Homalodisca insolita* (Walker), *H. vitripennis* (Germar) [laboratory rearing with limited success].

Distribution. USA: FL, GA, TX.

Acmopolynema uma Schauff, 1981

Acmopolynema uma Schauff, 1981: 451. Holotype ♀ (USNM). **TL:** USA, Florida, Miami. Fidalgo, 1989: 9 (key), 40 (description) [NT]; Yoshimoto, 1990: 78 (list, species group placement); De Santis & Fidalgo, 1994: 120 (catalogue) [NT]; Eldredge & Evenhuis, 2002: 74 (distribution) [A].

Distribution. USA: FL.

Acmopolynema varium (Girault, 1917)

Polynema bifasciatipenne var. *varium* Girault 1917 [323]: 92. Lectotype ♀ (USNM), designated by Schauff, 1981: 458. **TL:** USA, Kansas, Fredonia. Burks, 1979: 1031 (catalogue).

Polynema bifasciatipenne varium: Girault, 1929 [428]: 15 (key); Schwitzgebel & Wilbur, 1943: 6 (host, distribution); Peck, 1951: 416 (generic transfer, catalogue); Peck, 1963: 42 (catalogue); Burks, 1967: 215 (catalogue).

Acmopolynema varium: Schauff, 1981: 456 (status change, distribution); Yoshimoto, 1990: 78 (list, species group placement); Xu & Lin, 2002: 141 (host); Viggiani, 2004: 60 (male genitalia); Heraty *et al*., 2013: 494, 498 (illustrations), 535 (GenBank accession number).

Nearctic hosts. Oecanthidae: *Oecanthus nigricornis* Walker, *O. niveus* (De Geer), *Oecanthus* sp.

Distribution. Canada: ON, QC. USA: CA, DC, DE, IA, KS, MA, MD, ME, MI, NJ, OK, TN, TX.

Acmopolynema vittatipenne (Dozier, 1932)

Polynema vittatipennis [*sic*] Dozier 1932: 83. Holotype ♀ (USNM). **TL:** Haiti, Port-au-Prince. De Santis, 1979: 376 (catalogue) [NT].

Acmopolynema vittatipenne: Schauff, 1981: 454 (generic transfer, distribution); Fidalgo, 1989: 9 (key), 42 (description, Argentina) [NT];Yoshimoto, 1990: 78 (list, species group placement).

Nearctic hosts. On sweet potato infested with *Copicerus irroratus* Swartz (Delphacidae). This is likely not the true host because specimens were not actually reared.

Distribution. USA: FL.

ALAPTUS Westwood, 1839

(Figs 31–60)

Alaptus Westwood, 1839: 79. Type species: *Alaptus minimus* Westwood, 1839, by monotypy.

Parvulinus Mercet, 1912: 332. Type species: *Parvulinus auranti* Mercet, 1912, by monotypy. Synonymy by Girault, 1913 [127]: 221.

Metalaptus Malenotti, 1917: 339. Type species: *Metalaptus torquatus* Malenotti, 1917, by monotypy. Synonymy by Girault 1917 [330]: 1.

Diagnosis. Body length 205–555 μm; 210–580 μm in Triapitsyn (2017). Antenna with funicle 5-segmented (Figs 35, 36), exceptionally with a minute additional segment between fu_1 and fu_2 (Fig. 33); supraorbital trabecula with alternating sclerotized and unsclerotized sections (Figs 32, 34, 41); mandible with 2 teeth (Figs 47, 48); head posteriorly with curved horizontal sulcus medially above foramen (Fig. 44); fore wing posterior margin with an abrupt, recurved notch behind venation and, thereafter, posterior margin almost straight and gradually diverging from anterior margin (Fig. 39) almost to wing apex; petiole much wider than long and almost indistinguishable from propodeum or gt_1 (Figs 49, 50, 54); mesophragma projecting into gaster; gt_1 longitudinally divided medially (Fig. 40). Male with flagellum 8-segmented (Fig. 37).

Discussion. *Alaptus* belongs to the *Alaptus* group of genera, together with *Callodicopus, Dicopomorpha*, *Dico-*

pus and *Litus*. Its species are among the smallest Mymaridae in the Nearctic; only some *Camptoptera, Dicopus* and *Dicopomorpha* species are as small.

Nearctic hosts. Psocoptera. Despite the numerous records from species of Hemiptera (Coccoidea) catalogued by Peck (1951, 1963), Thompson (1958), Herting (1972), and Noyes (2019) additional, careful rearings are needed to be sure of the associations. Triapitsyn (2017) listed only Psocoptera as reliable host records.

Important reference. Triapitsyn (2017).

Alaptus eriococci Girault, 1908

Alaptus eriococci: Girault, 1908 [51]: 191. Lectotype ♀ (USNM), designated by Triapitsyn, 2017: 12. **TL:** USA, California, Los Angeles. Girault, 1910 [69]: 244 (list); Girault, 1911 [96]: 323 (list); Quayle, 1911: 138 (host, distribution); Frison, 1927: 226 (paratypes, host); Essig, 1929: 818 (host, distribution); Girault, 1929 [428]: 10 (key); Soyka, 1939b: 31 (list); Peck, 1951: 413 (catalogue); Peck, 1963: 27 (catalogue); Burks, 1979: 1024 (catalogue); Yoshimoto, 1990: 23 (list); Triapitsyn, 2017: 8 (key), 12 (description, distribution).

Alaptus criococci [*sic*]: Essig, 1913: 134 (host); Essig, 1915: 184 (host).

Nearctic hosts. Diaspididae: *Aonidiella aurantii* (Maskell). Eriococcidae: *Rhizococcus araucariae* Maskell. Both records are almost certainly incorrect (Triapitsyn 2017).

Distribution. USA: CA, FL.

Alaptus fusculus Walker, 1846

Alaptus fusculus Walker, 1846: 51. Lectotype ♂ (NMID), designated by Graham, 1982: 194. **TL:** UK, England, near London. Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 428 (catalogue) [P]; Girault, 1908 [51]: 184 (list, comments) [P]; Enock, 1914: 46 (list) [P]; Kryger, 1950: 33 (good species), 34 (description, hosts) [P]; Thompson, 1958: 566 (host catalogue) [P]; Hincks, 1959: 141 (key), 144 (description, hosts, distribution) [P]; New, 1969: 185 (biology) [P]; Cheke, 1974: 107 (numerical response) [P]; Broadhead & Cheke, 1975: 767 (ecology) [P]; Cheke, 1977: 17 (grooming behavior) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Viggiani & Jesu, 1988: 1020 (distribution in Italy) [P]; Pagliano & Navone, 1995: 35 (Italy list) [P]; Baquero & Jordana, 2002: 79 (distribution, host associations) [P]; Viggiani, 2004: 61 (male genitalia) [P]; Huber *et al.*, 2009: 292 (male genitalia) [P]; Pricop, 2009b: 123 (list) [P]; Pintureau, 2012: 31 (European list) [P]; Triapitsyn, 2015a: 218 (correction to Haliday collection list) [P]; Dale-Skey *et al*., 2016: 227 (checklist) [P]; Koponen & Triapitsyn, 2016: 2 (distribution) [P]; Triapitsyn, 2017: 15 (description, distribution, hosts).

Alaptus extremus Soyka, 1939a: 19. Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg, St. Ignatius Jesuit College [Ignatiuskolleg]. Synonymy by Triapitsyn, 2017: 16.

Alaptus foersteri Soyka, 1939a: 18. Lectotype ♀ (NHMW), designated by Triapitsyn, 2017: 16. **TL:** Poland, Wrocław, ulica Gajowicka [Breslau, Gabitzstrasse in original description]. Synonymy by Hincks, 1959: 144.

Alaptus magnus Cheke & Turner, 1973: 279. Holotype ♀ (NHMUK). **TL:** UK, North Yorkshire Co., Harrogate. Synonymy by Triapitsyn, 2017: 16.

Alaptus novickyi Soyka, 1948: 72. Holotype ♀ (NHMW). **TL:** Germany, Malchin, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Triapitsyn, 2017: 16.

Distribution. Canada: ON. USA: AK, CA, FL, MA, SC, VA.

Alaptus globosicornis Girault, 1908

Alaptus globosicornis Girault, 1908 [51]: 188. Lectotype ♀ (USNM), designated by Triapitsyn, 2017: 23. **TL:** USA, Florida, Orlando. Girault, 1910 [69]: 242, 244 (description); Girault, 1911 [89]: 132 (description, Hawaiian Islands) [A]; Girault, 1911 [96]: 323 (list); Girault, 1913 [135]: 10 (Florida); Timberlake, 1924: 447 (host) [A]; Girault, 1929 [428]: 9 (key), 10 (distribution); Cotton & Good, 1937: 37, 61 (host, distribution); Peck, 1951: 413 (catalogue); Thompson, 1958: 566 (host catalogue) [A]; Peck, 1963: 27 (catalogue); Burks, 1979: 1024 (catalogue); Fletchmann & Castello, 1982: 489 (host) [NT]; De Santis, 1983: 32 (catalogue) [NT]; Yoshimoto, 1990: 23 (list); Lin *et al*., 2007: 21 (list) [A]; Triapitsyn, 2017: 8 (key), 22 (description, distribution).

Alaptus globosicornis variety *hawaiiensis* Girault, 1912 [120]: 124. Holotype ♀ ([QM). **TL:** Hawaiian Islands, Oahu Island, Honolulu. Synonymy by Triapitsyn, 2017: 22.

Leimacis peregrina Perkins 1910: 661. Lectotype ♀ (NHMUK), designated by Triapitsyn, 2017: 23. **TL:** Hawaiian Islands, Oahu Island, Honolulu. Transferred (implicitly) to *Alaptus* by Triapitsyn, 2016: 150 (*nomen dubium*) and synonymy by Triapitsyn, 2017: 22.

Nearctic hosts. Liposcelididae: *Liposcelis bostrychophila* Badonnel, *L. divinatoria* (Müller).

Distribution. USA: FL, PA, TX.

Alaptus huberi Triapitsyn, 2017

Alaptus huberi Triapitsyn, 2017: 26. Holotype ♀ (CNC). **TL:** Canada, Ontario, Thousand Islands National Park, Grenadier Island Centre. Triapitsyn, 2017: 8 (key).

Distribution. Canada: ON.

Alaptus iceryae Girault, 1908

Alaptus iceryae Girault, 1908 [51]: 181. Lectotype ♀ (USNM), designated by Triapitsyn, 2017: 28. **TL:** USA, California, locality not given. Riley, 1888: 130 [*nomen nudum*]; Riley, 1889: 86 [*nomen nudum*] (figure 3, plate XI); Girault, 1907 [27]: 31 [*nomen nudum*] (host?); Girault, 1910 [69]: 240 (description, distribution); Girault, 1911 [96]: 323 (list); Essig, 1926: 819 (hosts, distribution); Peck, 1951: 413 (catalogue); Peck, 1963: 28 (catalogue); Burks, 1979: 1024 (catalogue); De Santis, 1979: 362 (catalogue) [NT]; Yoshimoto, 1990: 23 (list); Triapitsyn, 2017: 8 (key), 27 (description, distribution).
Alaptus iceryiae [*sic*]: Girault, 1929 [428]: 10 (key), 10 (distribution).
Alaptus priesneri Soyka, 1950b: 122. Holotype ♀ (NHMW). **TL:** Egypt, Beni-Suef. Synonymy by Triapitsyn, 2017: 27.

Nearctic hosts. Liposcelididae: *Liposcelis divinatoria* (Müller).

Distribution. USA: CA, DC, FL, IL, NY, SC, TX.

Alaptus immaturus Perkins, 1905

Alaptus immaturus Perkins, 1905: 197. Neotype ♀ (QM), designated by Triapitsyn, 2017: 3. **TL:** Australia, Queensland, Nambour, Maroochy Research Station. Triapitsyn, 2017: 8 (key), 12 (neotype designation, description, distribution).
Alaptus caecilii Girault, 1908 [51]: 189. Lectotype ♀ (USNM) designated by Triapitsyn, 2017: 34. **TL:** USA, Florida, Orlando. Synonymy by Triapitsyn, 2017: 32. Girault, 1910 [69]: 151 (description, distribution); Girault, 1911 [87]: 151 (host); Girault, 1911 [96]: 323 (list); Frison, 1927: 226 (paratypes, host); Gahan, 1927a: 180 (comparison with *A. psocidivorus*); Spruyt, 1927: 184 (host); Girault, 1929 [428]: 10 (key, host); Ferrière, 1930: 38 (Kenya) [AT]; Sommerman, 1943a: 104 (host, distribution); Sommerman, 1943b: 35 (host, distribution); Sommerman, 1943c: 61 (host failure); Procter, 1946: 490 (list, distribution); Wolcott, 1948: 771 (psocid egg mass, sugar cane) [NT]; Peck, 1951: 413 (catalogue); Peck, 1963: 27 (catalogue); Herting, 1971: 73 (host catalogue); Cheke & Turner, 1973: 281 (description); Burks, 1979: 1024 (catalogue); De Santis, 1979: 362 (catalogue) [NT]; Yoshimoto, 1990: 23 (list); Viggiani & van Harten, 1996: 72 (distribution) [AT]; Luft Albarracin *et al.*, 2009: 5 (list) [NT]; Triapitsyn, 2017: 8 (key), 32 (description).
Alaptus sp.: Howard, 1894a: 228 (host, distribution).
Alaptus caecilli [*sic*]: Procter, 1938: 429 (list, distribution).

Nearctic hosts. Caeciliidae: *Caecilius aurantiacus* (Hagen), *C. manteri* Sommerman. Ectopsocidae: ? *Ectopsocus californicus* (Banks). Psocidae: [?] *Psocus* sp.

Distribution. Canada: AB. USA: CA, DE, FL, IL, LA, MD, ME.

Alaptus klonx Triapitsyn, 2017

Alaptus klonx Triapitsyn, 2017: 39. Holotype ♀ (UCRC). **TL:** USA, Florida, Jefferson Co., Monticello, University of Florida, North Florida Research & Education Center.

Distribution. Canada: ON. USA: FL, MI, NY.

Alaptus minimus Westwood, 1839

Alaptus minimus Westwood, 1839: 79. Lectotype ♀ (NMID), designated by Hincks, 1959: 141. **TL**: unknown (most likely England). Walker, 1846: 51 (description) [P]; Kirchner, 1867: 201 (catalogue) [P]; Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 428 (catalogue) [P]; Girault, 1908 [51]: 182 (history, list) [P]; Enock, 1914: 46 (list) [P]; Bakkendorf, 1934: 17 (larva, development) [P]; Soyka, 1939a: 17 (description) [P]; Soyka, 1939b: 30 (key) [P]; Debauche, 1948: 56 (key), 59 (description) [P]; Soyka, 1948: 75 (key) [P]; Debauche, 1949: 10 (description) [P]; Kryger, 1950: 35 (description, hosts)

[P]; Soyka, 1950b: 121 (distribution) [P]; Thompson, 1958: 566 (host catalogue) [P]; Hincks, 1959: 142 (key, synonymy) [P]; Boţoc, 1963: 95 (description) [P]; New, 1969: 185 (biology) [P]; Hellén, 1974: 14 (key, description) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Donev, 1978: 458 (distribution) [P]; Trjapitzyn, 1978: 523 (key) [P]; Graham, 1982: 194 (paralectotype designations) [P]; Donev, 1985a: 62 (distribution) [P]; Donev, 1985b: 66 (distribution) [P]; Donev, 1987: 75 (distribution) [P]; Trjapitzin, 1987: 951 (key) [P]; Donev, 1988a: 178 (distribution) [P]; Donev, 1988b: 205 (distribution) [P]; Viggiani & Jesu, 1988: 1020 (Italy) [P]; Pagliano & Navone, 1995: 35 (list) [P]; Viggiani & van Harten, 1996: 72 (Cape Verde record) [AT]; Pricop, 2009b: 123 (list) [P]; Pintureau, 2012: 31 (European list) [P]; Pricop, 2013: 72, 74 (78 (distribution) [P]; Triapitsyn, 2015a: 218 (list) [P]; Dale-Skey *et al.*, 2016: 227 (checklist) [P]; Koponen & Triapitsyn, 2016: 2 (distribution) [P]; Triapitsyn, 2017: 8 (key), 42 (description, distribution).

Alaptus intonsipennis Girault, 1910 [69]: 244. Lectotype ♀ (INHS), designated by Frison, 1927: 226. **TL:** USA, Illinois, Hendrix, Bloomington. Synonymy by Triapitsyn, 2017: 43. Girault, 1911 [96]: 323 (list); Frison, 1927: 226 (lectotype designation); Girault, 1929 [428]: 10 (key); Peck, 1951: 413 (catalogue, host, distribution); Peck, 1963: 28 (catalogue); Burks, 1979: 1024 (catalogue); Webb, 1980: 118 (lectotype listing); Yoshimoto, 1990: 24 (list); Triapitsyn, 2017: 46 (type material).

Alaptus aegyptiacus Soyka 1950: 121. Holotype ♀ (ISNB). **TL:** Egypt, Alexandria. Synonymy by Triapitsyn, 2017: 43.

Alaptus borinquensis Dozier 1932: 90. Lectotype ♀ (USNM), designated by Triapitsyn, 2017: 45. **TL:** Puerto Rico, Río Piedras (now part of San Juan). Synonymy by Triapitsyn, 2017: 43.

Alaptus crassus Kryger, 1950: 33. Lectotype ♀ (NHMUK), designated by Hincks, 1959: 142. **TL:** UK, England, West Sussex Co., Goring-by-Sea. Synonymy by Hincks, 1959: 141.

Alaptus maccabei Girault 1913 [165]: 109. Lectotype ♀ (QM), designated by Dahms, 1984: 780. **TL:** Australia, Queensland, Herberton. Synonymy by Triapitsyn, 2017: 43.

Alaptus maidli Soyka 1939b: 28. Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg, St. Ignatius Jesuit College (Ignatiuskolleg). Synonymy by Triapitsyn, 2017: 43.

Alaptus malchinensis Soyka 1948: 71. Lectotype ♀ (NHMW), designated by Triapitsyn, 2017: 46. **TL:** Germany, Malchin, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Triapitsyn, 2017: 43.

Alaptus uncinatus Kryger, 1950: 36. Lectotype f # (NHMUK), designated by Hincks, 1959: 141. **TL:** UK , England, London Borough of Richmond upon Thames, Richmond. Synonymy by Hincks, 1959: 142.

Parvulinus auranti Mercet, 1912: 333. Lectotype ♀ (MNCN), designated by Triapitsyn, 2017: 45. **TL:** Spain, Valencia. Transferred to *Alaptus* by Debauche, 1948: 55. Synonymy by Triapitsyn, 2017: 43.

Parvulinus aurantii [*sic*]: Holman, 2002: 46 (host, Czech Republic) [P] [not referenced in Triapitsyn 2017].

Alaptus aurantii [*sic*]: Herting, 1971: 73; Thompson, 1958: 565 [not referenced in Triapitsyn 2017].

Nearctic hosts. Ectopsocidae: ? *Ectopsocus californicus* Banks.

Distribution. Canada: ON. USA: CA, DE, FL, IL, LA, MD, MI, MO, NC, NY.

Alaptus pallidicornis Foerster, 1856

Alaptus pallidornis Foerster, 1856: 120. Lectotype ♀ (NHMW), designated by Triapitsyn, 2017: 55. **TL**: Germany, Aachen environs. Westwood, 1879: 587 (comment) [P]; Vidal, 2001: 60 (list) [P]; Pricop, 2008: 36 (distribution, hosts) [P]; Pricop, 2009a: 81 (list) [P]; Pricop, 2009b: 123 (list) [P]; Pricop, 2010a: 70 (list) [P].

Alaptus pallidicornis: Kirchner, 1867: 201 (catalogue) [P]; Westwood, 1879: 587 (as *? pallidicornis*) [P]; Dalla Torre, 1898: 428 (catalogue, name emendation) [P]; Girault, 1908 [51]: 184 (list, comments) [P]; Girault, 1910 [69]: 244 (list) [P]; Soyka, 1937: 75 (description, distribution) [P]; Soyka, 1939b: 30 (key) [P]; Debauche, 1948: 56 (key, description) [P]; Soyka, 1948: 74 (key) [P]; Kryger, 1950: 35 (list, description) [P]; Soyka, 1950b: 121 (distribution) [P]; Hincks, 1959: 146 (description) [P]; Hincks, 1960: 170 (mention) [P]; New, 1969: 182 (biology) [P]; Cheke, 1974: 111 (simultaneous oviposition) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Donev, 1978: 458 (distribution) [P]; Trjapitzin, 1978: 521 (key, distribution, hosts) [P]; Graham, 1982: 194 (comments) [P]; Vikberg, 1982: 142 (list) [P]; Donev, 1987: 75 (distribution) [P]; Trjapitzyn, 1987: 951 (key, distribution, hosts) [P]; Viggiani & Jesu, 1988: 1020 (Italy) [P]; Viggiani, 1989: 144 (male genitalia) [P]; Pintureau & Keita, 1990: 239 (host associations, population dynamics) [P]; Pagliano & Navone, 1995: 35 (list) [P]; Triapitsyn, 2002c: 215 (distribution, hosts, comments) [P]; Baquero & Jordana, 2002: 79 (measurements, distribution, hosts) [P]; Arnaldos *et al.*, 2003: 226 (carrion community, distribution) [P]; Arnaldos *et al.*, 2004: 200 (list) [P]; Viggiani, 2004: 62 (male genitalia) [P]; Huber *et al.*, 2009: 271 (list); Pricop, 2009b: 123 (distribution) [P]; Pricop, 2010b: 92 (list, statistics); Pintureau, 2012: 31 (European list) [P]; Triapitsyn, 2015a: 218 (list); Dale-Skey *et al.*, 2016: 228 (checklist) [P]; Koponen & Triapitsyn, 2016: 2 (distribution) [P]; Triapitsyn, 2017: 8 (key), 55 (description, distribution).

Alaptus psocidivorus Gahan, 1927a: 180. Holotype ♀ (USNM). **TL:** USA, California, Palo Alto, Stanford University. Synonymy by Triapitsyn, 2017: 55. Spruyt, 1927: 182 (host, distribution); Sommerman, 1943c: 61 (host); Peck, 1951: 413 (catalogue, host); Peck, 1963: 28 (catalogue); Burks, 1979: 1024 (catalogue); De Santis, 1983: 32 (catalogue, Mexico) [NT]; Yoshimoto, 1990: 24 (list).

Alaptus excisus Westwood, 1879: 586. Neotype ♀ (OUMNH), designated by Triapitsyn, 2017: 57. **TL:** England, not given but possibly Wilton (near Salisbury). Synonymy under *A. pallidicornis* by Hincks, 1959: 146.

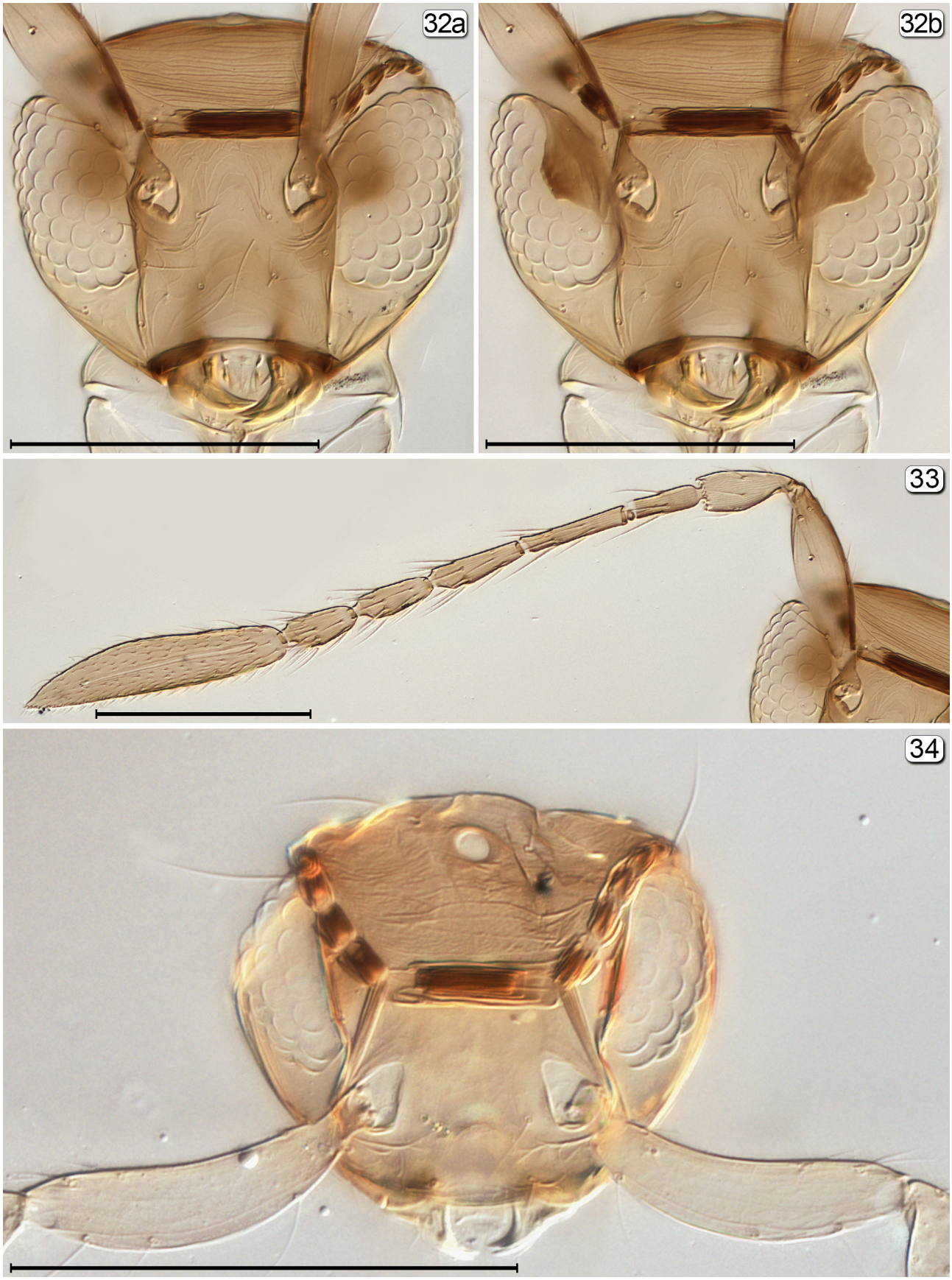
Metalaptus torquatus Malenotti, 1917: 340. Syntypes, 5 ♀, 1 ♂ (depository unknown), ? lost. **TL:** Italy, Sicily, Centùipe and Palermo. Synonymy by Triapitsyn, 2017: 55.
Paralaptus torquatus: Mercet, 1917: 370 (incorrect synonymy under *aurantii*) [P].
Metalaphus [*sic*] *torquatus*: Dingler, 1923: 236, 239 (biology, Germany, Switzerland) [P].
Alaptus pechlaneri Soyka, 1948: 73. Holotype ♀ (NHMW). **TL:** Austria, Innsbruck, Arzler Alm. Synonymy by Triapitsyn, 2017: 55.

Nearctic hosts. Psocidae: [?] *Psocus* sp.

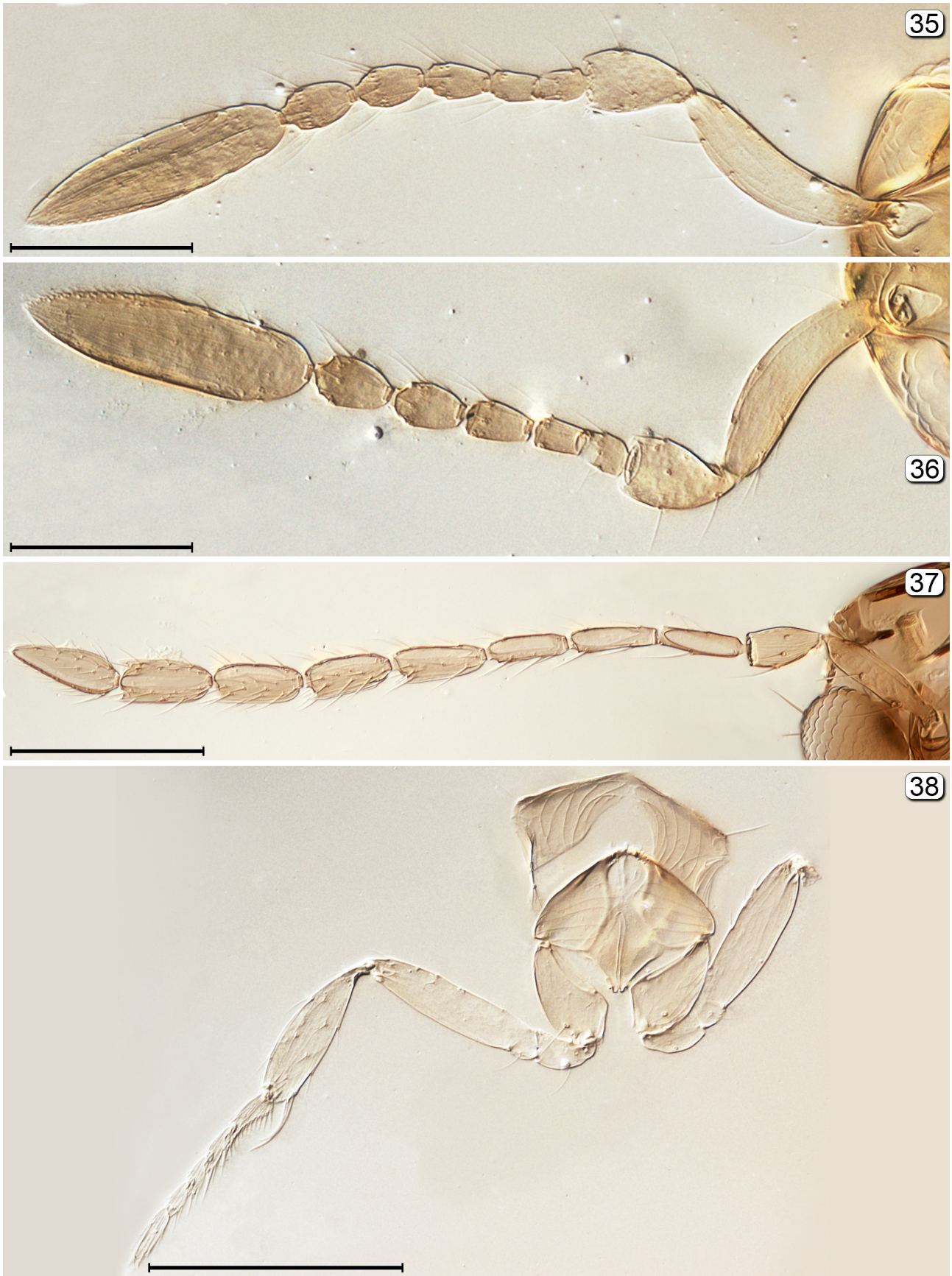
Distribution. USA: CA, IL, MI.



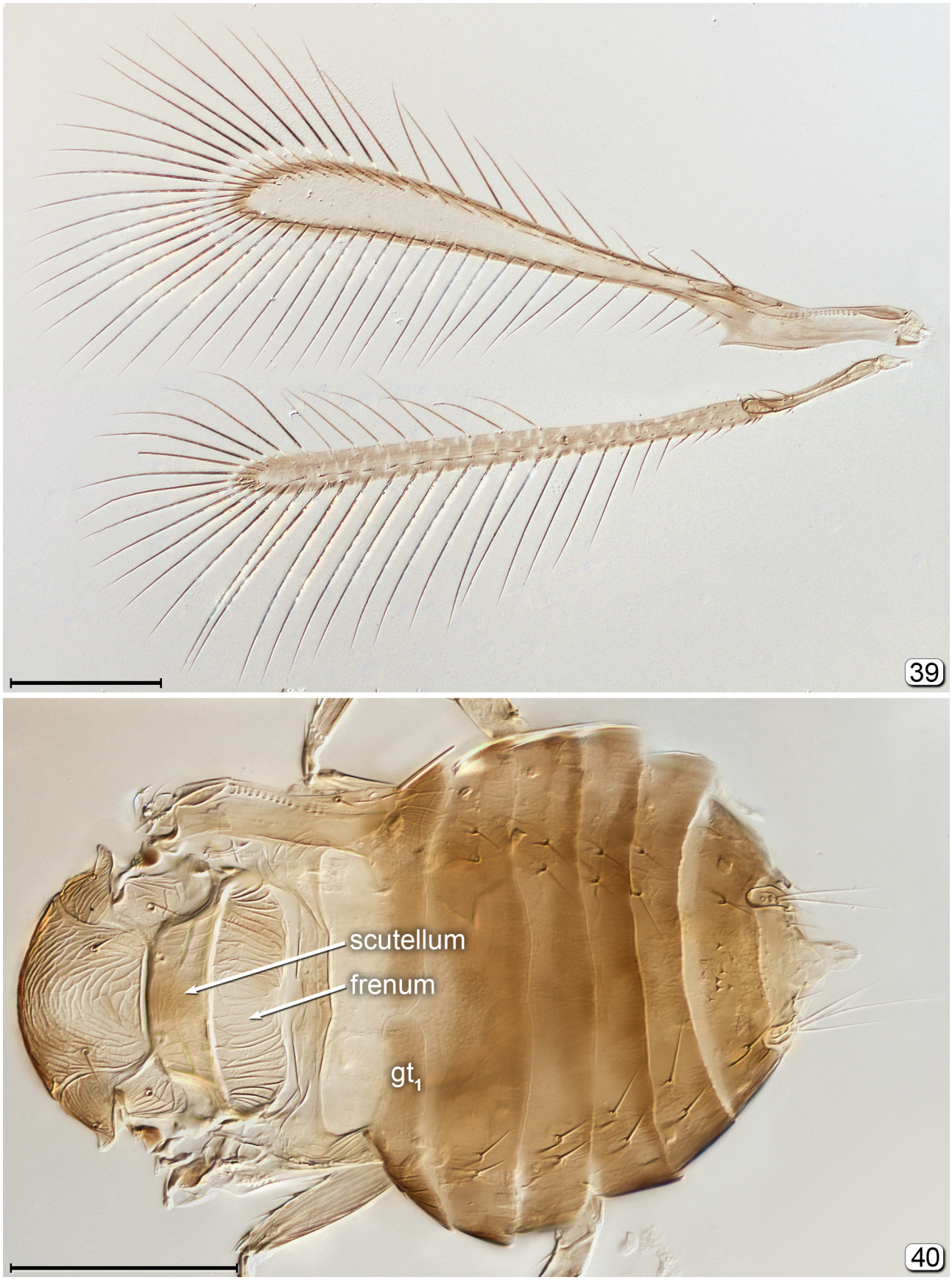
FIGURE 31. *Alaptus* sp., habitus. Canada, Quebec, Cloridorme, 49°11.22'N 64°51.28'W, 26.vii.2008, fallow field, H. Goulet, C. Boudreault, A. Badiss. Scale bar=500 µm.



FIGURES 32–34. *Alaptus* spp. 32a, head, anterior; 32b, head, anterior (internal), showing ocular apodeme; 33, antenna (note small additional segment between fu_2 and fu_3); 34, head, anterodorsal. Scale bars=100 μm.



FIGURES 35–38. *Alaptus iceryae* Girault. 35, left antenna; 36, right antenna; 37, male antenna; 38, prosoma + fore leg. Scale bars=100 μm.

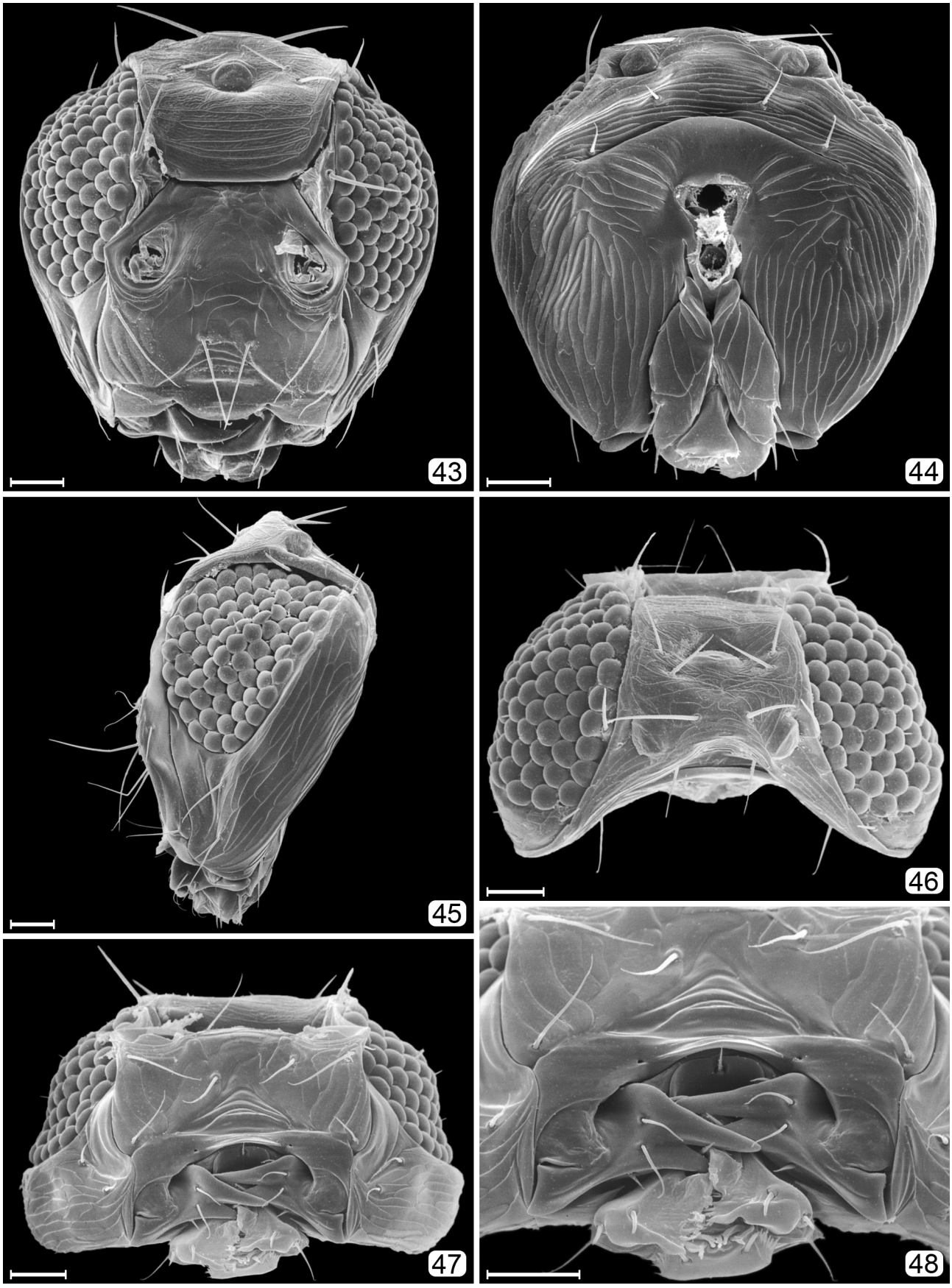


FIGURES 39, **40**. *Alaptus* sp., male. 40, wings; 41, mesosoma (except prothorax) + metasoma, dorsal. Scale bars=100 µm.

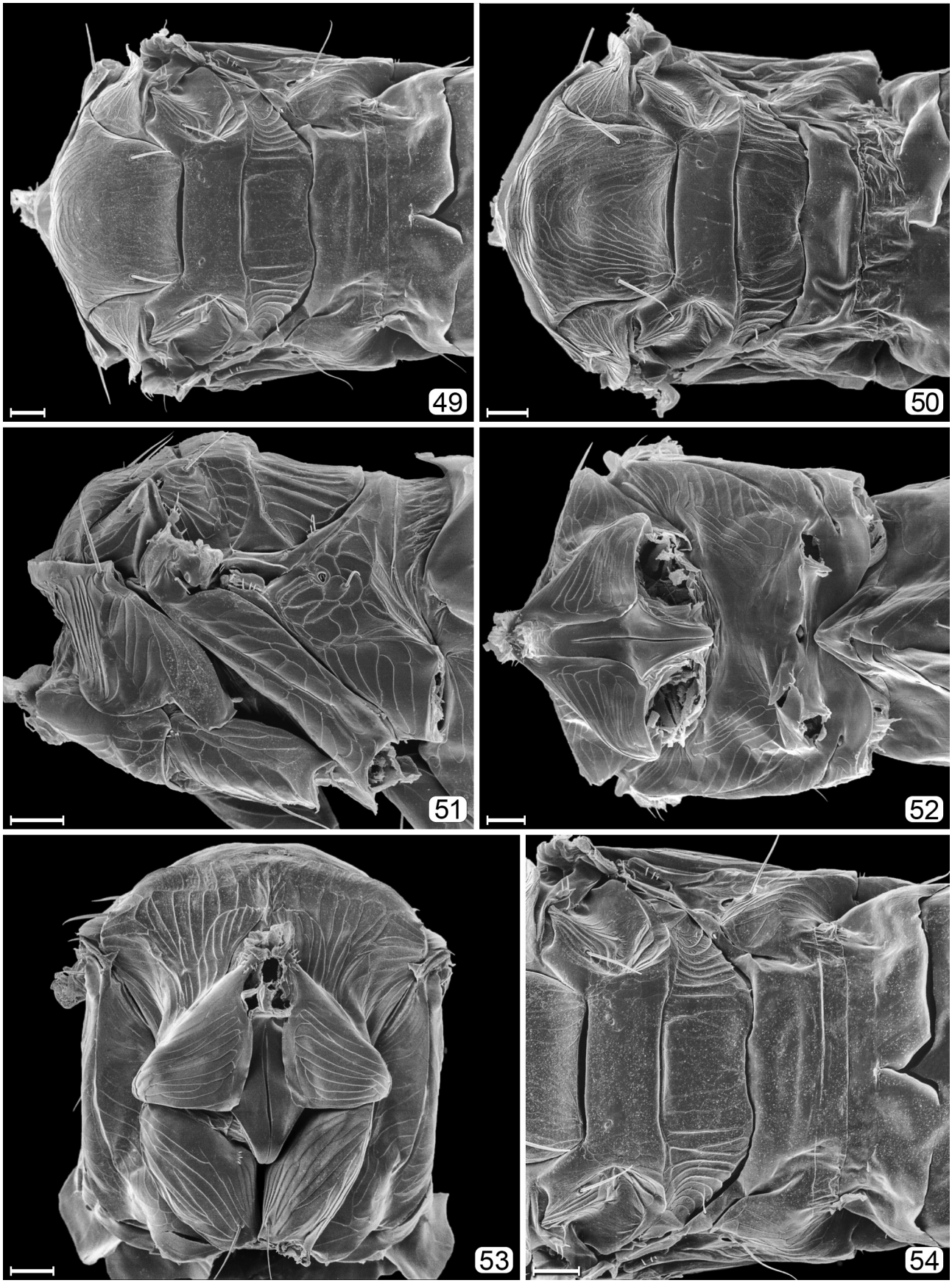




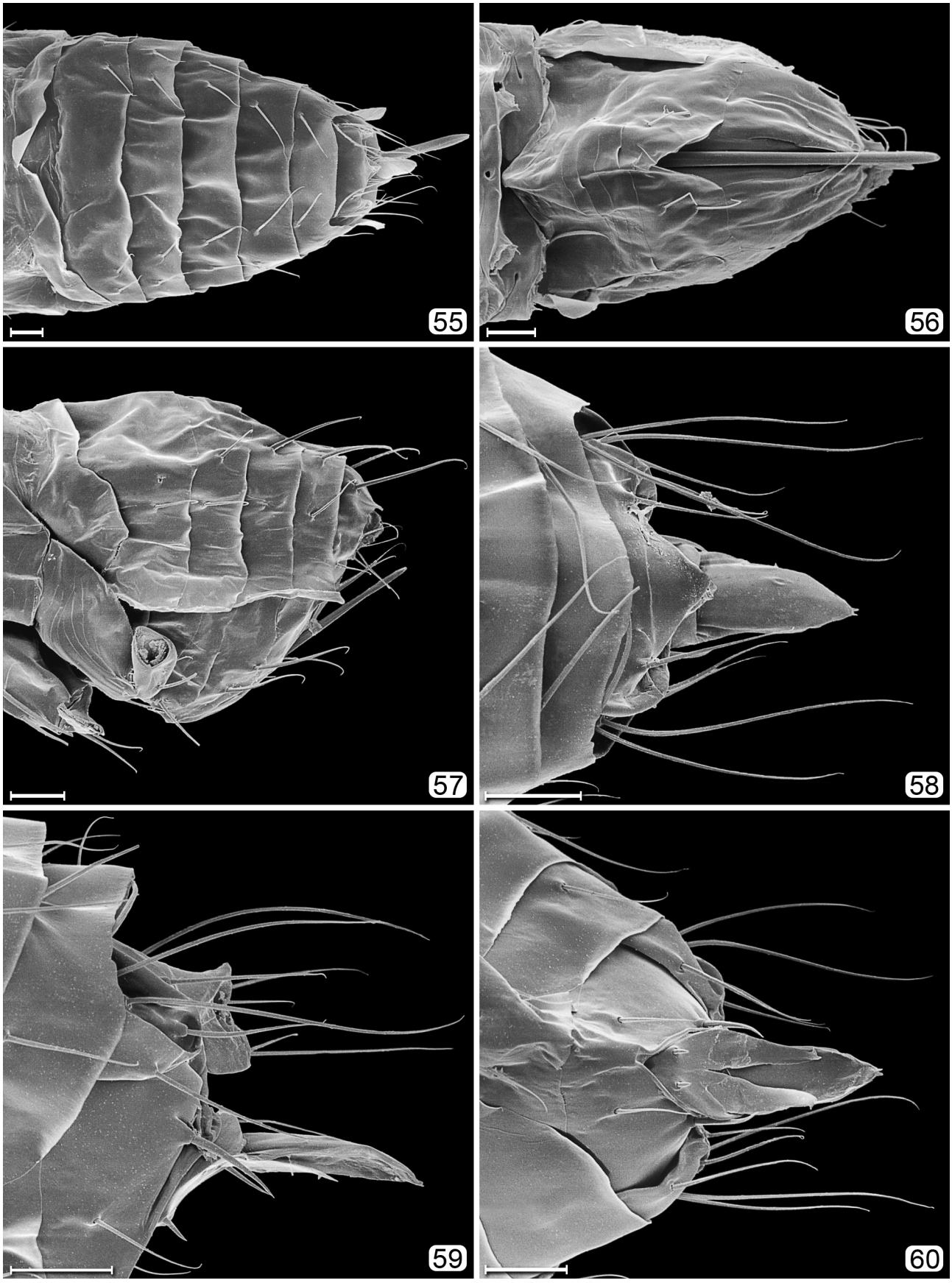
FIGURES 41, **42**. 41, *Alaptus* sp. body, dorsal, showing mesophragma and male genitalia. 42, *Alaptus klonx* Triapitsyn, body, lateral. Scale bars=100 μm.



FIGURES 43–48. *Alaptus* sp., head. 43, anterior; 44, posterior; 45, lateral; 46, dorsal; 47, ventral, 48, mouthparts. Scale bars=20 μm.



FIGURES 49–54. *Alaptus* sp., mesosoma. 49, dorsal; 50, dorsal (different specimen); 51, lateral; 52, ventral; 53 anteroventral; 54, scutellum–gt_1. Scale bars=20 μm.



FIGURES 55–60. *Alaptus* sp., metasoma. 55, dorsal; 56, ventral; 57, lateral; 58, apex of gaster, male dorsal (genitalia exserted); 59, apex of gaster, male, lateral; 60, apex of gaster, male, ventral. Scale bars=20 μm.

Alaptus santetrapsi Triapitsyn, 2017

Alaptus santetrapsi Triapitsyn, 2017: 65. Holotype ♀ (ZIN). **TL:** RUSSIA, Primorskiy Kray, Ussuriysk District, Gornotayozhnoye.

Distribution. Canada: AB, ON, YT.

Alaptus terebrans Kryger, 1950

Alaptus terebrans Kryger, 1950: 33. Lectotype ♀ (MMUE), designated by Hincks, 1959: 145. **TL:** UK, England, St. Neots.

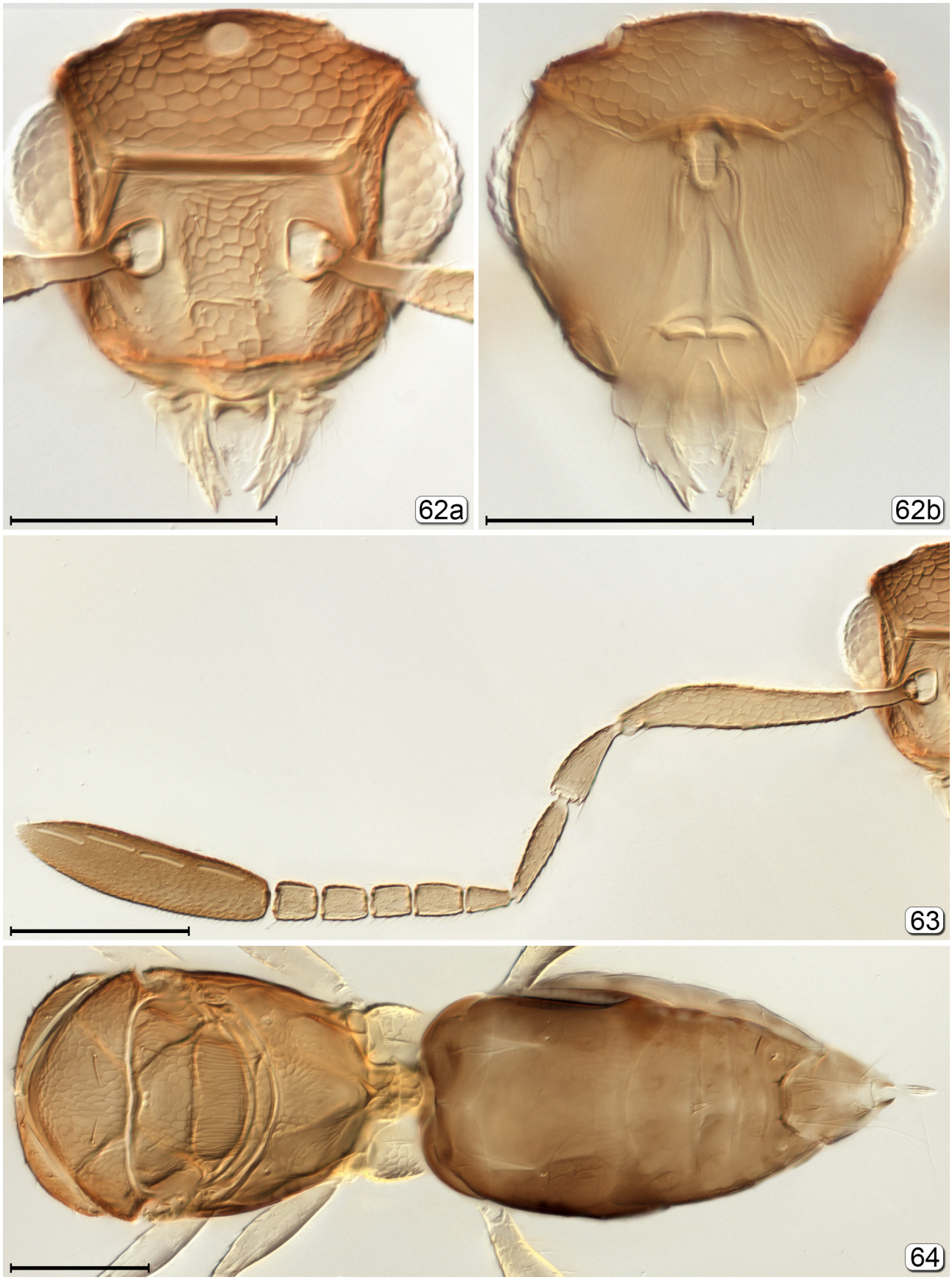
Distribution. USA: FL, MI, NY, TN. Triapitsyn (2017) was uncertain if the North American specimens he examined belong to this species or to *A. klonx*. The species is provisionally included as occurring in the Nearctic.

ANAGROIDEA Girault, 1915
(Figs 61–85)

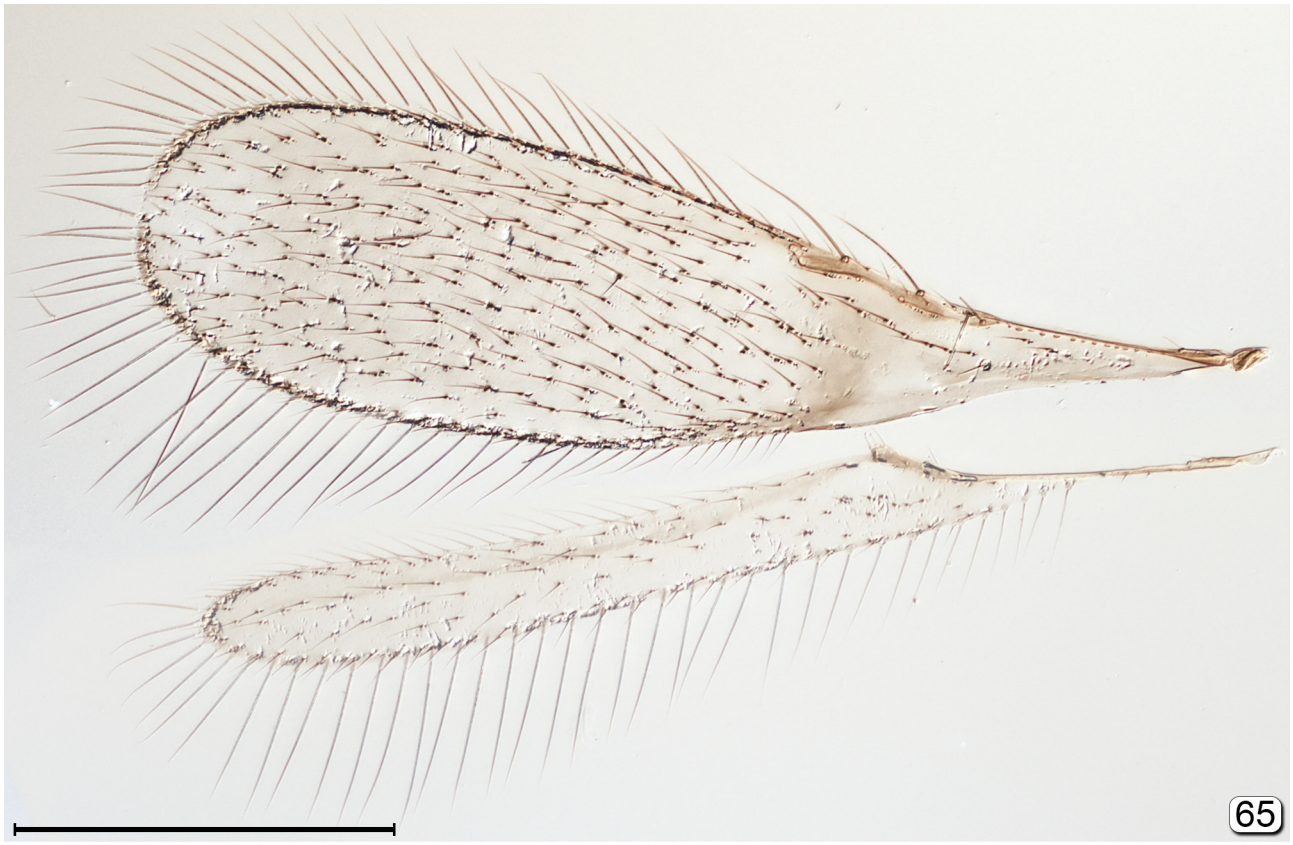
Anagroidea Girault, 1915 [228]: 164. Type species: *Eustochus dubius* Girault, 1913, by original designation.
Dahmsia Doutt**,** 1975: 254. Type species: *Dahmsia australiensis* Doutt, 1975, by original designation. Synonymy by Noyes & Valentine, 1989: 25.



FIGURE 61. *Anagroidea boweni* Yoshimoto, habitus. USA, Florida, Alachua Co., Gainesville, vi–vii.1987, CNC Hymenoptera Team. Scale bar=500 μm.

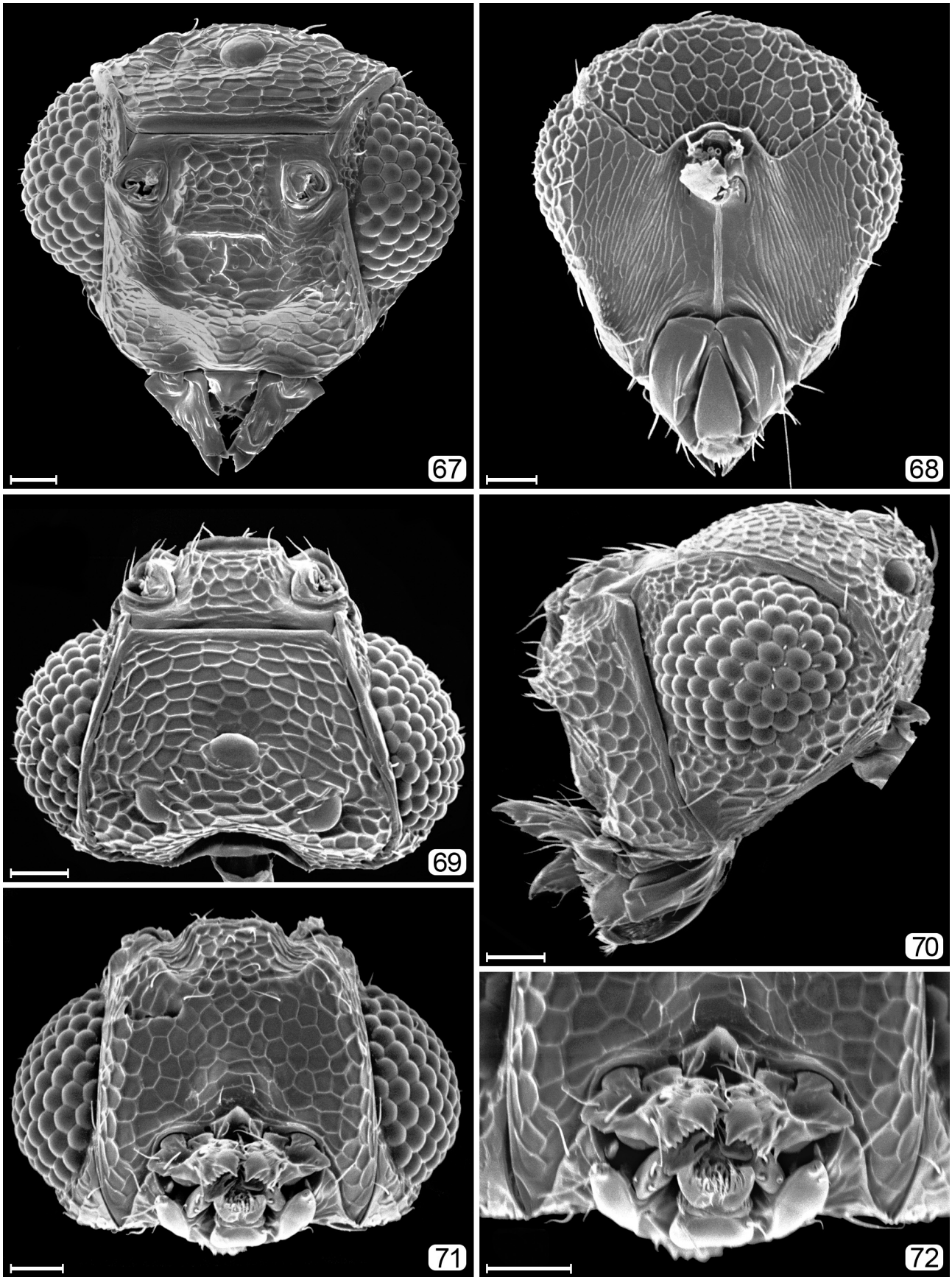


FIGURES 62–64. *Anagroidea boweni* Yoshimoto. 62a head, anterior; 62b, head, posterior; 63, antenna; 64, mesosoma + metasoma, dorsal. Scale bars=100 μm.

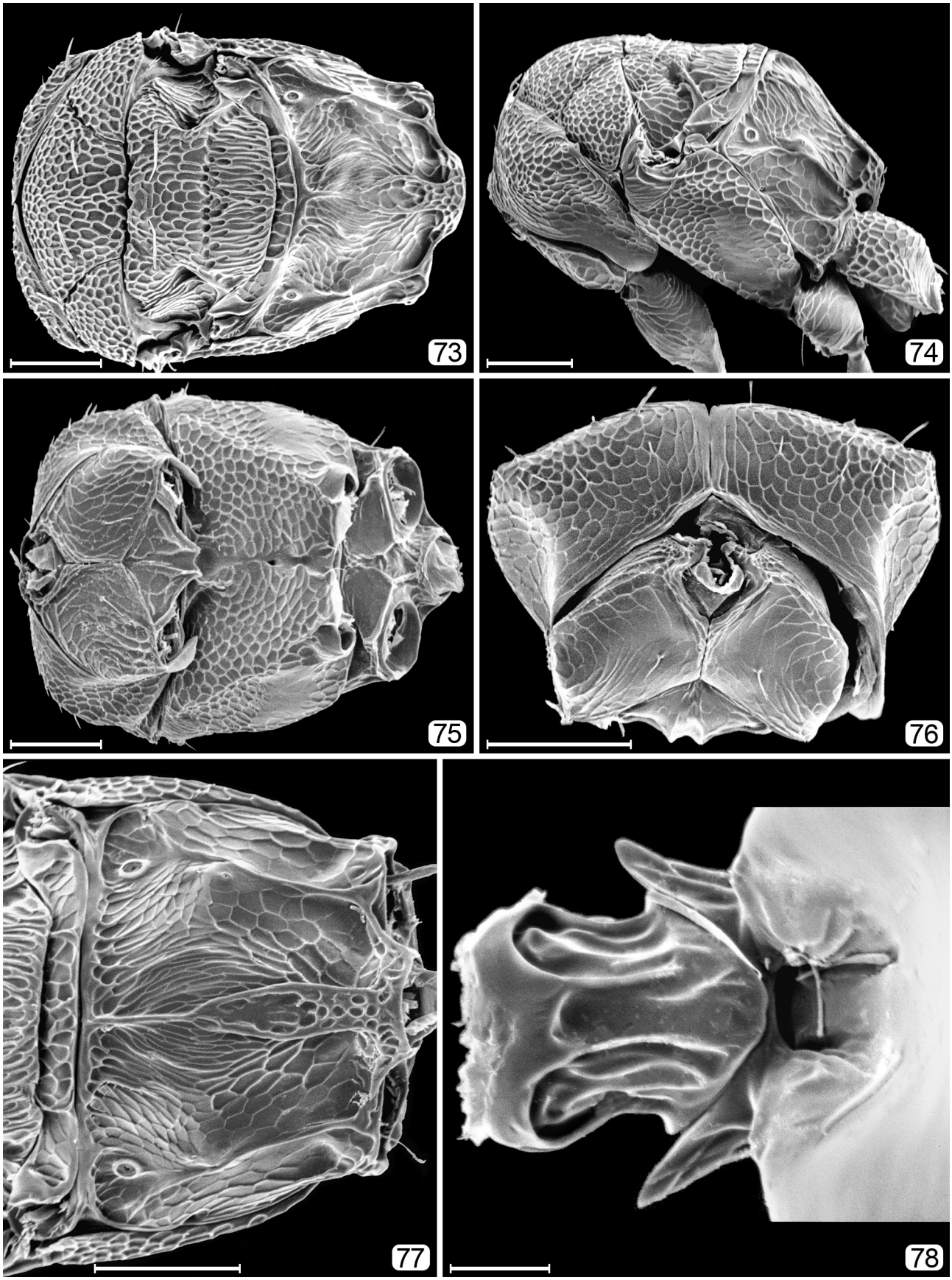




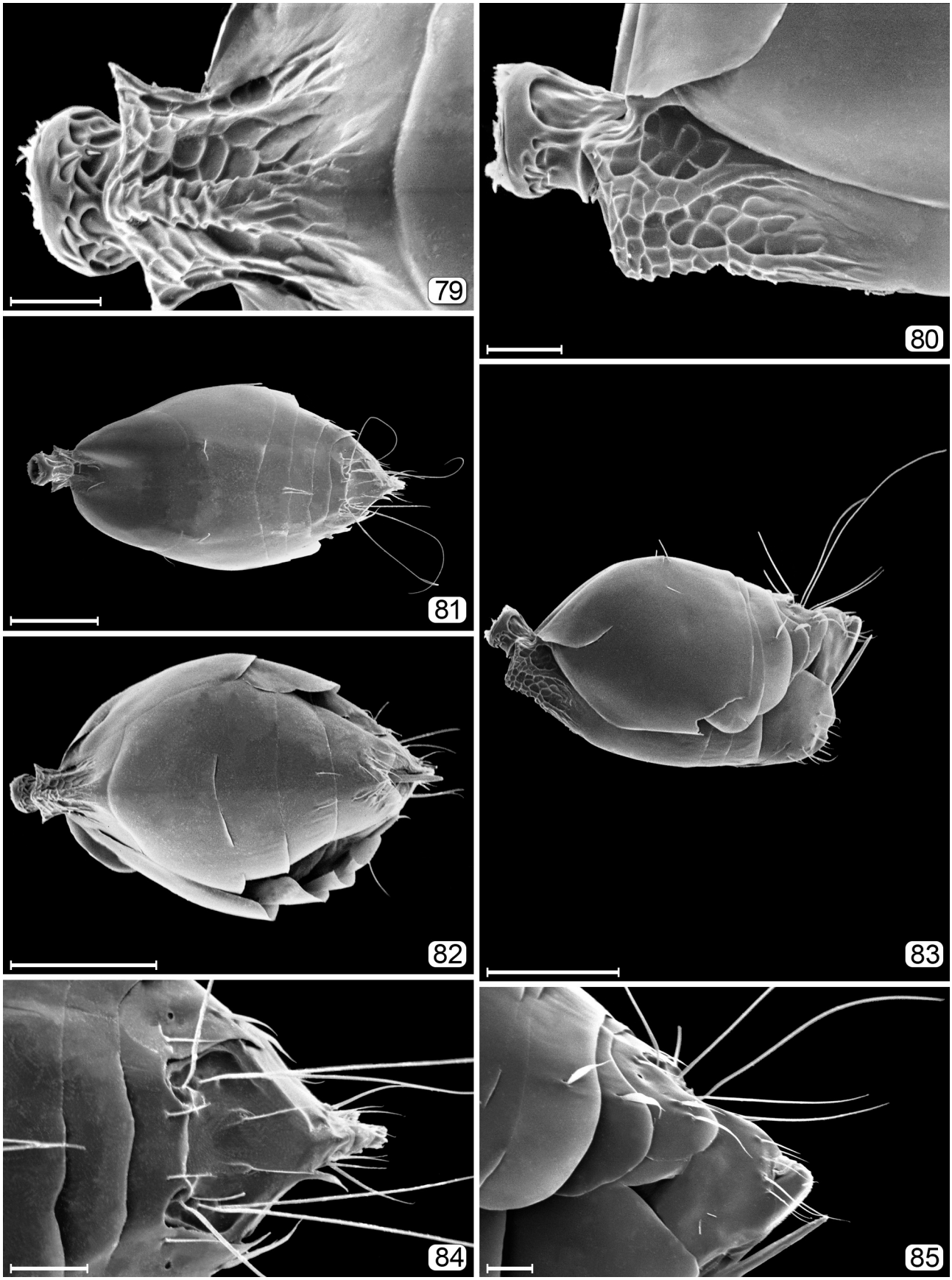
FIGURES 65, **66**. *Anagroidea boweni* Yoshimoto. 65, wings; 66, body, lateral. Scale bars=200 μm.



FIGURES 67–72. *Anagroidea* sp. (from Costa Rica), head. 67, anterior; 68, posterior; 69, dorsal; 70, lateral; 71, ventral, 72, mouthparts. Scale bars=20 μm.



FIGURES 73–78. *Anagroidea* sp. (Costa Rica), mesosoma except 78. 73, dorsal; 74, lateral; 75, ventral; 76, anterior; 77, metanotum + propodeum; 78, petiole, dorsal. Scale bars: 73–77=50 μm; 78: 10 μm.



FIGURES 79–85. *Anagroidea* sp. (Costa Rica), metasoma. 79, petiole, ventral; 80, petiole, lateral; 81, metasoma, dorsal; 82, metasoma, ventral, 83, metasoma, lateral; 84, apex of gaster, dorsal; 85, apex of gaster, lateral. Scale bars: 79, 80, 84, 85=20 μm; 81–83=100 μm.

Diagnosis. Body length 560–595 μm. Head and mesosoma with distinctly raised, reticulate sculpture (Figs 62a, 66–77); head in lateral view with face angular (Figs 66, 70); mandibles pointing ventrally, not crossing medially when closed (Figs 62, 67, 71, 72) and operating in an anterior/posterior direction (Fig. 70); hind wing often with membrane extending narrowly to base of venation, wing width near apex as wide as at level of hamuli, and with rather widely rounded apex (Fig. 65); fore-tibial spur comb-like

Discussion. *Anagroidea* is superficially similar to *Caraphractus* and *Eustochus*, both of which also have distinctly raised, reticulate head and mesosomal sculpture, but otherwise it is more closely related to *Cleruchus* group of genera and particularly to the extralimital *Eubroncus* Yoshimoto, Kozlov & Trjapitzin.

Nearctic hosts. Unknown.

Important reference. Triapitsyn & Berezovskiy (2002b).

Anagroidea boweni Yoshimoto, 1990

Anagroidea boweni Yoshimoto, 1990: 89. Holotype ♀ (CNC). **TL:** USA, Florida, Jacksonville. Huber, 1997: 505 (key); Triapitsyn & Berezovskiy, 2002b: 3 (key), 4 (description).

Distribution. USA: FL, GA, TX.

ANAGRUS Haliday, 1833

(Figs 86–119)

Anagrus Haliday, 1833a: 268, 1833b: 346. Type species: *Ichneumon atomus* [as *atomos*] Linnaeus, 1767, by subsequent designation by Westwood, 1839: 78.

Pteratomus Packard, 1864: 137. Type species: *Pteratomus putnamii* Packard, 1864, by monotypy. Synonymy by Girault, 1929 [428]: 27; fixed by Annecke & Doutt, 1961c: 7.

Packardiella Ashmead, 1904: 364. Unnecessary replacement name, proposed without apparent reason (name not preoccupied) according to Gahan & Fagan, 1923: 103 and Peck, 1963: 896.

Paranagrus Perkins, 1905: 199. Type species: *Paranagrus optabilis* Perkins, 1905, by original designation. Synonymy implied by Bakkendorf, 1926: 258; fixed by Annecke & Doutt, 1961c: 7.

Anagrella Bakkendorf, 1962: 372. Type species: *Anagrella mymaricornis* Bakkendorf, 1962, by monotypy. Synonymy by Viggiani, 1970: 139.

Diagnosis. Body length 300–800 μm. Face without subantennal sulci (Fig. 87); ocelli usually (except subgenus *Anagrella*) delimited by stemmaticum (Fig. 107); clava 1-segmented (entire), in lateral view often clearly asymmetrical, with dorsal margin usually strongly curved and ventral margin almost straight (Figs 86, 89, 98, 100); mandible with 3 teeth (Fig. 109); frenum longitudinally divided by narrow or wide sulcus into two lobes, each lobe shorter than wide (Figs 90, 102, 103, 110, 114).

Discussion. Four other genera in the Nearctic have a longitudinally divided frenum: *Krokella*, *Platystethynium* (*Platypatasson*), *Schizophragma* and *Stethynium*; *Omyomymar* may have an incompletely divided frenum. Females of all of them differ from *Anagrus* females by having the clava 2- or 3-segmented.

Considerable literature exists on various species of *Anagrus* because of their actual or potential use as biological control agents of economically important insects. Older references to various species of *Anagrus* may well be based on completely or partly incorrect identifications, e.g., specimens identified as *A. armatus* before Chiappini *et al*. (1996) and Triapitsyn (1998, 2014c). The older references are cited under the presumed correct name where this could be determined to complete the titles and journal references, mostly those in Peck (1963) or Burks (1979). Three subgenera, *A*. (*Anagrus*), *A*. (*Anagrella*) and *A*. (*Paranagrus*), are currently recognized.

Nearctic hosts. Hemiptera: Cercopidae, Cicadellidae, Cixiidae, Delphacidae, Miridae, Tingidae. Odonata: Coenagrionidae, Lestidae.

Important references. Gordh & Dunbar (1977) keyed the Nearctic species, Chiappini *et al.* (1996) treated the Holarctic fauna, Triapitsyn (1997, 2002a) reviewed the species in America south of the United States, Triapitsyn & Beardsley (2000) treated the species of the Hawaiian Islands, Triapitsyn (2001) reviewed the species in the Australasian region, Triapitsyn (2015b) gave an annotated key and catalogue to the world fauna, and Chiappini & Lin (1998) and Li et *al.* (2018) keyed the species of China.



FIGURE 86. *Anagrus* sp., habitus. Canada, Ontario, Buckham's Bay West, 45°29'36"N 76°6'38"W, v–x.2010, J. Read. Scale bar=500 µm.

Anagrus (*Anagrus*) *armatus* (Ashmead, 1887)

Litus armatus Ashmead, 1887: 193. Holotype ♀ (USNM). **TL:** USA, Florida, Jacksonville [according to type label]. Girault, 1911 [96]: 277 (recognized as *Anagrus*, but not transferred); Peck, 1951: 415 (catalogue).

Anagrus armatus: Girault, 1911 [89]: 137 (generic transfer, description); Girault, 1916 [265a]: 39 (hosts); Fenton & Hartzell, 1923: 397 (host, percent parasitism); Girault, 1929 [428]: 9 (key); Essig, 1931: 542 (list); Britton, 1938: 146 (distribution); Thompson, 1958: 566 (hosts, distribution); Gordh & Dunbar, 1977: 86 (key), 90 (description); Burks, 1979: 1022 (catalogue); De Santis *et al*., 1988: 93 (host) [NT]; Yoshimoto, 1990: 44 (list); De Santis & Fidalgo, 1994: 121 (catalogue) [NT].

Anagrus armatus [in part]: Girault, 1911 [96]: 289 (description).
Anagrus armatus armatus: Peck, 1951: 415 (catalogue); Peck, 1963: 35 (catalogue); De Santis, 1967: 360 (catalogue) [NT].
Anagrus (*Anagrus*) *armatus*: Chiappini *et al.*, 1996: 573 (description); Triapitsyn, 2002a: 215 (key), 219 (type material, description, previous identifications mostly incorrect); Triapitsyn, 2015b: 10 (key), 27 (description, distribution).
Eustochus xanthothorax Ashmead, 1887: 193. Holotype ♀ (USNM), lost. **TL:** USA, Florida, Jacksonville (according to the published type information). Generic transfer and synonymy by Girault, 1911 [96]: 300.
Eustochus xanthothorax [misidentification (Triapitsyn 2002)]: Fletcher, 1902: 241 (host, distribution); Peck, 1951: 415 (catalogue); Peck, 1963: 35 (catalogue).

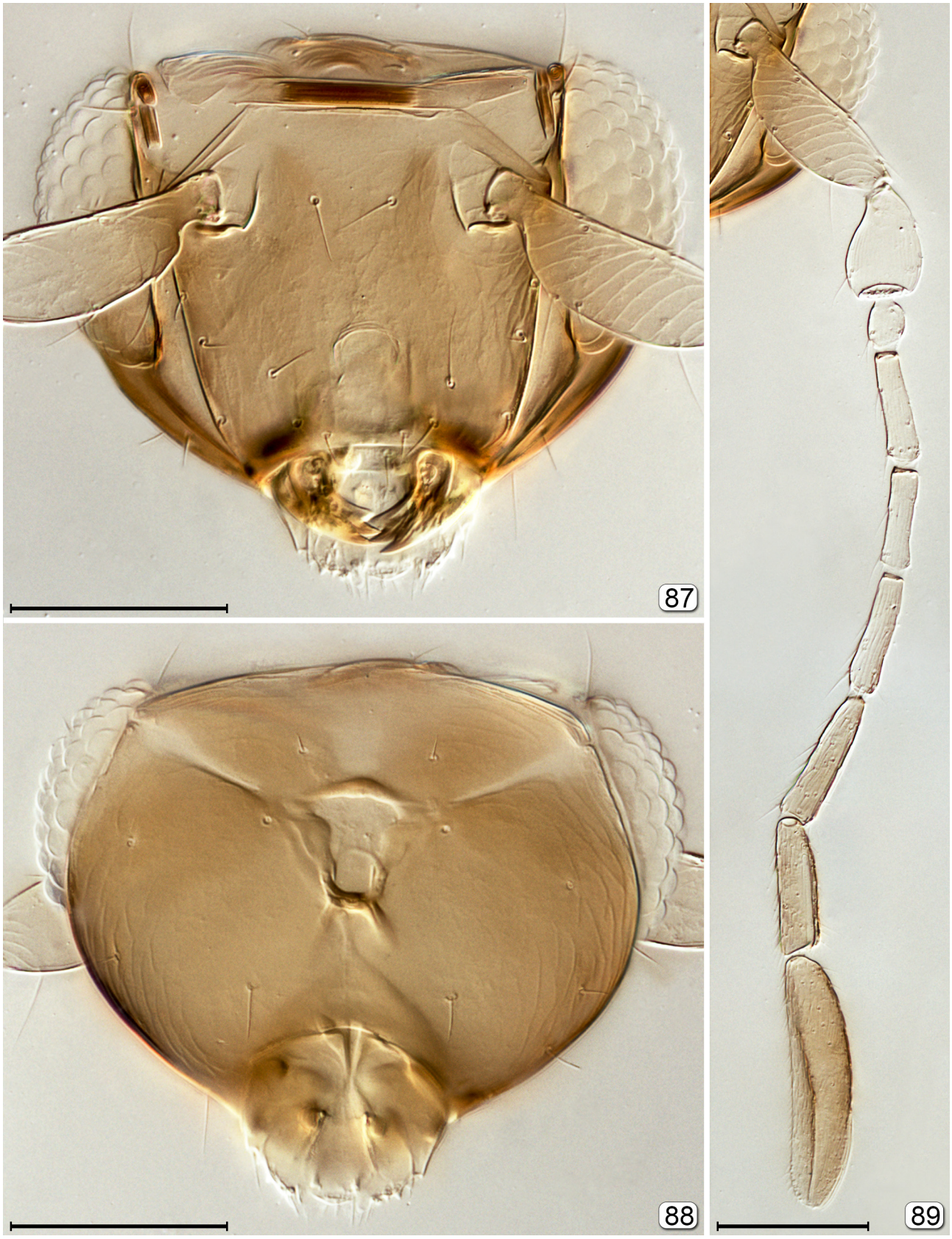
Distribution. USA: FL. Published records from other states or provinces are apparently based on incorrect identifications so are not listed here.

Anagrus (*Anagrus*) *atomus* (Linnaeus, 1767)

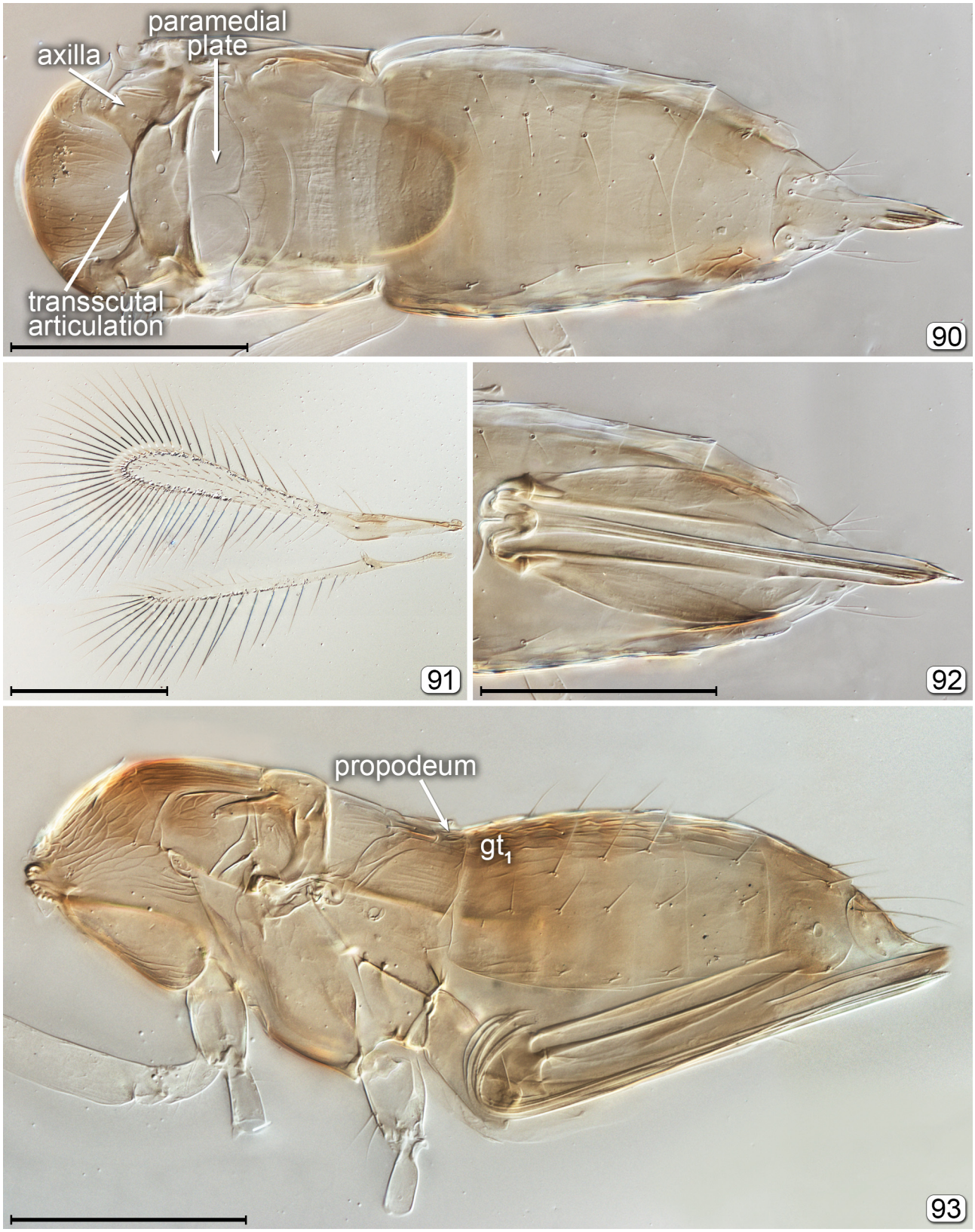
Ichneumon atomos Linné [Linnaeus], 1767: 941. Neotype ♀ (UZIU), designated by Chiappini & Triapitsyn, 2007: 2. **TL:** Sweden, Uppsala, Hågadalen.
Anagrus atomus: Curtis, 1837: 134 (generic transfer) [P]; Chiappini, 1987: 71 (morphological variation) [P]; Picotti & Pavan, 1993: 105 (population dynamics in absence of insecticides); Walker *et al*., 1997: 241 (hosts, introduction into USA) [P]; Triapitsyn, 1998: 81 (key), 82 (Nearctic distribution, hosts); Bayoun *et al*., 2000: 105 (host, sampling); Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Triapitsyn & Berezovskiy, 2004b: 4 (key), 13 (Nearctic distribution); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); Lowery *et al*., 2007: 9 (host plant associations); Prischmann *et al*., 2007: 45 (abundance, phenology); Wright & James, 2007: 19 (host plant, distribution); de León *et al*., 2008a: 99 (barcode); Wilson *et al.*, 2016: 604 (plant hosts).
Anagrus (*Anagrus*) *atomus*: Triapitsyn, 2015b: 10 (key), 19 (description, distribution, host); Triapitsyn, 2017: 10 (key), 19 (description, distribution).
Anagrus spiritus Girault, 1911 [75]: 209. Holotype ♀ (INHS). **TL:** USA, Colorado, Fort Collins. Synonymy by Triapitsyn, 2015b: 41. Girault, 1911 [87]: 148 (questionable host); Howard *in* Fernald, 1914: 39 (distribution); Felt, 1915: 187 (host, distribution); Baldwin, 1916: 13 (host [likely incorrect], distribution); Quaintance, 1916: 13 (host [likely incorrect]); Frison, 1927: 227 (type list); Girault, 1929 [428]: 9 (key, as synonym of *armatus*); Garman & Townsend, 1952: 72 (host [likely incorrect]); Peck, 1963: 35 (catalogue, under *A. armatus armatus*); Webb, 1980: 118 (holotype listed); Trjapitzin & Chiappini, 1994: 140 (comparison with *A. erythroneurae*).
Anagrus armatus [misidentification, in part?]: Girault, 1911 [96]: 289 (distribution).
Anagrus ? spiritus: Girault, 1913 [129]: 62 (host, distribution).
Anagrus (*Anagrus*) *spiritus*: Chiappini *et al*., 1996: 572 (species re-instated, description); Triapitsyn, 2017: 41 (again placed in synonymy).
Anagrus bartheli Tullgren, 1916: 8. Syntype ♀ & ♂ (depository not specified), ? lost. **TL:** Sweden, Tuscany and Umbria, localities not specified. Questionable synonymy by Graham, 1982: 199, confirmed by Chiappini, 1987: 95.
Anagrus devius Soyka, 1956a: 25. Syntype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Chiappini, 1989: 102.
Anagrus gabitzi Soyka, 1956a: 25. Lectotype ♀ (NHMW), designated by Chiappini, 1989: 103. **TL:** Poland, Wrocław [as Breslau]. Synonymy by Chiappini, 1989: 102.
Anagrus hundsheimensis Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Chiappini, 1989: 102.
Anagrus kressbachi Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Chiappini, 1989: 102.
Anagrus lemonicolor Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Poland, Wrocław [as Breslau], Domaszczyn [as Domatschine]. Synonymy by Chiappini, 1989: 102.
Anagrus levis Soyka, 1956a: 25. Lectotype ♀ (NHMW), designated by Chiappini, 1989: 103. **TL:** Austria, Krössbach. Synonymy by Chiappini, 1989: 102.
Anagrus minimus Menozzi, 1947: 38. Syntype ♀ & ♂ (depository unknown), ? lost. **TL:** Italy, locality not specified. Synonymy by Chiappini, 1987: 94.
Anagrus proscassellatii Viggiani & Jesu, 1995: 95. Holotype ♀ (DEZA). **TL:** Cape Verde Islands, S. Jorge. Synonymy by Triapitsyn, 2015b: 41.
Anagrus stammeri Soyka, 1956a: 24. Lectotype ♀ (NHMW), designated by Chiappini, 1989: 103. **TL:** Germany, Budberg, Wolfshuhlen. Synonymy by Chiappini, 1989: 103.
Anagrus tullgreni Heqvist, 1954: 272. Holotype ♀ (Swedish State Forest Research Institute, Stockholm; now in NHRS), lost; 12 paratypes (NHMUK). **TL:** Sweden, Uppland, Vallentuna. Synonymy by Graham, 1982: 200.
Anagrus varius Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Germany, Malchin, Jettchens Hof. Synonymy by Chiappini, 1989: 102.

Nearctic hosts. Cicadellidae: *Dikrella* sp., *Edwardsiana prunicola* (Edwards), *E. rosae* (L.), *Empoasca maligna* (Walsh), *Neoaliturus* (*Circulifer*) *tenellus* (Baker), *Zonocyba pomaria* (McAtee).

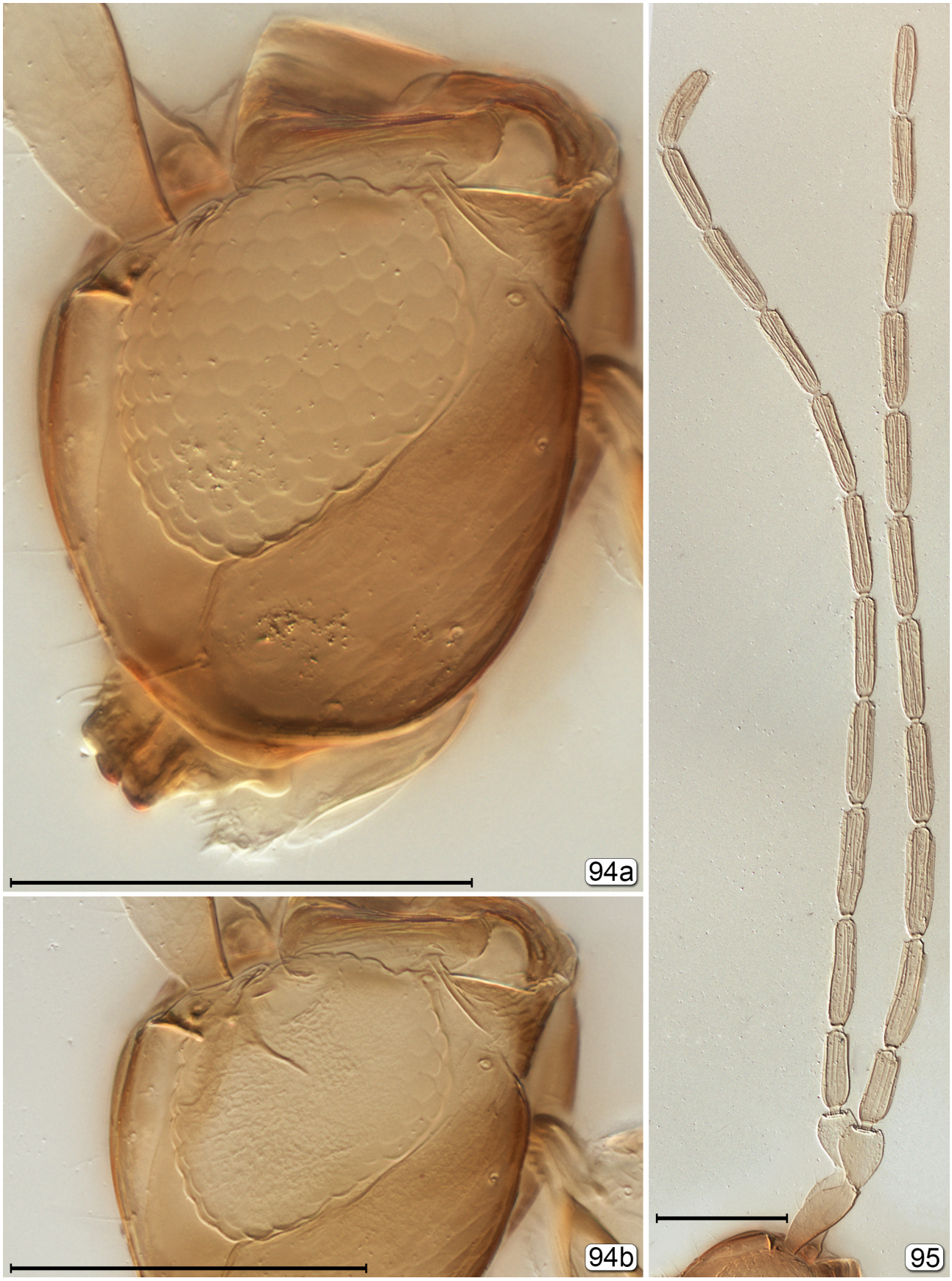
Distribution. Canada: BC, ON. USA: CA, CO, MI, NE, NY, WA.



FIGURES 87–89. *Anagrus erythroneurae* S. Trjapitzin & Chiappini. 87, head anterior; 88, head, posterior; 89, antenna. Scale bars=50 μm.



FIGURES 90–93. *Anagrus erythroneurae* S. Trjapitzin & Chiappini. 90, mesosoma + metasoma, dorsal; 91, wings; 92, metasoma showing ovipositor, dorsal; 93. Mesosoma + metasoma, lateral. Scale bars=100 μm.



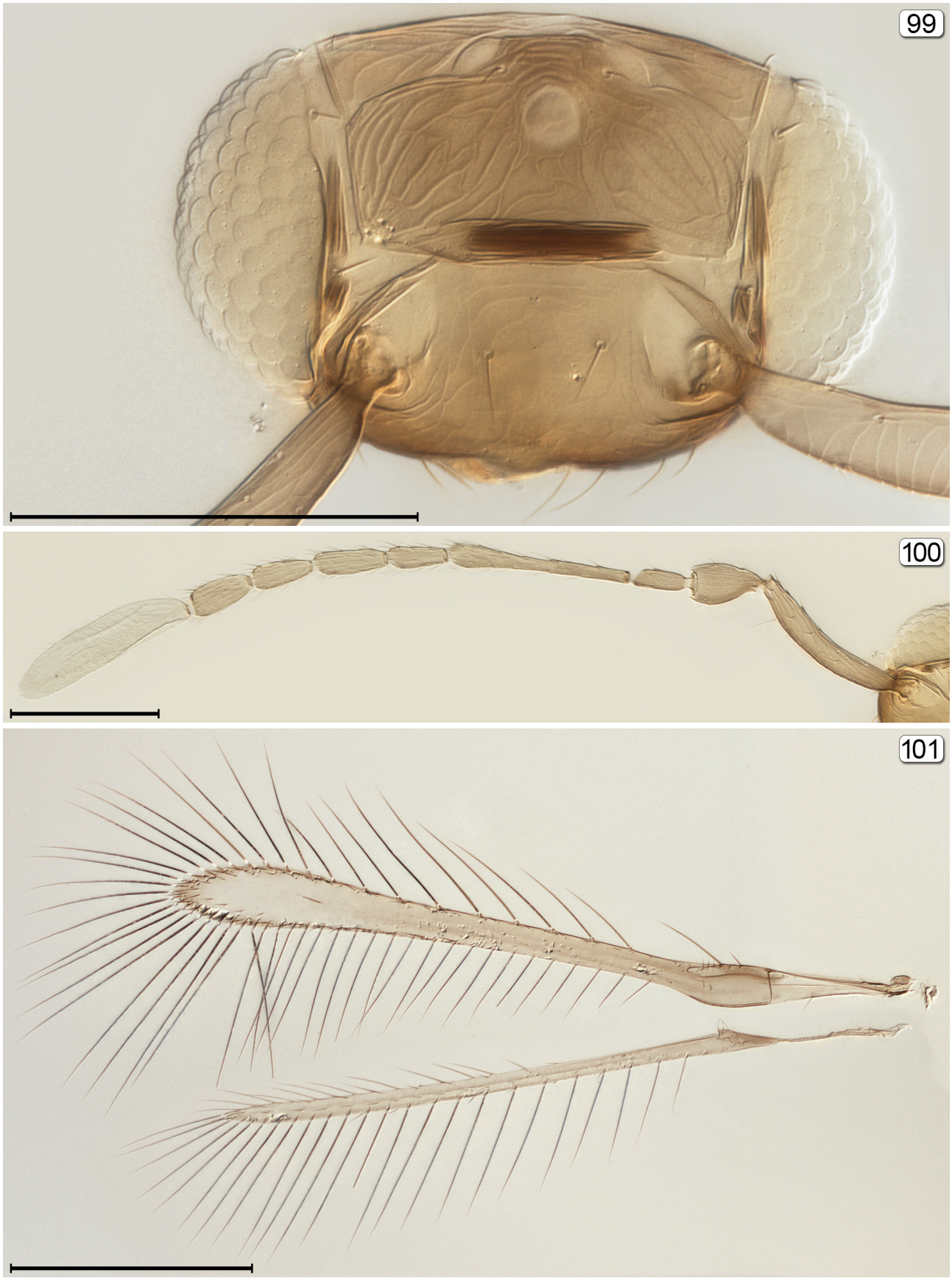
FIGURES 94, **95**. *Anagrus* sp., male (Greenland). 94a, head, lateral; 94b, head, lateral (internal) showing ocular apodeme; 95, antennae. Scale bars=100 µm.



FIGURES 96, **97**. *Anagrus* sp., male (Greenland). 96, mesosoma, lateral; 97, metasoma, lateral. Scale bars=100 µm.



FIGURE 98. *Anagrus* (*Anagrella*) *mockfordi* Triapitsyn, paratype habitus. USA, Illinois, McLean Co., Normal, 11.x.1995, E.L. Mockford. Scale bar=500 μm.



FIGURES 99–101. *Anagrus* (*Anagrella*) sp. 99, head, anterodorsal; 100, antenna; 101, wings. Scale bars: 99, 100=100 µm; 101=200 µm.



FIGURES 102, **103**. *Anagrus* (*Anagrella*) sp., mesosoma + metasoma. 102, dorsal; 103, dorsal showing ovipositor. Scale bars=100 μm.

Anagrus (*Anagrus*) *avalae* Soyka, 1956

Anagrus avalae Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Serbia, Mt. Avala (near Belgrade). Bouček, 1977: 123 (distribution) [P]; Chiappini & Triapitsyn, 1999: 120 (description, synonymies) [P]; Triapitsyn, 2000a: 218 (comparison with *A. lineolus* Triapitsyn); Viggiani, 2002: 68 (distribution) [P]; Böll & Schwappach, 2003: 176 (host) [P]; Böll & Herrmann, 2004: 33 (distribution) [P]; Böll *et al*., 2006: 175 (alternate host plant) [P]; Lowery *et al*., 2007: 9 (host plant associations); Wright & James, 2007: 21 (host plant, distribution); Dale-Skey *et al.*, 2016: 229 (checklist) [P]; Wilson *et al.*, 2016: 604 (plant hosts in CA).

Anagrus (*Anagrus*) *avalae*: Chiappini, 1989: 108 (description) [P]; Triapitsyn, 1998: 82 (key), 104 (distribution, misidentifications); Chiappini & Mazzoni, 2000: 1670 (male genitalia) [P]; Triapitsyn & Berezovskiy, 2004b: 25 (host, distribution); Triapitsyn, 2015b: 12 (key), 27 (description, distribution).

Anagrus epos Girault [misidentification (Triapitsyn 1998)]: McKenzie & Beirne, 1972: 1230 (biology); Boivin, 2010b: 14 (number of larval instars).

Anagrus armatus var. *nigriceps* Girault, 1915 [256]: 276. Lectotype ♀ (USNM), designated by Chiappini *et al*., 1996: 578. **TL:** USA, Oregon, Corvallis. Oldest available replacement name proposed by Chiappini & Triapitsyn, 1999: 120 and Triapitsyn, 1998: 104.

Anagrus armatus nigriceps: [Girault], 1916 [265a]: 39 (host); Essig, 1929: 818 (host, distribution); Girault, 1929 [428]: 9 (key); Peck, 1951: 415 (catalogue); Mulla & Madsen, 1955: 476 (host, distribution); Mulla, 1956: 438 (host, biology); Mulla, 1957: 86 (host); Peck, 1963: 36 (catalogue); Burks, 1967: 215 (catalogue).

Anagrus armatus (in part): Gordh & Dunbar, 1977: 90 (variation).

Anagrus nigriceps: Burks, 1979: 1023 (catalogue); Yoshimoto, 1990: 44 (list).
Anagrus (*Anagrus*) *oregonensis* S. Triapitsyn *in* Chiappini *et al*., 1996: 578. Unnecessary replacement name for *A. armatus* var. *nigriceps* Girault, 1915, not *A. nigriceps* Smits van Burgst, 1914. Synonymy fixed by Chiappini & Triapitsyn, 1999: 120.
Anagrus arcuatus Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Austria, Burgenland, above Bildein. Synonymy by Chiappini & Triapitsyn, 1999: 120.
Anagrus diversicornis Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy (implied) by Chiappini, 1989: 108.
Anagrus valkenburgensis Soyka, 1956a: 24. Syntype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Chiappini & Triapitsyn, 1999: 120.

Nearctic hosts. Cicadellidae: *E. prunicola* (Edwards), *Edwardsiana rosae* (L.), *Zonocyba pomaria* (McAtee).
Distribution. Canada: BC, ON. USA: CA, OR, WA.

Anagrus (*Anagrus*) *daanei* Triapitsyn, 1998

Anagrus (*Anagrus*) *daanei* Triapitsyn, 1998: 93. Holotype ♀ (USNM). **TL:** USA, California, Reedley, Smeds vineyard.
Anagrus epos: Scott, 1933: 6 [misidentification (Triapitsyn 1998)] (anatomy, biology); Doutt & Nakata, 1965: 586 [apparent misidentification in part (Trjapitzin 1995)] (biology, ecology); Doutt *et al*., 1966: 14 [apparent misidentification in part (Triapitsyn 1998)] (overwintering refuge); Jensen *et al*. 1969: 9 [misidentification in part]; McKenzie & Beirne, 1972: 1230 [apparent misidentification in part (Triapitsyn 1998), see under *avalae*] (biology); Doutt & Nakata, 1973: 382 [misidentification in part (Trjapitzin 1995)] (biology); Seyedoleslami & Croft, 1980: 625 [misidentification in part (Triapitsyn 1998) (host)]; Williams, 1984: 1 [apparent misidentification in part] (ecology); González *et al*., 1988: 25 [apparent misidentification in part] (ecology); Pickett *et al*., 1989: 552 [apparent misidentification in part] (biotype evaluation); Settle & Wilson, 1990a, 1462 [apparent misidentification in part] (parasitism rate); Settle & Wilson, 1990b: 878 [apparent misidentification in part] (behavior); Corbett *et al*., 1996: 30 [misidentification (Triapitsyn 1998)] (labelling with rubidium); De Santis & Fidalgo, 1994: 122 (catalogue) [NT]; Boivin, 1994: 237 (overwintering strategy); Corbett & Rosenheim, 1996b: 36 [misidentification (Triapitsyn 1998)] (tracking movement with fluorescent dye); Boivin, 2010b: 14 (number of larval instars).
Anagrus sp. A, near *epos*: Trjapitzin, 1995: 250 (previous misidentification, distribution).
Anagrus (*Anagrus*) *daanei*: Triapitsyn, 1998: 82 (key); Triapitsyn *et al*., 2010: 5 (key), 6 (description, distribution, hosts); Triapitsyn, 2015b: 12 (key), 30 (description, distribution).
Anagrus daanei: Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Martinson *et al*., 2001: 227 (insecticide and fungicide toxicity); James, 2005: 484 (attraction to synthetic plant volatiles); Morse & Stouthamer, 2005: 375 (collecting from host plant); Prischmann *et al*., 2005: 132 (managed and unmanaged vineyards); Morse & Stouthamer, 2006: 96 (molecular identification); Morse & Stouthamer, 2007: 95 (molecular identification); Prischmann *et al*., 2007: 43 (abundance, phenology on blackberry and wild rose; Jepsen *et al*., 2007: 600 (sulphur effect on reproduction); Wright & James, 2007: 19 (host plant, distribution); Lowery *et al*., 2007: 9 (host plant associations); Segoli & Rosenheim, 2013a: 1225 (fecundity, longevity); Segoli & Rosenheim, 2013b: 2499 (reproductive success); Segoli, 2016: 140 (density dependent parasitism); Wilson *et al.*, 2016: 602 (leafhopper and plant hosts in CA); Wilson & Triapitsyn, 2017: 53 (mention).

Nearctic hosts. Cicadellidae: ? *Dikrella* spp., *Edwardsiana rosae* (L.), *Erasmoneura variabilis* (Beamer), *Erythroneura anfracta* Beamer, *E. bistrata* McAtee, *E. comes* (Say), *E. elegantula* Osborn, *E. ziczac* Walsh, *Zonocyba pomaria* (McAtee).
Distribution. Canada: BC. USA: CA, MI, NY, WA.

Anagrus (*Anagrus*) *delicatus* Dozier, 1936

Anagrus delicatus Dozier, 1936: 177. Holotype ♀ (INHS). **TL:** USA, Illinois, near Elizabethtown. Peck, 1951: 415 (catalogue); Burks, 1958: 63 (catalogue); Peck, 1963: 37 (catalogue); Gordh & Dunbar, 1977: 86 (key), 92 (description); Burks, 1979: 1022 (catalogue); Webb, 1980: 118 (holotype listed); Yoshimoto, 1990: 44 (list).
Anagrus (*Anagrus*) *delicatus*: Chiappini *et al.*, 1996: 558 (key), 574 (description); Triapitsyn, 2015b: 10 (key), 30 (description, distribution).

Distribution. USA: IL, TX.

Anagrus (*Anagrus*) *empoascae* Dozier, 1932

Anagrus empoascae Dozier, 1932: 86. Lectotype ♀ (USNM), designated by Triapitsyn, 1997: 8. **TL**: Haiti, Damien.
Anagrus armatus nigriventris: Beyer, 1921: 24 [misidentification (Triapitsyn, 2002: 220)] (host).

Anagrus empoascae: Alayo & Hernández, 1978: 50 (host) [NT]; De Santis, 1989: 71 (catalogue) [NT]; Yoshimoto, 1990: 44 (list); Triapitsyn, 1997: 2 (key), 8 (description); Triapitsyn, 1998: 102 (comparison with *A. epos*); Triapitsyn, 2002a: 215 (key), 220 (distribution); Luft Albarracin *et al.*, 2009: 5 (list) [NT].

Anagrus (*Anagrus*) *empoascae*: Triapitsyn & Beardsley, 2000: 27 (key), 40 (distribution) [A]; Triapitsyn, 2015b: 12 (key), 30 (description, distribution).

Nearctic hosts. Cicadellidae: ? *Empoasca erigeron* DeLong. Miridae: *Halticus bractatus* (Say).

Distribution. USA: DE, FL, LA, SC.

Anagrus (*Anagrus*) *epos* Girault, 1911

Anagrus epos Girault, 1911 [96]: 292. Lectotype ♀ (INHS), designated by Frison, 1927: 227. **TL:** USA, Illinois, Centralia. Ackerman, 1919: 28 (hosts, distribution, economics) [likely misidentification of *A. atomus* (Triapitsyn 1998)]; Girault, 1929 [428]: 9 (key); Ackerman & Isely, 1931: 33 (host, distribution); McConnell, 1931: 561 (host, distribution); Moulton, 1932: 749 (host, distribution); Gould & Geissler, 1940: 815 (host, distribution); Brimley, 1942: 34 (list); Cox, 1942: 700 (host, distribution); Jones *et al*., 1946: 772 (effect of DDT, distribution); Peck, 1951, 415 (catalogue); Mulla & Madsen, 1955: 476 (host, distribution); Mulla, 1957: 86 (host); Thompson, 1958: 567 (host catalogue); Peck, 1963: 37 (catalogue); Burks, 1967: 215 (catalogue); Madsen & Morgan, 1975: 13 (host, distribution); Gordh & Dunbar, 1977: 86 (key), 92 (description); Flaherty *et al*., 1978: 17 (integrated control); Burks, 1979: 1022 (catalogue); Kido, 1980: 25 (alternative host); Webb, 1980: 118 (lectotype listed); Kido *et al*., 1983: 4 (host, biological control); Kido *et al*., 1984: 31 (host, biological control); Settle *et al*., 1986: 31 (biological control); Davidson & Lyon, 1987: 483 (host); Meyerdirk & Moratorio, 1987b: 362 (percent parasitism); Wells *et al*., 1988: 45 (biological control); Cerutti & Delucchi, 1989: 247 (mention); Cerutti *et al.*, 1989: 254 (mention); Pitcairn *et al*., 1990: 2372 (searching efficiency); Settle & Wilson, 1990a: 1462 (parasitism, competition); Settle & Wilson, 1990b: 878 (behavior, differential parasitism); Yoshimoto, 1990: 44 (list); Boivin, 1994: 222 (overwintering strategy); Trjapitzin, 1995: 250 (= sp. A and B) [previous misidentifications discussed; see under *A. daanei* and *A. erythroneurae*, respectively, and under *A. avalae*]; Corbett & Rosenheim, 1996a: 156 (overwintering refuges); Murphy *et al*., 1996: 495 (abundance in vineyards); Zimmerman *et al*., 1996: 344 (percent parasitism, distribution) [probably a misidentification of *A. vulneratus* Triapitsyn (Triapitsyn *et al*. (2010)]; Triapitsyn, 1998: 82 (key), 100 (description, hosts, distribution); Murphy *et al*., 1998: 227 (habitat diversification); Nicholls *et al*., 2000: 109 (abundance); Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Martinson *et al*., 2001: 227 (insecticide and fungicide toxicity); Nicholls *et al*., 2001: 134 (distribution, abundance); Hambäck & Björkman, 2002: 1593 (effect on host competition); Hoddle & Triapitsyn, 2004b: 343 (host and factitious host); Morse, 2005: 371 (laboratory culture and release); Morse & Stouthamer, 2005: 373 (host, quarantine rearing); Triapitsyn, 2005: 392 (key); Morse, 2006: 92 (laboratory culture and release); Morse & Stouthamer, 2006: 95 (molecular identification); Triapitsyn, 2006: 4 (key), 7 (description, hosts, lab. rearing); Bernal *et al*., 2007: 67 (importation from MN); Morse & Stouthamer, 2007: 94 (molecular identification); Krugner *et al*., 2008b: 440 (host specificity); Krugner *et al*., 2009: 122 (laboratory production); Triapitsyn, 2011b: 17 (mention); Triapitsyn, 2013c: 293 (host, poor success in biocontrol); Daane *et al.*, 2018: 198 (overwintering habitats).

Anagrus epos "Minnesota strain": Morse & Stouthamer, 2005: 373 (hosts).

Anagrus (*Anagrus*) *epos*: Chiappini *et al.*, 1996: 558 (key), 576 (description); Triapitsyn *et al.*, 2010: 5 (key), 9 (description, distribution, hosts); Triapitsyn, 2015b: 12 (key), 31 (description, distribution).

Nearctic hosts. Cicadellidae: *Cuerna fenestella* Hamilton, *Erythroneura comes* (Say) [needs verification (Triapitsyn *et al*. (2010)], *Homalodisca vitripennis* (Germar) [factitious host, laboratory rearing].

Distribution. USA: CA [introduced but not established], IL, KY?, MD?, MI?, MN, NC?, NM?, NY, PA?, VA?

Anagrus (*Anagrus*) *erythroneurae* S. Trjapitzin & Chiappini, 1994

Anagrus erythroneurae S. Trjapitzin & Chiappini, 1994: 137. Holotype ♀ (USNM). **TL:** USA, California, Riverside Co., Coachella. Corbett & Rosenheim, 1996a: 156 (overwintering refuges); Triapitsyn, 2000a: 214 (comparison with *A. ustulatus* Haliday); Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Martinson *et al*., 2001: 227 (insecticide and fungicide toxicity); Triapitsyn, 2001: 276 (comparison with extralimital species); Morse & Stouthamer, 2005: 375 (distribution); Prischmann *et al*., 2005: 132 (managed and unmanaged vineyards); Riddick, 2005a: 63 (ovigeny index); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 56 (molecular species boundaries); Morse & Stouthamer, 2006: 96 (molecular identification); Jepsen *et al*., 2007: 722 (effect of sulphur on biocontrol); Lowery *et al*., 2007: 11 (host plant associations); Prischmann *et al*., 2007: 43 (abundance, phenology on blackberry and wild rose); Jepsen *et al*., 2007: 600 (sulphur effect on reproduction); Lowery *et al.*, 2007: 9 (host plant, distribution); Morse & Stouthamer, 2007: 95 (molecular identification); Wright & James, 2007: 19 (host plant, distribution); de León *et al*., 2008a: 99 (barcode); de León *et al*., 2008b: 20 (molecular, morphometric analysis); Segoli &

Rosenheim, 2013b: 2499 (reproductive success); Segoli, 2016: 140 (density dependent parasitism); Wilson *et al*., 2016: 602 (leafhopper and plant hosts in CA); Wilson & Triapitsyn, 2017: 53 (mention).

Anagrus epos biotype: Pickett *et al*., 1987: 15 (biological control); González, 1988: 476 (biological control); Pickett *et al*., 1989: 554 (biological control).

Anagrus sp. B: Trjapitzin, 1995: 250 (previously misidentifications, as *epos* in part).

Anagrus epos: Martinson & Dennehy, 1995: 557 (misidentification, host, distribution).

Anagrus (*Anagrus*) *erythroneurae*: Chiappini *et al*., 1996: 558 (key), 570 (description); Triapitsyn, 1998: 81 (key), 84 (hosts, distribution); Triapitsyn, 2015b: 10 (key), 21 (description, distribution).

Nearctic hosts. Cicadellidae: *Dikrella cockerelli* (Gillette), *D*. spp. [most probably including *D*. *californica* (Lawson) and *D*. *cruentata* (Gillette)], *Edwardsiana prunicola* (Edwards), *Erasmoneura variabilis* (Beamer), *Erythroneura bistrata* McAtee, *E*. *comes* (Say), *E*. *elegantula* Osborn, *Zonocyba pomaria* (McAtee).

Distribution. Canada: BC. USA: CA, MN, NM, NY, WA.

Anagrus (*Anagrus*) *flaveolus* Waterhouse, 1913

Anagrus flaveolus Waterhouse, 1913: 87. Holotype ♀ (NHMUK). **TL:** Trinidad and Tobago, Trinidad Island.

Anagrus (*Anagrus*) *flaveolus*: Triapitsyn, 2002a: 215 (key), 220 (host, distribution) [NT]; Triapitsyn, 2015b: 14 (key), 32 (description, distribution).

Nearctic hosts. Delphacidae: *Saccharosydne saccharivora* (Westwood).

Distribution. Canada: BC. USA: AZ, CA, FL.

Anagrus (*Anagrus*) *incarnatus* Haliday, 1833

Anagrus incarnatus Haliday, 1833b: 347. Lectotype ♀ (NMID), designated by Graham, 1982: 200. **TL:** unknown, possibly UK, England.

Anagrus armatus Girault, 1911 [96]: 289 [misidentification, in part?] (distribution)

Anagrus (*Anagrus*) *incarnatus*: Triapitsyn & Berezovskiy, 2004b: 18 (distribution); Triapitsyn *et al*., 2018: 2802 (synonyms, redescription, distribution, hosts, genetic analysis); Triapitsyn *et al*., 2019, 90 (synonyms, description, distribution, hosts morphometry, genetic analysis).

Anagrus columbi Perkins, 1905: 198. Lectotype ♀ (BPBM), designated by Triapitsyn & Beardsley, 2000: 34. **TL:** USA, Ohio, Columbus. Synonymy by Triapitsyn *et al*., 2018: 2802. Girault, 1907 [27]: 31 (host); Girault, 1911 [96]: 289 (synonymy under *armatus*); Girault, 1912 [112]: 298 (type examined); Waterhouse, 1913: 88 (comparison with extralimital species) [NT]; Dozier, 1936: 176 (comparison with *A*. *armatus*, distribution); Peck, 1951: 415 (catalogue, under *A*. *armatus armatus*); Peck, 1963: 35 (catalogue, under *A*. *armatus armatus*); Cronin, 2003a: 1507 (host-parasitoid interactions); Cronin, 2003b: 284 (oviposition behavior); Cronin, 2004: 504 (local extinction/colonization); Cronin & Haynes, 2004: 2774 (host-parasitoid dynamics); Cronin, 2007a: 2978 (parasitism rate); Cronin, 2007b: 115 (movement, establishment success); Cronin & Wilson, 2007: 644 (host).

Anagrus (*Anagrus*) *columbi*: Chiappini *et al*., 1996: 560 (key), 579 (description); Triapitsyn, 2015b: 12 (key), 28 (description, distribution).

Anagrus breviphragma Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** unknown—not specified (Chiappini, 1989). Synonymy by Triapitsyn, 2015a: 216.

Anagrus danicus Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Denmark, near Copenhagen. Synonymy by Triapitsyn, 1997: 8 and Triapitsyn *et al*., 2018: 2802 (Triapitsyn, 2015a: 216–217 reinstated the previous synonymy under *A*. *incarnatosimilis* by Chiappini, 1989: 113).

Anagrus incarnatosimilis Soyka, 1956a: 25 (in key). Lectotype ♀ (NHMW), designated by Triapitsyn, 2015a: 217. **TL:** Austria, Lower Austria, Hundsheim. Synonymy by Triapitsyn, 1997: 7 and Triapitsyn *et al*., 2018: 2802 (Triapitsyn 2015a: 216 reinstated it as a valid taxon).

Anagrus longigaster Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Chiappini, 1989: 105 (under *A*. *breviphragma*) and Triapitsyn, 2015a: 216 (under *A*. *incarnatus*).

Anagrus mutans I. Walker, 1979: 199. Holotype ♀ (NHMUK). **TL:** UK, England, Sunninghill, Silwood Park, Imperial College Field Station. Synonymy by Triapitsyn, 1997: 8 and Triapitsyn *et al*., 2018: 2803 (Triapitsyn, 2015a: 217 reinstated the previous synonymy under *A*. *incarnatosimilis* by Chiappini, 1989: 113).

Anagrus neopallidus Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Chiappini 1989: 112 and Triapitsyn *et al*., 2018: 2802 (from the synonymy under *A*. *incarnatosimilis* by Triapitsyn 2015a: 217).

Anagrus nilaparvatae Pang & Wang, 1985: 176. Holotype ♀ (SCAC). **TL:** China, Guangdong, Wushan (Fuoshan). Synonymy by Triapitsyn *et al*., 2018: 2803.

Anagrus ovipositor Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Germany, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Chiappini, 1989: 105 (under *A*. *breviphragma*) and Triapitsyn, 2015a: 216 (under *A*. *incarnatus*).

Anagrus pallidior Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Chiappini 1989: 112 and Triapitsyn *et al.*, 2018: 2802 (from the synonymy under *A. incarnatosimilis* by Triapitsyn 2015a: 217).

Anagrus pulcher Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Poland, Domaszczyn (Triapitsyn, 2015a). Synonymy by Triapitsyn, 1997: 7 and Triapitsyn *et al.*, 2018: 2802 (Triapitsyn, 2015a: 217 reinstated the previous synonymy under *A. incarnatosimilis* Soyka by Chiappini, 1989: 113).

Anagrus pulcherrimus Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 1997: 7 and Triapitsyn *et al.*, 2018: 2802 (Triapitsyn, 2015a: 217 reinstated the previous synonymy under *A. incarnatosimilis* by Chiappini, 1989: 113).

Anagrus silwoodensis I. Walker, 1979: 199. Holotype ♀ (NHMUK). **TL:** UK, England, Sunninghill, Silwood Park, Imperial College Field Station. Synonymy by Chiappini, 1989: 105 (under *A. breviphragma*) and Triapitsyn, 2015a: 216 (under *A. incarnatus*).

Anagrus stenocrani I. Walker, 1979: 198. Holotype ♀ (NHMUK). **TL:** UK, England, Sunninghill, Silwood Park, Imperial College Field Station. Synonymy by Triapitsyn, 1997: 8 and Triapitsyn *et al.*, 2018: 2803 (Triapitsyn, 2015a: 217 reinstated the previous tentative synonymy under *A. incarnatosimilis* by Chiappini, 1989: 113).

Anagrus supremus Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Chiappini, 1989: 105 (under *A. breviphragma* Soyka) and Triapitsyn, 2015b: 216.

Anagrus vacuipennis Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Chiappini, 1989: 105 (under *A. breviphragma*) and Triapitsyn, 2015a: 216 (under *A. incarnatus*).

Anagrus varicolor Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 1997: 7 and Triapitsyn *et al.*, 2018: 2802 (Triapitsyn, 2015a: 217 reinstated the previous synonymy under *A. incarnatosimilis* by Chiappini, 1989: 113).

Nearctic hosts. Cicadellidae: *Macrosteles divisus* (Uhler). Delphacidae: "*Liburnia*" sp., *Prokelisia crocea* (Van Duzee), *Prokelisia* sp.

Distribution. Canada: SK. USA: AZ, CA, CO, IL, MN, ND, OH, PA, WY.

Anagrus (*Anagrus*) *lineolus* Triapitsyn, 2000

Anagrus (*Anagrus*) *lineolus* Triapitsyn, 2000a: 218. Holotype ♀ (MLPA). **TL:** Argentina, Misiones, Loreto. Triapitsyn, 2002a: 215 (key), 218 (distribution) [NT]; Triapitsyn, 2015b: 12 (key), 34 (description, distribution).

Anagrus lineolus: Luft Albarracin *et al.*, 2009: 5 (list) [NT].

Distribution. USA: FL.

Anagrus (*Anagrella*) *mockfordi* Triapitsyn, 2000

Anagrus (*Anagrella*) *mockfordi* Triapitsyn, 2000b: 296. Holotype ♀ (CNC). **TL:** USA, Illinois, Normal. Triapitsyn, 2015b: 8 (key), 16 (distribution, possible host).

Nearctic hosts. Possibly Lepidopsocidae: *Echmepteryx hageni* (Packard).

Distribution. USA: IL.

Anagrus (*Anagrus*) *nigriceps* (Smits van Burgst, 1914)

Litus nigriceps Smits van Burgst, 1914: 125. Lectotype ♀ (WAUE), designated by Graham, 1982: 201. **TL:** Netherlands, Wageningen.

Anagrus (*Anagrus*) *nigriceps*: Triapitsyn & Berezovskiy, 2004b: 24 (distribution).

Anagrus dilatatus Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Netherlands, Limburg, Valkenburg. Synonymy by Triapitsyn, 2015b: 43.

Anagrus holci I. Walker, 1979: 198. Holotype ♀ (NHMUK). **TL:** UK, England, Berkshire, Ascot, Sunninghill, Silwood Park, Imperial College Field Station. Synonymy by Chiappini, 1989: 105 (under *A. similis*) and Triapitsyn, 2015b: 43.

Anagrus longus Soyka, 1956a: 25 (in key). Syntype ♀ (NHMW). **TL:** Austria, Tyrol, Gschnitztal. Synonymy by Chiappini, 1989: 110 (under *A. obvius* Soyka) and Triapitsyn, 2015b: 43.

Anagrus obvius Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Austria, Tyrol, Krössbach. Synonymy by Triapitsyn, 2015b: 43.

Anagrus similis Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Germany, Malchin, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Triapitsyn, 2015b: 43.

Distribution. USA: NY.

Anagrus (*Anagrus*) *nigriventris* Girault, 1911

Anagrus armatus nigriventris Girault, 1911 [96]: 291. Lectotype ♀ (INHS), designated by Frison, 1927: 226. **TL:** USA, Illinois, Centralia. Girault, 1915 [256]: 276 (comparison with *A. armatus nigriceps* and typical *A. armatus*); Girault, 1915 [261]: 6 (distribution); Ackerman, 1919: 28 (hosts, distribution, economics) [likely misidentification in part of *avalae* (Triapitsyn (1998)]; Girault, 1929 [428]: 9 (key); Peck, 1951: 415 (catalogue); Peck, 1963: 35 (catalogue); Webb, 1980: 118 (lectotype listed); Bin, 1994: 148 (misidentification, host).

Anagrus armatus Girault, 1911 [96]: 289 (distribution) [misidentification, in part?].

Anagrus armatus var. *nigriventris*: Girault, 1911 [89]: 137 (description); Girault, 1913 [129]: 63 (comparison with *A. spiritus*); Ackerman & Isely, 1931: 33 (distribution, host); Armstrong, 1936: 17 (biology, host, distribution) [misidentification in part (Triapitsyn 1998)]; Steiner, 1936: 632 (host, distribution); Steiner, 1938a: 233 (biology, spray effect, distribution, host); Steiner, 1938b: 23 (biology, percent parasitism, host); Meyerdirk & Moratorio, 1987b: 362 (percent parasitism); Knight *et al.*, 1991: 1662 (percent parasitism).

Anagrus armatus nigricentris [*sic*]: Thompson, 1958: 566 (host catalogue).

Anagrus nigrieventris [*sic*]: Burks, 1979: 1023 (change in status, catalogue).

Anagrus nigriventris: Yoshimoto, 1990: 44 (list); Honda & Walker, 1996: 4 (olfactory response to plant volatiles); Walker *et al*., 1997: 238 (host); Beardsley, 1998: 45 (distribution, host) [A]; Triapitsyn & Moratorio, 1998: 185 (hosts, distribution, laboratory rearing); Al-Wahaibi & Walker, 2000a: 140 (oviposition behavior); Al-Wahaibi & Walker, 2000b: 10 (searching, oviposition behavior); Lovinger *et al*., 2000: 188 (searching behavior); Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Bayoun & Walker, 2003: 176 (sampling); Morse & Stouthamer, 2005: 375 (mention); Luft Albarracin *et al*., 2006: 285 (host, percent parasitism) [NT]; Morse & Stouthamer, 2006: 97 (molecular identification); Cronin, 2007a: 2978 (parasitism rate); Cronin, 2007b: 115 (movement, establishment success); Cronin & Wilson, 2007: 64 (host); Morse & Stouthamer, 2007: 95 (molecular identification); Wright & James, 2007: 19 (host plant); Bayoun *et al*., 2008: 415 (host, distribution); Triapitsyn *et al*., 2008b: 681 (mention) [NT]; Cronin, 2009a: 197 (host, dispersion, percent parasitism); Cronin, 2009b: 115 (host, dispersion, oviposition behavior); Luft Albarracin *et al*., 2009: 6 (list) [NT]; Wilson *et al.*, 2016: 604 (plant hosts).

Anagrus (*Anagrus*) *nigriventris*: Chiappini *et al*., 1996: 561 (key), 581 (description); Triapitsyn, 1997: 2 (key), 9 (description); Triapitsyn, 1998: 82 (key), 99 (hosts, distribution); Triapitsyn, 2000a: 214 (key), 219 (distribution) [NT]; Triapitsyn & Beardsley, 2000: 27 (key), 44 (distribution) [A]; Triapitsyn, 2002d, 215 (key), 222 (distribution) [NT]; Triapitsyn, 2015b: 14 (key), 35 (description, distribution).

Anagrus giraulti Crawford, 1913: 259. Holotype ♀ (USNM). **TL:** USA, California, El Monte. Synonymy by Chiappini *et al*., 1996: 581. Girault, 1915 [256]: 276 (comparison with *A. armatus nigriventris*); Stahl, 1920: 250 (host, larval/pupal colour, distribution); Henderson, 1941: 2 (rearing technique, distribution); Peck, 1951: 415 (catalogue); Fattig, 1955: 10 (distribution, host); Thompson, 1958: 567 (host catalogue); Turner & Pollard, 1959: 26 (economics, distribution, host); Flock *et al.*, 1962: 277 (host, seasonal abundance); Peck, 1963: 37 (catalogue); Burks, 1967: 215 (catalog); Herting, 1972: 14, 21 (host catalogue); Moffitt & Reynolds, 1972: 288 (host, biological control); Gordh & Dunbar, 1977: 86 (key), 92 (description); Burks, 1979: 1023 (catalogue); Meyerdirk & Hessein, 1985: 352 (host, relative abundance); Davidson & Lyon, 1987: 319 (host); Meyerdirk & Moratorio, 1987a: 272 (host, biology); Meyerdirk & Moratorio, 1987b: 362 (seasonal population density); Meyerdirk & Moratorio, 1987c: 443 (fecundity and longevity); Meyerdirk & Moratorio, 1987d: 909 (morphometrics); Yoshimoto, 1990: 44 (list); Boivin, 1994: 221 (overwintering strategy); Nénon *et al*., 1995: 997 (larval morphology); Chiappini *et al*., 1996: 581 (synonymy under *nigriventris*); Riddick, 2005a: 63 (ovigeny index); Boivin, 2010b: 14 (number of larval instars).

Anagrus armatus giraulti: Girault, 1929 [428]: 9 (key).

Nearctic hosts. Cicadellidae: *Aceratagallia* spp., *Empoasca* spp. including *E. fabae* (Harris), *Erythroneura comes* (Say), *Neoaliturus* (*Circulifer*) *tenellus* (Baker), *Scaphytopius nitridus* (DeLong). Delphacidae: *Delphacodes scolochloa* Cronin & Wilson. Miridae: *Pycnoderes quadrimaculatus* Guérin-Méneville.

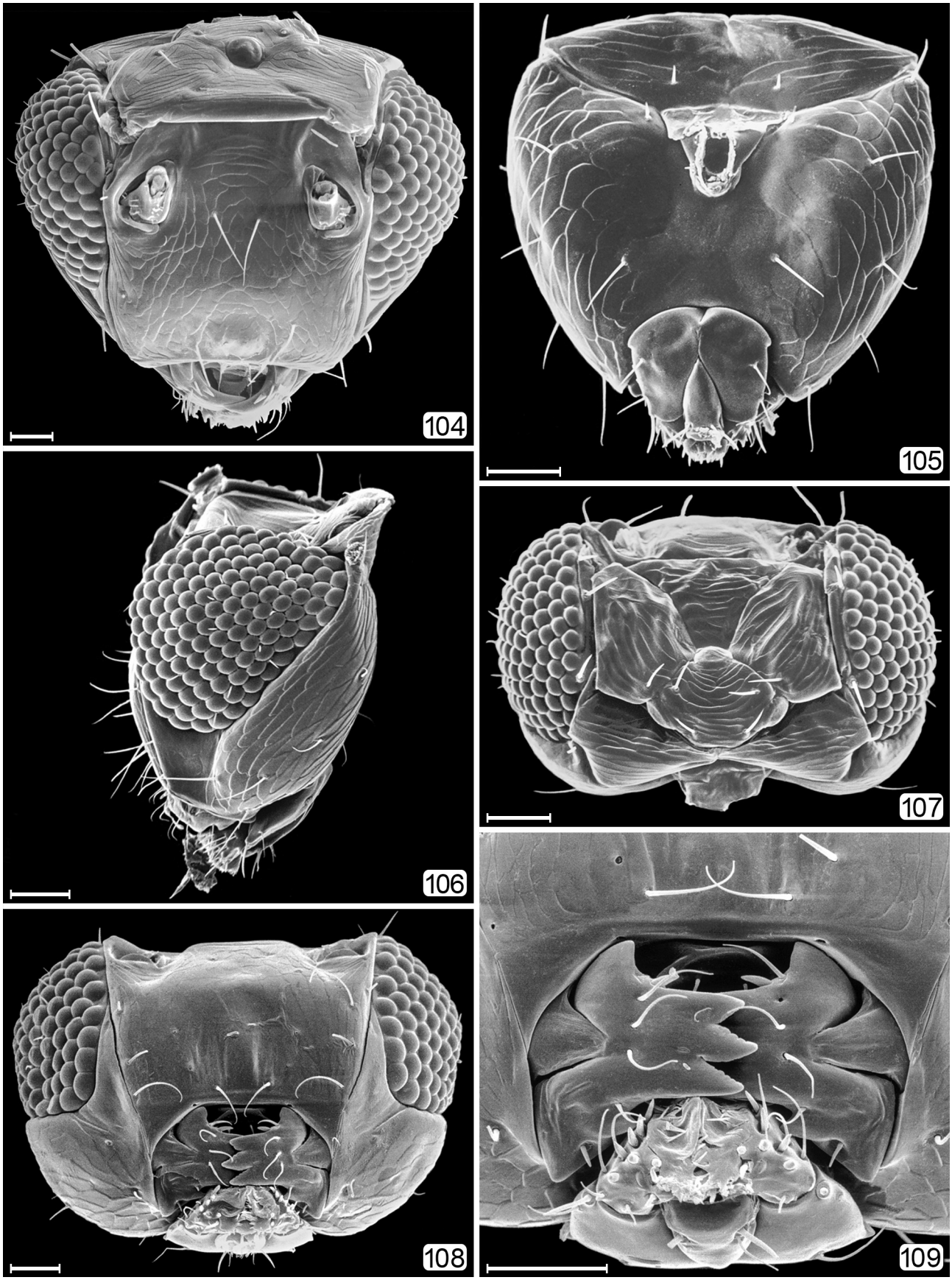
Distribution. Canada: ON. USA: AZ, CA, DE, GA, IL, IN, LA, MD, NM, NY, OH, PA, TX, UT.

Anagrus (*Anagrus*) *puella* Girault, 1911

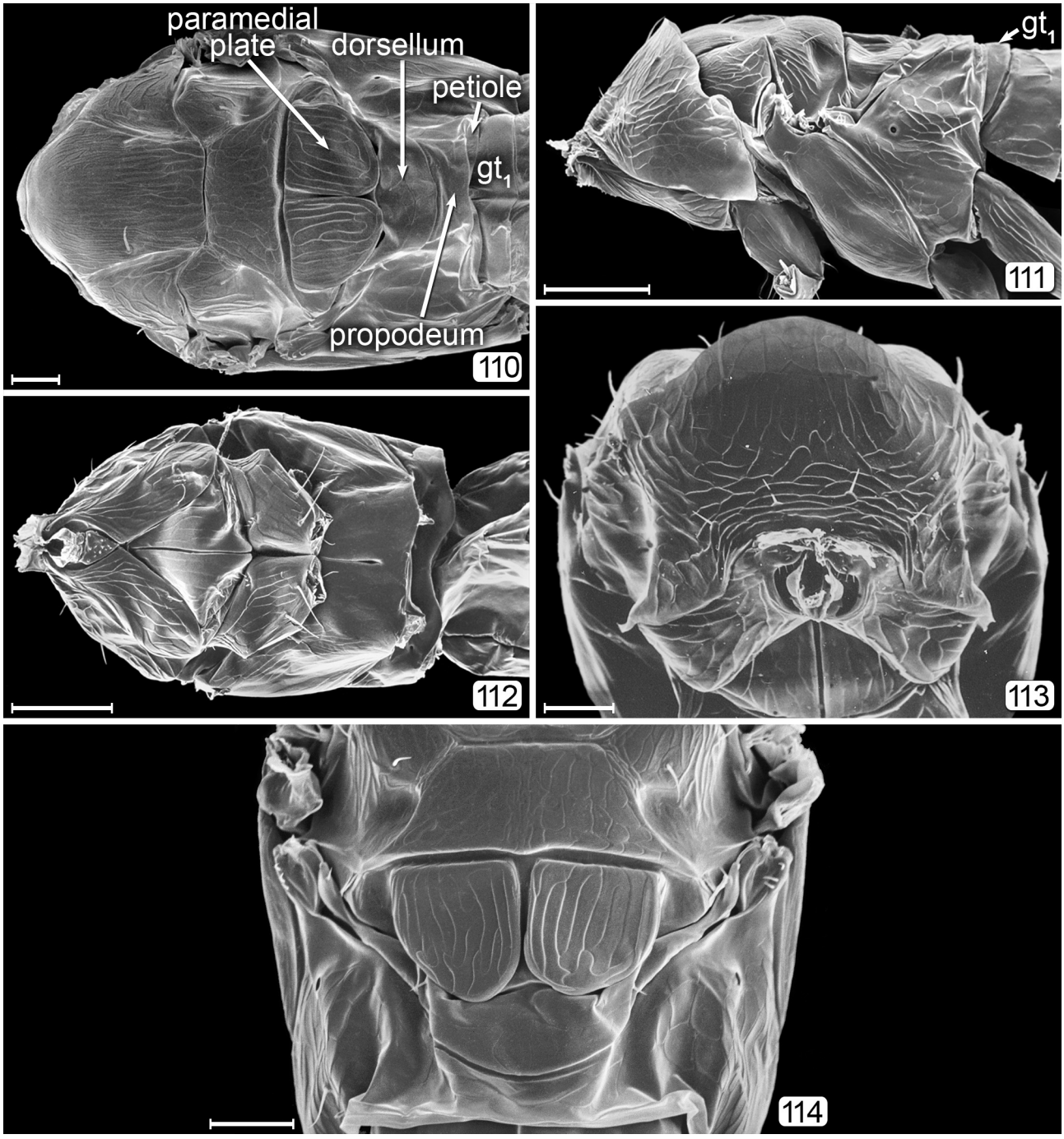
Anagrus puella Girault, 1911 [96]: 193. Holotype ♀ (INHS), lost. **TL:** USA, Illinois, Pulaski. Girault, 1929 [428]: 9 (key); Peck, 1951: 415 (catalogue); Peck, 1963: 38 (catalogue); Gordh & Dunbar, 1977: 86 (key), 94 (description); Burks, 1979: 1023 (catalogue); Yoshimoto, 1990: 44 (list).

Anagrus (*Anagrus*) *puella*: Chiappini *et al*., 1996: 580 (description); Triapitsyn, 2015b: 12 (key), 36 (description, distribution).

Distribution. Canada: AB. USA: CA, KY, NV.



FIGURES 104–109. *Anagrus* sp., head. 104, anterior; 105, posterior; 106, lateral; 107, dorsal; 108, ventral, 109, mouthparts. Scale bars=20 μm.



FIGURES 110–114. *Anagrus* sp., mesosoma. 110, dorsal; 111, lateral; 112, ventral; 113, anterior; 114, scutellum–propodeum. Scale bars: 110, 113, 114=20 μm; 111, 112=50 μm.

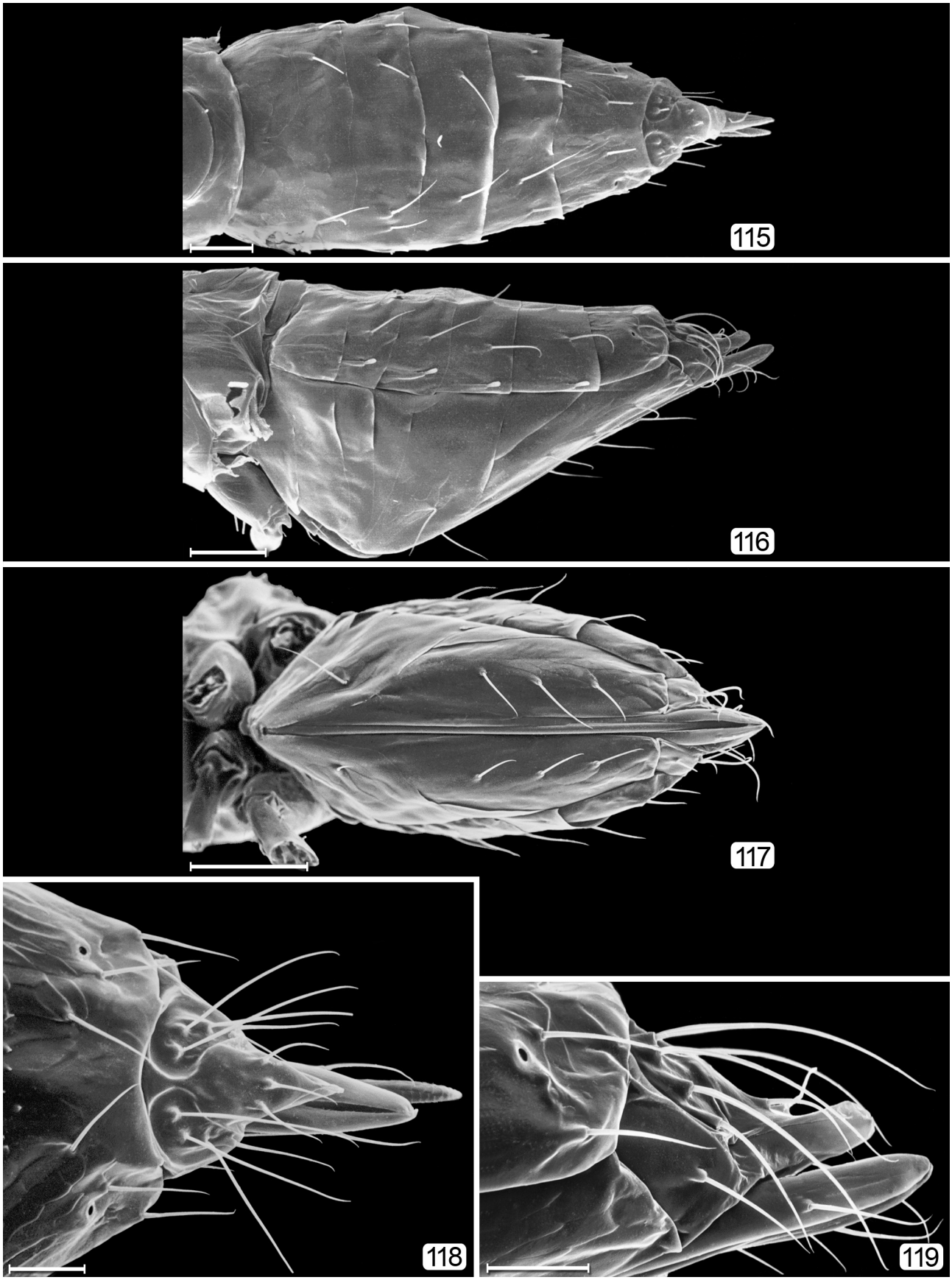
Anagrus (*Anagrus*) *putnamii* (Packard, 1864)

Pteratomus putnamii Packard, 1864: 137. Holotype ♂ (USNM), lost. **TL:** USA, Vermont, Bridgeport. Peck, 1963: 896 (unplaced genus).

Anagrus putnamii: Burks, 1967: 215 (generic transfer); Burks, 1979: 1023 (catalogue, distribution); Yoshimoto, 1990: 44 (list); Chiappini *et al*., 1996: 587 (discussion).

Anagrus (*Anagrus*) *putnamii*: Triapitsyn, 2015b: 44 (*nomen dubium*).

Distribution. USA: VT.



FIGURES 115–119. *Anagrus* sp., metasoma. 115, dorsal; 116, lateral; 117, ventral; 118, apex of gaster, dorsal; 119, apex of gaster, lateral. Scale bars: 115–117=50 μm; 118, 119=20 μm.

Anagrus (*Anagrus*) *raygilli* Triapitsyn, 2000

Anagrus raygilli Triapitsyn, 2000c: 90. Holotype ♀ (USNM). **TL:** Guatemala, Sacatepéquez, Chyllá. Triapitsyn, 2002a: 215 (key), 220 (Nearctic distribution).
Anagrus takeyanus: Triapitsyn, 1997 [misidentification]: 2 (key), 4 (distribution).
Anagrus (*Anagrus*) *raygilli*: Triapitsyn, 2015b: 12 (key), 37 (description, distribution).

Distribution. USA: FL.

Anagrus (*Anagrus*) *sophiae* S. Trjapitzin, 1995

Anagrus sophiae S. Trjapitzin *in* Trjapitzin & Strong, 1995: 200. Holotype ♀ (USNM). **TL:** USA, Florida, Walkulla Co., Oyster Bay. Knell, 1998: 188 (generation cycles); Bowdish & Stiling, 1998: 401 (parasitism rates); Rosenheim, 1999a: 379 (reproduction cost); Rosenheim, 1999b: 145 (oviposition cost); Cronin & Strong, 1999: 24 (dispersal-dependent oviposition); Stiling & Bowdish, 2000: 281 (plant clone effects); Moon & Stiling, 2002: 244 (host, effect of plant quality); Cronin, 2003b: 284 (oviposition behavior); Riddick, 2005a: 63 (ovigenic index); Segoli *et al*., 2013: 2717 (effect of *Wolbachia*, reproductive success); Segoli & Rosenheim, 2015: 483 (oviposition success).
Anagrus sp.: Stiling & Strong, 1982a: 192 (biology).
Anagrus delicatus: Stiling & Strong, 1982b: 1630 [misidentification] (parasitism intensity); Antolin & Strong, 1987: 288 (long distance dispersal); Mesterton-Gibbons, 1988: 376 (dispersal modelling); Strong, 1989: 1066 (percent parasitism); Cronin & Strong, 1990a: 846 (ecology); Cronin & Strong, 1990b: 1020 (percent parasitism); Stiling *et al*., 1991: 2144 (density dependence); Cronin & Strong, 1993b: 294 (superparasitism); Reeve *et al*., 1994a: 913 (role in host cycles); Reeve *et al*., 1994b: 289 (aggregation and mobility); Rosenheim & Mangel, 1994: 375 (host discrimination); Bouskila *et al*., 1995: 1990 (oviposition rate); Cronin & Strong, 1996: 44 (genetics).
Anagrus (*Anagrus*) *sophiae*: Triapitsyn, 2015b: 14 (key), 37 (description, distribution).

Nearctic hosts. Delphacidae: *Prokelisia delicata* McAtee, *P. dolus* Wilson, *P. marginata* (Van Duzee).
Distribution. USA: CA, FL.

Anagrus (*Anagrus*) *stethynioides* Triapitsyn, 2002

Anagrus stethynioides Triapitsyn, 2002a: 216. Holotype ♀ (USNM). **TL:** Guatemala, Sacatepéquez, Chyllá. Triapitsyn, 2006: 4 (key), 9 (description, host); Luft Albarracin *et al.*, 2009: 5 (list) [NT]; Triapitsyn, 2013c: 293 (mention).
Anagrus (*Anagrus*) *stethynioides*: Triapitsyn, 2015b: 8 (key), 18 (description, distribution, host).

Nearctic hosts. Cicadellidae: *Homalodisca vitripennis* (Germar).
Distribution. USA: TX.

Anagrus (*Anagrus*) *subfuscus* Foerster, 1847

Anagrus subfuscus Foerster, 1847: 214. Neotype ♀ (ISNB), designated by Chiappini, 1989: 109. **TL:** Belgium, Leuven, Egenhoven. Dalla Torre, 1898: 423 (catalogue) [P]; Rimsky-Korsakov, 1917: 222 (hosts) [P]; Bakkendorf, 1926: 267 (host) [P]; Hoffmann, 1932: 33 (host) [P]; Viggiani, 1970: 15 (male genitalia), 16 (key) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Donev, 1998: 73 (key) [P]; Triapitsyn, 1998: 144 (catalogue) [P]; Baquero & Jordana, 1999: 44 (distribution) [P]; Triapitsyn, 2000a: 214 (key), 220 (host, distribution); Bennett, 2008a: 684 (host); Luft Albarracin *et al.*, 2009: 5 (list) [NT]; Dale-Skey *et al.*, 2016: 231 (checklist) [P].
Anagrus incarnatus subfuscus: Debauche, 1948: 133, 135 (description) [P].
Anagrus (*Anagrus*) *subfuscus sensu* Debauche: Chiappini, 1989: 108 (description) [P].
Anagrus subfuscatus [*sic*]: Pagliano & Navone, 1995: 35 (list) [P].
Anagrus (*Anagrus*) *subfuscus*: Triapitsyn & Berezovskiy, 2004b: 28 (distribution, hosts); Triapitsyn, 2015b: 14 (key), 37 (description, distribution).
Anagrus supremosimilis Soyka, 1956a: 26 (in key). Syntype ♀ (NHMW). **TL:** Poland, Lower Silesia, Wrocław, Świniary [as "Weidenhof, (Breslau, Germany)" (Chiappini 1989) for the invalidly designated "holotype"]. Synonymy by Triapitsyn, 2015b: 44.

Nearctic hosts. Lestidae: *Lestes disjunctus* Selys, *L. unguiculatus* Hagen.
Distribution. Canada: QC. USA: CA, MI.

Anagrus (*Anagrus*) *takeyanus* Gordh, 1977

Anagrus takeyanus Gordh in Gordh & Dunbar, 1977: 87. Holotype ♀ (USNM). **TL:** USA, Connecticut, Mt. Carmel. Yoshimoto, 1990: 44 (list); Tsukada, 1992: 136 (host) [P]; Balston *et al*., 1993: 153 (insecticide effect); Balsdon *et al*., 1996: 383 (biology, ecology); Triapitsyn, 1997: 2 (key); Triapitsyn, 1998: 91 (comparison with *A. tretiakovae*); Tsukada, 1999: 37 (diapause) [P]; Triapitsyn, 2000a: 215 (comparison with sp. B in Argentina); Triapitsyn, 2000c: 93 (comparison with *A. raygilli*); Tsukada, 2000a: 168 (migration and diapause); Tsukada, 2000b: 303 (parasitism rate); Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Puttler *et al*., 2014: 30 (hosts, distribution); Nugnes & Viggiani, 2014: 71 (summer diapause).
Anagrus sp.: Dunbar, 1974: 287 (percent parasitism).
Anagrus (*Anagrus*) *takeyanus*: Chiappini *et al*., 1996: 575 (description); Triapitsyn & Beardsley, 2000: 27 (key), 34 (distribution); Triapitsyn, 2003a: 118 (key), 119 (figures, hosts, distribution); Triapitsyn, 2015b: 12 (key), 38 (description, distribution).

Nearctic hosts. Tingidae: *Stephanitis pyrioides* (Scott), *S. takeyai* Drake & Maa.
Distribution. USA: CT, GA, PA.

Anagrus (*Anagrus*) *tretiakovae* Triapitsyn, 1998

Anagrus (*Anagrus*) *tretiakovae* Triapitsyn, 1998: 90. Holotype ♀ (USNM). **TL:** USA, Arizona, Pinal Co., near Stanfield, Pavich vineyard. Triapitsyn *et al*., 2010: 5 (key, description, hosts); Triapitsyn, 2015b: 12 (key), 38 (description, distribution).
Anagrus tretiakovae: Triapitsyn, 2000a: 218 (comparison with *A. lineolus* & extralimital sp. C); Triapitsyn, 2000c: 93 (comparison with *A. raygilli*); Williams III & Martinson, 2000: 139 (hosts, overwintering sites); Martinson *et al*., 2001: 227 (insecticide toxicity); Morse & Stouthamer, 2005: 374 (distribution); Prischmann *et al*., 2005: 132 (managed and unmanaged vineyards); Morse & Stouthamer, 2006: 96 (molecular identification); Morse & Stouthamer, 2007: 95 (molecular identification); Prischmann *et al*., 2007: 43 (abundance, phenology on blackberry and wild rose); Wright & James, 2007: 19 (host plant, distribution); Segoli & Rosenheim, 2013a: 1227 (distribution); Wilson & Triapitsyn, 2017: 53 (in vineyards).

Nearctic hosts. Cicadellidae: ? *Dikrella cockerellii* (Gillette), *Erasmoneura variabilis* (Beamer), *Erythridula plena* (Beamer), *Erythroneura bistrata* McAtee, *E. comes* (Say), *E. elegantula* Osborn, *E. ziczac* Walsh.
Distribution. USA: AZ, CA, NM, WA.

Anagrus (*Paranagrus*) *unilinearis* Soyka, 1950

Anagrus unilinearis Soyka, 1950b: 124. Holotype ♀ (PPDD). **TL:** Egypt, Shareh El-Haram.
Viggiani & Jesu, 1988: 1019 [P]; Pagliano & Navone, 1995: 35 (list) [P].
Anagrus (*Paranagrus*) *unilinearis*: Chiappini & Mazzoni, 2000: 1663 (male genitalia) [P]; Triapitsyn, 2002a: 214 (key), 215 (distribution [Nearctic]); Triapitsyn, 2015b: 8 (key), 18 (description, distribution).

Distribution. USA: LA, TX.

Anagrus (*Anagrus*) *virginiae* Triapitsyn & Puttler, 2006

Anagrus (*Anagrus*) *virginiae* S. Triapitsyn & Puttler *in* Puttler & Triapitsyn, 2006: 26. Holotype ♀ (UCRC). **TL:** USA, Missouri, Boone Co., Columbia, University of Missouri campus. Triapitsyn, 2015b: 12 (key), 38 (description, distribution).
Anagrus virginiae: Puttler *et al*., 2014: 30 (mention).

Nearctic hosts. Tingidae: *Corythuca marmorata* (Uhler).
Distribution. USA: MO.

Anagrus (*Anagrus*) *vulneratus* Triapitsyn, 2010

Anagrus (*Anagrus*) *vulneratus* Triapitsyn in Triapitsyn *et al*., 2010: 10. Holotype ♀ (UCRC). **TL:** USA, Colorado, Mesa Co., Grand Junction, Colorado State University Western Colorado Research Center. Triapitsyn *et al*., 2010: 5 (key); Triapitsyn, 2015b: 12 (key), 39 (description, distribution).
Anagrus epos González *et al*., 1988: 23 [misidentification, in part (specimens from CO, Grand Junction)] (biotypes in biocontrol); Triapitsyn, 1998: 100 (discussion).
Anagrus new species: Morse & Stouthamer, 2007: 95 (host, distribution).

Nearctic hosts. Cicadellidae: likely *Erasmoneura vulnerata* (Fitch).

Distribution. USA: CO.

Anagrus (*Anagrus*) *? yawi* Fullaway, 1944

Anagrus yawi Fullaway, 1944: 47. Lectotype ♀ (BPBM), designated by Triapitsyn & Beardsley, 2000: 36. **TL:** Mexico, Sinaloa, Los Mochis. Williams III & Martinson, 2000: 139 (hosts, overwintering sites) [NT]; Luft Albarracin *et al.*, 2009: 6 (list) [NT]; Mills, 2010: 395 (biological c*ontrol*, minimal impact) [A].

Anagrus ? *yawi* Triapitsyn, 1998: 81 (key), 103 (host, distribution).

Anagrus (*Anagrus*) *yawi*: Triapitsyn & Beardsley, 2000: 27 (key), 36 (description) [A]; Triapitsyn, 2012: 215 (key), 217 (distribution); Triapitsyn, 2015b: 12 (key), 39 (description, distribution).

Nearctic hosts. Cicadellidae: *Erythroneura come*s (Say).

Distribution. USA: NY. This species should perhaps not be included in the list of species occurring north of Mexico since the record was based on a tentative identification.

Anagrus spp.

Anagrus sp. near *armatus*: Moon *et al*., 2000: 326 (host: *Pissonotus quadripustulatus* Van Duzee [Delphacidae], parasitism rate, abiotic factor influence).

Anagrus sp. near *armatus*: Moon & Stiling, 2002: 482 (mention).

Anagrus sp. near *armatus*: Moon & Stiling, 2003: 458 (host, parasitism rate).

Anagrus sp.: Sosa, 1985: 358 (host: *Perkinsiella saccharicida* Kirkaldy [Delphacidae]).

Anagrus sp.: Beers & Elsner, 1990a: 49 (host: *Zonocyba pomaria* (McAtee) [Cicadellidae]).

Anagrus sp.: Beers & Elsner, 1990b: 58 (sticky board trapping, hosts).

Anagrus sp.: Letourneau, 1990: 506 (host: *Empoasca* spp. [Cicadellidae]).

Anagrus sp.: Huber *et al*., 1997: 970 (host: *Listronotus oregonensis* (LeConte) [Curculionidae]).

Anagrus sp.: Gut & Brunner, 1998: 390 (host: *Zonocyba pomaria* (McAtee) [Cicadellidae]).

Anagrus spp.: Martinson *et al*., 2001: 227 (toxicity of insecticides and fungicides).

Anagrus spp.: English-Loeb *et al.*, 2003: 173 (flower-cover crop influence).

Anagrus spp.: James, 2003: 978 (lack of attraction to synthetic plant volatiles).

Anagrus spp.: James & Grasswitz, 2005: 873 (attraction to synthetic plant volatiles).

ANAPHES Haliday, 1833

(Figs 120–141)

Anaphes Haliday, 1833a: 268, 1833b: 346. Type species: *Anaphes fuscipennis* Haliday, 1833, by designation under the Plenary Powers of the International Commission on Zoological Nomenclature, 2017: 122 (Opinion 2401).

Panthus Walker, 1846: 50. Type species: *Panthus crassicornis* Walker, 1846, by subsequent designation by Gahan & Fagan, 1923: 10. Synonymy by Graham, 1982: 202.

Patasson Walker, 1846: viii. Type species: *Panthus crassicornis* Walker, 1846, by monotypy. Synonymy by Debauche, 1949: 64.

Flabrinus Rondani, 1877: 180. Type species: *Flabrinus fabarius* Rondani, 1877, by monotypy. Synonymy by Bouček, 1974: 248.

Anaphoidea Girault, 1909 [61]: 167. Type species: *Anaphoidea sordidata* Girault, 1909, by original designation. Synonymy by Debauche, 1949: 64.

Clinomymar Kieffer, 1913: 100. Type species: *Clinomymar peyerimhoffi* Kieffer, 1913, by monotypy. Synonymy by Debauche, 1949: 63.

Yungaburra Girault, 1933 [440]: 5. Type species: *Anaphoidea nitens* Girault, by monotypy. *De facto* synonymy by Huber, 1992: 32.

Synanaphes Soyka, 1946b: 181. Type species: *Synanaphes ranalteris* Soyka, 1946, by original designation. *De facto* synonymy by Huber, 1992: 32.

Ferrierella Soyka, 1946b: 182. Type species: *Ferrierella neopratensis* Soyka, 1946, by original designation. *De facto* synonymy by Huber, 1992: 32.

Hofenederia Soyka, 1946b: 183. Type species: *Hofenederia pectoralis* Soyka, 1946, by original designation. *De facto* synonymy by Huber, 1992: 32.

Fulmekiella Soyka, 1946b: 184. Type species: *Fulmekiella hundsheimensis* Soyka, 1946, by original designation. *De facto* synonymy by Huber, 1992: 32.

Stammeriella Soyka, 1950a: 120. Type species: *Stammeriella wolfsthali* Soyka, 1950, by original designation. Synonymy by

Annecke & Doutt, 1961c: 19.

Antoniella Soyka, 1950a: 121. Type species: *Fulmekiella stubaiensis* Soyka, 1950, by original designation. Synonymy by Annecke & Doutt, 1961c: 21.

Mariella Soyka, 1950a: 123. Type species: *Mariella superaddita* Soyka, 1950, by original designation. Synonymy by Annecke & Doutt, 1961c: 21.

Anaphes (*Austranaphes*) Ogloblin, 1962: 49. Type species: *Anaphes* (*Austranaphes*) *amplipennis* Ogloblin, 1962, by original designation. *De facto* synonymy by Huber, 1992: 32.

Diagnosis. Body length 280–890 μm. Body almost always uniform black or dark brown (Fig. 120); fore wing with posterior margin straight to distinctly concave, with apex slightly asymmetrical (anterior margin usually more curved than posterior margin), and with both dorsal and ventral surfaces almost always uniformly covered with microtrichia except for two more or less distinct bare areas (the marginal and medial spaces) separated by an oblique row of microtrichia extending from just behind apex of stigmal vein towards wing apex (Fig. 120); wing retinaculum with a socketed seta near apex; petiole a thin, narrow and almost vertical crescent longitudinally divided medially; gaster with gt_1 divided medially by a longitudinal sulcus (Fig. 135); ovipositor base enclosed in a somewhat membranous gastral sac often anteriorly projecting more or less strongly under mesosoma (Fig. 133).

Discussion. Considerable literature exists on various species of *Anaphes* because of their actual or potential use as biological control agents of economically important weevils (Curculionidae) and leaf beetles (Chrysomelidae). Many of the species identifications in the literature are likely or definitely wrong, e.g., as shown by Triapitsyn (2014c). Huber & Thuróczy (2018) reviewed the genus and Huber (2018) made important corrections to that review. Two subgenera, *A*. (*Anaphes*) and *A*. (*Patasson*), are recognized.

Nearctic hosts. Coleoptera: Byrrhidae, Chrysomelidae, Curculionidae. Hemiptera: Gerridae, Miridae. Diptera: Ephydridae.

Important references. Huber (1992, 2006) for the Nearctic, Huber & Thuróczy (2018) for Europe, with a world checklist and catalogue.

Anaphes (*Anaphes*) *alaskae* Annecke & Doutt, 1961

Anaphes alaskae Annecke & Doutt, 1961c: 47. Holotype ♀ (EMEC). **TL:** USA, Alaska, Point Barrow. Burks, 1979: 1028 (catalogue); Huber, 1992: 36 (key), 44 (description, distribution).

Anaphes ? *alaskae*: MacLean & Pitelka, 1971: 32 (seasonal abundance).

Anaphes (*Anaphes*) *alaskae*: Yoshimoto, 1990: 52 (list); Huber & Thuróczy, 2018: 24 (catalogue).

Nearctic hosts. Unknown. Possibly Tipulidae.

Distribution. Canada: NT, YT. USA: AK.

Anaphes (*Anaphes*) *behmani* Girault, 1929

Anaphes behmani Girault, 1929 [428]: 14 (key). Lectotype ♀ (USNM), designated by Huber 1992: 50. **TL:** USA, New York, Ithaca. Burks, 1979: 1029 (catalogue); Huber, 1992: 36 (key), 50 (description, distribution, hosts).

Mymar behmani: Soyka, 1949a: 331 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer fixed); Peck, 1963: 39 (catalogue).

Anaphes (*Anaphes*) *behmani*: Yoshimoto, 1990: 52 (list); Huber & Thuróczy, 2018: 24 (catalogue).

Nearctic hosts. Chrysomelidae: *Dibolia borealis* Chevrolat, but record questioned by Huber, 1992: 50.

Distribution. USA: MI, NY.

Anaphes (*Patasson*) *brevis* Walker 1846

Anaphes brevis Walker, 1846: 52. Neotype ♀ (NHMUK), designated by Huber, 2018: 53. **TL:** France, Yvelines, Béhoust.

Anaphoidea brunnea Doutt, 1949b: 159. Holotype ♀ (EMEC). **TL:** USA, California, Sonoma Co., Forestville. Synonymy by Huber & Thuróczy, 2018: 28. Doutt, 1949b: 160 (key).

Patasson brunnea: Burks, 1958: 63 (generic transfer, catalogue).

Patasson brunneus: Peck, 1963: 32 (catalogue); Burks, 1979: 1030 (catalogue).

Anaphes (*Patasson*) *brunneus*: Yoshimoto, 1990: 53 (list); Huber & Thuróczy, 2018: 28 (catalogue).

Anaphes brunneus: Huber, 1992: 73 (list); Huber, 2006: 8 (description, distribution).

Distribution. USA: CA.

Anaphes (*Anaphes*) *byrrhidiphagus* Huber, 1992

Anaphes byrrhidiphagus Huber, 1992: 43. Holotype ♀ (USNM). **TL:** USA, Oregon, Benton Co., Mary's Peak. Huber, 1992: 36 (key), 43 (description, distribution, hosts).
Anaphes sp.: Schauff, 1984a: 48 (hosts).
Anaphes (*Anaphes*) *byrrhidiphagus*: Huber & Thuróczy, 2018: 24 (catalogue).

Nearctic hosts. Byrrhidae: *Lioligus nitidus* (Motschulsky), *Lioon* sp. [*simplicipes* (Mannerheim)].
Distribution. Canada: BC, MB, YT. USA: AK, ID, OR, WA.

Anaphes (*Patasson*) *calendrae* (Gahan, 1927)

Anaphoidea calendrae Gahan, 1927b: 32. Holotype ♀ (USNM). **TL:** USA, Missouri, Kirkwood. Marlatt, 1929: 11 (reared for shipment to Hawaii, host); Williams, 1929b: 227 (release in Hawaii) [A]; Williams, 1929a: 29 (introduction into Hawaii) [A]; Williams, 1931: 216 (release in Hawaii) [A]; Clausen, 1940: 101 (host); Satterthwaite, 1931: 171 (biology, hosts); Doutt, 1949b: 160 (key); Soyka, 1949a: 387 (list); Vaurie, 1951: 39 (host list); Thompson, 1958: 569 (host catalogue).
Patasson calendrae: Peck, 1951: 414 (generic transfer, catalogue); Peck, 1963: 32 (catalogue); Beardsley, 1964: 340 (insectary rearing) [A]; Bianchi, 1964: 346 (release in Hawaii, laboratory hosts) [A]; Davis & Krauss, 1964: 395 (release in Hawaii) [A]; Davis, 1968: 16 (release in Hawaii) [A]; Davis & Chong, 1968: 25 (release in Hawaii) [A]; Davis & Chong, 1969: 320 (release in Hawaii) [A]; Funasaki, 1969: 285 (release in Hawaii) [A]; Anonymous, 1970: 34 (propagation in Hawaii) [A]; Clausen, 1978: 274 (failed establishment in Hawaii) [A]; Burks, 1979: 1030 (catalogue); Collins & Grafius, 1983: 1 (hosts); Huber, 1986: 198 (mention of failure in Hawaii) [A].
Patasson calandrae [*sic*]: Tooke, 1953: 112 (sex ratio).
Anaphes calendrae: Annecke & Doutt, 1961c: 49 (generic transfer); Huber, 1992: 73 (list); Beardsley, 1999: 45 (distribution) [A]; Beardsley & Huber, 2000: 10 (hosts, Hawaii) [A]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Huber, 2006: 9 (description); Mills, 2010: 394 (biological control, minimal impact).
Anaphes (*Patasson*) *calendrae*: Yoshimoto, 1990: 53 (list); Beardsley, 2000: 209 (establishment, probable hosts in Hawaii) [A]; Kuhn *et al.*, 2013: 10 (establishment in Hawaii); Huber & Thuróczy, 2018: 28 (catalogue).
Anaphes (*Anaphoidea*) *calendrae*: Dupuy & Ramirez, 2016: 7 (distribution, parasitism rate).

Nearctic hosts. Curculionidae: *Calendra callosa* (Oliver), *C. costipennis* (Horn), *C. destructor* (Chittenden), *C. minima* (Hart), *C. parvula* (Gyllenhal), *C. pertinax* (Oliver).
Distribution. Canada: ON. USA: IN, MO, MS, NJ.

Anaphes (*Patasson*) *collinus* Walker, 1846

Anaphes collinus Walker, 1846: 52. Lectotype ♀ (NMID), designated by Graham, 1982: 212. **TL:** UK, Northern Ireland, Belfast, Cavehill. Dalla Torre, 1898: 423 (catalogue) [P]; Enock, 1914: 46 (list) [P]; Bouček & Graham, 1978: 110 (checklist) [P]; Graham, 1982: 212 (description) [P]; Huber, 1992: 73 (list) [P]; Jesu, 2002: 71 (comparison with extralimital species) [P]; Pintureau, 2012: 33 (European list) [P]; Dale-Skey *et al.*, 2016: 232 (checklist) [P].
Anaphes (*Patasson*) *collinus*: Huber & Thuróczy, 2018: 29 (catalogue).
Alaptus pallipes Ashmead, 1887: 193. Holotype ♀ (USNM). **TL:** USA, Florida, Jacksonville. Synonymy by Huber & Thuróczy, 2018: 29. Girault, 1908 [51]: 186 (description); Girault, 1910 [69]: 243 (description, "anaphine" affinity); Girault, 1911 [96]: 278 (generic transfer).
Anaphes pallipes: Underhill, 1926: 17 (host [incorrect]); Girault, 1929 [428]: 13 [key]; Burks, 1979: 1029 (catalogue); Huber, 2006: 28 (description, distribution); Manickavasagam & Menakadevi, 2012: 881 (distribution) [O]; Triapitsyn, 2014c: 40 [O] [misidentification (specimen examined)].
Mymar pallipes: Peck, 1951: 416 (catalogue); Peck, 1963: 40 (catalogue).
Anaphes (*Patasson*) *pallipes*: Yoshimoto, 1990: 54 (list).
Anagrus pallidipes [*sic*]: Glick, 1939: 48 (collected by airplane).
Anaphoidea conotracheli Porter & Alden, 1921: 62 [misidentification] (host, percent parasitism); Porter, 1922: 165 [misidentification] (host); Porter, 1928: 29 [probable misidentification] (host, percent parasitism).
Anaphes conotracheli [misidentification]: Charlet & Balsbaugh, 1984: 526 (host); Schauff, 1984a: 48 (host).
Anaphea [*sic*] *conotracheli* [misidentification]: Solomon, 1985: 12 (host, distribution).
Anaphes aestivus (Soyka, 1950: 121). Holotype ♀ (NHMW). **TL:** Poland, Lenartowice [as Leonhardwitz, near Breslau (Schlesien)]. Synonymy by Huber & Thuróczy, 2018: 29.
Anaphes aterrimus (Soyka, 1949: 399). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes declinatus (Soyka, 1950: 121). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes discolor (Soyka, 1949: 404). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes discolorsimilis (Soyka, 1950: 122). Holotype ♀ (NHMW). **TL:** Germany, Malchin, Jettchenshof. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes latus (Soyka, 1949: 406). Holotype ♀ (NHMW). **TL:** Poland, Małkowice (near Wrocław) [as Malkwitz near Breslau (Schlesien)]. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes minor (Soyka, 1949: 409). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes nigerrimus (Soyka, 1949: 410). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes ornatus (Soyka, 1949: 412). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes ovatus (Soyka, 1949: 413). Holotype ♀ (NHMW). **TL:** Poland, Małkowice (near Wrocław) [as Malkwitz near Breslau (Schlesien)]. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes pallidus (Soyka, 1949: 414). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes relictus (Soyka, 1949: 393). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes stubaiensis (Soyka, 1949: 417). Holotype ♀ (NHMW). **TL:** Austria, Krössbach-Neustift, Stubaital. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes tenuis (Soyka, 1949: 395). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 29.

Anaphes trijohanni Jesu, 2002: 67. Holotype ♀ (DEZA). **TL:** Italy, Portici. Synonymy by Huber & Thuróczy, 2018: 29.

Nearctic hosts. Tephritidae: *Rhagoletis pomonella* (Walsh).

Distribution. Canada: ON. USA: FL, IL, ND, TX.

Anaphes (*Patasson*) *confertus* (Doutt, 1949)

Anaphoidea conferta Doutt, 1949b: 155. Holotype ♀ (CAS). **TL:** USA, California, Napa Co., Oakville. Doutt, 1949b: 160 (key).

Patasson conferta: Burks, 1958: 63 (generic transfer, catalogue).

Patasson confertus: Peck, 1963: 32 (catalogue); Burks, 1979: 1030 (catalogue); Schauff, 1984b: 216 (implied generic transfer, description).

Anaphes (*Patasson*) *confertus*: Yoshimoto, 1990: 53 (list); Huber & Thuróczy, 2018: 28 (catalogue).

Anaphes confertus: Huber, 1992: 73 (list); Zuparko & Hamai, 1994: 316 (holotype depository) Huber, 2006: 11 (description).

Distribution. Canada: BC, MB. USA: AZ, CA, TX.

Anaphes (*Patasson*) *conotracheli* (Girault, 1905)

Anaphoidea conotracheli Girault, 1905 [13]: 220. Holotype ♀ (USNM). **TL:** USA, Maryland, Arundel. Girault, 1910 [69]: 247 (key), 248 (description, distribution); Pierce, 1910: 453 (endoparasitism); Girault, 1911 [76]: 216 (comparison with *A. diana*); Girault, 1911 [87]: 148 (host, generic transfer); Girault, 1912 [120]: 153 [comparison with extralimital species] [A]; Marcovitch, 1916b: 140 (host) [misidentification?]; Girault, 1917 [323]: 93 (host); Brooks, 1918: 14 (host); Washburn, 1919: 184 (host); Britton, 1920: 323 (list, distribution); Porter, 1928: 29 (host, percent parasitism); Girault, 1929 [428]: 12 (key, synonymy of *A. pullicrura* and *A. luna*); Alden, 1930: 19 (host); Snapp, 1930: 77 (host); Dozier *et al*., 1932: 38 (longevity, percent parasitism); Ogloblin, 1939: 144 (mention); Doutt, 1949b: 155 (host [error]), 160 (key); Soyka, 1949a: 359 (translation of original description), 387 (list) [P]; Garman *et al*., 1953: 7 (host); Jackson, 1956: 145 (mention) [P]; Thompson, 1958: 569 (host catalogue); Collins & Grafius, 1983: 1 (mention).

Anaphes conotracheli: Johnson & Girault, 1906: 5 (distribution, percent parasitism); Quaintance, 1906: 327 (percent parasitism); Girault, 1907 [27]: 29 (host); Pierce, 1908: 43 (host); Girault, 1909 [61]: 171 (transferred to *Anaphoidea*); Brooks, 1910: 110 (percent parasitism, host); Viereck in Smith, 1910: 637 (host); Brooks, 1911: 137 (host); Quaintance & Jenne, 1912: 140 (life cycle, percent parasitism); Richards & Davies, 1977: 1225 (mention); Hinton, 1981: 708 (host); Charlet & Balsbaugh, 1984: 526 (host); Schauff, 1984a: 48 (host); Huber, 1992: 73 (list); Huber *et al*., 1997: 969 (incorrect host); Huber, 2006: 13 (description, distribution).

Anaphes (*Anaphoidea*) *conotracheli*: Viereck, 1916: 447 (description, host).

Anaphoidea conotrocheli [*sic*]: Girault, 1911 [96]: 323 (list).

Anaphoides [*sic*] *conotracheli*: Dozier & Williams, 1929: 36 (host).
Patasson conotracheli: Peck, 1951: 414 (generic transfer, catalogue); Burks, 1967: 214 (*A. luna* removed from synonymy); Burks, 1979: 1030 (catalogue); Arnett, 1985: 435 (host); Davidson & Lyon, 1987: 426 (hosts).
Anaphoidia [*sic*] *conotracheli*: Moultrie, 1952: 19 (host).
Patasson (*Anaphoidea*) *conotracheli*: Garman & Townsend, 1952: 63 (hosts).
Anaphea [*sic*] *conotracheli*: Solomon, 1985: 12 (host).
Anaphes possibly *conotracheli*: Tedders & Payne, 1986: 495 (host).
Anaphes (*Patasson*) *conotracheli*: Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Argidae: *Schizocerella pilicornis* (Holmgren) [the *Anaphes* reared from this host may not be *A. conotracheli* despite the fact that Girault identified it as such]. Curculionidae: *Conotrachelus nenuphar* (Herbst), *C. schoofi* Papp, *Craponius inaequalis* (Say), *Cylindrocopturus adspersus* (LeConte).

Distribution. Canada: QC. USA: CT, GA, MD, MN, TX, UT.

Anapahes (*Patasson*) *cotei* Huber, 1997

Anaphes cotei Huber *in* Huber *et al*., 1997: 970. Holotype ♀ (CNC). **TL:** Canada, Nova Scotia, Great Village. Baaren *et al*., 1999a: 1 (mention); Huber, 2006: 16 (description, comparison with *A. pullicrurus*).
Anaphes sp.: Hooper *et al*., 1996: 80 (host, distribution).
Anaphes (*Patasson*) *cotei*: Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Curculionidae: *Listronotus oregonensis* (LeConte).

Distribution. Canada: NS.

Anaphes (*Patasson*) *diana* (Girault, 1911)

Anaphoidea diana Girault, 1911 [76]: 215. Lectotype ♀ (USNM), designated by Schauff, 1984b: 216. **TL:** England, London or vicinity? Girault, 1914 [219]: 109 (contrast with *luna*); Girault, 1929 [428]: 12 (contrast with *conotracheli*); Soyka, 1949a: 362 (description translated into German).
Patasson diana: Hincks, 1960: 213 (description, distribution in Britain) [P]; Richards & Waloff, 1965: 202 (host) [P]; Collins & Grafius, 1983: 1 (host).
Anaphes (*Patasson*) *diana*: Bouček & Graham, 1978: 110 (checklist) [P]; Viggiani & Jesu, 1988: 1021 (host) [P]; Viggiani, 1994: 474 (male genitalia), 480 (key) [P]; Pricop, 2009a: 81 (distribution) [P]; Huber & Thuróczy, 2018: 30 (catalogue).
Anaphes diana: Schauff, 1984a: 48 (mention, type examined); Schauff, 1984b: 214 (generic transfer, description); Yeargan, 1985: 528 (release in Delaware and Kentucky); Aeschlimann, 1986: 164 (distribution, parasitism rate) [P]; Huber, 1986: 197 (biocontrol in Australia) [A]; Aeschlimann *et al*., 1989: 418 (release, rearing, recovery in Australia) [A]; Worner *et al*., 1989: 1086 (ecoclimatic assessment) [P]; Aeschlimann, 1990: 3 (thelytoky and bisexuality) [P]; Dysart, 1990: 307 (introduction, release and recovery in USA); Weigand, 1990: 60 (host, distribution) [P]; Huber, 1992: 73 (list); Boivin, 1994: 228 (overwintering strategy); Chiriac & Poiras, 1995: 39 (distribution) [P]; Pagliano & Navone, 1995: 35 (list) [P]; Poiras, 1996: 37 (host, Moldova) [P]; Huber, 2006: 13 (description, distribution); Huber *et al*., 2009: 271 (list) [P]; Pricop, 2009b: 124 (distribution) [P]; Vinson, 2010: 33 (older host effect); Dale-Skey *et al.*, 2016: 232 (checklist) [P].
Anaphes (*Anaphes*) *diana*: Baquero & Jordana, 2002: 79 (distribution in Spain) [P].
Anaphes lameerei Debauche, 1948: 182. Holotype ♀ (ISNB). **TL:** Belgium, Heverlee. Synonymy by Schauff, 1984b: 214. Hellén, 1974: 27 (description, distribution) [P].
Patasson lameerei: Aeschlimann, 1975: 405 (host, distribution) [P]; Dysart & Bingham, 1976: 29 (introduction into USA); Aeschlimann, 1977: 111 (hosts, behavior) [P]; Hopkins, 1978a: 1 (biology, biological control in Australia) [A]; Hopkins, 1978b: 2 (release in Australia) [A]; Aeschlimann, 1979: 409 (generation time) [P]; Leibee *et al*., 1979: 345 (development rates); Aeschlimann, 1980: 140 (distribution, percent parasitism) [P]; Yeargan & Shuck, 1981: 119 (longevity, reproductive rate); Bloem & Yeargan, 1982a: 37 (extreme temperature effects); Bloem & Yeargan, 1982b: 93 (host finding behavior).

Nearctic hosts. Curculionidae: *Sitona hispidulus* (Fabricius).

Distribution. USA: DE, ID, KY. Yeargan & Shuck (1981) and Yeargan (1985) stated that *P. lameerei* apparently had not become established in the USA.

Anaphes (*Anaphes*) *flavipes* (Foerster, 1841)

Gonatocerus flavipes Foerster, 1841: 45. Neotype ♀ (NHMW), designated by Samková *et al*., 2017: 681. **TL:** Germany, Aachen area.

Anaphes flavipes: Maltby *et al*., 1971: 693 (establishment in USA); Dysart, 1971: 446 (European distribution, importation into USA); Dysart *et al*., 1973: 157 (1968 establishment in USA); Huber, 1992: 36 (key), 47 (description, distribution, hosts); Samková *et al*., 2017: 677 (description, literature, distribution); Samková *et al*., 2018: 442 (reproductive strategy) [P]; Samková *et al*., 2019: 2 (fertility, longevity) [P].

Anaphes (*Anaphes*) *flavipes*: Huber & Thuróczy, 2018: 25 (catalogue).

Anaphes auripes Walker, 1846: 52. Lectotype ♀ (NMID), designated by Graham, 1982: 209. **TL:** England, London, almost certainly Southgate vicinity (Graham, 1982: 192). Synonymy by Samková *et al*., 2017: 681.

Anaphes lemae Bakkendorf, 1970: 153. Holotype ♀ (ZMUC). **TL:** Poland, Lublin (city area). Synonymy by Viggiani & Jesu: 1988: 1021; fixed by Huber, 1992: 48.

Nearctic hosts. Chrysomelidae: *Lema trilinea* White, *Oulema collaris* (Say), *O. gallaeciana* (Heydon)*, O. melanopus* (L.).

Distribution. Canada: NS, ON. USA: IN, MD, MI, NC, NY, OH, PA, VA, WV.

Anaphes (*Anaphes*) *fuscipennis* Haliday, 1833

Anaphes fuscipennis Haliday, 1833b: 346. Lectotype ♀ (NMID), designated by Graham, 1982: 207. **TL:** England or Ireland. Curtis, 1837: 134 (list) [P]; Blanchard, 1840: 293 (description) [P]; Walker, 1846: 51 (description, distribution) [P]; Dalla Torre, 1898: 424 (catalogue) [P]; Enock, 1914: 46 (list) [P]; Gahan, 1949: 204 (type of genus discussion); Varis, 1972: 22 (percent parasitism) [P]; Bilewicz-Pawinska,1983: (host, Poland) [P]; Viggiani & Jesu: 1988: 1021 (biocontrol); Coutinot & Hoelmer, 1999: 645 (host) [P] [misidentification]; Huber, 1992: 36 (key), 38 (description, distribution, introduction history); Conti *et al.*, 1994: 523 (percent parasitism) [P]; Pagliano & Navone, 1995: 35 (list) [P]; Ahmed, 1996: 61 (host, Saudi Arabia) [P]; Radcliffe & Flanders, 1998: 234 (biological control); Gijswijt, 2003: 49 (list) [P]; Salerno *et al*., 2007: 422 (oviposition factors) [P] [misidentification; probably refers to *A. brevis* Walker]; Williams *et al.*, 2008: 1191 (response to plant volatiles); Pricop, 2009b: 124 (distribution) [P]; Pricop, 2009c: 20 (distribution) [P]; Pintureau, 2012: 34 (European list) [P]; ICZN, 2017, 122 (designated as type species of *Anaphes*); Dale-Skey *et al.*, 2016: 232 (checklist) [P].

Anaphes (*Anaphes*) *fuscipennis*: Bouček & Graham, 1978: 110 (checklist) [P]; Viggiani, 1994: 476 (male genitalia), 479 (key) [P]; Pricop, 2009a: 81 (distribution) [P]; Huber & Thuróczy, 2018: 26 (catalogue).

Anaphes pratensis Foerster, 1847: 211. Lectotype ♀ (NHMW), designated by Huber, 1992: 39. **TL:** Unknown. Presumably Germany. Synonymy by Graham, 1982: 206. Dalla Torre, 1898: 424 (catalogue) [P]; Lameere, 1907: 247 (habitat) [P]; Schmiedeknecht, 1909: 499 (list) [P]; Girault, 1911 [89]: 135 (description [first Nearctic record]); Girault, 1911 [91]: 188 (description); Girault, 1911 [95]: 364, 368 (description); Girault, 1912 [107]: 88 (description); Girault, 1912 [112]: 299 (addition to North American list); Girault, 1914 [219]: 110 (releases from Italy into USA, description); Britton, 1920: 323 (distribution); Howard, 1927: 14 (importations from Europe on small scale); Christie, 1929: 43 (releases in Indiana); Pack & Fife, 1930: 30 (percent parasitism, sex ratio); Couturier, 1935: 92 (host?) [P]; Hamlin *et al*., 1949: 41 (mention), 58 (host, percent parasitism); Thompson, 1958: 568 (host catalogue) [P]; Mailloux & Pilon, 1975: 111 (establishment in USA); Clausen, 1978: 267 (biological control); Burks, 1979: 1029 (catalogue); Aeschlimann, 1980: 145 (host) [P]; Schaber, 1981: 169 (recovery in North America, confusion with *luna*); Viggiani & Jesu, 1988: 1021 (synonym).

Mymar pratensis: Peck, 1951: 416 (generic transfer, catalogue); Peck, 1963: 40 (catalogue).

Mymar pratensis [in part]: Clausen, 1956: 116 (biological control).

Anaphes sp.: Webster, 1912: 34 (illustration), 35 (importation from Italy to Utah).

Anaphes ? pratensis: Girault, 1914 [187]: 87 (host) [P].

Anophes [*sic*] *pratensis*: Mailloux & Pilon, 1970: 607 (introduction, spread, host).

Anaphes (*Anaphes*) *pratensis*: Bakkendorf, 1964: 4 (unidentified egg in host plant) [P]; Yoshimoto, 1990: 52 (list).

Anaphes capitulatus (Soyka, 1949: 341). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber, 1992: 38.

Anaphes filicornis (Soyka, 1949: 343). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber, 1992: 38.

Anaphes maculatus (Soyka, 1949: 345). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber, 1992: 38.

Anaphes neopratensis (Soyka, 1946b: 182). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim, Spitzerberg. Synonymy by Huber, 1992: 38.

Anaphes stammeri (Soyka, 1949: 349). Holotype ♀ (NHMW). **TL:** Poland, Wrocław [as Breslau]. Synonymy by Huber, 1992: 38.

Nearctic hosts. Curculionidae: *H. nigrirostris* (Fabricius), *Hypera postica* (Gyllenhal), *H. punctata* (Fabricius), *Sitona crinita* Herbst.

Distribution. Canada: BC, NL, NS, ON, QC. USA: CT, FL, OH, WI, VA.

Anaphes (*Patasson*) *gerrisophaga* (Doutt, 1949)

Anaphoidea gerrisophaga Doutt, 1949b: 156. Holotype ♀ (CAS). **TL:** USA, California, Shasta Co., Lake Britton. Doutt, 1949b: 160 (key).
Patasson gerrisophaga: Hagen, 1956: 291 (host); Burks, 1958: 63 (generic transfer, catalogue); Peck, 1963: 34 (catalogue); Burks, 1979: 1030 (catalogue).
Anaphes gerrisophaga: Zuparko & Hamai, 1994: 316 (holotype depository); Huber, 2006: 7 (key), 19 (description, distribution).
Anaphes gerrisophagus [*sic*]: Huber, 1992: 74 (list).
Anaphes (*Patasson*) *gerrisophagus*: Yoshimoto, 1990: 53 (list); Bennett, 2008a: 684 (host).
Anaphoidea pullicrura: Scotland, 1940: 325 [misidentification] (list).
Anaphes (*Patasson*) *gerrisophaga*: Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Gerridae: *Gerris* sp. Possibly Ephydridae: *Lemnaphila scotlandae* Cresson.
Distribution. Canada: MB, ON, QC. USA: CA, UT.

Anaphes (*Anaphes*) *hercules* Girault, 1911

Anaphes hercules Girault, 1911 [96]: 285. Holotype ♀ (INHS). **TL:** USA, Illinois, Urbana. Girault, 1911 [95]: 364 (comparison with extralimital species); Girault, 1912 [107]: 89 (mention); Frison, 1927: 227 (holotype listed); Girault, 1929 [428]: 14 (key); Webb, 1980: 118 (holotype listed); Burks, 1979: 1030 (catalogue); Huber, 1992: 36 (key), 47 (description, distribution).
Mymar hercules: Soyka, 1949a: 331 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 39 (catalogue).
Anaphes (*Anaphes*) *hercules*: Yoshimoto, 1990: 52 (list); Huber & Thuróczy, 2018: 24 (catalogue).

Distribution. USA: IL.

Anaphes (*Anaphes*) *iole* Girault, 1911

Anaphes iole Girault, 1911 [96]: 284. Holotype ♀ (INHS), lost. **TL:** USA, Illinois, Urbana, greenhouse window. Girault, 1911 [89]: 135 (*nomen nudum*, similar to *A. pratensis* [now *A. fuscipennis*]); Girault, 1911 [91]: 188 (*nomen nudum*, male described); Girault, 1912 [107]: 89 (mention); Girault, 1916 [261]: 6 (comparison with *A. perdubius*); Underhill, 1924: 6 (host); Girault, 1929 [428]: 13 (key); Thompson, 1958: 568 (host catalogue); Burks, 1979: 1030 (catalogue); Schauff, 1984a: 48 (type lost); Huber & Rajakulendran, 1988: 894 (morphological variation); Jones & Jackson, 1990: 463 (fecundity, longevity); Huber, 1992: 36 (key), 41 (description, hosts); Norton *et al*., 1992: 132 (parasitism in strawberry); Sohati *et al*., 1992: 515 (percent parasitism); Carillo *et al*., 1994: 157 (pesticide resistence); De Santis & Fidalgo, 1994: 123 (catalogue) [NT]; Degrandi-Hoffman *et al*., 1994: 1046 (simulation model); Al-Ghamdi & Stewart, 1995: 458 (synchrony with host); Conti *et al*., 1996: 10 (host recognition behavior); Norton & Welter, 1996: 1407 (augmentation in strawberry); Rose *et al*., 1996: 357 (percent parasitism in strawberries; Conti *et al*., 1997: 91 (oviposition behavior); Hagler & Jackson, 1998: 1010 (immunomarking technique); Jackson *et al*., 1998: 309 (dispersal prevention); Coutinot & Hoelmer, 1999: 645 (host) [P]; Gokhman, 2000: 1485 (karyotype); McGregor *et al.*, 2000: 89 (hosts, distribution); Nordlund & King, 2000: 63 (biological control); Ruberson & Williams III, 2000: 97 (biological control); Smith & Nordlund, 2000: 122 (mass rearing); Udayagiri & Welter, 2000: 235 (escape from parasitism); Udayagiri *et al*., 2000a: 88 (pesticide effects); Udayagiri *et al*., 2000b: 28 (inundative releases); Takasu & Nordland, 2001: 61 (host recognition kairomones); Wu & Nordlund, 2002: 121 (superparasitism); Zhu & Williams III, 2002: 359 (molecular detection in host); Bensen & Rao, 2003: 435 (habitat diversification effects); Beach *et al*., 2003: 1205 (physiology); Jackson, 2003: 168 (oviposition on host in different plants); Riddick, 2003a: 334 (density and arena size affecting progeny production); Riddick, 2003b: 177 (factors affecting progeny production); Williams III *et al*., 2003a: 217 (insecticide effects); Williams III *et al*., 2003b: 534 (insecticide effects); Accinelli *et al*., 2004: 57 (pest control) [P]; Riddick, 2004: 147 (exposure time and food effects on propagation); Williams & Price, 2004: 164 (bioassay for insecticide toxicity); Manrique *et al*., 2005: 90 (olfactory responses); Riddick, 2005a: 53 (egg load); Riddick, 2005b: 911 (physiology); Williams III & Roane, 2007: 1262 (nutrition); Williams III & Hendrix, 2008: 23 (physiology); Williams III *et al*., 2008: 1191 (physiology); Abdullah *et al*., 2009: 320 (cold storage); Williams III *et al*., 2011: 160 (chemical ecology); Portilla, 2014: 71 (augmentative release); Boivin & Ellers, 2016: 164 (ovigeny index).
Mymar iole: Soyka, 1949a: 331 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 39 (catalogue).
Anaphes (*Anaphes*) *iole*: Yoshimoto, 1990: 52 (list); Viggiani, 1994: 476 (male genitalia), 480 (key); Huber & Thuróczy, 2018: 24 (catalogue).
Anaphes iole anomocerus Girault, 1929 [428]: 13. Lectotype ♀ (USNM), designated by Huber, 1992: 42. **TL**: USA, locality not specified. Synonymy by Huber & Rajakulendran, 1988: 894. Girault, 1929 [428]: 13 (key).

Anaphes anomocerus: Strong, 1936: 66 (host); Strong, 1937: 57 (host); Strong, 1938: 52 (host); Ewing & Crawford, 1939: 304 (biology); Thompson, 1958: 568 (host catalogue); Burks, 1979: 1029 (catalogue); Strand, 1986: 107 (physiology); Rajakulendran & Cate, 1986: 255 (laboratory rearing, host).

Mymar anomocerus: Soyka, 1949a: 331 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 38 (catalogue).

Anagrus ovijentatus Crosby & Leonard, 1914a: 181. Lectotype ♀ (CUIC), designated by Huber, 1992: 42. **TL:** USA, New York, Ithaca. Synonymy (implied) by Girault, 1929 [428]: 14; accepted by Huber & Rajakulendran, 1988: 894. Crosby & Leonard, 1914a: 182 (key); Crosby & Leonard, 1914b: 483 (description, host, distribution); Gahan *et al*., 1928: 984 (list, host, distribution); Glick, 1939: 48 (collected by airplane); Thompson, 1958: 567 (host catalogue); Hoebeke, 1980: 20 (type catalogue).

Anagrus ovijententatus [*sic*]: Bakkendorf, 1926: 270 (incorrect subsequent spelling).

Anaphes ovijentatus: Girault, 1929 [428]: 14 (key, generic transfer, implied synonym of *ovijentatus*); Romney & Cassidy, 1945: 497 (biology); Clancy & Pierce, 1966: 854 (host); Bryan *et al*., 1969: 11 (rearing); Stoner & Surber, 1969: 502 (biology); Herting, 1971: 108 (host catalogue); Sillings, 1971: 105 (host, Indiana); Stoner & Surber, 1971: 1566 (biology); Scales, 1973: 305 (distribution); Sillings & Broersma, 1974: 124 (host, distribution); CIBC, 1979: 4 (biological control); Burks, 1979: 1029 (catalogue); Graham & Jackson, 1982: 56 (biology); Collins & Grafius, 1983: 2 (hosts); Jackson & Graham, 1983: 772 (hosts); Graham *et al*., 1984: 250 (D-vac sampling, host); Jackson & Cohen, 1984: 437 (temperature and water relations); Graham *et al*., 1986: 132 (parasitism rate); Jackson, 1986: 149 (cold storage); Strand, 1986: 107 (physiology); Coulson, 1987: 7 (mention); Day, 1987: 26 (biological control); Debolt, 1987: 82 (biological control); Gordon *et al*., 1987: 347 (host); Jackson, 1987: 367 (biology); Jackson & Debolt, 1987: 10 (augmentative releases); Schuster, 1987, 14 (biological control); Snodgrass & Ertle, 1987: 90 (mention); Van Driesche & Hauschild, 1987: 27 (biocontrol); Jackson *et al*., 1988: 919 (radioactive labelling); Boivin, 1994: 221 (overwintering strategy); Colinet & Boivin, 2011: 89 (cold storage).

Mymar ovijentatus: Soyka, 1949a: 332 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 39 (catalogue).

Anaphoidea perdubius Girault, 1915 [261]: 6. Holotype ♀ (USNM). **TL**: USA, Utah, Salt Lake City. Synonymy [in key] by Girault, 1929 [428]: 14.

Anaphes perdubius: Beyer, 1921: 24 (host); Thompson, 1958: 568 (host catalogue); Burks, 1979: 1029 (generic transfer, catalogue).

Mymar perdubius: Soyka, 1949a: 332 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 40 (catalogue).

Anaphes (*Anaphes*) *perdubius*: Yoshimoto, 1990: 52 (list).

Anaphes behmani: Flock *et al*., 1962: 281 [misidentification (Huber 1992: 51)] (incorrect host).

Anaphes pallipes: Girault, 1911 [96]: 278 [misidentification (Huber & Rajakulendran 1988: 899)] (description).

Anaphes near *hercules*: Flock *et al*., 1962: 277 [misidentification (Huber & Rajakulendran 1988: 900)].

Nearctic hosts. Miridae: *Halticus bractatus* (Say), *Lygus hesperus* Knight, *L. lineolaris* (Palisot de Beauvois), *L. pratensis* (L.), *Pseudatomoscelis seriatus* (Reuter).

Distribution. Canada: AB, BC, NT, PE, QC. USA: AK, AZ, CO, FL, ID, IN, LA, MT, NE, NH, NM, NY, OH, OR, TX, VA, WA, WY.

Anaphes (*Patasson*) *listronoti* Huber, 1997

Anaphes listronoti Huber, 1997: 963. Holotype ♀ (CNC). **TL:** Canada, Quebec, Ste. Clotilde.

Anaphes sp. (possibly also *victus*): Hance & Boivin, 1992: 293 (effect on host cold hardiness); Boivin *et al*., 1993: 176 (pre-imaginal development); Hance & Boivin, 1993: 759 (effect on host cold hardiness); Boivin, 1994: 235 (overwintering strategy, may be *A. victus* or mixture of both species).

Anaphes sordidatus: Boivin, 1988: 245 [misidentification; may also be *listronoti*] (rearing technique); Baaren *et al*., 1994: 326 [misidentification] (host discrimination).

Anaphes listronoti: Baaren *et al*., 1995b: 673 (*nomen nudum*, oviposition behavior); Cormier *et al*., 1996: 1376 (*nomen nudum*, seasonal ecology); Hooper *et al*., 1996: 80 (*nomen nudum*, parasitism rate, comparison with *A. cotei*); Baaren *et al*., 1997: 189 (*nomen nudum*, larval morphology); Vigneault *et al*., 1997: 546 (olefactometer test); Baaren & Boivin, 1998b: 13 (mention); Cormier *et al*., 1998: 1596 (sex pheromone emission); Baaren *et al*., 1999: 1 (antennal sensilla morphology); Boivin, 1999: 28 (hosts); Boivin & Baaren, 2000: 471 (larval aggression and mobility); Brodeur & Boivin, 2004: 34 (mention); Pexton & Mayhew, 2004: 180 (gregarious broods); Huber, 2006: 21 (description, distribution); Boivin, 2010a: 459 (phenotypic plasticity); Boivin, 2010b: 5 (sperm size and number); Romani *et al*., 2010: 73 (antennal sensilla); Boivin & Martel, 2012: 1695 (reproductive constraints); Huber, 2015b: 24 (comparison with extralimital species); Boivin & Ellers, 2016: 164 (ovigeny index).

Anaphes (*Patasson*) *listronoti*: Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Curculionidae: *Listronotus oregonensis* (LeConte), *L. sparsus* (Say).

Distribution. Canada: QC. USA: TX.

Anaphes (*Patasson*) *longiclava* (Doutt, 1949)

Anaphoidea longiclava Doutt, 1949b: 158. Holotype ♀ (EMEC). **TL:** USA, California, Morgan Hill. Doutt, 1949b: 160 (key).
Patasson longiclava: Burks, 1958: 63 (generic transfer, catalogue); Peck, 1963: 34 (catalogue); Burks, 1979: 1030 (catalogue).
Anaphes longiclava: Schauff, 1984b: 216 (comparison with *A. diana*); Huber, 2006: 22 (description, distribution).
Anaphes (*Patasson*) *longiclava*: Yoshimoto, 1990: 53 (list); Huber & Thuróczy, 2018: 28 (catalogue).
Anaphes longiclavus [*sic*]: Huber, 1992: 74 (list).

Distribution. USA: CA.

Anaphes (*Patasson*) *luna* (Girault, 1914)

Anaphoidea luna Girault, 1914 [219]: 109. Lectotype ♀ (USNM), designated by Huber, 2006: 24. **TL:** Italy, Portici. Girault, 1914 [187]: 87 [P]; Girault, 1914 [219]: 110 (introduction into USA); Silvestri, 1915: 80 (egg development, larva) [P]; [Girault], 1916 [265a]: 40 (host); Chamberlin, 1924a: 3 (release in USA); Chamberlin, 1924b: 627 (egg parasitism) [P]; Howard, 1927: 14 (further importations from Europe); Girault, 1929 [428]: 12 (synonym [incorrect] under *conotracheli*); Essig & Michelbacher, 1933: 69 (hosts, introduction into USA); Kaufmann, 1939: 421 (host) [P]; Kaufmann, 1941a: 110 (host) [P]; Kaufmann, 1941b: 83 (occasional appearance) [P]; Doutt, 1949b: 160 (citation of incorrect synonymy by Girault); Hamlin *et al*., 1949: 58 (hosts, percent parasitism); Soyka, 1949a: 387 (list); Peck, 1951: 414 (catalogue, under *A. conotracheli*); Tooke, 1953: 94 (morphology, biology, ecology, introduction into South Africa, biological control); Clausen, 1956: 116 (importations, percent parasitism); Baccetti, 1957: 110 (hosts, oviposition) [P]; Baccetti, 1958: 569 (host [incorrect?) [P]; Thompson, 1958: 569 (host catalogue); Peck, 1963: 32 (catalogue, perhaps separate from *A. conotracheli*).
Mymar luna: Poinar & Gyrisco, 1963: 534 (emergence from egg); Burbutis *et al*., 1967: 1009 (percent parasitism); El M'Sadda, 1967: 13 (parasitism rate) [P].
Patasson luna: Shaw & Zeiner, 1964: 138 (distribution); Shaw & Miller, 1965: 1131 (distribution); Streams & Fuester, 1966: 331 (abundance, survival); Burks, 1967: 214 (removal from synonymy under *A. conotracheli*); Brunson & Coles, 1968: 6 (percent parasitism, treated as native to USA); DeWitt & Burks, 1968: 129 (host, distribution); Petty, 1968: 129 (reared); Mailloux & Pilon, 1970: 607 (recovery in Quebec); Miller, 1970: 440 (biological control mention); Niemczyk & Flessel, 1970: 247 (percent parasitism, distribution); Ellis, 1973: 1059 (percent parasitism, distribution); Mailloux & Pilon, 1975: 111 (host); Aeschlimann, 1975: 407 (biological control, mention); Dysart & Day, 1976: 2 (distribution, percent parasitism, biology); Harcourt *et al*., 1977: 1522 (mention, distribution); Weaver & Gallo, 1977: 6 (host, distribution); Clausen, 1978: 267 (biological control); Hopkins, 1978b: 5 (history of introductions, percent parasitism); Burks, 1979: 1030 (catalogue); Lovett, 1980: 688 (host, distribution); Schaber, 1981: 169 (host, distribution); Collins & Grafius, 1983: 3 (parasitism rate); Hogg & Kingsley, 1983: 54 (percent parasitism); Bryan *et al*., 1993: 26, 35 (distribution map, summary of establishment); Meyerdirk *et al*., 2000: 139 (list).
Pattason [*sic*] *luna*: Miller & Guppy, 1972: 45 (recovery).
Anaphes luna: Day, 1983: 41 (biology); Huber, 1986: 197 (biocontrol); Huber, 1992: 75 (list); Pagliano & Navone, 1995: 35 (list) [P]; Nasr, 1998: 17 (life cycle [abstract]) [P]; Radcliffe & Flanders, 1998: 228 (biological control); Huber, 2006: 23 (description, distribution, biological control); Pricop, 2009b: 124 (distribution) [P].
Anaphes (*Patasson*) *luna*: Viggiani & Jesu: 1988: 1021 (Italy) [P]; Yoshimoto, 1990: 53 (list); Viggiani, 1994: 476 (male genitalia), 480 (key) [P]; Huber & Thuróczy, 2018: 31 (catalogue).
Anaphes aequipennatus (Soyka, 1953a: 37). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes albipes (Soyka, 1949: 355). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes bicolor (Soyka, 1953a: 38). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes brachygaster Debauche, 1948: 176. Holotype ♀ (IRSNB). **TL**: Belgium, Héverlé. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes devillei Debauche, 1948: 177. Holotype ♀ (IRSNB). **TL**: Belgium, Loverval forest. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes differens (Soyka, 1949: 363). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes dorcas Debauche, 1948: 179. Holotype ♀ (IRSNB). **TL**: Belgium, Héverlé. Synonymy by Huber & Thuróczy, 2018: 32.
Anaphes euryale Debauche, 1948: 174. Holotype ♀ (IRSNB). **TL**: Belgium, Loverval forest. Synonymy by Huber & Thuróczy, 2018: 31.
Anaphes hundsheimensis (Soyka, 1946b: 184). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 31.

Anaphes neustadti (Soyka, 1949: 373). Holotype ♀ (NHMW). **TL:** Poland, Prudnik [as Neustadt]. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes ordinarius (Soyka, 1954: 61). Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes palliditarsis (Soyka, 1949: 375). Holotype ♀ (NHMW) [5♀ paratypes]. **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes pilosissimus (Soyka, 1954: 61). Holotype ♀ (NHMW). **TL:** Poland, Prudnik [as Neustadt]. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes speciosior (Soyka, 1954: 61). Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes swiedecki (Soyka, 1953b: 54). Holotype ♀ (NHMW). **TL:** Austria, Gumpoldskirchen. Synonymy by Huber & Thuróczy, 2018: 32.

Anaphes vulgaris (Soyka, 1946a: 42). Holotype ♀ (NHMW).**TL:** Netherlands, Valkenburg. Synonymy by Huber & Thuróczy, 2018: 31.

Anaphes wratislawensis (Soyka, 1954: 62). Holotype ♀ (NHMW). **TL:** Poland, near Wrocław [as Wiedenhof near Breslau, Scheitnig, Oder River]. Synonymy by Huber & Thuróczy, 2018: 32.

Nearctic hosts. Curculionidae: *Hypera postica* (Gyllenhal), *Phytonomus punctatus* Fabricius, *P. variabilis* (Herbst).

Distribution. Canada: AB, ON, QC. USA: DE, IL, KY, MA, MD, MI, NJ, OH, PA, UT, WI, WV.

Anaphes (*Anaphes*) *nigrellus* Girault, 1911

Anaphes nigrellus Girault, 1911 [96]: 282. Holotype ♀ (INHS). **TL:** USA, Illinois, Urbana. Girault, 1911 [96]: 289 (comparison with *A. pullicrura*); Girault, 1911 [89]: 135 (comparison with *A. pratensis* [now *A. fuscipennis*]); Girault, 1911 [91]: 188 (additional specimens); Girault, 1911 [89]: 135 (similar to *A. pratensis* [now *A. fuscipennis*]); Girault, 1912 [107]: 89 (mention); Frison, 1927: 227 (holotype listing); Girault, 1929 [428]: 14 (key); Burks, 1979: 1029 (catalogue); Webb, 1980: 118 (holotype listing); Yoshimoto, 1990: 52 (list); Huber, 1992: 36 (key), 45 (description, hosts); Puttler *et al.*, 2014: 34 (mention).

Anaphes (*Anaphes*) *nigrellus*: Huber & Thuróczy, 2018: 24 (catalogue).

Mymar nigrellus: Soyka, 1949a: 332 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 39 (catalogue).

Anaphes behmani: Puttler *et al*., 1973: 1304 (hosts, biology, distribution) [misidentification (Huber 1992: 51)].

Nearctic hosts. Curculionidae: *Hypera compta* (Say), *H. eximia* LeConte, *H. paludicola* Warner.

Distribution. USA: IL, KS, MO.

Anaphes (*Patasson*) *nitens* (Girault, 1928)

Anaphoidea nitens Girault, 1928 [420]: 262. Lectotype ♀ (MVMA), designated by Huber & Prinsloo, 1990: 336. **TL**: Australia, Victoria, Ferntree Gully. Huber & Prinsloo, 1990: 334 (key); Millar *et al*., 1996: 508 (biological control); Hanks *et al*., 2000: 476 (biological control); Paine *et al*., 2000: 12 (biological control); Paine & Millar, 2002: 149 (biological control); Paine & Millar, 2003: 68 (biological control); Jetter & Paine, 2004: 314 (biological control); Riddick, 2005a: 63 (egg load); Boivin, 2010a: 459 (phenotypic plasticity); Mills, 2010: 394 (biological control success); Mapondera *et al.*, 2012: 186 (host, biological control); Paine *et al.*, 2015: 2498 (biological control success); Boivin & Ellers, 2016: 164 (ovigeny index); Paine, 2016: 717 (biological control); Schröder *et al.*, 2017: 99 (biological control); Jeger *et al.*, 2018: 21 (biological control); Van Driesche *et al.*, 2018: 13 (biological control).

Anaphes (*Patasson*) *nitens*: Viggiani, 1994: 479 (male genitalia, key); Huber & Thuróczy, 2018: 28 (catalogue).

Anaphoidea gonipteri Ferrière, 1930: 38. Lectotype ♀ (NHMUK), designated by Huber & Prinsloo, 1990: 336. **TL**: Australia, South Australia, Penola. Synonymy by Girault, 1930 [433]: 4.

Nearctic hosts. Curculionidae: *Gonipterus platensis* Marelli. The host was misidentified as *G. scutellatus* Gyllenhal in the publications listed above, other than in Mapondera *et al.* (2012). Over 100 extralimital publications treat *A. nitens*.

Distribution. USA : CA (introduced and established).

***Anaphes* (*Patasson*) *pullicrura* (Girault, 1910)**

Anaphoidea pullicrura Girault, 1910 [69]: 252. Holotype ♀ (INHS). **TL:** USA, Illinois, Centralia. Girault, 1911 [76]: 216 (comparison with *A. diana*); Girault, 1911 [91]: 187 (additional specimen, distribution); Girault, 1911 [96]: 288 (mention, distribution); Girault, 1914 [219]: 109 (comparison with *A. luna*); Frison, 1927: 227 (type listing); Gahan, 1927b: 31 (comparison with *A. calendrae*); Girault, l929 [428]: 12 (key, synonymy under *A. conotracheli*); Soyka, 1949a: 387 (list); Webb, 1980: 118 (holotype listing).

Patasson pullicrura: Peck, 1951: 415 (generic transfer, catalogue); Peck, 1963: 34 (generic transfer, catalogue); Burks, 1979: 1030 (catalogue).

Anaphes (*Patasson*) *pullicrura*: Yoshimoto, 1990: 54 (implied generic transfer, list); Huber & Thuróczy, 2018: 28 (catalogue).

Anaphes pullicrurus [*sic*]: Huber, 2006: 30 (description, distribution); Manickavasagam & Menakadevi, 2012: 881 [misidentification] (distribution) [O].

Distribution. USA: IL.



FIGURE 120. *Anaphes iole* Girault, habitus. USA, Arizona, Tucson, 8.xi.1985, ex *Lygus hesperus* lab. culture. Scale bar=1000 µm.

Anaphes (*Anaphes*) *sinipennis* Girault, 1911

Anaphes sinipennis Girault, 1911 [96]: 280. Syntypes, 3 ♀ (INHS), lost. **TL:** USA, Illinois, Urbana and Litchfield. Girault, 1911 [91]: 187 (*nomen nudum*); Girault, 1911 [96]: 288 (key); Girault, 1912 [120]: 153 (comparison with extralimital species); Girault, 1913 [165]: 117 (comparison with extralimital species); Girault, 1929 [428]: 13 (key); Burks, 1979: 1029 (catalogue); Schauff, 1984a: 48 (type lost); Huber, 1992: 36 (key), 37 (description).
Mymar sinipennis: Soyka, 1949a: 332 (implied generic transfer, list); Peck, 1951: 416 (catalogue, generic transfer formalized); Peck, 1963: 41 (catalogue).
Anaphes (*Anaphes*) *sinipennis*: Yoshimoto, 1990: 53 (implied generic transfer, list); Huber & Thuróczy, 2018: 24 (catalogue).

Distribution. Canada: AB, ON. USA: FL, IL.

Anaphes (*Patasson*) *sordidatus* (Girault, 1909)

Anaphoidea sordidata Girault, 1909 [61]: 169. Lectotype ♀ (INHS), designated by Frison, 1927: 227. **TL:** USA, Illinois, Centralia. Girault, 1910 [69]: 247 (key), 248 (description, host); Girault, 1911 [76]: 216 (description); Girault, 1911 [87]: 148 (host); Girault, 1911 [96]: 323 (list); Frison, 1927: 227 (type listing); Girault, 1929 [428]: 13 (key); Schröder *et al*., 2017: 99 (biological control); Webb, 1980: 118 (holotype listing); Soyka, 1949a: 387 (list); Doutt, 1949b: 160 (key).
Anaphoidea sordida [*sic*]: Pierce, 1910: 453 (host).
Anaphoidea sorditata [*sic*]: Dickerson & Weiss, 1920: 58 (host, distribution).
Patasson sordidatus: Peck, 1951: 415 (generic transfer, catalogue); Peck, 1963: 34 (catalogue); Burks, 1979: 1030 (catalogue); Collins & Grafius, 1986a: 100 (life cycle).
Anaphes sordidatus: Collins & Grafius, 1986b: 469 (host, percent parasitism); Collins & Grafius, 1986c: 31 (behavior); Boivin, 1991: 22 (density dependence); Zhao *et al*., 1991: 64 (simulation model) [in part?; may be *victus* or *listronoti*)]; Boivin, 1993: 74 (density dependence); Boivin, 1994: 236 (overwintering strategy); Baaren *et al*., 1999: 1 (mention); Huber, 2006: 32 (description, distribution); Huber, 2015b: 34 (mention).
Anaphes (*Patasson*) *sordidatus*: Yoshimoto, 1990: 54 (implied generic transfer, list); Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Curculionidae: *Tyloderma foveolata* Say.

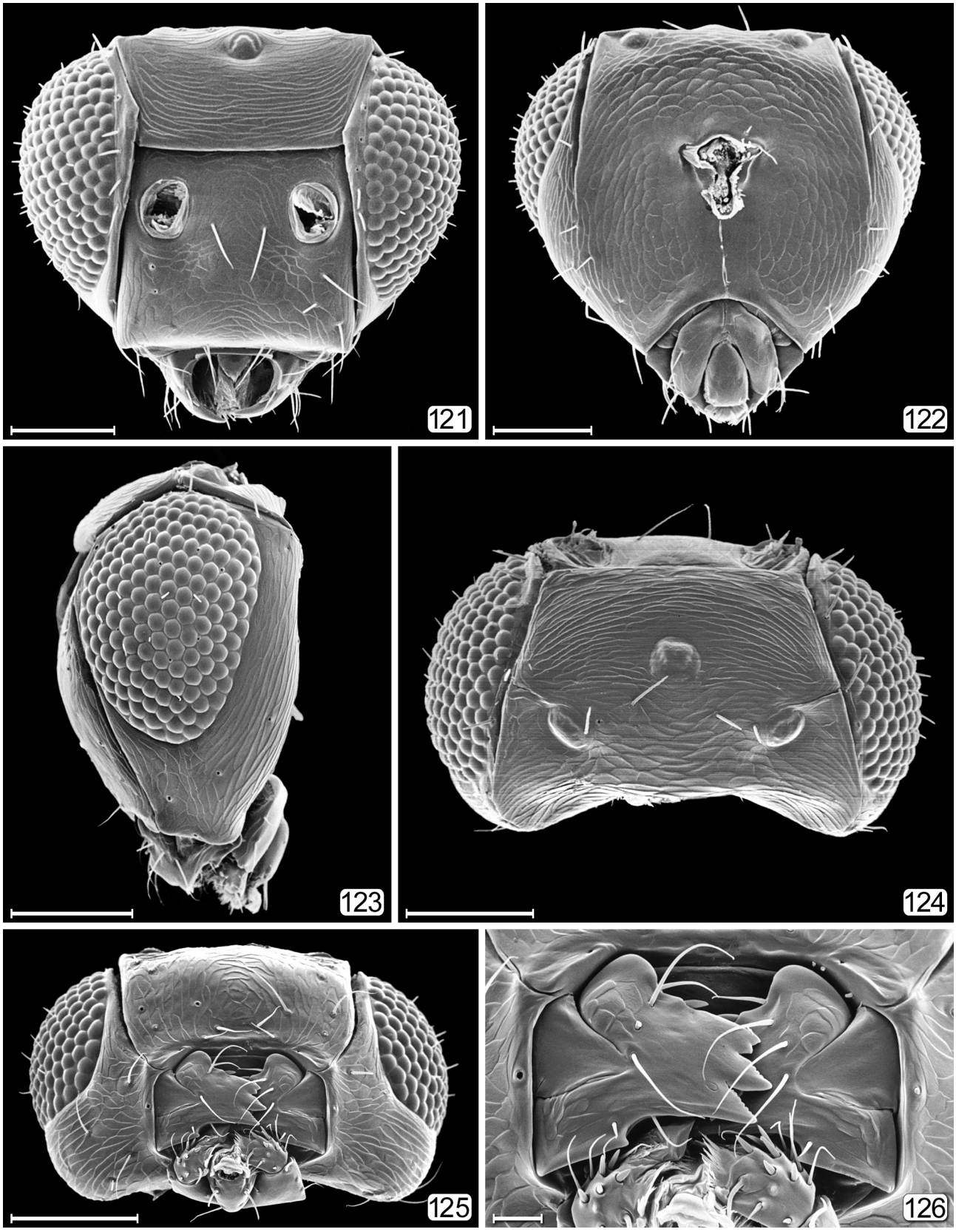
Distribution. USA: IL, MI, NJ.

Anaphes (*Patasson*) *victus* Huber, 1997

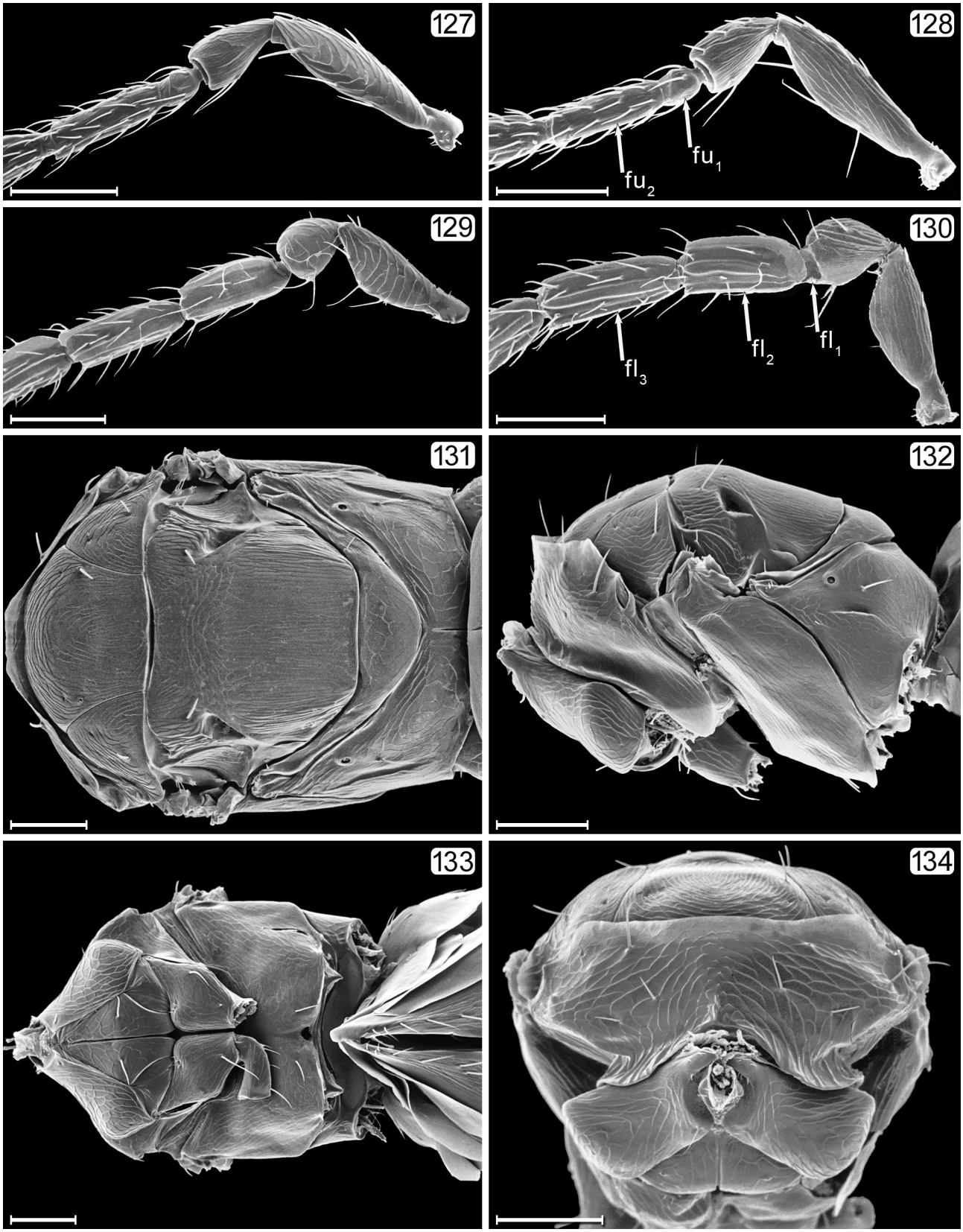
Anaphes victus Huber *in* Huber *et al*., 1997: 967. Holotype ♀ (CNC). **TL:** Canada, Quebec, Ste. Clotilde. Boivin *et al*., 1990: 91 (host, percent parasitism); Baaren *et al*., 1995a: 238 (*nomen nudum*, intraspecific hyperparasitism); Baaren *et al*., 1995b: 673 (*nomen nudum*, oviposition behavior); Boivin, 1995: 65 (*nomen nudum*, sex allocation strategy); Nénon *et al*., 1995: 997 (*nomen nudum*, larval morphology); Cormier *et al*., 1996: 1376 (*nomen nudum*, seasonal ecology, distribution); Hooper *et al*., 1996: 80 (*nomen nudum*, parasitism rate, comparison with *A. cotei*); Baaren *et al*., 1997: 189 (*nomen nudum*, larval morphology); Baaren & Boivin, 1998a: 525 (kin discrimination); Baaren & Boivin, 1998b: 10 (host discrimination); Baaren *et al*., 1999: 1 (antennal sensilla morphology); Baaren *et al*., 1999b: 67 (sex allocation, larval competition); Boivin, 1999: 28 (hosts); Boivin & Baaren, 2000: 471 (larval aggression and mobility); Boivin & Nénon, 2003: 772 (egg tubercule effect on parasitism); Boivin *et al*., 2004: 641 (foraging time); Baaren *et al*., 2005a: 503 (foraging behavior); Baaren *et al*., 2005b: 154 (oviposition behavior); Cournoyer & Boivin, 2005: 230 (kairomones); Huber, 2006: 33 (taxonomy); Traoré *et al*., 2006: 1122 (adaptations to climate); Wajnberg *et al*., 2006: 5 (foraging behavior); Bennett, 2008a: 677 (larva description [after Nénon *et al*. 1995]); Boivin, 2010a: 458 (phenotypic plasticity); Boivin, 2010b: 4 (male reproductive system); Romani *et al*., 2010: 73 (antennal sensilla); Colinet & Boivin, 2011: 90 (cold storage); Huber, 2015b: 24 (comparison with extralimital species).
Anaphes sordidatus: Boivin, 1986: 393 [misidentification; may also be *A. listronoti*] (host, percent parasitism); Boivin, 1993: 74 [misidentification; may also be *A. listronoti*)] (density dependence); Landry *et al*., 1993: 580 [misidentification, may also be *A. listronoti*] (barcoding).
Anaphes sp.: Boivin *et al.*, 1990: 91 (host, percent parasitism); Hance & Boivin, 1992: 293 (resistance to cold); Hance & Boivin, 1993: 759 (effect on host cold hardiness); Baaren *et al*., 1994: 326 (host discrimination).
Anaphes (*Patasson*) *victus*: Huber & Thuróczy, 2018: 28 (catalogue).

Nearctic hosts. Curculionidae: *Auletes epilobii* (Paykull), *Conotrachelus anaglypticus* (Say), *Listronotus oregonensis* (LeConte), *L. sparsus* (Say), *L. texanus* (Stockton), *Nedyus flavicaudis* (Boheman).

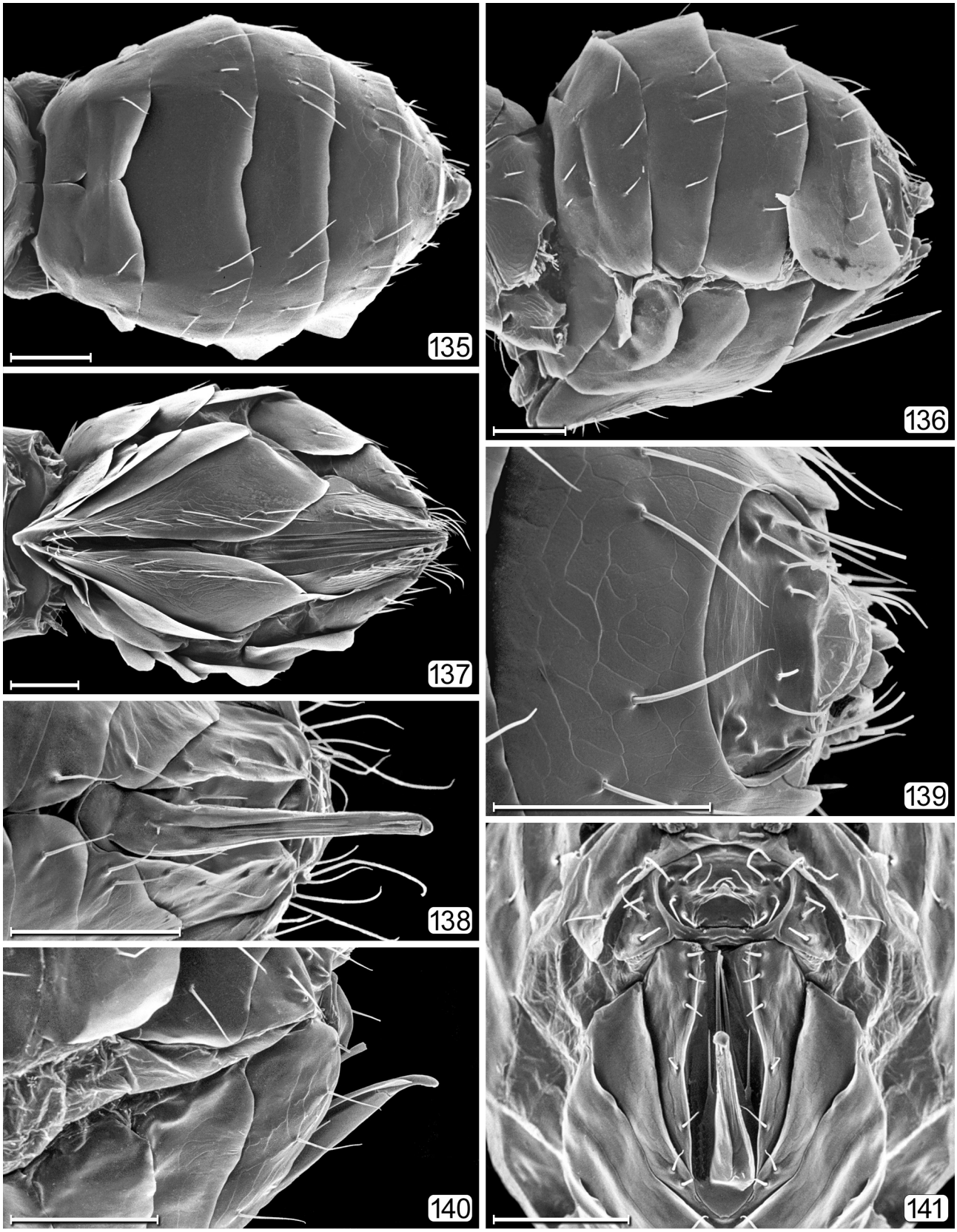
Distribution. Canada: QC. USA: MI, TX.



FIGURES 121–126. *Anaphes* sp., head. 121, anterior; 122, posterior; 123, lateral; 124, dorsal; 125, ventral, 126, mouthparts. Scale bars: 121–125=50 μm; 126=10 μm.



FIGURES 127–134. *Anaphes* sp. 127, female scape–fu_2, medial; 128, female scape–fu_2, lateral; 129, male scape–fl_2, medial; 130, male scape–fl_2, lateral; 131, mesosoma, dorsal; 132, mesosoma, lateral; 133, mesosoma, ventral; 134, mesosoma, anterior. Scale bars=50 μm.



FIGURES 135–141. *Anaphes* sp. 135, metasoma, dorsal; 136, metasoma, lateral; 137, metasoma, ventral; 138, male, apex of gaster ventral; 139, male, apex of gaster, dorsal, 140, male, apex of gaster, lateral; 141, male, apex of gaster, posterior. Scale bars=50 μm.

***Anaphes* spp.**

Anaphes sp.: Thier *et al*., 1976: 206 (host: *Parydra* sp. probably *quadrituberculata* Loew [Ephydridae]).
Anaphoidea sp.: Scotland, 1939: 717 (host: possibly *Lemnaphila scotlandae* Cresson [Ephydridae]).
Patasson sp.: Fisher *et al*., 1961: 196 (importation from Iran, host: *Hypera brunneipennis* (Boheman) [Curculionidae]).
Anaphes sp.: Schauff, 1984a: 48 (host: *Parydra quadrituberculata* Loew [Ephydridae]).
Anaphes sp.: Picard *et al*., 1991: 170 (response to host egg age).
Anaphes sp.: Cuda & Burke, 1991: 902 (host: *Trichobaris bridwelli* Barber [Curculionidae]).
Anaphes sp.: Meyers & Deonier, 1992: 15 (hosts: *Parydra aquila* (Fallén), *P. quadrituberculata* Loew [Ephydridae]).
Patasson sp.: Stark & Goyer, 1983: 150 (host: *Neochetina eichhorniae* Warner [Curculionidae]).

ARESCON Walker, 1846

(Figs 142–162)

Arescon Walker, 1846: 50. Type species: *Mymar dimidiatus* Curtis, 1832, by monotypy.
Leimacis Foerster, 1847: 208. Type species: *Leimacis rufula* Foerster, 1847, by monotypy. Synonymy by Foerster, 1856: 119.
Limacis Foerster, 1856: 120. Unjustified emendation.
Xenomymar Crawford, 1913: 349. Type species: *Xenomymar urichi* Crawford, 1913, by monotypy. Synonymy by Annecke & Doutt, 1961c: 12.
Neurotes Enock, 1914: cxxxiv. Type species: *Neurotes iridescens* Enock, 1914, by monotypy. Synonymy by De Santis, 1967: 102.

Diagnosis. Body length 595 μm (n=1). Funicle 5-segmented (Fig. 145); fore wing (Fig. 146) with venation extending at least 0.66× wing length; marginal vein longer than submarginal vein and 2× as long as parastigma; postmarginal vein absent; 2 distal macrochaeta present. Male genitalia with two rod-like parameres.

Discussion. Only three specimens (CNC) of *Arescon* from America north of Mexico were seen. *Arescon aspidioticola* Ashmead (1879), catalogue by Peck (1963: 51) and placed in *Arescon*, is probably correctly placed in Aphelinidae as discussed by Schauff (1984a: 39), so no named species are represented in the Nearctic. Incidentally, that species appears, incorrectly, under Mymaridae in the checklist of Chalcidoidea of Malta (Askew & Mifsud 2016). *Arescon* has 5-segmented tarsi and represents an early lineage that appears to be most closely related to *Kikiki* Huber & Beardsley and *Tinkerbella* Huber & Noyes with 3- and 4-segmented tarsi, respectively; the latter two genera occur in the New World but have not yet been found in the Nearctic. Four other apparently related genera occur only in the Old World (Huber 2017).

Nearctic hosts. Unknown. An extralimital host is in Hemiptera: Cicadellidae (Subba Rao 1966).

Important references. Ogloblin (1957) treated the Neotropical species (as *Xenomymar*), Triapitsyn & Berezovskiy (2003, 2004a) treated the Palaearctic species and Triapitsyn (2016) treated the Oriental species.

***Arescon* spp**. The few specimens examined appear to represent two species.

Distribution. USA: AL, FL.

CALLODICOPUS Ogloblin, 1955

(Figs 163–183)

Callodicopus Ogloblin, 1955: 377. Type species: *Callodicopus crassula* Ogloblin, 1955, by original designation.
Decamymar Annecke, 1961b: 68. Type species: *Decamymar magiclavae*, Annecke, 1961, by monotypy. Synonymy by Huber & Lin, 1999: 26.

Diagnosis. Funicle 7-segmented, with fu_2 about as long as fu_1 or fu_3 (Fig. 166); mandibles with 2 equal teeth, crossing when closed (Fig. 177); occiput separated from gena/postgena by vertexal trabecula, a thick bar of cuticle (in photographs) extending transversely across posterior surface of head to posterior apex or each supraorbital sulcus, the latter extending ventrally at least to level of occipital foramen (Fig. 165); in scanning electron micrographs the cuticular bar appearing as a thin sulcus (Fig. 173); mesophragma projecting slightly into gaster (Fig. 171); gt_1 about same length as each following tergum (Fig. 183).

Discussion. *Callodicopus* belongs to the *Alaptus* group of genera, together with *Alaptus*, *Dicopomorpha*, and *Dicopus* though it appears to be a link with the *Camptoptera* group of genera. The main feature that supports place-

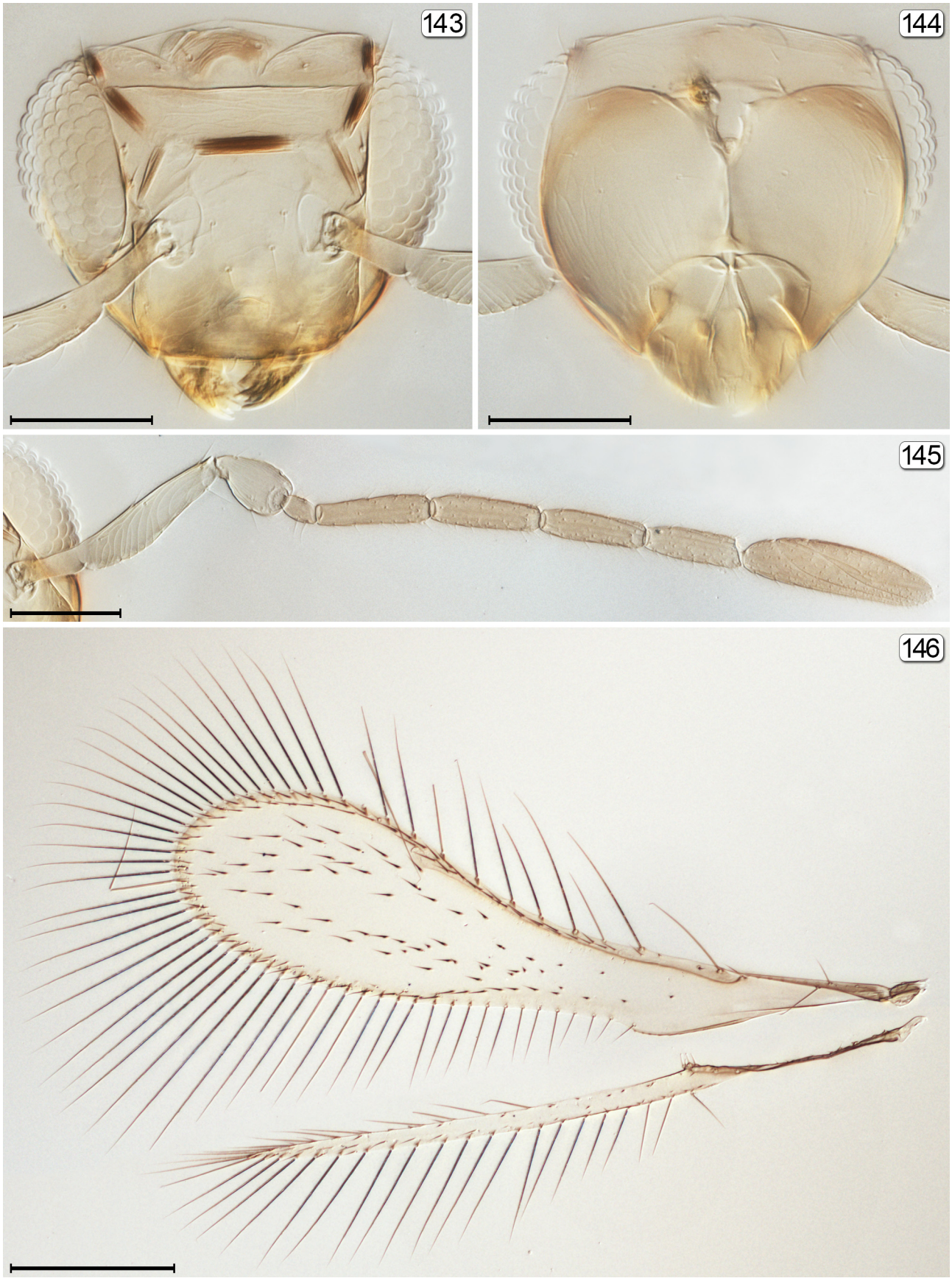
ment in the former group is the wide propodeal foramen with the mesophragma projecting slightly through it into the gaster. However, the back of the head closely resembles members of the *Camptoptera* group of genera because of the presence of a median vertical coronal sulcus (Figs 165, 173).

The first *Callodicopus* species known in America north of Mexico is described below. Several other specimens were examined but do not seem to have the back of the head with a thick transverse bar of cuticle (Fig. 165) extending above the foramen from eye to eye; they may be species of *Dicopomorpha*. The limits of both genera need clarification.

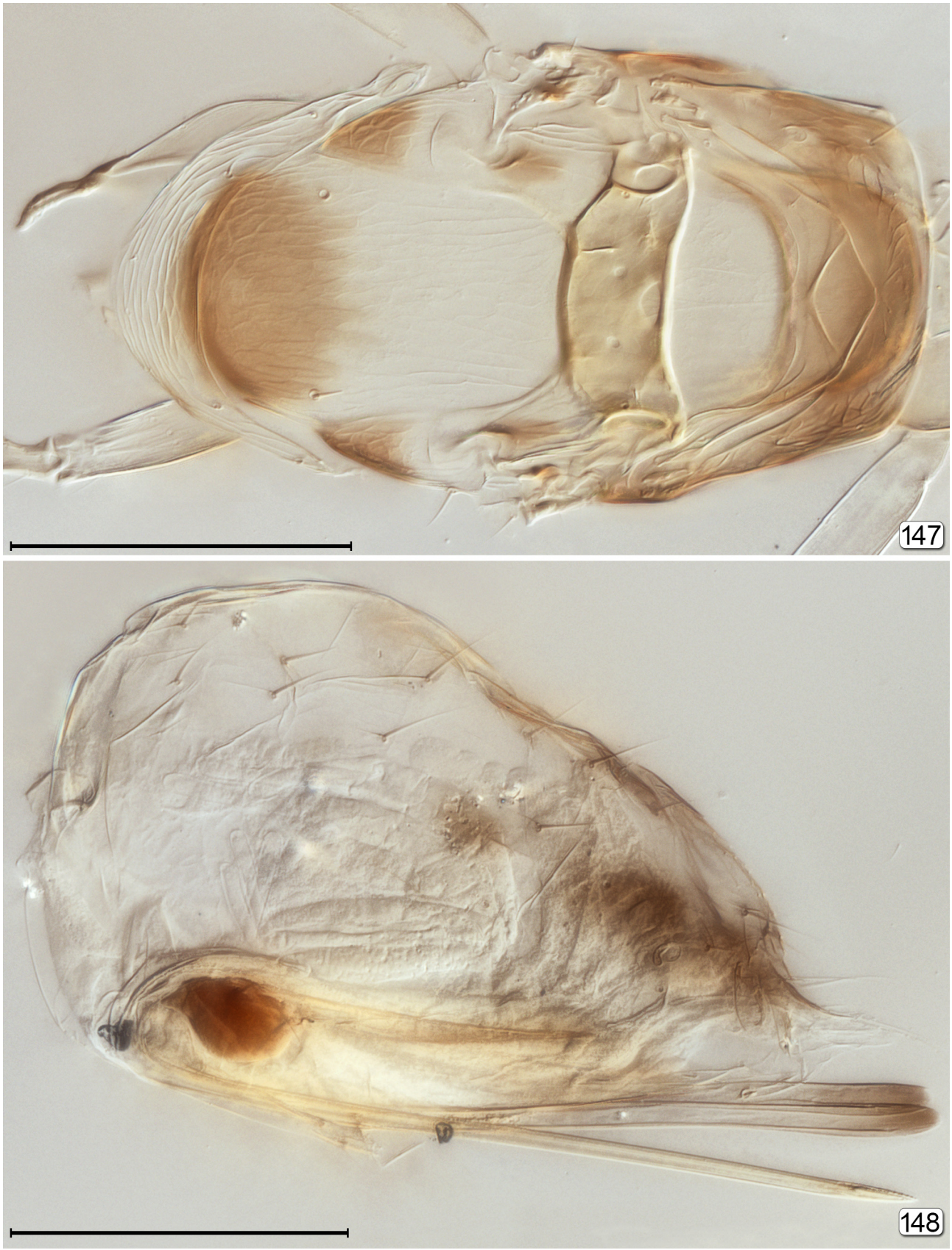
Important references. Ogloblin (1955), Huber & Lin (1999).



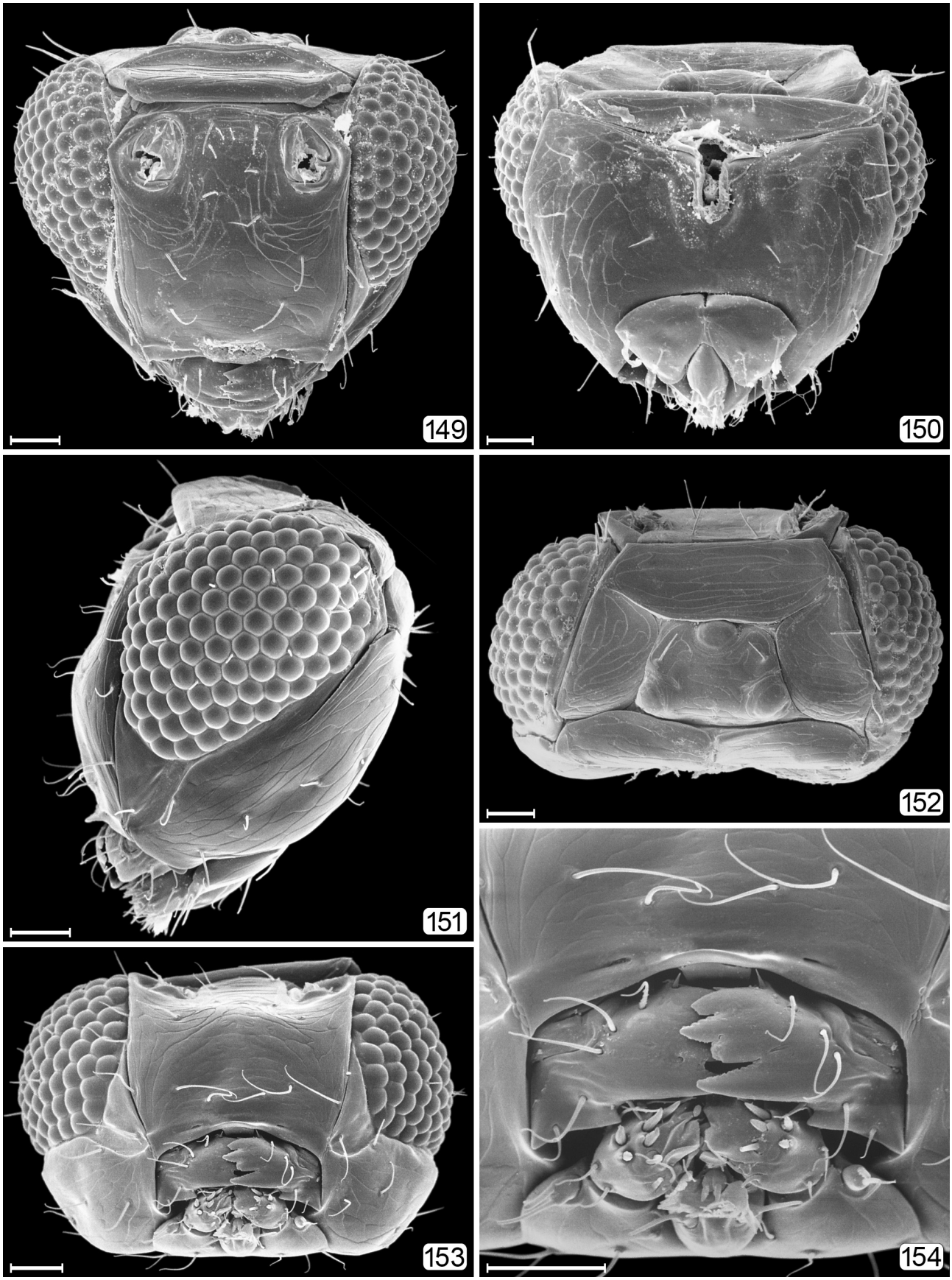
FIGURE 142. *Arescon* sp., habitus. USA, Alabama, Mobile Co., Chunchula, 20.vi.2004, E. Benton. Scale bar=500 μm.



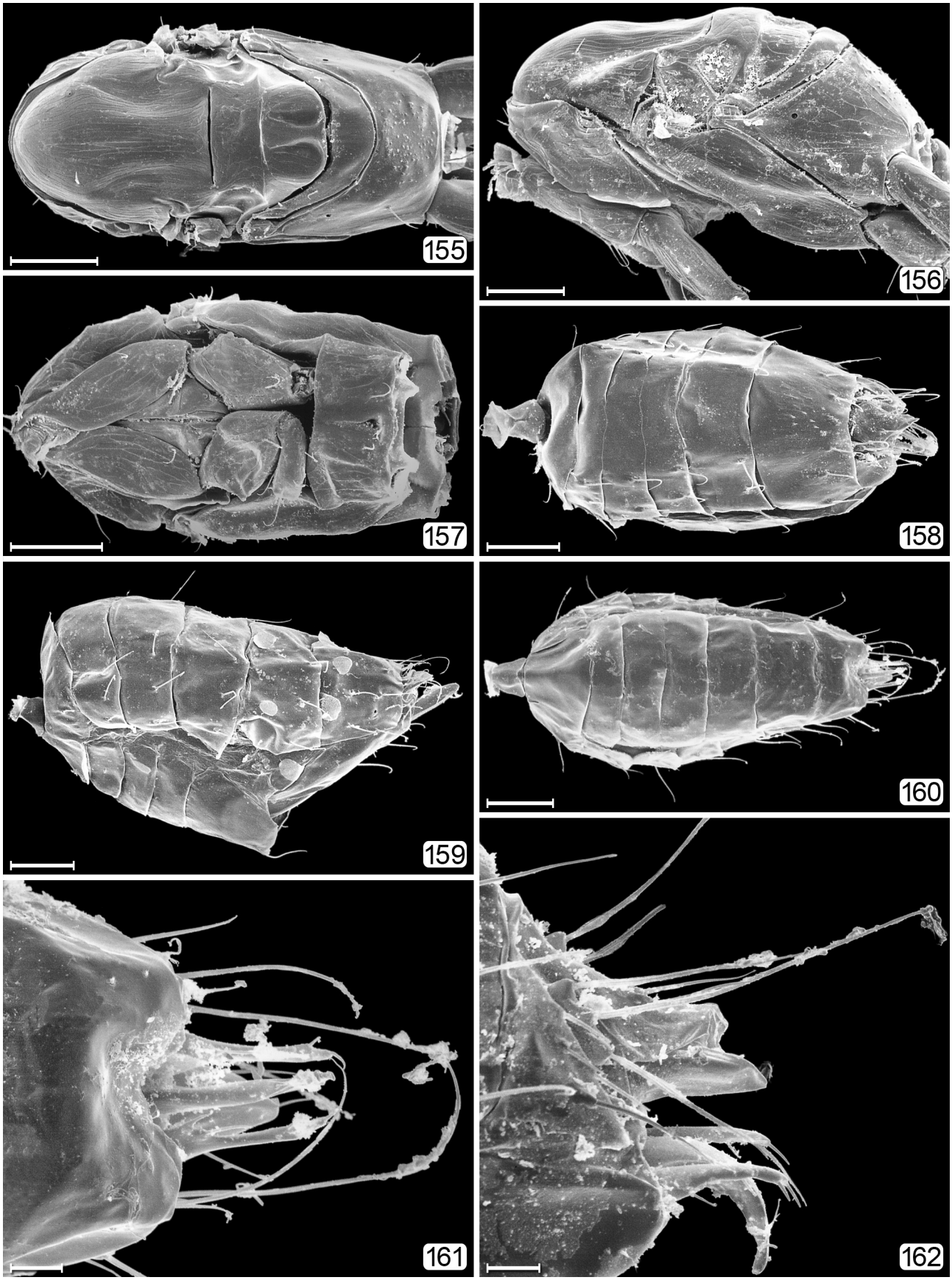
FIGURES 143–146. *Arescon* sp. 143, head, anterior; 144, head, posterior; 145, antenna; 146, wings. Scale bars: 143–145=50 μm; 146=100 μm.



FIGURES 147, **148**. *Arescon* sp. 147, mesosoma, dorsal; 148, metasoma, lateral. Scale bars=100 μm.



FIGURES 149–154. *Arescon dimidiatus* (Curtis), head (Czech Republic). 149, anterior; 150, posterior; 151, lateral; 152, dorsal; 153, ventral; 154, mouthparts. Scale bars=20 μm.



FIGURES 155–162. *Arescon dimidiatus* (Curtis). 155, mesosoma, dorsal; 156, mesosoma, lateral; 157, mesosoma, ventral; 158, metasoma, dorsal; 159; metasoma, lateral; 160, metasoma, ventral; 161, male gaster apex, dorsal; 162, male gaster apex, lateral. Scale bars: 155–160=50 μm; 161, 162=10 μm.

***Callodicopus floridanus* Huber, sp. n.**
(Figs 163–171)

Type material. Holotype ♀ (CNC), dissected under 4 coverslips on slide (Fig. 169) labelled: 1. "Callodicopus floridanus Huber Holotype ♀ dorsal". 2."USA: FL, Alachua Co. Gainesville 12-20.XII.1986 W.R.M. Mason, MT mesic forest".

Paratypes. 5 ♀. USA. **AL**: *Mobile Co.*, Chunchula, 30.90°N 88.20°W, 25.x.2004, W.E. Benton, Malaise trap (1 ♀, CNC). **F**L: *Alachu*a *Co*., Gainesville, AEI, 23.ii-2.vi.1988, D.B. Wahl, FIT (1 ♀, CNC); *Baker Co*., Glenn St. Mary, 13.ix.2007, 13°18'00"N 82°00'55"W, rural yard/mixed woods, E. Zoll, S. Fullerton (1♀, CNC); *Dade Co.*, Miami, Deering Estate Park, SW 1057 Street & SW 72 Avenue, 21.ii-1.vi.1986, S. & J. Peck, young hammock forest (1 ♀, CNC); Miami, Old Cutler Hammock, 7900 SW 76 Street, 21.ii-1.iv.1986, S. & J. Peck, hammock. Malaise trap (1 ♀, CNC).



FIGURE 163. *Callodicopus floridanus* Huber, paratype, habitus. USA, Florida, Alachua Co., AEI [3005 SW 56th Avenue], 23.ii–2.vi.1988, D.B. Wahl. Scale bar=500 μm.

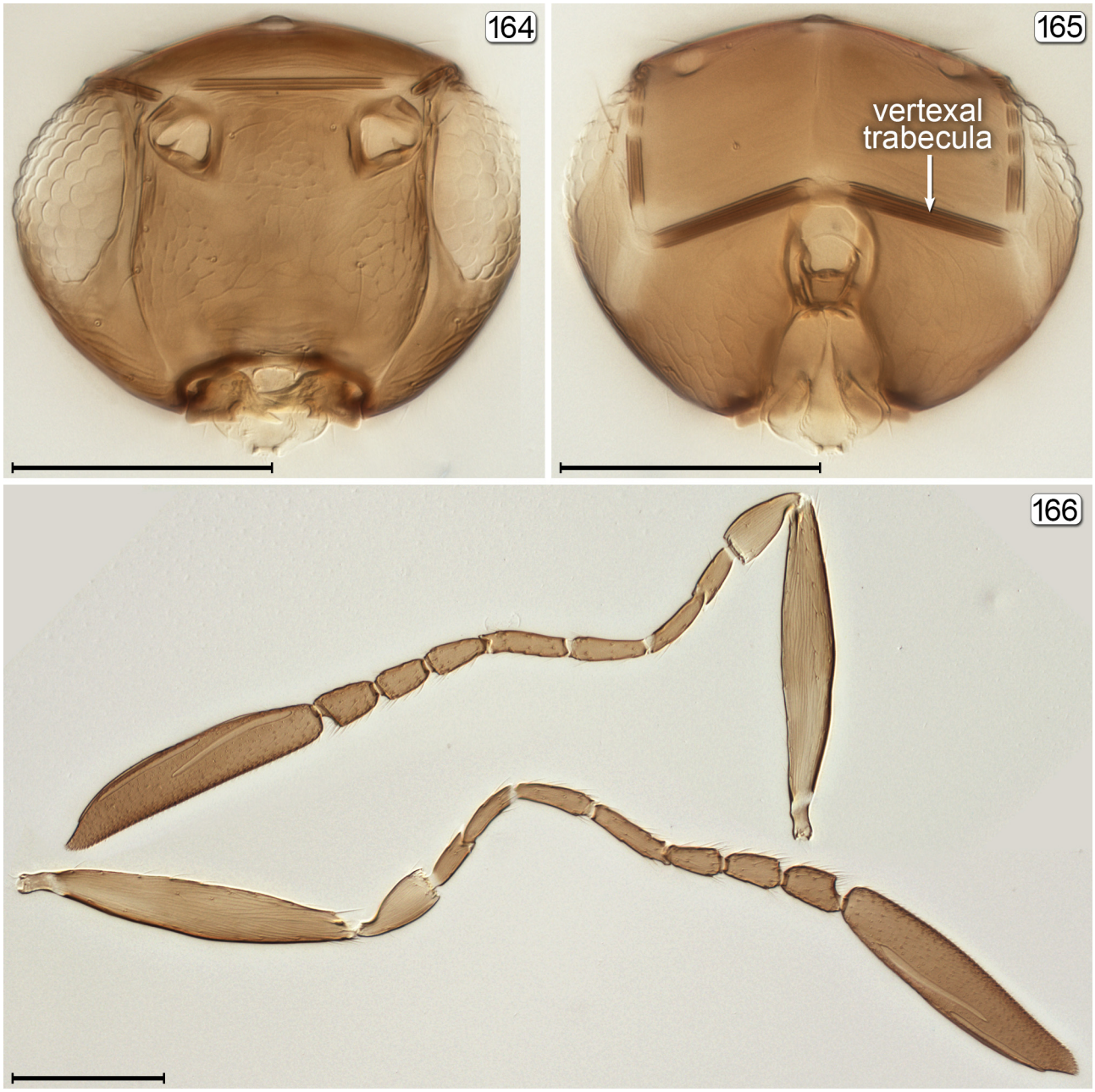
Diagnosis. *Callodicopus floridanus* is distinguished from all other described *Callodicopus* species by fu_2 longer than fu_1 and almost as long as fl_3 (Figs 163, 166). In the other described species fu_2 is much shorter (almost ring-like) than either of these segments.

Description. **Female**. Body length 335–445 (n=3). Colour. Head and mesosoma brown, antennae, metasoma and legs except coxae and apical tarsomere slightly (Fig. 163) to distinctly lighter (in one specimen radicle, pedicel, and legs yellowish white). Head width 193 (n=1). Antenna length/width measurements (ratios) (n=2) are: scape 203–226/31–36 (6.29–6.50), pedicel 58–60/27–28 (2.03–2.25), fu_1 34–39/14–15 (2.24–2.77), fu_2 48–50/12–13 (3.79–3.87), fu_3 50–55/16 (3.12–3.51), fu_4 54–59/14–16 (3.35–4.18), fu_5 37–40/18–19 (2.06–2.11), fu_6 38–39/20–21 (1.79–1.94), fu_7 40–42/20–26 (1.66–2.00), clava 182–186/38–39 (4.75–4.79). Fore wing length (n=2) 558–592, width 50–62, length/width 9.6–11.2, longest marginal setae 158–171; hind wing length 568–602, width 30, longest marginal setae 136–145. Ovipositor length (n=2) 136–139, 0.72–0.77× as long as metatibia length (178–193).

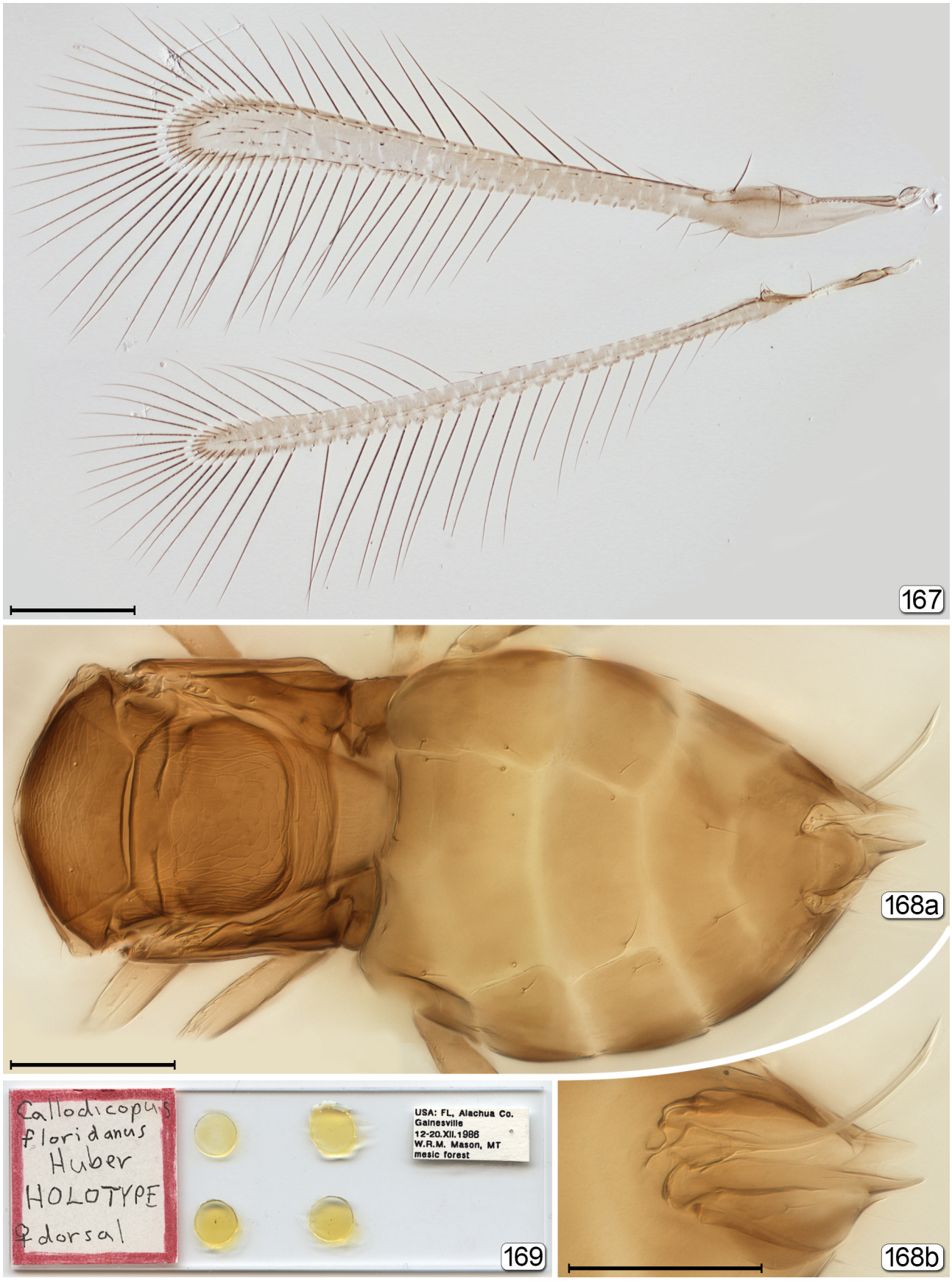
Male. Unknown.

Derivation of species name. The species is named after Florida, the first state in which it was collected.

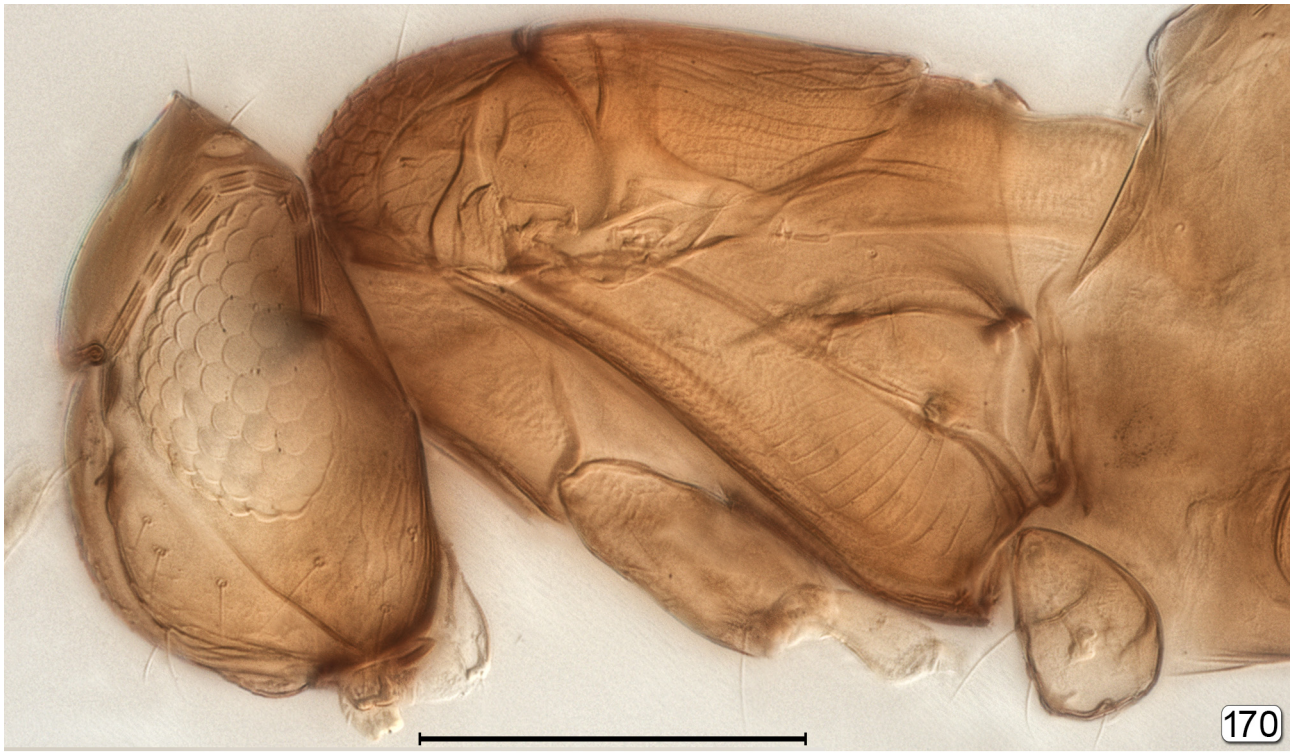
Distribution. USA: AL, FL.

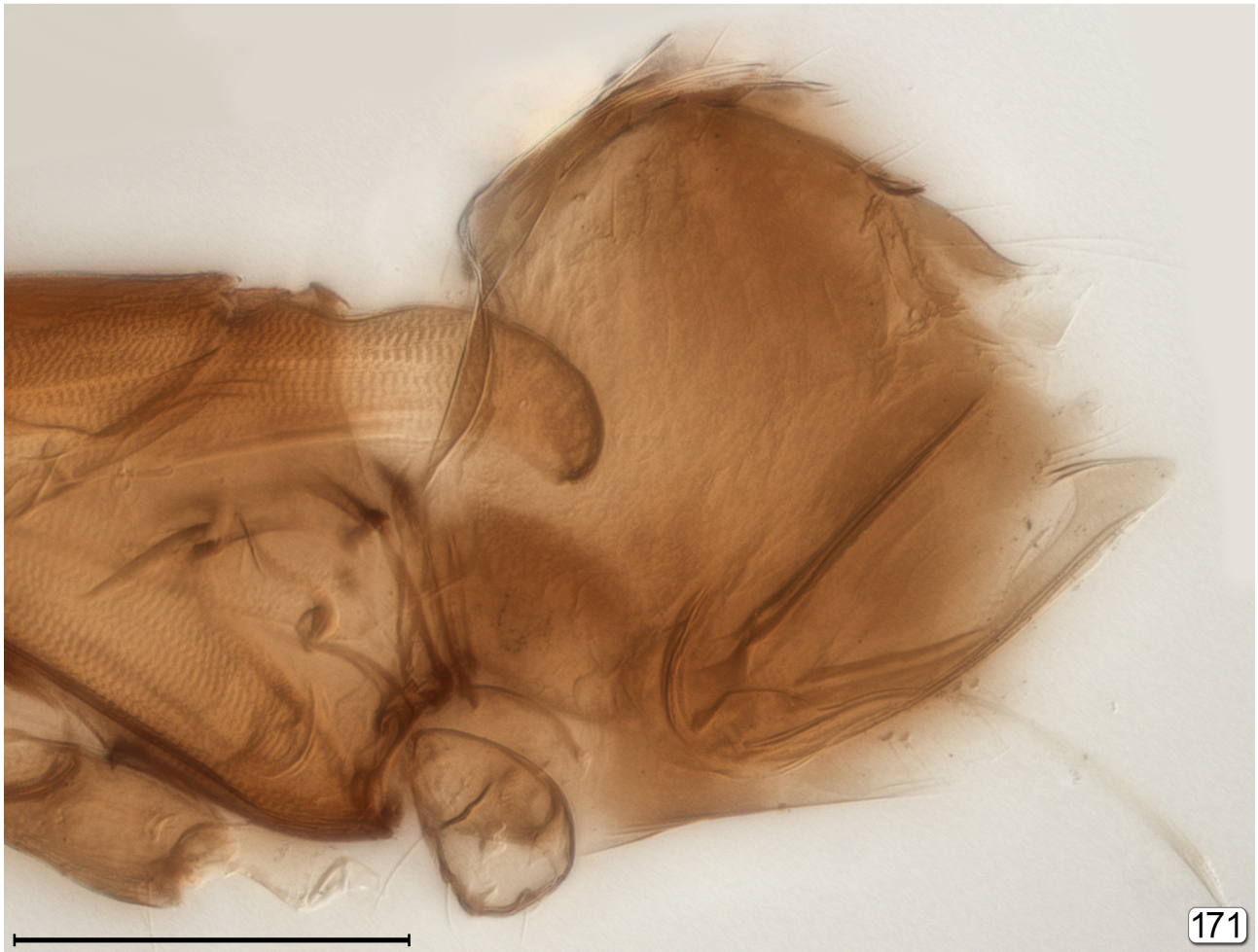


FIGURES 164–166. *Callodicopus floridanus* Huber, holotype. 164, head, anterior; 165, head, posterior; 166, antennae. Scale bars=100 μm.

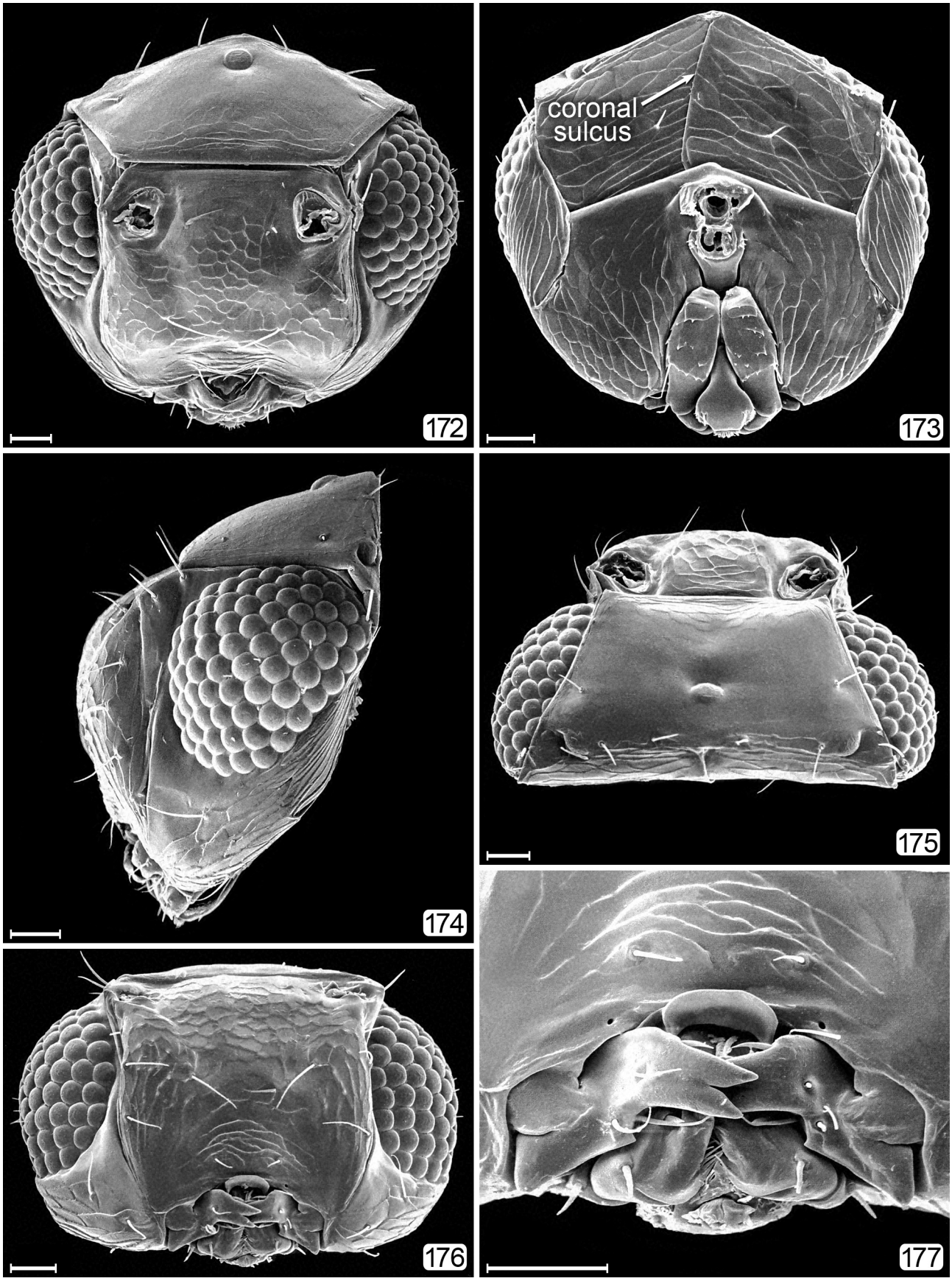


FIGURES 167–169. *Callodicopus floridanus* Huber, holotype. 167, wings; 168a, mesosoma + metasoma, dorsal; 168b, genitalia seen through gaster; 169, holotype slide. Scale bars=100 μm.

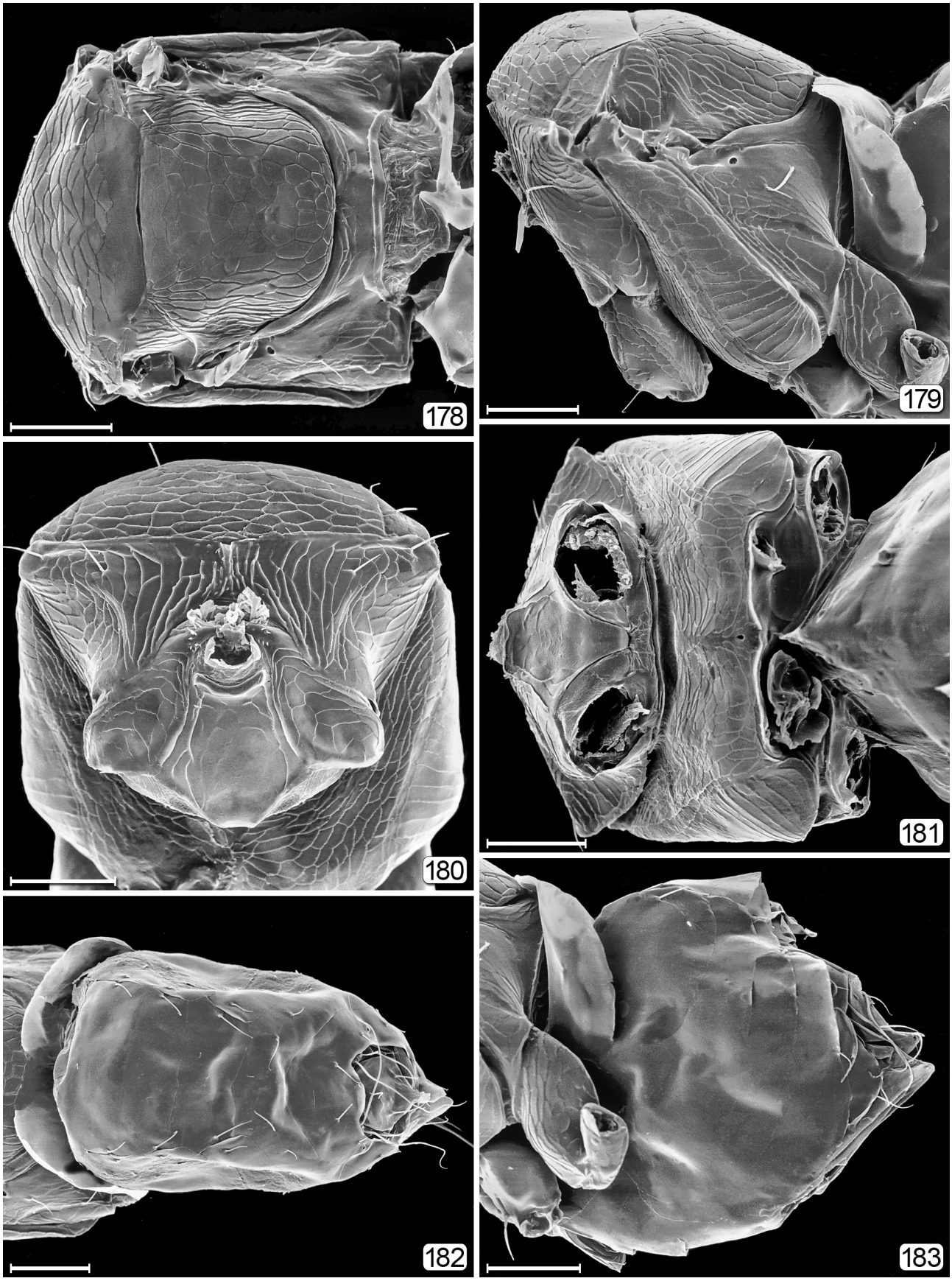




FIGURES 170, 171. *Callodicopus floridanu*s Huber, paratype. 70, head–base of metasoma, lateral; 171, apex of mesosoma + metasoma, lateral showing mesophragma and ovipositor. Scale bars=100 μm.



FIGURES 172–177. *Callodicopus* sp., head (Costa Rica). 172, anterior; 173, posterior, 174, lateral; 175, dorsal, 176, ventral; 177, mouthparts. Scale bars=20 μm.



FIGURES 178–183. *Callodicopus* sp. (Costa Rica), mesosoma. 178, dorsal; 179, mesosoma, lateral; 180, mesosoma, anterior; 181, mesosoma, ventral; 182, metasoma, dorsal; 183, metasoma, lateral. Scale bars=50 μm.

CAMPTOPTERA Foerster, 1856

(Figs 184–214)

Camptoptera Foerster, 1856: 116, 119. Type species: *Camptoptera papaveris* Foerster, 1856, by monotypy.

Stichothrix Foerster, 1856: 117, 118, 121. Type species: *Stichothrix cardui* Foerster, 1856, by monotypy. Synonymy by Annecke & Doutt, 1961c: 15.

Pteroclisis Foerster, 1856: 144. Unnecessary replacement name for *Camptoptera* (Huber & Lin, 1999: 27).

Eomymar Perkins, 1912: 26. Type species: *Eomymar muiri* Perkins, 1912, by monotypy. Synonymy by Huber & Lin, 1999: 27.

Congolia Ghesquière, 1942: 320. Type species: *Congolia sycophila* Ghesquière, 1942, by monotypy. Synonymy by Debauche, 1949: 18.

Sphegilla Debauche, 1948: 62. Type species: *Sphegilla franciscae* Debauche, 1848, by monotypy. Synonymy by Yoshimoto, 1990: 32.

Wertanekiella Soyka, 1961: 87. Type species: *Wertanekiella brevicornis* Soyka, 1961, by monotypy. Synonymy under *Sphegilla* by Mathot, 1969: 2.

Camptoptera (*Zemicamptoptera*) Ogloblin & Annecke, 1961: 302. Type species: *Camptoptera* (*Zemicamptoptera*) *semialbata* Ogloblin & Annecke, 1961, by original designation.

Staneria Mathot, 1966: 214. Type species: *Staneri diademata* Mathot, 1966, by monotypy. Synonymy by Huber & Lin, 1999: 27.

Diagnosis. Body length 210–535 µm. Funicle 7-segmented with fu_2 ring-like, much shorter than fu_1 or fu_3 (Figs 189, 190); mandible with 1 tooth (Fig. 203); head posteriorly with median vertical coronal sulcus extending medially from vertexal suture to meet postorbital sulcus and postorbital sulcus extending from above foramen laterally to below eye (Figs 186, 199); fore wing narrow, with posterior margin concave and apex slightly but distinctly curved (Figs 184, 192); petiole slightly longer than wide (Figs 193, 212–214). Male flagellum with fl_2 and often fl_3 ring-like, much shorter than remaining segments (Fig. 191).

Discussion. *Camptoptera* belongs to the *Camptoptera* group of genera together with *Camptopteroides*, *Eofoersteria*, *Macrocamptoptera*, *Ptilomymar* and *Stephanocampta*. Huber & Lin (1999) had also included *Callodicopus* in the group, but on balance of features, particularly the mesophagma projecting into the gaster, *Callodicopus* fits better in the *Alaptus* group rather than the *Camptoptera* group, in which the mesophragma does not project through the petiole into the gaster. The two groups are more closely related to each other than to any other group of genera, with *Callodicopus* appearing to form the link between them.

Nearctic hosts. Coleoptera: ? Ciidae, Curculionidae (Scolytinae).

Important references. Girault (1929 [428]), Huber & Lin (1999), Triapitsyn (2014b).

Camptoptera brunnea Dozier, 1933

Camptoptera brunnea Dozier, 1933: 97. Holotype ♀ (USNM). **TL:** USA, Delaware, Newark, University of Delaware Agriculture Experiment Station. Debauche, 1949: 18 (antennal structure) [AT]; Peck, 1951: 411 (catalogue); Peck, 1963: 20 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 34 (list); Triapitsyn, 2014b: 22 (comparison with *C. cardui*, distribution).

Camptoptera (*Camptoptera*) *brunnea*: Yoshimoto, 1990: 34 (list).

Distribution. USA: DE.

Camptoptera cardui (Foerster, 1856)

Stichothrix Cardui [*sic*] Foerster, 1856: 121. Lectotype ♀ (NHMW), designated by Triapitsyn, 2014b: 13. **TL:** Germany, likely Aachen environs.

Camptoptera cardui: Triapitsyn, 2014b: 9 (key), 12 (description, distribution); Dale-Skey *et al.*, 2016: 235 (checklist) [P].

Camptoptera aula Debauche, 1948: 71. Holotype ♀ (ISNB). **TL:** Belgium, Héverlé. Synonymy by Triapitsyn, 2014b: 13 (from the previous synonymy under *C. foersteri* by Huber, 2011: 56). Debauche, 1948: 68 (key).

Camptoptera Foersteri [*sic*] Girault, 1917 [313a]: 20. Several syntype ♀ and ♂ (ZMHB). **TL:** Germany, unspecified. Synonymy by Triapitsyn, 2014b: 12.

Camptoptera lapponica Heqvist, 1954: 273. Holotype ♀, lost? [current type depository in Sweden unclear] (Triapitsyn 2014b). **TL:** Sweden, Hällnäs. Synonymy by Triapitsyn, 2014b: 13.

Camptoptera tarsalis Kryger, 1950: 47. Neotype ♀ (NHMUK), designated by Triapitsyn, 2014b: 15. **TL:** UK, England, Surrey Co., Godalming. Synonymy by Triapitsyn, 2014b: 13.

Stichothrix pechlaneri Soyka, 1953: 58. Lectotype ♀ (NHMW), designated Triapitsyn, 2014b: 18. **TL:** Austria, Gschnitztal. Synonymy by Triapitsyn, 2014b: 13.

Stichothrix stammeri Soyka, 1953: 60. Holotype ♀ (NHMW). TL: Germany, Malchin, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Triapitsyn, 2014b: 13.

Nearctic hosts. ? Ciidae.

Distribution. Canada: MB. USA: IL.

Camptoptera magna Soyka, 1946

Camptoptera magna Soyka, 1946a: 43. Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg, St. Ignatius Jesuit College. Triapitsyn, 2014b: 10 (key), 38 (description, distribution).

*Camptoptera hundsheimens*is Soyka, 1961: 78. Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 2014b: 38.

Camptoptera kressbachi Soyka, 1961: 80. Holotype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Triapitsyn, 2014b: 38.

Camptoptera minorignatha Hu & Lin in Guo *et al.*, 2011: 410. Holotype ♀ (ICXU). **TL:** China, Xinjiang, Shihezi. Synonymy by Triapitsyn, 2014b: 39.

Camptoptera nigra Soyka, 1961: 81. Holotype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Triapitsyn, 2014b: 39.

Camptoptera nigrosimilis Soyka, 1961: 81. Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 2014b: 39.

Camptoptera signatipennis Soyka, 1961: 85. Holotype ♀ (NHMW). **TL:** Austria, Innsbruck, Arzler Alm. Synonymy by Triapitsyn, 2014b: 39.

Camptoptera strobilicola Heqvist, 1956: 37. Holotype ♀ (ZMUN), lost? (Triapitsyn 2014b). **TL:** Norway, Romedal, "on Gammelseter-berget". Synonymy by Triapitsyn, 2014b: 38.

Nearctic hosts. Likely Ciidae.

Distribution. USA: DE, IA, NE?, TX.

Camptoptera papaveris Foerster, 1856

Camptoptera Papaveris [*sic*] Foerster, 1856: 119. Lectotype ♀ (NHMW), designated by Triapitsyn, 2014b: 50. **TL:** Germany, almost certainly Aachen area.

Camptoptera papaveris: Bouček & Graham, 1978: 109 (checklist) [P]; Pagliano & Navone, 1995: 35 (list) [P]; Gijswijt, 2003: 50 (list) [P]; Pricop, 2009b: 125 (distribution) [P]; Pintureau, 2012: 38 (European list) [P]; Triapitsyn, 2014b: 10 (key), 48 (description, distribution); Dale-Skey *et al.*, 2016: 236 (checklist) [P].

Camptoptera pulla Girault, 1909 [57]: 27. Lectotype ♀ (INHS), designated by Frison, 1927: 227. **TL:** USA, Illinois, Urbana. Synonymy by Triapitsyn, 2014b: 48. Girault, 1909 [57]: 28 (key); Girault, 1910 [69]: 236 (description, distribution); Girault, 1911 [96]: 254 (distribution); Girault, 1915 [256]: 276 (description); Girault, 1915 [261]: 8 (hosts, distribution); Essig, 1929: 818 (hosts, distribution); Girault, l929 [428]: 22 (description in key); Dozier *et al*., 1932: (bionomics); Peck, 1951: 411 (catalogue); Thompson, 1958: 569 (host catalogue); Ogloblin & Annecke, 1961: 296 (distribution) [AT]; Peck, 1963: 20 (catalogue); De Santis, 1967: 107 (catalogue); Burks, 1979: 1027 (catalogue); De Santis, 1979: 368 (catalogue); Ogloblin, 1979: 107 (catalogue) [NT]; Webb, 1980: 118 (lectotype listed); Luft Albarracin *et al.*, 2009: 6 (list) [NT]; Triapitsyn, 1914b: 53 (type material).

Camptoptera (*Camptoptera*) *pulla*: Yoshimoto, 1990: 34 (list).

Camptoptera aequilonga Soyka, 1961: 76. Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera andradae Soyka, 1961: 75. Holotype ♀ (NHMW). **TL:** Portugal, Viseu, Resende. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera annulata Soyka, 1961: 76. Holotype ♀ (NHMW). **TL:** Poland, Gmina Długołęka, Pruszowice [as Bruschewitz near Breslau]. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera colorata Soyka, 1961: 77. Holotype ♀ (NHMW). **TL:** Austria, most likely Zicksee near Sankt Andrä am Zicksee. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera grandithoracala Guo & Wang in Guo *et al.*, 2011: 409 (key), 411, 413. Holotype ♀ (ICXU). **TL:** China, Xinjiang, Wujiaqu. Synonymy by Triapitsyn, 2014b: 50.

Camptoptera intermedia Soyka, 1961: 78. Holotype ♀ (NHMW). **TL:** Portugal, Viseu, Resende. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera interposita Soyka, 1961: 79. Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera parva Soyka, 1961: 83. Holotype ♀ (NHMW). **TL:** Germany, Malchin, Jettchenshof [a farm ≈ 2.5 km N. of Malchin]. Synonymy by Triapitsyn, 2014b: 49.

Camptoptera saintpierrei Girault, 1915 [228]: 154. Holotype ♀ (USNM). **TL:** unknown (presumed England). Synonymy by Triapitsyn, 2014b: 49.

Camptoptera setipaupera Soyka, 1961: 84. Holotype ♀ (NHMW). **TL:** Netherlands, Valkenburg, St. Ignatius Jesuit College. Synonymy by Triapitsyn, 2014b: 49.

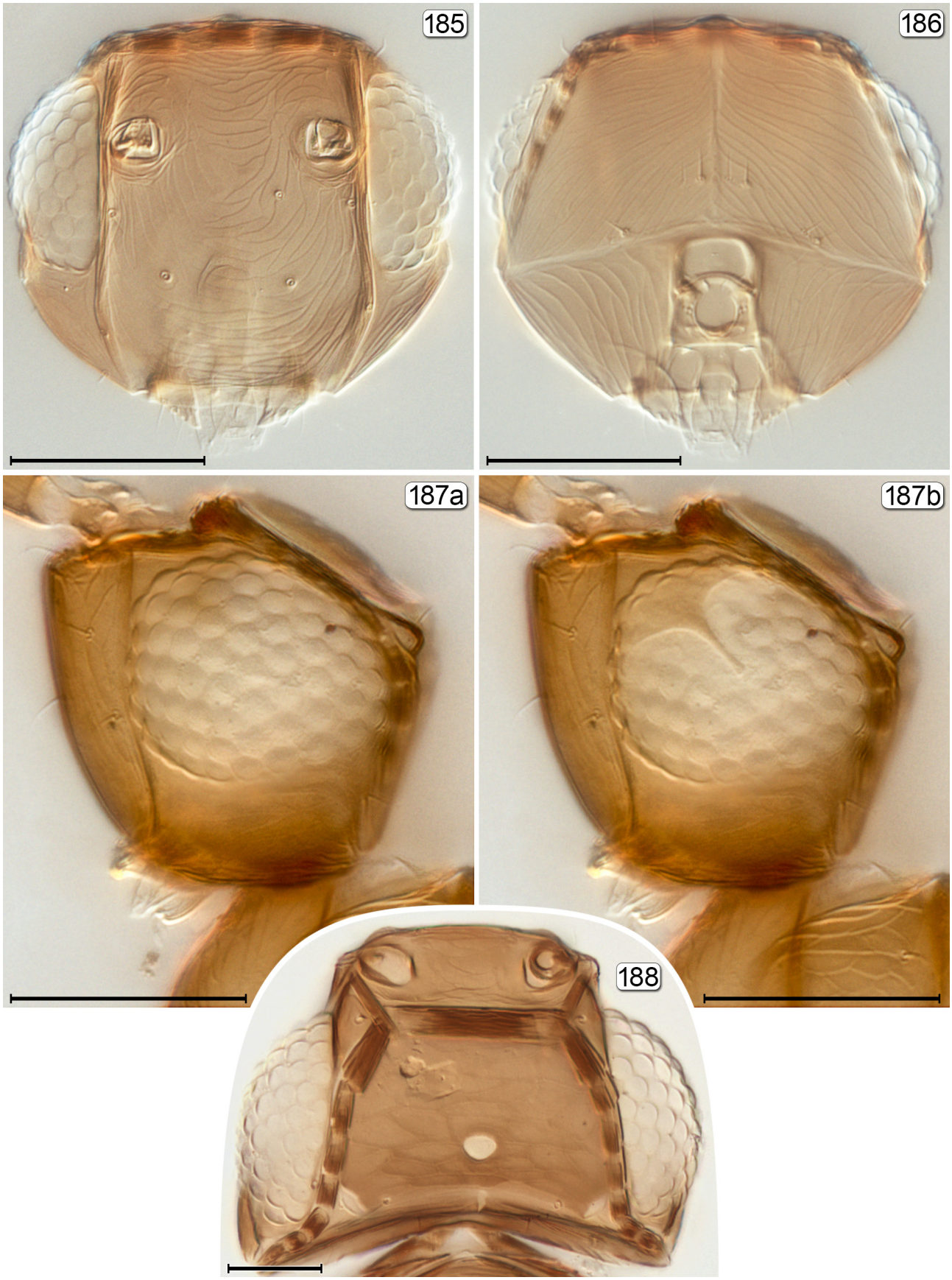
Camptoptera tenuis Soyka, 1961: 85. Holotype ♀ (NHMW). **TL:** Poland, Małkowice (near Wrocław) [as Malkwitz near Breslau]. Synonymy by Triapitsyn, 2014b: 49.

Sphegilla transilvanica Boţoc, 1960: 82. Holotype? ♀, lost (Triapitsyn 2014b). **TL:** Romania, Cluj-Napoca, Galcer. Synonymy by Triapitsyn, 2014b: 49.

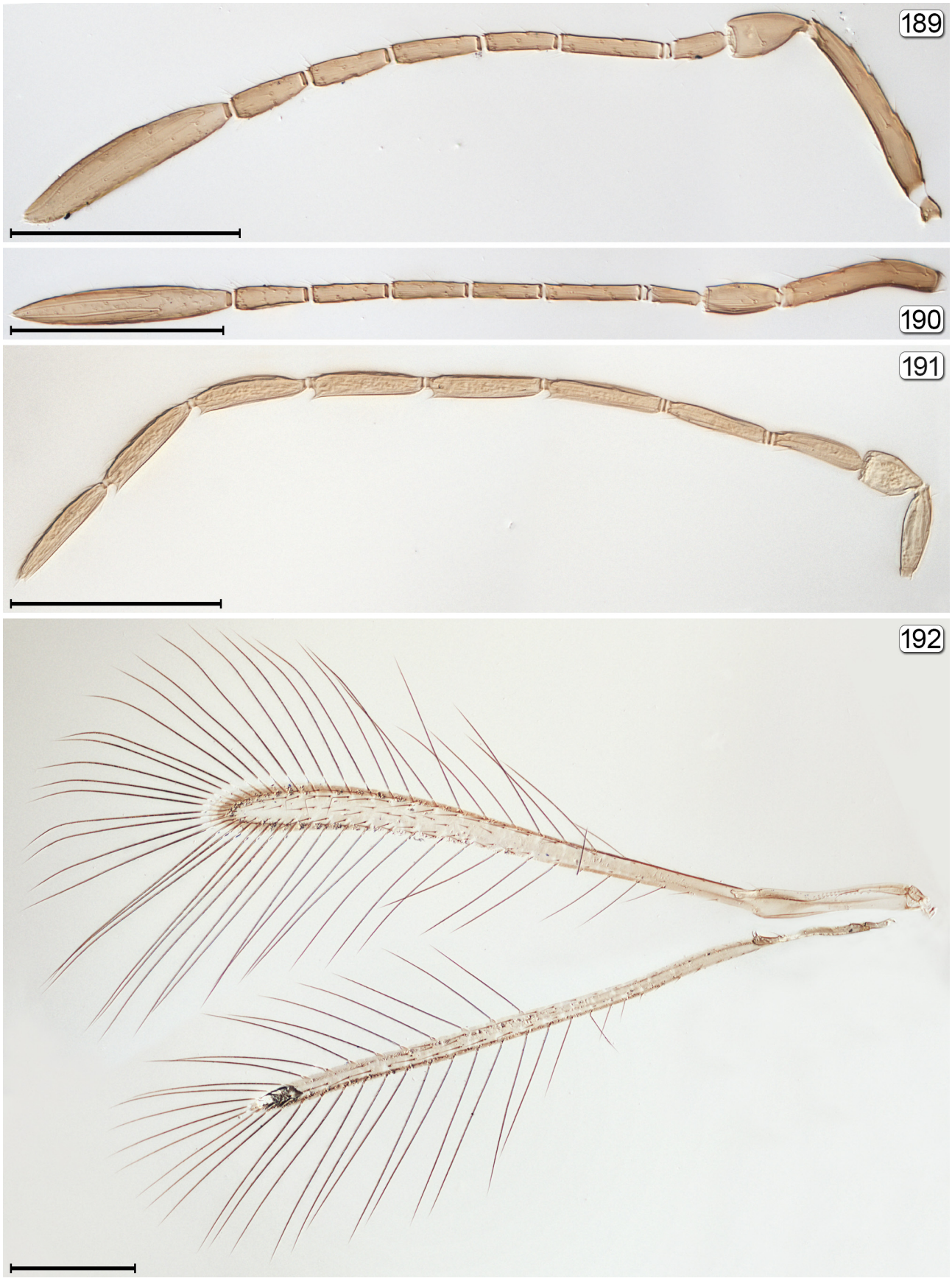
Distribution. USA: CA, CT, DE, GA, IA, IL, LA, PA, TX.



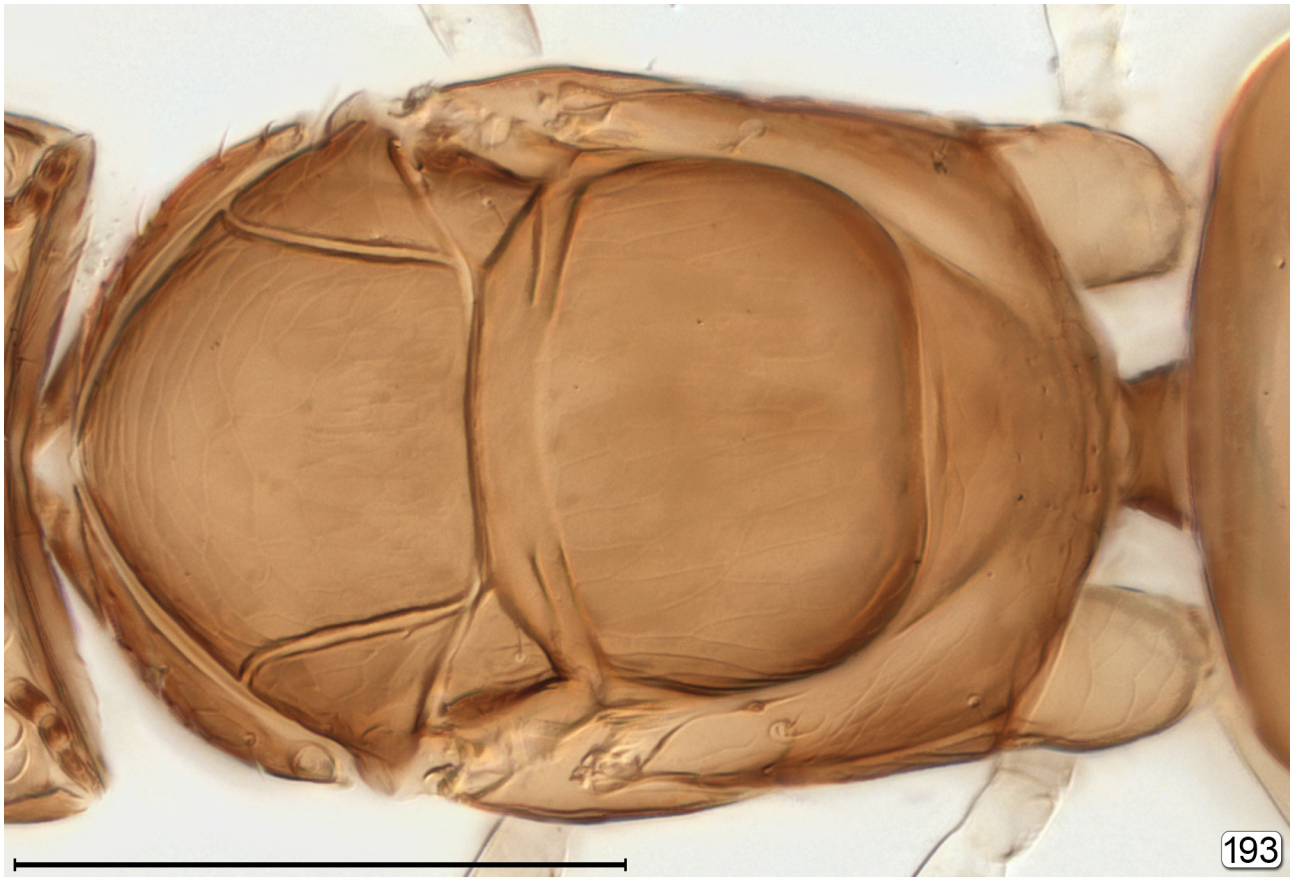
FIGURE 184. *Camptoptera* sp., habitus. Canada, Ontario, 6 km NNE Eganville, Shaw Forest, 45°38'N 77°04'W, 26.viii–2.ix.1993, H. Goulet & M. Sharkey. Scale bar=500 μm.



FIGURES 185–188. *Camptoptera* sp. head. 185, anterior; 186, posterior; 187a, lateral; 187b, lateral (internal) showing ocular apodeme; 188, dorsal. Scale bars=50 μm.

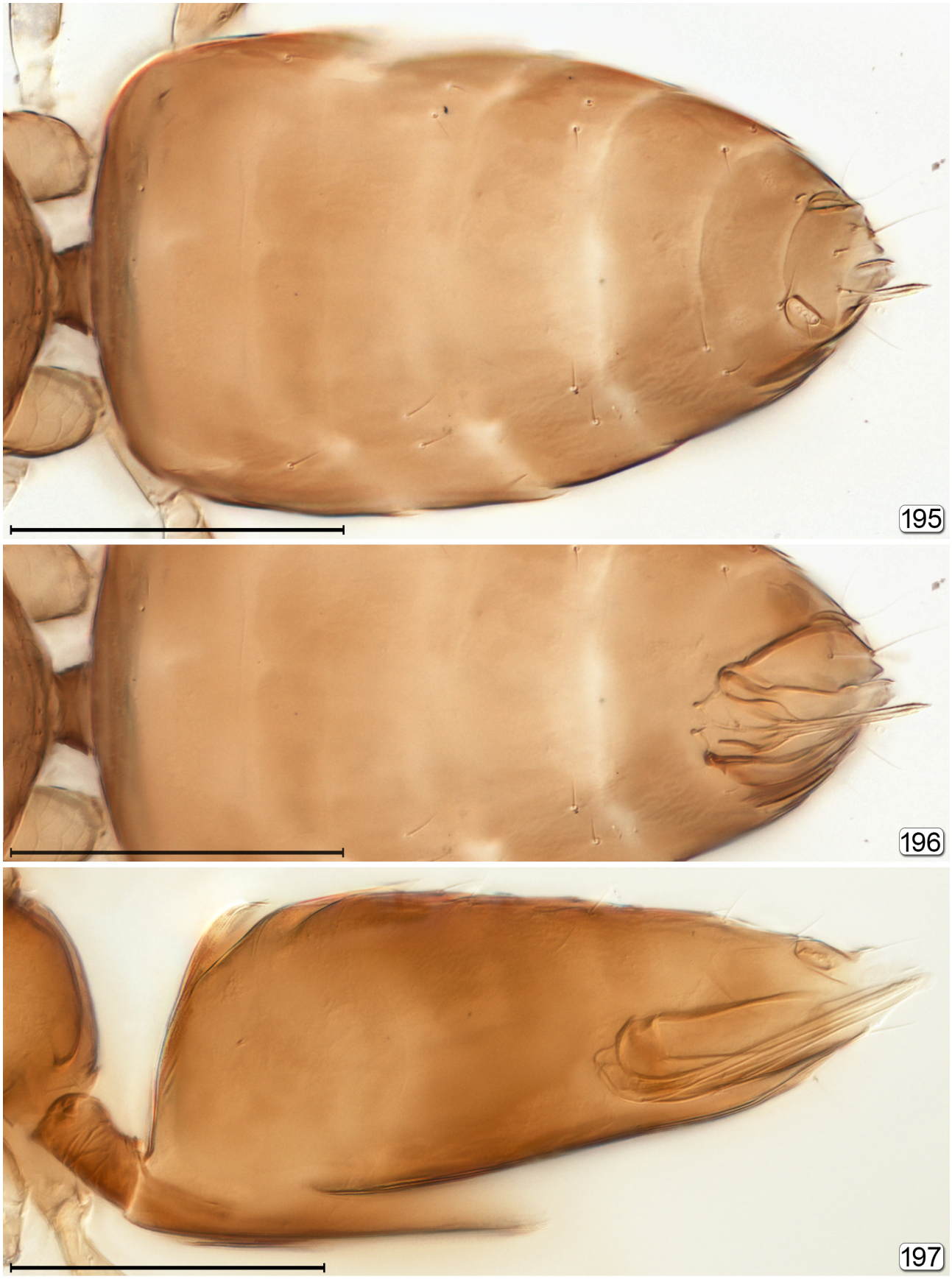


FIGURES 189–192. *Camptoptera* sp. 189, female antenna, lateral; 190, female antenna, dorsal; 191, male antenna; 192, wings. Scale bars=100 μm.

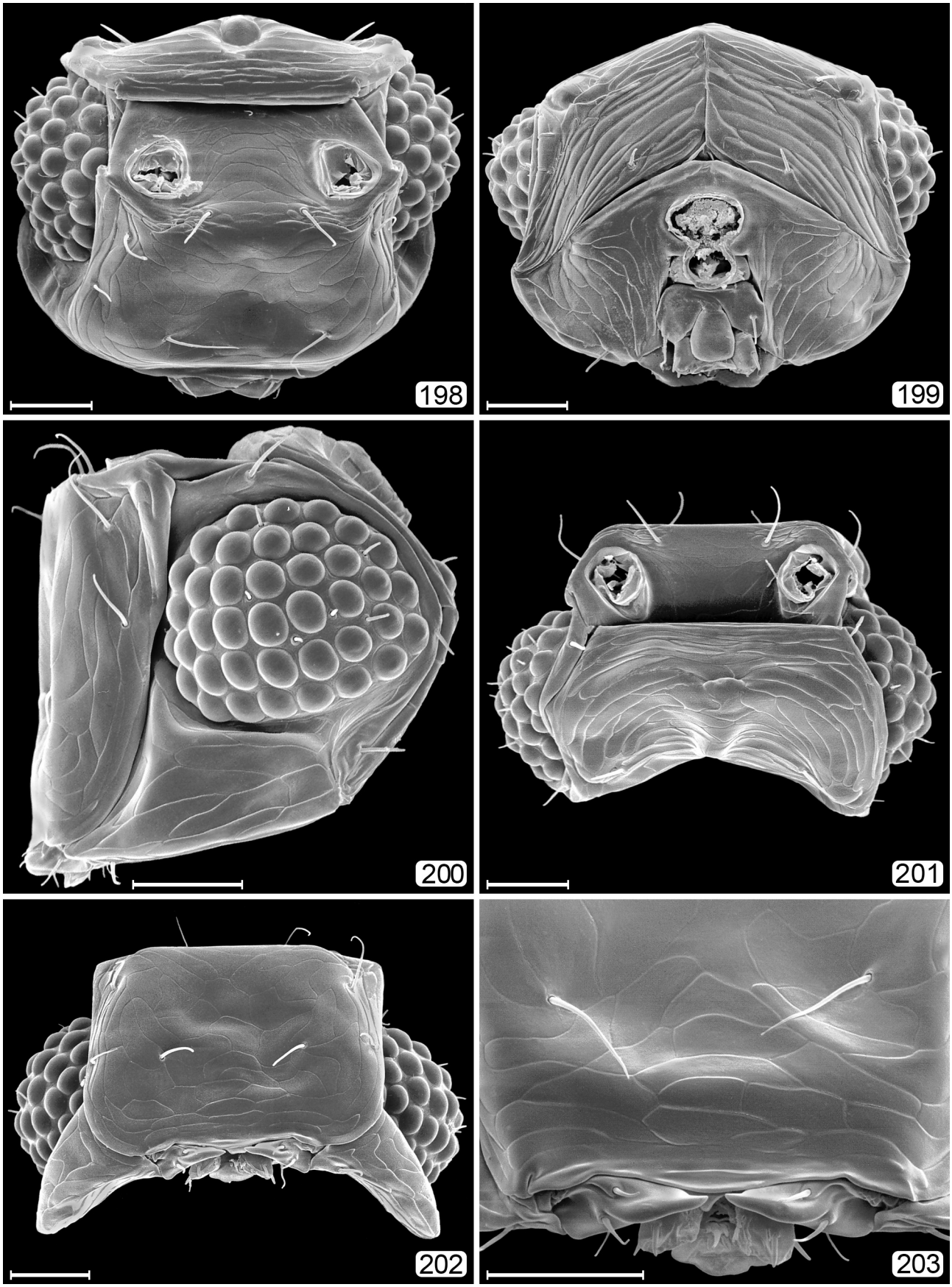




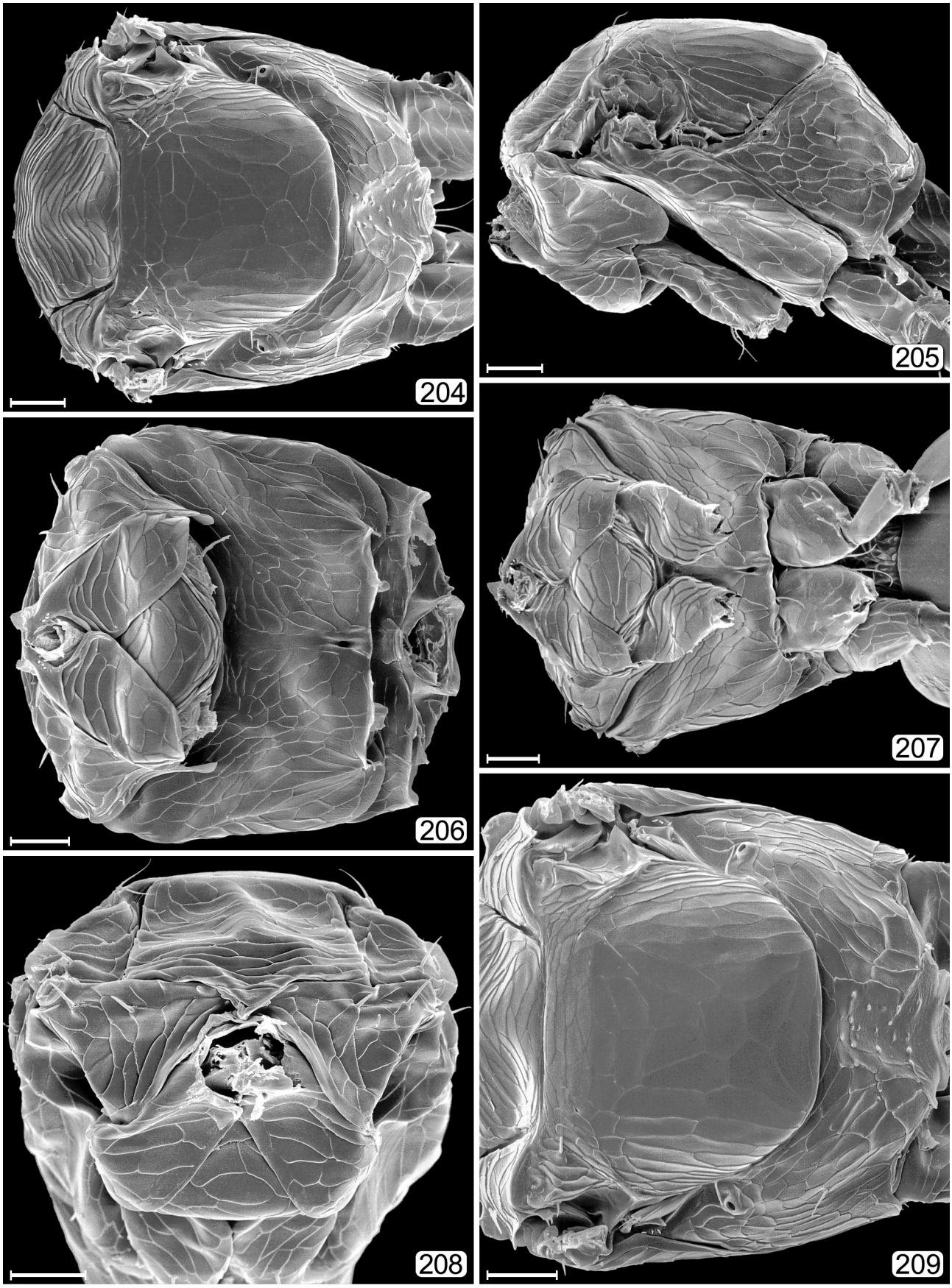
FIGURES 193, **194**. *Camptoptera* sp., mesosoma. 193, dorsal; 194, lateral. Scale bars=100 µm.



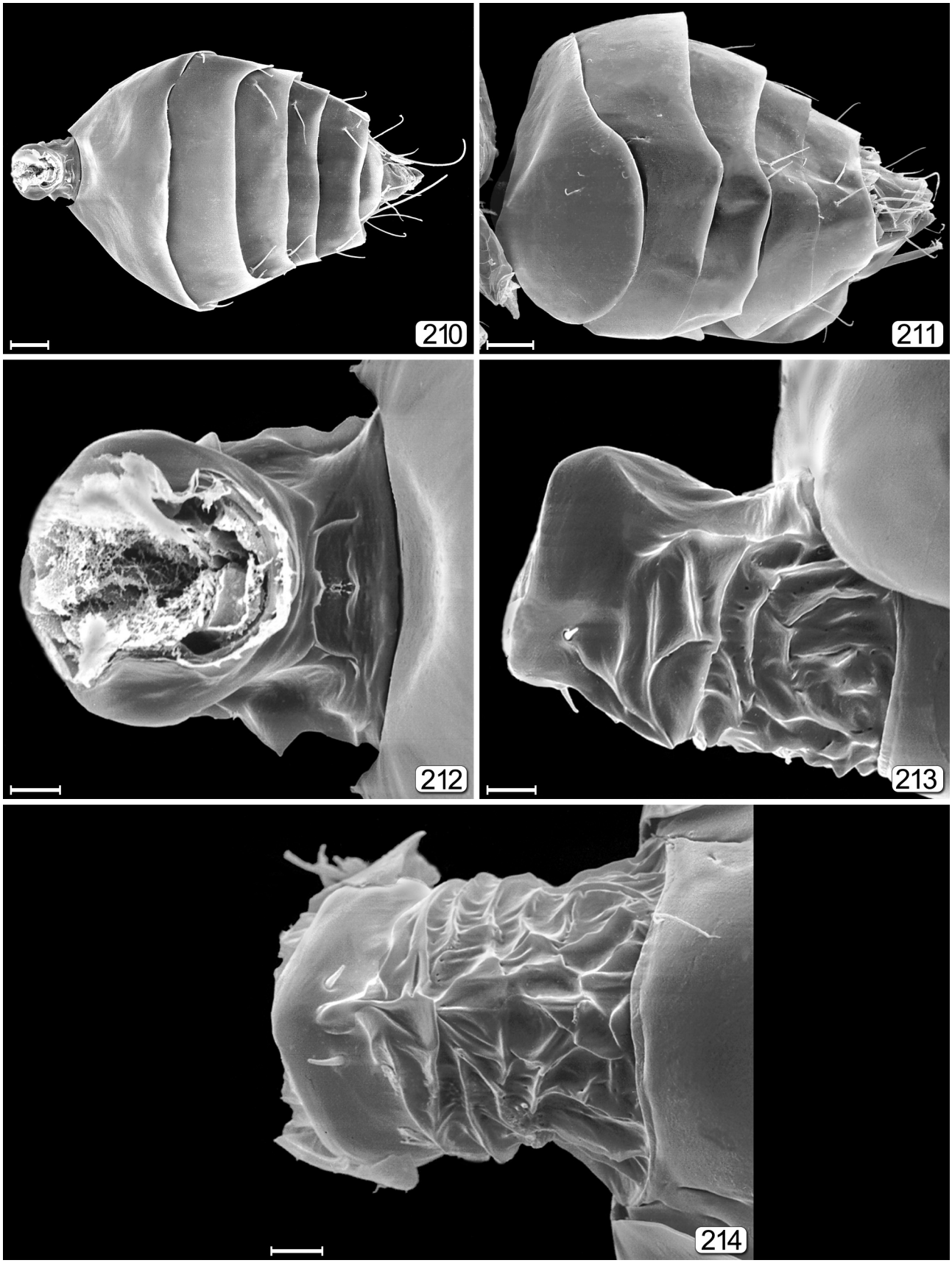
FIGURES 195–197. *Camptoptera* sp., metasoma. 195, dorsal; 196, genitalia seen through gaster; 197, lateral. Scale bars=100 μm.



FIGURES 198–203. *Camptoptera* sp., head. 198, anterior; 199, posterior; 200, lateral; 201, dorsal; 202, ventral; 203, lower face + mouthparts. Scale bars=20 μm.



FIGURES 204–209. *Camptoptera* sp., mesosoma. 204, dorsal; 205; lateral; 206, ventral; 207, ventral with coxae; 208, anterior; 209; scutellum–propodeum. Scale bars=20 μm.



FIGURES 210–214. *Camptoptera* sp. 210, metasoma, dorsal; 211, metasoma, lateral; 212, petiole, dorsal; 213, petiole, lateral; 214, petiole, ventral. Scale bars: 210, 211=20 μm; 212–214=5 μm.

CAMPTOPTEROIDES Viggiani, 1974

(Figs 215–245)

Camptopteroides Viggiani, 1974c: 3. Type species: *Camptopteroides armata* Viggiani, 1974, by original designation.

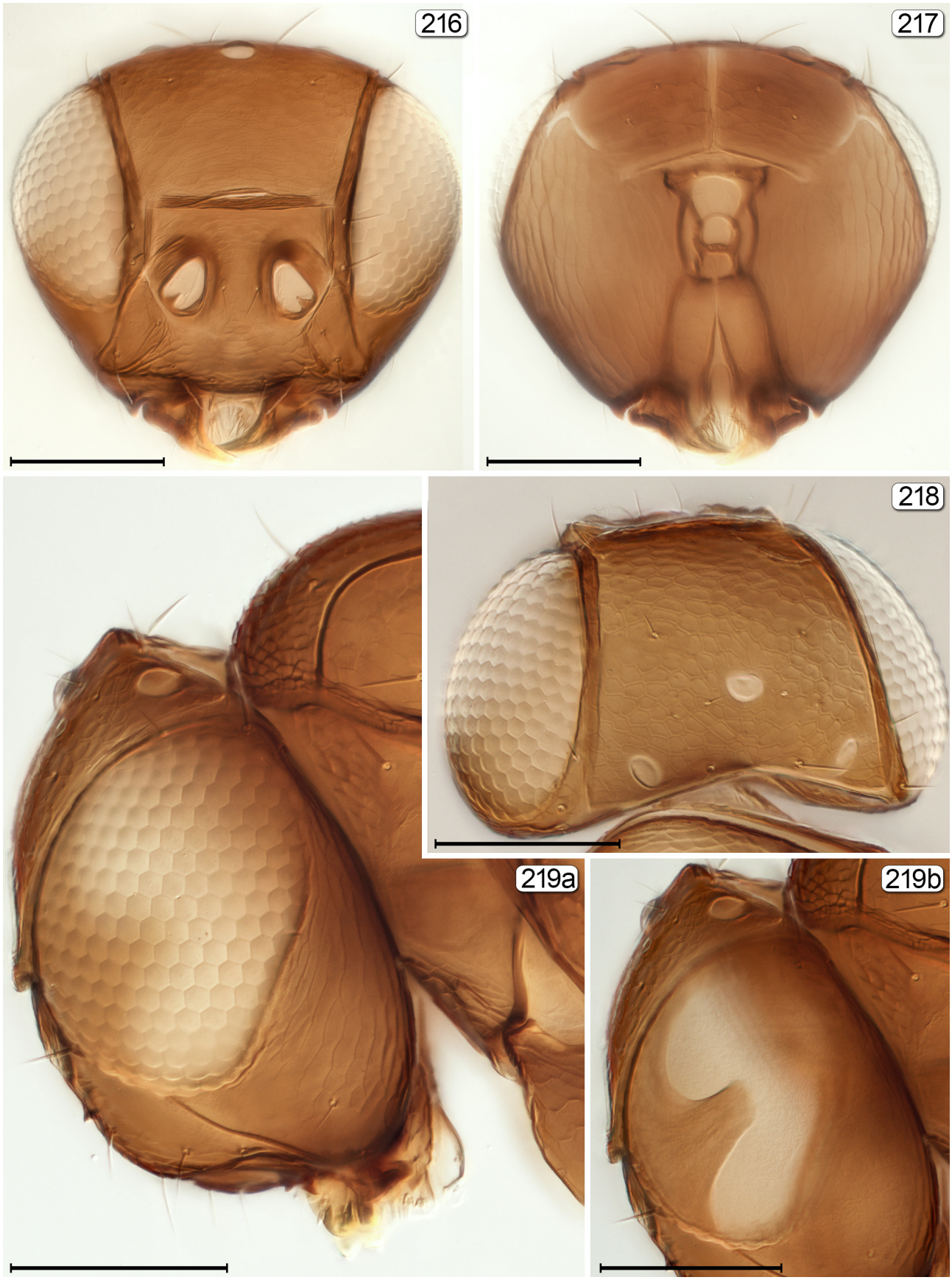
Camptopteroides (*Alalinda* Huber) in Huber & Lin, 1999: 33. Type species *Camptopteroides* (*Alalinda*) *dorothea* Huber, 1999, by original designation.

Paranagroidea Noyes & Valentine, 1989: 44. Type species: *Paranagroidea verrucosa* Noyes & Valentine, 1989, by original designation. Synonymy by Huber & Lin, 1999: 31.



FIGURE 215. *Camptopteroides dorothea* Huber, paratype, habitus. USA, South Carolina, Anderson Co., Pendleton, 250 m, 13–18.v.1987, hardwood forest, CNC Hymenoptera team. Scale bar=500 µm.

Diagnosis. Body length 740–950 µm. Funicle 7-segmented, with fu_2 ring-like (Fig. 220); vertex sharply margined at occiput (Figs 215, 219, 227); head in posterior view (Figs 207, 227) with median vertical coronal sulcus extending ventrally to occipital sulcus just above foramen, the occipital sulcus extending laterally about half way towards outer eye orbit; ocular apodeme thick and blunt (Fig. 219b); mandible with 2 equal-sized teeth (Figs 230, 231);



FIGURES 216–219. *Camptopteroides dorothea* Huber, paratype head. 216, anterior; 217, posterior; 218, dorsal; 219a, lateral; 219b, lateral (internal), showing ocular apodeme. Scale bars=100 μm.

fore wing with wide brownish median band separated by clear spot from narrow brownish apical band (Fig. 221); parastigma with long macrochaetae (Fig. 215); propodeum distinctly sculptured, with more or less isodiametric reticulations.

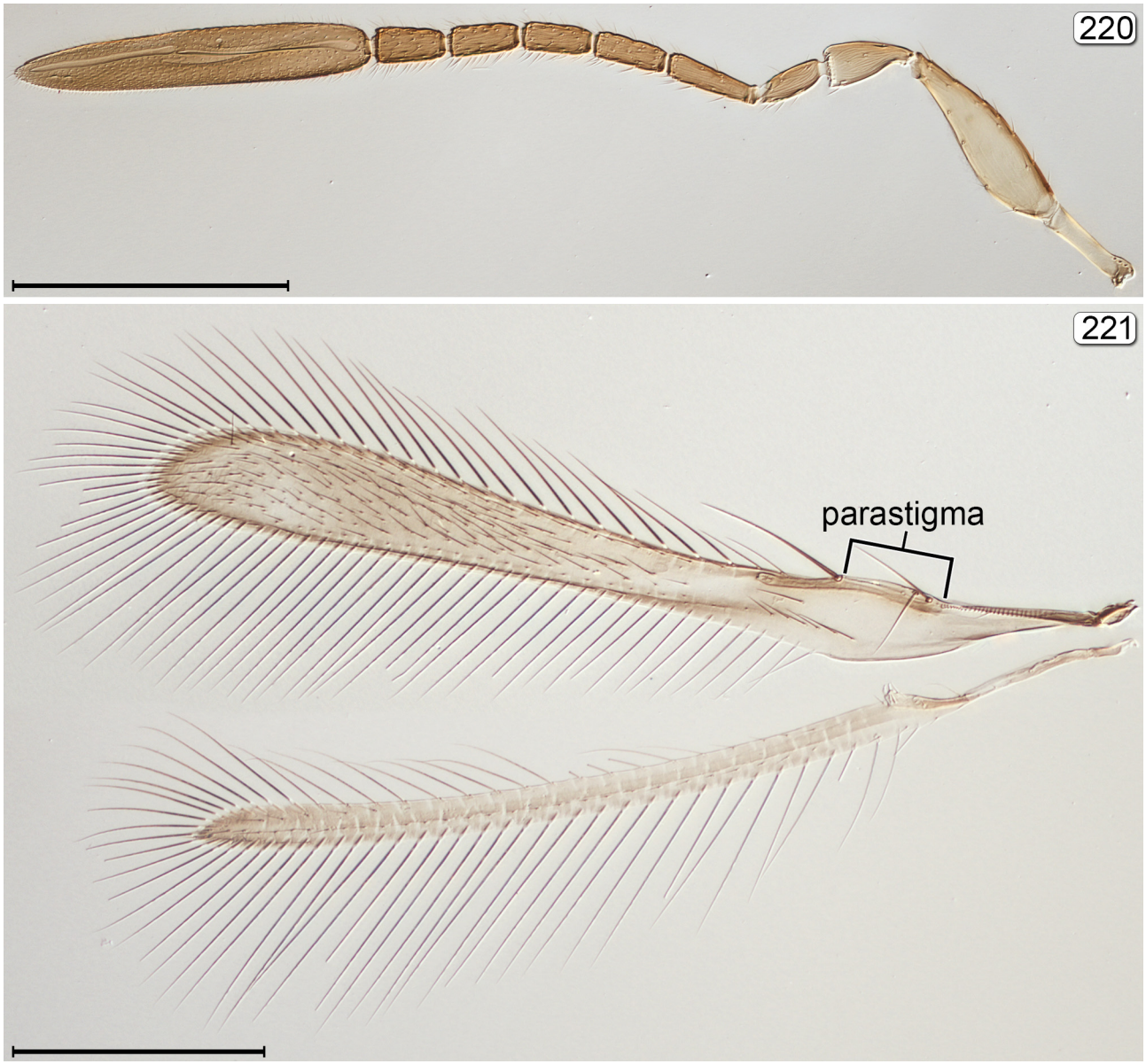
Discussion. *Camptopteroides* belongs to the *Camptoptera* group of genera together with *Camptoptera, Eofoersteria*, *Macrocamptoptera*, *Ptilomymar* and *Stephanocampta*. *Camptopteroides* is most similar to *Macrocamptoptera*, the body of both genera being considerably larger, and the fore wing relatively wider and more distinctly patterned than in the remaining three genera.

Important reference. Huber & Lin (1999).

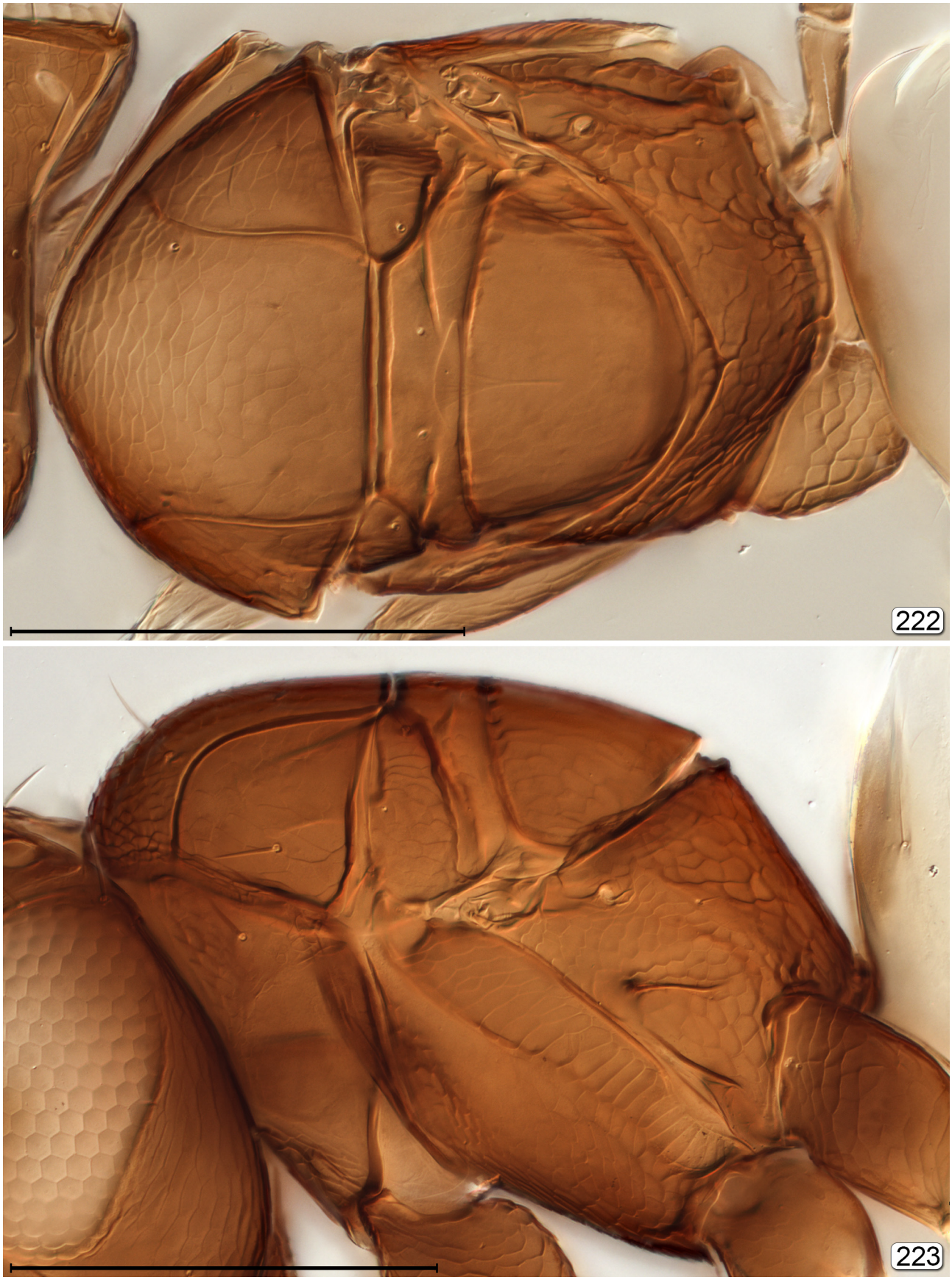
Camptopteroides (*Alalinda*) *dorothea* Huber, 1999

Camptopteroides (*Alalinda*) *dorothea* Huber in Huber & Lin, 1999: 35. Holotype ♀ (CNC). **TL:** USA, South Carolina, Anderson Co., Pendleton.

Distribution. USA: FL, MO, SC, VA.



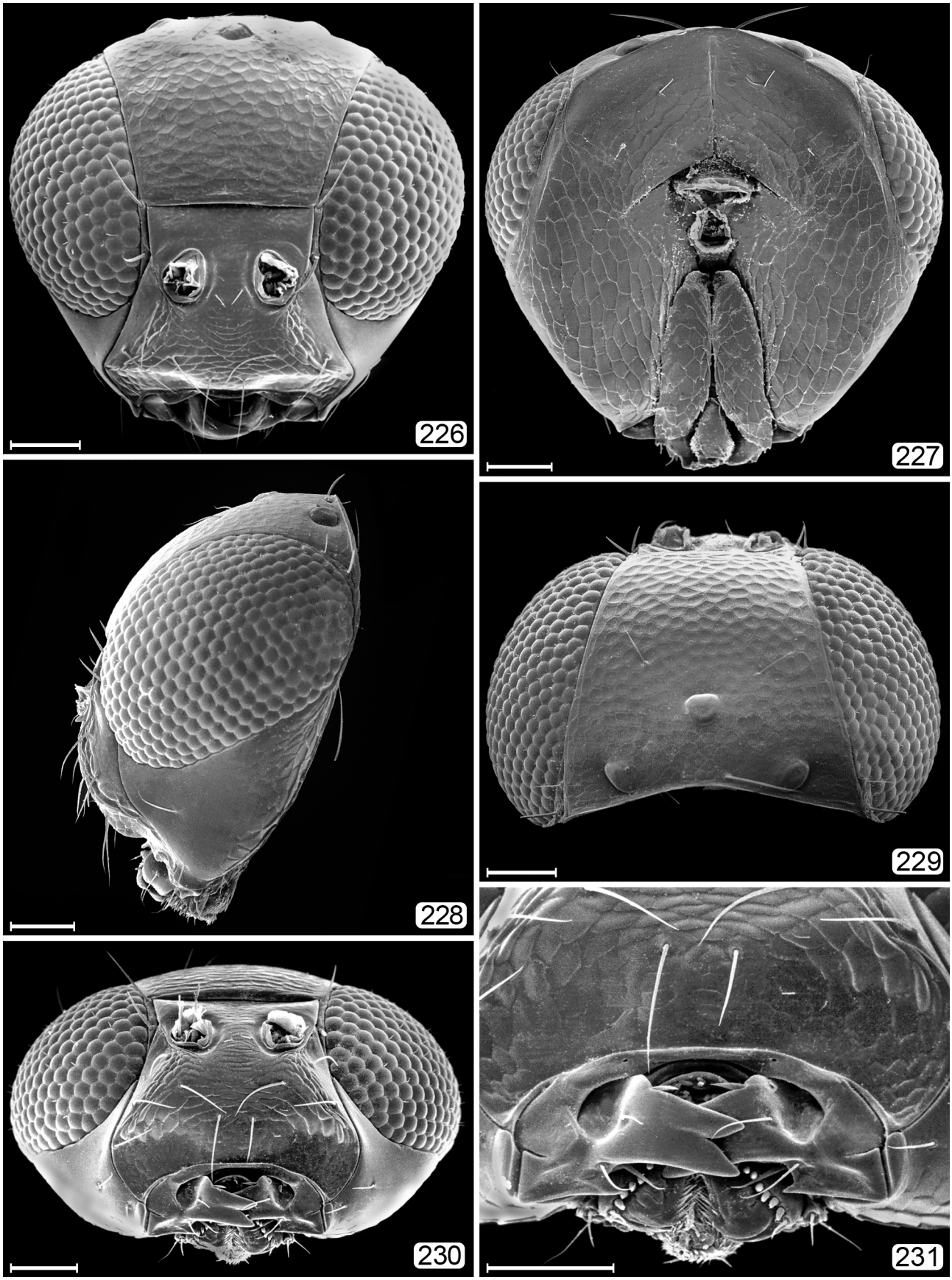
FIGURES 220, **221**. *Camptopteroides dorothea* Huber. 220, antenna; 221, wings. Scale bars=200 µm.



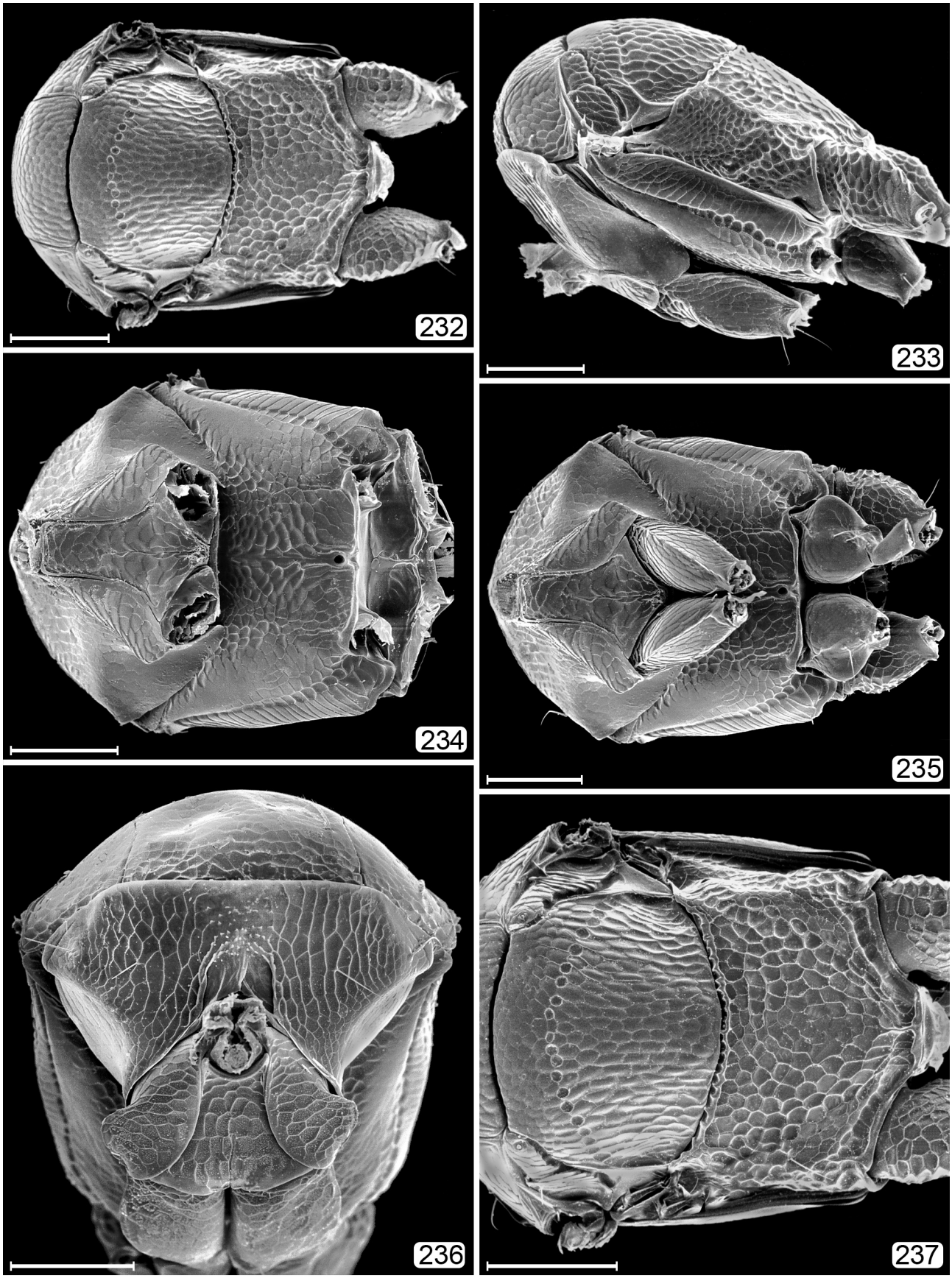
FIGURES 222, **223**. *Camptopteroides dorothea* Huber. 222, mesosoma, dorsal; 223, mesosoma, lateral. Scale bars=200 µm.



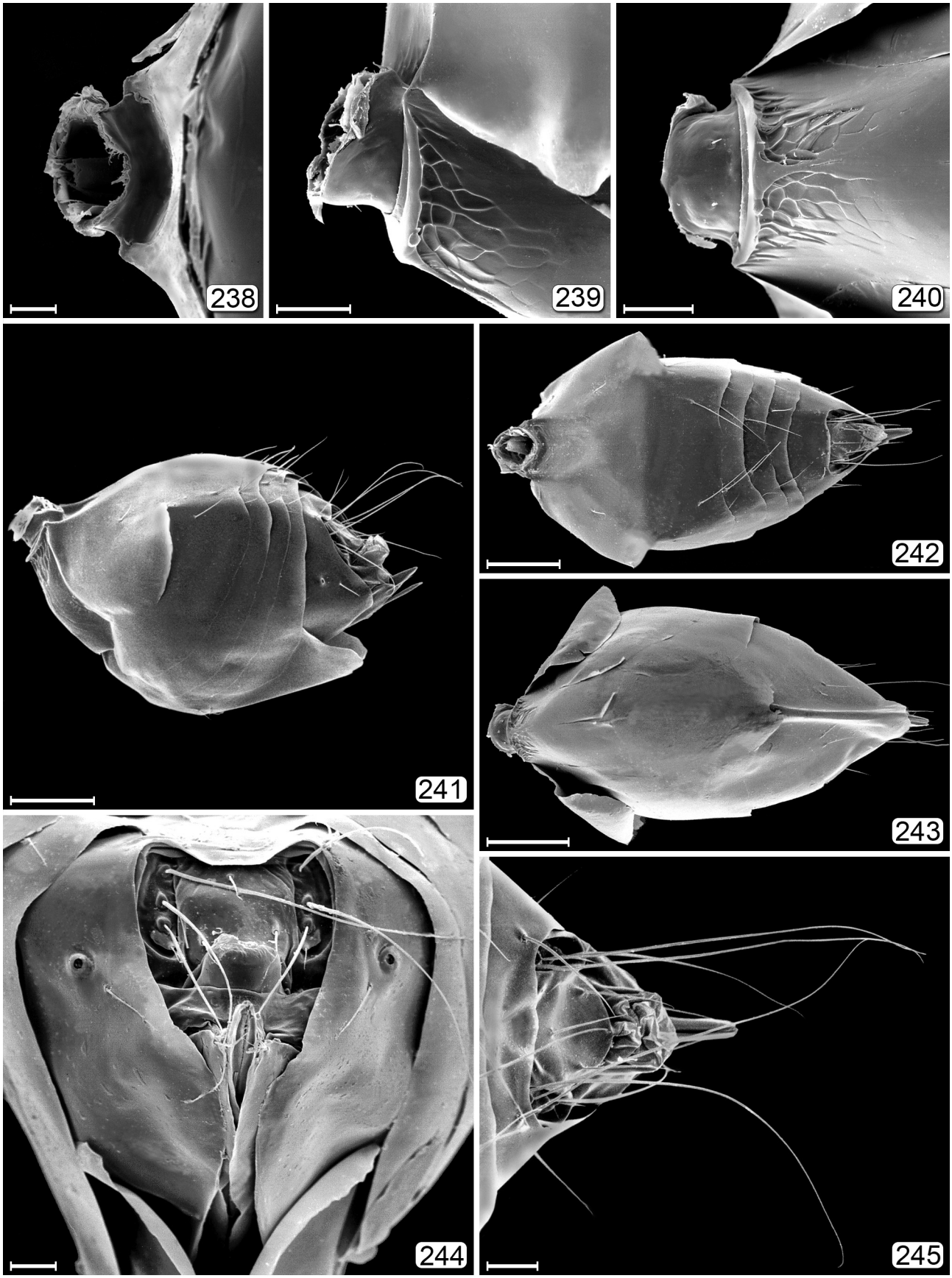
FIGURES 224, 225. *Camptopteroides dorothea* Huber. 224a, metasoma, dorsal; 224b, metasoma dorsal showing ovipositor seen through gaster; 225, metasoma, lateral. Scale bars=200 µm.



FIGURES 226–231. *Camptopteroides* sp./spp. (Costa Rica [CR] or Ecuador [E]), head. 226, anterior (E); 227, posterior (CR); 228, lateral (CR); 229, dorsal (CR); 230, ventral (E); 231; mouthparts (E). Scale bars=50 μm.



FIGURES 232–237. *Camptopteroides* sp./ spp. ? (Costa Rica [CR] or Ecuador [E]), mesosoma. 232, dorsal (E); 233, lateral (E); 234, ventral (CR); 235, ventral with coxae (CR); 236, ventroanterior (CR); 237, scutellum–propodeum (E). Scale bars=100 μm.



FIGURES 238–245. *Camptopteroides* sp. / spp. ? (Costa Rica [CR] or Ecuador [E]). 238, petiole, dorsal (CR); 239, petiole, lateral (CR); 240, petiole, ventral (CR); 241, metasoma, lateral (E); 242, metasoma, dorsal (CR); 243, metasoma, ventral (CR); 244, metasoma, posterior (CR); 245, metasoma apex, dorsal (E). Scale bars: 238–240, 244, 245=20 μm; 241–243=100 μm.

CARAPHRACTUS Walker, 1846

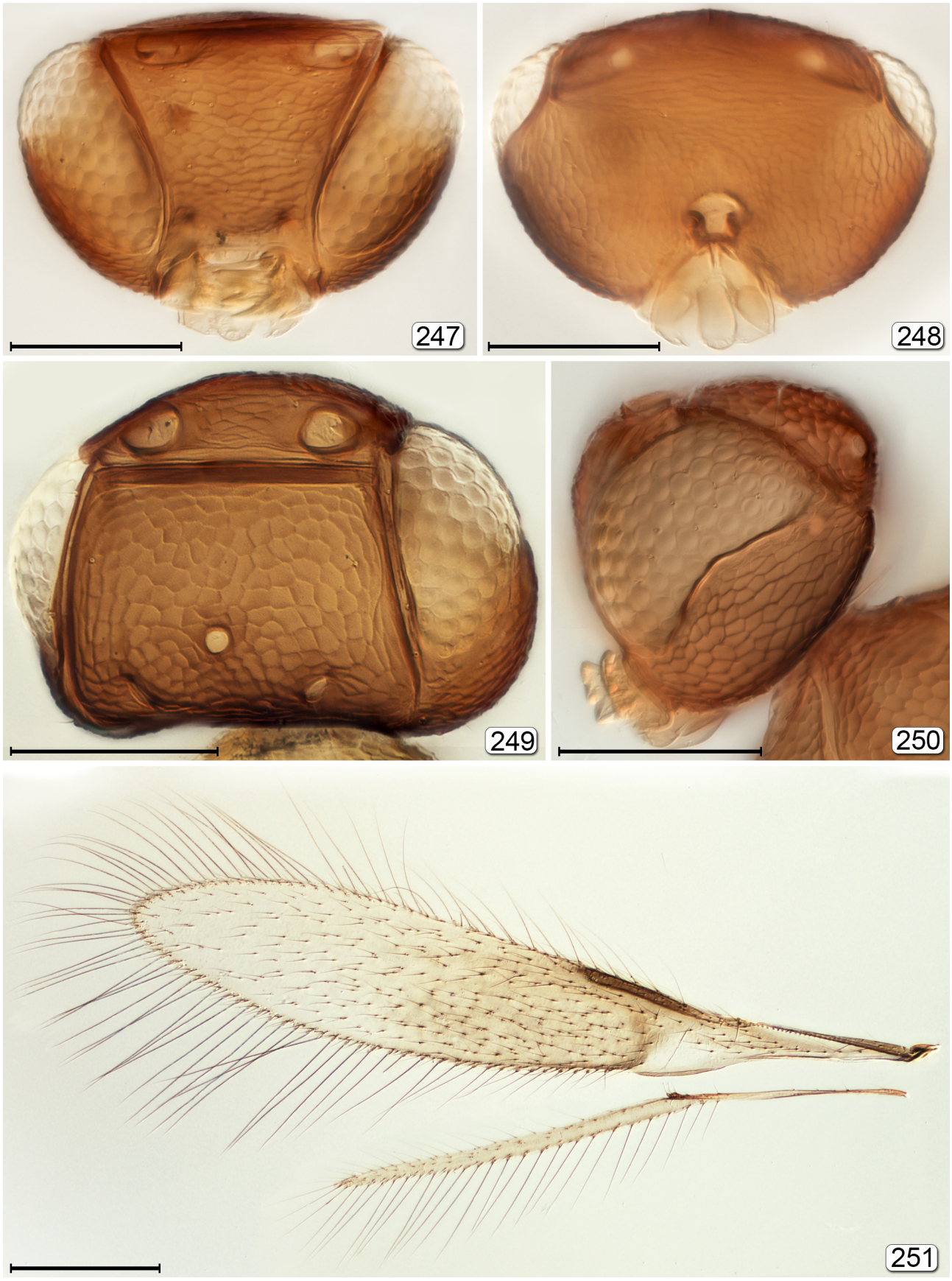
(Figs 246–273)

Caraphractus Walker, 1846: 49 (key), 50 (description). Type species: *Caraphractus cinctus* Walker, 1846, by monotypy.
Valkerella Westwood, 1879: 584 (footnote). Type species: *Polynema natans* Lubbock, 1864, by monotypy.
Walkerella Dalla Torre, 1898: 425. Unjustified emendation.

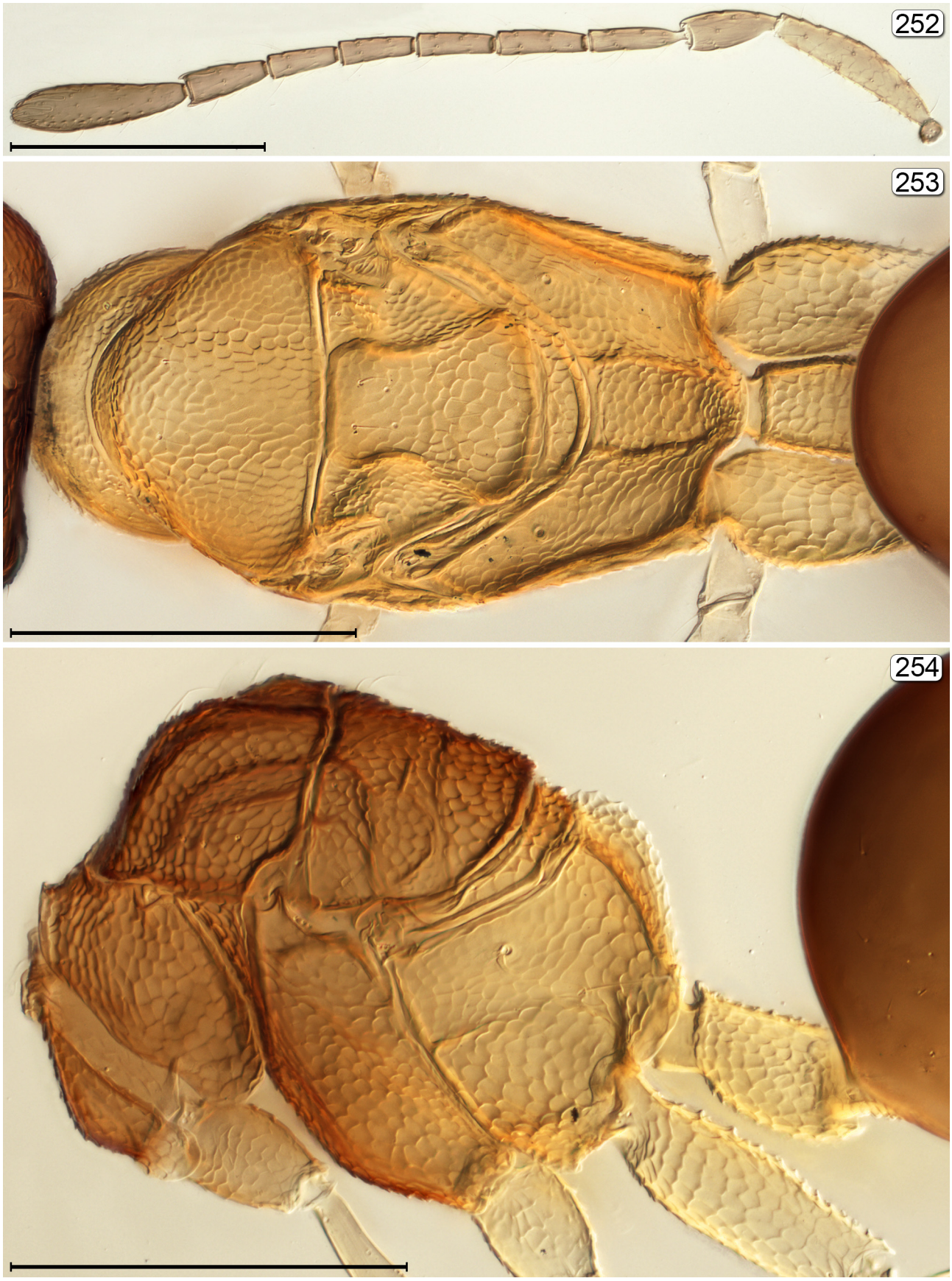
Diagnosis. Body length 795–1250 µm. Head, mesosoma, petiole and coxae heavily sculptured with isodiametric reticulations (Figs 246–250, 253, 254); antenna with clava 1-segmented and widening towards apex (Fig. 252); fore wing with 1 distal macrochaeta, apparently without marginal vein, and with parastigmal and stigmal veins together as long as submarginal vein (Fig. 251).



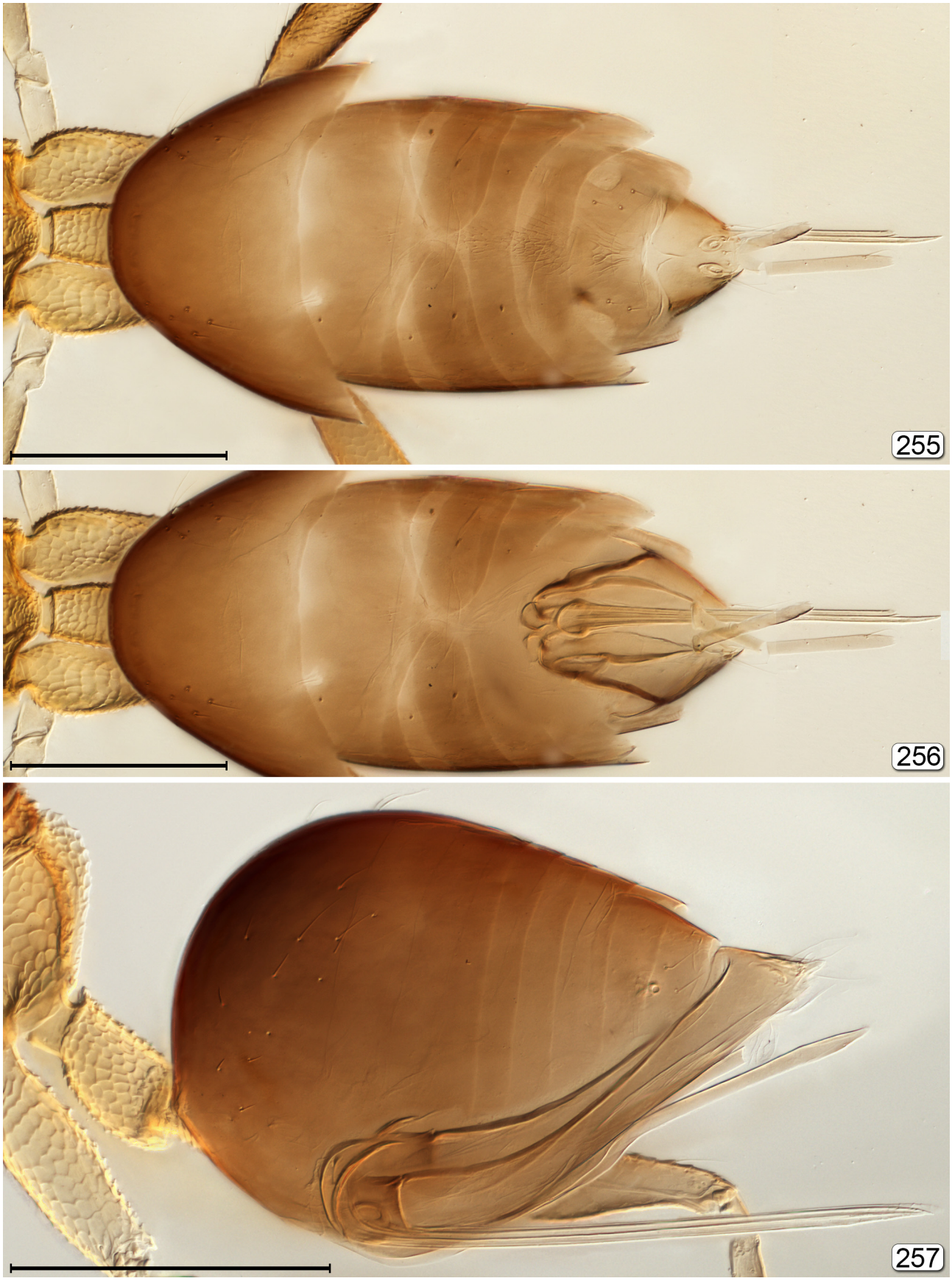
FIGURE 246. *Caraphractus cinctus* Walker, habitus. Canada, Ontario, 3.4 km NNE Almonte, 45°15'N 76°10'W, 12–28.vii.1993, F.W. Grimm, alvar. Scale bar=500 µm.



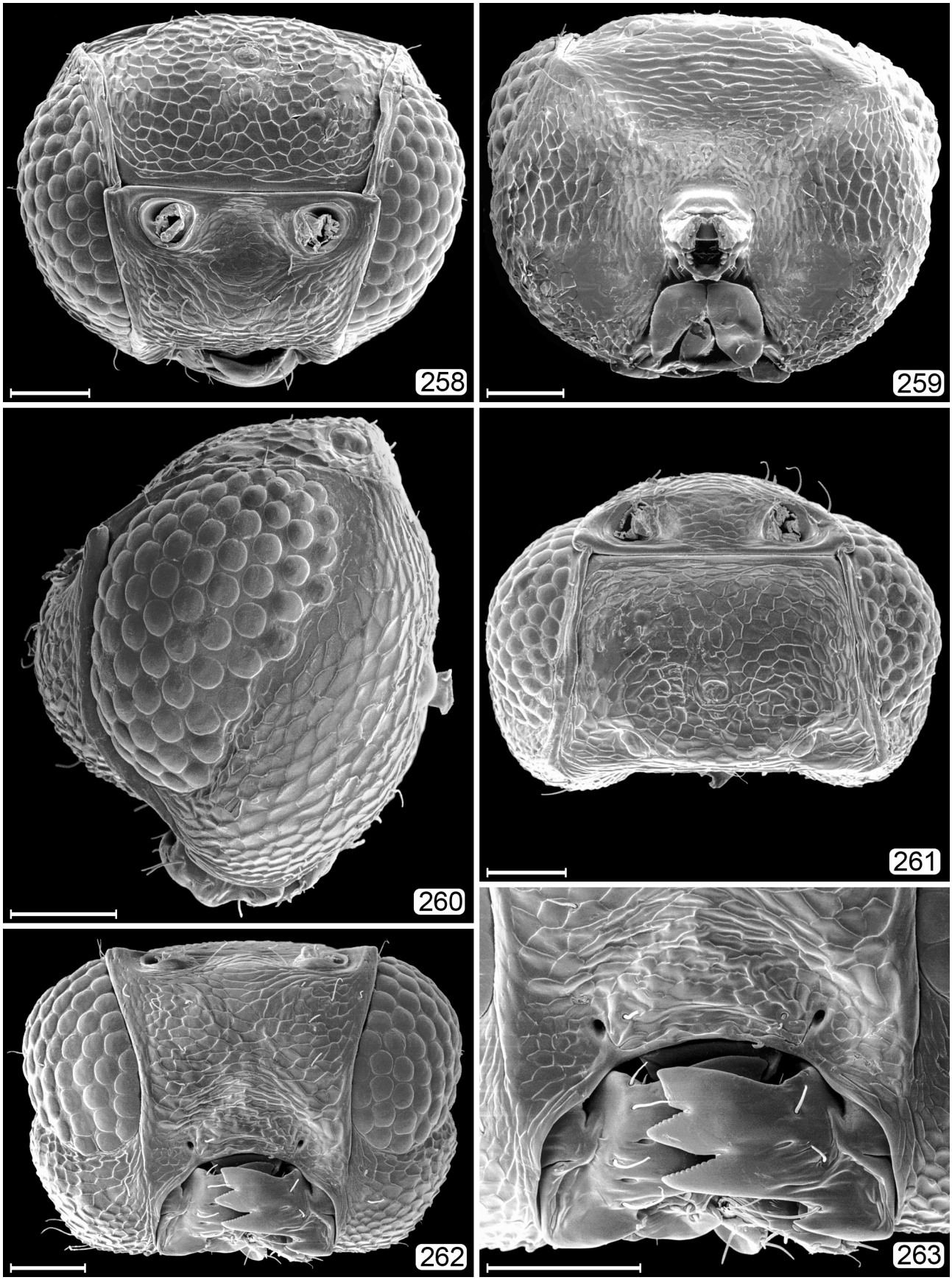
FIGURES 247–251. *Caraphractus cinctus* Walker. 247, head, ventroanterior; 248, head, posterior; 249, head, dorsal; 250, head, lateral; 251, wings. Scale bars: 247–250=100 µm; 251=200 µm.



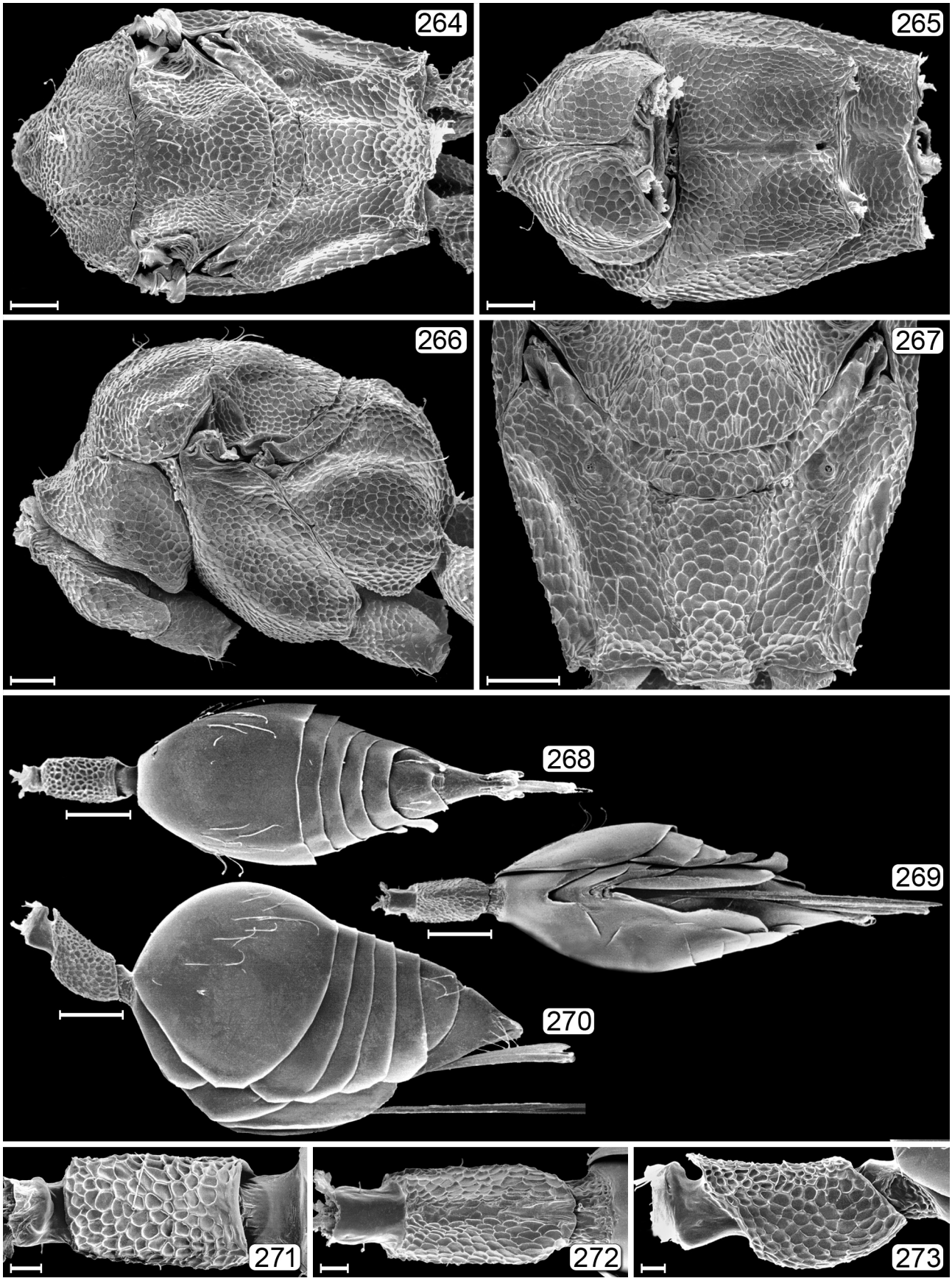
FIGURES 252–254. *Caraphractus cinctus* Walker. 252, antenna; 253, mesosoma + petiole, dorsal; 254, mesosoma + petiole, lateral. Scale bars=200 μm.



FIGURES 255–257. *Caraphractus cinctus* Walker, metasoma. 255, dorsal; 256, genitalia seen through gaster; 257, lateral. Scale bars=200 μm.



FIGURES 258–263. *Caraphractus cinctus* Walker. head. 258, dorsoanterior; 259, posterior. 260, lateral; 261, dorsal; 262, ventral; 263, mouthparts. Scale bars=50 μm.



FIGURES 264–273. *Caraphractus cinctus* Walker. 264, mesosoma, dorsal; 265, mesosoma, ventral; 266, mesosoma, lateral; 267, frenum–propodeum; 268, metasoma, dorsal; 269, metasoma, ventral; 270, metasoma, lateral; 271, petiole, dorsal; 272, petiole, ventral; 273, petiole, lateral. Scale bars: 264–267=50 μm; 268–270=100 μm; 271–273=20 μm.

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Caraphractus* is the sister genus to *Eustochus*. Together they form a distinct subgroup distinguished by their heavily sculptured head, mesosoma, and petiole.

Nearctic hosts. Coleoptera: Dytiscidae.

Important reference. Triapitsyn (2011a).

Caraphractus cinctus Walker, 1846

Caraphractus cinctus Walker, 1846: 52. Syntype(s)? ♀ (depository not specified), lost. **TL:** Great Britain, locality not specified. A neotype was not designated, as explained by Triapitsyn (2011a). Kirchner, 1867: 202 (catalogue) [P]; Enock, 1895: 89 [P]; Enock, 1896: 28 [P]; Dalla Torre, 1898: 424, 426 (catalogue) [P]; Ashmead, 1904: 364, 369 (genotype); Schmiedeknecht, 1909: 497 (catalogue) [P]; Matheson & Crosby, 1912: 68 (description, biology, hosts, distribution); Enock, 1914: 46 (list) [P]; Rimsky-Korsakov, 1917: 220, 225 (biology) [P]; Hungerford, 1920: 32 (host, distribution); Gahan & Fagan, 1923: 26 (type species); Rimsky-Korsakov, 1925: 103 (biology, morphology) [P]; Gahan *et al*., 1928: 984 (host, distribution); Hoffmann, 1932: 33 (host) [P]; Rimsky-Korsakov, 1940: 230 (distribution) [P]; Kryger, 1950: 48 (description, hosts) [P]; Peck, 1951: 418 (catalogue); Betten, 1951: 135 (literature review) [P]; Nikol'skaya, 1952: 542 (key) [P]; Jackson, 1956: 144 (host, percent parasitism) [P]; Hagen, 1956: 291 (host); Ison, 1958: 71 (biology, morphology) [P]; Jackson, 1958a: 533 (rearing methods, hosts) [P]; Jackson, 1958b: 17 (larva) [P]; Jackson, 1959: 198 (gynandromorph) [P]; Jackson, 1961a: 823 (diapause) [P]; Jackson, 1961b: 269 (immature stages) [P]; Jackson, 1963: 225 (diapause, life history) [P]; Peck, 1963: 49 (catalogue); Jackson, 1966: 23 (adult life, sex ratio) [P]; Jackson, 1969: 59 (reproductive organs, poison apparatus) [P]; Herting, 1973: 3 (host catalogue) [P]; Viggiani, 1973b: 276 (male genitalia [P]; Hellén, 1974: 21 (key, distribution) [P]; Bouček & Graham, 1978: 110 (catalogue) [P]; Trjapitzin, 1978: 532 (synonymy, distribution) [P]; Burks, 1979: 1031 (catalogue); Hinton, 1981: 709 (mention) [P]; Graham, 1982: 218 (types information) [P]; Trjapitzyn, 1987: 968 (synonymy, distribution) [P]; Viggiani, 1989: 146 (male genitalia) [P]; Yoshimoto, 1990: 70 (list); Boivin, 1994: 224 (overwintering strategy); Fursov, 1995: 5 (host, biology) [P]; Huber, 1997: 506 (key); Triapitsyn & Huber, 2000: 613 (list, distribution) [P]; Bennett, 2008a: 674 (larval description); Bennett, 2008b: 530 (host, swims under water); Boivin, 2010b: 11 (hymenopteriform larva); Triapitsyn, 2011a: 21 (description, distribution, literature); Pintureau, 2012: 28 (list) [P]; Zanolli & Pavan, 2013: 270 (diapause) [P]; Dale-Skey *et al.*, 2016: 237 (checklist) [P].

Anaphes cinctus: Rousseau, 1908: 390 (generic combination) [P]; Thompson, 1958: 568 (host catalogue) [P].

Polynema natans Lubbock, 1864: 138. Lectotype ♀ (NHMUK), validated by Graham, 1982: 218. **TL:** UK, England, London, Bromley, Farnborough, High Elms. Synonymy by Enock, 1897: 10 and Schmiedeknecht, 1909: 497.

Caraphractus reductus Rimsky-Korsakov, 1920: 7. Lectotype ♀ (ZIN), designated by Triapitsyn, 2011a: 24. **TL:** Russia, Leningrad[skaya] Oblast, Lake Ladoga. Synonymy by Trjapitzin, 1978: 532 and Trjapitzin, 1987: 968.

Caraphractus flavicollis Hellén, 1974: 21. Holotype ♀ (FMNH). **TL:** Finland, Lohja (as Lojo). Synonymy by Triapitsyn, 2011a: 24.

Nearctic hosts. Dytiscidae: *Agabus* sp. (CNC specimens).

Distribution. Canada: BC, NB, NT, ON, QC. USA: NY.

CHRYSOCTONUS Mathot, 1966

(Figs 274–278)

Chrysoctonus Mathot, 1966: 224. Type species: *Chrysoctonus apterus* Mathot, 1966, by monotypy.

Myrmecomymar Yoshimoto, 1990: 28. Type species: *Myrmecomymar masneri* Yoshimoto, 1990, by original designation. Synonymy by Huber & Triapitsyn, 2015: 80.

Diagnosis. Body length 425–675 μm (females); 365–605 (males). Wingless (Figs 274, 276); ocelli absent (Fig. 276b); metasoma short, higher than wide, with pronotum, mesoscutum and scutellum all about equal in length, with an almost 90° angle between mesoscutum and scutellum, and scutellum almost in line with propodeum (Figs 274, 276). Male fully winged, with venation extending almost 0.6× fore wing length (Fig. 275); flagellum with each funicle segment several times as long as wide (Fig. 278).

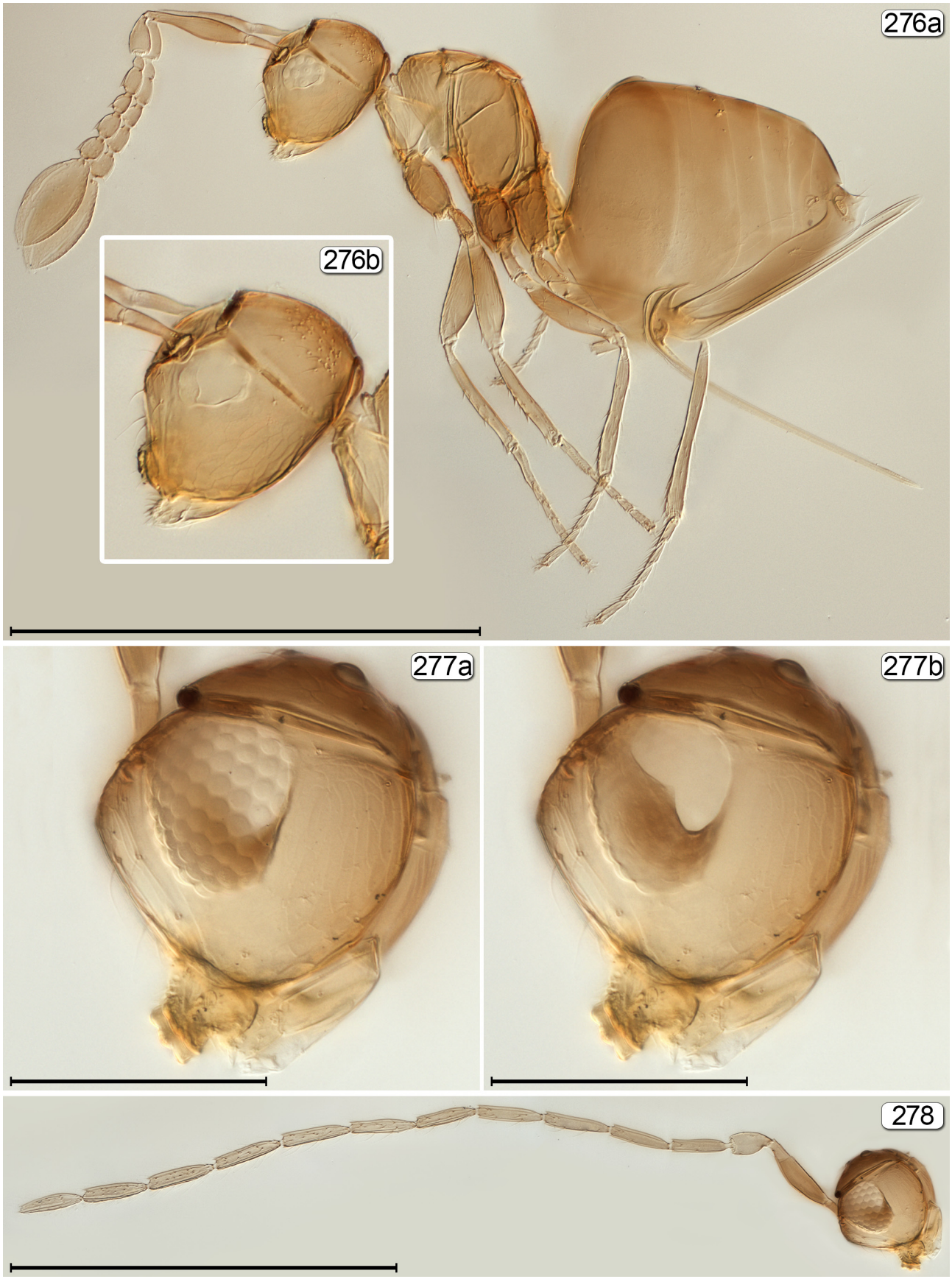
Discussion. Among genera with 5-segmented tarsi, *Chrysoctonus* appears to be most closely related to *Arescon*, which also has a long fore wing venation. Unlike *Arescon*, and most other Mymaridae, the number of funicle segments in females is variable, ranging from four to eight but usually five in Nearctic species.

Important reference. Huber & Triapitsyn (2015).





FIGURES 274, 275. *Chrysoctonus* sp., habitus. USA, Florida, Alachua Co., Gainesville, AEI, 29°35'53"N 82°21'54"W, 8–25.x.2003, D.B. Wahl. 274, female; 275, male. Scale bars=500 µm.



FIGURES 276–278. *Chrysoctonus masneri* (Yoshimoto). 276a, female habitus, lateral; 276b, female head, internal showing ocular apodeme; 277a, male head, lateral; 277b, male head, lateral (internal) showing ocular apodeme; 278, male head, lateral + antenna. Scale bars: 276a, 278=500 µm; 276b, 277=100 µm.

Chrysoctonus masneri (Yoshimoto, 1990)

Myrmecomymar masneri Yoshimoto, 1990: 84. Holotype ♀ (CNC). **TL:** Canada, Ontario, Spencerville. Huber, 1997: 501 (key); Viggiani, 2004: 65 (male genitalia).
Chrysoctonus masneri: Huber & Triapitsyn, 2015: 91 (generic transfer, description).

Distribution. Canada: ON.

CLERUCHUS Enock, 1909
(Figs 279–310)

Cleruchus Enock, 1909: 453. Type species: *Cleruchus pluteus* Enock, 1909, by monotypy.
Eucleruchus Ogloblin, 1940: 600. Type species: *Eucleruchus neivai* Ogloblin, 1940, by original designation. Synonymy by Luft Albarracin *et al*., 2009: 3.
Stenopteromymar Ferrière, 1952: 41. Type species: *Stenopteromymar biciliatus* Ferrière, 1952, by monotypy. Synonymy by Viggiani, 1974b: 88.
Paracleruchus Yoshimoto, 1971: 1079. Type species: *Paracleruchus pieloui* Yoshimoto, 1971, by original designation. Synonymy by Viggiani, 1974b: 88.
Douttiella Annecke, 1961b: 71. Type species: *Douttiella depressa* Annecke, 1961, by original designation. Synonymy by Noyes & Valentine, 1989: 31.
Haplochaeta Noyes & Valentine, 1989: 35. Type species: *Haplochaeta mandibularis* Noyes & Valentine, 1989, by original designation. Synonymy by Lin *et al*., 2007: 29.
Bakkendorfia Mathot, 1966: 229. Type species: *Bakkendorfia musangae* Mathot, 1966, by original designation. Synonymy by Huber & Triapitsyn, 2017: 40.

Diagnosis. Body length 330–1040 µm. Head in lateral view with face strongly projecting anteriorly, with a sharp angle (about 90°) between dorsal and ventral surfaces and toruli just dorsal to angle (Figs 280, 284a, 295); vertex with ocelli in a low, wide triangle, the lateral ocelli at posterolateral angles next to posterior apex of supraorbital trabecula (Figs 281, 296); funicle segments quadrate (Fig. 285) to wider than long; clava 1-segmented (Figs 280, 285); frenum entire (Fig. 287); fore wing narrow and parallel-sided, with widest point at posterior lobe opposite or just distal to venation (Figs 279, 292); ovipositor short, less than half length of gaster (Figs 290, 305).

Discussion. *Cleruchus* and *Platystethynium* (*Platypatasson*) belong in the *Cleruchus* group of genera, which consists of species with rather dorsoventrally flattened bodies, claval segments quadrate or shorter than wide (Figs 285, 805) and head in lateral view triangular, with face strongly projecting anteriorly (Figs 280, 284, 295, 800, 804) so toruli are well anterior to the mouthparts. This group could be treated a subgroup within a larger *Anagrus* group of genera depending on which features are used to define the group. *Cleruchus* differs from *Platystethynium* (*Platypatasson*) by the clava 1-segmented (entire) clava.

Nearctic hosts. Coleoptera: Curculionidae, possibly Ciidae.

Important reference. Triapitsyn (2014a).

Cleruchus biciliatus (Ferrière, 1952)

Stenopteromymar biciliatus Ferrière, 1952: 42. Holotype ♀ (MHNG). **TL:** France, Haute-Savoie, Arcine.
Cleruchus biciliatus: Viggiani, 1974b: 87 (description) [P]; Schauff, 1984a: 44 (mention); Clouâtre *et al*., 1988: 939 (distribution); Clouâtre *et al*., 1989: 825 (habitat); Yoshimoto, 1990: 56 (distribution); Huber, 2013b: 67 (wing proportions); Triapitsyn, 2014a: 7 (key), 8 (description, distribution) [P]; Huber & Triapitsyn, 2015: 44 (paratype photograph).

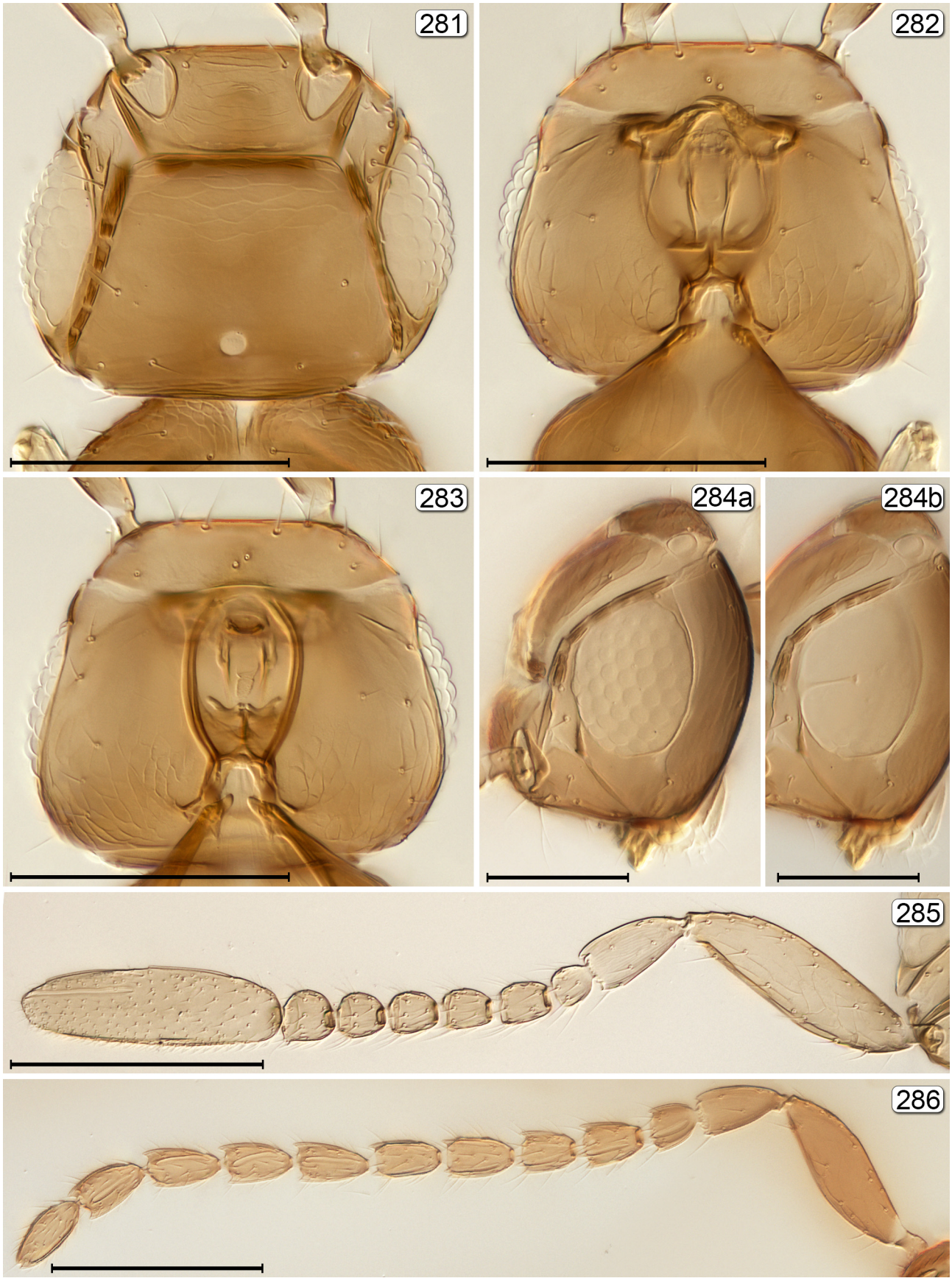
Distribution. Canada: ON, QC.

Cleruchus pieloui (Yoshimoto, 1971)

Paracleruchus pieloui Yoshimoto, 1971: 1079. Holotype ♀ (CNC). **TL:** Canada, New Brunswick, Ludlow. Burks, 1979: 1028 (catalogue).
Cleruchus sp.: Pielou & Verma, 1968: 1187 (list).
Cleruchus pieloui: Schauff, 1984a: 44 (mention); Clouâtre *et al*., 1988: 939 (from birch bracket fungus); Yoshimoto, 1990: 56 (list); Triapitsyn & Moraal, 2008: 63 (key), 65 (distribution); Triapitsyn *et al*., 2011: 9 (comparison with extralimital species); Triapitsyn *et al*., 2013: 8 (mention); Barnes, 2014: 903 (mention); Triapitsyn, 2014a: 6 (from bracket fungus).



FIGURES 279, 280. *Cleruchus* sp., habitus. 279, winged specimen – Canada, Ontario, Constance Bay, 12–24.viii.1983, M. Sanborne; 280, wingless specimen – Canada, Nova Scotia, Kings Co., Sheffield Mills, 21.vii.1997, S. Rigby, pitfall under McIntosh apple tree. Scale bars=500 µm.



FIGURES 281–286. *Cleruchus* sp. 281, head, dorsal; 282, head ventral; 283 head ventral (internal) showing tentorium; 284a, head, lateral; 284b, head, lateral (internal) showing ocular apodeme; 285, female antenna; 286, male antenna. Scale bars: 281–283, 285, 286=100 µm; 284=50 µm.

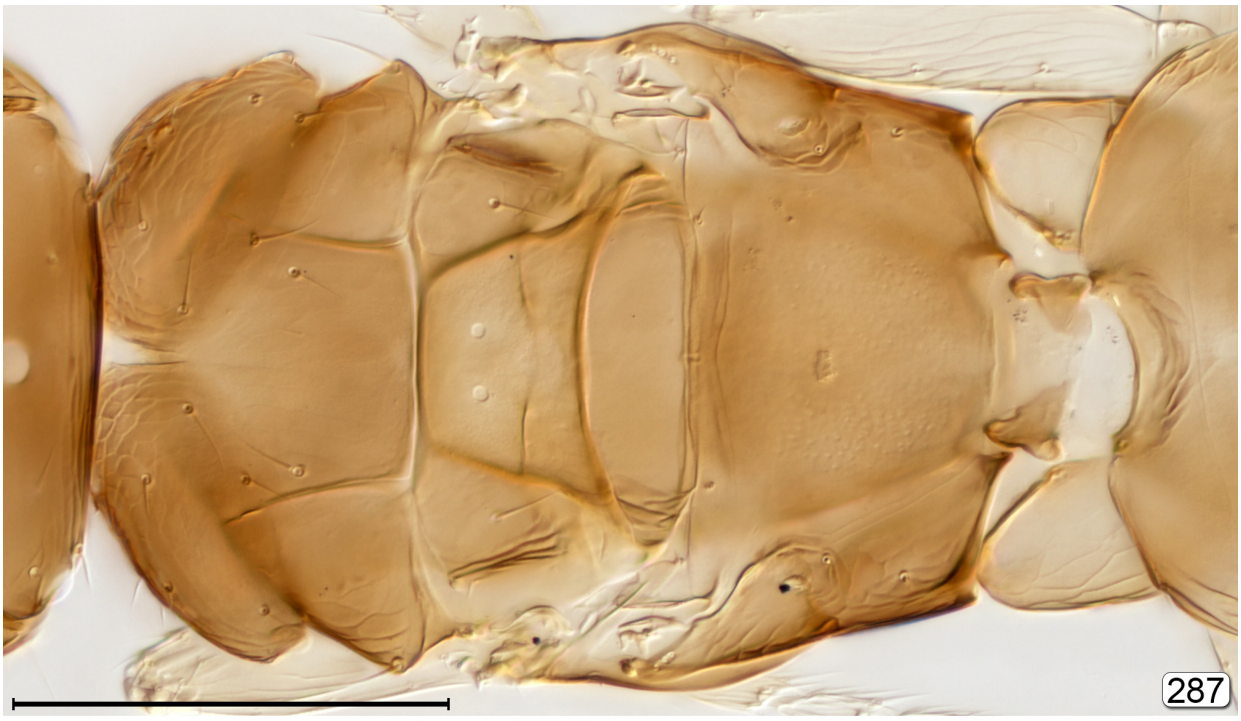
Nearctic hosts. Possibly Ciidae in birch bracket fungus.
Distribution. Canada: QC.

***Cleruchus puchus* Triapitsyn, 2008**

Cleruchus puchus Triapitsyn in Triapitsyn & Moraal, 2008: 66. Holotype ♀ (EMEC). **TL:** USA, California, Contra Costa Co., 10 mi. SE. Clayton, Morgan Territory Rd. Triapitsyn & Moraal, 2008: 63 (key).

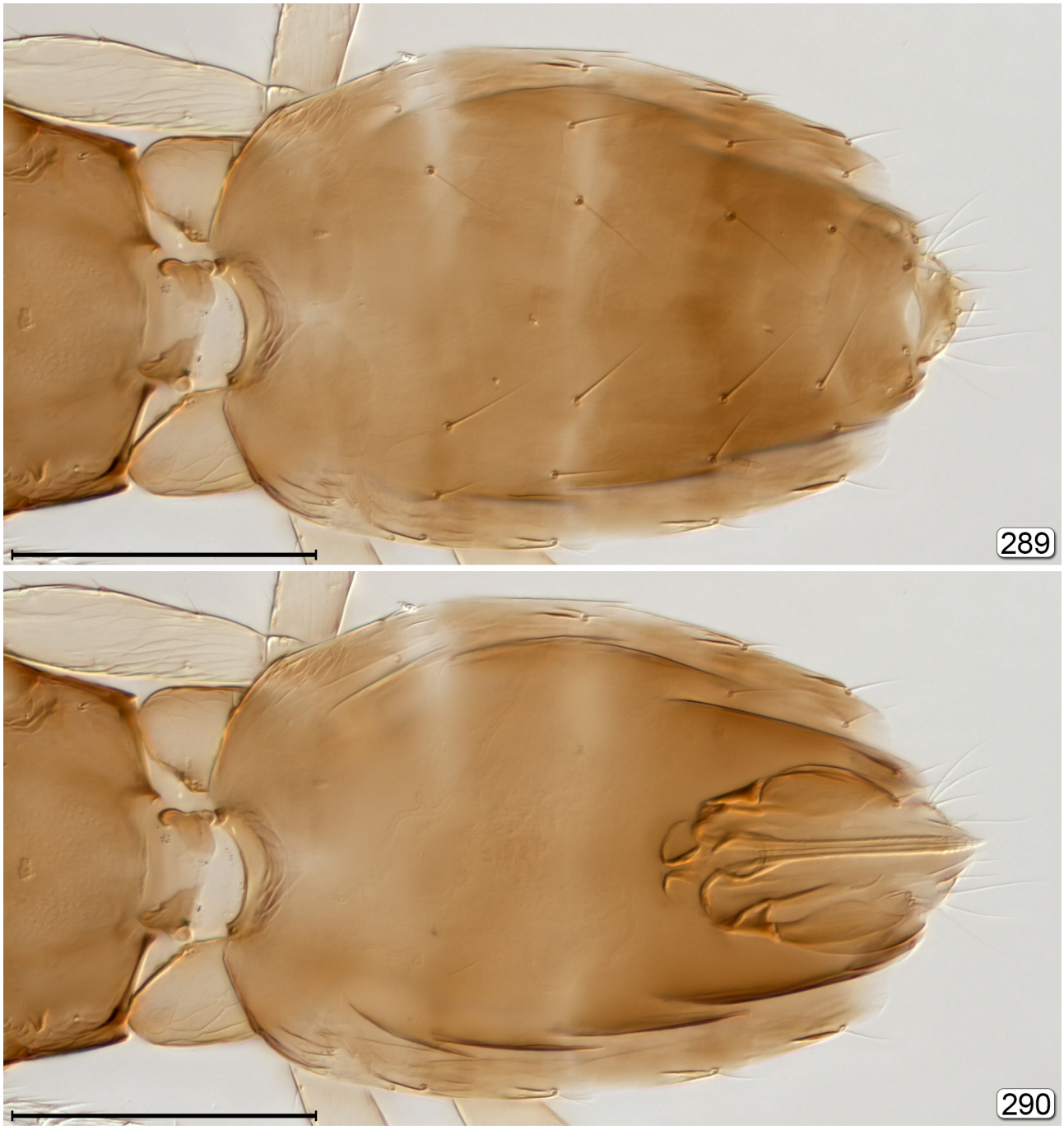
Nearctic hosts. ? Ciidae: culture of unidentified species.
Distribution. USA: CA.

Cleruchus sp.: Schauff, 1987: 41 (host: *Artipus floridanus* Horn [Curculionidae]).

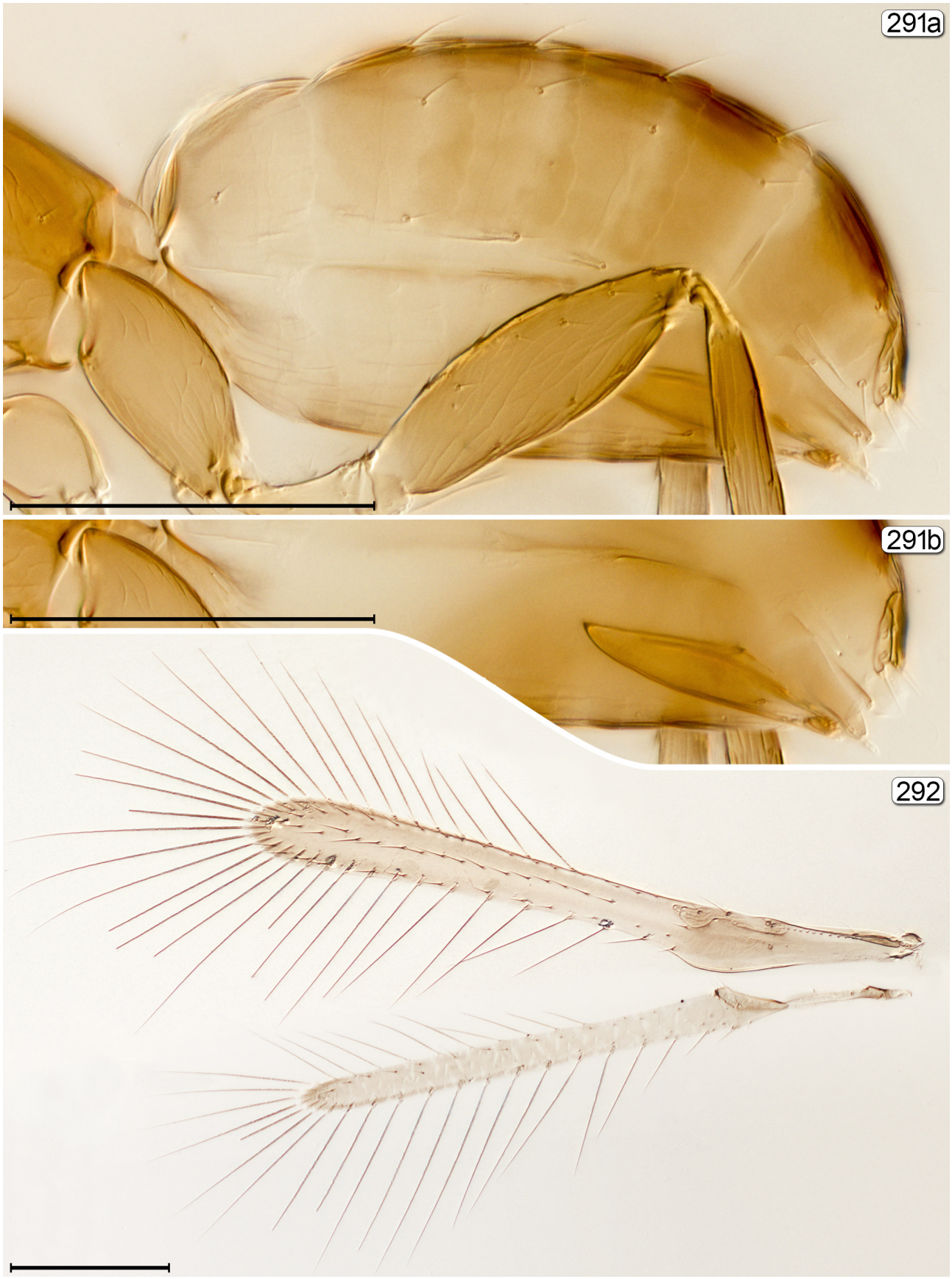




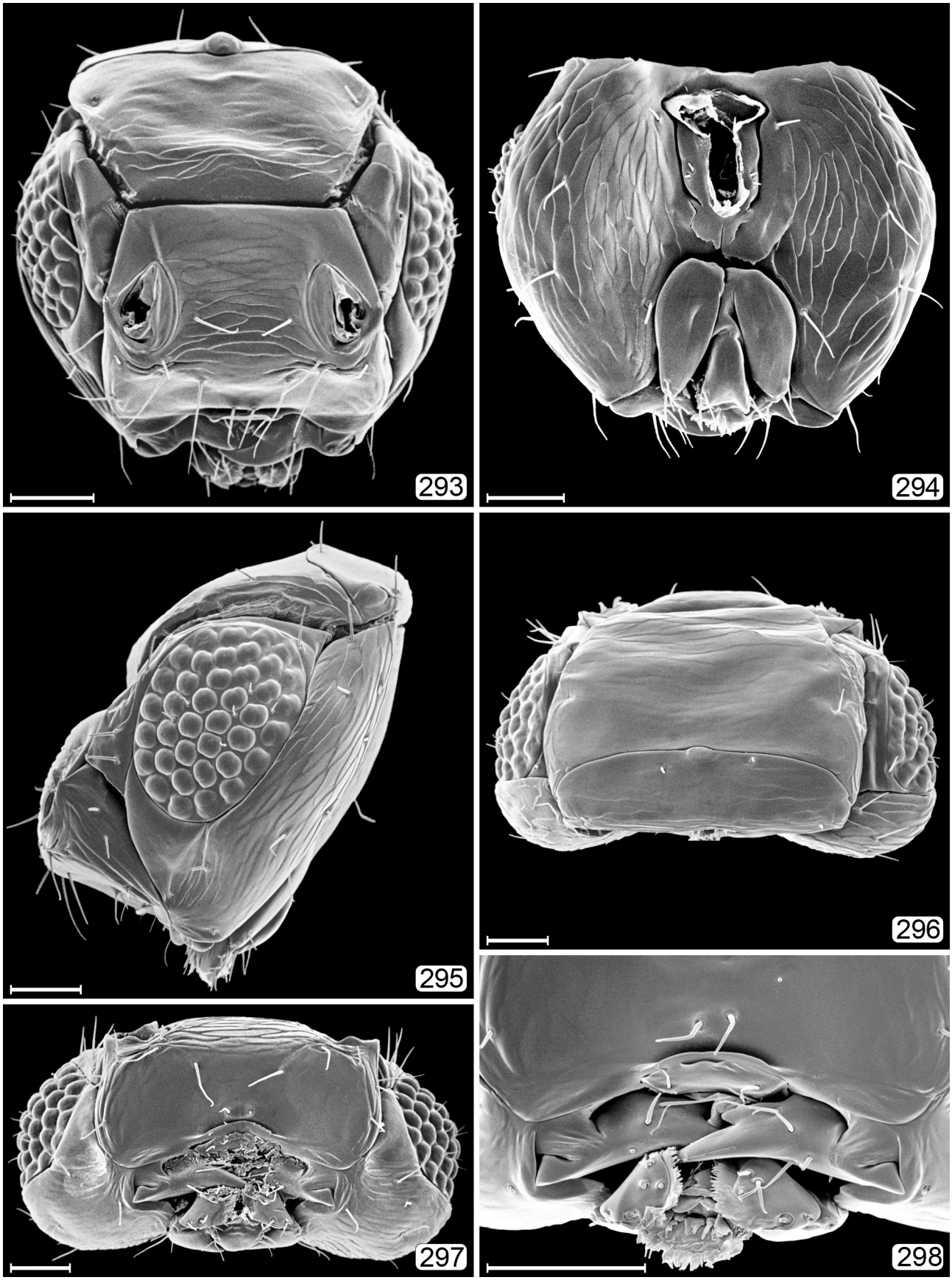
FIGURES 287, **288**. *Cleruchus* sp., mesosoma. 287, dorsal; 288, lateral. Scale bars=100 μm.



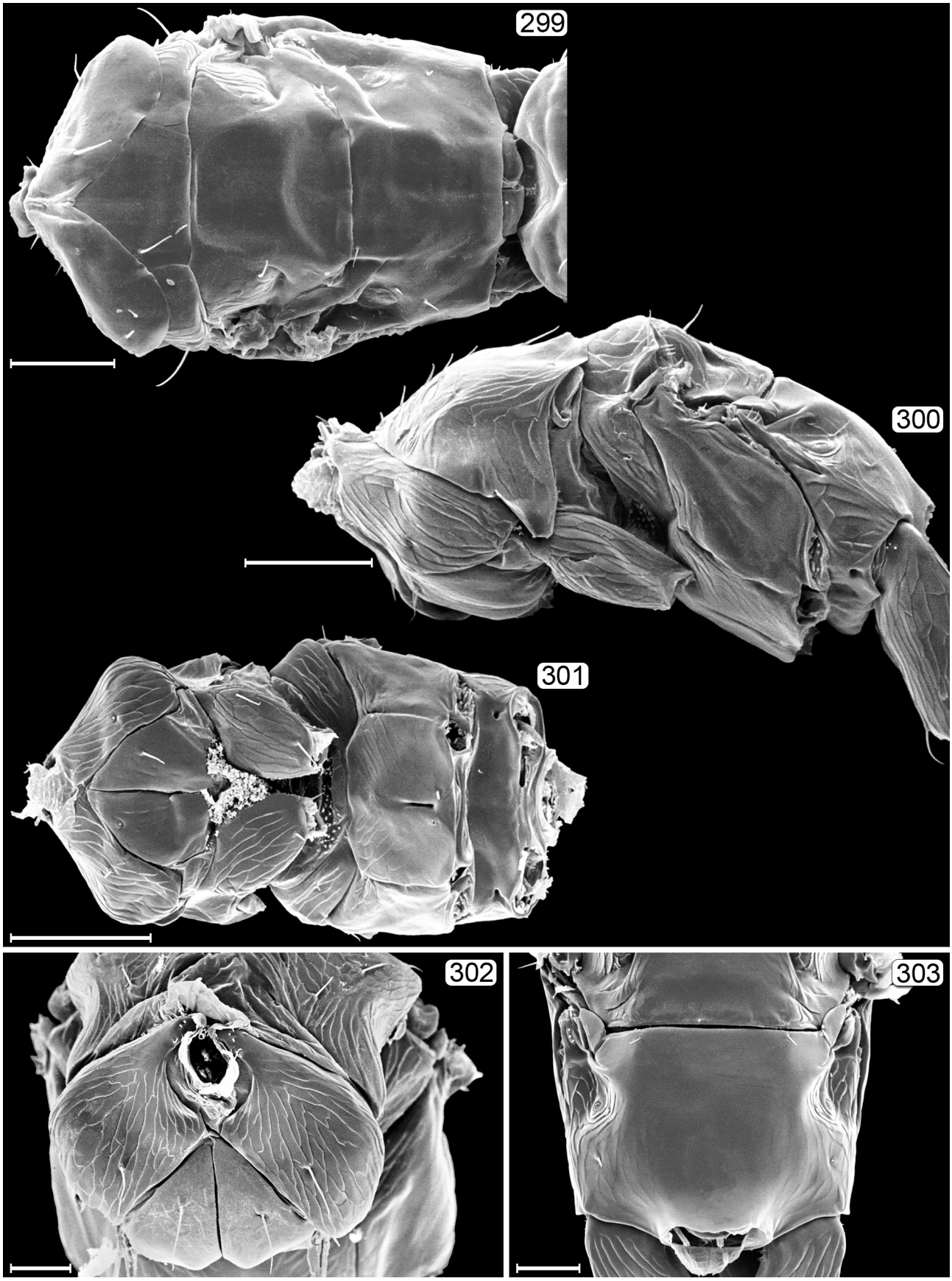
FIGURES 289, **290**. *Cleruchus* sp., metasoma. 289, dorsal; 290, dorsal showing genitalia through gaster. Scale bars=100 μm.



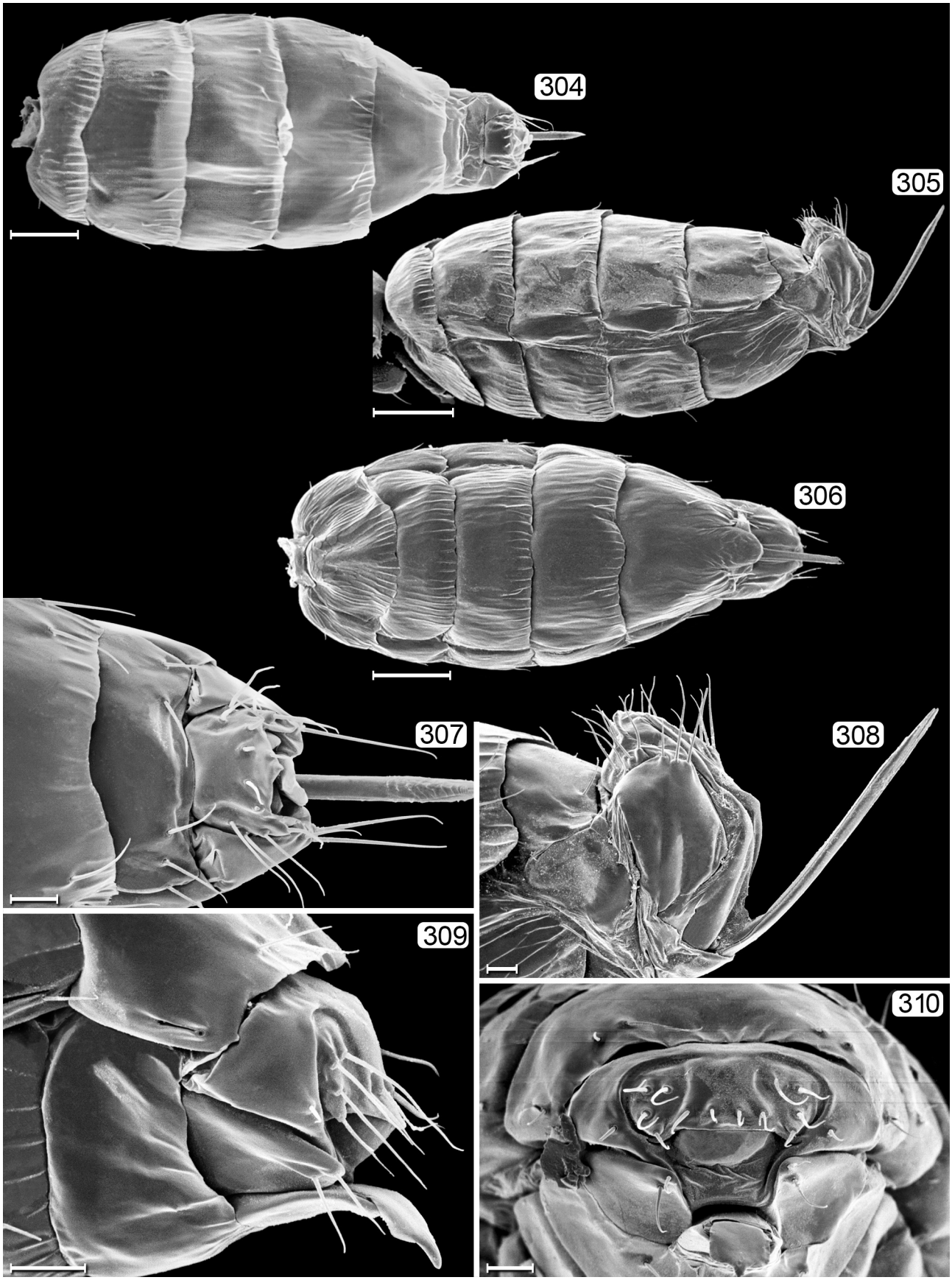
FIGURES 291, **292**. *Cleruchus* sp., male. 291a, metasoma, lateral; 291b, genitalia seen through gaster; 292, wings. Scale bars=100 μm.



FIGURES 293–298. *Cleruchus* sp., head. 293, male, anterior; 294, male, posterior; 295, lateral; 296, dorsal; 297, ventral; 298, mouthparts. Scale bars=20 μm.



FIGURES 299–303. *Cleruchus* sp., mesosoma. 299, dorsal; 300, lateral; 301, ventral; 302, anterior; 303, propodeum, dorsal. Scale bars: 299–301=50 μm; 32, 303=20 μm.



FIGURES 304–310. *Cleruchus* sp., metasoma. 304, dorsal; 305, lateral; 306, ventral; 307, apex, dorsal; 308, apex, lateral; 309, male apex, lateral; 310, male apex, posterior. Scale bars: 304–306=50 μm; 32, 307–310=10 μm.

***CNECOMYMAR* Ogloblin, 1963**
(Figs 311–339)

Cnecomymar Ogloblin, 1963: 65. Type species: *Cnecomymar major* Ogloblin, 1963, by original designation.

Diagnosis. Body length 1100–1715 µm. Body mainly yellow or light brown (Fig. 311); face with toruli separated by about half torular diameter from transverse trabecula (Fig. 312); fore wing with microtrichia relatively sparse, long and scraggly (Figs 311, 317); metafemur and metatibia with erect setae each at least 4× as long as width of femur or tibia (Fig. 311).



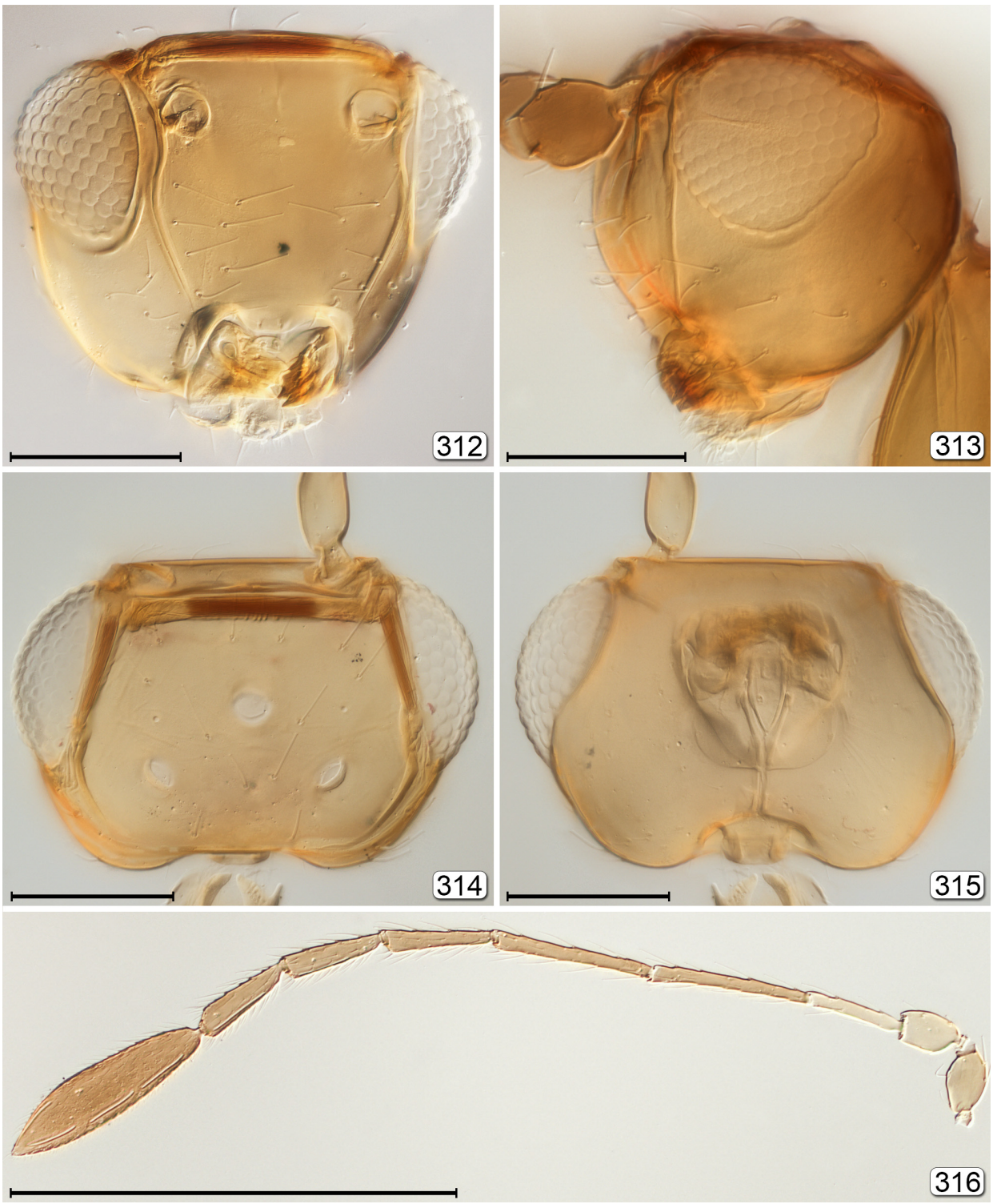
FIGURE 311. *Cnecomymar* sp., habitus. Canada, Quebec, 1.8 km N. Eardley, 45°34'00"N 76°05'29"W, 60–80 m, 29.vi–6.vii.2012, CNC Hym. Team. Scale bar=2000 µm.

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Cnecomymar* is superficially similar to one *Palaeoneura* sp., which is also yellow, but otherwise it is distinct on the features listed above. Only the extralimital type species is described but several species are known, including at least one from the Nearctic.

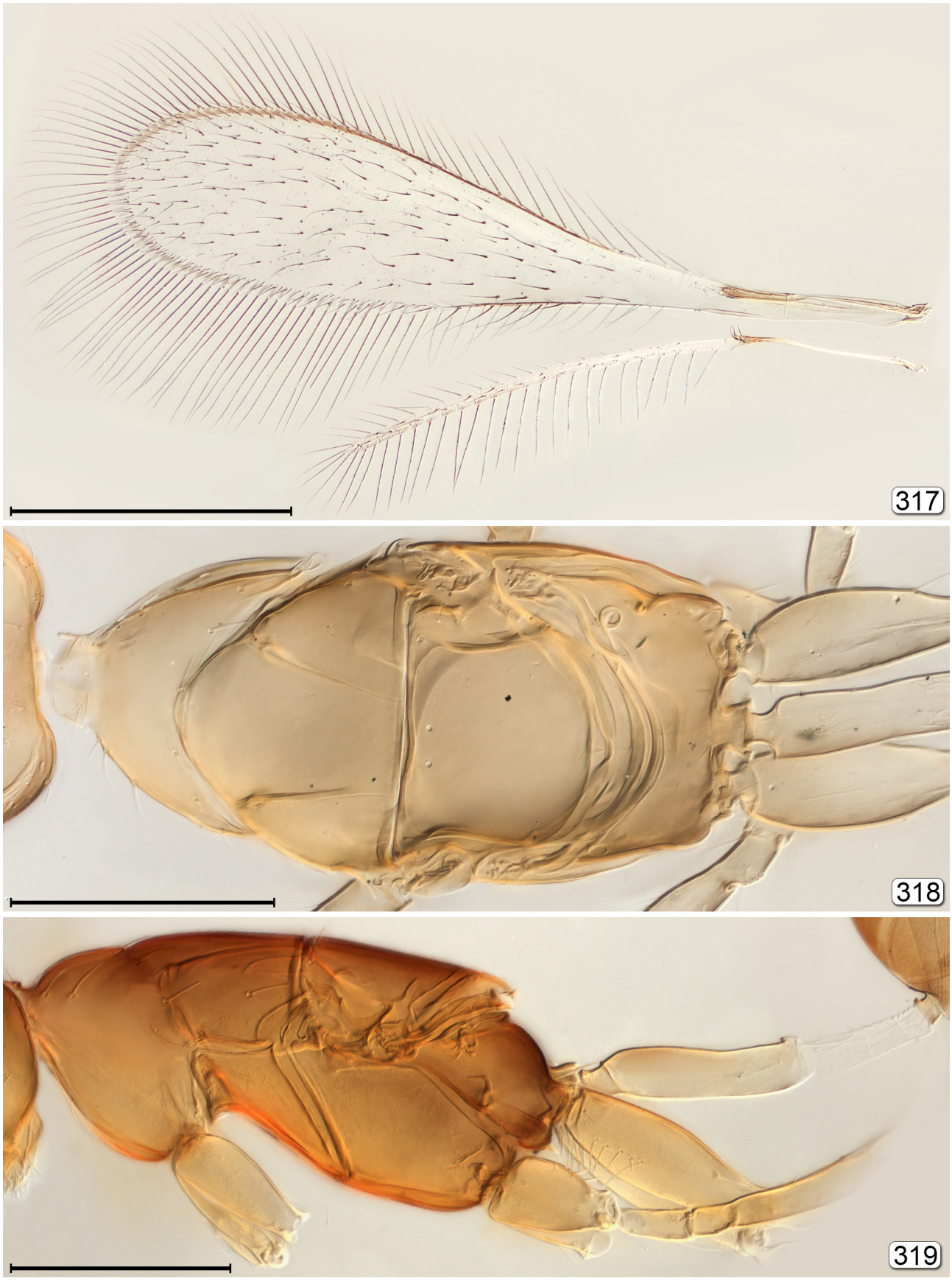
Important reference. Ogloblin (1963).

Cnecomymar sp.

Distribution. Canada: ON, QC. USA: AL, FL, GA, IL, LA, MD, MO, NC, NY, OH, OK, SC, TX, VA.



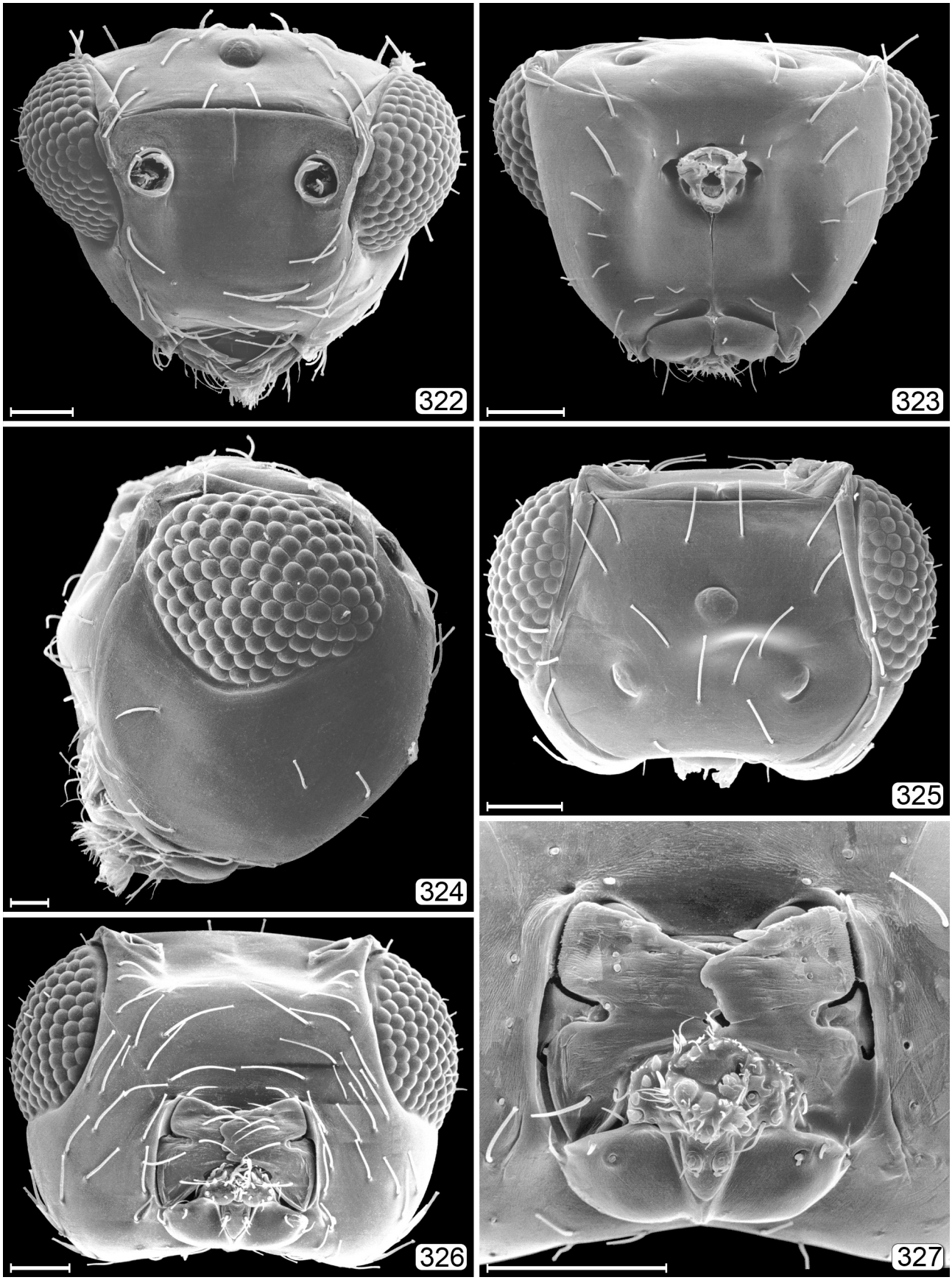
FIGURES 312–316. *Cnecomymar* sp. 312, head, anterior; 313, head, lateral; 314, head, dorsal; 315, head ventral; 316, antenna. Scale bars: 312–315=100 µm; 316=500 µm.



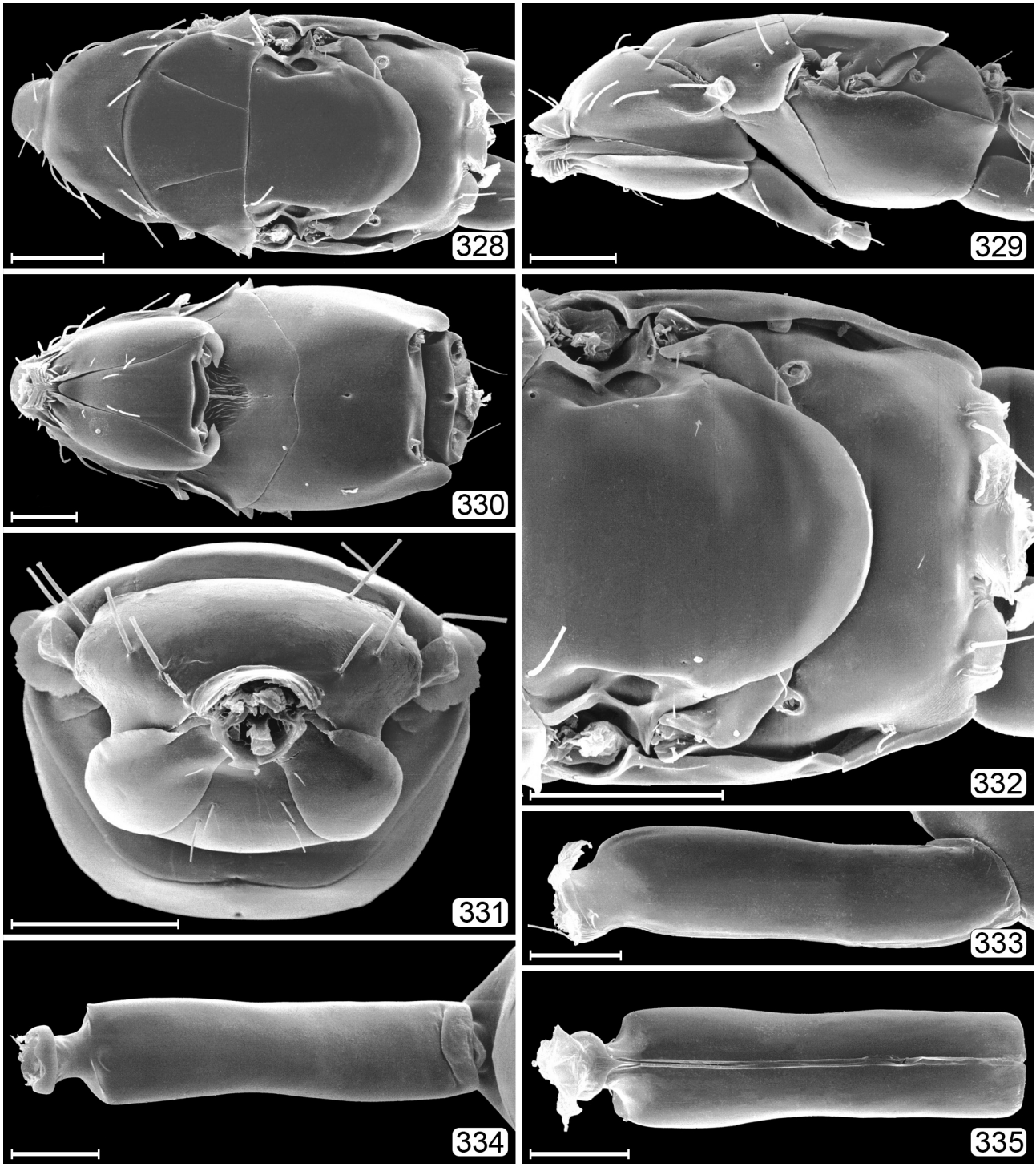
FIGURES 317–319. *Cnecomymar* sp. 317, wings; 318, mesosoma, dorsal; 319, mesosoma + petiole, lateral (gaster detached from petiole but still attached to extruded ventriculus (middle portion of alimentary canal). Scale bars: 317=500 µm; 318, 319=200 µm.



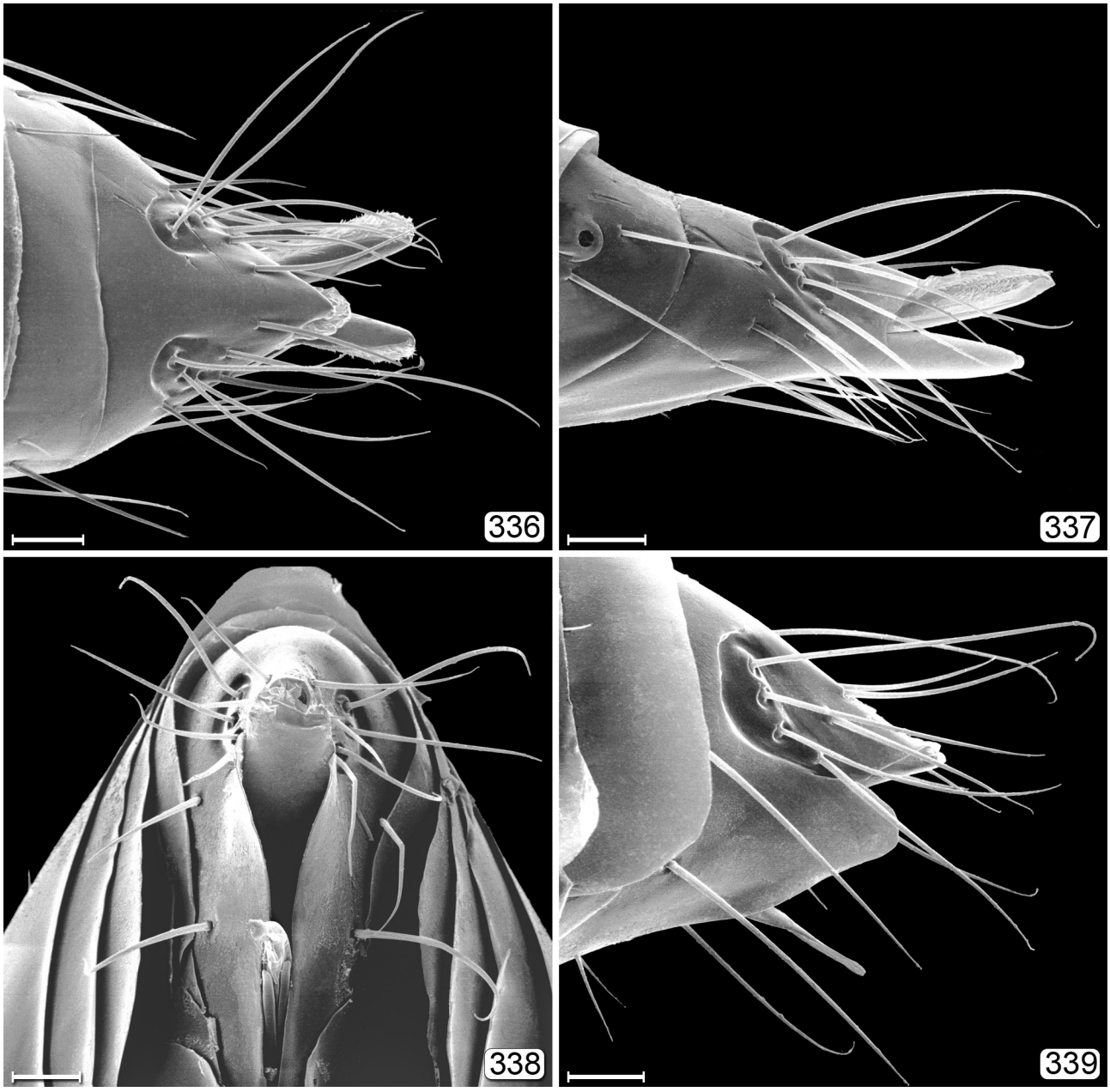
FIGURES 320, 321. *Cnecomymar* sp. metasoma. 320a, dorsal; 320b, genitalia seen through gaster; 321a, lateral; 321b, genitalia seen through gaster. Scale bars=200 μm.



FIGURES 322–327. *Cnecomymar* sp., head. 322, anterior; 323, posterior; 324, male, lateral; 325, dorsal; 326, ventral; 327, mouthparts. Scale bars=50 μm.



FIGURES 328–335. *Cnecomymar* sp. 328, mesosoma, dorsal; 329, mesosoma, lateral; 330, mesosoma, ventral; 331, mesosoma, anterior; 332, scutellum–propodeum; 333, petiole, lateral; 334, petiole, dorsal; 335, petiole, ventral. Scale bars: 328–332=100 μm; 333–335=50 μm.



FIGURES 336–339. *Cnecomymar* sp., gaster apex. 336, dorsal; 337, lateral; 338, male, ventroposterior; 339, male lateral. Scale bars=20 μm.

COSMOCOMOIDEA Howard, 1908

(Fig. 340)

Cosmocomoidea Howard, 1908: 68. Type species: *Cosmocomoidea morrilli* Howard, 1908, by monotypy. Treated by various authors as a subgenus or synonym under *Ooctonus*, *Lymaenon* or *Gonatocerus* but given generic status by Huber (2015a).

Diagnosis. Body length 615–2075 μm. Antenna with funicle 8-segmented; tarsi 5-segmented; funicle with fu_2 and fu_3 not the longest segments; ocellar triangle with 2 setae between lateral ocelli; pronotal lobes abutting medially; dorsellum rhomboidal; fore wing relatively wide with few or no microtrichiae behind venation; stigmal vein with apex oblique; propodeum with 2 submedian carinae.

Discussion. Four genera in the Nearctic (*Cosmocomoidea*, *Gastrogonatocerus*, *Gonatocerus*, and *Lymaenon*) share the following combination of features: tarsi 5-segmented, funicle 8-segmented, face with subantennal sulci,

and parastigma with hypochaeta about midway between proximal and distal macrochaetae (Huber 2015a). Among these, *Cosmocomoidea* is most similar to *Gonatocerus*, which has narrower fore wings, fu_2 and fu_3 usually the longest segments, and propodeum without carinae or, at most, a trace of them.

Nearctic hosts. Hemiptera: Cicadellidae.

Important references. Huber (1988, 2015a), Triapitsyn (2006, 2013a, b), Triapitsyn *et al.* (2010).

Cosmocomoidea ashmeadi (Girault, 1915)

Gonatocerus dolichocerus var. *ashmeadi* Girault, 1915 [261]: 8. Lectotype ♀ (USNM), designated by Huber, 1988: 53. **TL:** USA, Texas, no locality specified.

Ooctonus homalodiscae Ashmead (*nomen nudum* according to Girault, 1911 [96]: 324); Sanderson, 1906: 51, *nomen nudum* (economics, host, distribution); Girault, 1907 [27]: 31 (host, citation of *nomen nudum*).

Oöctonus [*sic*] *homalodiscae*: Girault, 1911 [87]: 149 (host). *Nomen nudum*.

Ooctonus homolodiscae [*sic*]: Girault, 1911 [96]: 316, 324. *Nomen nudum*.

Gonatocerus ashmeadi: Girault, 1929 [428]: 25 (key, given species status); Peck, 1951: 411 (generic transfer); Fattig, 1955: 10 (host, distribution); Burks, 1967: 214 (catalogue, distribution); Herting, 1972: 13, 14 (host catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 53 (description); Yoshimoto, 1990: 39 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT]; Triapitsyn & Phillips, 1996: 10 (host); Triapitsyn *et al*., 1998: 241 (hosts, distribution); Triapitsyn & Phillips, 2000: 200 (percent parasitism); Daane, 2001: 17 (percent parasitism); Grafton-Cardwell & Kallsen, 2001: 32 (density in orchards); Grafton-Cardwell & Haines, 2001: 36 (insecticide toxicity); Hoddle *et al*., 2001: 95 (species survey in California); Irvin & Hoddle, 2001: 135 (host age preference and susceptibility); Leopold, 2001: 42 (cold storage); Leopold & Yocum, 2001: 65 (cold storage); Mizell III, 2001: 52 (egg age susceptibility); Mizell III & Andersen, 2001: 81 (host plant/natural enemy interaction); Redak, 2001: 71 (mention); Triapitsyn & Hoddle, 2001: 133 (survey); Daane & Johnson, 2002: 100 (percent parasitism); Hoddle, 2002: 86 (interspecific competition); Hoddle & Stouthamer, 2002: 93 (cryptic species complex?); Jones, 2002: 88 (parasitism rates); Lauzière *et al*., 2002: 81 (biological control); Leopold & Yocum, 2002: 91 (cold storage development); Mizell III & Andersen, 2002: 109 (mention); Triapitsyn, 2002d: 91 (mention); Triapitsyn & Hoddle, 2002: 94 (survey); Triapitsyn *et al*., 2002: 654 (host); Daane & Johnson, 2003: 248 (percent parasitism); Hoddle, 2003a: 250 (interspecific competition); Hoddle, 2003b: 255 (distribution); Hoddle & Stouthamer, 2003: 257 (morphology, molecular differences); Leopold, 2003a: 221 (cold storage); Leopold, 2003b: 225 (host age preference, behavior, fecundity); Luck *et al*., 2003: 265 (olfactory behavior); Mizell III & Andersen, 2003: 271 (host plant/natural enemy interaction); Coudron & Goodman, 2004: 304 (artificial diet and ovipositional substrates); Daane & Johnson, 2004: 95 (percent parasitism, phenology); Daane *et al*., 2004: 102 (host plant influence); de León, 2004a: 309 (intraspecific genetic differences); de León, 2004b: 314 (genetic differentiation); Hoddle, 2004a: 111 (possible non-target impact); Hoddle, 2004b: 334 (lifetime parasitism, brochosomes); Hoddle, 2004c: 336 (reproductive, developmental biology); Hoddle & Triapitsyn, 2004a: 339 (mention); Hoddle & Triapitsyn, 2004b: 342 (quarantine colony); Irvin & Hoddle, 2004: 505 (oviposition preference); Leopold, 2004a: 124 (cold storage effects); Leopold, 2004b: 128 (functional response, superparasitism); López *et al*., 2004: 214 (overwintering biology, percent parasitism); Morse, 2004: 365 (percent parasitism); Pilkington *et al*., 2004: 133 (biology, phenology); Tipping, 2004: 153 (overwintering biology); Toscano *et al*., 2004: 378 (insecticide compatibility); Vickerman *et al*., 2004: 338 (morphology, DNA); Daane & Johnson, 2005: 97 (parasitism rate); de León, 2005: 299 (DNA fingerprinting); de León & Jones, 2005: 1 (genetic differentiation); de León *et al*., 2005: 302 (cryptic species complex); Groves & Johnson, 2005: 106 (host selection behavior); Hoddle, 2005a: 330 (lifetime parasitism); Hoddle, 2005b: 330 (reproduction and development); Hoddle & Boyd, 2005: 325 (hosts, choice/no choice tests); Irvin & Hoddle, 2005a: 205 (competitive ability); Irvin & Hoddle, 2005b: 392 (host suitability); Leopold, 2005a: 349 (temperature influence); Leopold, 2005b: 354 (refrigerated storage); Morse, 2005: 92 (percent parasitism); Morse, 2005: 370 (percent parasitism); Pilkington *et al*., 2005: 224 (biological control); Toscano *et al*., 2005: 389 (insecticide compatibility); Triapitsyn, 2005: 393 (key); Velema *et al*., 2005: 486 (brochosome influence); Byrne & Toscano, 2006: 197 (detection by electrophoresis); Chen *et al.*, 2006a: 120 (functional response and superparasitism); Chen *et al.*, 2006b: 1178 (temperature effect); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Grandgirard *et al*., 2006: 436 (biological control possibility) [A]; Groves & Johnson, 2006: 9 (host selection behavior); Hoddle, 2006a: 73 (mention); Hoddle, 2006b: 80 (egg load estimate); Hoddle & Boyd, 2006: 88 (non-target impact); Irvin & Hoddle, 2006: 162 (intraspecific competition); Irvin *et al*., 2006: 360 (interspecific competition); Pilkington & Hoddle, 2006a: 266 (reproduction, development); Pilkington & Hoddle, 2006b: 276 (life table, degree days); Toscano & Morse, 2006: 107 (insecticide compatibility); Triapitsyn, 2006: 6 (key), 24 (distribution, description, hosts); Boyd & Hoddle, 2007: 57 (host specificity testing); Boyd *et al*., 2007: 179 (rearing technique); Byrne & Toscano, 2007a: 70 (insecticide impact); Byrne & Toscano, 2007b: 132 (insecticide toxicity); Chen & Leopold, 2007: 685 (progeny quality on stored eggs); de León & Morgan, 2007b: 753 (molecular markers); de León *et al*., 2007a: 77 (molecular markers); Grandgirard *et al*., 2007a: 810 (pre-introductory assessment)[A]; Hoddle & Irvin, 2007: 90 (competitive ability); Irvin & Hoddle, 2007: 81 (fitness enhancement); Irvin *et al*., 2007: 70 (dietary supplements); Krugner *et al*., 2007: 39 (response to volatile cues); Lauzière & Elzen, 2007: 12 (insecticide effects); Leopold, 2007: 42 (cold storage effects); Petit *et al*., 2007: 956 (release in Tahiti) [A]; Prabhaker *et al*., 2007: 1055 (insecticide toxicity); Chen *et al*., 2008a: 1760 (cold storage effects); Chen *et al*., 2008b:

122 (cold storage effects); de León *et al*., 2008a: 99 (barcode); Grandgirard *et al*., 2008a: 136 (biological control success) [A]; Grandgirard *et al*., 2008b: 101 (biological control, distribution) [A]; Gunawardana *et al*., 2008: 13 (biocontrol in Cook Islands) [A]; Hoddle, 2008b: 66 (lab. competition with *G. tuberculifemur*); Hoddle, 2008a: 63 (relative abundance); Hoddle, 2008b: 66 (relative parasitism rate); Irvin & Hoddle, 2008: 125 (egg maturation, wing wear); Krugner *et al*., 2008a: 9 (olfactory response); Leopold, 2008: 35 (cold storage); Petit *et al*., 2008: 345 (dispersal, establishment) [A]; Williams III & Hendrix, 2008: 26 (fitness compared to *A. iole*); Grandgirard *et al*., 2009: 99 (biological control) [A]; Hoddle, 2009: 19 (relative abundance); Irvin *et al*., 2009: 1635 (functional response); Petit *et al*., 2009: 486 (long-distance dispersal) [A]; Hoddle, 2010: 16 (biological control in California); Irvin & Hoddle, 2010: 187 (competitive ability in laboratory); Mills, 2010: 394 (biological control success) [A]; Triapitsyn *et al*., 2010: 98 (key), 107 (distribution, hosts) [NT]; Colinet & Boivin, 2011: 91 (cold storage); Cooksey, 2011: 27 (molecular identification); Gutierrez *et al*., 2011: 757 (biological control); Irvin & Hoddle, 2011: 840 (competitive ability in laboratory); Vilhelmsen, 2011: 346 (Morphbank image examined); Charles, 2012: 620 (non-target impact assessment) [A]; Irvin *et al*., 2012: 2 (marking for dispersal monitoring); Krugner *et al*., 2012: 1280 (dispersal); Rathé *et al*., 2012: 216 (management option); Triapitsyn, 2012b: 10 (biological control, vouchers); Charles & Logan, 2013: 73 (predicted distribution) [A]; Triapitsyn, 2013c: 293 (mention); Irvin *et al*., 2014a: 11 (enhanced survival); Irvin *et al*., 2014b: 662 (lifetime fecundity); Krugner *et al*., 2014: 24 (plant volatile attraction); Rathé *et al*., 2014: 5 (parasitism on Australian host plants); Boivin & Ellers, 2016: 164 (ovigeny index).

Gonatocerus (*Cosmocomoidea*) *ashmeadi*: Triapitsyn, 2013b: 213 (key, 214 (distribution).

Lymaenon ashmeadi: Burks, 1958: 63 (generic transfer); Turner & Pollard, 1959: 26 (hosts, distribution); Peck, 1963: 21 (catalogue).

Cosmocomoidea ashmeadi: Huber, 2015a: 17 (generic transfer, list); Van Driesche *et al.*, 2018: 26 (biological control).

Nearctic hosts. Cicadellidae: *Cuerna costalis* (Fabricius), *Homalodisca liturata* Ball, *H. vitripennis* (Germar), *Oncometopia clarior* (Walker), *O. orbona* Fabricius.

Distribution. USA: CA, GA, LA, MS, TX.

Cosmocomoidea atra (Foerster, 1841), *s.l.*

Gonatocerus (*Cosmocomoidea*) *ater*: Triapitsyn, 2013a: 134 (distribution); Triapitsyn, 2013b: 213 (key), 2014 (distribution).

Cosmocomoidea atra: Huber, 2015a: 17 (generic transfer, list).

Distribution. Canada: BC. USA: CA, NY.

Remarks. Because Triapitsyn (2013a, b) listed this as a possible species complex, only the three references above are given. If *C. atra s.s.* is found to occur in the Nearctic the list of references could be greatly increased, though many may not refer to the correct species in the complex. Details on the primary type specimen can then also meaningfully be given.

Cosmocomoidea bonariensis (Brèthes, 1922)

Försterella [*sic*] *bonariensis* Brèthes, 1922: 129. Holotype ♀ (MLPA). **TL:** Argentina, Buenos Aires, General Urquiza.

Gonatocerus (*Gonatocerus*) *bonariensis*: De Santis, 1967: 102 (generic transfer).

Gonatocerus (*Cosmocomoidea*) *bonariensis*: Triapitsyn *et al.*, 2010: 96 (key), 119 (distribution) [NT]; Triapitsyn, 2013b: 214 (key).

Cosmocomoidea bonariensis: Huber, 2015a: 18 (generic transfer, list).

Gonatocerus enicmophilus Huber, 1988: 79. Holotype ♀ (USNM). **TL:** USA, California, Riverside Co., University of California, Riverside Campus. Synonymy by Triapitsyn *et al*., 2010: 118. Yoshimoto, 1990: 40 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT].

Cosmocomoidea enicmophila [*sic*]: Huber, 2015a: 18 (generic transfer, as synonym under *C. bonariensis*).

Distribution. USA: CA, WY.

Cosmocomoidea bucculenta (Huber, 1988)

Gonatocerus bucculentus Huber, 1988: 76. Holotype ♀ (CNC). **TL:** USA, Arizona, Cochise Co., 5 mi. W. Portal, Southwestern Research Station. Yoshimoto, 1990: 39 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT].

Gonatocerus (*Cosmocomoidea*) *bucculentus*: Triapitsyn *et al.*, 2010: 96 (key), 126 (distribution); Triapitsyn, 2013b: 213 (key).

Cosmocomoidea bucculenta: Huber, 2015a: 18 (generic transfer, list).

Distribution. USA: AZ, NM, TX.



FIGURE 340. *Cosmocomoidea capitata* (Gahan), habitus. USA, Oregon (locality, date and collector not recorded, USNM specimen). Scale bar=500 μm.

***Cosmocomoidea capitata* (Gahan, 1932)**

Gonatoceros [*sic*] *capitatus* Gahan, 1932: 754. Lectotype ♀ (USNM), designated by Huber, 1988: 65. **TL:** USA, Utah, Centerville.
Gonatocerus capitatus: Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 65 (description); Yoshimoto, 1990: 39 (list, species group placement); Triapitsyn *et al*., 1998: 241 (host); Huber & Beardsley, 2000: 52 (key), 56 (distribution, host?) [A]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Bayoun *et al*., 2008: 415 (host, distribution).
Lymaenon capitatus: Flock *et al.*, 1962: 277 (mention); Burks, 1958: 63 (generic transfer); Peck, 1963: 22 (catalogue).
Gonatocerus (*Gonatocerus*) *capitatus*: De Santis, 1979: 365 (catalogue) [NT].
Gonatocerus (*Cosmocomoidea*) *capitatus*: Triapitsyn, 2013b: 213 (key), 214 (distribution).
Cosmocomoidea capitata: Huber, 2015a: 18 (generic transfer, list).

Nearctic hosts. Cicadellidae: *Neoaliturus* (*Circulifer*) *tenellus* (Baker).
Distribution. USA: CA, TX, UT.

***Cosmocomoidea chula* (Triapitsyn & Bernal, 2009)**

Gonatocerus chula Triapitsyn & Bernal, 2009: 4. Holotype ♀ (UCRC). **TL:** Mexico: Sonora, near Miguel Alemán.
Gonatocerus (*Cosmocomoidea*) *chula*: Triapitsyn *et al.*, 2010: 96 (key), 173 (distribution); Triapitsyn, 2013b: 213 (key).
Cosmocomoidea chula: Aquino *et al.*, 2016: 590 (generic transfer).

Distribution. USA: AZ.

***Cosmocomoidea dolichocerus* (Ashmead, 1887)**

Gonatocerus dolichocerus Ashmead, 1887: 192. Holotype ♀ (USNM). **TL:** USA, Florida, Jacksonville.
Gonatocerus dolichocerus: Girault, 1911 [87]: 148 (host); Girault, 1911 [96]: 254 (description, host, distribution), 273 (key); Girault, 1915 [261]: 8 (description); Girault, 1929 [428]: 25 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 72 (description, hosts, distribution); Yoshimoto, 1990: 40 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT]; Huber & Beardsley, 2000: 52 (key), 57 (distribution) [A]; Grandgirard *et al*., 2007b: 179 (Tahiti) [A].
Gonatocerus (*Cosmocomoidea*) *dolichocerus*: Triapitsyn *et al.*, 2010: 146 (distribution); Triapitsyn, 2013b: 213 (key), 214 (distribution).
Lymaenon dolichocerus: Burks, 1958: 63 (generic transfer); Peck, 1963: 22 (catalogue).
Cosmocomoidea dolichocerus: Huber, 2015a: 18 (generic transfer, list).
Gonatocerus marilandicus Girault, 1917 [301]: 115. Holotype ♀ (USNM). **TL:** USA, Maryland, Glenn Dale, **stat. rev**. Girault, 1929 [428]: 25 (key); Burks, 1979: 1026 (catalogue); Huber, 1988: 72 (synonymy); Yoshimoto, 1990: 40 (list).
Gonatocerus marylandicus: Peck, 1951: 412 (catalogue, unjustified emendation); Fattig, 1955: 10 (hosts); Burks, 1967: 214 (catalogue, host, distribution).
Lymaenon marylandicus: Burks, 1958: 63 (generic transfer); Peck, 1963: 23 (catalogue).
Cosmocomoidea marilandica: Huber, 2015a: 20 (incorrectly listed as valid species instead of synonym of *C. dolichocerus*).

Nearctic hosts. Membracidae: *Ceresa bubalus* (Fabricius), *Gypona* sp.
Distribution. Canada: ON, QC. USA: FL, GA, IL, LA, MO, NY, OH, PA, VT.

***Cosmocomoidea elizavetae* (Triapitsyn, 2013)**

Gonatocerus (*Cosmocomoidea*) *elizavetae* Triapitsyn, 2013b: 214. Holotype ♀ (UCRC). **TL:** USA, Illinois, Elizabethtown. Triapitsyn, 2013b: 213 (key).
Cosmocomoidea elizavetae: Huber, 2015a: 18 (generic transfer, list).

Distribution. USA: IL.

***Cosmocomoidea ermi* (Triapitsyn, 2013)**

Gonatocerus (*Cosmocomoidea*) *ermi* Triapitsyn, 2013b: 215. Holotype ♀ (UCRC). **TL:** USA, California, near Temecula, Sandia Creek near De Luz Rd. Triapitsyn, 2013b: 213 (key).
Cosmocomoidea latipennis [misidentification (Triapitsyn, 2013a, b)]: Boyd *et al.*, 2004: 95 (host); Boyd & Hoddle 2006: 1154 (host).

Gonatocerus (*Cosmocomoidea*) *latipennis* [misidentification]: Triapitsyn, 2013a: 145 (distribution); Triapitsyn, 2013b: 213 (key).
Gonatocerus ermi: Triapitsyn & Shih, 2014: 675 (host).
Cosmocomoidea ermi: Huber, 2015a: 18 (generic transfer, list).

Nearctic hosts. Cicadellidae: *Graphocephala atropunctata* (Signoret).

Distribution. USA: CA.

Cosmocomoidea fasciata (Girault, 1911)

Gonatocerus fasciatus Girault, 1911 [96]: 265. Lectotype ♀ (INHS), designated by Frison, 1927: 227. **TL:** USA, Virginia, Arlington. Girault, 1929 [428]: 24 (key); Peck, 1951: 412 (catalogue); Fattig, 1955: 10 (hosts, distribution); Burks, 1967: 214 (catalogue, distribution); Herting, 1972: 14 (host catalogue); Burks, 1979: 1025 (catalogue); Webb, 1980: 118 (lectotype listing); Huber, 1988: 57 (description); Yoshimoto, 1990: 40 (list, species group placement); Triapitsyn *et al.*, 1998: 241 (distribution); Triapitsyn & Phillips, 2000: 202 (candidate for importation); Triapitsyn & Hoddle, 2001: 133 (survey); Triapitsyn & Hoddle, 2002: 94 (field collecting, propagation); Hoddle, 2003a: 250 (interspecific competition); Hoddle, 2003b: 255 (behavior, biology); Hoddle, 2003c: 262 (collecting); Triapitsyn & Hoddle, 2003: 261 (distribution); Triapitsyn *et al.*, 2003: 75 (biology); Coudron & Goodman, 2004: 304 (artificial diet and ovipositional substrates); Hoddle, 2004a: 111 (possible non-target impact); Hoddle, 2004b: 334 (mention); Hoddle, 2004c: 336 (mention); Hoddle & Triapitsyn, 2004b: 342 (distribution); Irvin & Hoddle, 2004: 505 (oviposition); Morse, 2004: 365 (percent parasitism); Pilkington *et al.*, 2004: 133 (biology, phenology); de León, 2005: 299 (DNA fingerprinting); Hoddle & Boyd, 2005: 325 (hosts, choice/no choice tests); Irvin & Hoddle, 2005a: 205 (competitive ability); Irvin & Hoddle, 2005b: 392 (host suitability); Pilkington *et* al., 2005: 224 (biological control); Triapitsyn, 2005: 393 (key); Chen *et al.*, 2006b: 1178 (release in California); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Hoddle, 2006a: 73 (mention); Hoddle & Boyd, 2006: 88 (non-target impact); Irvin & Hoddle, 2006: 162 (intraspecific competition); Morse, 2006: 92 (percent parasitism); Pilkington & Hoddle, 2006a: 266 (mention); Tipping *et al.*, 2006: 6 (key), 20 (description, distribution, hosts); Boyd & Hoddle, 2007: 57 (host specificity testing); Boyd *et al*., 2007: 179 (rearing technique); de León & Morgan, 2007b: 753 (molecular markers); Irvin *et al*., 2007: 70 (dietary supplements); de León *et al*., 2008a: 99 (barcode); Hoddle, 2008a: 63 (relative abundance); Williams III & Hendrix, 2008: 26 (fitness compared to *A. iole*); Hoddle, 2009: 19 (relative abundance); Hoddle, 2010: 16 (biological control in California); Rathé *et al*., 2012: 216 (introduction into California); Triapitsyn, 2012b: 10 (biological control, vouchers); Triapitsyn, 2013c: 293 (gregarious in host)*;* Rathé *et al*., 2014: 2 (biocontrol mention).
Gonatocerus (*Cosmocomoidea*) *fasciatus*: Triapitsyn, 2013b: 213 (key), 216 (distribution).
Lymaenon fasciatus: Burks, 1958: 63 (generic transfer); Turner & Pollard, 1959: 26 (host, distribution); Peck, 1963: 22 (catalogue).
Cosmocomoidea fasciata: Huber, 2015a: 19 (generic transfer, list); Van Driesche *et al.*, 2018: 27 (biological control).

Nearctic hosts. Cicadellidae: *Homalodisca vitripennis* (Germar), *Oncometopia orbona* (Fabricius), *Paraulacizes irrorata* (Fabricius).

Distribution. USA: CA (apparently native to northern CA; also introduced to southern and central CA but apparently not established there), DC, FL, GA, IL, KY, LA, MD, MO, MS, NC, OH, PA, SC, TN, TX, VA.

Cosmocomoidea flagellata (Huber, 1988)

Gonatocerus flagellatus Huber, 1988: 78. Holotype ♀ (USNM). **TL:** USA, Texas, Weslaco.
Gonatocerus flagellatus: Yoshimoto, 1990: 40 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT].
Gonatocerus (*Cosmocomoidea*) *flagellatus*: Triapitsyn, 2013b: 214 (key).
Cosmocomoidea flagellata: Huber, 2015a: 19 (generic transfer, list).

Distribution. USA: AZ, TX.

Cosmocomoidea impar (Huber, 1988)

Gonatocerus impar Huber, 1988: 69. Holotype ♀ (USNM). **TL:** USA, California, Riverside Co., Menifee Valley. Yoshimoto, 1990: 40 (list, species group placement); Triapitsyn, 2006: 5 (key, 31 (description, distribution).
Gonatocerus (*Cosmocomoidea*) *impar*: Triapitsyn, 2013b: 213 (key).
Cosmocomoidea impar: Huber, 2015a: 19 (generic transfer, list).

Distribution. USA: AZ, CA.

***Cosmocomoidea incompta* (Huber, 1988)**

Gonatocerus incomptus Huber, 1988: 78. Holotype ♀ (USNM). **TL:** USA, California, Riverside Co., Riverside. Yoshimoto, 1990: 40 (list, species group placement); Triapitsyn *et al.*, 1998: 241 (phenology); Hoddle *et al*., 2001: 95 (survey); Morse, 2005: 370 (percent parasitism); Triapitsyn, 2005: 393 (key); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Morse, 2006: 92 (percent parasitism); Triapitsyn, 2006: 5 (key), 30 (description, distribution, hosts); de León & Morgan, 2007b: 753 (molecular markers); de León *et al*., 2008a: 99 (barcode); Cooksey, 2011: 27 (molecular identification); Triapitsyn, 2012b: 10 (biological control, vouchers); Triapitsyn, 2013c: 293 (mention).
Gonatocerus (*Cosmocomoidea*) *incomptus*: Triapitsyn, 2013b: 213 (key), 216 (distribution).
Cosmocomoidea incompta: Huber, 2015a: 19 (generic transfer, list).

Nearctic hosts. Cicadellidae: *Cuerna costalis* (Fabricius), *Homalodisca liturata* Ball, *Homalodisca vitripennis* (Germar).

Distribution. USA: CA, OR, TX.

***Cosmocomoidea inexpectata* (Huber, 1988)**

Gonatocerus inexpectatus, Huber, 1988: 75. Holotype ♀ (CNC). **TL:** Canada, Ontario, Constance Bay. Yoshimoto, 1990: 40 (list, species group placement).
Gonatocerus (*Cosmocomoidea*) *inexpectatus*: Triapitsyn, 2013b: 213 (key), 216 (distribution).
Cosmocomoidea inexpectata: Huber, 2015a: 19 (generic transfer, list).

Distribution. Canada: ON. USA: GA, LA, TX.

***Cosmocomoidea inflatiscapus* (Huber, 1988)**

Gonatocerus inflatiscapus Huber, 1988: 70. Holotype ♀ (USNM). **TL:** USA, California, San Bernardino Co., Barton Flats, hwy 38, Hathaway Creek. Yoshimoto, 1990: 40 (list, species group placement); De Santis & Fidalgo, 1994: 125 (catalogue) [NT].
Gonatocerus (*Cosmocomoidea*) *inflatiscapus*: Triapitsyn, 2013b: 213 (key).
Cosmocomoidea inflatiscapus: Huber, 2015a: 19 (generic transfer, list); Rauber *et al.*, 2016: 133 (distribution) 135 (key) [NT].

Distribution. USA: CA, FL.

***Cosmocomoidea latipennis* (Girault, 1911)**

Gonatocerus latipennis Girault, 1911 [96]: 268. Holotype ♂ (USNM). **TL:** USA, no locality specified. Girault, 1929 [428]: 24 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 60 (description); De Santis & Fidalgo, 1994: 125 (catalogue) [NT]; Hoddle, 2004a: 111 (host); Hoddle & Boyd, 2005: 325 (host).
Lymaenon latipennis: Burks, 1958: 63 (generic transfer); Burks, 1958: 63 (generic transfer); Peck, 1963: 23 (catalogue).
Cosmocomoidea latipennis: Huber, 2015a: 20 (generic transfer, list); Dale-Skey *et al.*, 2016: 2 (checklist) [P].
Gonatocerus maximus Girault, 1911 [96]: 264. Holotype ♀ (INHS), lost. **TL:** USA, Illinois, Pulaski. Synonymy by Huber, 1988: 60. Girault, 1929 [428]: 25 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 60 (synonymy); Yoshimoto, 1990: 40 (list, species group placement).
Lymaenon maximus: Burks, 1958: 63 (generic transfer); Peck, 1963: 24 (catalogue).

Distribution. Canada: BC, NS, ON. USA: AR, AZ, CA, FL, GA, IL, KA, LA, MD, MO, NY, PA, TX.

***Cosmocomoidea morgani* (Triapitsyn, 2006)**

Gonatocerus morgani S. Triapitsyn, 2006: 9. Holotype ♀ (UCRC). **TL:** USA, California, Orange Co., Irvine, Irvine Ranch, Old Irvine Ranch Rd. de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); Morse, 2006: 92 (distribution); Triapitsyn *et al*., 2006: 4 (key), 5 (DNA); de León & Morgan, 2007b: 253 (molecular markers); de León *et al*., 2007a: 77 (molecular markers); de León *et al*., 2007b: 74 (DNA fingerprinting); de León *et al*., 2008a:

99 (barcode); Cooksey, 2011: 27 (molecular identification); Triapitsyn, 2011b: 17 (biological control, vouchers); Triapitsyn, 2012b: 9 (biological control, vouchers); Son *et al.*, 2012: 234 (temperature effects); Triapitsyn, 2013c: 293 (mention).
Gonatocerus (*Cosmocomoidea*) *morgani*: Triapitsyn, 2013b: 213 (key), 216 (distribution).
Cosmocomoidea morgani: Huber, 2015a: 20 (generic transfer, list).

Nearctic host. Cicadellidae: *Homalodisca vitripennis* (Germar).

Distribution. USA: CA.

Cosmocomoidea morrilli Howard, 1908

Cosmocomoidea morrilli Howard, 1908: 69. Lectotype ♀ (USNM), designated by Huber, 1988: 51. **TL:** USA, Florida, Orlando. Girault, 1911 [96]: 323 (distribution); Girault, 1913 [135]: 17 (body size); Peck, 1951: 411 (catalogue); Turner & Pollard, 1959: 26 (host, distribution); Peck, 1963: 19 (catalogue); Burks, 1967: 213 (catalogue, distribution); Burks, 1979: 1026 (catalogue).
Cosmocomoidea morilli [*sic*]: Girault, 1917 [303]: 36 (description, Mexico) [NT].
Ooctonus morrilli: Girault, 1929 [428]: 21 (key), 22 (host, Mexico); Whittaker, 1931: 192 (key); Herting, 1972: 14 (host catalogue).
Ooctonus morilli [*sic*]: Fattig, 1955: 10 (host, distribution).
Gonatocerus morrilli: Huber, 1988: 51 (description, generic transfer); Yoshimoto, 1990: 40 (list, species group placement); Triapitsyn *et al*., 1998: 241 (percent parasitism); Hoddle *et al*., 2001: 95 (survey); Mizell III, 2001: 52 (egg age susceptibility); Mizell III & Andersen, 2001: 83 (host susceptibility); Triapitsyn & Hoddle, 2001: 133 (survey); Jones, 2002: 88 (parasitism rates); Lauzière *et al*., 2002: 81 (biological control); Triapitsyn, 2002d: 91 (mention); Triapitsyn & Hoddle, 2002: 94 (field collecting, propagation); Leopold, 2003a: 221 (mention); Leopold, 2003b: 225 (mention); de León *et al*., 2004: 1 (molecular distinction among populations); de León, 2004a: 309 (genetic relationships); de León, 2004c: 318 (intraspecific genetic relationships); de León, 2004d: 322 (genetic relationships); Hoddle, 2004c: 336 (mention); Hoddle & Stouthamer, 2004: 115 (sibling species complex?); Hoddle & Triapitsyn, 2004a: 339 (mention); López *et al*., 2004: 214 (overwintering biology, percent parasitism); Morse, 2004: 365 (percent parasitism); Pilkington *et al.*, 2004: 133 (biology, phenology); de León *et al.*, 2005: 302 (cryptic species complex); de León & Morgan, 2005: 306 (post-release evaluation); Hoddle & Stouthamer, 2005: 338 (sibling species complex?); Hoddle & Triapitsyn, 2005: 341 (quarantine culture); Morse, 2005: 370 (percent parasitism); Pilkington *et al*., 2005: 224 (biological control); Chen *et al*., 2006b: 1178 (mention); de León & Morgan, 2006: 60 (diagnostic molecular marker); de León *et al*., 2006a: 283 (genetic/hybridization study); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006c: 49 (DNA fingerprinting); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Hoddle, 2006a: 73 (mention); Pilkington & Hoddle, 2006a: 266 (mention); Triapitsyn, 2006: 4 (key), 20 (description, corrected distribution, hosts); Triapitsyn *et al*., 2010: 183 (distribution); Bernal *et al*., 2007: 68 (distribution) [NT]; de León & Morgan, 2007a: 81 (molecular markers); de León & Morgan, 2007b: 749 (molecular markers); de León *et al*., 2007a: 77 (molecular markers); de León *et al*., 2007b: 74 (DNA fingerprinting); de León *et al*., 2008a: 99 (barcode); Hoddle, 2008a: 63 (relative abundance); Triapitsyn *et al*., 2008a: 5 (DNA); Hoddle, 2009: 19 (relative abundance); Hoddle, 2010: 16 (biological control in California); Cooksey, 2011: 27 (molecular identification); Triapitsyn, 2011b: 17 (biological control, vouchers); Vilhelmsen, 2011: 346 (Morphbank image examined); Triapitsyn, 2012b: 9 (biological control, vouchers); Krugner, 2013: 11 (host egg suitability)*;* Triapitsyn, 2013c: 293 (mention).
Gonatocerus morrilli (complex): Triapitsyn, 2005: 393 (key).
Gonatocerus morilli [*sic*]: Rathé *et al*., 2012: 216 (introduction into California); Rathé *et al*., 2014: 2 (biocontrol mention).
Lymaenon (*Cosmocomoidea*) *morrili* [*sic*]: Ogloblin, 1959a: 50 (generic transfer, comparison with extralimital species) [NT].
Gonatocerus (*Cosmocomoidea*) *morrilli*: Triapitsyn *et al*., 2010: 183 (distribution); Triapitsyn, 2013b: 213 (key); De Santis, 1979: 12 (change in rank), 367 (catalogue) [NT].
Cosmocomoidea morrilli: Huber, 2015a: 20 (generic transfer, list).
Cosmocomoidea (*Gonatocerus*) *morrilli*: Van Driesche *et al.*, 2018: 26 (biological control).

Nearctic hosts. Cicadellidae: *Homalodisca liturata* Ball, *H. vitripennis* (Germar), *Oncometopia nigricans* (Walker), *Oncometopia* sp(p.).

Distribution. USA: AZ, CA (also introduced), FL, GA, LA, NC, TX.

Cosmocomoidea novifasciata (Girault, 1911)

Gonatocerus novifasciatus Girault, 1911 [96]: 266. Holotype ♀ (USNM). **TL:** USA, Tennessee, no locality specified. Girault, 1916 [300]: 112 (description, distribution); Girault, 1929 [428]: 24 (key); Peck, 1951: 412 (catalogue); Burks, 1967: 214 (catalogue, distribution); Herting, 1972: 14 (host catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 63 (description); Yoshimoto, 1990: 41 (list, species group placement); De Santis & Fidalgo, 1994: 125 (catalogue) [NT]; Triapitsyn *et al.*,

1998: 241 (host); Hoddle *et al*., 2001: 95 (survey); Hoddle & Triapitsyn, 2004b: 342 (distribution); Morse, 2004: 365 (percent parasitism); Morse, 2005: 370 (percent parasitism); Triapitsyn, 2005: 393 (key); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Morse, 2006: 92 (percent parasitism); Triapitsyn, 2006: 6 (key), 28 (description, distribution, hosts); Bernal *et al*., 2007: 68 (Mexico) [NT]; de León & Morgan, 2007b: 253 (molecular markers); Prabhaker *et al*., 2007: 1055 (insecticide toxicity); de León *et al*., 2008a: 99 (barcode); Hoddle, 2008a: 63 (relative abundance); Hoddle, 2009: 19 (relative abundance); Hoddle, 2010: 16 (biological control in California); Cooksey, 2011: 27 (molecular identification); Triapitsyn, 2012b: 10 (biological control, vouchers); Triapitsyn, 2013c: 293 (mention); Triapitsyn & Shih, 2014: 675 (host).

Gonatocerus novofasciatus [*sic*]: Hoddle, 2006a: 73 (parasitism rate).

Ooctonus novifasciatus: Fattig, 1955: 10 (host, distribution).

Gonatocerus (*Cosmocomoidea*) *novifasciatus*: Triapitsyn *et al.*, 2010: 200 (distribution); Triapitsyn, 2013b: 213 (key).

Lymaenon novifasciatus: Burks, 1958: 63 (generic transfer); Turner & Pollard, 1959: 26 (host, distribution); Peck, 1963: 24 (catalogue).

Cosmocomoidea novifasciata: Huber, 2015a: 21 (generic transfer, list).

Nearctic hosts. Cicadellidae: *Graphocephala coccinea* (Förster), *G. versuta* (Say), *Homalodisca liturata* Ball, *H. vitripennis* (Germar).

Distribution. Canada: NS. USA: AR, AZ, CA, FL, GA, IL, KS, LA, MD, MO, MS, NY, PA, SC, TN, TX, VA, WV.

Cosmocomoidea oxypygus (Foerster, 1856)

Gonatocerus maga [misidentification?]: Dickerson & Weiss, 1917: 221 (host).

Gonatocerus oxypygus Foerster 1856: 118. Neotype ♀ (MHNG), designated by Triapitsyn, 2013a: 151. **TL:** Europe, likely Germany, no locality specified; Kirchner (1867) gave Aachen as the original type locality. Kirchner, 1867: 201 (catalogue) [P]; Kryger, 1934: 503 (mention) [P]; Graham, 1982: 224 (remarks) [P].

Lymaenon oxypygus: Debauche, 1948: 81 (list) [P].

Gonatocerus (*Cosmocomoidea*) *oxypygus*: Triapitsyn, 2013a: 150 (description, distribution) [P]; Triapitsyn, 2013b: 213 (key).

Gonatocerus (*Cosmocomoidea*) *oxypus* [*sic*]: Lotfalizadeh, 2015: 75 (distribution) [P].

Cosmocomoidea oxypygus: Dale-Skey *et al.*, 2016: 238 (checklist) [P]; Huber, 2015a: 21 (generic transfer, list).

Gonatocerus ovicenatus Leonard & Crosby, 1915: 545. Lectotype ♀ (CUIC), designated by Huber (1988: 59). **TL:** USA, New York, Ithaca. Synonymy by Triapitsyn, 2013a: 150. Gahan *et al*., 1928: 984 (host, distribution); Girault, 1929 [428]: 24 (key); Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 59 (description); Yoshimoto, 1990: 41 (list, species group placement).

Lymaenon ovicenatus: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue); Viggiani, 1969: 46 (description) [P]; Arzone *et al*., 1988: 577 (host) [P]; Viggiani, 1988: 563 (host) [P]; Viggiani & Jesu,1988: 1023 (host) [P]; Pagliano & Navone, 1995: 36 (list) [P]; Huber *et al*., 2009: 271 (list) [P]; Pricop, 2009b: 125 (distribution) [P]; Pintureau, 2012: 39 (European list) [P].

Cosmocomoidea ovicenatus: Huber, 2015a: 21 (listed under *C. oxypygus*).

Lymaenon megalura Mathot, 1969: Holotype ♀ (ISNB). **TL:** Belgium, Louvain [Leuven]. Synonymy by Triapitsyn, 2013a: 150.

Nearctic hosts. Cicadellidae: *Rhytidodus decimaquartus* (Schrank).

Distribution. USA: NY.

Cosmocomoidea triguttata (Girault, 1916)

Gonatocerus triguttatus Girault, 1916 [287]: 297. Lectotype ♀ (USNM), designated by Huber, 1988: 55. **TL:** Trinidad and Tobago, Trinidad Island, Caroni. Huber, 1988: 55 (description); Yoshimoto, 1990: 41 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT]; Triapitsyn *et al.*, 1998: 241 (host); Triapitsyn & Phillips, 2000: 201 (host); Irvin & Hoddle, 2001: 135 (host age preference and susceptibility); Jones, 2001: 50 (natural control); Triapitsyn & Hoddle, 2001: 133 (survey, distribution); Jones, 2002: 88 (parasitism rates); Hoddle, 2002: 86 (interspecific competition); Lauzière *et al*., 2002: 81 (biological control); Triapitsyn, 2002d: 91 (mention); Triapitsyn & Hoddle, 2002: 94 (field collecting, propagation); Triapitsyn *et al.*, 2002: 654 (host, distribution); Daane & Johnson, 2003: 248 (percent parasitism); Hoddle, 2003a: 250 (interspecific competition); Hoddle, 2003b: 255 (behavior, biology); Leopold, 2003a: 221 (cold storage); Leopold, 2003b: 225 (host age preference, behavior, fecundity); Logarzo *et al*., 2003: 486 (host, *Pseudometopia* spp.) [NT]; Coudron & Goodman, 2004: 304 (artificial diet and ovipositional substrates); Daane & Johnson, 2004: 95 (percent parasitism, phenology); Daane *et al.*, 2004: 102 (host plant influence); de León, 2004a: 309 (genetic relationships); Hoddle, 2004a: 111 (possible non-target impact); Hoddle, 2004b: 334 (mention); Hoddle, 2004c: 336 (mention); Irvin & Hoddle,

2004: 505 (oviposition preference); Leopold, 2004a: 124 (cold storage effects); Morse, 2004: 365 (percent parasitism); Pilkington *et al.*, 2004: 133 (biology, phenology); Toscano *et al*., 2004: 378 (insecticide compatibility); Daane & Johnson, 2005: 99 (parasitism rate); de León, 2005: 299 (DNA fingerprinting); Irvin & Hoddle, 2005a: 205 (competitive ability); Irvin & Hoddle, 2005b: 392 (host suitability); Morse, 2005: 370 (percent parasitism); Pilkington *et al*., 2005: 224 (biological control); Toscano & Morse, 2005: 389 (insecticide compatibility); Triapitsyn, 2005: 393 (key); Chen *et al*., 2006b: 1178 (release in California); de León *et al*., 2006b: 42 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Grandgirard *et al*., 2006: 436 (biological control possibility) [A]; Hoddle, 2006a: 73 (mention); Hoddle, 2006c: 84 (day-degree model); Irvin & Hoddle, 2006: 162 (intraspecific competition); Irvin *et al*., 2006: 360 (interspecific competition); Morse, 2006: 92 (percent parasitism); Pilkington & Hoddle, 2006a: 266 (mention); Toscano & Morse, 2006: 108 (insecticide compatibility); Triapitsyn, 2006: 5 (key), 22 (description, distribution, hosts); de León & Morgan, 2007b: 753 (molecular markers); de León *et al*., 2007a: 77 (molecular markers); Irvin *et al*., 2007: 70 (dietary supplements); Pilkington & Hoddle, 2007a: 1 (life tables, biology); Pilkington and Hoddle, 2007b: 10 (invasion success prediction); de León *et al*., 2008a: 99 (barcode); Williams III & Hendrix, 2008: 26 (fitness compared to *A. iole*); Hoddle, 2008a: 63 (relative abundance); Hoddle, 2009: 19 (relative abundance); Hoddle, 2010: 16 (biological control); Cooksey, 2011: 27 (molecular identification); Gutierrez *et al*., 2011: 757 (biological control); Rathé *et al*., 2012: 216 (introduction into California); Triapitsyn, 2012b: 10 (biological control, vouchers); Rathé *et al*., 2014: 2 (biocontrol mention).

Gonatocerus (*Gonatocerus*) *triguttatus triguttatus*: De Santis, 1979: 365 (catalogue) [NT].

Gonatocerus (*Cosmocomoidea*) *triguttatus*: Triapitsyn, 2013b: 213 (key).

Cosmocomoidea triguttata: Huber, 2015a: 22 (generic transfer, list); Van Driesche *et al.*, 2018: 27 (biological control).

Gonatocerus triguttus [*sic*]: Burks, 1967: 214 (catalogue, distribution); Burks, 1979: 1026 (catalogue).

Nearctic hosts. Cicadellidae: *Homalodisca liturata* Ball, *H. vitripennis* (Germar), *Oncometopia clarior* (Walker), *O. nigricans* (Walker).

Distribution. USA: CA (introduced), FL, TX.

Cosmocomoidea walkerjonesi (Triapitsyn, 2006)

Gonatocerus walkerjonesi S. Triapitsyn, 2006: 15. Holotype ♀ (UCRC). **TL:** USA, California, Ventura Co., Fillmore, Young Rd.

Gonatocerus morrilli (California population): de León, 2005: 299 (DNA fingerprinting).

Gonatocerus nov. sp. *morrilli*: de León *et al.*, 2005: 303 (sibling species).

Gonatocerus morrilli: de León & Morgan, 2005: 306 (cryptic species complex); Hoddle & Triapitsyn, 2005: 341 (quarantine culture); de León & Morgan, 2007a: 81 (molecular markers).

Gonatocerus near *morrilli*: Hoddle & Stouthamer, 2005: 338 (sibling species).

Gonatocerus walkerjonesi: de León & Morgan, 2006: 60 (diagnostic molecular marker); de León *et al*., 2006b: 42, 54 (molecular phylogram); de León *et al*., 2006d: 54 (molecular phylogram); de León *et al*., 2006e: 57 (molecular species boundaries); Morse, 2006: 92 (percent parasitism); de León & Morgan, 2007b: 750 (molecular markers); de León *et al*., 2007b: 74 (DNA fingerprinting); de León *et al*., 2008a: 99 (barcode); Triapitsyn *et al.*, 2008a: 5 (DNA); Hoddle, 2010: 16 (biological control); Cooksey, 2011: 27 (molecular identification); Triapitsyn, 2011b: 17 (biological control, vouchers); Triapitsyn, 2012b: 9 (biological control, vouchers); Triapitsyn, 2103c: 293 (mention).

Gonatocerus (*Cosmocomoidea*) *walkerjonesi*: Triapitsyn, 2013b: 213 (key).

Cosmocomoidea walkerjonesi: Huber, 2015a: 22 (generic transfer, list).

Cosmocomoidea (*Gonatocerus*) *walkerjonesi*: Van Driesche *et al.*, 2018: 26 (biological control).

Nearctic hosts. Cicadellidae: *Homalodisca liturata* Ball, *H. vitripennis* (Germar).

Distribution. USA: CA.

DICOPOMORPHA Ogloblin, 1955

(Figs 341–369)

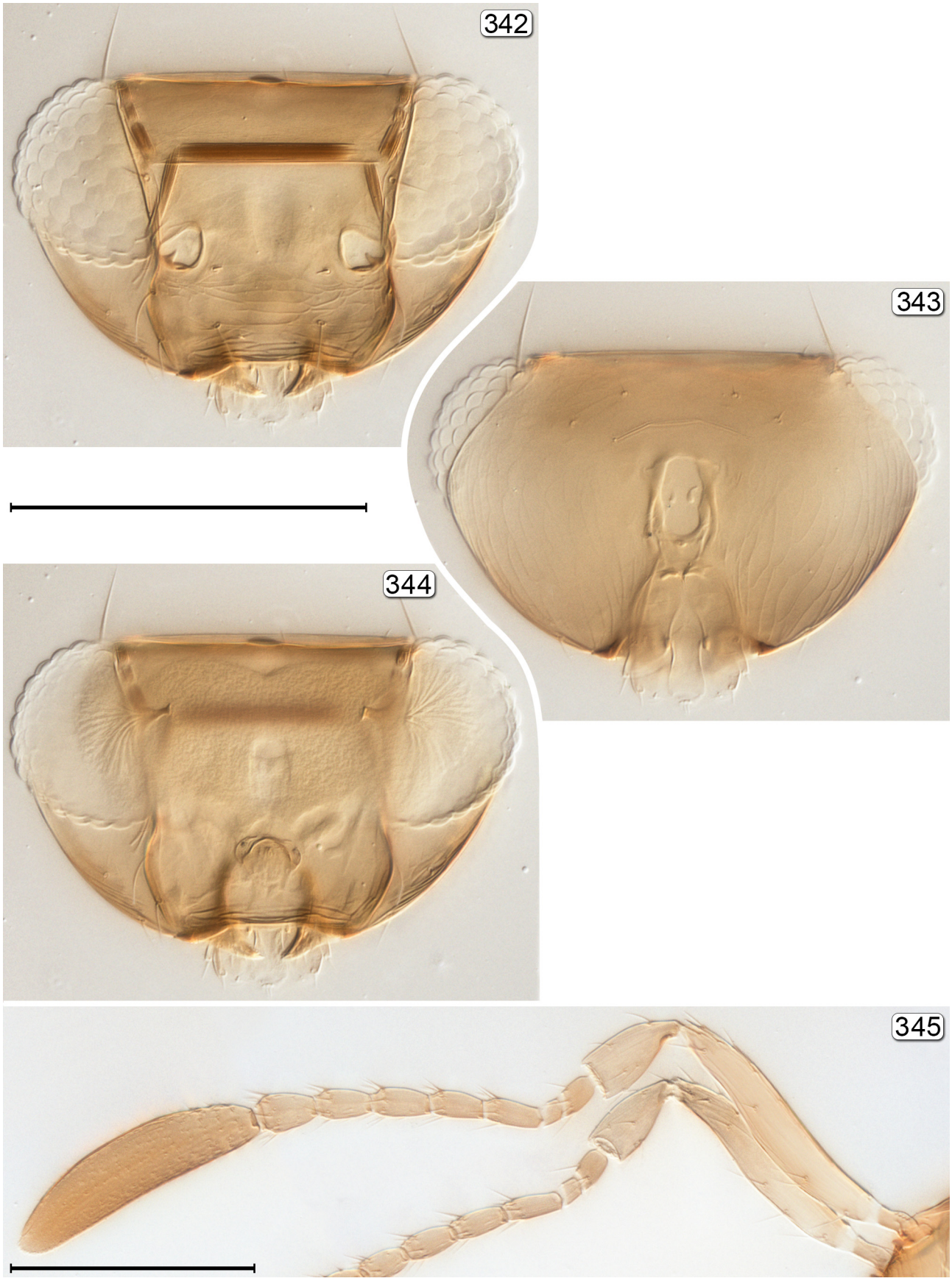
Dicopomorpha Ogloblin, 1955: 387. Type species: *Dicopomorpha macrocephala* Ogloblin, 1955, by original designation.

Chromodicopus Ogloblin, 1955: 390. Type species: *Chromodicopus pulchricornis* Ogloblin, 1955, by original designation. Synonymy by Yoshimoto, 1990: 27.

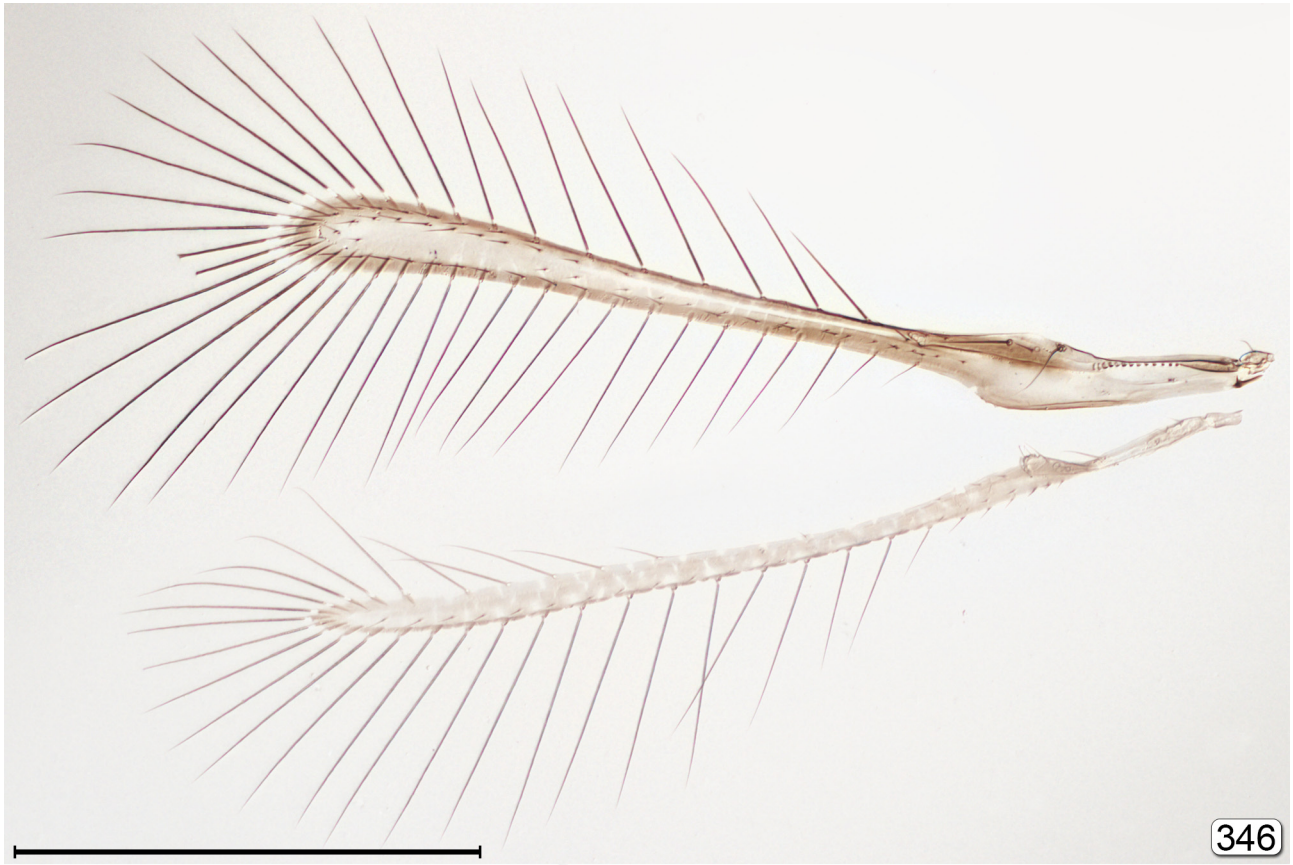
Dicopulus Ogloblin, 1955: 377. Type species: *Dicopulus stramineus* Ogloblin, 1955, by original designation. Synonymy by Yoshimoto, 1990: 27.



FIGURE 341. *Dicopomorpha* sp., habitus. USA, Florida, Alachua Co., Gainesville, 3005 SW 56th Avenue, AEI, 26–30.v.1991, J. Woolley, G. Zolnerowich. Scale bar=500 μm.

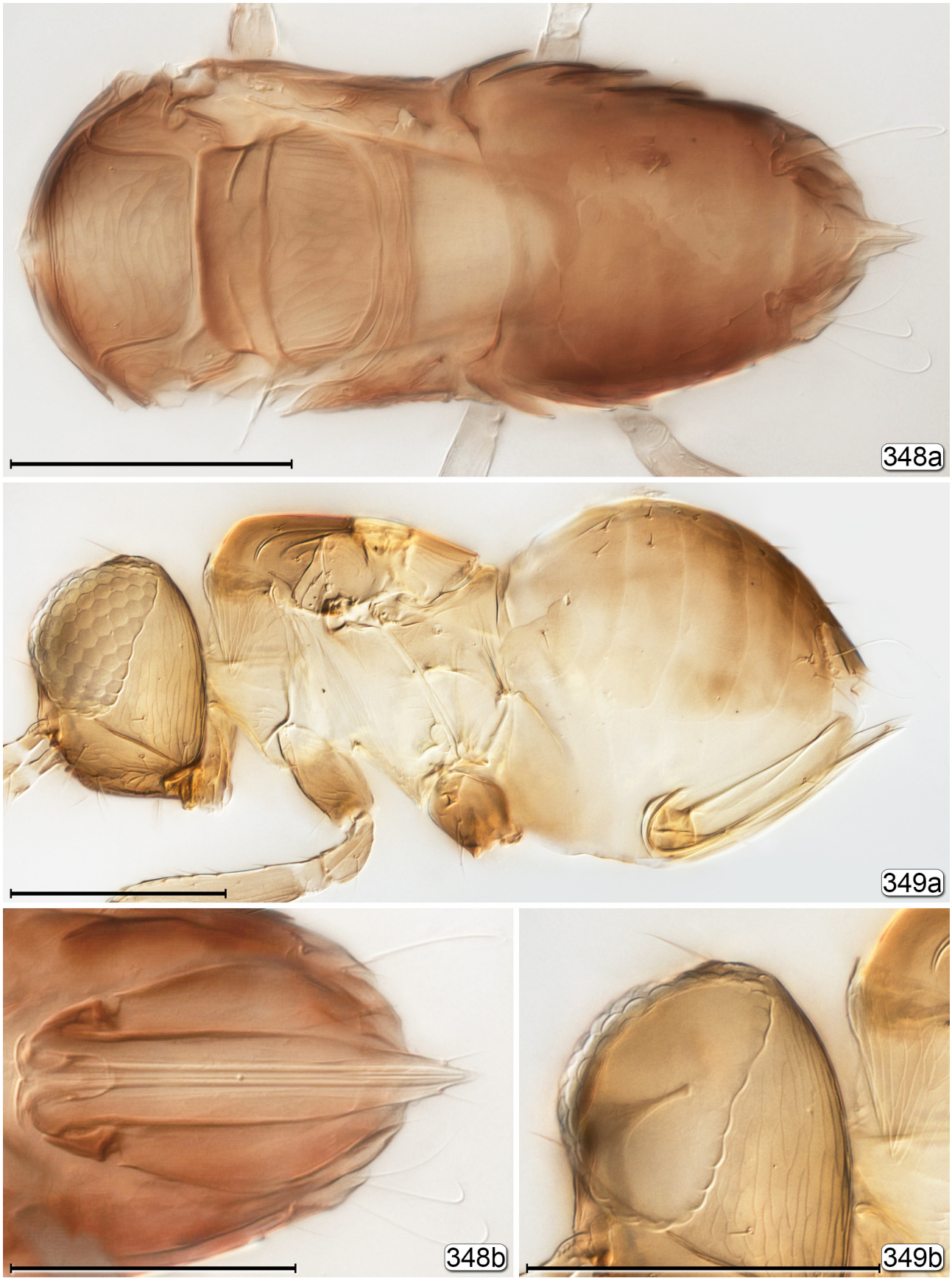


FIGURES 342–345. *Dicopomorpha* sp. 342, head, anterior; 343, head, posterior; 344, head anterior (internal) showing ocular apodeme; the optic sense cells converge to the optic nerve apparently near apex of the apodeme; 345, antenna. Scale bars=100 µm.

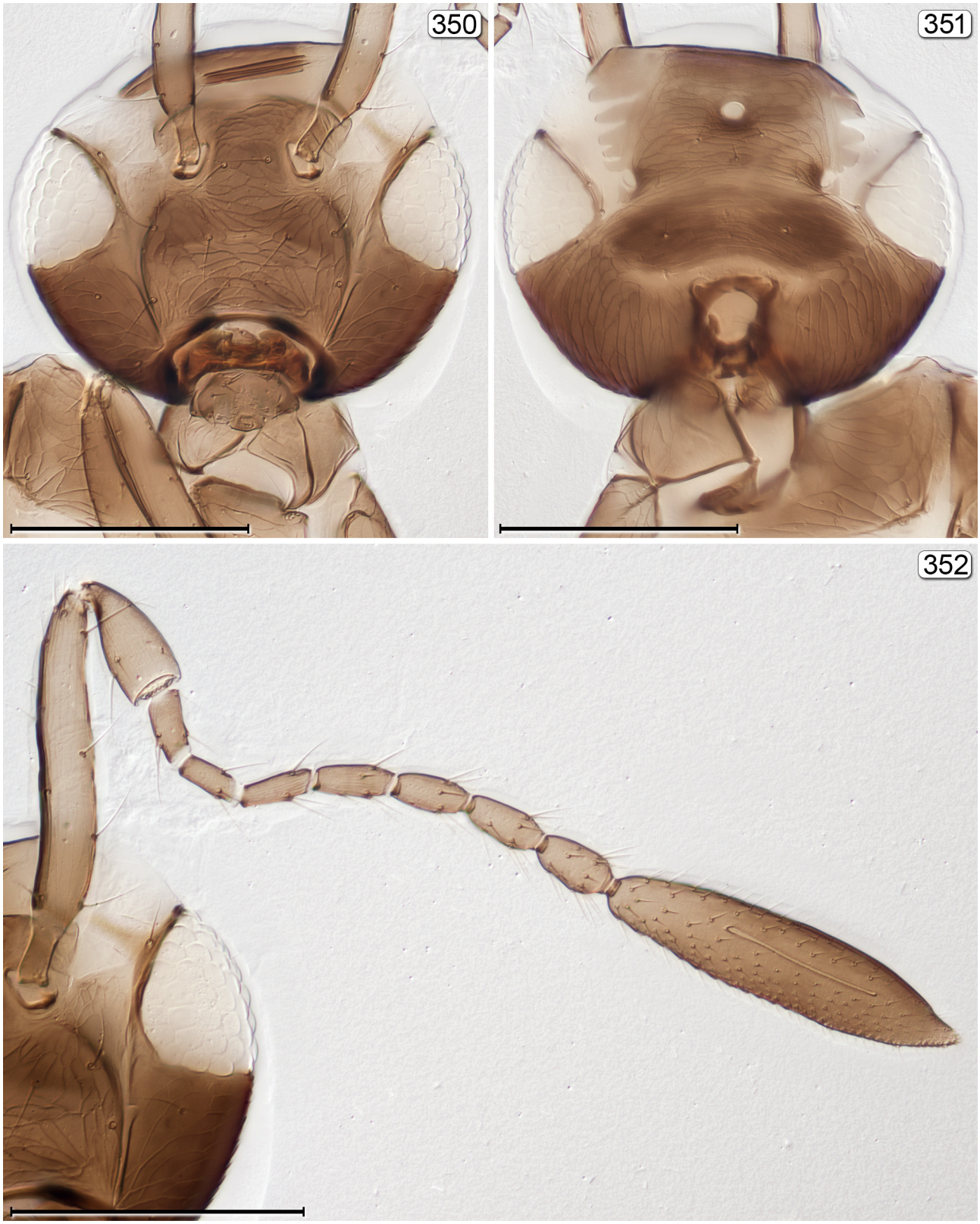




FIGURES 346, **347**. *Dicopomorpha* spp. wings. 346, sp. 1; 347, sp. 2. Scale bars=100 μm.



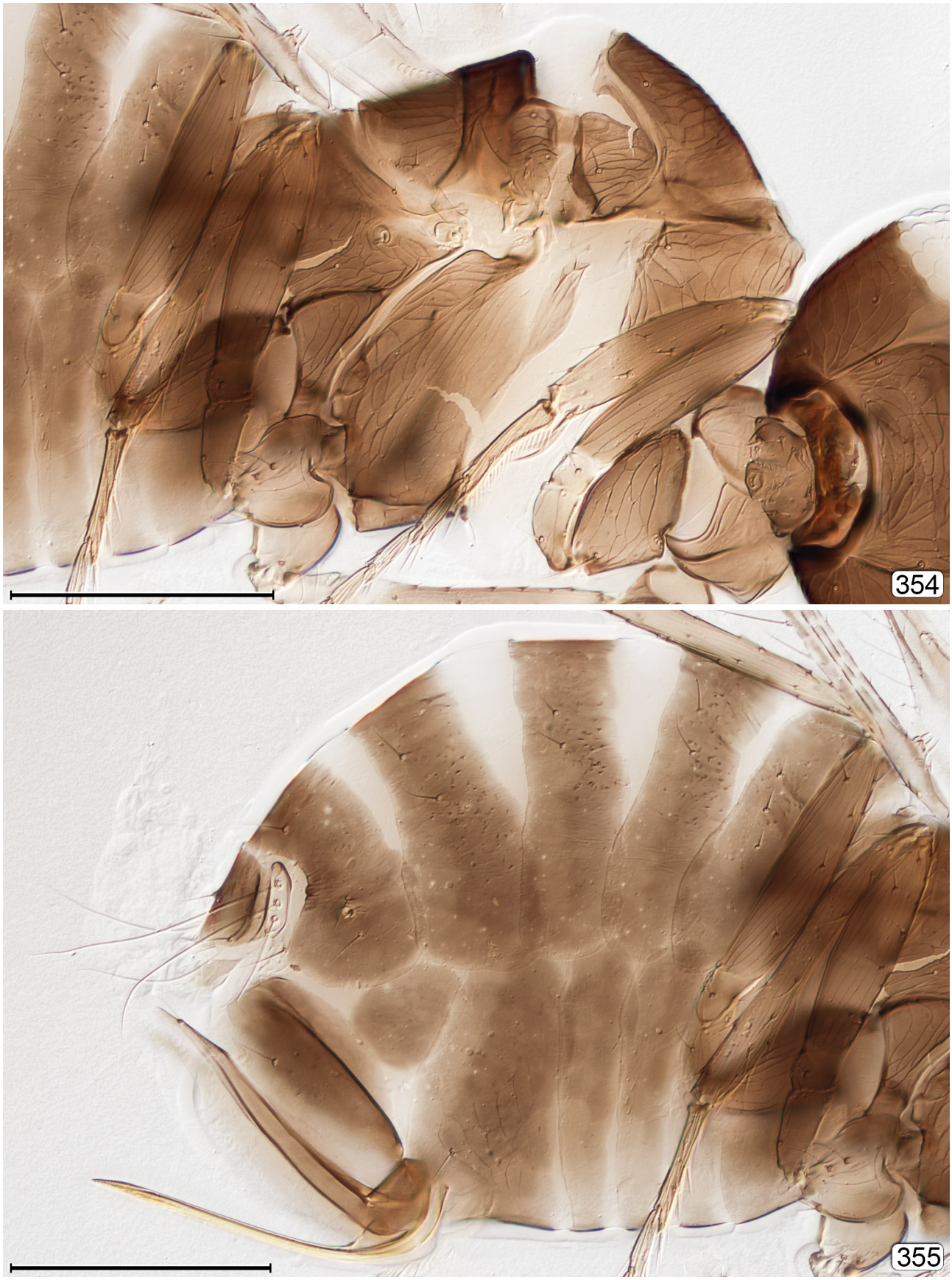
FIGURES 348, **349**. *Dicopomorpha* sp., 348a, mesosoma + metasoma, dorsal; 348b, genitalia seen through gaster); 349a, head–metasoma; lateral; 349b, head lateral (internal) showing ocular apodeme. Scale bars=100 μm.



FIGURES 350–352. *Dicopomorpha echmepterygis* Mockford, paratype. 350, head, anterior; 351, head, posterior; 352, antenna. Scale bars=100 μm.



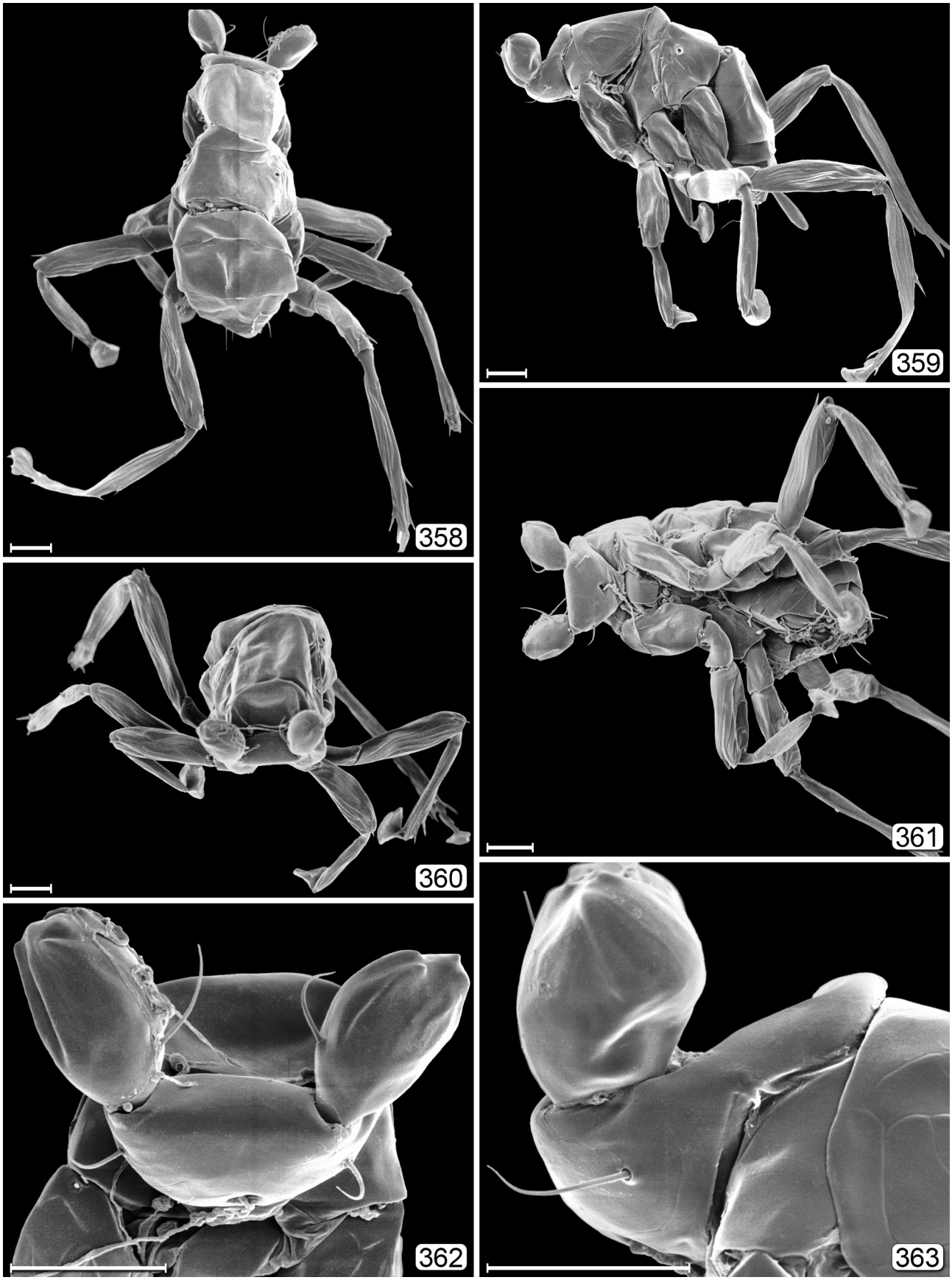
FIGURE 353. *Dicopomorpha echmepterygis* Mockford, paratype, habitus on slide. Scale bar=200 µm.



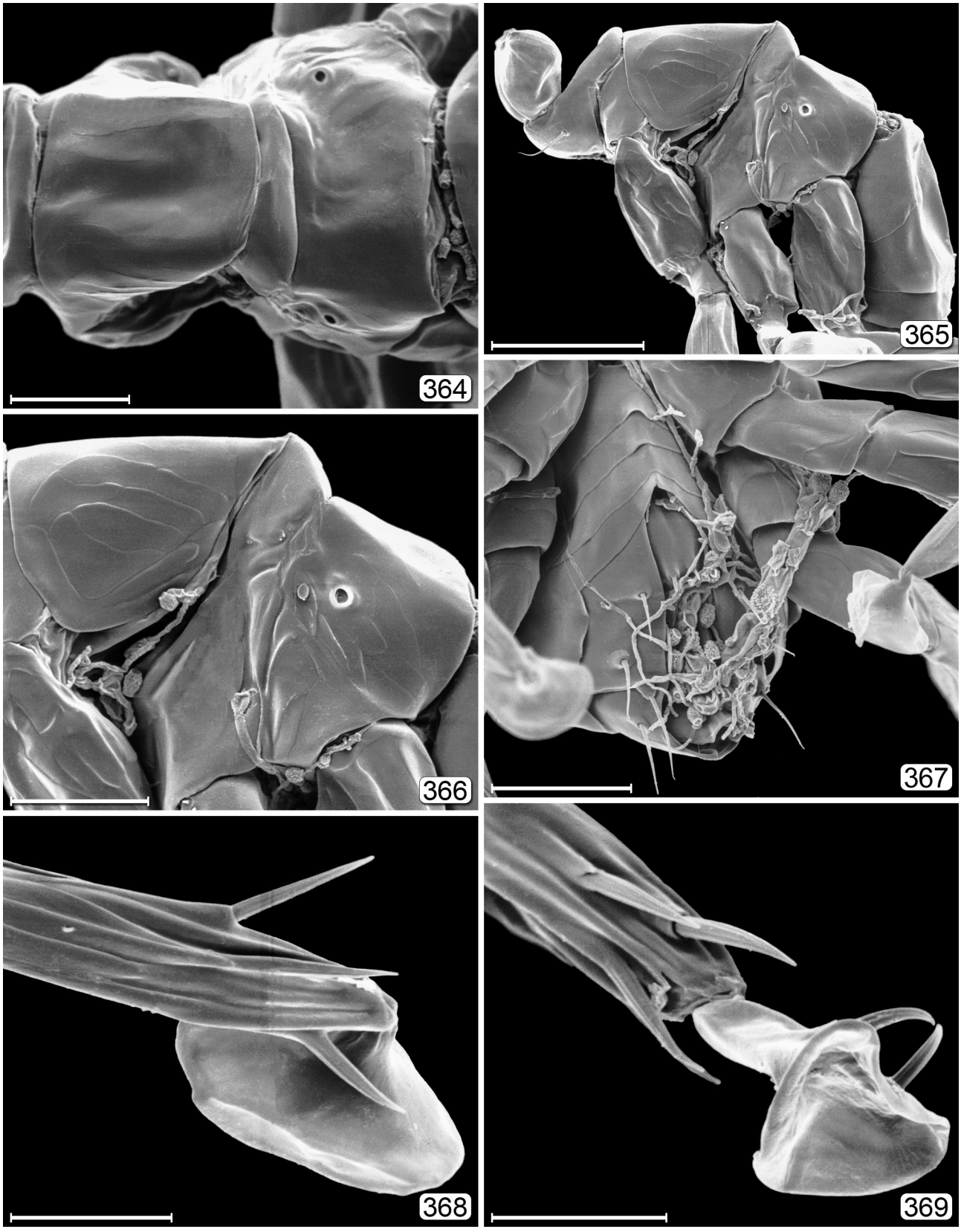
FIGURES 354, **355**. *Dicopomorpha echmepterygis* Mockford, paratype. 354, mesosoma; 355, metasoma. Scale bars=100 μm.



FIGURES 356, **357**. *Dicopomorpha echmepterygis* Mockford, habitus, male paratype. 356, dorsal; 357, ventral. Scale bars=100 μm.



FIGURES 358–363. *Dicopomorpha echmepterygis* Mockford, male paratype. 358, habitus, dorsal; 359, habitus, lateral; 360, habitus, dorsoanterior; 361, habitus, ventral; 362, head, anterior; 363, head, lateral. Scale bars=20 μm.



FIGURES 364–369. *Dicopomorpha echmepterygis* Mockford, male paratype. 364, mesosoma, dorsal; 365, body + coxae, lateral; 366, mesoscutum–propodeum, lateral; 367, metasoma, ventral (apex covered with fungal hyphae and fruiting bodies); 368, apex of tibia + tarsal arolium, lateral; 369, apex of tibia + tarsal arolium, ventral. Scale bars: 364–367=20 μm; 368, 369=10 μm

Diagnosis. Body length 240–425. Funicle 7-segmented with fu_2 shorter than or equal to fu_1 and fu_3 (Figs 341, 345, 352); mandibles when closed overlapping medially (Fig. 350), each with 2 small apparently equal teeth; occiput without lines, sulci or carinae except for a median transverse sulcus of variable length (Figs 343, 351) just above foramen; fore wing behind venation with posterior margin forming an evenly rounded lobe (Figs 346, 347). Male body length 110–140 (2 card-mounted specimens). Body without wings, eyes, ocelli and mouthparts; antenna and tarsi greatly reduced (Figs 356–359). Mockford (1997) recorded body length measurements for 8 slide-mounted specimens as 139–240 μm.

Discussion. *Dicopomorpha* belongs to the *Alaptus* group of genera, together with *Alaptus*, *Callodicopus, Dicopus*, and *Litus*. It is most similar to *Callodicopus* but does not have a thick vertexal trabecula extending transversely across the back of the head. It differs from *Dicopus* by the mandibles crossing medially when closed, the head ventral to lower eye margin not narrowing so appreciably, and the fore wing wider distal to venation. In the Nearctic, males have never been collected in the wild; the only males known are for the single included species and were laboratory reared from a culture of Psocoptera.

Nearctic hosts. Psocoptera: Lepidopsocidae.

Important references. Huber (2009).

Dicopomorpha echmepterygis Mockford, 1997

Dicopomorpha echmepterygis Mockford, 1997: 115. Holotype ♀ (USNM). **TL:** USA, Illinois, McLean Co., Parklands Foundation Merwyn Reserve. Huber, 1997: 503 (key); Triapitsyn, 2000b: 295 (host); Grebennikov, 2008: 325 (miniaturization); Boivin, 2010a: 457 (fitness); Boivin, 2010b: 2 (body size); Mitroiu *et al.*, 2015: 7 (mention); Polilov, 2015: 61 (mention).
Dycopomorpha [*sic*] *echmepterygis*: Makarova & Polilov, 2013: 714 (mention).

Nearctic hosts. Lepidopsocidae: *Echmepteryx hageni* (Packard).

Distribution. USA: IL.

DICOPUS Enock, 1909

(Figs 370–379)

Dicopus Enock, 1909: 455. Type species: *Dicopus minutissimus* Enock, 1909, by monotypy.
Kubja Subba Rao, 1984: 251. Type species: *Kubja longipes* Subba Rao, 1984, by monotypy. Synonymy by Huber, 2009: 235.

Diagnosis. Body length 220–415 μm. Antenna 7-segmented with fu_2 slightly shorter to or longer than fu_1 (Figs 370, 375); mandible when closed pointing ventrally (Figs 370, 371–374), with one short and one long tooth (Fig. 371); vertex posteriorly separated from occiput by a medially divided postorbital trabecula (Figs 372–374) (the latter showing trabecula partly unrolled); fore wing extremely narrow, the narrowest point about one venation length distal to venation, before distinctly widening to apex (Fig. 379); hind wing also narrow for about 4 venation lengths beyond hamuli then becoming uniformly wider to apex (Figs 370, 379).

Discussion. *Dicopus* belongs to the *Alaptus* group of genera, together with *Alaptus*, *Callodicopus*, *Dicopomorpha*, and *Litus*. It is most similar to *Dicopomorpha* in having the funicle 7-segmented and fore wing very narrow but with a distinct lobe behind the venation.

Nearctic hosts. Unknown. An extralimital host is Psocoptera: Liposcelididae.

Important reference. Doutt (1974).

Dicopus enocki Doutt, 1974

Dicopus enocki Doutt, 1974: 167. Holotype ♀ (UCBC). **TL:** USA, California, Fresno Co., Kingsburg. Yoshimoto, 1990: 25 (list); Zuparko & Hamai, 1994: 316 (type depository); Triapitsyn, 2015c: 8 (distribution).

Distribution. USA: CA.

Dicopus halitus Girault, 1911

Dicopus halitus Girault, 1911 [93]: 347. Holotype ♂ (USNM). **TL:** Canada, Quebec, Maniwaki. Girault, 1912 [108]: 22 (com-

parison with extralimital species); Girault, 1929 [428]: 10 (key); Peck, 1951: 413 (catalogue); Peck, 1963: 28 (catalogue); Burks, 1979: 1024 (catalogue); Yoshimoto, 1990: 25 (list).
Discopus [*sic*] *halitus*: Girault, 1911 [96]: 324 (*nomen nudum*, list).

Distribution. Canada: QC.

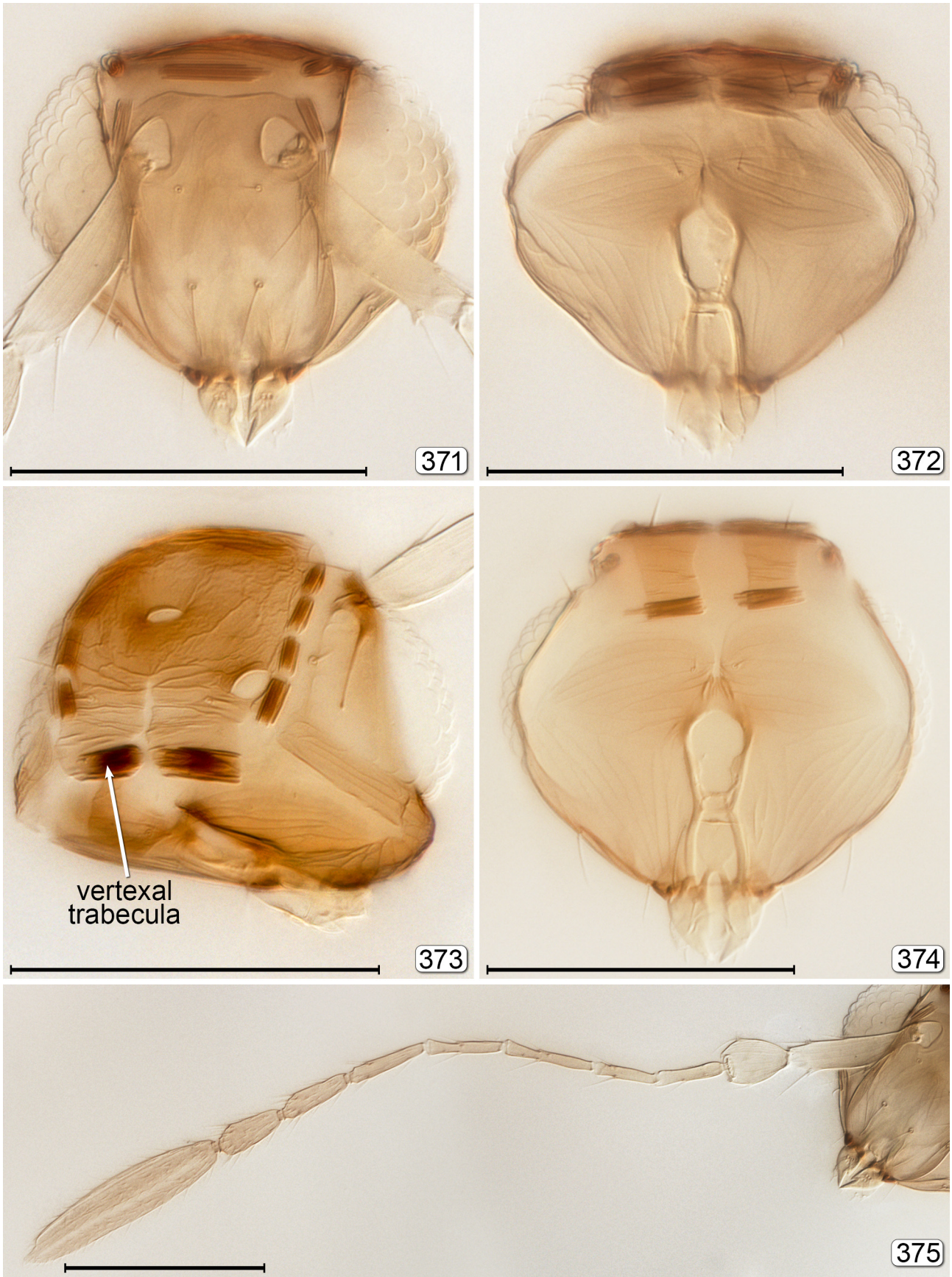
Dicopus pygmaeus Doutt, 1974

Dicopus pygmaeus Doutt, 1974: 166. Holotype ♀ (UCBC). **TL:** USA, California, Imperial Co., Mecca. Yoshimoto, 1990: 25 (list); Zuparko & Hamai, 1994: 316 (type depository); Triapitsyn, 2015c: 9 (distribution).

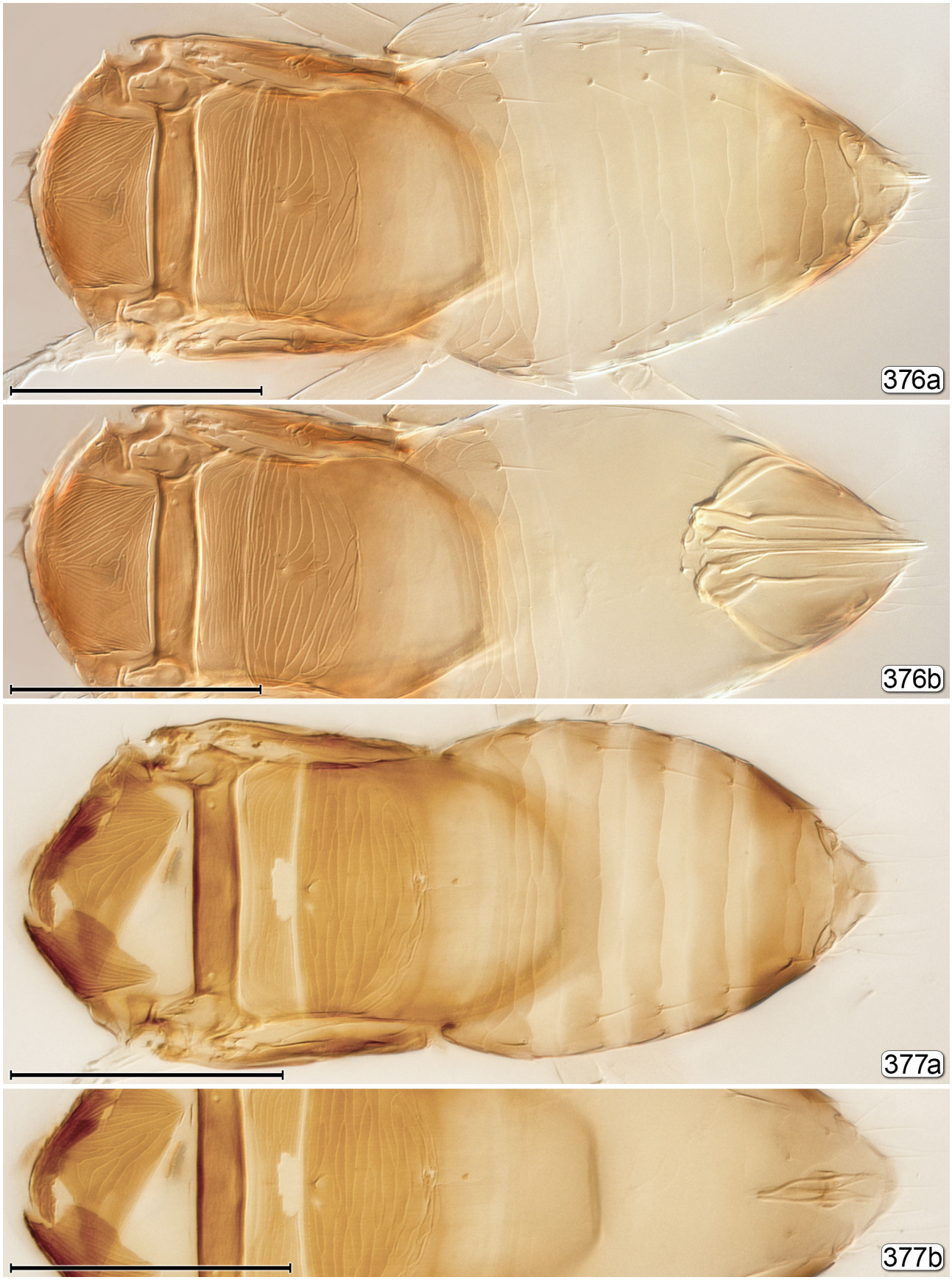
Distribution. USA: CA.



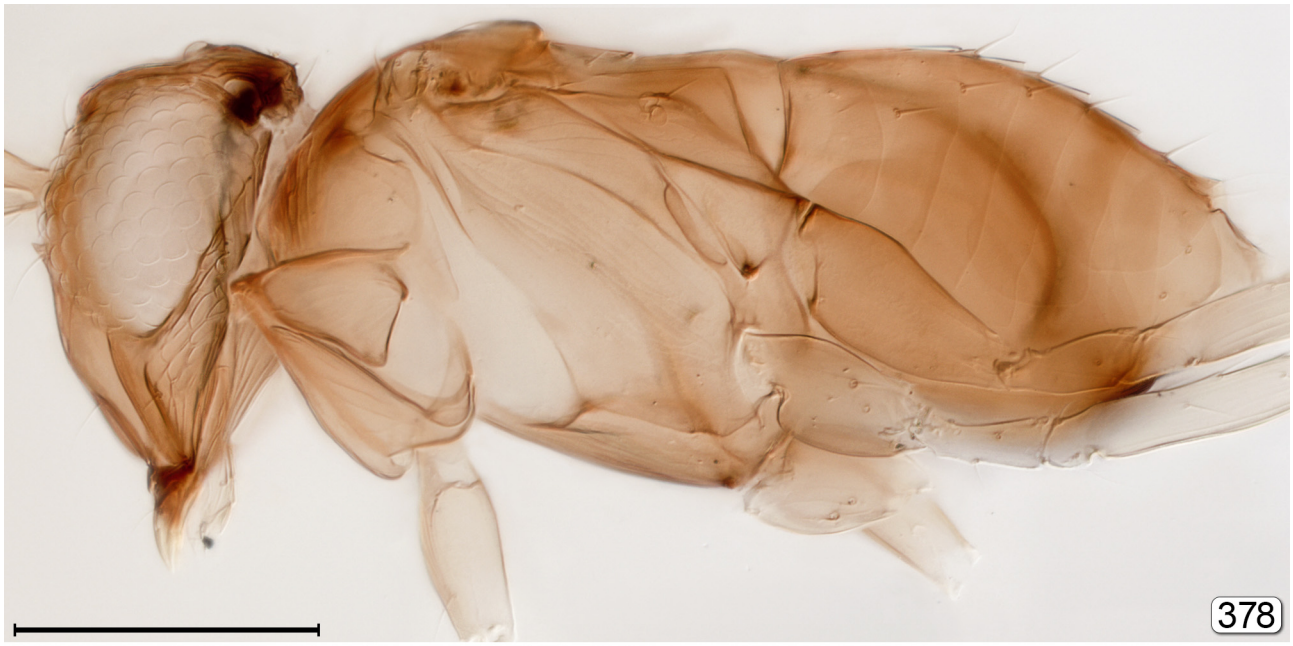
FIGURE 370. *Dicopus* sp., habitus. USA, Texas, Robertson Co., 8 mi. E. Hearne, Hallmark property, 13–22.x.1990, M. Hallmark, L. Masner. Scale bar=500 μm.

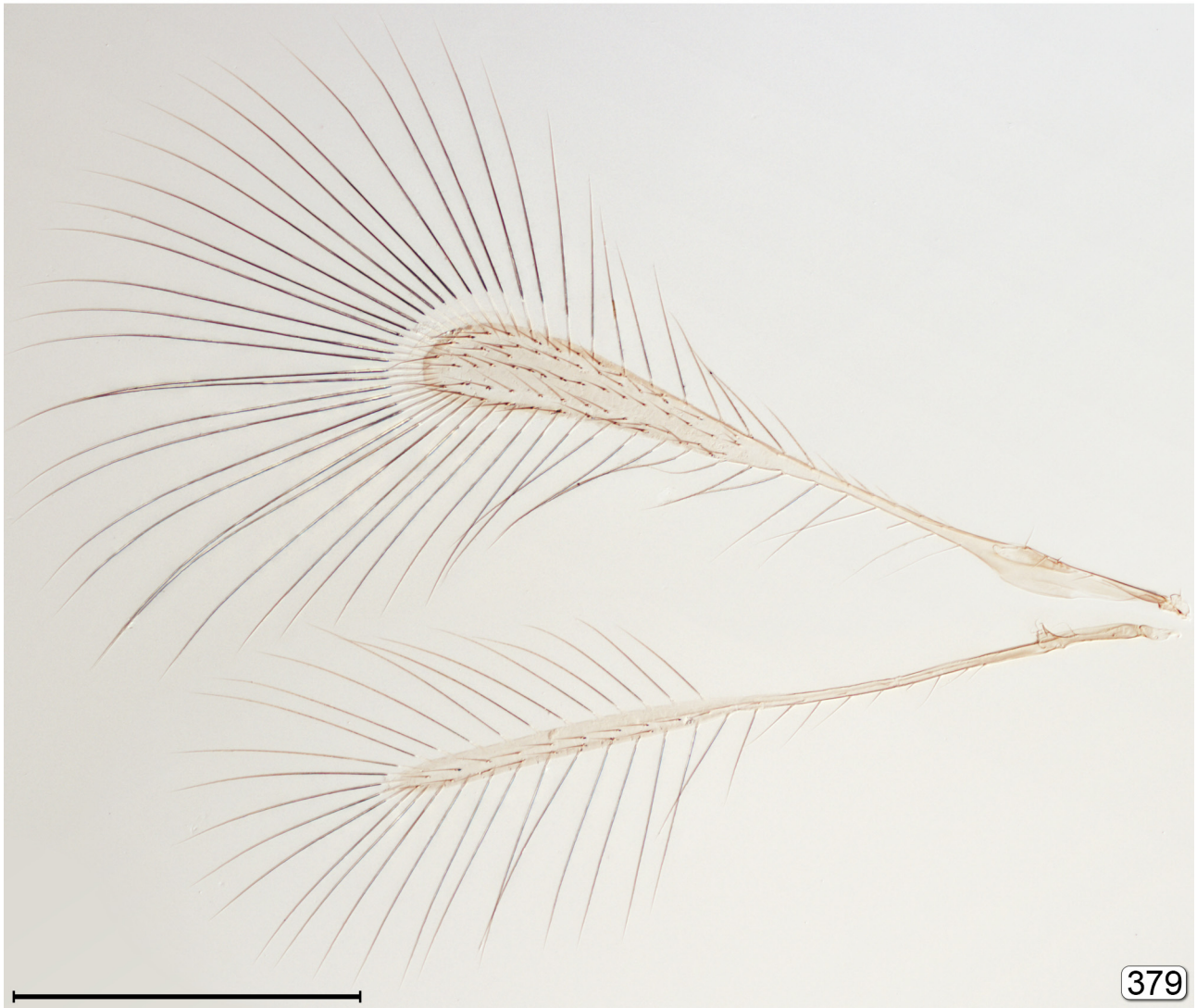


FIGURES 371–375. *Dicopus* sp. 371, head, anterior; 372, head, posterior; 373, head, dorsal (and slightly posterolateral); 374, head, posterior, different specimen showing partly unrolled vertexal trabecula; 375, antenna. Scale bars=100 μm.



FIGURES 376, **377**. *Dicopus* sp., mesosoma + metasoma, dorsal. 376a, female; 376b, female showing genitalia; 377a, male (mesosoma damaged, partly missing); 377b, male showing genitalia. Scale bars=100 µm.





FIGURES 378, **379**. *Dicopus* sp. 378, male body + coxae (left procoxa and part of propleuron missing), lateral; 379, wings. Scale bars: 378=100 μm; 379=200 μm.

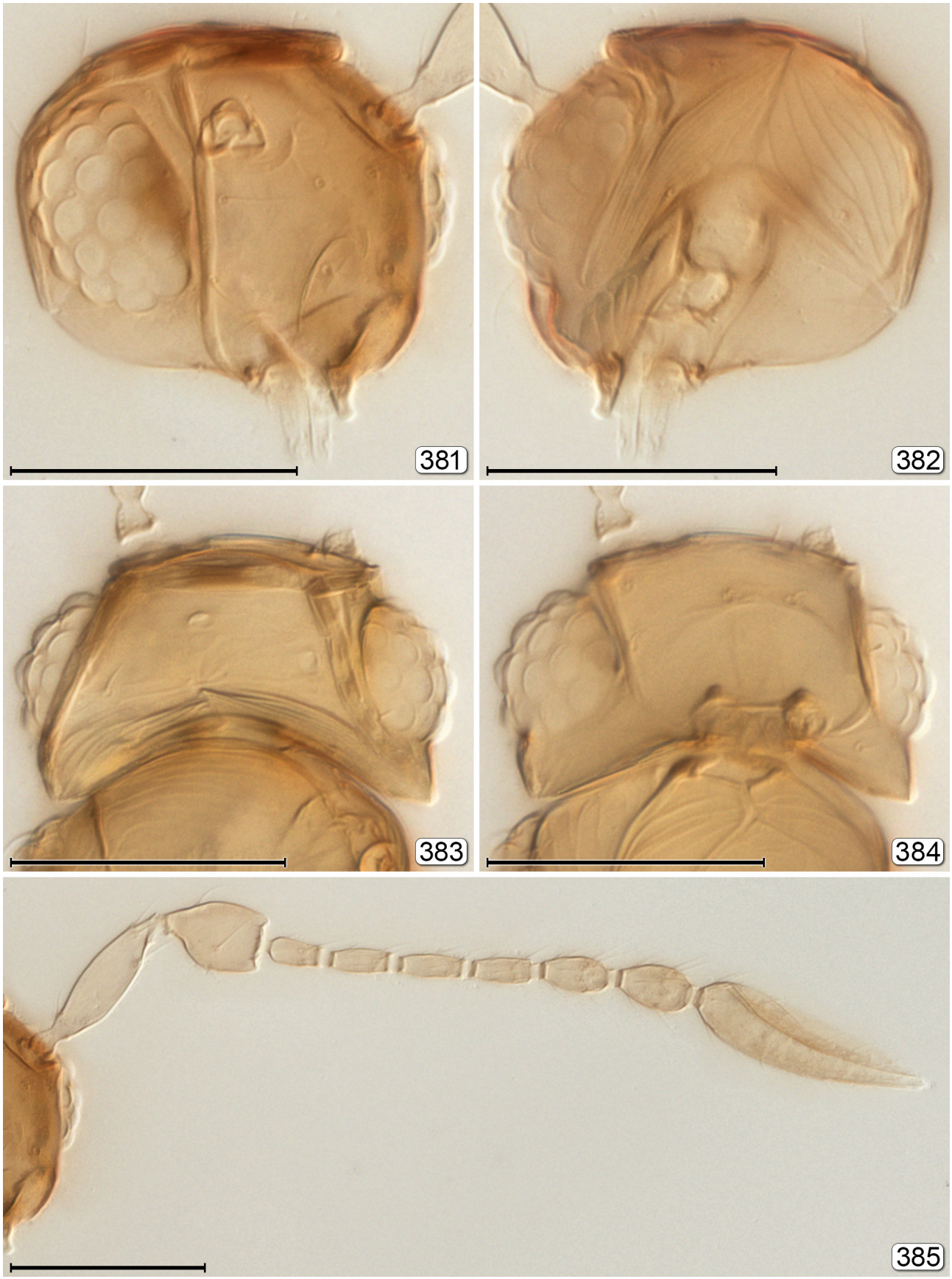
EOFOERSTERIA Mathot, 1966

(Figs 380–387)

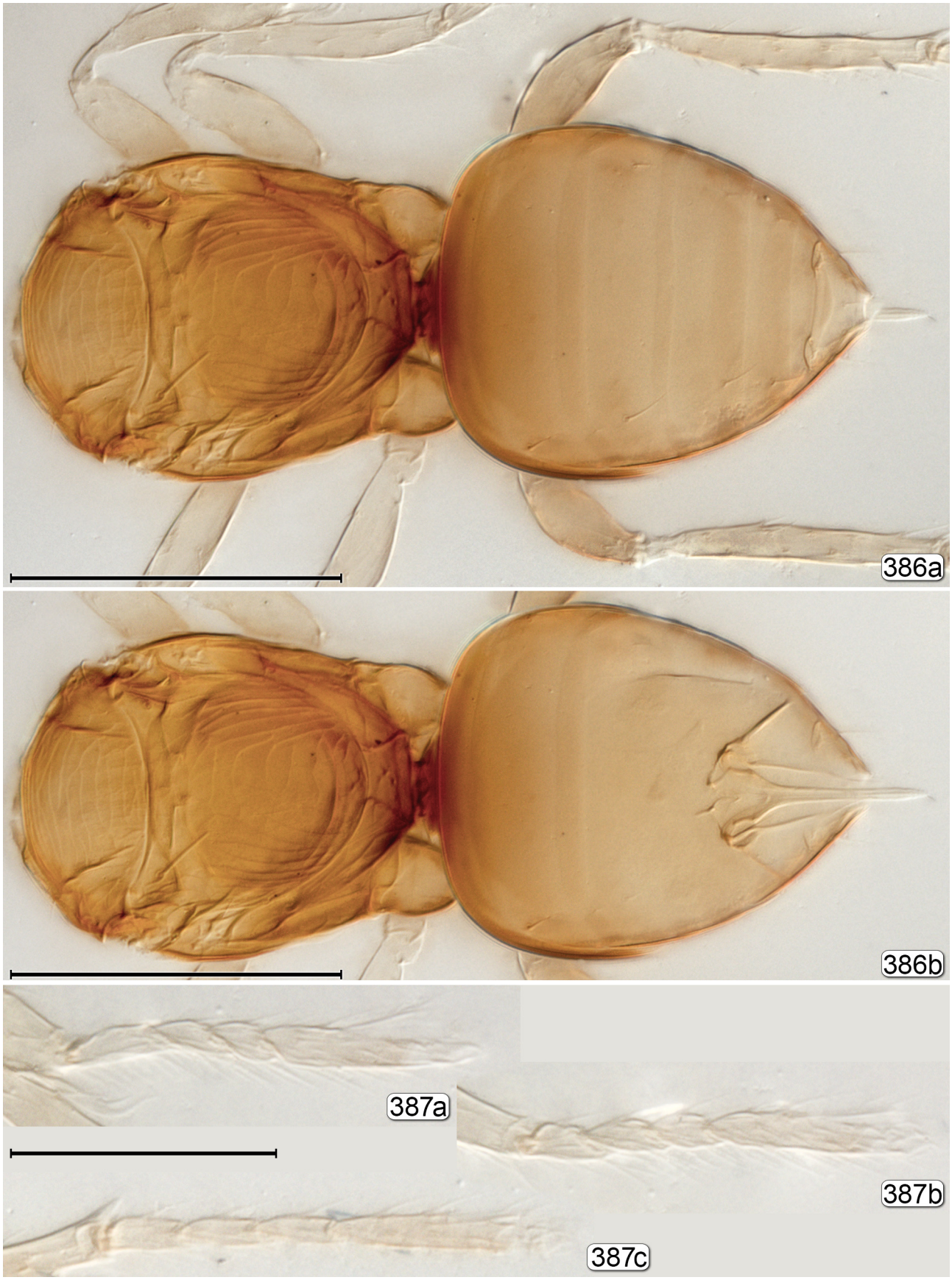
Eofoersteria Mathot, 1966: 231. Type species: *Eofoersteria camptopteroides* Mathot, 1966, by original designation.



FIGURE 380. *Eofoersteria* sp., habitus, two views of same specimen. 380a, ventrolateral; 380b, lateral (slightly dorsal). USA, Florida, Dade Co., Miami, Deering Estate Park, SW 167th Street & 72 Avenue, 26.viii–11.xii.1986. Scale bars=200 µm.



FIGURES 381–385. *Eofoersteria* sp. 381, head, anterolateral; 382, head, posterolateral; 383, head + anterior mesosoma, dorsal; 384, head + anterior mesosoma, ventral; 385, antenna. Scale bars=50 μm.



FIGURES 386, **387**. *Eofoersteria* sp. 386a, mesosoma + metasoma, dorsal; 386b, mesosoma + metasoma, dorsal showing genitalia; 387a protarsus; 387b, mesotarsus; 387c, metatarsus. Scale bars: 386=100 μm; 387=50 μm.

Diagnosis. Body length 220–260 μm. Funicle 6-segmented, without ring segment (Fig. 385); metascutellum in lateral view with dorsellum slightly overhanging almost vertical propodeum (Fig. 380); fore wing narrow and curved (Fig. 380); tarsi 4-segmented, with tarsomere 4 over 2× as long as tarsomere 3 (Fig. 387).

Discussion. *Eofoersteria* belongs to the *Camptoptera* group of genera together with *Camptoptera*, *Camptopteroides*, *Macrocamptoptera*, *Ptilomymar* and *Stephanocampta*. It is most similar to *Camptoptera* except for the reduced number of funicle and tarsal segments. *Eofoersteria* is one of the few genera (*Ptilomymar* is another) that clearly belongs among the numerous genera with 5-segmented tarsi even though it has only 4-segmented tarsi, the apical two having fused together without trace of a suture between them.

Important reference. Huber & Lin (1999).

***Eofoersteria* sp.**

Distribution. USA: FL.

ERYTHMELUS Enock, 1909

(Figs 388–419)

Erythmelus Enock, 1909: 454. Type species: *Erythmelus goochi* Enock, 1909, by monotypy.
Parallelaptera Enock, 1909: 454. Type species: *Parallelaptera panis* Enock, 1909, by monotypy. Synonymy by Schauff, 1984a: 45.
Enaesius Enock, 1909: 456. Type species: *Enaesius agilis* Enock, 1909, by subsequent designation by Gahan & Fagan, 1923: 50. Synonymy by Debauche. 1948: 192.
Anthemiella Girault, 1911 [90]: 185. Type species: *Anthemiella rex* Girault, 1911, by original designation. Synonymy by Schauff, 1984a: 45; previous synonymy under *Parallelaptera* by Girault, 1912 [112]: 297.
Erythmelus (*Erythmelellus*) Viggiani & Jesu, 1985: 487. Type species: *Erythmelus lygivorus* Viggiani & Jesu, 1985, by original designation.

Diagnosis. Body length 370–1590 μm; 330–1170 in Triapitsyn *et al*. (2007). Head in lateral view with gena short (Fig. 396) or absent (Figs 388, 389, 403) so head appearing thin and long; mandible (in both sexes) reduced to small stub, without teeth (Fig. 406); maxillae together in posterior view distinctly longer than wide (Figs 402); mesosoma in lateral view with dorsellum slightly overhanging propodeum (Figs 396, 408); propodeum medially divided by a longitudinal sulcus (Fig. 395, 407); gaster in lateral view with hypopygium long, extending posteriorly at least to apex of gaster (Figs 388, 389, 398, 413).

Discussion. Schauff (1984) related *Erythmelus* to *Anaphes*, based on the propodeum with a median longitudinal sulcus, but otherwise the two genera are structurally very different.

Nearctic hosts. Hemiptera: Miridae, Tingidae.

Important reference. Triapitsyn *et al*. (2007).

Erythmelus (*Erythmelus*) *agilis* (Enock, 1909)

Enaesius agilis Enock, 1909: 456. Lectotype ♀ (NHMUK), designated by Graham, 1982: 221. **TL:** UK, England, Surrey, Woking. Soyka, 1932: 84 (key) [P].
Erythmelus (*Enaesius*) *agilis*: Debauche, 1948: 197 (key, description) [P]; Donev, 2004: 123 (description, distribution) [P].
Erythmelus (*Erythmelus*) *agilis*: Triapitsyn, 2003b: 6 (key), 12 (description, distribution, hosts) [P]; Triapitsyn *et al*., 2007: 7 (key), 11 (description, distribution, host); Triapitsyn *et al*., 2017: 189 (distribution) [P].
Erythmelus agilis: Dale-Skey *et al.*, 2016: 239 (checklist) [P].
Enaesius laticeps Enock, 1909: 456. Holotype ♀ (NHMUK), lost? **TL:** UK, England, Surrey, Woking. Synonymy (*de facto*) by Kryger, 1950: 57.
Enaesius limburgensis Soyka, 1932: 82. Holotype ♀ (NHMW), lost? **TL:** Netherlands, Valkenburg. Synonymy by Triapitsyn, 2003b: 12.

Nearctic hosts. Miridae: *Leptopterna dolabrata* (L.).

Distribution. Canada: BC, NT, ON, PE, QC. USA: AK, CA, WA.



FIGURE 388. *Erythmelus* (*Erythmelus*) sp., habitus. Canada, Ontario, Metcalfe, 1–4.vii.1985, B.E. Cooper. Scale bar=1000 μm.

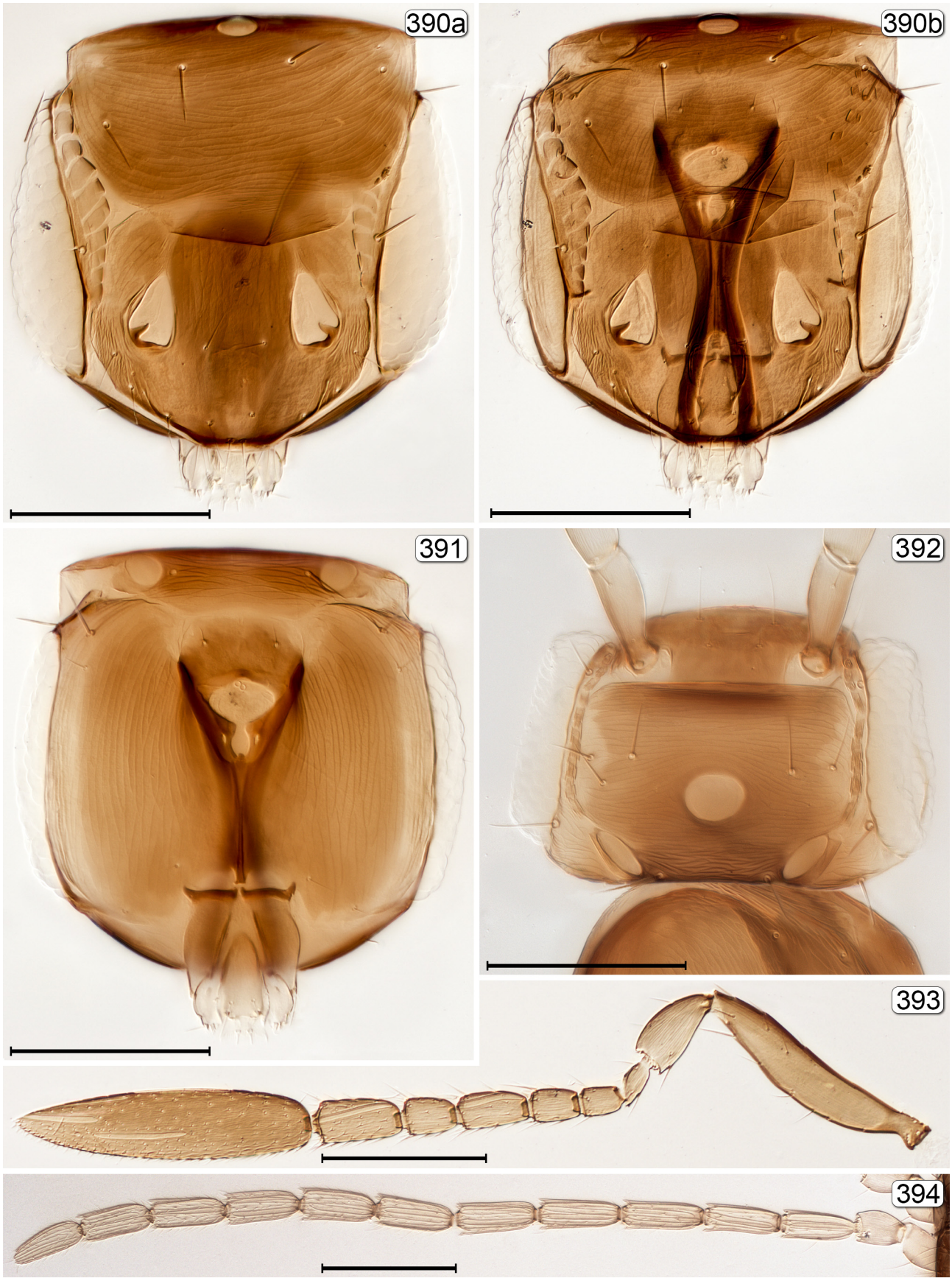
Erythmelus (*Erythmelus*) *burtik* Triapitsyn, 2007

Erythmelus (*Erythmelus*) *burtik* S. Triapitsyn in Triapitsyn *et al*., 2007: 24. Holotype ♀ (CNC). **TL:** Canada, Ontario, Hamilton.
Erythmelus (*Erythmelus*) *burtik* Triapitsyn *et al*., 2007: 7 (key).

Distribution. Canada: ON.



FIGURE 389. *Erythmelus* (*Parallelaptera*) sp., habitus. Canada, Ontario, Thedford, 13–17.ix.1982, A. Tomlin. Scale bar=500 μm.



FIGURES 390–394. *Erythmelus* (*Erythmelus*) spp. 390a, head, anterior; 390b, head, anterior (internal) showing ocular apodemes and tentorium; 391, head, posterior; 392, head, dorsal; 393, antenna; 394, male antenna. Scale bars=100 μm.

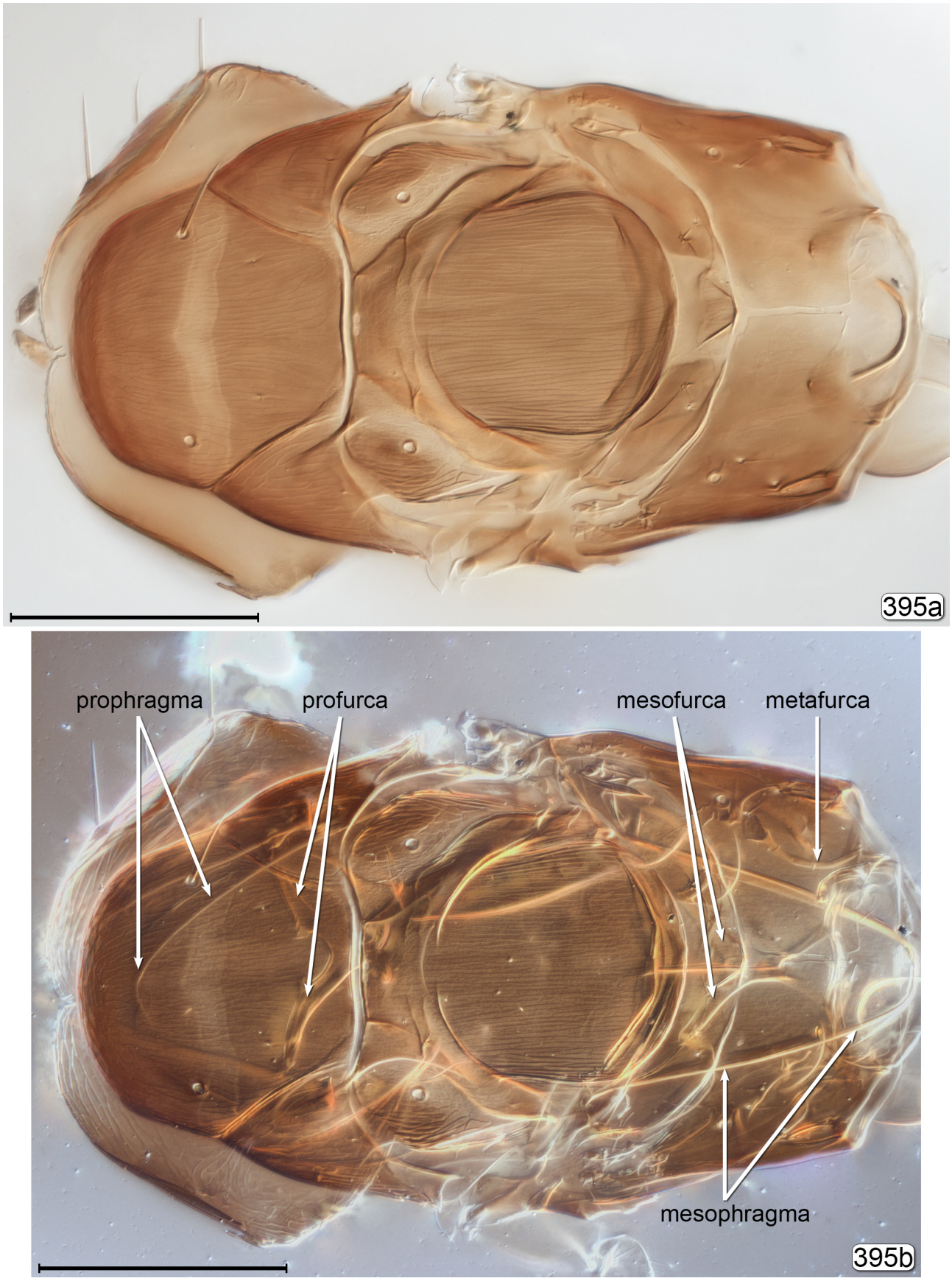


FIGURE 395. *Erythmelus* (*Erythmelus*) sp., mesosoma, dorsal. 395a, surface; 395b, internal. Scale bars=100 µm.

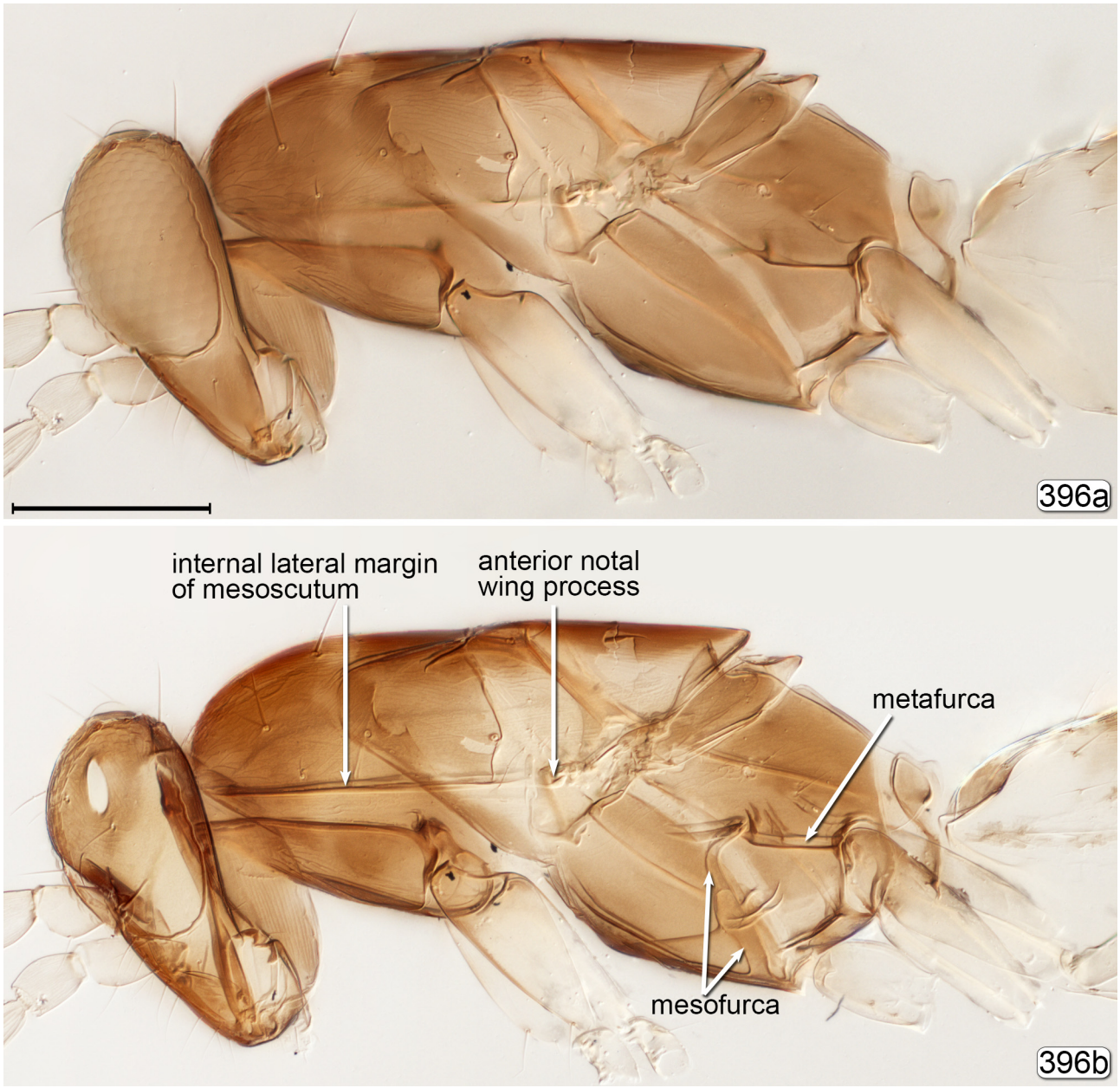


FIGURE 396. *Erythmelus* (*Erythmelus*) sp., mesosoma, lateral. 396a, surface; 396b, internal. Scale bars=100 μm.

Erythmelus (*Erythmelus*) *flavovarius* (Walker, 1846)

Panthus flavovarius Walker, 1846: 52. Lectotype ♀ (OUMNH), designated by Graham, 1982: 219. **TL:** Unknown [Ireland?].
Anagrus flavovarius: Foerster, 1856: 121 (mention) [P]; Dalla Torre, 1898: 422 (catalogue) [P].
Erythmelus miridiphagus Dozier [misidentification (Triapitsyn *et al*. (2007)]: Sohati *et al*., 1989: 1127 (host); Sohati *et al*., 1992: 515 (parasitism rate); Al-Ghamdi & Stewart, 1995: 458 (synchrony with host).
Erythmelus (*Erythmelus*) *flavovarius*: Triapitsyn, 2003b: 7 (key), 17 (description, distribution, host) [P]; Donev, 2004: 122 (description, distribution) [P]; Triapitsyn *et al*., 2007: 7 (key), 47 (description, distribution, hosts); Rameshkumar *et al*., 2015b: 51 (distribution) [O]; Rameshkumar *et al*., 2017: 230 (list) [O]; Triapitsyn *et al*., 2017: 190 (distribution) [P];.
Erythmelus flavovarius: Gijswijt, 2003: 50 (list) [P]; Lotfalizadeh, 2015: 74 (distribution) [P]; Dale-Skey *et al*., 2016: 239 (checklist) [P].
Erythmelus goochi Enock, 1909: 455. Lectotype ♀ (NHMUK), designated by Graham, 1982: 220. **TL:** UK, England, London, Holloway. Synonymy by Triapitsyn, 2003b: 17.
Enaesius parvus Soyka, 1932: 83. Syntypes 7 ♀, 2 ♂ (NHMW), lost? **TL:** Netherlands, Valkenburg. Synonymy by Graham, 1982: 219.
Erythmelus (*Erythmelus*) *empoascae*: Subba Rao, 1966: 192. Holotype ♀ (INPC), lost? **TL:** India, Delhi. Synonymy by Triapitsyn *et al*., 2007: 48.

Erythmelus spinosus Mathot, 1969: 15. Holotype ♀ (ISNB). **TL:** Belgium, Hainault, Rièzes. Synonymy by Triapitsyn, 2003b: 17.

Nearctic hosts. Miridae: *Adelphocoris lineolatus* (Goeze), *Lygus lineolaris* (Palisot de Beauvois).

Distribution. Canada: PE, ON, QC. USA: AK, FL.

Erythmelus (*Erythmelus*) *gracilis* (Howard, 1881)

Anaphes gracilis Howard, 1881: 370. Holotype ♀ (USNM). **TL:** USA, District of Columbia. Ashmead, 1887: 194 (distribution); Cresson, 1887: 250 (catalogue); Howard, 1889: 130 (host [error?]); Howard, 1894b: 256 (host [error?]); Howard, 1895: 254 (hosts [error?]); Riley, 1895: 100 (hosts [error?]); Howard & Marlatt, 1896: 51 (host [error?]); Dalla Torre, 1898: 424 (catalogue); Johnson, 1898: 68. (host [error?]); Johnson, 1900: 73 (host [error?]); Howard *in* Marlatt, 1906: 60 (host [error?]); Girault, 1907 [27]: 31 (host [error?]); Schmiedeknecht, 1909: 499 (list); Quaintance & Sasscer, 1910: 6 (host [error?]); Viereck in Smith, 1910: 637 (host [error?]); Girault, 1911 [73]: 133 (description, host [error?], distribution); Girault, 1911 [87]: 149 (host [error]); Girault, 1911 [90]: 186 (description); Girault, 1911 [96]: 280 (corrections, generic placement), 287 (key); Essig, 1915: 180, 190 (hosts [error?]); Girault, 1915 [261]: 7 (belongs to *Erythmelus*); Quaintance, 1916: 13 (host [error?]); Quaintance & Sasscer, 1916: 6 (host); Houser, 1918: 282, 287 (hosts [error?]); Thompson, 1958: 568 (host catalogue).

(*Anaphes*) *Erythmelus gracilis*: Gahan, 1937: 268 (*E. psallidis* a form?).

Erythmelus gracilis: Girault, 1929 [428]: 8 (key); Doutt, 1949a: 78 (distribution, hosts), 81 (key); Peck, 1951: 414 (catalogue); Peck, 1963: 29 (catalogue); Burks, 1979: 1028 (catalogue); Huber, 1992: 77 (listed in *Erythmelus*).

Erythmelus (*Erythmelus*) *gracilis*: Triapitsyn, 2003b: 15 (species-group placement); Triapitsyn *et al*., 2007: 8 (key), 56 (description, distribution, hosts).

Anaphes cinctiventris Girault, 1911 [96]: 286. Holotype ♀ (USNM), lost. **TL:** USA, California, Santa Clara Co., Mountain View. Synonymy by Doutt, 1949: 78. Girault, 1911 [96]: 287 (key); Girault, 1915 [261]: 7 (description); Girault, 1929 [428]: 7 (key); Doutt, 1949a: 78 (synonymy); Peck, 1951: 414 (catalogue, under *gracilis*); Huber, 1992: 77 (listed in *Erythmelus*).

Mymar cinctiventris: Soyka, 1949a: 331 (list).

Erythmelus (*Erythmelus*) *cinctiventris*: Triapitsyn, *et al*., 2007: 58 (synonym confirmed).

Anaphes gracilipes Girault, 1915 [261]: 7. Holotype ♀ (USNM) [+ generic transfer]. **TL:** USA, New Mexico, Colfax Co., Koehler. Synonymy by Triapitsyn *et al*., 2007: 56. Girault, 1929 [428]: 7 (key); Peck, 1951: 413 (catalogue); Peck, 1963: 29 (catalogue); Burks, 1979: 1028 (catalogue); Yoshimoto, 1990: 46 (list), 52 (incorrectly listed under *Anaphes*); Huber, 1992: 77 (listed in *Erythmelus*).

Erythmelus (*Erythmelus*) *gracilipes*: Triapitsyn *et al*., 2007: 56 (synonymy).

Anagrus io Girault, 1911 [96]: 294. Holotype ♂ (INHS), lost. **TL:** USA, Illinois, Urbana. Girault, 1911 [90]: 186 (description). Synonymy by Triapitsyn *et al*., 2007: 56.

Erythmelus io: Girault, 1929 [428]: 8 (comparison with *E. cinctiventris*); Doutt, 1949a: 81 (taxonomic status); Peck, 1951: 414 (catalogue); Peck, 1963: 29 (catalogue); Burks, 1979: 1028 (catalogue); Yoshimoto, 1990: 46 (list).

Erythmelus (*Erythmelus*) *io*: Triapitsyn, 2003b: 15 (species-group placement).

Distribution. Canada: BC, NT, ON, PE. USA: CA, CO, DC, GA, IL, NY, TX, WY.

Erythmelus (*Erythmelus*) *klopomor* Triapitsyn, 2007

Erythmelus klopomor S. Triapitsyn in Triapitsyn, 2007 *et al*.: 54. Holotype ♀ (UCRC). **TL:** USA, Missouri, Howard Co. New Franklin, Horticulture & AgroForestry Research Center. Peña *et al*., 2009: 394 (distribution, host); Puttler *et al.*, 2014: 31 (distribution, hosts, bionomics).

Erythmelus sp.: Horn *et al*., 1979: 11 (host); Horn *et al*., 1983: 263 (host); Triapitsyn, 2003b: 26 (distribution, host).

Erythmelus (*Erythmelus*) *klopomor*: Triapitsyn *et al*., 2007: 28 (key); Peña *et al*., 2012: 179 (host).

Nearctic hosts. Tingidae: *Corythuca arcuata* (Say), *C. ciliata* (Say), *C. cydoniae* (Fitch), *C. floridana* Heidemann, *C. marmorata* (Uhler), *C. pergandei* Heidemann, *Pseudacysta perseae* (Heidemann).

Distribution. USA: FL, MD, MO, NC.

Erythmelus (*Erythmelus*) *miridiphagus* Dozier, 1937

Erythmelus miridiphagus Dozier, 1937: 133. Holotype ♀ (USNM). **TL:** Puerto Rico, Hormigueros. Doutt, 1949a: 80 (distribution), 81 (key); Peck, 1951: 414 (catalogue); Peck, 1963: 29 (catalogue); Burks, 1979: 1028 (catalogue); Yoshimoto, 1990: 46 (list); Ruberson & Williams III, 2000: 97 (biological control).

Erythmelus (*Erythmelus*) *miridiphagus*: Triapitsyn *et al*., 2007: 7 (key), 50 (description, distribution).

Distribution. USA: TX.

Erythmelus (*Erythmelus*) *mudrila* Triapitsyn, 2007

Erythmelus (*Erythmelus*) *mudrila* S. Triapitsyn in Triapitsyn *et al*., 2007: 23. Holotype ♀ (UCRC). **TL:** Mexico, Oaxaca, Yagul (ruins).
Erythmelus (*Erythmelus*) *mudrila* Triapitsyn *et al*., 2007: 7 (key).

Distribution. USA: TX.

Erythmelus (*Erythmelus*) *nanus* Dozier, 1937

Erythmelus nanus Dozier, 1937: 134. Holotype ♀ (USNM). **TL:** Puerto Rico: Las Vegas.
Erythmelus (*Erythmelus*) *nanus*: Triapitsyn *et al*., 2007: 7 (key), 40 (description, distribution).

Distribution. USA: FL.

Erythmelus (*Erythmelus*) *picinus* (Girault, 1915)

Anaphes picinus Girault, 1915 [261]: 6. Lectotype ♀ (USNM) [+ generic transfer], designated by Triapitsyn *et al*., 2007: 35. **TL:** USA, New Mexico, Colfax Co., Koehler.
Erythmelus picinus: Girault, 1929 [428]: 8 (key); Doutt, 1949a: 80 (distribution), 81 (key); Peck, 1951: 413 (catalogue); Peck, 1963: 30 (catalogue); Burks, 1979: 1028 (catalogue); Yoshimoto, 1990: 46 (list), 52 (incorrect listing under *Anaphes*); Huber, 1992: 77 (listed in *Erythmelus*).
Erythmelus (*Erythmelus*) *picinus*: Triapitsyn *et al*., 2007: 35 (description, distribution, host).
Erythmelus flandersi Doutt, 1949a: 77. Holotype ♀ (CAS). **TL:** USA, California, Covina. Synonymy by Triapitsyn *et al*., 2007: 36. Doutt, 1949a: 81 (key); Peck, 1951: 413 (catalogue); Peck, 1963: 28 (catalogue); Burks, 1979: 1028 (catalogue); Yoshimoto, 1990: 46 (list); Zuparko & Hamai, 1994: 316 (holotype depository).
Erythmelus (*Erythmelus*) *flandersi*: Triapitsyn, 2003b: 15 (species-group placement).

Nearctic hosts. Miridae: *Neurocolpus longirostris* Knight.

Distribution. Canada: AB, BC, NS, ON. USA: AK, AZ, CA, CO, LA, MD, NM, SC, TX, UT, WA.

Erythmelus (*Erythmelus*) *psallidis* Gahan, 1937

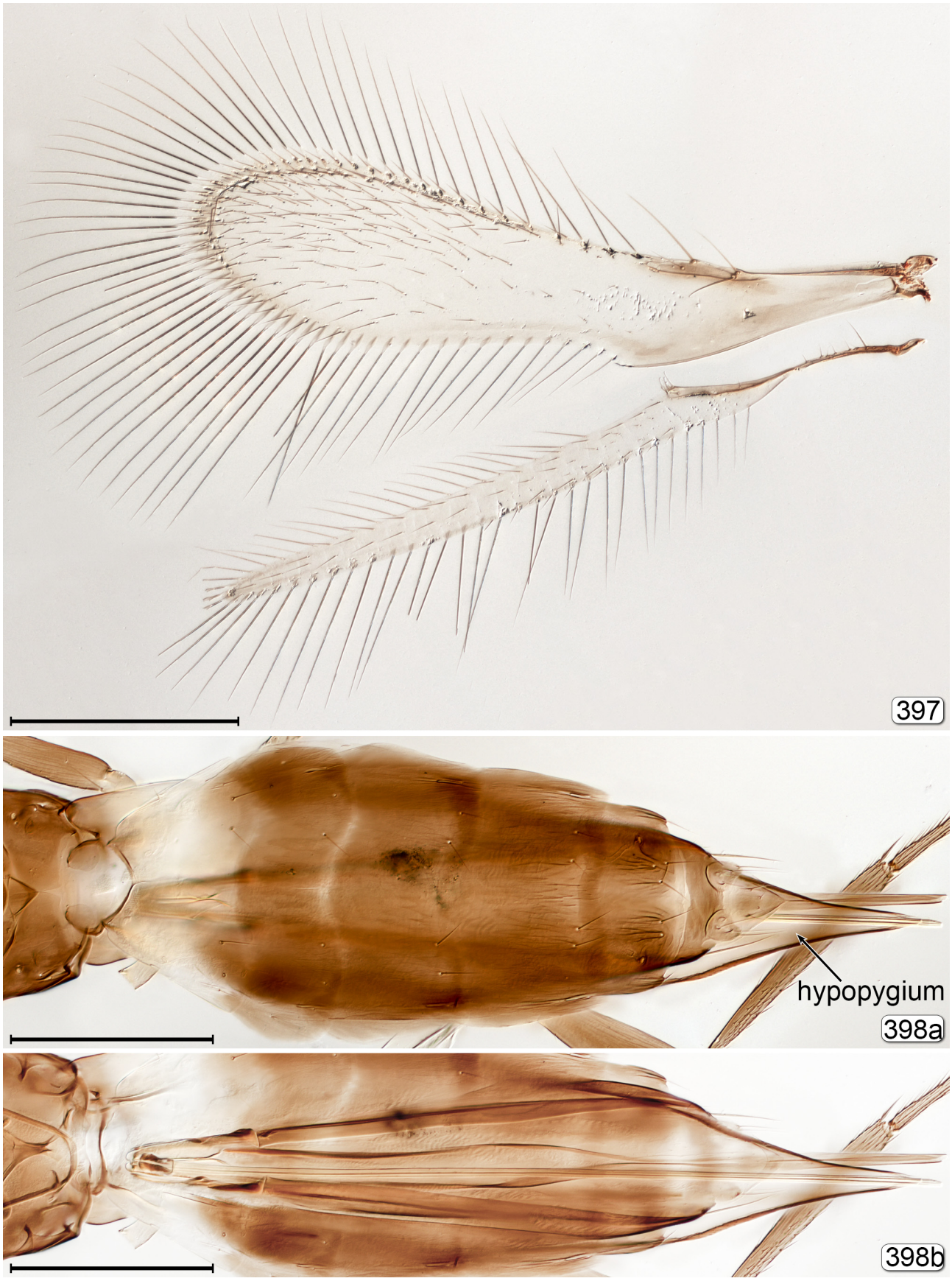
Erythmelus psallidis Gahan, 1937: 268. Holotype ♀ (USNM). **TL:** USA, Louisiana, Tallulah. Strong, 1938: 52 (host); Ewing & Crawford, 1939: 303 (biology); Doutt, 1949a: 80 (distribution, host), 81 (key); Peck, 1951: 414 (catalogue); Peck, 1963: 29 (catalogue); Herting, 1971: 109 (host catalogue); Burks, 1979: 1028 (catalogue); Rajakulendran & Cate, 1986: 257 (host); Yoshimoto, 1990: 46 (list).
Erythmelus n. sp.: Strong, 1936: 66 (host); Strong, 1937: 57 (host).
Erythmelus (*Erythmelus*) *psallidis*: Triapitsyn, 2003b: 15 (species group placement); Triapitsyn *et al*., 2007: 7, 8 (key), 32 (description, distribution, hosts).

Nearctic hosts. Miridae: *Lygus* sp., *Neurocolpus longirostris* Knight, *Pseudatomoscelis seriatus* (Reuter), *Keltonia sulphurea* (Reuter).

Distribution. Canada: AB, BC, NB, PE. USA: AR, AZ, CA, FL, IL, LA, MD, MS, ND, NM, SC, TX.

Erythmelus (*Parallelaptera*) *rex* (Girault, 1911)

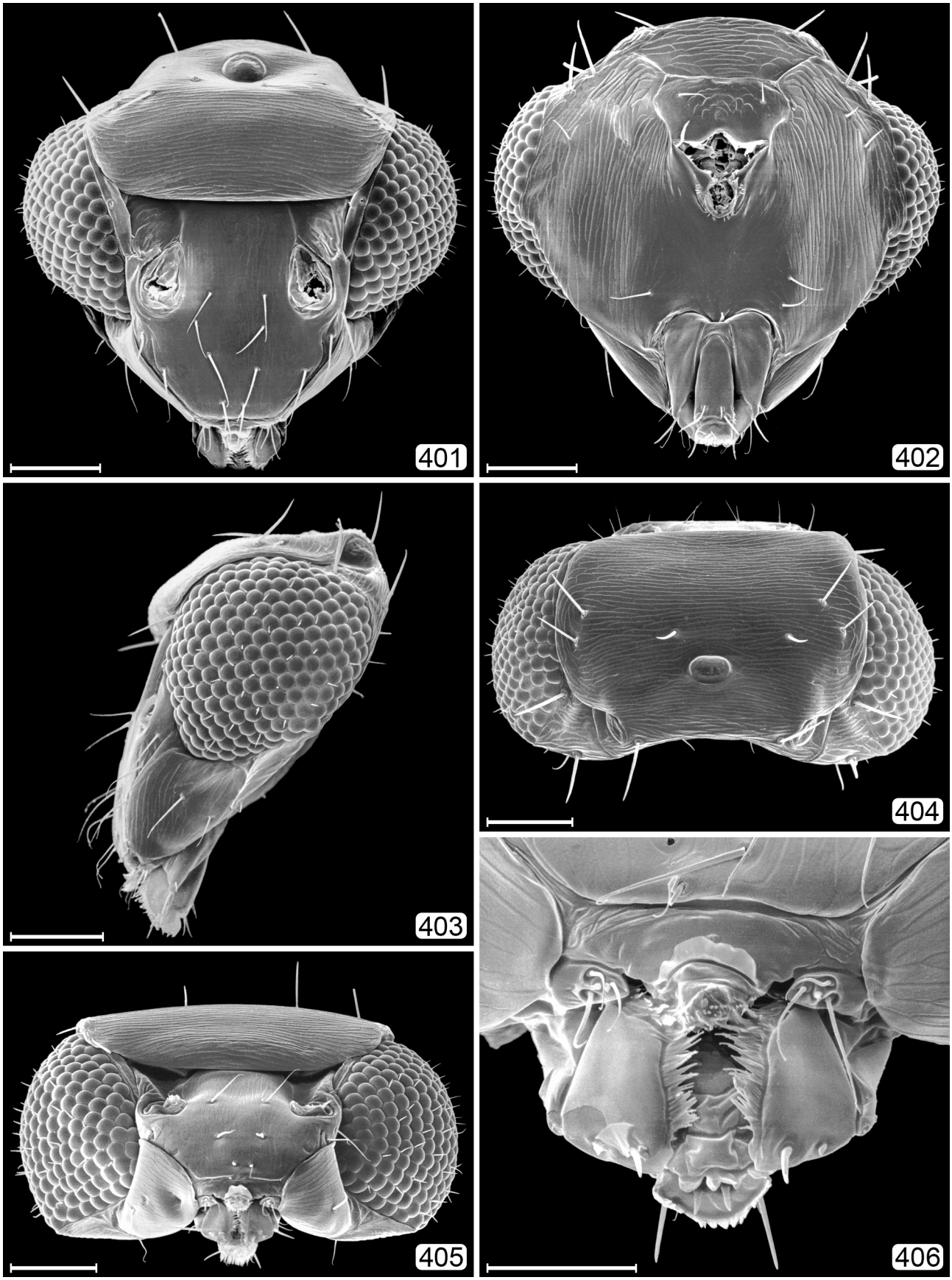
Anthemiella rex Girault, 1911 [90]: 185. Holotype ♀ (USNM). **TL:** USA, Illinois, Urbana. Girault, 1911 [96]: 324 (*nomen nudum*); Girault, 1912 [112]: 298 (comparison with extralimital species); Severin, 1924: 371 (distribution); Girault, 1929 [428]: 8 (description); Essig, 1931: 383 (host); Peck, 1951: 414 (catalogue); Burks, 1958: 63 (catalogue); Thompson, 1958: 571 (host catalogue); Flock *et al.*, 1962: 277 (host, seasonal abundance); Peck, 1963: 31 (catalogue); Burks, 1979: 1028 (catalogue).



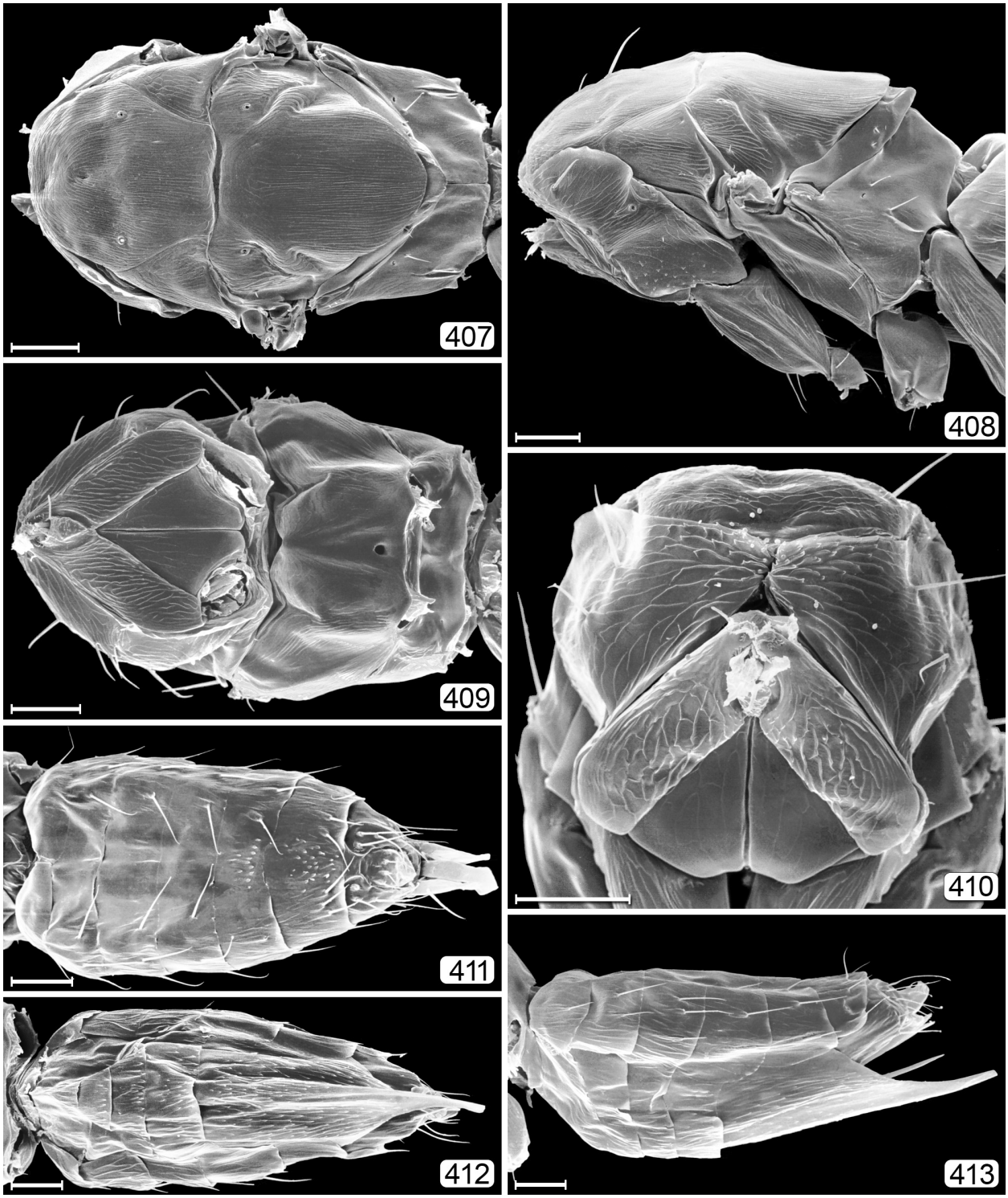
FIGURES 397, **398**. *Erythmelus* (*Erythmelus*) sp. 397, wings; 398a, metasoma, dorsal; 398b, metasoma, showing genitalia. Scale bars=200 μm.



FIGURES 399, **400**. *Erythmelus* (*Erythmelus*) sp. 399, metasoma, lateral; 400a, male metasoma, dorsal; 400b, male metasoma showing genitalia. Scale bars=100 μm.



FIGURES 401–406. *Erythmelus* (*Erythmelus*) sp., head. 401, anterior; 402, posterior; 403, lateral; 404, dorsal; 405, ventral; 406, mouthparts. Scale bars=50 μm.

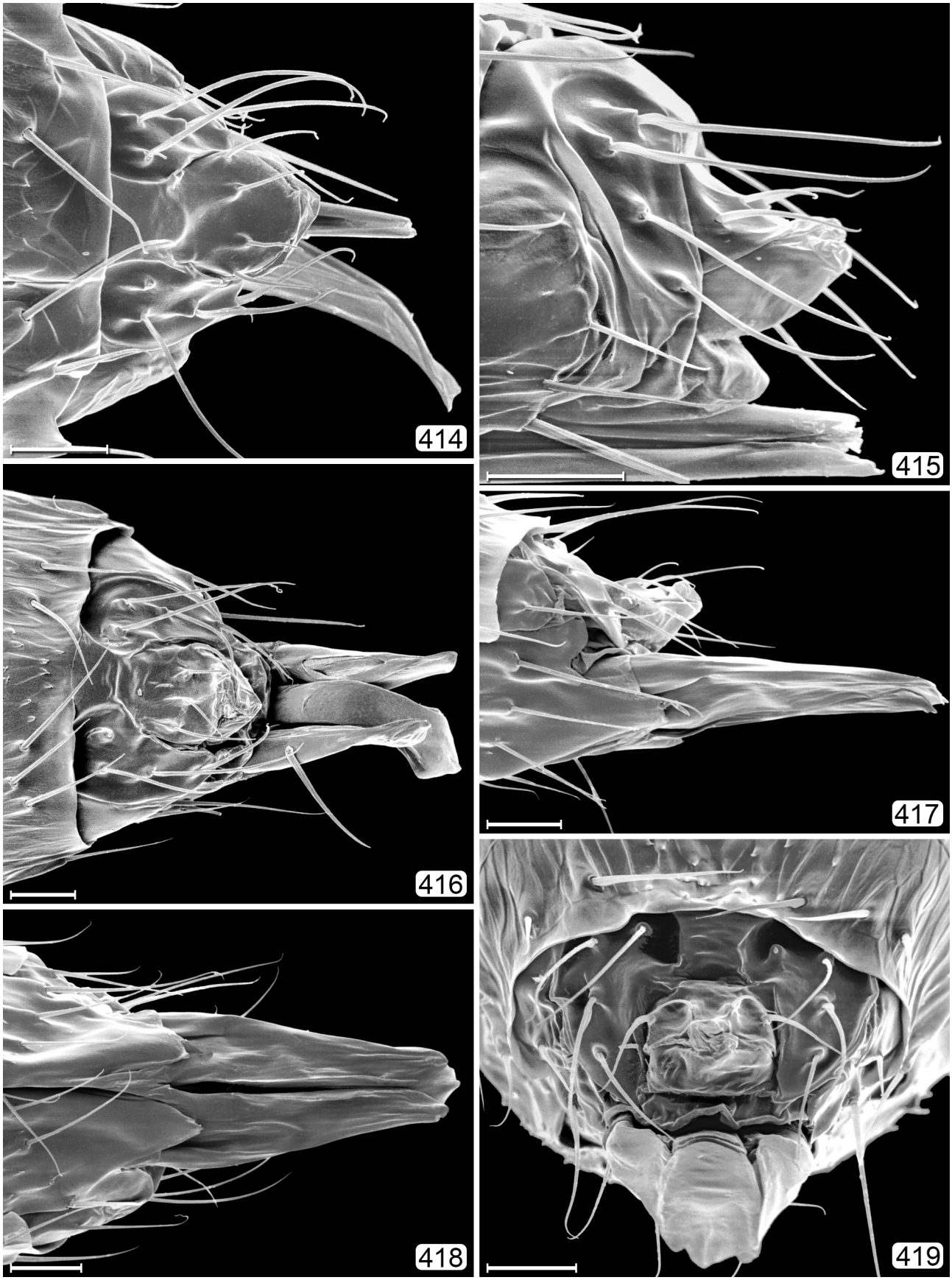


FIGURES 407–413. *Erythmelus* (*Erythmelus*) sp. 407, mesosoma, dorsal; 408, mesosoma, lateral; 409, mesosoma, ventral; 410, mesosoma, anterior; 411, male metasoma, dorsal; 412, metasoma, ventral; 413, metasoma, lateral. Scale bars=50 μm.

Erythmelus rex: Yoshimoto, 1990: 46 (list); Trjapitzyn, 1993: 268 (key), 270 (distribution); Luft Albarracin *et al.*, 2009: 6 (list) [NT]; Pricop, 2009b: 125 (distribution) [P]; Pricop, 2009c: 20 (distribution) [P]; Lotfalizadeh, 2015: 74 (distribution) [P]; Dale-Skey *et al.*, 2016: 239 (checklist) [P].

Erythmelus (*Parallelaptera*) *rex*: Triapitsyn, 2003b: 36 (distribution); Triapitsyn *et al*., 2007: 6 (key), 9 (description, hosts, distribution); Triapitsyn, 2008: 66 (distribution) [NT].

Nearctic hosts. Miridae: *Adelphocoris* sp., *Atomoscelis modestus* (Van Duzee), *Lygus hesperus* Knight.
Distribution. Canada: AB, ON, PE, SK. USA: AZ, CA, IA, IL, OH.



FIGURES 414–419. *Erythmelus* (*Erythmelus*) sp., apex of gaster. 414, dorsal; 415, lateral; 416, male dorsal; 417, male, lateral; 418, male, ventral; 419, male, posterior. Scale bars=50 μm.

EUSTOCHUS Haliday, 1833

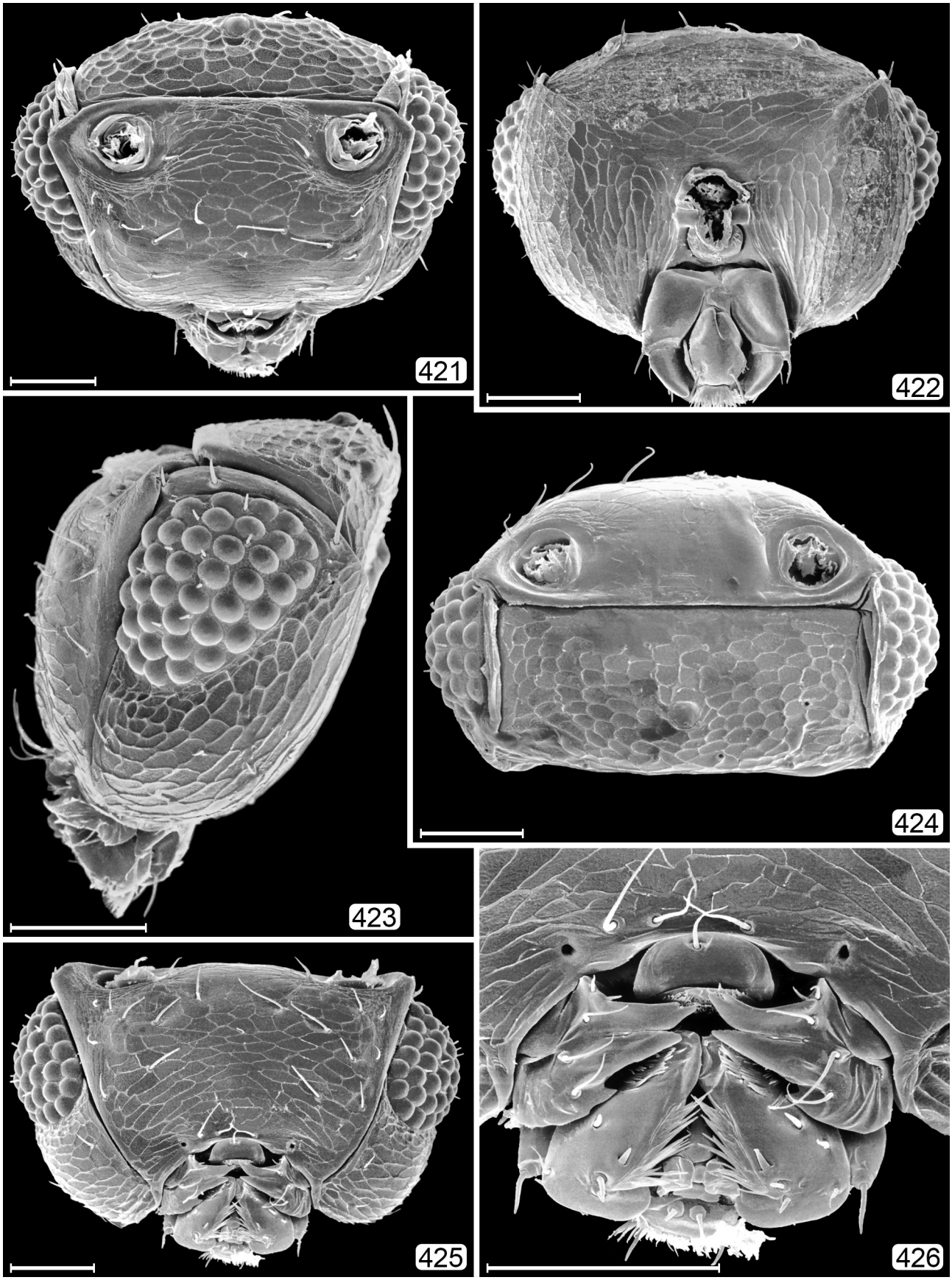
(Figs 420–438)

Eustochus Haliday, 1833a: 268, 1833b: 349. Type species: *Mymar atripennis* Curtis, 1832, by monotypy.

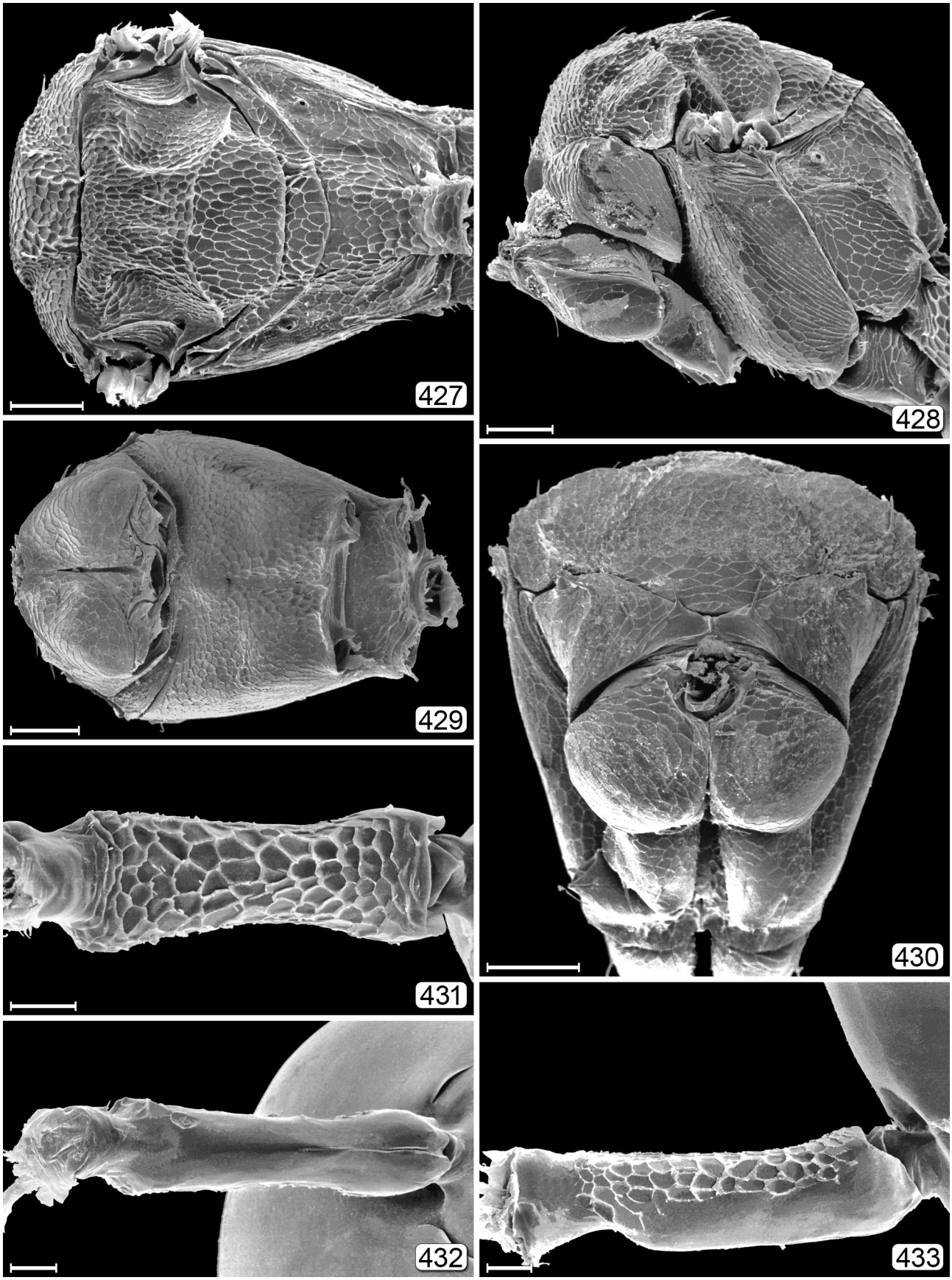
Diagnosis. Body length 640–1145 µm. Head, mesosoma, petiole dorsally, and coxae heavily sculptured with raised reticulations (Figs 420, 421–425, 427–430); antenna with clava 2-segmented and narrowed towards apex (Fig. 420); fore wing with 2 distal macrochaetae and marginal vein present between them, parastigma, marginal and stigmal veins together as long as submarginal vein (Fig. 420).



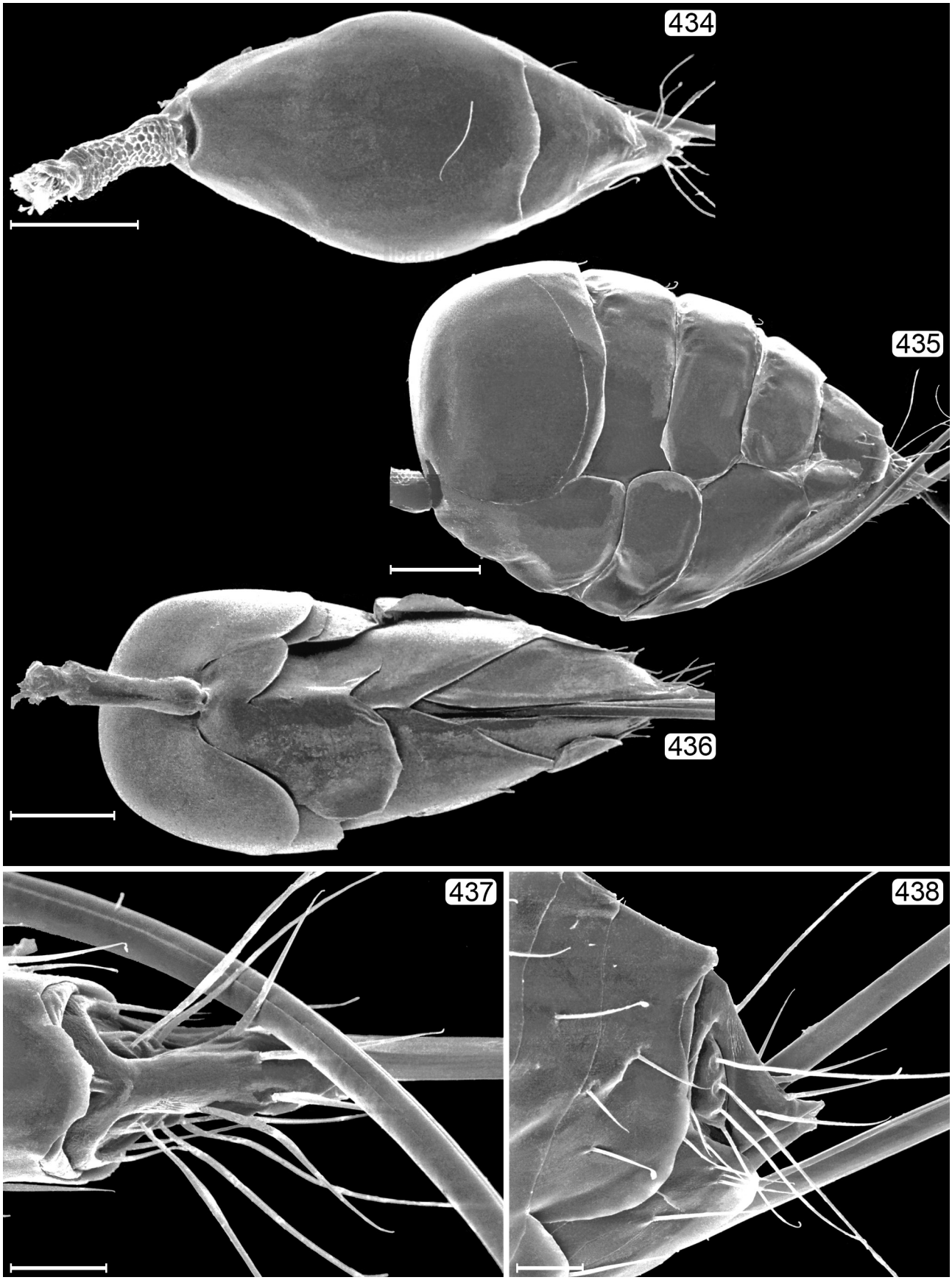
FIGURE 420. *Eustochus* sp., habitus. USA, California, Tuolumne Co., Stanislaus Nat. Forest, 5561', 1 mi. N. hwy 108, 38°21'50"N 119°52'20"W, 12.vii.2006, S. Fullerton, E. Zoll, S. Kelly, P. Russell. Scale bar=500 µm.



FIGURES 421–426. *Eustochus* sp., probably *atripennis* (Curtis), heads (Japan). 421, anterior; 422, posterior; 423, lateral; 424, dorsal; 425, ventral; 426, mouthparts. Scale bars=50 μm.



FIGURES 427–433. *Eustochus* sp., probably *atripennis* (Curtis) (Japan). 427, mesosoma, dorsal; 428, mesosoma, lateral; 429, mesosoma, ventral; 430, mesosoma, anterior; 431, petiole dorsal; 432, petiole, ventral; 433, petiole, lateral. Scale bars: 427–430=50 μm; 431–433=20 μm.



FIGURES 434–438. *Eustochus* sp., probably *atripennis* (Curtis) (Japan). 434, metasoma, dorsal; 435, metasoma, lateral; 436, metasoma, ventral; 437, apex of gaster, dorsal; 438, apex of gaster, lateral. Scale bars: 434–436=100 μm; 437, 438=20 μm.

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Eustochus* is the sister genus to *Caraphractus*. Together they form a distinct subgroup distinguished by their heavily sculptured head, mesosoma, and petiole, at least dorsally.

Nearctic hosts. Unknown. An extralimital host is in Coleoptera (Pricop & Moglan 2016).

Important reference. Huber & Baquero (2007).

***Eustochus nearcticus* Yoshimoto, 1990**

Eustochus nearcticus Yoshimoto, 1990: 96. Holotype ♀ (CNC). **TL:** Canada, Nova Scotia, Cape Breton Highlands National Park, Lone Shieling. Yoshimoto, 1990: 58 (list); Huber, 1997: 505 (key); Xu & Lin, 2003, 65 (mention); Huber & Baquero, 2007: 19 (key), 24 (description, distribution).

Distribution. Canada: NS.

***Eustochus pengellyi* Huber & Baquero, 2007**

Eustochus pengellyi Huber & Baquero, 2007: 27. Holotype ♀ (CNC). **TL:** Canada, Ontario, Flint Hill near Kemptville. Huber & Baquero, 2007: 19 (key).

Distribution. Canada: ON.

***Eustochus yoshimotoi* Huber & Baquero, 2007**

Eustochus yoshimotoi Huber & Baquero, 2007: 27. Holotype ♀ (CNC). **TL:** USA, Washington, Pierce Co., Ashford. Huber & Baquero, 2007: 19 (key), 28 (distribution).

Distribution. USA: WA.

GASTROGONATOCERUS Ogloblin, 1935

(Figs 439–451)

Gonatocerus **(***Gastrogonatocerus***)** Ogloblin, 1935c: 65. Type species: *Gonatocerus membraciphagus* Ogloblin, 1935c, by original designation. Given generic status by Huber, 2015: 27.

Diagnosis. Body length 510–1025 μm. Ocellar triangle with 2 setae between lateral ocelli (Figs 440, 441, 443); head posteriorly with curved postgenal sulcus (Fig. 441); fore wing almost bare behind and just beyond venation and on rest of wing surface microtrichia fairly widely spaced (Fig. 439); propodeum medially with several faint parallel longitudinal lines (Fig. 445); propodeal spiracle huge (Figs 445, 446); ovipositor, enclosed in gastral sac, extending anteriorly ventral to mesosoma (Figs 439, 449).

Discussion. Among the four genera in the *Gonatocerus* group (*Cosmocomoidea*, *Gastrogonatocerus*, *Gonatocerus*, and *Lymaenon*) that share the following combination of features: tarsi 5-segmented, funicle 8-segmented, face with subantennal sulci, and parastigma with hypochaeta about midway between proximal and distal macrochaetae (Huber 2015a), *Gastrogonatocerus* is most likely to be confused with *Cosmocomoidea* because of the lack of microtrichia behind the venation.

Nearctic hosts. Unknown. Extralimital hosts are Hemiptera: Membracidae.

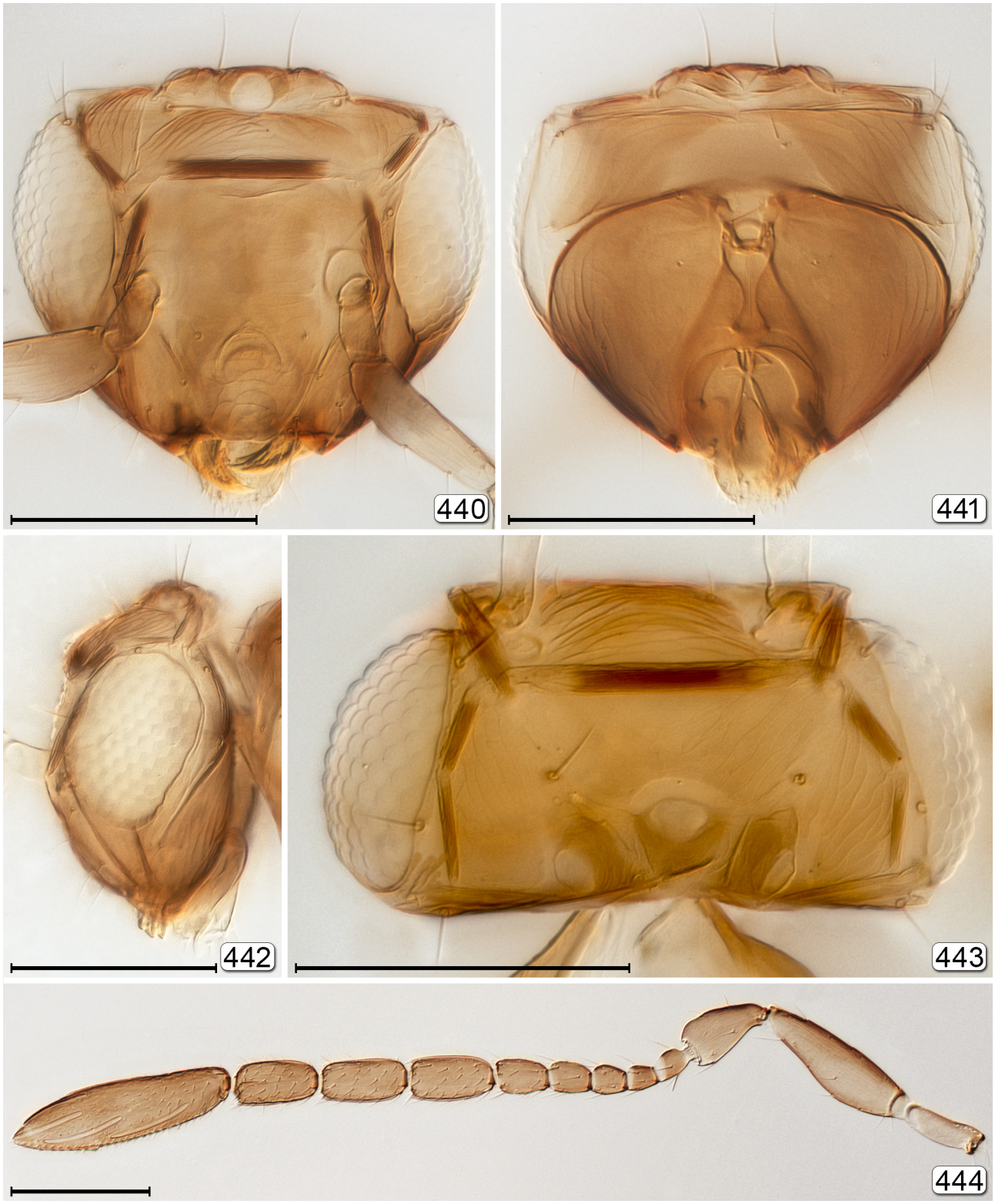
Important references. Huber (1988, 2015a, 2017), Triapitsyn *et al.* (2010).

***Gastrogonatocerus* spp.** Specimens (CNC) representing at least three species occur north of Mexico and may be undescribed; they do not key well in Triapitsyn *et al.* (2010) who treated the Neotropical species.

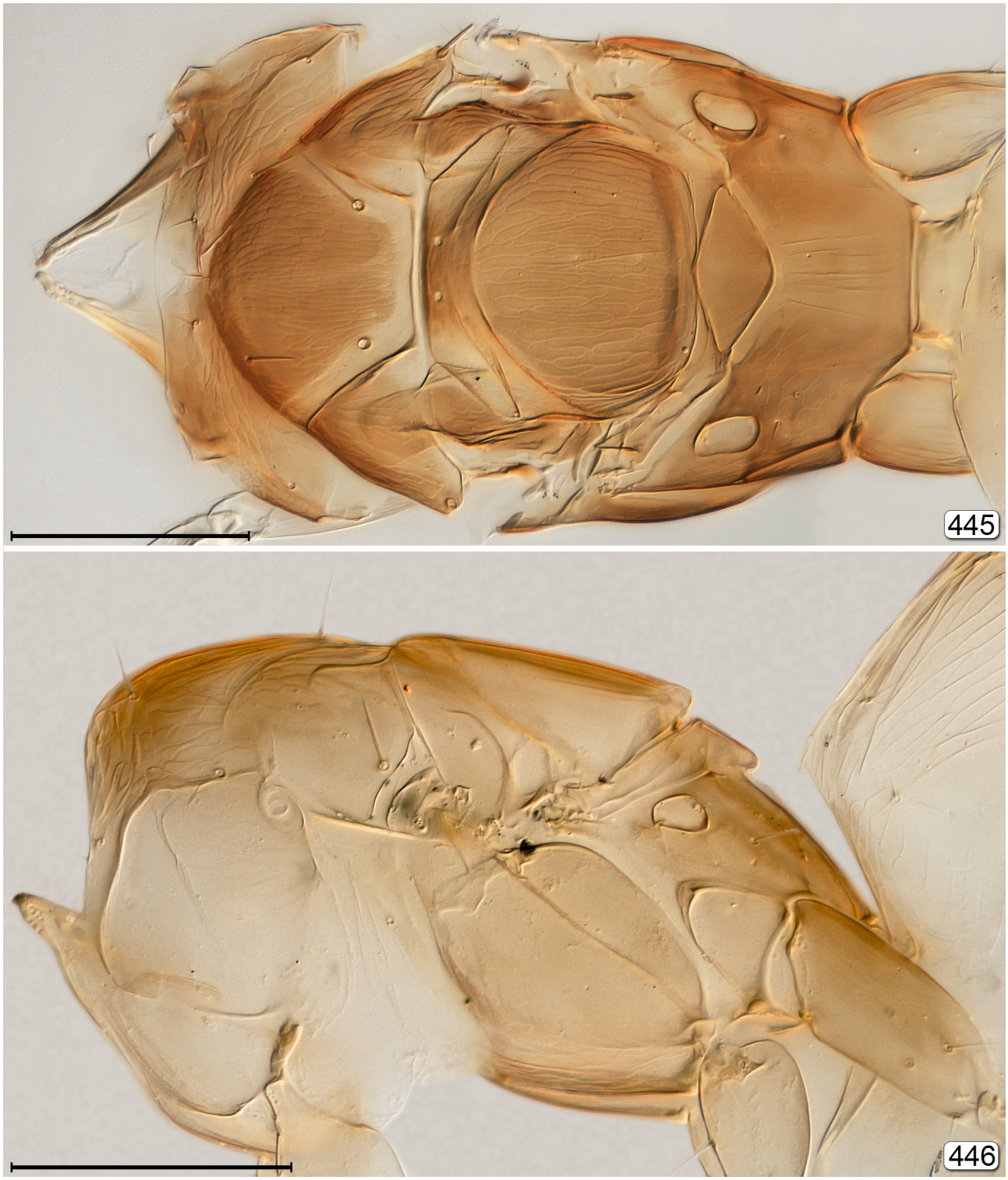
Distribution. USA: AZ, CA, FL, GA, IL, KS, MO, SC, TX.



FIGURE 439. *Gastrogonatocerus* sp., habitus. USA, Missouri, Wayne Co., Williamsville, vii.1987, J.T. Becker. Scale bar=500 µm.



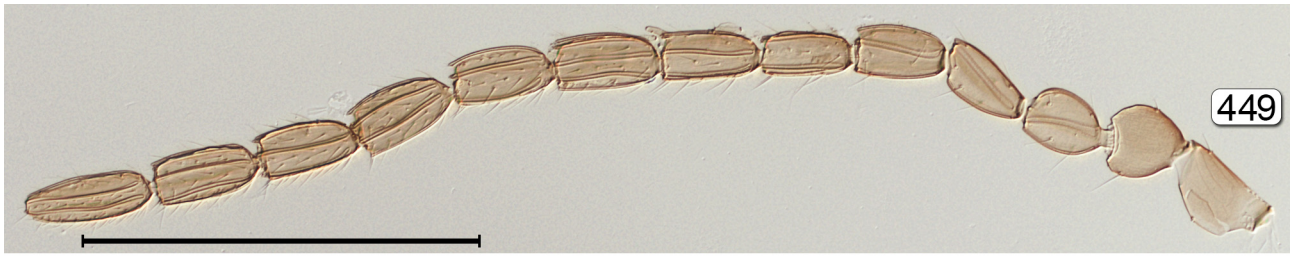
FIGURES 440–444. *Gastrogonatocerus* sp. 440, head, anterior; 441, head, posterior; 442, head lateral; 443, head, dorsal; 444, antenna. Scale bars=100 µm.

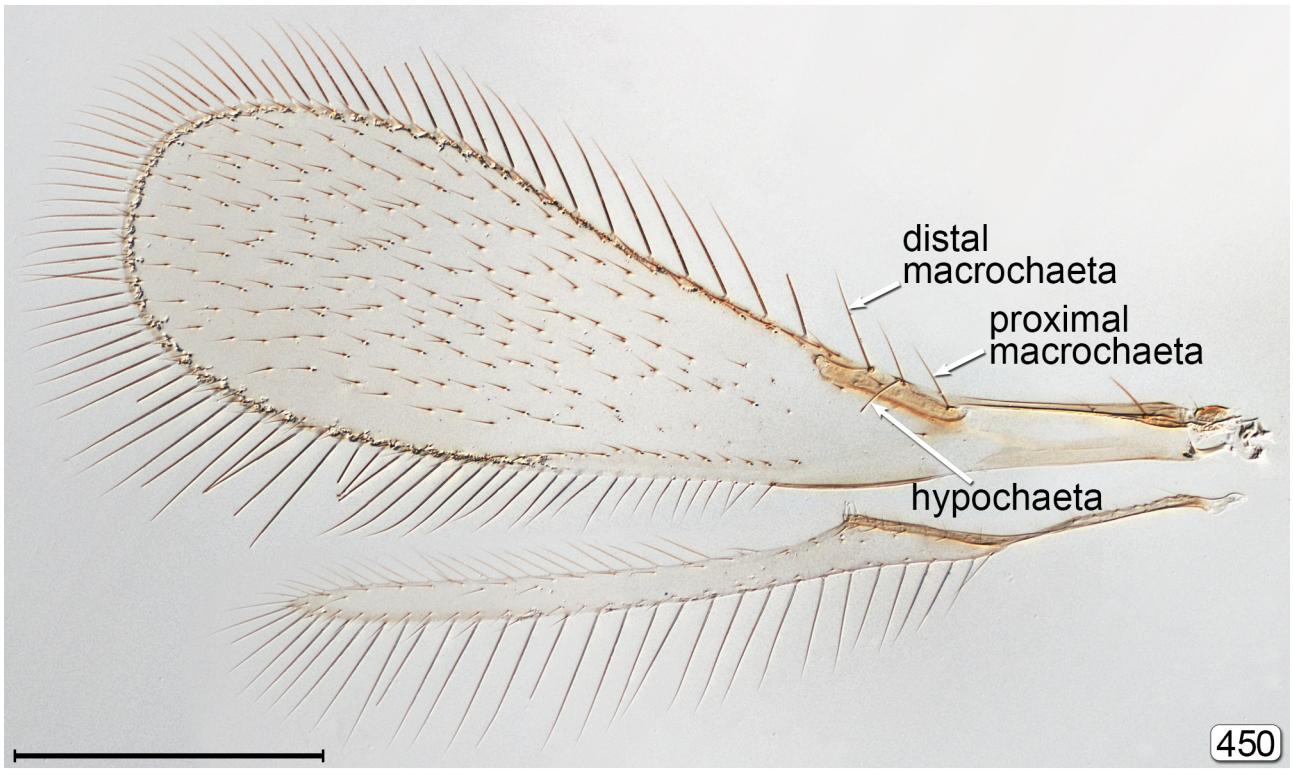


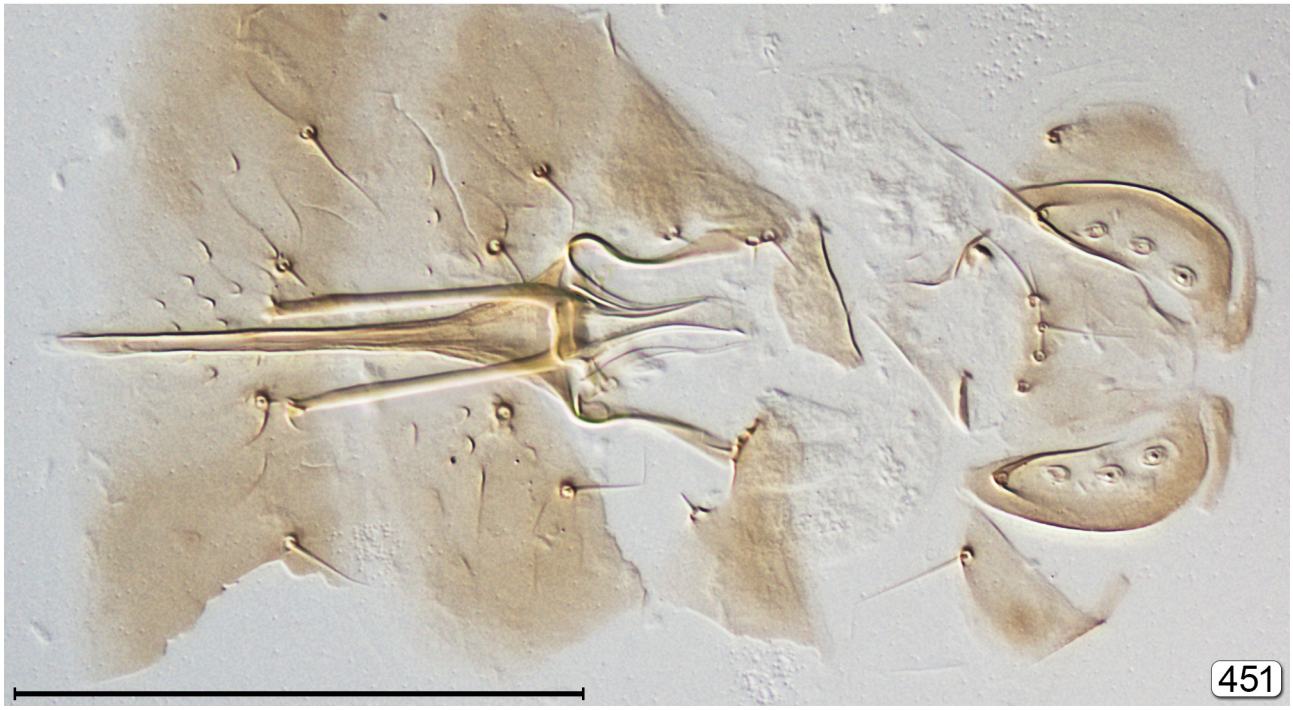
FIGURES 445, **446**. *Gastrogonatocerus* sp., mesosoma. 445, dorsal; 446, lateral. Scale bars=100 μm.



FIGURES 447, **448**. *Gastrogonatocerus* sp., metasoma. 447a, dorsal; 447b, ovipositor seen through gaster; 448, lateral. Scale bars=200 μm.







FIGURES 449–451. *Gastrogonatocerus* sp., male. 449, antenna; 450, wings; 451, genitalia, dorsal, with apical tergum and cerci flattened on right of genitalia. Scale bars: 449, 450=200 μm; 451=100 μm.

***GONATOCERUS* Nees, 1834**
(Figs 452–466)

Gonatocerus Nees, 1834: 192. Type species: *Gonatocerus longicornis* Nees, 1834, by monotypy.

Diagnosis. Body length 640–1665 μm. Funicle with fu_2 and fu_3 usually the longest segment and often fu_2 with apex slightly oblique (Fig. 457); fore wing relatively narrow and as setose behind venation as beyond venation, with the microtrichia fairly dense (Figs 452, 464); stigmal vein with apex oblique (Fig. 464); dorsellum rhomboidal (Fig. 458), often with margins slightly lighter in colour laterally than medially; propodeum without submedian carinae (Fig. 458), but sometimes with faint converging sulci.

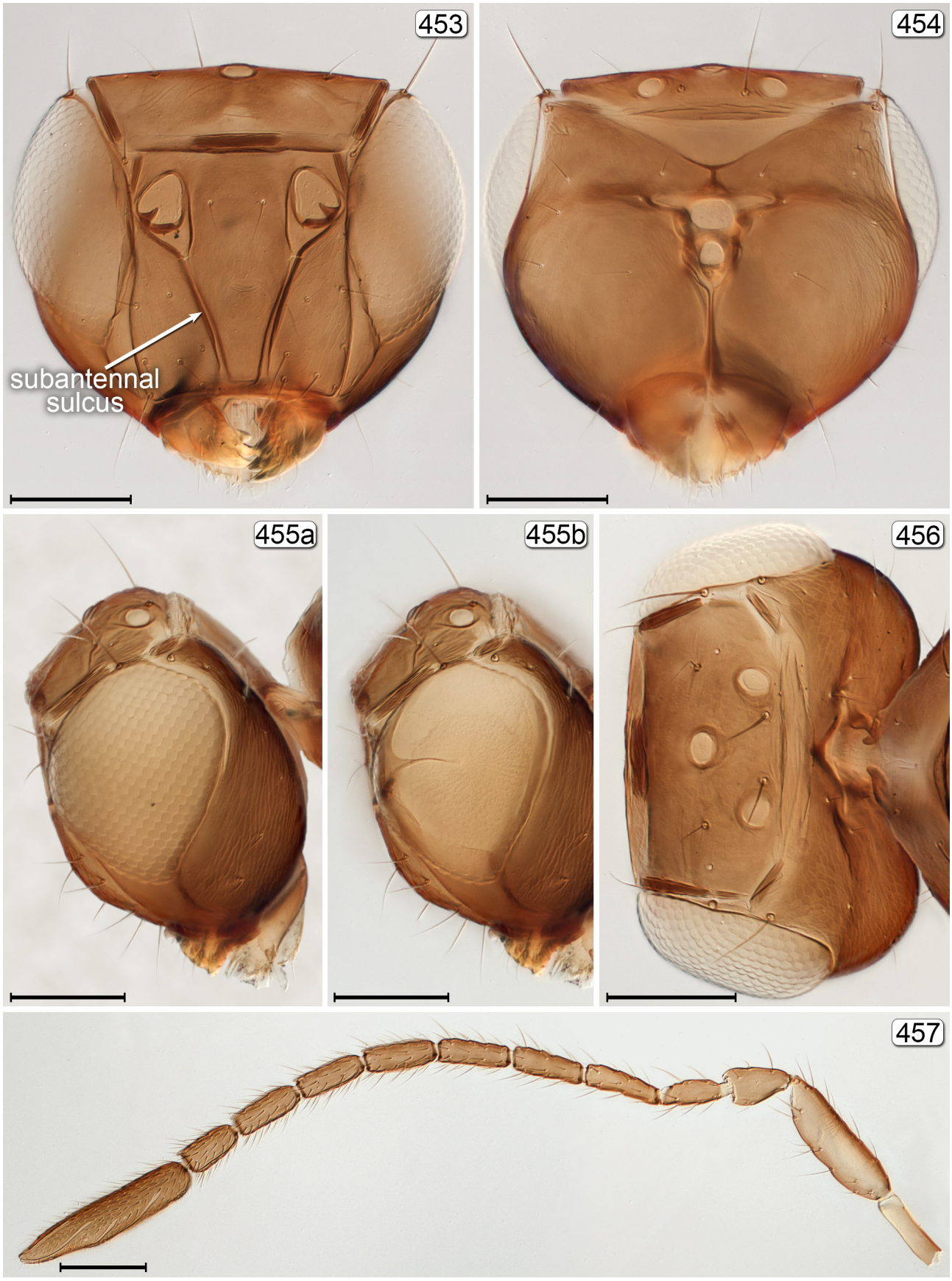


FIGURE 452. *Gonatocerus rivalis* Girault, habitus. Canada, Ontario, Buckham's Bay West, 45°29'36"N 76°6'38"W, v–x.2010, J. Read. Scale bar=500 μm.

Discussion. Among the four genera in the *Gonatocerus* group (*Cosmocomoidea*, *Gastrogonatocerus*, *Gonatocerus*, and *Lymaenon*) that share the following combination of features: tarsi 5-segmented, funicle 8-segmented, face with subantennal sulci, and parastigma with hypochaeta about midway between proximal and distal macrochaetae (Huber 2015a), *Gonatocerus* is superficially most similar to *Lymaenon*, but the pronotal lobes abut medially and the dorsellum is triangular as in *Cosmocomoidea* and *Gastrogonatocerus* but in contrast to *Lymaenon*.

Nearctic hosts. Hemiptera: Cicadellidae.

Important references. Girault (1929 [428]), Huber (1988, 2015a, 2017), Triapitsyn *et al.* (2010), Triapitsyn (2013a, b).



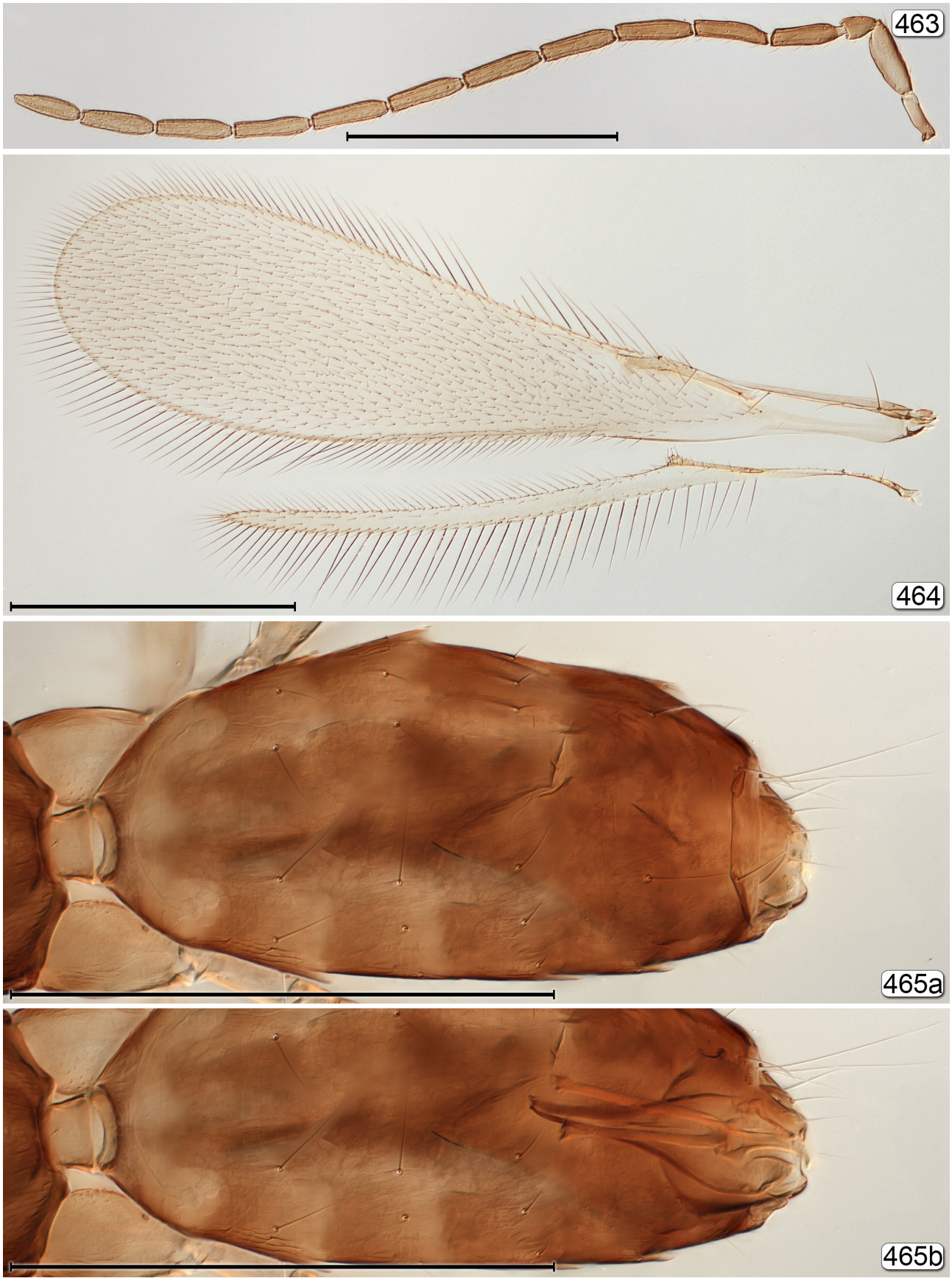
FIGURES 453–457. *Gonatocerus* sp. 453, head, anterior; 454, head, posterior; 455a, head, lateral; 455b, head, lateral (internal) showing ocular apodeme; 456; head, dorsal; 457, antenna. Scale bars=100 μm.



FIGURES 458, **459**. *Gonatocerus* sp., mesosoma. 458, dorsal; 459, lateral. Scale bars=200 µm.



FIGURES 460–462. *Gonatocerus* sp., metasoma. 460, dorsal; 461, lateral; 462, ventral. Scale bars=200 µm.



FIGURES 463–465. *Gonatocerus* sp., male. 463, antenna; 464, wings; 465a, metasoma, dorsal; 465b, genitalia seen through gaster. Scale bars=200 μm.

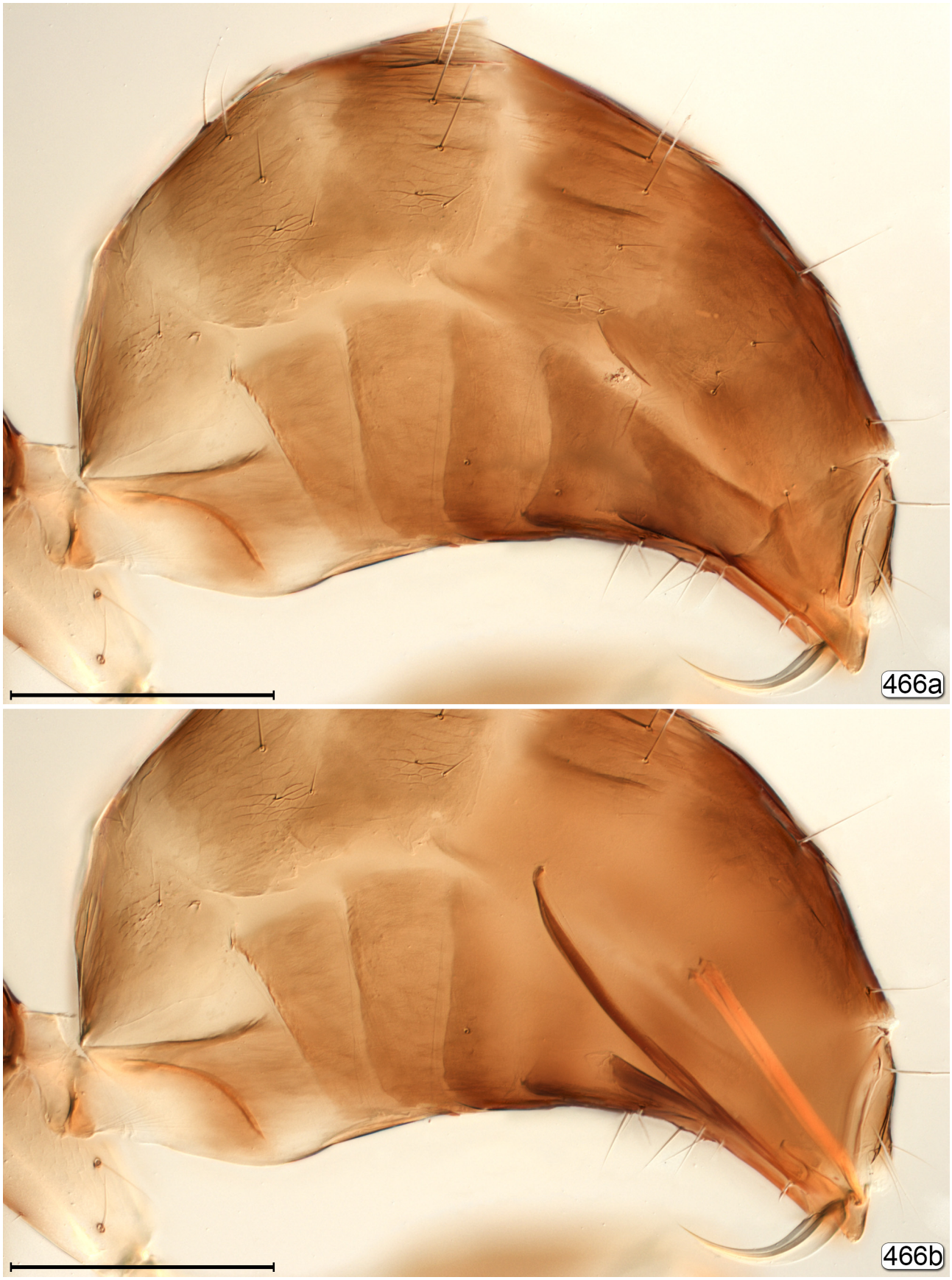


FIGURE 466. *Gonatocerus* sp., male, metasoma. 466a, lateral; 466b, lateral showing genitalia. Scale bars=200 μm.

Gonatocerus californicus Girault, 1911

Gonatocerus californicus Girault, 1911 [96]: 271. Holotype ♀ (USNM), lost. **TL:** USA, California, Siskiyou Co., no locality specified. Girault, 1929 [428]: 27 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988, 34 (key), 35 (description); Yoshimoto, 1990: 39 (list, species group placement); De Santis & Fidalgo, 1994: 124 (catalogue) [NT]; Huber & Beardsley, 2000: 52 (key), 56 (distribution) [A]; Huber, 2015a: 30 (list); Rauber *et al.*, 2016: 133 (distribution) 134 (key) [NT].

Lymaenon californicus: Burks, 1958: 63 (generic transfer); Peck, 1963: 22 (catalogue).

Gonatocerus (*Gonatocerus*) *californicus*: Triapitsyn *et al.*, 2010: 14 (key), 22 (description, distribution) [NT]; Luft Albarracin & Triapitsyn, 2012: 297 (hosts, percent parasitism, distribution) [NT]; Triapitsyn, 2013b: 212 (key, variation, distribution).

Gonatocerus titillatus Girault, 1917 [336]: 87. Holotype ♀ (USNM). **TL:** USA, Utah, Salt Lake City. Synonymy under *G. utahensis* by Huber, 1988: 37. Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 37 (synonymy).

Lymaenon titillatus: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue).

Gonatocerus utahensis Girault, 1917 [331]: 446. Lectotype ♀ (USNM), designated by Huber,1988: 37. **TL:** USA, Utah, Salt Lake City. Synonymy by Triapitsyn, 2013b: 212. Girault, 1929 [428]: 23 (key); Peck, 1951: 413 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 34 (key), 37 (description); Yoshimoto, 1990: 41 (list, species group placement); De Santis & Fidalgo, 1994: 125 (catalogue) [NT].

Lymaenon utahensis: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue).

Gonatocerus (*Gonatocerus*) *utahensis*: Triapitsyn, 2013b: 212 (synonym under *G. californicus*, distribution).

Distribution. USA: AZ, CA, FL, IL, TX, UT. Other localities in Huber (1988) of *G. utahensis* as a separate species are probably incorrect; more likely they are *G. rivalis*.

Gonatocerus floridensis Huber, 1988

Gonatocerus floridensis Huber, 1988: 46. Holotype ♀ (CNC). **TL:** USA, Florida, Collier Co., Collier Seminole State Park. Huber 1988: 34 (key); Yoshimoto, 1990: 40 (list, species group placement); Huber, 2015a: 30 (list).

Distribution. USA: FL.

Gonatocerus koebelei Perkins, 1912

Gonatoceus [*sic*] *koebelei* Perkins, 1912: 22. Lectotype ♀ (BPBM), designated by Huber, 1988: 41. **TL:** Mexico, Veracruz, Orizaba.

Gonatocerus koebelei: Girault, 1917 [331]: 446 (description); Holloway & Loftin, 1919: 449 (hosts); Girault, 1929 [428]: 23 (key); Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Burks, 1967: 214 (catalogue, distribution); Burks, 1979: 1025 (catalogue); Huber, 1988: 35 (key), 40 (description); Triapitsyn & Shih, 2014: 675 (host); Huber, 2015a: 31 (list).

Gonatocerus (*Gonatocerus*) *koebelei*: De Santis, 1979: 365 (catalogue) [NT]; Triapitsyn *et al.*, 2010: 14 (key), 30 (distribution, host); Luft Albarracin & Triapitsyn, 2012: 297 (hosts) [NT].

Lymaenon koebelei: Burks, 1958: 63 (generic transfer); Peck, 1963: 23 (catalogue).

Nearctic hosts. Cicadellidae: *Draeculacephala mollipes* (Say), *D. producta* (Walker).

Distribution. USA: CA, FL.

Gonatocerus lissonotus Huber, 1988

Gonatocerus lissonotus Huber, 1988: 47. Holotype ♀ (CNC). **TL:** Canada, Ontario, Oxford Mills. Huber, 1988: 34 (key); Yoshimoto, 1990: 40 (list, species group placement); Huber, 2015a: 31 (list).

Distribution. Canada: ON. USA: NH, VT.

Gonatocerus maga Girault, 1911

Gonatocerus maga Girault, 1911 [96]: 267. Holotype ♀ (INHS), lost. **TL:** USA, Illinois, Litchfield. Perkins, 1912: 23 (description); Crawford, 1915: 586 (description); Girault, 1917 [336]: 87 (comparison with *G. titillatus*); Girault, 1929 [428]: 24 (key); Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 34 (key), 44 (description); Yoshimoto, 1990: 40 (list, species group placement); Huber, 2015a: 31 (list).

Gonatocerus (*Gonatocerus*) *maga*: Triapitsyn, 2013b: 212 (distribution).
Lymaenon maga: Burks, 1958: 63 (generic transfer); Peck, 1963: 23 (catalogue).

Distribution. USA: FL, IL, MD, NY.

Gonatocerus mexicanus Perkins, 1912

Gonatocerus mexicanus Perkins, 1912: 21. Lectotype ♀ (BPBM), designated by Huber, 1988: 42. **TL:** Mexico, Distrito Federal, Chapultepec. Swezey, 1916: 146 (host) [A]; Timberlake, 1924: 447 (Hawaiian Islands, host) [A]; Girault, 1929 [428]: 22 (key); Zimmerman, 1948: 23 (host) [A]; Peck, 1951: 412 (catalogue); Ogloblin, 1955: 20 (description) [NT]; Alayo, 1973: 57 (host) [NT]; Alayo & Hernández, 1978: 50 (host) [NT]; Burks, 1979: 1026 (catalogue); Huber, 1988: 34 (key), 42 (description); Yoshimoto, 1990: 40 (list, species group placement); Huber & Beardsley, 2000: 52 (key), 56 (distribution) [A]; Luft Albarracin *et al.*, 2009: 9 (list, distribution) [NT]; Triapitsyn & Shih, 2014: 675 (host); Huber, 2015a: 32 (list); Boyd *et al.*, 2018: 147 (host).
Lymaenon mexicanus: Burks, 1958: 63 (generic transfer); Thompson, 1958: 570 (host catalogue); Peck, 1963: 24 (catalogue).
Gonatocerus (*Gonatocerus*) *mexicanus*: De Santis, 1967: 104 (catalogue) [NT]; De Santis, 1979: 366 (catalogue) [NT]; Triapitsyn *et al.*, 2010: 14 (key), 31 (distribution, host) [NT]; Luft Albarracin & Triapitsyn, 2012: 297 (hosts); Triapitsyn, 2013b: 212 (distribution).
Gonatocerus gibsoni Crawford, 1915: 586. Lectotype ♀ (USNM), designated by Huber, 1988: 42. **TL:** USA, Arizona, Tempe. Synonymy by Girault 1929 [428]: 22; confirmed by Huber, 1988: 42. Gibson, 1915: 14 (host, distribution); Girault, 1916 [265a]: 50 (host); Essig, 1929: 818 (host, distribution); Peck, 1951: 412 (catalogue).
Gonatocerus eximius Gahan, 1913: 441. Lectotype ♀ (USNM), designated by Huber, 1988: 42. **TL:** USA, Florida, Orlando. Synonymy by Girault, 1929 [428]: 22; confirmed by Huber, 1988: 42. Peck, 1951: 412 (catalogue).

Nearctic hosts. Cicadellidae: *Draeculacephala mollipes* (Say).
Distribution. Canada: ON. USA: AZ, CA, FL, TX.

Gonatocerus rivalis Girault, 1911

Gonatocerus rivalis Girault, 1911 [96]: 257. Holotype ♀ (USNM). **TL:** USA, Illinois, Butler. Perkins, 1912: 21 (host, Mexico) [NT]; Crawford, 1915: 586 (description); Frison, 1927: 228 (paratype listing); Girault, 1929 [428]: 23 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 35 (key), 38 (description, host, distribution); Yoshimoto, 1990: 41 (list, species group placement); De Santis & Fidalgo, 1994: 125 (catalogue) [NT]; Hoddle & Triapitsyn, 2004b: 342 (likely host); Triapitsyn & Shih, 2014: 675 (host); Huber, 2015a: 32 (list).
Lymaenon rivalis: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue).
Gonatocerus (*Gonatocerus*) *rivalis*: De Santis, 1979: 366 (catalogue) [NT]; Triapitsyn *et al.*, 2010: 14 (key), 36 (distribution, host) [NT]; Luft Albarracin & Triapitsyn, 2012: 297 (hosts); Triapitsyn, 2013b: 212 (distribution).

Nearctic hosts. Cicadellidae: *Draeculacephala antica* (Walker).
Distribution. Canada: ON, QC. USA: AL, FL, GA, IA, IL, MD, MI, NH, NY, OH, TN, VA, WI, WV.

Gonatocerus spp.

Gonatocerus sp.: Schlinger, 1958: 106 (host: *Agamatium bilobum* (Fieber) [Issidae]).
Gonatocerus sp.: Rossi *et al*., 1994: 90 (host: *Carneocephala floridana* Ball [Cicadellidae]).

KALOPOLYNEMA Ogloblin, 1960
(Figs 467–499)

Kalopolynema Ogloblin, 1960a: 6. Type species: *Kalopolynema discrepans* Ogloblin, 1960, by original designation.
Kalopolynema (*Floripolynema*) Triapitsyn & Berezovskiy, 2002c: 616. Type species: *Kalopolynema* (*Floripolynema*) *mizelli* Triapitsyn & Berezovskiy, 2002c, by original designation.

Diagnosis. Body length 615–870 µm; 1120 µm (*K. mizelli* holotype). Face with subantennal sulci and without pits between toruli (Figs 469, 480); vertex without pits outside each ocellus (Figs 472, 483); fore wing narrow (Figs 467, 476); pronotum with propleura abutting medially anterior to prosternum (Fig. 488); propodeum with large propodeal pit next to metapleural suture (Figs 487, 490); petiole in ventral view widely divided posteriorly (Fig. 492); ovipositor strongly excerted beyond gastral apex (Figs 467, 468, 477, 496).

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Eustochus*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Kalopolynema* is unique in having subantennal sulci and large propodeal pit at junction with metapleuron. The long ovipositor, distinctly exserted posterior to apex of gaster occurs in one or two *Polynema* and one *Palaeoneura* species but otherwise is unique to *Kalopolynema*.

Nearctic hosts. Hemiptera: Delphacidae.

Important reference. Triapitsyn & Berezovskiy (2002c).

Kalopolynema (*Kalopolynema*) *ema* (Schauff & Grissell, 1982)

Polynema ema Schauff & Grissell, 1982: 530. Holotype ♀ (USNM). **TL:** USA, Illinois, Jackson Co., 3 mi. N. Pomona, Etherton Pond.

Cosmocoma ciliata (Say): Van Duzee, 1896: 18 [misidentification].

Polynema ciliata (Say): Zimmerman, 1948: 248 [misidentification]; Wilson & McPherson, 1981: 346 [misidentification].

Kalopolynema (*Kalopolynema*) *ema*: Triapitsyn & Berezovskiy, 2002c: 612 (key), 613 (generic transfer, description, distribution); Triapitsyn *et al.*, 2011: 172 (host) [NT]; Minteer *et al.*, 2016: 576 (host, percent parasitism).

Nearctic hosts. Delphacidae: *Megamelus scutellaris* Berg.

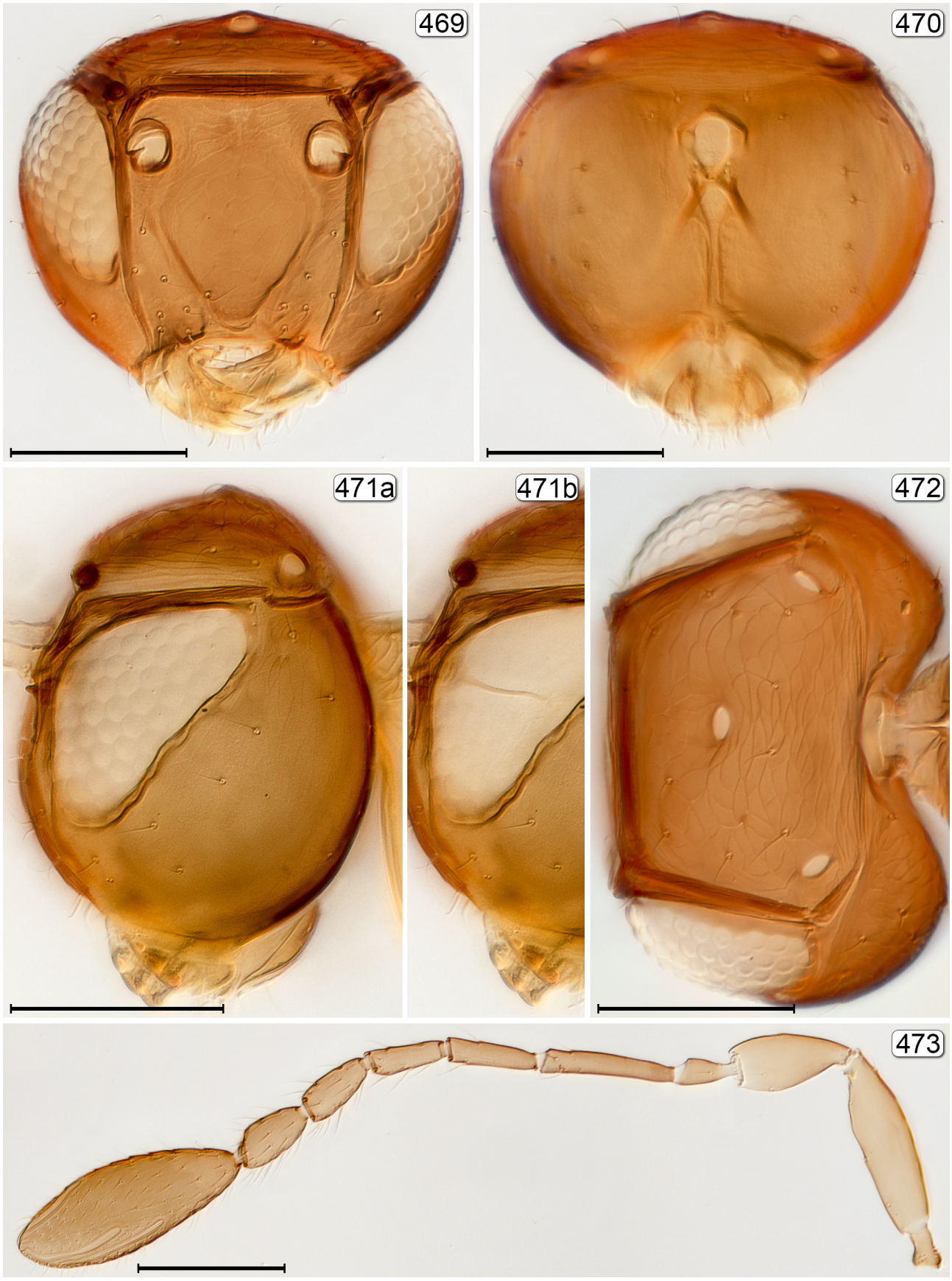
Distribution. Canada: ON. USA: FL, GA, IL, MA, MD, OH, VA.



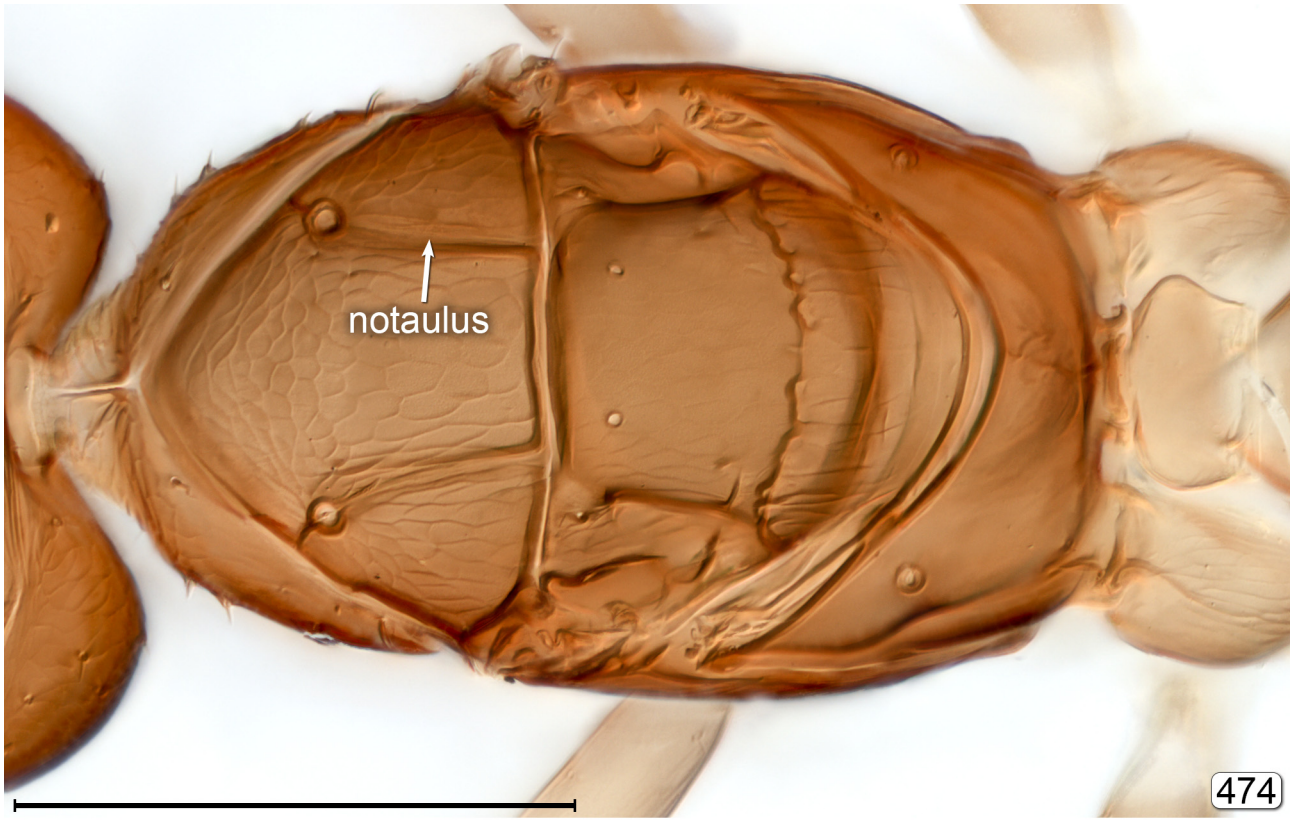
FIGURE 467. *Kalopolynema ema* (Schauff & Grissell), habitus. USA, Ohio, Summit Co., Singer Lake, 339m, 40°59'N 81°29'W, 7–8.viii.2006, H. Clebsch, T. Pucci, kettle lake/bog + forest edge. Scale bar=500 μm.



FIGURE 468. *Kalopolynema mizelli* Triapitsyn & Berezovskiy, holotype, habitus + labels. Scale bar=1000 μm.

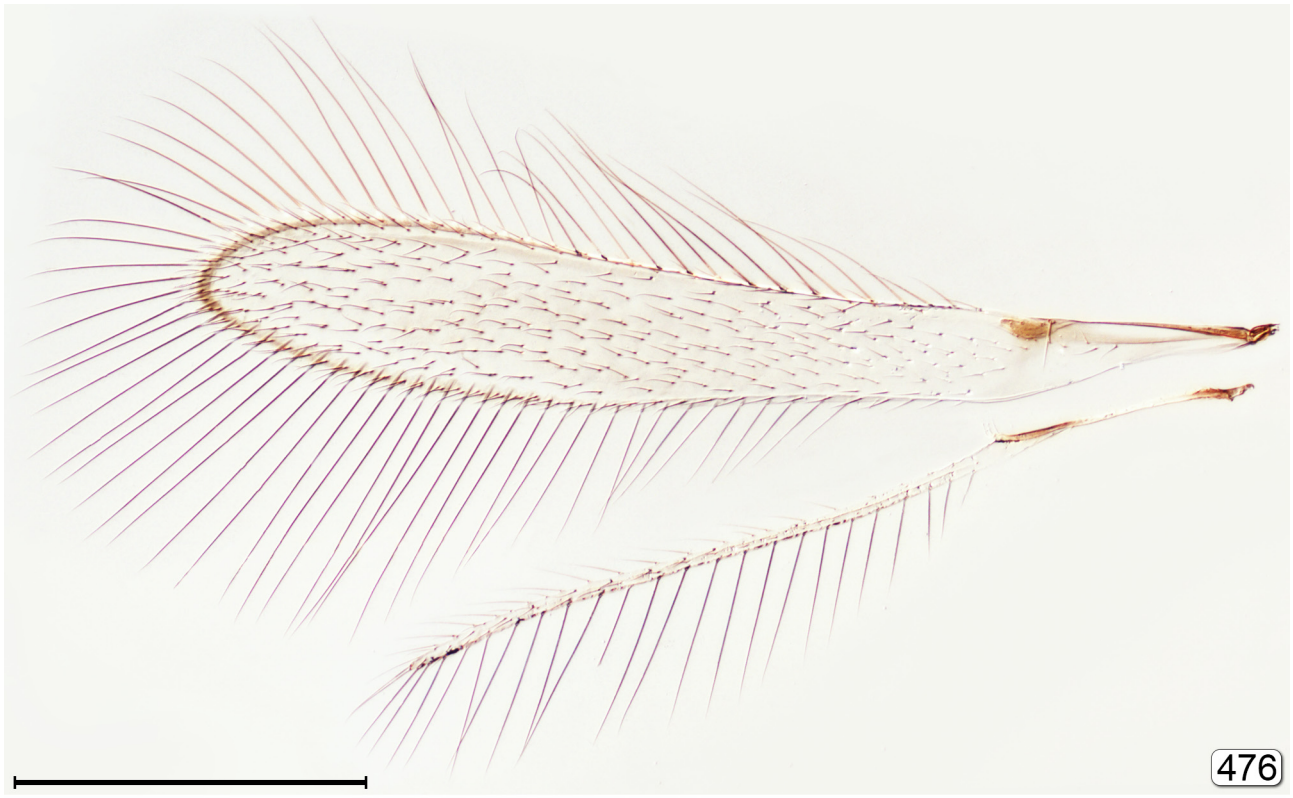


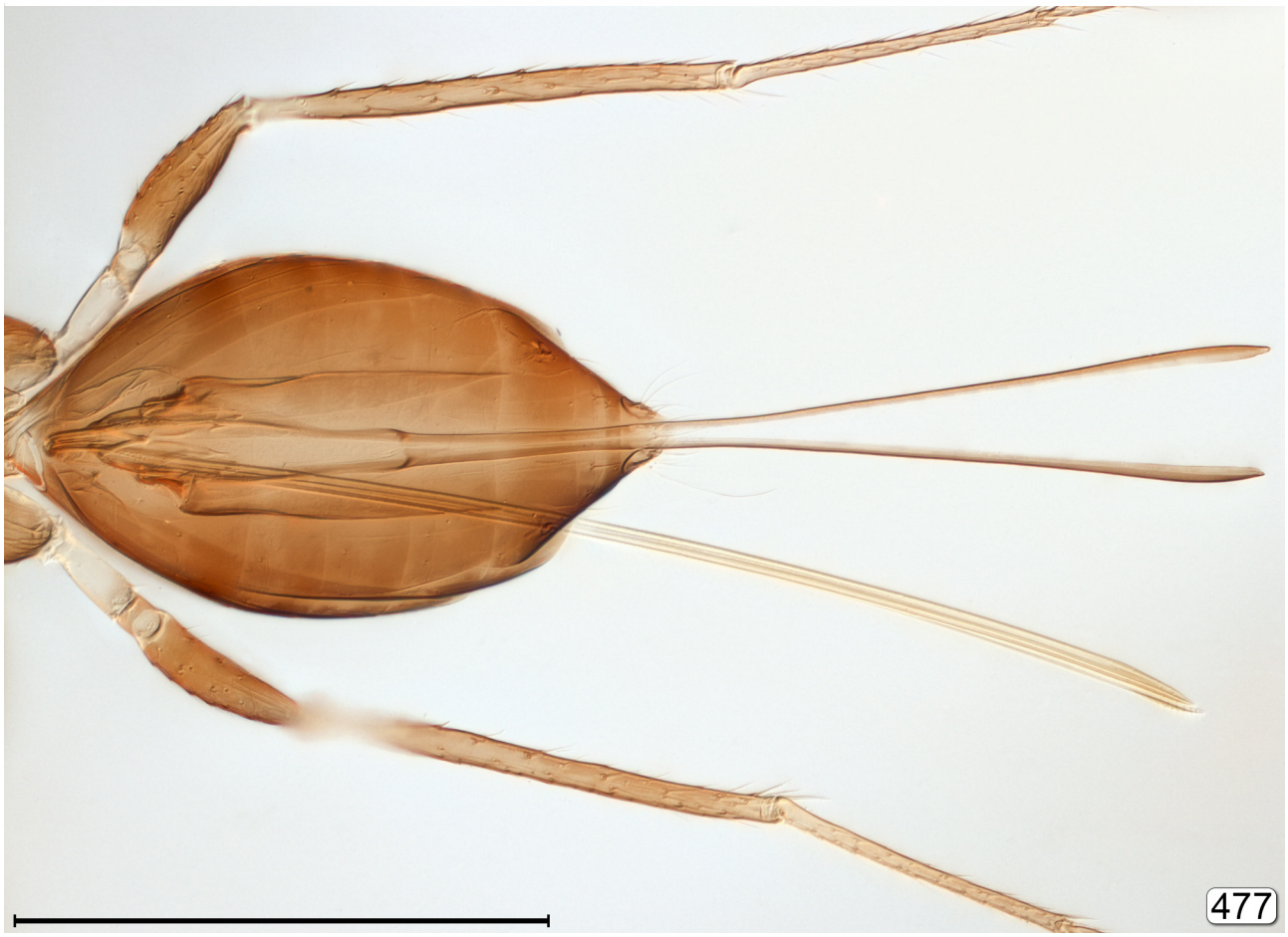
FIGURES 469–473. *Kalopolynema ema* (Schauff & Grissell). 469, head, anterior; 470, head, posterior; 471a, head, lateral; 471b, head lateral (internal) showing ocular apodeme; 472, head, dorsal; 473, antenna. Scale bars=50 μm.





FIGURES 474, **475**. *Kalopolynema ema* (Schauff & Grissell), mesosoma. 474, dorsal; 475, lateral. Scale bars=100 µm.

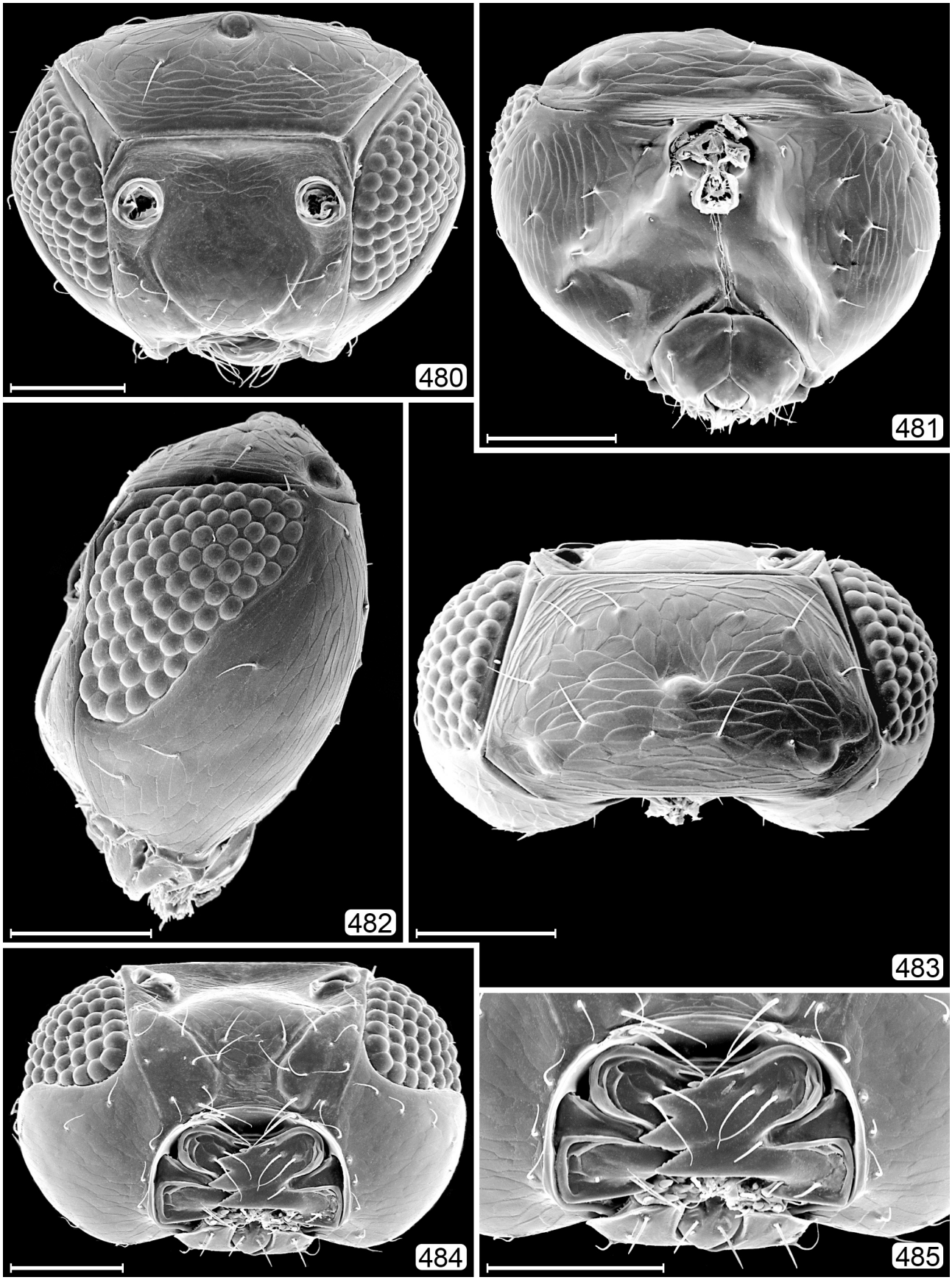




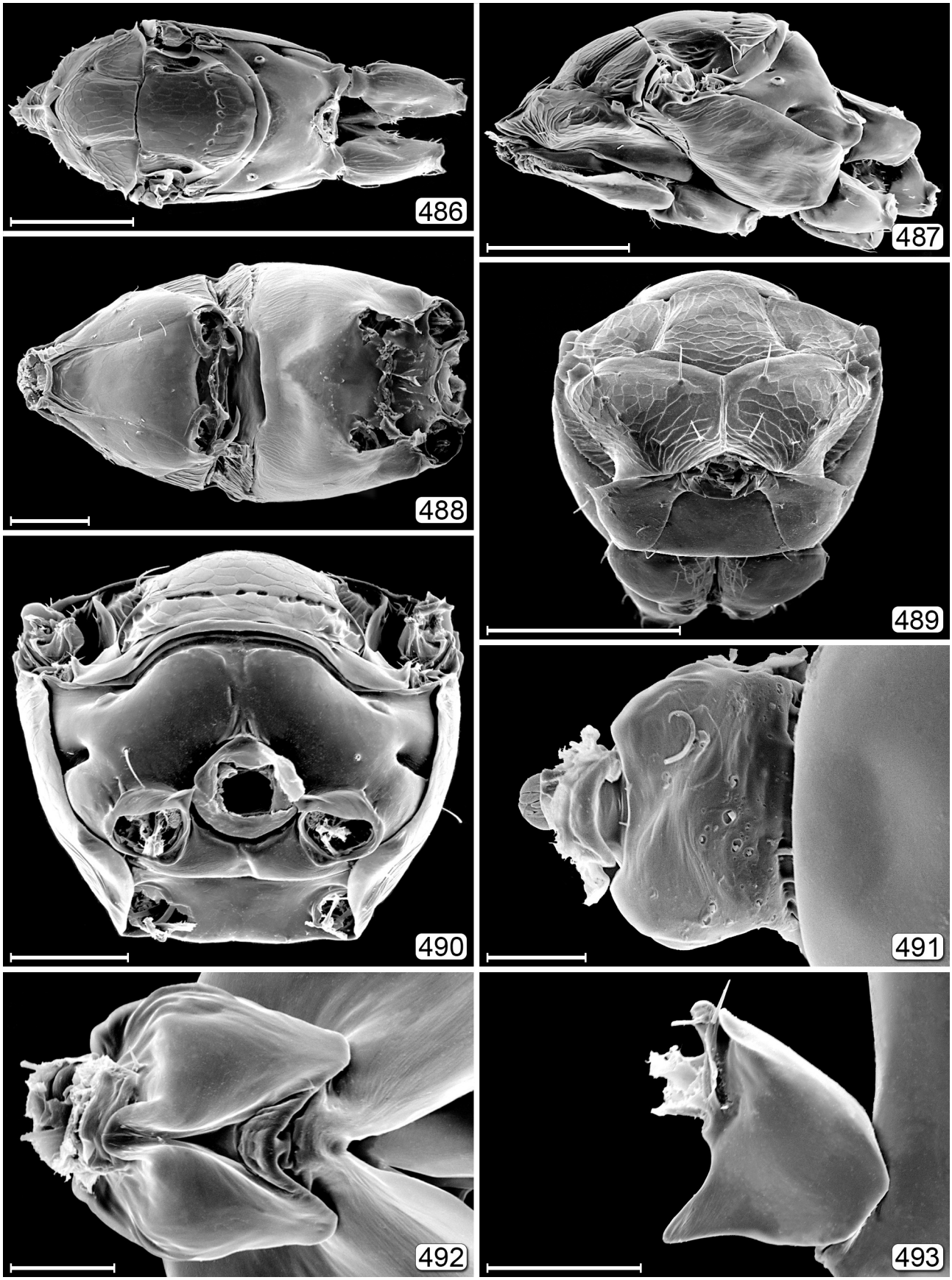
FIGURES 476, **477**. *Kalopolynema ema* (Schauff & Grissell). 476, wings; 477, metasoma, composite (dorsal + ventral). Scale bars=200 μm.



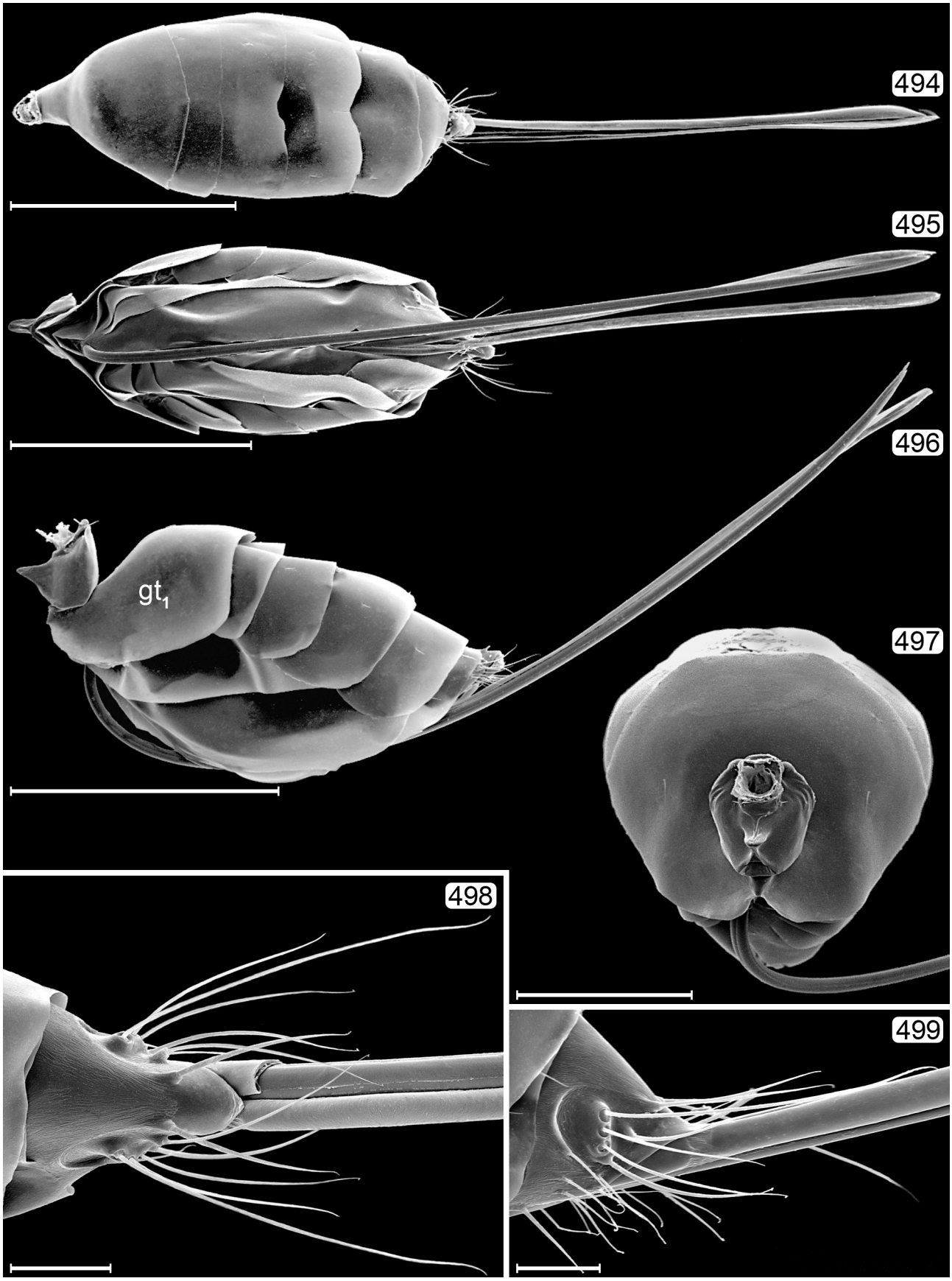
FIGURES 478, **479**. *Kalopolynema ema* (Schauff & Grissell), metasoma. 478a, dorsal; 478b, ovipositor seen through gaster; 479, lateral. Scale bars=100 μm.



FIGURES 480–485. *Kalopolynema ema* (Schauff & Grissell), head. 480, anterior; 481, posterior; 482, lateral; 483, dorsal; 484, ventral; 485, mouthparts. Scale bars=50 μm.



FIGURES 486–493. *Kalopolynema ema* (Schauff & Grissell), mesosoma. 486, dorsal; 487, lateral; 488, ventral; 489, anterior; 490, posterior; 491, petiole, dorsal; 482, petiole, ventral; 483, petiole, lateral. Scale bars: 486–490=100 μm; 491, 492=20 μm.



FIGURES 494–499. *Kalopolynema ema* (Schauff & Grissell), mesosoma. 494, dorsal; 495, ventral; 496, lateral; 497, anterior; 498, apex of gaster, dorsal; 499, apex of gaster, lateral. Scale bars: 494–497=200 μm; 498, 499=20 μm.

***Kalopolynema* (*Floripolynema*) *mizelli* Triapitsyn & Berezovskiy, 2002**

Kalopolynema (*Floripolynema*) *mizelli* Triapitsyn & Berezovskiy, 2002c: 616. Holotype ♀ (CNC). **TL:** USA, Florida, Alachua Co., Gainesville, AEI (3005 SW 56th Avenue). Triapitsyn & Berezovskiy, 2002c: 612 (key).

Distribution. Canada: ON. USA: FL, GA, MA, MD, OH, VA.

KROKELLA Huber, 1993

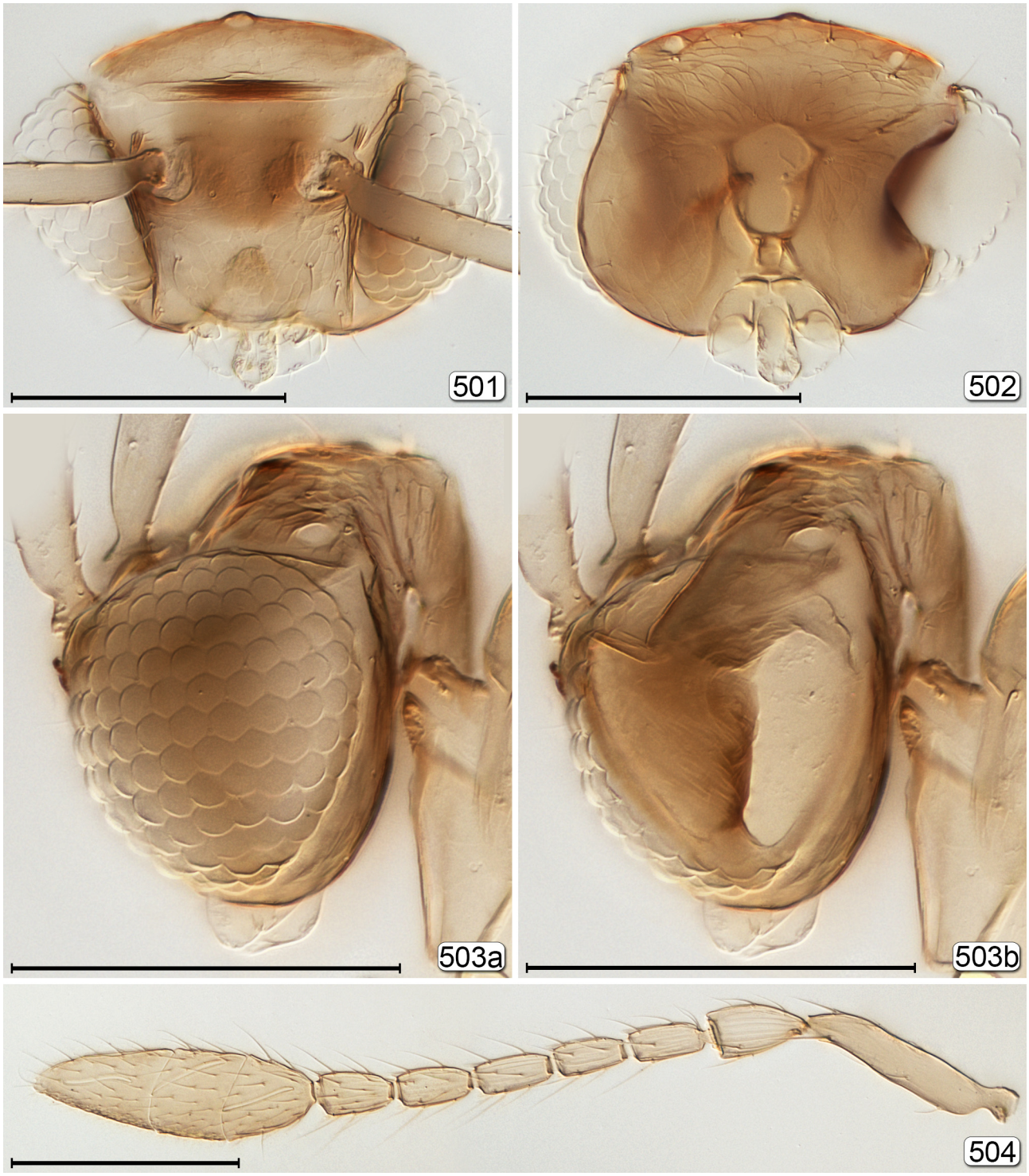
(Figs 500–518)

Krokella Huber, 1993: 349. Type species: *Krokella fera* Huber, 1993, by original designation.

Diagnosis. Body length 385–485 µm. Face without subantennal sulci (Fig. 501, 513); clava 3-segmented (Figs 500, 504); mandible a minute stub without teeth (Figs 501, 513); ocular apodeme apparently absent but ocular ridge with anterior margin greatly thickened (Fig. 503b); frenum divided medially by longitudinal sulcus (Figs 511, 515); fore wing with venation extending more than half wing length. Male with mandible enormous, crocodile-like (Figs 508, 518); flagellum 9-segmented (Fig. 509).



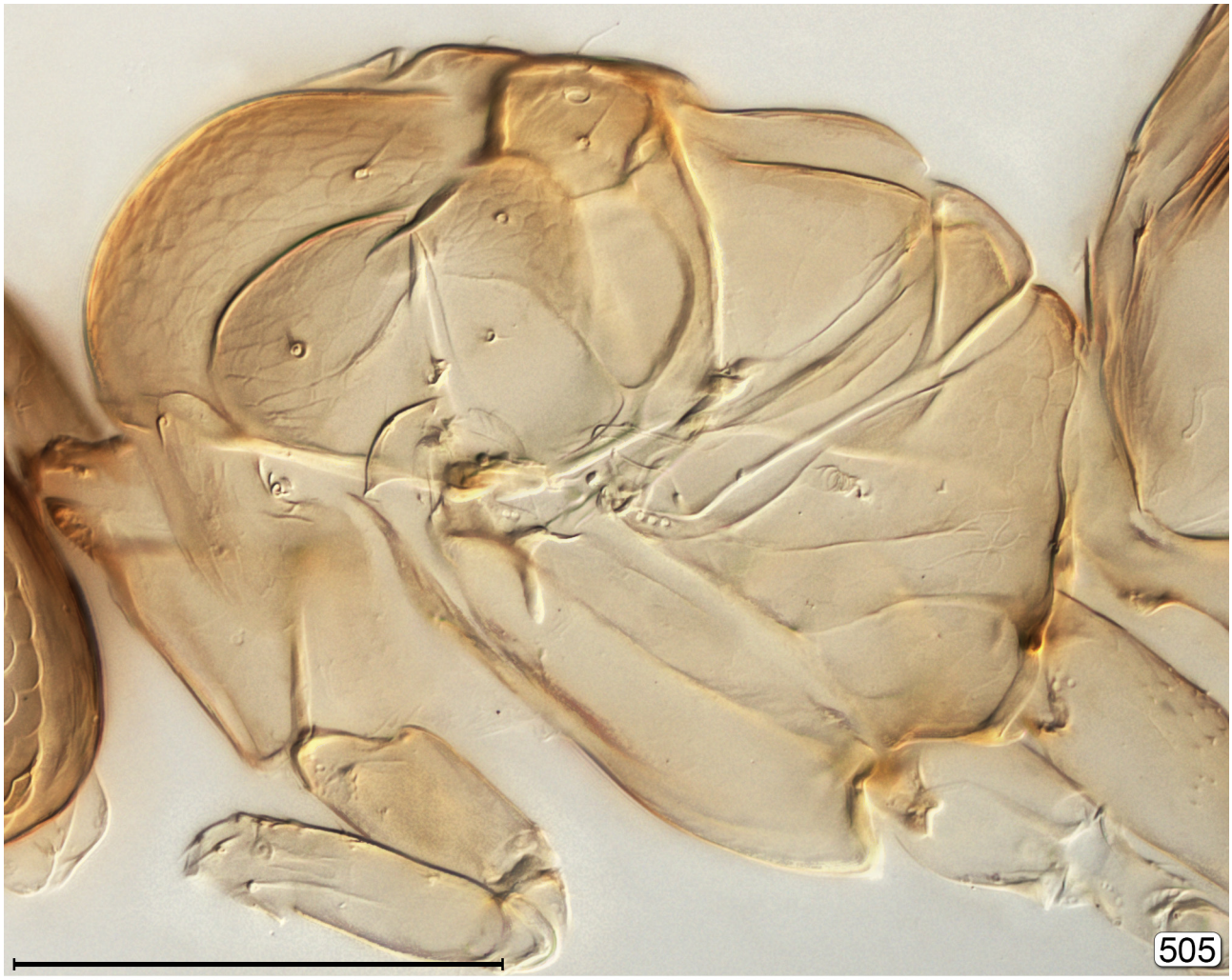
FIGURE 500. *Krokella fera* Huber, male paratype, habitus. USA, Florida, Dade Co., Everglades National Park, Long Pine Key, 31.viii–9.xii.1986, S. & J. Peck, pineland forest. Scale bar=500 µm.



FIGURES 501–504. *Krokella* sp. 501, head, anterior; 502, head, posterior; 503a, head, lateral; 503b, head lateral (internal) showing ocular apodeme (as anteriorly thick ocular ridge); 504, antenna. Scale bars=100 μm.

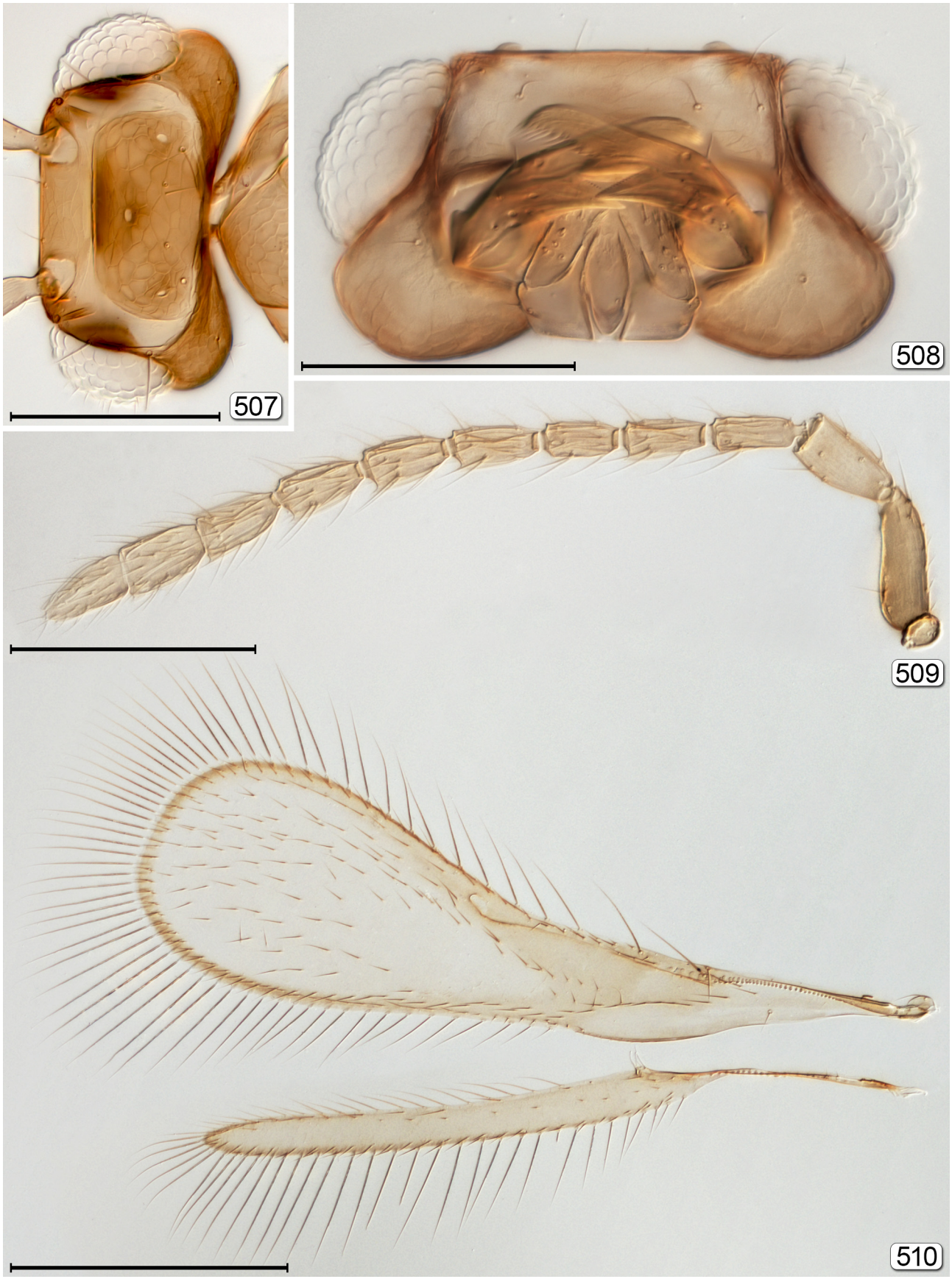
Discussion. Only two other Nearctic genera, *Neostethynium* and *Stethynium*, have the clava 3-segmented. *Krokella* differs from both by having the fore wing venation extending more than half the wing length. It is similar to *Neostethynium* based on the very similar male mandible, and to *Stethynium* based on the longitudinally divided frenum.

Important reference. Huber (1993).

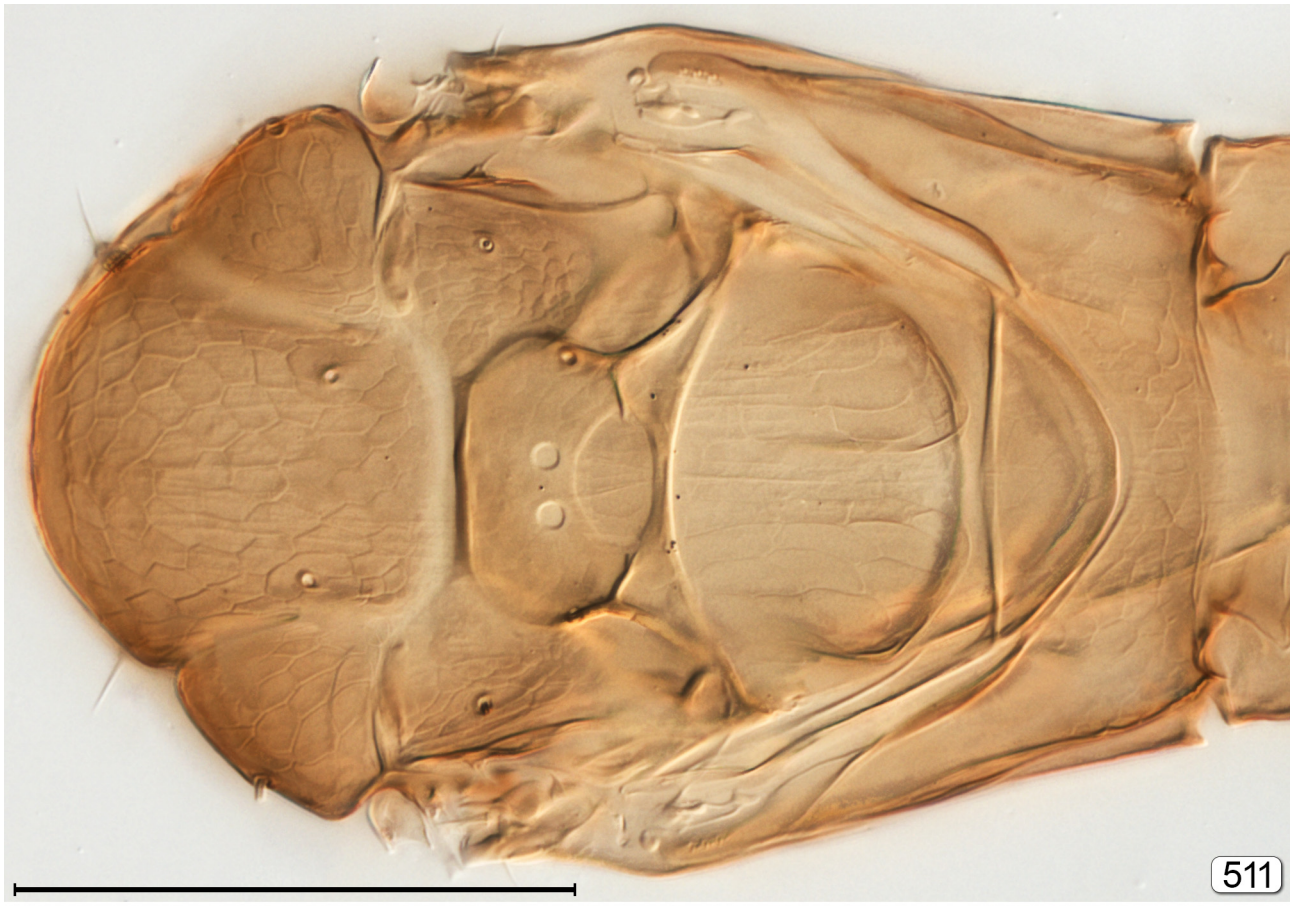




FIGURES 505, **506**. *Krokella* sp. 505, mesosoma, lateral; 506, metasoma, lateral showing genitalia. Scale bars=100 µm.

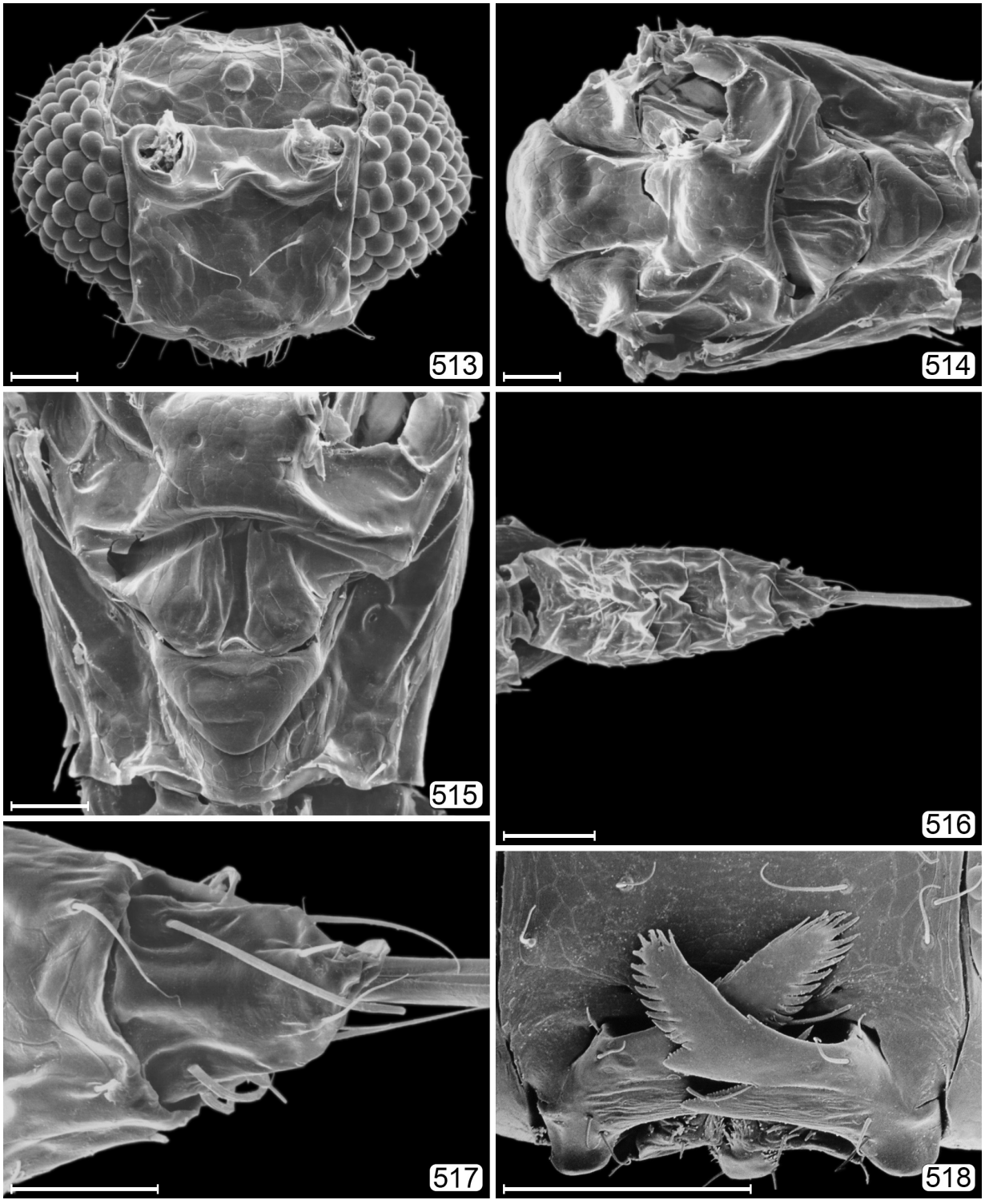


FIGURES 507–510. *Krokella fera* Huber, male. 507, head, dorsal; 508, head, ventral; 509, antenna; 510, wings. Scale bars: 507, 508=100 μm; 509, 510=200 μm.





FIGURES 511, **512**. *Krokella fera* Huber, male. 511, mesosoma, dorsal; 512, metasoma, dorsal, showing genitalia. Scale bars=100 μm.



FIGURES 513–518. *Krokella* sp., female except 518. 513, head, anterior; 514, mesosoma, dorsal; 515, scutellum–propodeum; 516, metasoma, dorsal; 517, apex of gaster, dorsal; 518, male, lower face + mouthparts, anterior. Scale bars: 513–515, 517=20 µm; 516=50 µm; 518=5 µm.

Krokella fera Huber, 1993

Krokella fera Huber, 1993: 356. Holotype ♀ (CNC). **TL:** USA, Florida, Dade Co., Everglades National Park, Long Pine Key. Huber, 1997: 504 (key).

Distribution. USA: FL.

LITUS Haliday, 1833

(Figs 519–544)

Litus Haliday, 1833a: 269, 1833b: 345. Type species: *Litus cynipseus* Haliday, 1833, by monotypy.

Neolitus Ogloblin, 1935a: 60. Type species: *Neolitus argentinus* Ogloblin, 1935, by original designation. Synonymy by Triapitsyn & Berezovskiy, 2004a: 3.

Diagnosis. Body length 265–645 μm. Funicle 6-segmented (Figs 519, 524); mandibles crossing when closed, with 2 subequal teeth (Fig. 534); vertex with lateral ocellus at posterolateral angle, forming an obtuse ocellar triangle (Figs 523, 532); head posteriorly without evident sulci but occiput separated from gena/postgena by slight change in sculpture lateral to dorsal margin of foramen (Figs 521, 530); mesophragma projecting into gaster (Fig. 535 [gaster broken off]); propodeum posteriorly with a short but wide ring-like nucha (neck) separated from rest of propodeum by a distinct narrowing (Fig. 535); petiole apparently narrow (Fig. 541); metasoma smooth, laterally compressed, with gt_1 cynipid-like, much the largest tergum (Figs 528, 540–542).

Discussion. *Litus* apparently belongs to the *Alaptus* group of genera together with *Alaptus, Callodicopus*, *Dicopomorpha* and *Dicopus* but is also similar in petiole structure to the *Camptoptera* group of genera. It is perhaps most similar to *Callodicopus* in having a compressed gaster, higher than wide, but differs in the back of the head not having any distinct sulci, funicle 6-segmented, and gt_1 the largest tergum.

Nearctic hosts. Unknown. An extralimital host is for the type species, reared from *Ocypus olens* (Müller) (Coleoptera: Staphylinidae), which also occurs as an accidental introduction in California.

Important reference. Triapitsyn & Berezovskiy (2004a).

Litus camptopterus Novicky, 1953

Litus camptopterus Novicky, 1953: 14. Holotype ♀ (NHMW), lost. **TL:** Austria, Farauenhofen (near Horn). Triapitsyn & Berezovskiy, 2004a: 5 (key), 10 (description, distribution); Rehmat *et al.*, 2009: 370 (distribution) [P]; Pintureau, 2012: 32 (list) [P]; Pricop, 2009b: 126 (list) [P]; Pricop, 2014b: 21 (key, distribution, description) [P]; Triapitsyn, 2018a: 145 (distribution) [O].

Litus distinctus Boţoc, 1964: 79. Holotype? ♀ (depository not specified), lost. **TL:** Romania, Malnas. Synonymy by Triapitsyn & Berezovskiy, 2004a: 10.

Distribution. Canada: ON, QC. USA: CA, GA.

Litus cynipseus Haliday, 1833

Litus cynipseus Haliday, 1833b: 365. Lectotype ♀ (NMID), designated by Graham, 1982: 225. **TL:** Likely England or Ireland, locality not specified. Curtis, 1837: 134 (list) [P]; Walker, 1846: 51 (description) [P]*;* Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 428 (catalogue) [P]*;* Lameere, 1907: 246 (habitat) [P]; Brocher, 1910: 182 (host, Switzerland) [P] [misidentification?]; Schultz, 1910a: 189 (description, Switzerland) [P] [misidentification?]*;* Girault, 1914 [187]: 88 (host-*Limnobates* sp.) [P] [misidentification]*;* Ogloblin, 1935a: 63 (comparison with other species) [NT]; Ogloblin, 1955: 498 (description) [NT]; Annecke & Doutt, 1961c: 10 (correction to Ogloblin description); Hellén, 1968: 34 (list) [P]; Viggiani, 1973a: 231 (male description) [P]; Hellén, 1974: 13 (description, distribution) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Viggiani & Jesu, 1988: 1022 (distribution) [P]*;* Fursov, 1995: 5 (host, biology) [P] [misidentification]; Pagliano & Navone, 1995: 35 (list) [P]; Huber, 1997: 503 (key); Baquero & Jordana, 2002: 81 (distribution) [P]; Triapitsyn & Berezovskiy, 2004a: 4 (key), 5 (description, distribution); Ulrich, 2004: 62 (habitat) [P]; Ulrich, 2005: 47, 198 (phenology, density) [P]; Santos *et al.*, 2008: 142 (distribution) [P]; Huber *et al*., 2009: 271 (list) [P]; Pricop, 2009b: 125 (distribution) [P]; Pricop, 2009c: 19 (distribution) [P]; Aguiar *et al.*, 2010: 246 (list) [P]; Pintureau, 2012: 32 (list) [P]; Pricop, 2014b: 21 (key, distribution, diagnosis) [P]; Rameshkumar *et al*., 2015a: 4 (distribution) [O]; Dale-Skey *et al*., 2016: 241 (checklist) [P]; Koponen & Triapitsyn, 2016: 2 (distribution) [P]; Triapitsyn, 2018a: 145 (distribution) [O].

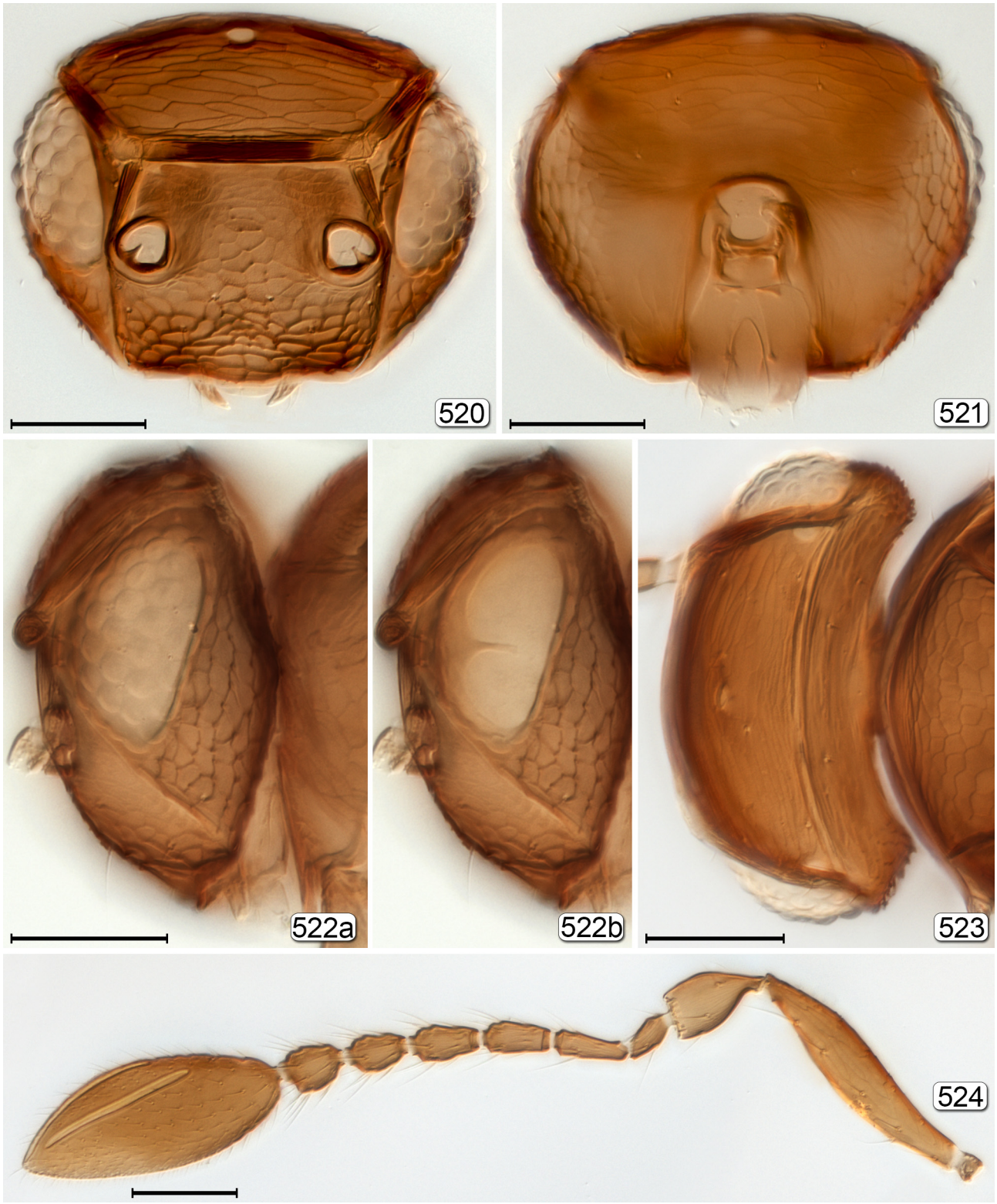
Lytus [*sic*] *cynipseus*: Blanchard, 1840: 293 (description) [P].

Litus krygeri Kieffer, 1913: 378. Syntypes? ca. 70 ♀ (unknown, probably ZMUC), lost. **TL:** Denmark, Dyrehaven (near Copenhagen). Synonymy by Triapitsyn & Berezovskiy, 2004a: 5.

Distribution. Canada: BC, NS, ON. USA: CA, GA, MD, TX.



FIGURE 519. *Litus cynipseus* Haliday, habitus. Canada, Ontario, 7 km SE Westport, 134 m, 44°37.727'N 76°21.545'W, 1–31.viii.2005, S. Peck, maple sugar bush. Scale bar=500 μm.



FIGURES 520–524. *Litus* sp. probably *cynipseus* Haliday. 520, head, anterior; 521, head, posterior; 522a, head, lateral; 522b, head, lateral (internal) showing ocular apodeme; 523, head, dorsal; 524, antenna. Scale bars=50 µm.





FIGURES 525, **526**. *Litus* sp. probably *cynipseus* Haliday. 525, mesosoma–anterior half of metasoma, dorsal; 526, wings. Scale bars: 525=100 μm; 526=200 μm.

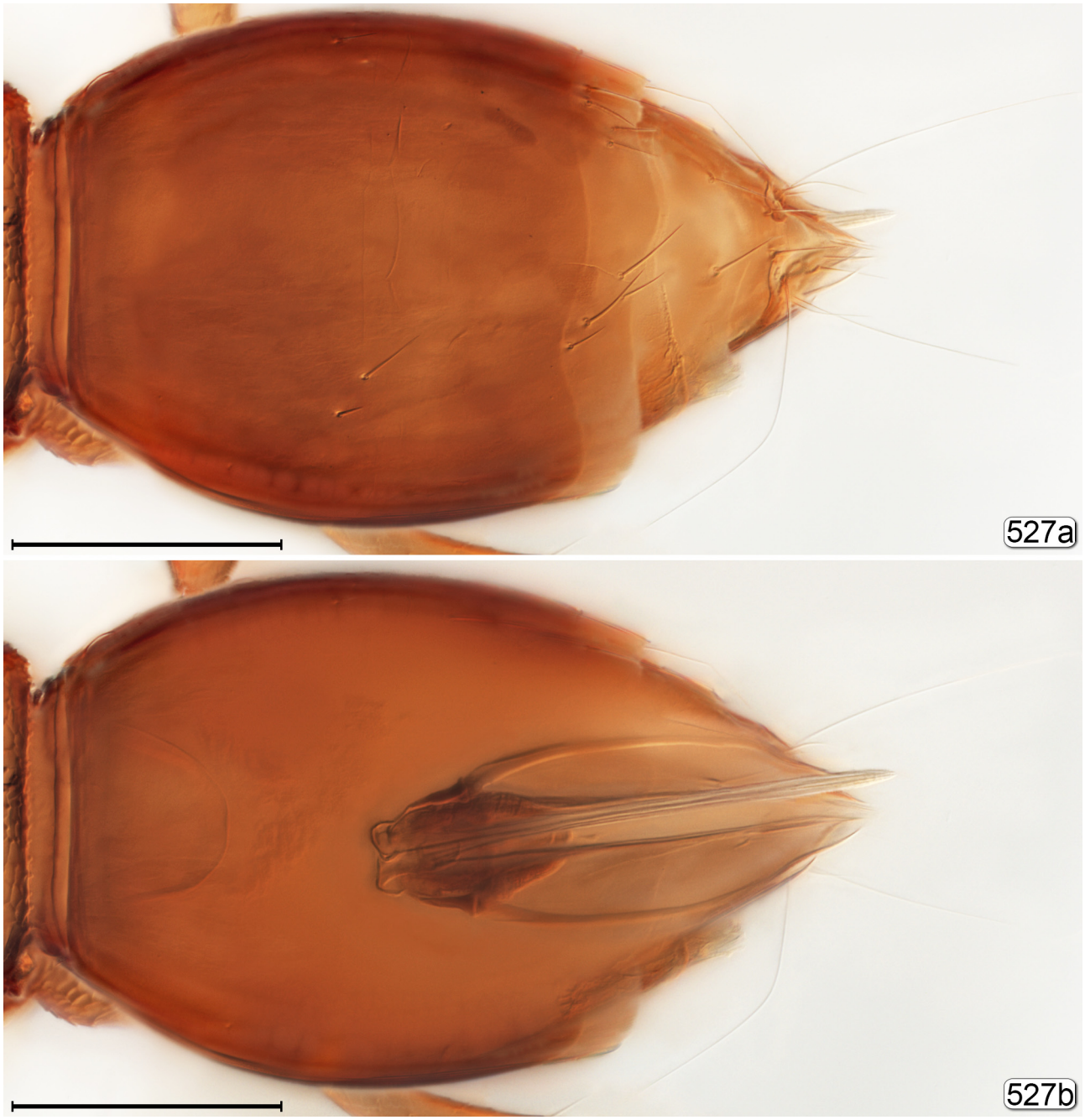


FIGURE 527. *Litus* sp. probably *cynipseus* Haliday, metasoma. 527a, dorsal; 527b, ovipositor seen through gaster. Scale bars=100 μm.

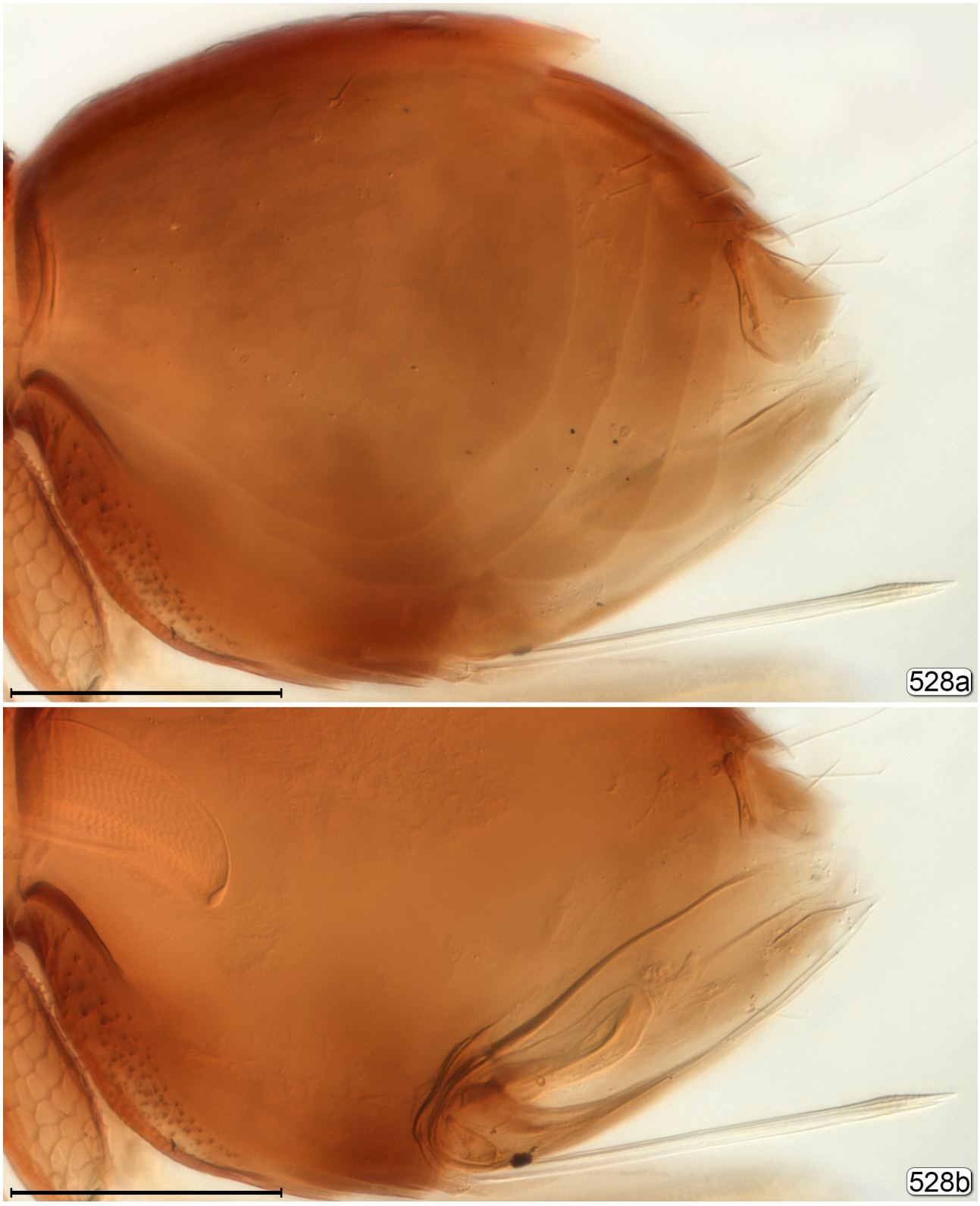
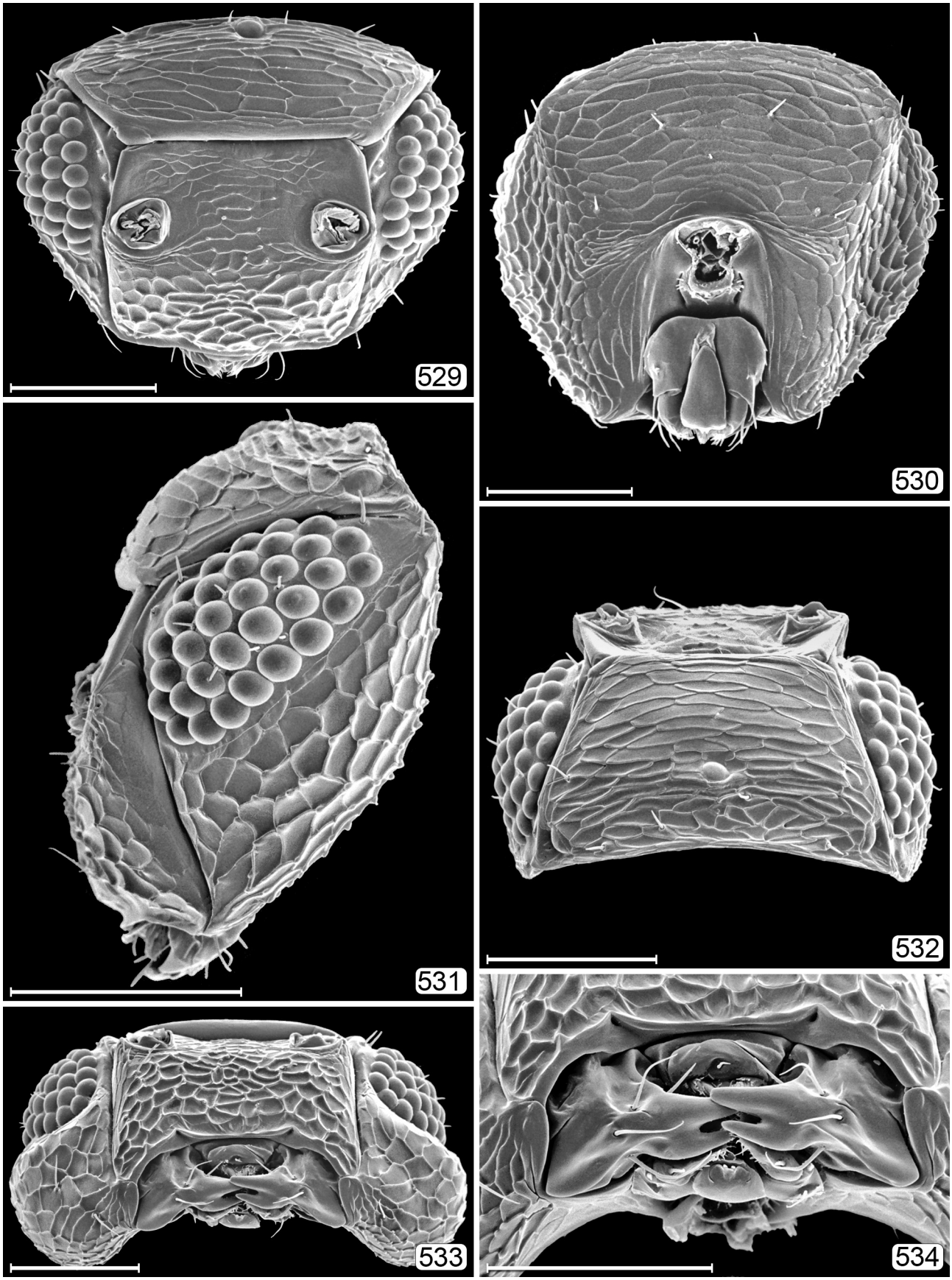
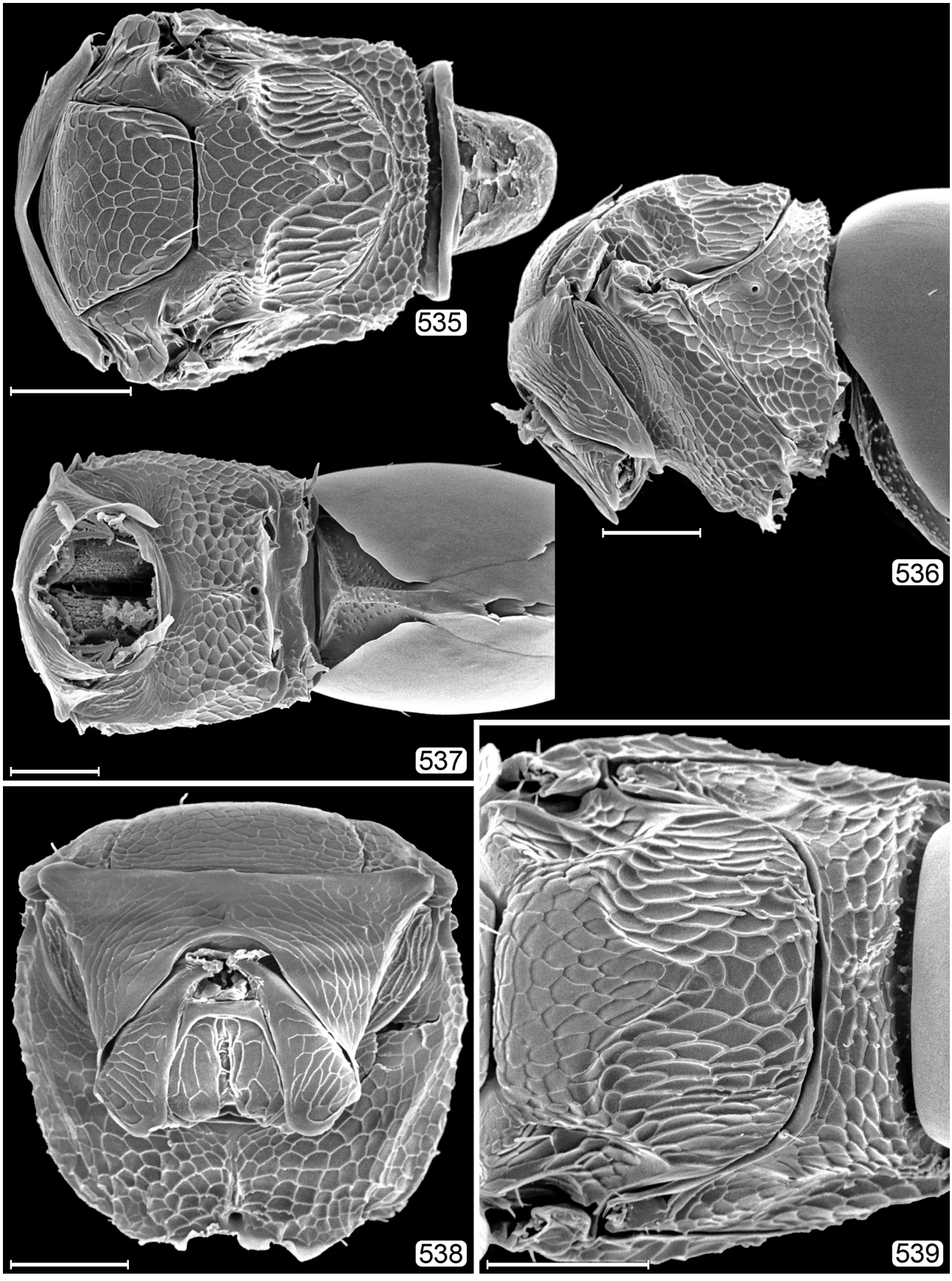


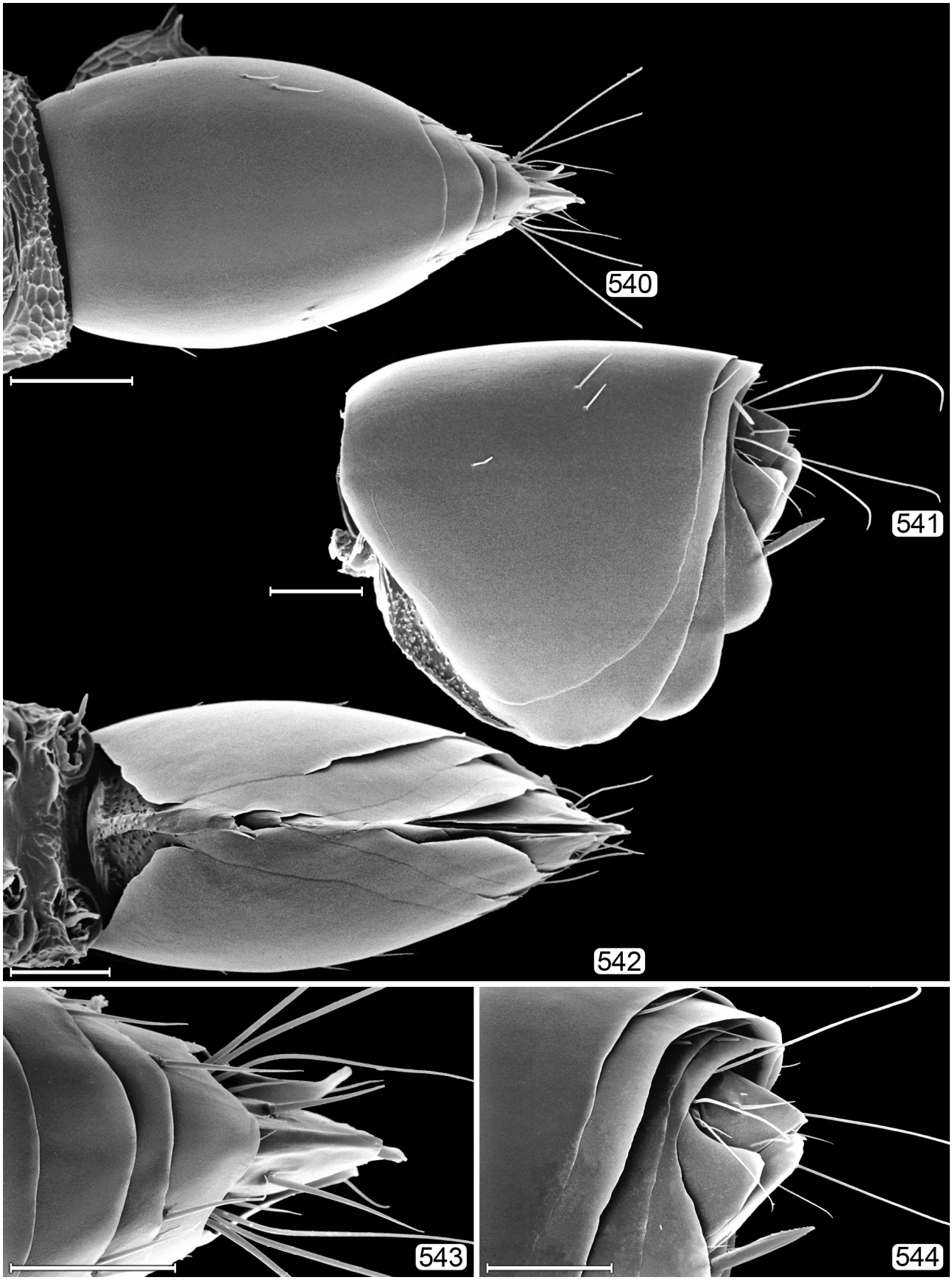
FIGURE 528. *Litus* sp. probably *cynipseus* Haliday, metasoma. 528a, lateral; 528b, lateral showing genitalia. Scale bars=100 μm.



FIGURES 529–534. *Litus* sp. probably *cynipseus* Haliday, head. 529, anterior; 530, posterior; 531, lateral; 532, dorsal; 533, ventral; 534, mouthparts. Scale bars=50 μm.



FIGURES 535–539. *Litus* sp. probably *cynipseus* Haliday. 535, mesosoma, dorsal, showing mesophragma; 536, mesosoma + anterior part of metasoma, lateral; 537, mesosoma + most of metasoma, ventral; 538, mesosoma, anterior; 539, scutellum–propodeum. Scale bars=50 μm.



FIGURES 540–544. *Litus* sp. probably *cynipseus* Haliday, metasoma. 540, dorsal; 541, lateral; 542, ventral; 543, apex of gaster, dorsal; 544, apex of gaster, lateral. Scale bars: 540–542, 543=50 μm; 544=20 μm.

LYMAENON Walker, 1846

(Figs 545–560)

Lymaenon Walker, 1846: 49. Type species: *Lymaenon acuminatus* Walker, 1846, by subsequent designation by Gahan & Fagan, 1923: 82.

Rachistus Foerster, 1847: 203. Type species: *Ooctonus litoralis* Haliday, 1833, by subsequent designation by Gahan & Fagan, 1923: 128. *De facto* synonymy under *Lymaenon* by Huber, 2015: 41.

Rhachistus [*sic*]: Dalla Torre, 1898: 429. Unjustified emendation.

Oophilus Enock, 1909: 458. Type species: *Oophilus longicauda* Enock, 1909, by monotypy. *De facto* synonymy under *Lymaenon* by Huber, 2015a: 41.

Agonatocerus Girault, 1913 [149]: 276. Type species: *Agonatocerus humboldti* Girault, 1913, by original designation. *De facto* synonymy under *Lymaenon* by Huber, 2015a: 41.

Gonatocerus (*Gonatoceroides*) Girault, 1913 [155]: 255. Type species: *Gonatocerus australicus* Girault, 1913, by original designation. *De facto* synonymy under *Lymaenon* by Huber, 2015: 41.

Decarthrius Debauche, 1949: 21. Type species: *Decarthrius straeleni* Debauche, 1949, by original designation. *De facto* synonymy under *Lymaenon* by Huber, 2015a: 41.

Diagnosis. Body length 560–1770 μm. Ocellar triangle with 3 or, rarely, 4 setae between lateral ocelli (Fig. 547); pronotal lobes separated by a membranous gap (Fig. 551); mesothoracic spiracle much larger than propodeal spiracle (Fig. 552); dorsellum strap-like, with anterior and posterior margins parallel (Figs 551, 552); stigmal vein with apex truncate (Fig. 554); propodeum with parallel or slightly converging submedian lines, often with spicules between them (Fig. 551).

Discussion. Among the four genera in the Nearctic (*Cosmocomoidea*, *Gastrogonatocerus*, *Gonatocerus*, and *Lymaenon*) that share the following combination of features: tarsi 5-segmented, funicle 8-segmented, face with subantennal sulci, and parastigma with hypochaeta about midway between proximal and distal macrochaetae (Huber 2015a), *Lymaenon* is superficially most similar to *Gonatocerus* because of its relatively narrow fore wing usually uniformly covered with microtrichia from base of parastigma to wing apex but sometimes with a clear area between parastigma + stigma and cubital line of microtrichia (Fig. 554); otherwise it differs especially in mesosomal structure.

Nearctic hosts. Hemiptera: Cicadellidae, Membracidae.

Important references. Triapitsyn (2013a), Triapitsyn (2013b), and Triapitsyn *et al.* (2010) treated Palaearctic, Nearctic and Neotropical species, respectively.

Lymaenon aureus (Girault, 1911)

Gonatocerus aureus Girault, 1911 [96]: 263. Neotype ♀ (USNM), designated by Triapitsyn, 2013a: 48. **TL:** USA, Illinois, Urbana. Girault, 1929 [428]: 26 (key); Peck, 1951: 411 (catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 39 (list, species group placement); Huber & Beardsley, 2000: 58 (mention) [A]; Triapitsyn, 2013b: 217 (key); Zeya *et al.*, 2014: 63 (distribution) [P]; Rameshkumar *et al.*, 2015b: 51 (distribution) [O].

Gonatocerus (*Lymaenon*) *aureus*: Triapitsyn, 2013a: 51 (distribution); Haghayeghi-Nosrati *et al.*, 2014b: 151 (key), 145 (distribution) [P]; Lotfalizadeh, 2015: 75 (distribution) [P].

Lymaenon aureus: Burks, 1958: 63 (generic transfer); Peck, 1963: 21 (catalogue); Huber, 2015a: 43 (list); Dale-Skey, 2016: 242 (checklist) [P]; Rauber *et al.*, 2016: 134 (distribution, key) (NT]; Amer *et al.*, 2017: 354, 357 (list, distribution) [O]; Rameshkumar *et al.*, 2017: 230 (list) [O]; Triapitsyn, 2018a: 145 (distribution) [O].

Gonatocerus brunneus var. *tenuipennis* Girault, 1911 [96]: 263. Holotype (INHS), lost. **TL:** USA, Illinois, Centralia, Urbana. Synonymy (objective junior synonym) by Triapitsyn, 2013a: 47; Perkins, 1912: 24 (comparison with extralimital species).

Gonatocerus tenuipennis: Girault, 1929 [428]: 26 (revised status); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 41 (list, species group placement).

Lymaenon tenuipennis: Burks, 1958: 63 (generic transfer); Peck, 1963: 26 (catalogue).

Gonatocerus aligarhensis Shamim & Shafee, 1984: 623. Holotype ♀ (ZDAMU). **TL:** India, Uttar Pradesh, Aligarh. Synonymy by Triapitsyn, 2013a: 48.

Lymaenon chrysis Debauche, 1948: 99. Holotype ♀ (ISNB). **TL:** Belgium, Heverlee. Synonymy by Triapitsyn, 2013a: 47.

Lymaenon flavus Soyka, 1950b: 127. Holotype ♀ (PPDD), lost. **TL:** Egypt, Giza. Synonymy by Triapitsyn, 2013a: 47.

Gonatocerus fukuokensis Sahad in Sahad & Hirashima, 1984: 20. Holotype ♀ (KUEC). **TL:** Japan, Fukuoka City, Hakozaki. Synonymy by Triapitsyn, 2013a: 48.

Gonatocerus gracilentus Hellén, 1974: 11. Holotype ♀ (FMNH). **TL:** Finland, Parikkala. Synonymy by Triapitsyn, 2013a: 48.

Lymaenon kanheriensis Mani & Saraswat in Mani *et al.*, 1973: 87. Holotype ♀ (USNM). **TL:** India, Mumbai [Bombay], Borivali National Park, below Kanheri Caves. Synonymy by Zeya & Hayat, 1995: 114.

Lymaenon pahlgamensis Narayanan, 1960: 25. Holotype ♀ (INPC). **TL:** India, Kashmir [Valley]. Synonymy by Triapitsyn, 2013a: 47.

Nearctic host. Cicadellidae: *Neoaliturus* (*Circulifer*) *tenellus* (Baker), under quarantine laboratory conditions only (Triapitsyn 2013a).

Distribution. Canada: ON. USA: CA, GA, IL, MD, NC, NY, TX.

Lymaenon litoralis (Haliday, 1833)

Ooctonus litoralis Haliday, 1833a: 268, 1833b: 344. Lectotype ♀ (OUMNH), designated by Graham, 1982: 223. **TL:** UK, Northern Ireland, Co. Down, near Holywood. Curtis, 1837: 134 (catalogue) [P]; Blanchard, 1840: 293 (description) [P].

Lymaenon litoralis: Walker, 1846: 51 (generic transfer, description) [P]; Huber, 2015a: 47 (list); Dale-Skey, 2016: 242 (checklist) [P]; Amer *et al.*, 2017: 356, 363 (list, distribution) [O]; Triapitsyn, 2018a: 145 (distribution) [O].

Gonatocerus litoralis: Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 429 (catalogue) [P]; Enock, 1914: 46 (list) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Gijswijt, 2003: 50 (Netherlands list) [P]; Pricop, 2009a: 81 (distribution) [P]; Fallahzadeh & Huber, 2011: 297 (host, distribution) [P]; Viggiani, 2013: 117 (host) [P].

Gonatocerus (*Lymaenon*) *litoralis*: Triapitsyn, 2013a: 82 (description, distribution, hosts); Triapitsyn, 2013b: 217 (key); Lotfalizadeh, 2015: 75 (distribution) [P].

Gonatocerus americanus Brues, 1907: 109. Lectotype ♀ (MCPM), effectively designated by Girault, 1911 [96], 257; followed by Triapitsyn, 2013a: 84. **TL:** USA, Wisconsin, Milwaukee. Synonymy by Triapitsyn, 2013a: 83. Girault, 1911 [96]: 274 (key); Girault, 1929 [428]: 27 (key), 27 (comparison with *G. anthonomi*); Peck, 1951: 411 (catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 39 (list, species group placement).

Lymaenon americanus: Burks, 1958: 63 (generic transfer); Peck, 1963: 20 (catalogue).

Gonatocerus anthonomi Girault, 1905 [16]: 288. Lectotype ♀ (USNM), designated by Triapitsyn, 2013: 84. **TL:** USA, Georgia, Fort Valley. Synonymy by Triapitsyn, 2013a: 83. Girault, 1907 [27]: 29 (host); Girault, 1911 [96]: 274 (key), 256, 324 (description,); Viereck, 1916: 449 (description, host); Girault, 1929 [428]: 27 (key), 27 (comparison with *G. americanus*); Romney, 1946: 261 (ecology, distribution); Peck, 1951: 411 (catalogue); Burks, 1979: 1025 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 41 (list, species group placement).

Gonatocerus (*Gonatocerus*) *anthonomi*: De Santis, 1979: 365 (catalogue) [NT].

Lymaenon anthonomi: Burks, 1958: 63 (generic transfer); Peck, 1963: 21 (catalogue).

Gonatocerus brunneus Girault, 1911 [96]: 261. Lectotype ♀ (USNM), designated by Triapitsyn, 2013a: 86. **TL:** USA, Indiana, locality not specified. Synonymy by Triapitsyn, 2013a: 83. Girault, 1911 [96]: 274 (key); Girault, 1912 [107]: 89 (possible synonymy under European name); Perkins, 1912: 24 (comparison with extralimital species); Davis, 1914: 14 (Webster host record not verified); Girault, 1929 [428]: 26 (key); Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Stegmaier, 1973: 239 (parasitism, host); Maddox, 1976: 418 (host); Burks, 1979: 1025 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 39 (list, species group placement).

Gonotocerus [*sic*] *brunneus* Webster, 1894: 117 (*nomen nudum*, suspected host, distribution).

Lymaenon brunneus: Burks, 1958: 63 (generic transfer); Peck, 1963: 21 (catalogue).

Gonatocerus illinoiensis [*sic*] Girault, 1917 [323]: 91 (invalid original spelling). Holotype ♀ (USNM). **TL:** USA, Illinois, Coulterville. Synonymy by Triapitsyn, 2013a: 83 Girault, 1929 [428]: 27 (key, valid emendation); Peck, 1951: 412 (catalogue); Burks, 1979: 1025 (catalogue); Huber & Beardsley, 2000: 58 (mention) [A]; Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 40 (list, species group placement).

Lymaenon illinoiensis: Burks, 1958: 63 (generic transfer); Peck, 1963: 22 (catalogue).

Gonatocerus maevius Girault, 1911 [96]: 272. Holotype (INHS), lost. **TL:** USA, Illinois, Normal. Synonymy by Triapitsyn, 2013a: 83. Girault, 1911 [96]: 273 (key); Girault, 1929 [428]: 26 (synonymy under *G. brunneus*); Peck, 1951: 412 (catalogue, under *G. brunneus*); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 40 (list, species group placement).

Gonatocerus texanus Girault, 1911 [96]: 270. Lectotype ♀ (USNM), designated by Triapitsyn, 2013a: 86. **TL:** USA, Texas, College Station. Synonymy by Triapitsyn, 2013a: 83. Girault, 1929 [428]: 26 (synonymy under *G. anthonomi*); Romney, 1946: 261 (list); Peck, 1951: 411 (catalogue, under *anthonomi*).

Gonatocerus welateri Nason, 1906: 8 (*nomen nudum*). Girault, 1911 [96]: 324 (validating *welateri*, spelling corrected); Peck, 1963: 21 (catalogue under *anthonomi*); Triapitsyn, 2013a: 83 (*nomen nudum*).

Gonatocerus websteri: Peck, 1951: 411 (catalogue under *anthonomi*).

Lymaenon arduennae Mathot, 1969: 5. Holotype ♀ (ISNB). **TL:** Belgium, Vresse-sur-Semois, Nafraiture, Ry de Grahais. Synonymy by Matthews, 1986: 223.

Lymaenon effusi Bakkendorf, 1934: 23. Lectotype ♀ (ZMUC), effectively designated by Matthews, 1986: 223; see Triapitsyn, 2013a: 83. **TL:** Denmark, Zealand Island, Dyrehaven. Synonymy by Matthews, 1986: 223.

Gonatocerus exiguus Förster, 1861: 43. Lectotype ♀ (NHMW), designated by Triapitsyn, 2013a: 84. **TL:** Switzerland, Val Roseg. Synonymy by Triapitsyn, 2013a: 82.

Alaptus fuscus Förster, 1861: 43. Lectotype ♀ (NHMW), designated by Triapitsyn, 2013a: 84. **TL:** Switzerland, Val Roseg. Synonymy by Triapitsyn, 2013a: 82.

Lymaenon paludis Debauche, 1948: 91. Holotype ♀ (ISNB). **TL:** Belgium, Héverlé, Abbaye du Parc. Synonymy by Matthews, 1986: 223.
Gonatocerus priesneri Soyka, 1950b: 128. Holotype ♀ (PPDD), lost. **TL:** Egypt, Gebel Elba, Wadi Aideb. Synonymy by Triapitsyn, 2013a: 83.
Gonatocerus pulchellus Hellén, 1974: 11. Holotype ♀ (FMNH). **TL:** Finland, Hauho. Synonymy by Matthews, 1986: 223.
Gonatocerus radiculatus Ahlberg, 1925: 85. Syntype? females (NHRS?); see Triapitsyn, 2013a: 83. **TL:** Sweden, near Spånga. Synonymy by Matthews, 1986: 223.
Lymaenon rhacodes Debauche, 1948: 97. Holotype ♀ (ISNB). **TL:** Belgium, Héverlé, Parc d'Arenberg. Synonymy by Matthews, 1986: 223.

Nearctic hosts. Cicadellidae: *Anoplotettis putoni* Ribaut.
Distribution. Canada: NT, SK. USA: CA, IL, IN, MT, NM, OR, TX, WI.

Lymaenon nigritarsis (Ashmead, 1887)

Gonatocerus nigritarsis Ashmead, 1887: 192. Holotype ♀ (USNM). **TL:** USA, Florida, Duval Co., Jacksonville. Girault, 1911 [96]: 273 (key), (description); Girault, 1929 [428]: 25 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 41 (list, species group placement).
Lymaenon nigritarsis: Burks, 1958: 63 (generic transfer); Peck, 1963: 24 (catalogue); Huber, 2015a: 49 (list).
Gonatocerus (*Lymaenon*) *nigritarsis*: Triapitsyn, 2013b: 217 (key, description).

Distribution. USA: FL.

Lymaenon ornatus (Gahan, 1918)

Gonatocerus ornatus Gahan, 1918: 23. Holotype ♀ (USNM). **TL:** USA, Arizona, Tempe. Essig, 1929: 818 (host, distribution); Zimmerman, 1948: 89 (host) [A]; Peck, 1951: 412 (catalogue); Thompson, 1958: 570 (host catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 41 (list, species group placement); Beardsley, 1999: 46 (distribution, host) [A]; Huber & Beardsley, 2000: 53 (key), 58 (distribution, host) [A].
Lymaenon ornatus: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue); Huber, 2015a: 49 (list).
Gonatocerus (*Lymaenon*) *ornatus*: Triapitsyn, 2013b: 217 (key, description, host).

Nearctic hosts. Membracidae: *Spissistilus festinus* (Say).
Distribution. USA: AZ.

Lymaenon partifuscipennis (Girault, 1916)

Gonatocerus partifuscipennis Girault, 1916 [265]: 102. Holotype ♀ (USNM). **TL:** USA, Maryland, Glen Dale (Glenndale). Girault, 1929 [428]: 23 (key); Peck, 1951: 412 (catalogue); Burks, 1979: 1026 (catalogue); Huber, 1988: 31 (species group placement); Yoshimoto, 1990: 41 (list, species group placement).
Lymaenon partifuscipennis: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue); Huber, 2015a: 49 (list).
Gonatocerus (*Lymaenon*) *partifuscipennis*: Triapitsyn, 2013b: 217 (key), 219 (description).

Distribution. USA: MA, MD, NC, OK, TN, TX.

Lymaenon pygmaeus (Girault, 1911)

Gonatocerus pygmaeus Girault, 1911 [96]: 269. Lectotype ♀ (USNM), designated by Triapitsyn, 2013b: 220. **TL:** USA, Mississippi, locality not specified. Girault, 1929 [428]: 27 (key); Peck, 1951: 412 (catalogue); Frison, 1927: 228 (paratype listed); Burks, 1979: 1026 (catalogue); Huber, 1988: 31 (species group placement); Huber & Beardsley, 2000: 52 (key), 58 (distribution) [A]; Eldredge & Evenhuis, 2002: 74 (distribution) [A].
Gonatocerus pygmaenus [*sic*]: Yoshimoto, 1990: 41 (list, species group placement).
Lymaenon pygmaeus: Burks, 1958: 63 (generic transfer); Peck, 1963: 25 (catalogue); Huber, 2015a: 50 (list).
Gonatocerus (*Lymaenon*) *pygmaeus*: Triapitsyn, 2013b: 217 (key), 219 (description, distribution).

Distribution. USA: GA, MD, MS.

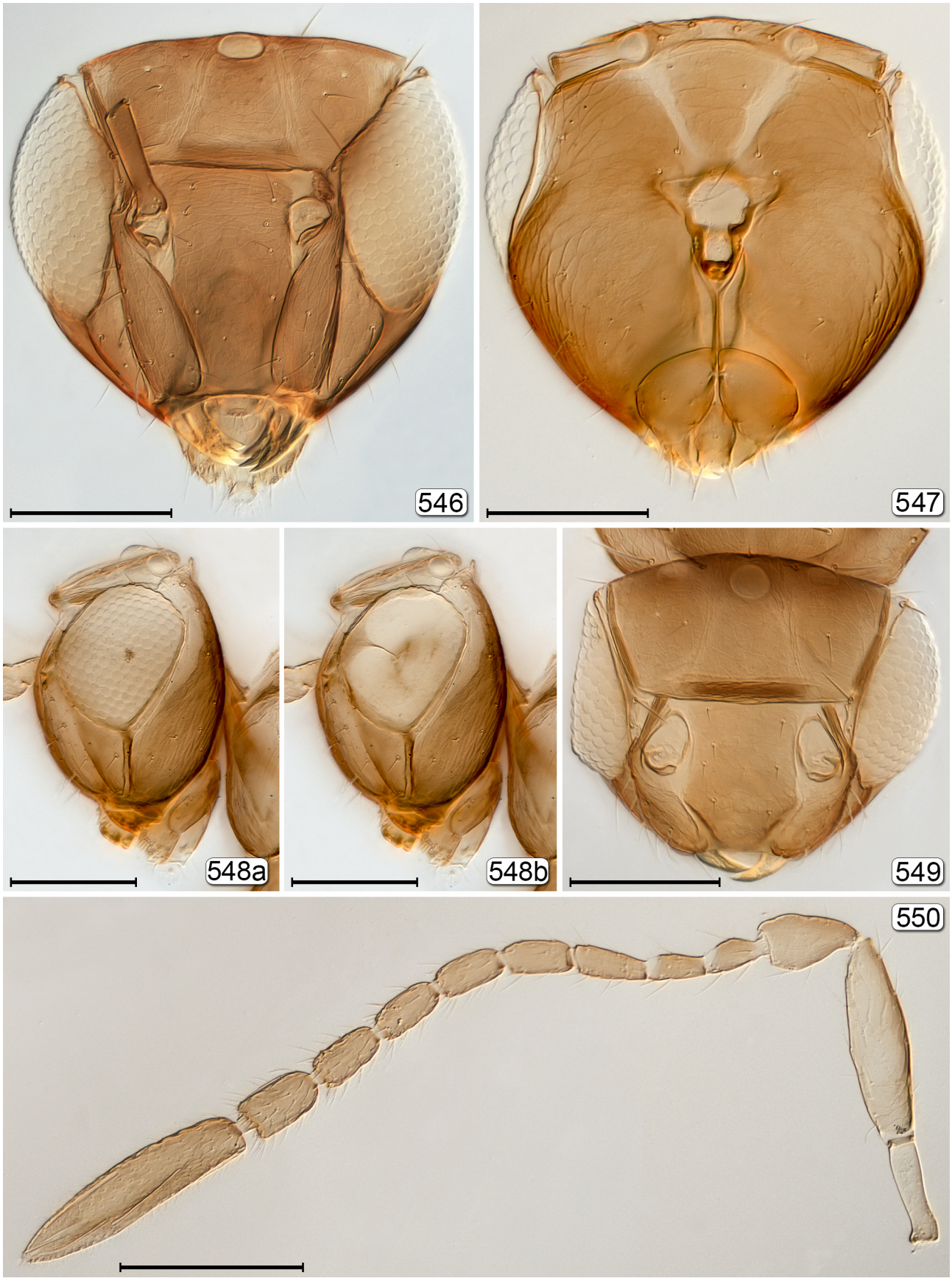
***Lymaenon vladimiri* (Triapitsyn, 2013)**

Gonatocerus (*Lymaenon*) *vladimiri*: Triapitsyn, 2013b: 220. Holotype ♀ (UCRC). **TL:** USA, New York, Ontario Co., Geneva, Cornell University Agricultural Experiment Station. Triapitsyn, 2013b: 217 (key).
Lymaenon vladimiri: Huber, 2015a: 51 (generic transfer, list).

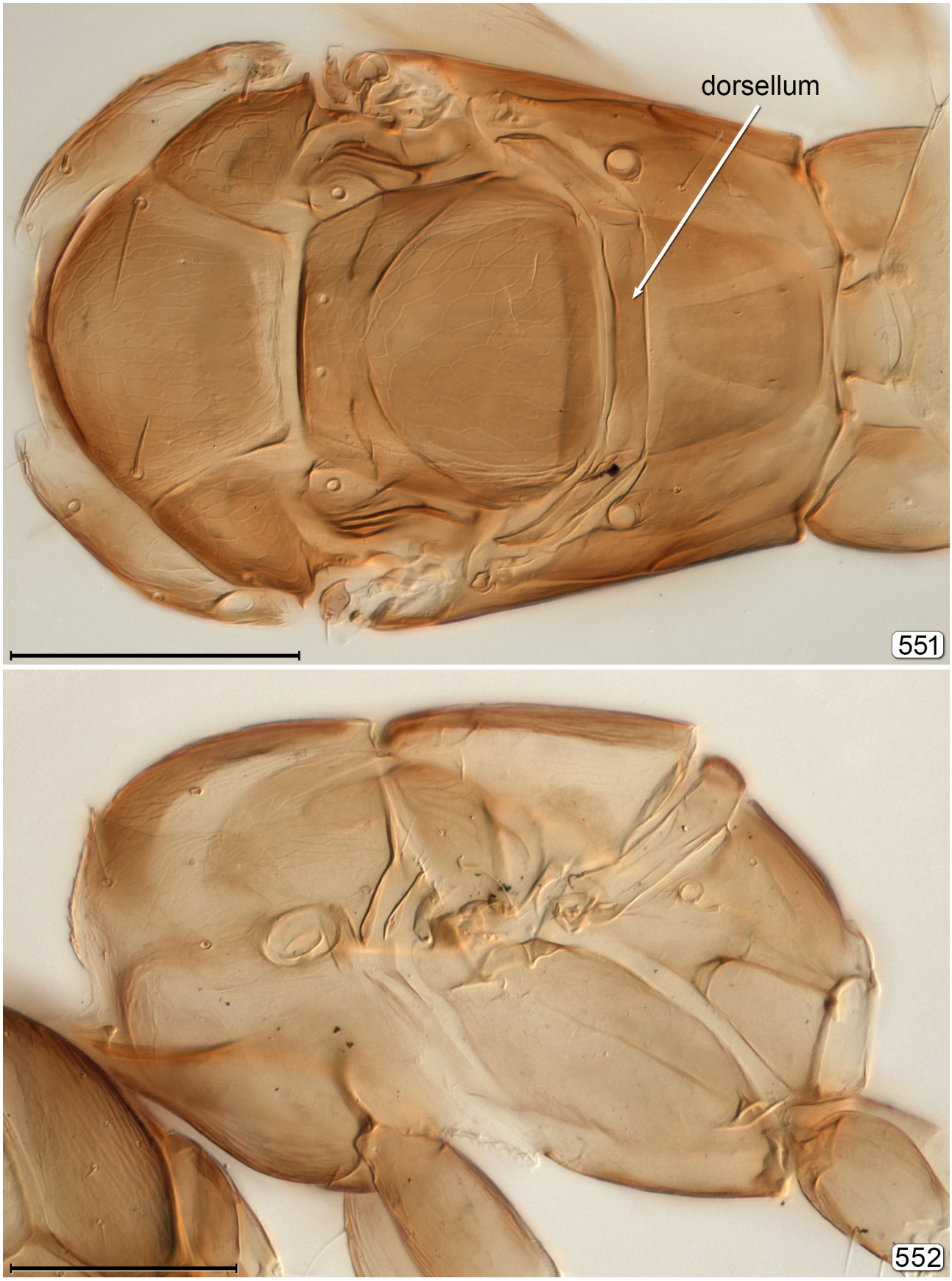
Nearctic hosts. Cicadellidae: ? *Idiocerus stigmaticalis* Lewis.
Distribution. USA: NY.



FIGURE 545. *Lymaenon* sp., habitus. Canada, Ontario, Buckham's Bay West, 45°29'36"N 76°6'38"W, v–x.2010, J. Read. Scale bar=500 µm.

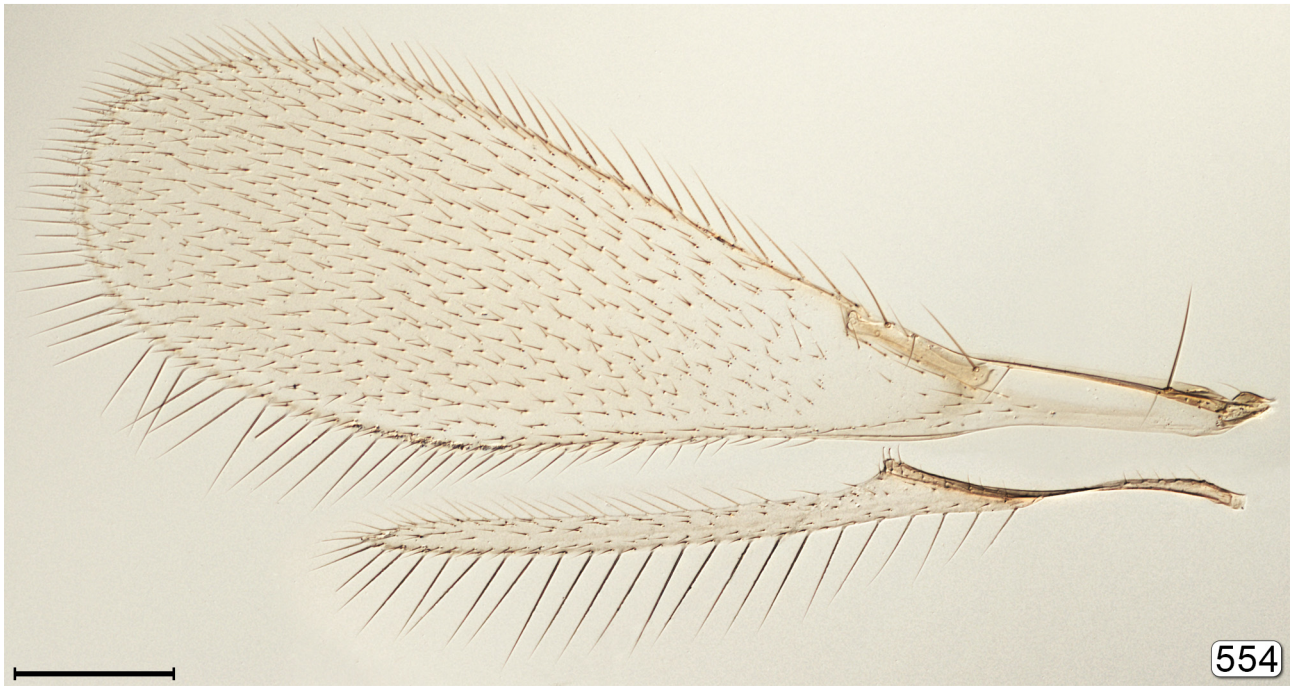


FIGURES 546–550. *Lymaenon* spp. 546, *L. pygmaeus* (Girault), head, anterior; 547, *L. pygmaeus* (Girault), head, posterior, 548a, *L. ornatus* (Gahan), head, lateral; 548b, male lateral (internal) showing ocular apodeme; 549, *L.* sp., head, anterodorsal; 550, *L. pygmaeus* (Girault), antenna. antenna. Scale bars=100 μm.



FIGURES 551, **552**. *Lymaenon* spp., mesosoma. 551, *L. pygmaeus* (Girault), female, dorsal; 552, *L. ornatus* (Gahan), male, lateral. Scale bars=100 μm.





FIGURES 553, **554**. *Lymaenon pygmaeus* (Girault). 553, mesosoma, ventral; 554, wings. Scale bars=100 μm.



FIGURES 555–557. *Lymaenon* spp., metasoma. 555, *L. pygmaeus* (Girault), dorsal; 556, *L. ornatus* (Gahan), lateral; 557, *L. pygmaeus* (Girault), ventral. Scale bars=100 μm.



FIGURES 558–560. *Lymaenon ornatus* (Girault), male. 558, antenna; 559a, metasoma, dorsal; 559b, metasoma showing genitalia seen through gaster; 560; metasoma, lateral. Scale bars=100 μm.

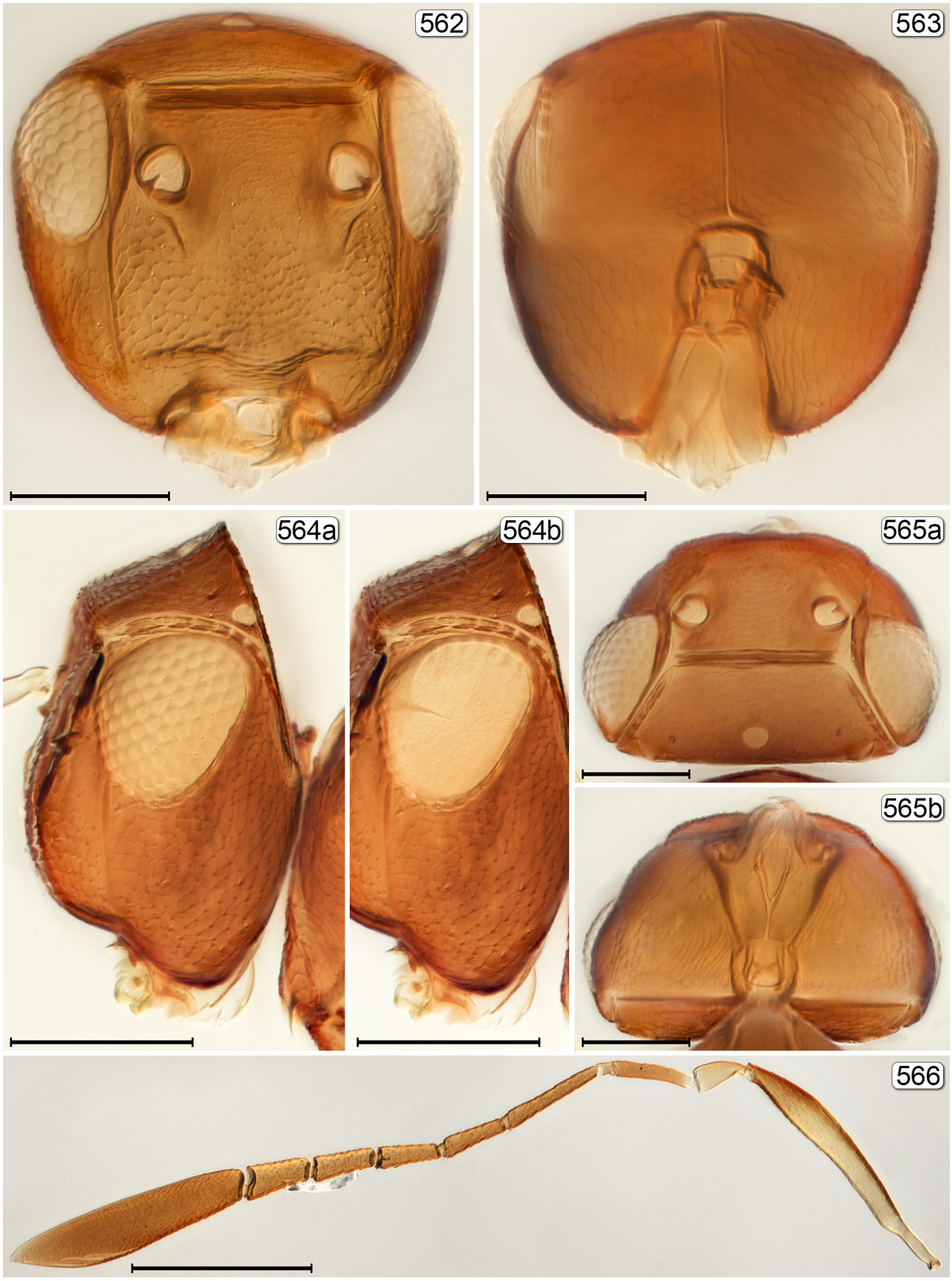
MACROCAMPTOPTERA Girault, 1910

(Figs 561–592)

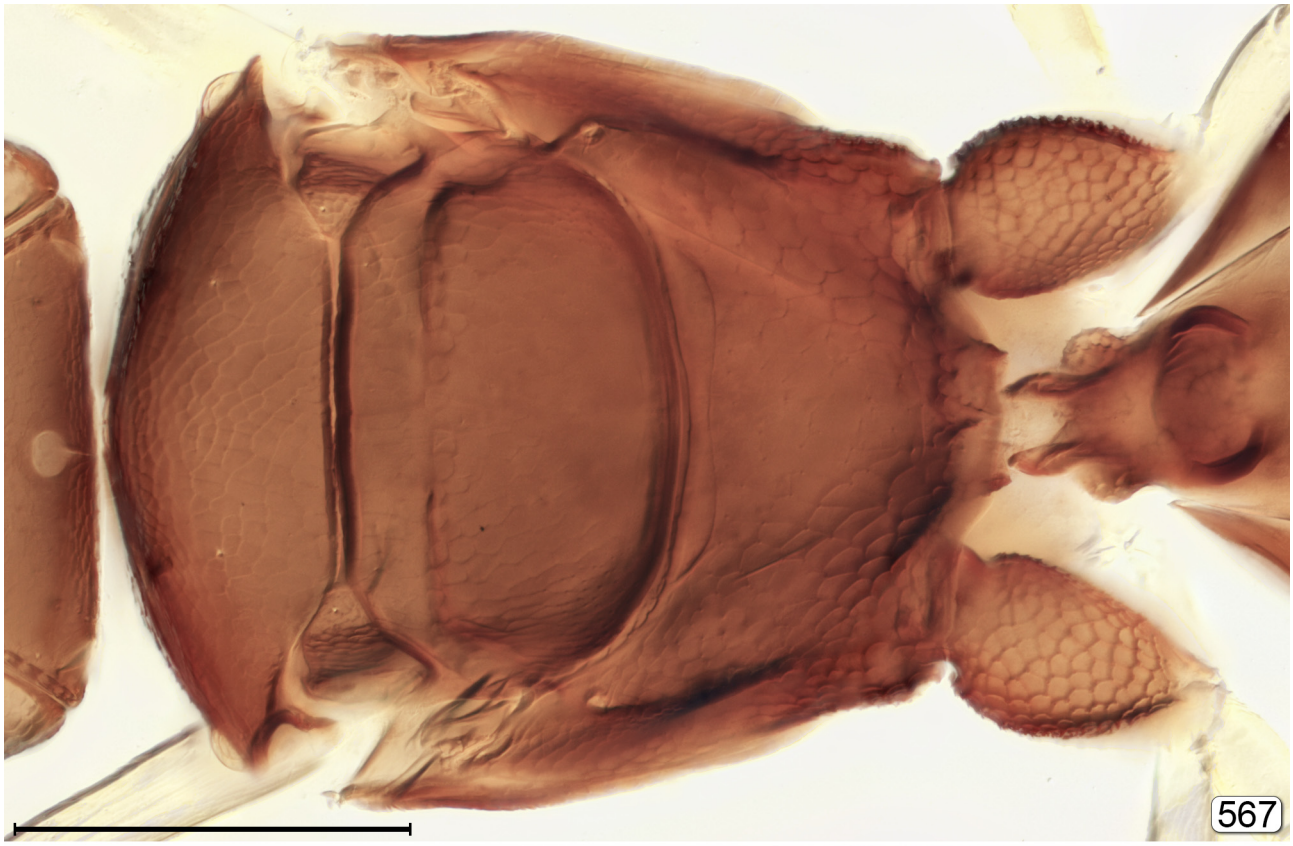
Macrocamptoptera Girault, 1910 [69]: 239. Type species: *Camptoptera metotarsa* Girault, 1910, by original designation.
Herulia Hedqvist, 1962: 103. Type species: *Herulia sundholmi* Hedqvist, 1962, by original designation. Synonymy by Huber & Lin, 1999: 38; previous synonymy under *Camptoptera* by Schauff, 1984a: 39 and by Taguchi, 1971: 52.
Rhila Donev, 1989: 79. Type species: *Rhila bulgarica* Donev, 1989, by original designation. Synonymy by Huber & Lin, 1999: 38.

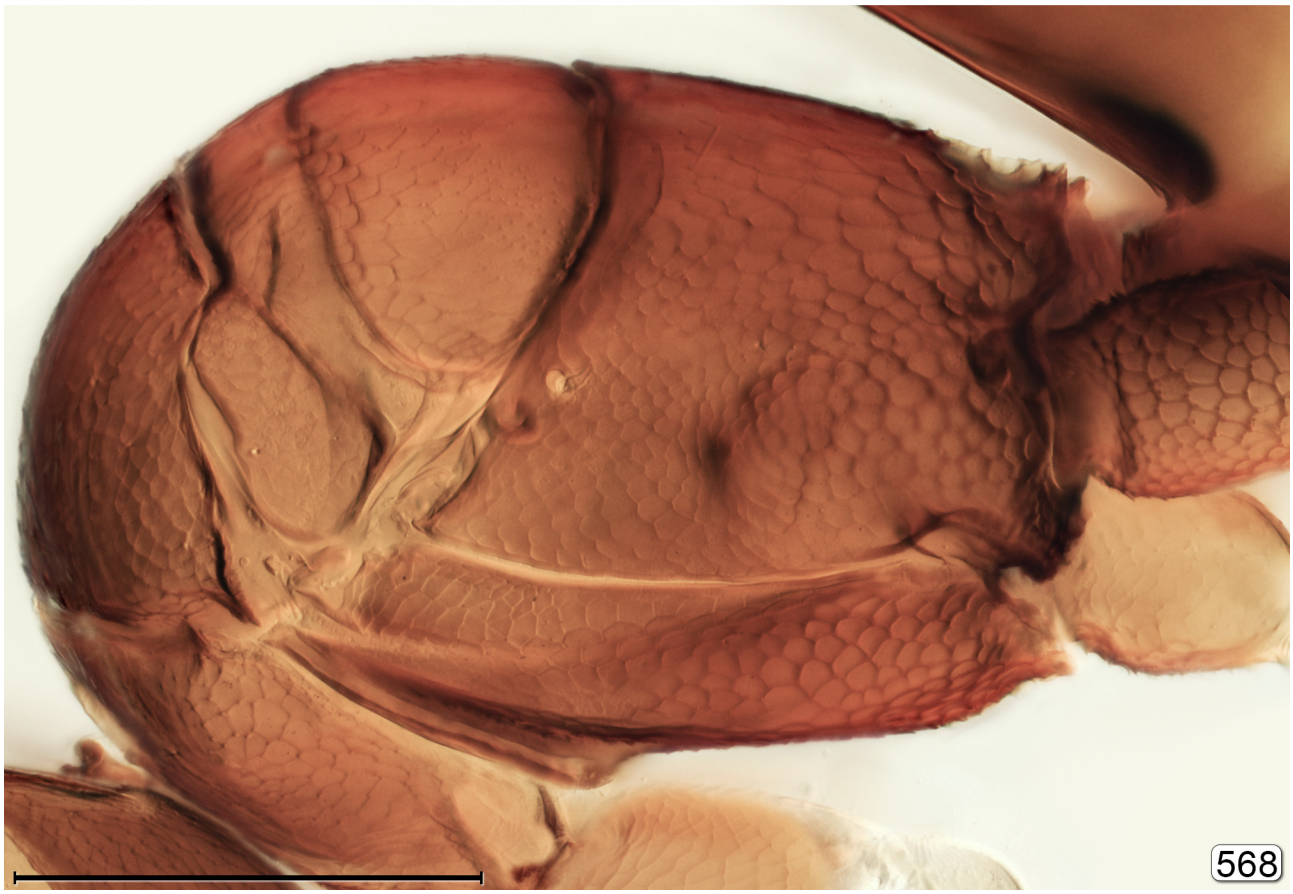


FIGURE 561. *Macrocamptoptera metotarsa* (Girault), habitus. Canada, Ontario, near Eganville, Shaw Forest, 13–20.viii.1992, M. Sharkey. Scale bar=1000 μm.

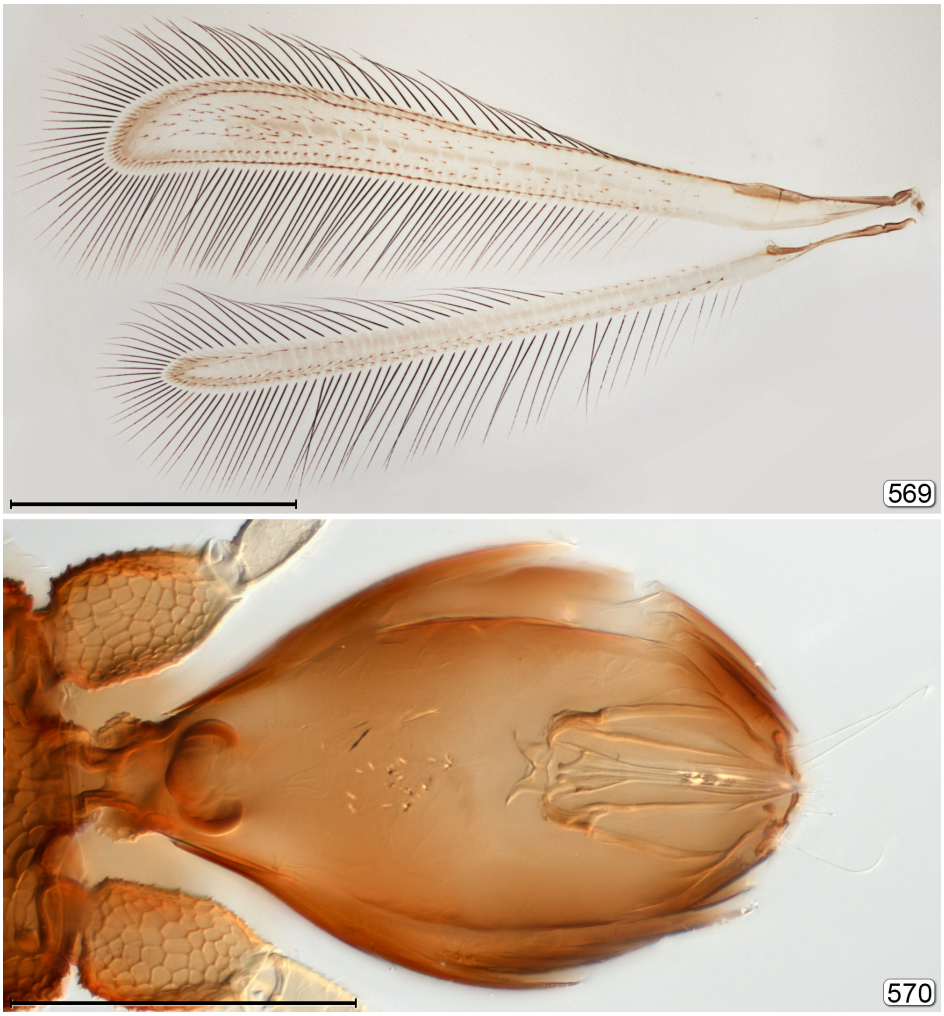


FIGURES 562–566. *Macrocamptoptera metotarsa* (Girault), head except 566. 562, anterior; 563, posterior; 564a, lateral; 564b, lateral (internal) showing ocular apodeme; 565a, dorsal; 565b, ventral; 566, antenna. Scale bars: 562–565=100 µm; 566=300 µm.

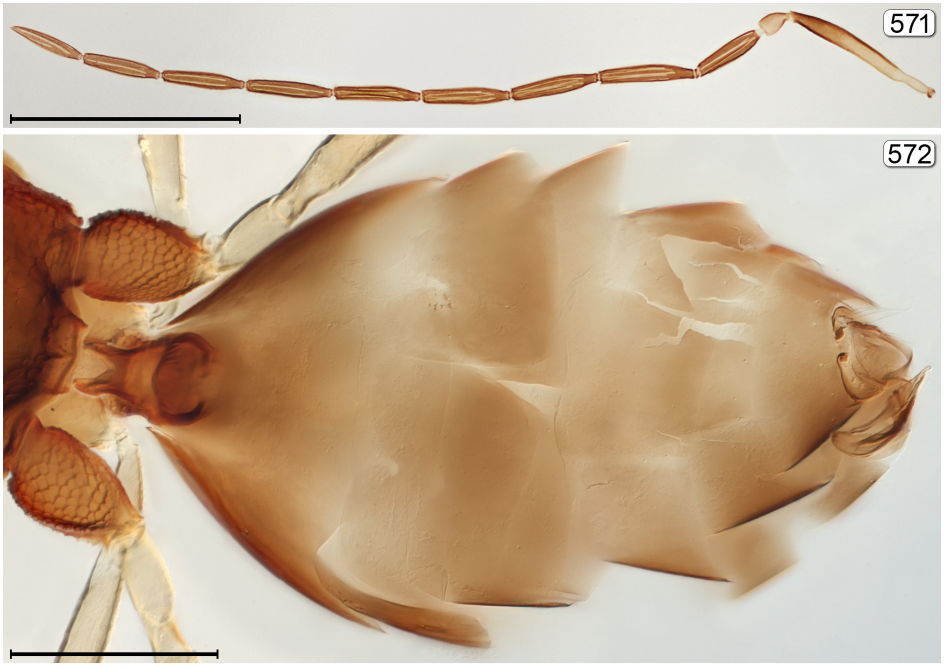




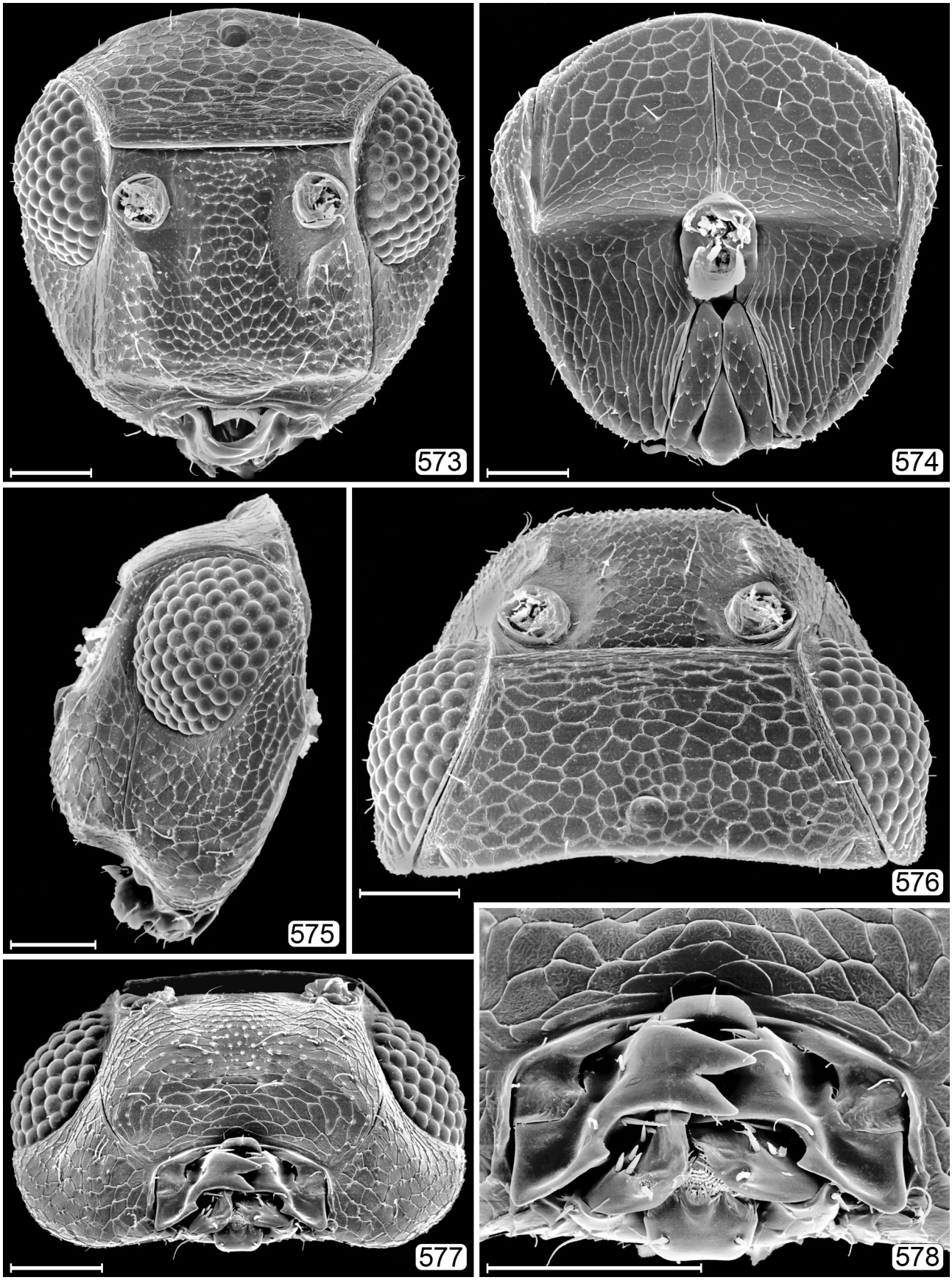
FIGURES 567, **568**. *Macrocamptoptera metotarsa* (Girault), mesosoma. 567, dorsal; 568, dorsolateral. Scale bars=200 µm.



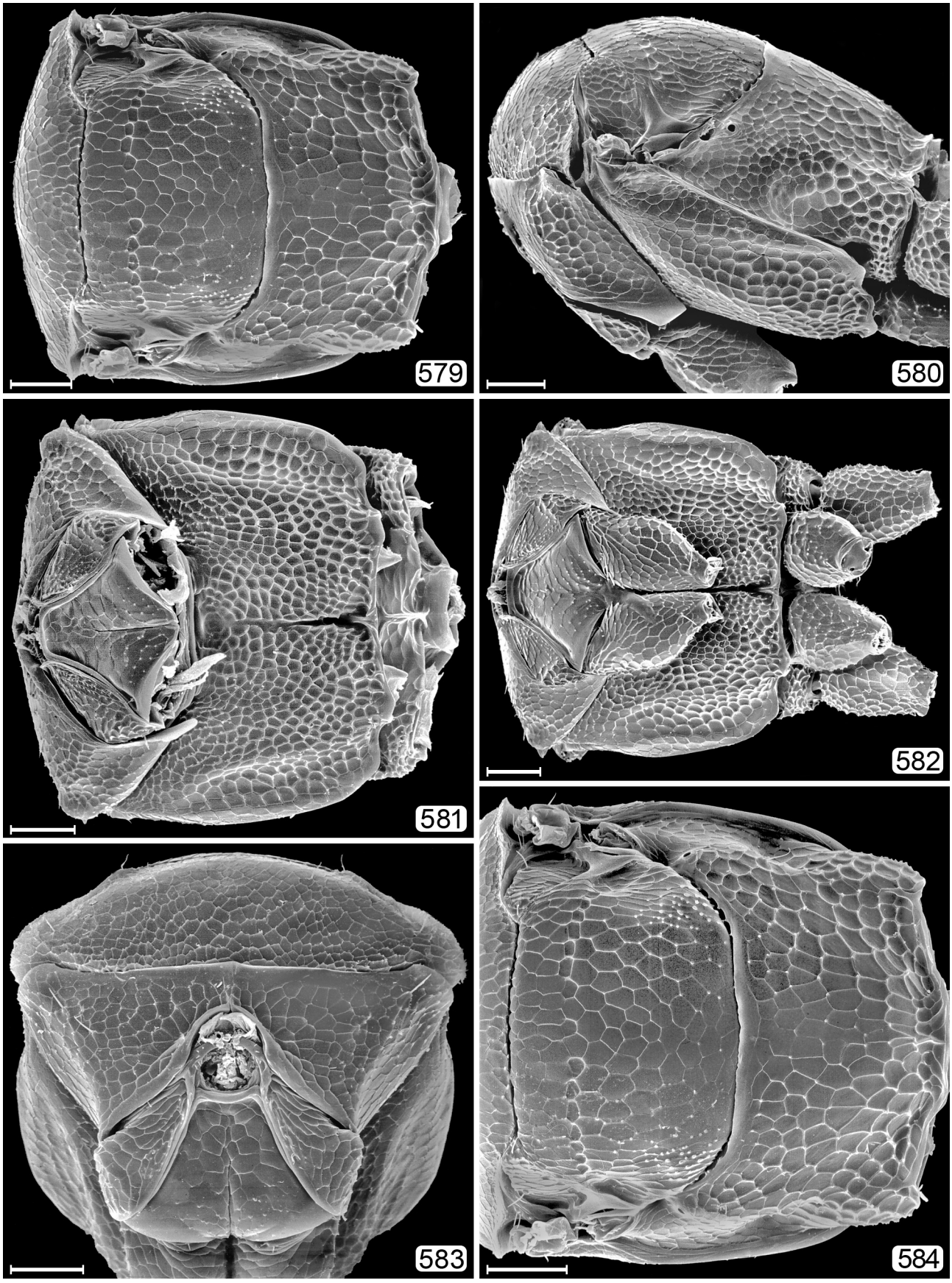
FIGURES 569, **570**. *Macrocamptoptera metotarsa* (Girault). 569, wings; 570, metasoma, genitalia seen through gaster. Scale bars: 569=500 µm; 570=100 µm.



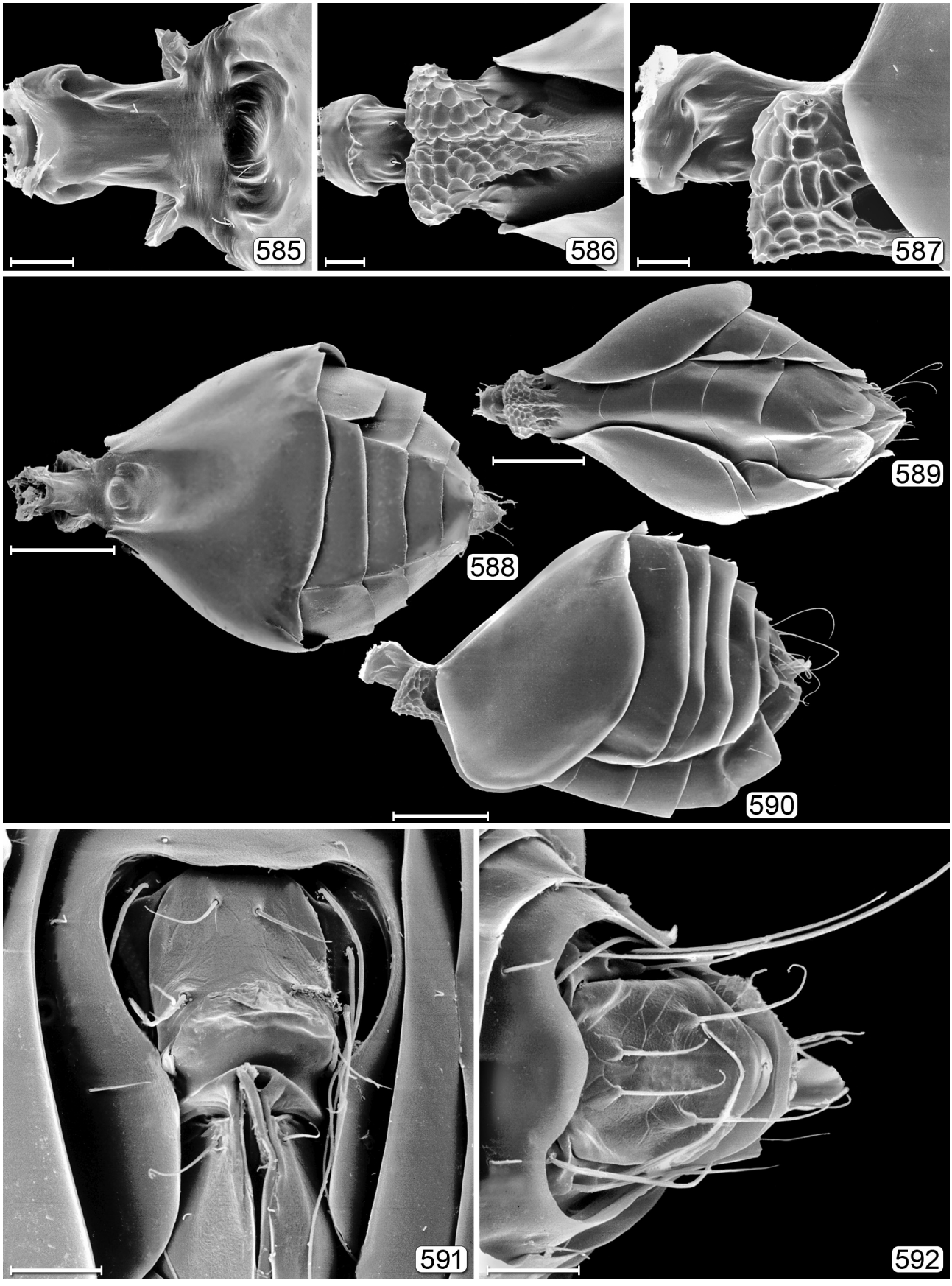
FIGURES 571, **572**. *Macrocamptoptera metotarsa* (Girault), male. 571, antenna; 572, metasoma, dorsal. Scale bars: 571=500 µm; 572=200 µm.



FIGURES 573–578. *Macrocamptoptera metotarsa* (Girault), head. 573, anterior; 574, posterior; 575, lateral; 576, dorsal; 577, ventral; 578, mouthparts. Scale bars=50 μm.



FIGURES 579–584. *Macrocamptoptera metotarsa* (Girault), mesosoma. 579, dorsal; 580, lateral; 581, ventral; 582, ventral with coxae; 583, anterior; 584, scutellum–propodeum. Scale bars=50 μm.



FIGURES 585–592. *Macrocamptoptera metotarsa* (Girault). 585, petiole, dorsal; 586, petiole, ventral; 587, petiole, lateral; 588, metasoma, dorsal; 589, metasoma, ventral; 590, metasoma, lateral; 591, gaster apex, posterior; 592, gaster apex, dorsal. Scale bars 585–587, 591, 592=20 μm; 588–590=100 μm.

Diagnosis. Body length 715–1180 μm; ~800–1250 μm in Triapitsyn (2012a). Body black and legs brownish-yellow (Fig. 561) to orange; funicle 7-segmented with fu_2 ring-like, much shorter than fu_1 or fu_3 (Fig. 566); mandible with 2 equal teeth (Figs 577, 578); head posteriorly with median vertical coronal sulcus and occipital sulcus wide, shallow and indistinct (Figs 563, 574); head and mesosoma with distinct, slightly raised, mostly isodiametric reticulated sculpture (Fig. 561, 573–577, 579–584); fore wing (Figs 561, 569) with distinct brown tinge separated by a clear subapical area from brown apical margin; hind wing tinged with brown and apical margin brown (Fig. 569).

Discussion. *Macrocamptoptera* belongs to the *Camptoptera* group of genera together with *Camptoptera*, *Camptopteroides*, *Eofoersteria*, *Ptilomymar* and *Stephanocampta*. *Macrocamptoptera* is most similar to *Camptopteroides*. In both, the body is large, the head and mesosoma have relatively distinct sculpture, and the fore wing is relatively wide and patterned.

Important references. Huber & Lin (1999), Triapitsyn (2012a).

Macrocamptoptera metotarsa (Girault, 1905)

Camptoptera metotarsa Girault, 1905 [15]: 91. Holotype ♀ (USNM). **TL:** USA, Virginia, Arlington Co., Arlington. Girault, 1909 [57]: 26 (description, key); Peck, 1951: 411 (catalogue); Peck, 1963: 20 (catalogue); Burks, 1979: 1027 (catalogue); Girault, 1910 [69]: 238 (indication of generic transfer).

Camptoptera (*Macrocamptoptera*) *metotarsa*: Yoshimoto, 1990: 35 (list).

Macrocamptoptera metotarsa: Girault, 1910 [69]: 239 (generic transfer); Girault, 1911 [96]: 323 (distribution); Girault, 1929 [428]: 20 (description in key); Soyka, 1961: 72 (mention); Huber & Lin, 1999: 39 (distribution); Triapitsyn, 2012a: 97 (key), 100 (description).

Distribution. Canada: AB, ON, QC. USA: AR, FL, GA, KS, LA, MD, MO, MS, NC, NH, NM, OH, SC, TN, TX, VA.

Macrocamptoptera setata Triapitsyn, 2012

Macrocamptoptera setata Triapitsyn, 2012a: 104. Holotype ♀ (UCRC). **TL:** USA, California, San Bernardino Co., Oak Glen. Triapitsyn, 2012a: 97 (key).

Distribution. USA: CA, OR.

MYMAR Curtis, 1829

(Figs 593–622)

Mymar Curtis, 1829: 112. Type species: *Mymar pulchellus* Curtis, 1829, by designation under the Plenary Powers of the International Commission on Zoological Nomenclature, 1965: 82 (Opinion 729).

Pterolinononyktera Maláč, 1943: 51. Type species: *Pterolinononyktera obenbergeri* Maláč, 1943, by original designation. Synonymy by Annecke & Doutt, 1961c: 26.

Diagnosis. Body length 560–1075 μm. Face with toruli abutting transverse trabecula (Figs 594, 605); antenna with scape narrower medially than apically and fu_2 longer than following segments combined (Fig. 598); fore wing spatulate, without membrane for basal 0.6 of its length (Figs 593, 601); hind wing filamentous, without membrane and either extremely short (Fig. 593) or longer and with a long apical seta (Fig. 601).

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Neomymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Mymar* is most similar to *Neomymar*. Both have the toruli abutting the transverse trabecula, unlike the other genera, which have the toruli well separated from it. The wings are also more similar to each other than to other genera of the group; in both genera the fore wing is narrow for at least half its length before widening suddenly towards the apex.

Nearctic hosts. Unknown. Extralimital hosts are Hemiptera: Cicadellidae and Delphacidae (Triapitsyn & Berezovskiy 2001).

Important references. Triapitsyn & Berezovskiy (2001), Triapitsyn (2018a).



FIGURE 593. *Mymar pulchellum* Curtis, habitus. USA, New York, Herkimer Co., 9 mi. N. Herkimer National Forest, no date, N.F. Johnson, old field. Scale bar=500 μm.

Mymar pulchellum Curtis, 1832

Mymar pulchellus Curtis, 1832: 411. Syntypes 1 ♂ (NMID), 4 ♀ (NMVM). **TL:** UK, England, Southgate (suburb of London). Curtis, 1829: 112 (*nomen nudum*); Haliday, 1833b: 349 (description) [P]; Curtis, 1837: 134 (list) [P]; Westwood, 1839: 78 (description) [P]; Walker, 1846: 54 (description) [P]; Foerster, 1856: 120 (distribution) [P]; Marshall, 1873: 24 (catalogue) [P]; Westwood, 1879: 584 (description) [P]; Schmiedeknecht, 1909: 496 (list) [P]; Enock, 1911a: 271 (behaviour) [P]; Enock, 1911b: xxvii (comparison with extralimital species) [P]; Enock, 1912: cviii (comparison with extralimital species) [P]; Enock, 1914: (list) [P]; Bakkendorf, 1934: 92 (larva) [P]; Gahan, 1949: 204 (type of genus discussion); Kryger, 1950: 73 (description, distribution) [P]; Hellén, 1960: 154 (Finland) [P].

Oglobliniella pulchella: Soyka, 1950b: 131 (comparison with extralimital species) [P].

Mymar pulchellum: Dalla Torre, 1898: 427 (catalogue) [P]; Lameere, 1907: 247 (habitat) [P]; Girault, 1911 [84]: 93 (Nearctic species compared); Girault 1912 [120]: 167 (description) [P]; Soyka, 1946b: 180 (mention); Debauche, 1948: 234 (key, description, distribution) [P]; Radu & Boţoc, 1960: 327 (description) [P]; Annecke, 1961a: 544 (key), 550 (description) [AT]; Doutt & Annecke, 1963: 134 (proposed type species) [P]; Viggiani, 1966: 116 (key) [P]; Hellén, 1974: 22 (key, description) [P]; Bouček & Graham, 1978: 110 (catalogue) [P]; Trjapitzin, 1978: 532 (synonymy, distribution) [P]; Burks, 1979: 1031 (catalogue); George, 1981: 202 (distribution) [P]; Trjapitzyn, 1987: 968 (synonymy, distribution) [P]; Kalina, 1989: 127

(list) [P]; Noyes & Valentine, 1989: 40 (distribution) [A]; Yoshimoto, 1990: 60 (list); Pintureau *et al*., 1996: 114 (morphometrics, distribution) [P]; Triapitsyn & Berezovskiy, 2001: 6, 7 (key), 8 (description); Gijswijt, 2003: 50 (list) [P]; Pricop, 2009a: 81 (distribution) [P]; Pricop, 2009b: 126 (distribution) [P]; Pricop, 2009c: 22 (distribution) [P]; Donev & Triapitsyn, 2010: 66 (compared with extralimital species); Pintureau, 2012: 28 (list) [P]; Triapitsyn, 2015c: 10 (distribution); Dale-Skey *et al.*, 2016: 243 (checklist) [P]; Rameshkumar *et al.*, 2017: 230 (list) [O]; Triapitsyn, 2018a: 150 (key).

Pterolinononyktera obenbergeri Maláč, 1943: 51. Holotype ♀ (NMPC), lost. **TL:** Czech Republic, Bohemia, Krkonoše Mountains (Riesengebirge), locality not specified. Synonymy by Annecke, 1961a: 550.

Mymar spectabilis Foerster, 1856: 120. Holotype ♂ (NHMW?). **TL:** Germany, Eupen environs or Boppard am Rhein. *De facto* synonymy by Annecke, 1961: 550.

Distribution. Canada: NS, ON, PE, QC. USA: NY, PA, VA, WI.

Mymar taprobanicum Ward, 1875

Mymar taprobanicus Ward, 1875: 197. Lectotype (NHMUK?), lost. **TL:** Sri Lanka, locality not specified [but sent to England from Colombo]. Westwood, 1879: 585 (description) [P].

Mymarilla taprobanicus: Mani, 1938: 143 (catalogue, distribution) [O].

Mymar taprobanicum: Annecke, 1961a: 544 (key), 547 (description) [AT]; Viggiani, 1966: 114 (description, distribution), 116 (key) [P]; Viggiani, 1967b: 160 (distribution) [P]; Subba Rao, 1976: 89 (distribution) [O]; Hayat, 1977: 283 (distribution) [O]; Chiu, 1979: 336 (biological control) [O]; Hirashima *et al.*, 1979: 7 (distribution) [O]; Subba Rao & Hayat, 1983: 137 (catalogue) [O]; Khan & Saxena, 1985: 119 (list) [O]; Viggiani & Jesu, 1988: 1023 (distribution) [P]; Yoshimoto, 1990: 60 (list); Hayat, 1992, 87 (distribution, hosts) [O]; Benrey & Lamp, 1993: 523 (biological control) [O]; Cohen *et al.*, 1994: 752 (effect of insecticides) [O]; Pagliano & Navone, 1995: 36 (list) [P]; Pintureau *et al*., 1996: 114 (morphometrics, distribution) [P]; Triapitsyn & Berezovskiy, 2001: 6, 7 (key), 11 (distribution); Baquero & Jordana, 2002: 81 (distribution) [P]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Pintureau *et al.*, 2003: 167 (list, distribution) [P]; Gupta & Poorani, 2008: 411 (distribution) [O]; Hayat *et al.*, 2008: 328 (distribution) [O]; Huber *et al*., 2009: 271 (list) [P]; Pricop, 2009b: 126 (distribution) [P]; Aguiar *et al.*, 2010: 246 (list) [P]; Manickavasagam *et al.*, 2011: 395 (key), 397 (distribution) [O]; Rameshkumar *et al.*, 2011: 281 (distribution) [O]; Pintureau, 2012: 28 (list) [P]; Anis & Rehmat, 2013: 6 (list, distribution) [O]; Bayegan *et al.*, 2014: 655 (distribution) [P]; Lotfalizadeh, 2015: 75 (distribution) [P]; Rameshkumar *et al.*, 2015b: 52 (distribution) [O]; Triapitsyn, 2015c: 10 (distribution); Koponen & Triapitsyn, 2016: 3 (distribution) [P]; Lotfalizadeh *et al.*, 2016: 105 (distribution, hosts) [P]; Joshi *et al.*, 2017: 1811 (distribution) [O]; Rameshkumar *et al.*, 2017: 230 (list) [O]; Triapitsyn, 2018a: 150 (key), 153 (distribution) [O]; Triapitsyn, 2018c: 7 (host) [O].

Mymar antillanum Dozier, 1937: 130. Holotype ♀ (USNM). **TL:** Puerto Rico, near Boquerón. Synonymy by Annecke, 1961a: 547.

Mymar indica Mani, 1942: 160. Holotype ♂ (INPC). **TL:** India, Delhi. Synonymy by Hayat, 1977: 283.

Mymar tyndalli Girault 1912 [120]: 168. Holotype ♀ (QM). **TL:** Australia, Queensland, Nelson. Synonymy by Annecke, 1961a: 547.

Oglobliniella aegyptiaca Soyka, 1950b: 131. Holotype ♀ (PPDD), lost. **TL:** Egypt, Giza. Synonymy by Annecke, 1961a: 547.

Distribution. USA: FL, GA, MD, MO, NC, SC, VA.

Mymar venustum Girault, 1911

Mymar venustum Girault, 1911 [84]: 94. Holotype ♀ (USNM). **TL:** USA, Pennsylvania, Greensburg. Girault, 1911 [91]: 188 (description); Girault, 1911 [96]: 323 (list); Girault, 1917 [324]: 99 (description); Girault, 1917 [428]: 12 (key); Annecke, 1961a: 550 (synonymy under *M. pulchellum*); Triapitsyn & Berezovskiy, 2001: 16 (type material, possible good species); Donev & Triapitsyn, 2010: 67 (re-instated as valid species); Triapitsyn, 2018a: 148 (diagnostic comments), 150 (key), 152 (distribution).

Mymarilla venusta: Peck, 1951: 419 (generic transfer, catalogue).

Pterolinononyktera venusta: Peck, 1963: 50 (generic transfer, catalogue).

Mymar venusta: Yoshimoto, 1990: 60 (list).

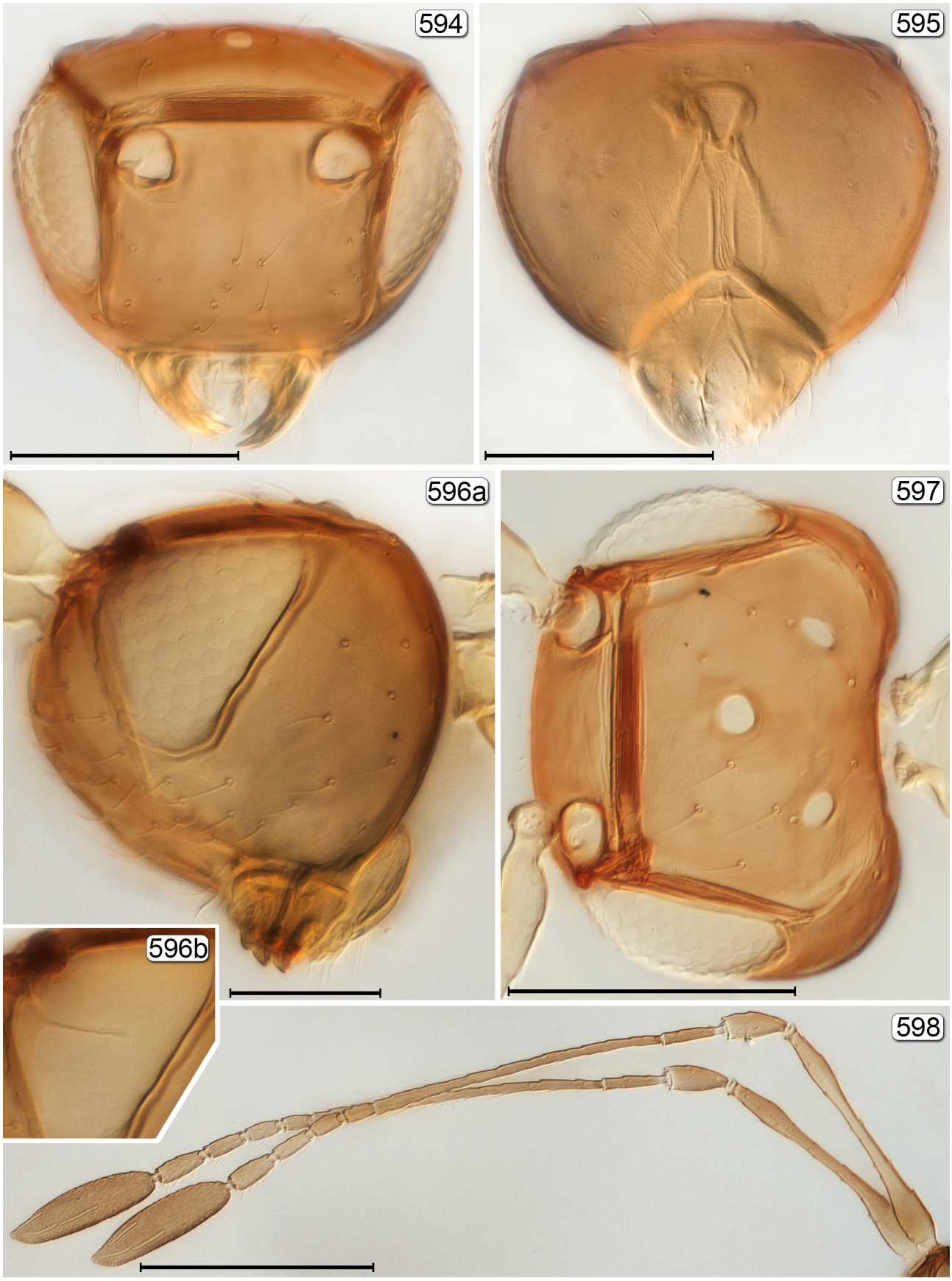
Mymar cincinnati Girault, 1917 [324]: 99. Holotype ♂ (USNM). **TL:** USA, Maryland, Glendale. Synonymy by Donev & Triapitsyn, 2010: 67, from previous synonymy under *M. pulchellum* by Annecke, 1961a: 550. Girault, 1929 [428]: 12 (key); Annecke, 1961a: 551 (unplaced species) [AT]; Burks, 1979: 1031 (catalogue); Triapitsyn & Berezovskiy, 2001: 7 (key), 16 (description).

Mymarilla cincinnati: Peck, 1951: 418 (generic transfer, catalogue).

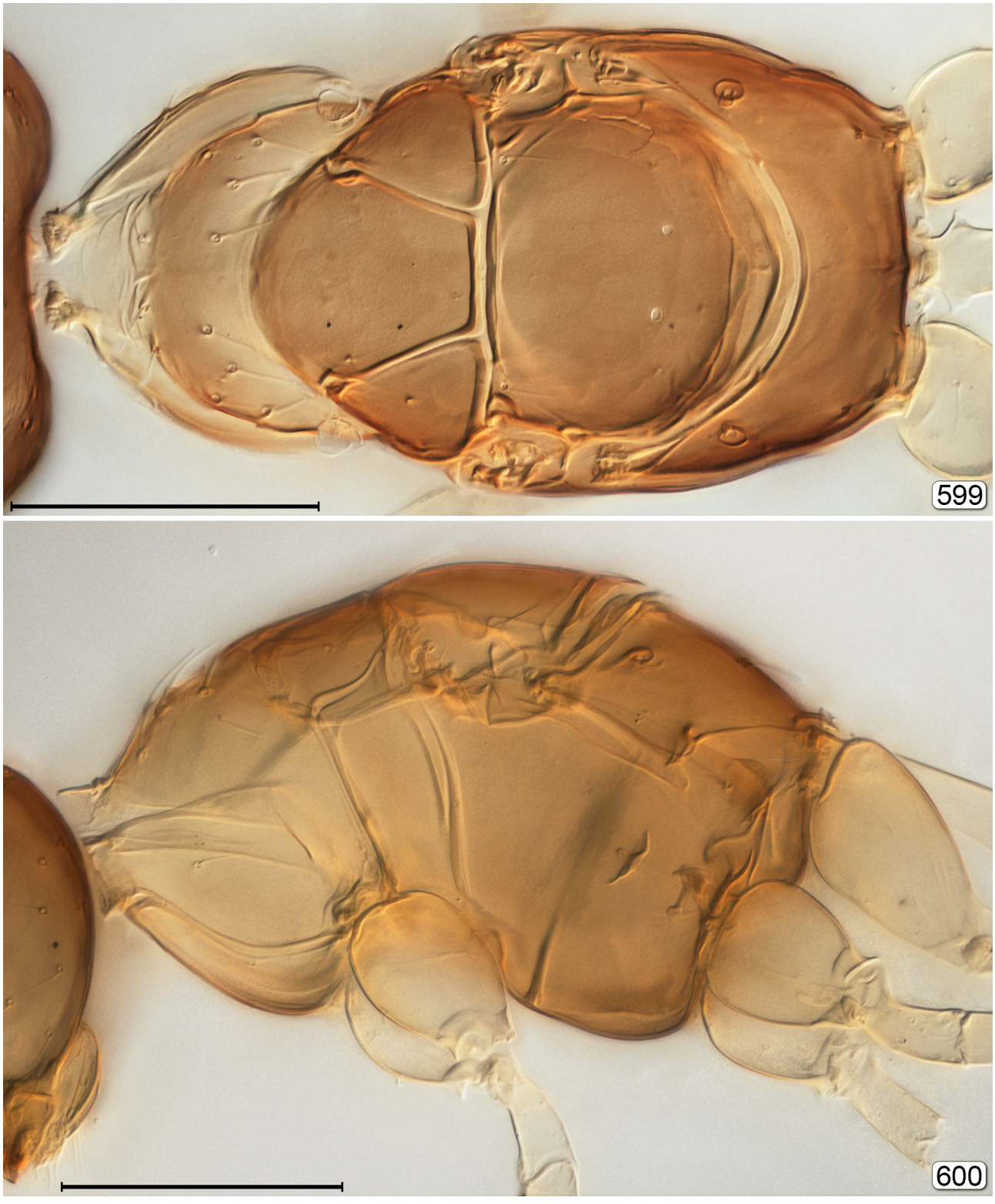
Pterolinononyktera cincinnati: Peck, 1963: 50 (generic transfer, catalogue).

Mymar cincinati [*sic*]: Yoshimoto, 1990: 60 (list).

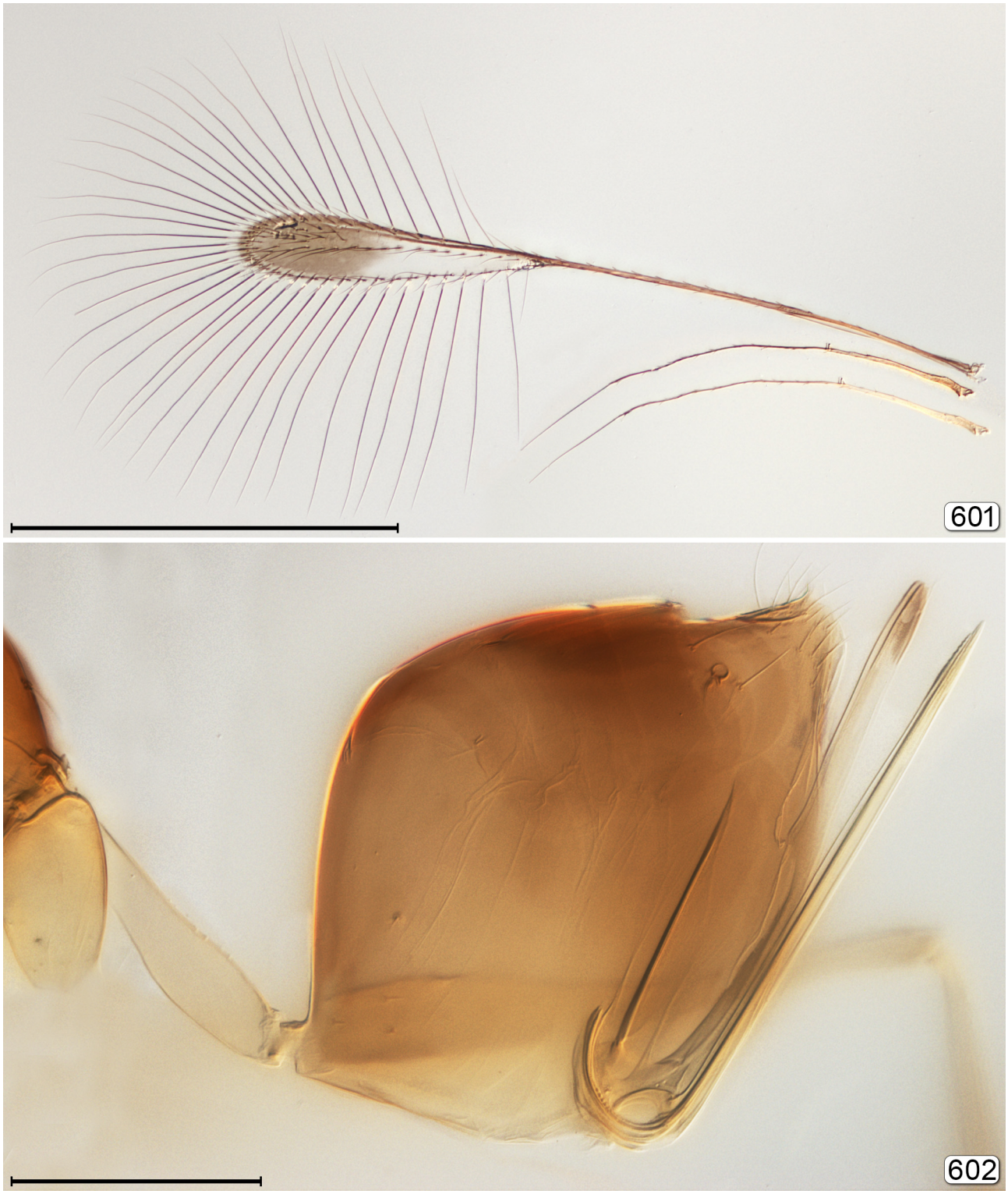
Distribution. USA: IL, MD, NY, PA.



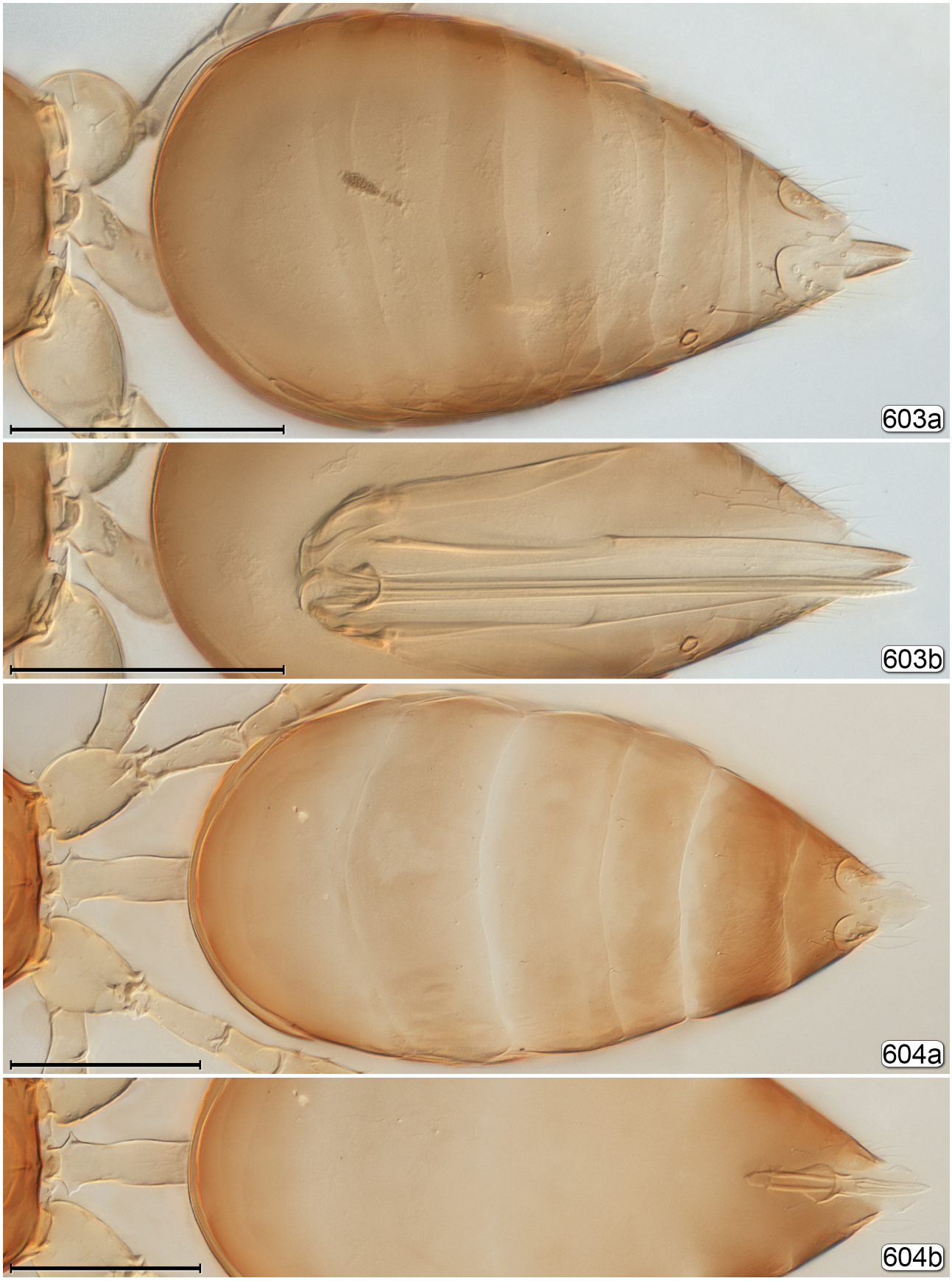
FIGURES 594–598. *Mymar* sp. 594, head, anterior; 595, head, posterior; 596a, head, lateral; 596b, eye showing ocular apodeme; 597, head, dorsal; 598, antennae. Scale bars: 594–597=50 μm; 598=100 μm.



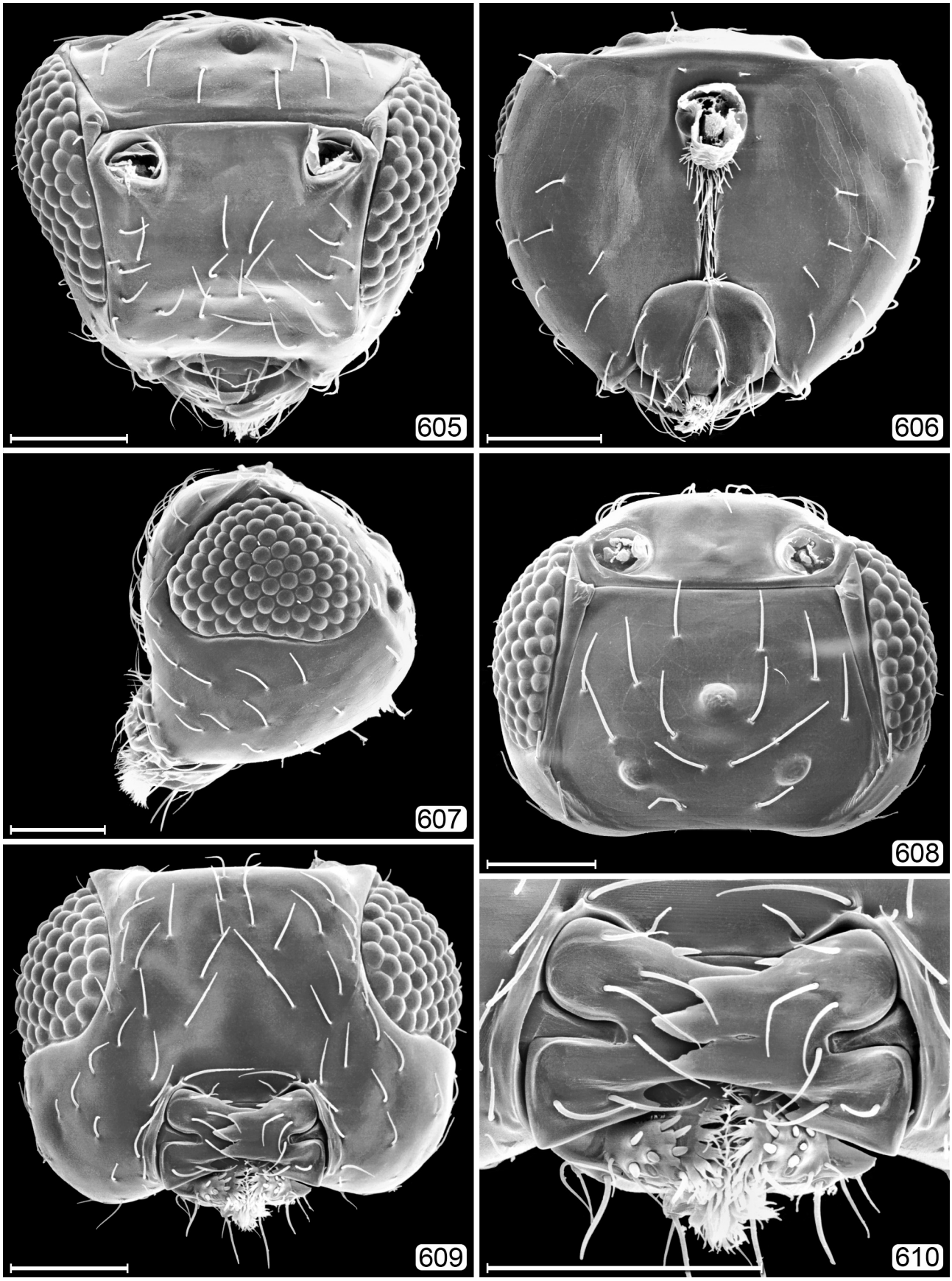
FIGURES 599, **600**. *Mymar* sp., mesosoma. 599, dorsal; 600, lateral. Scale bars=100 μm.



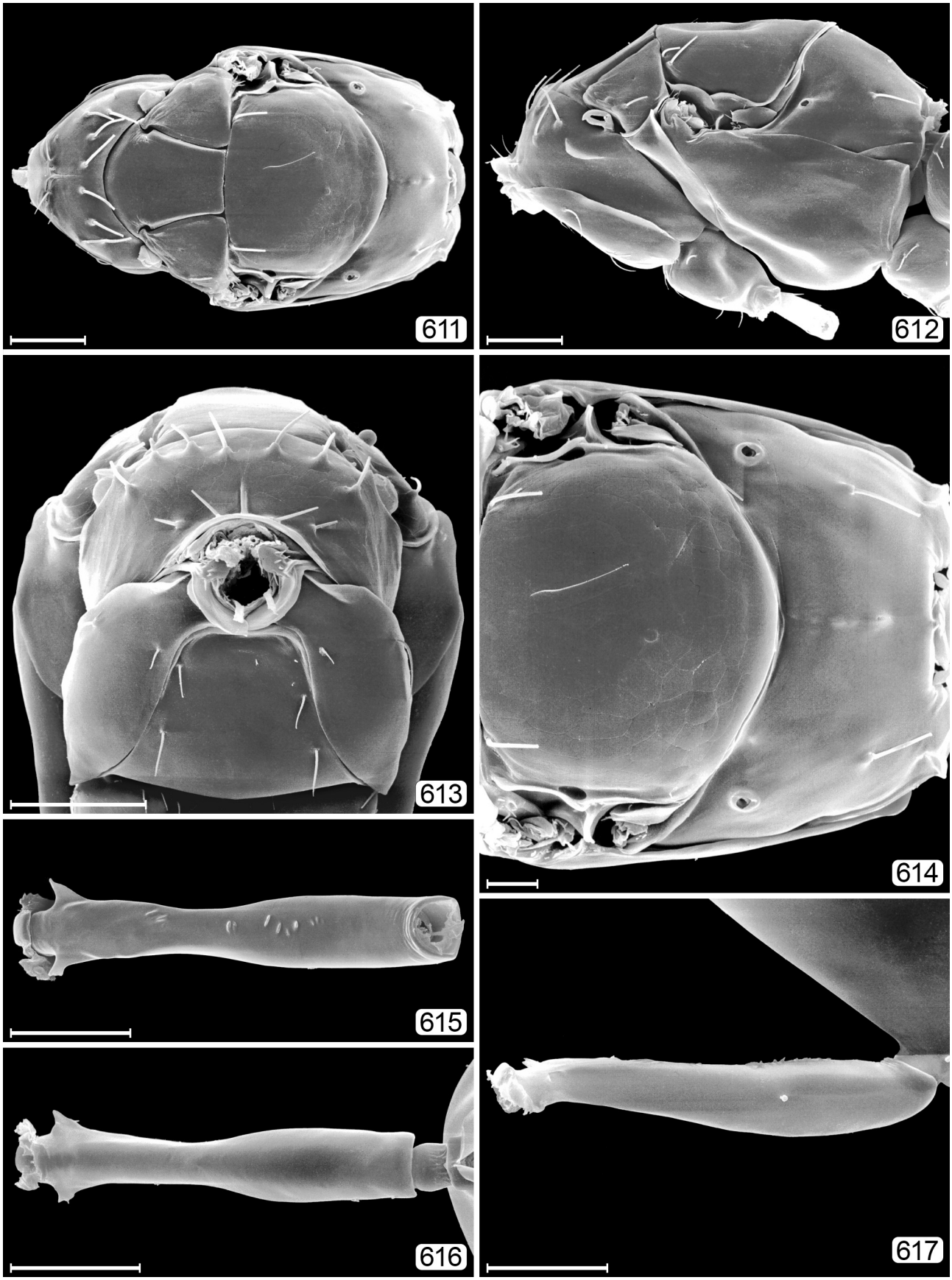
FIGURES 601, **602**. *Mymar taprobanicum* Ward. 601, wings; 602, metasoma. Scale bars=100 μm.



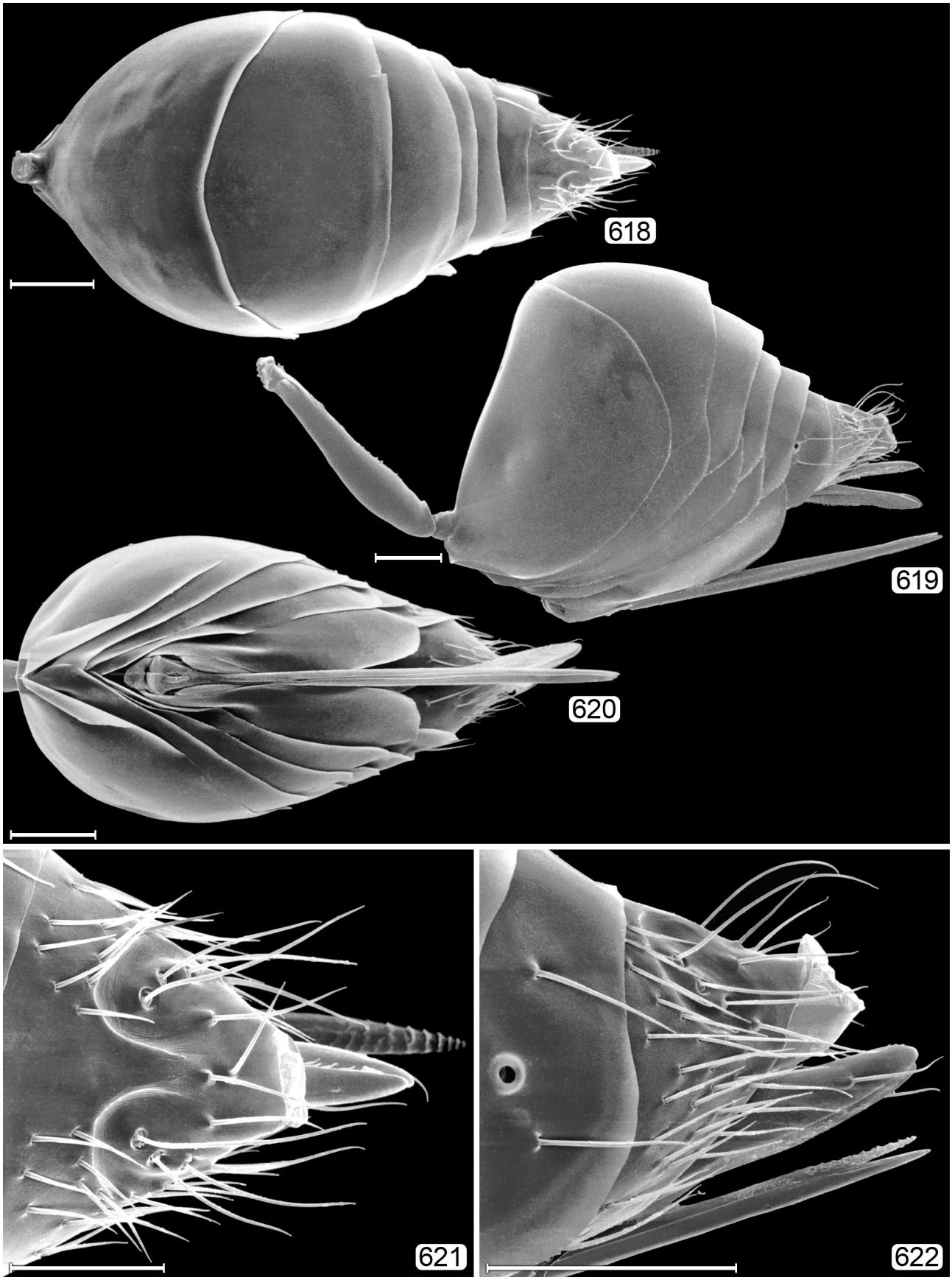
FIGURES 603, **604**. *Mymar* sp., metasoma. 603a, dorsal; 603b, genitalia; 604a, male, dorsal; 604b; genitalia. Scale bars=100 μm.



FIGURES 605–610. *Mymar* sp., head. 605, anterior; 606, posterior; 607, lateral; 608, dorsal; 609, ventral; 610, mouthparts. Scale bars=50 μm.



FIGURES 611–617. *Mymar* sp. 611, mesosoma, dorsal; 612, mesosoma, lateral; 613, mesosoma, anterior; 614, scutellum–propodeum; 615, petiole, dorsal; 616, petiole, ventral; 617, petiole, lateral. Scale bars=50 μm.



FIGURES 618–622. *Mymar* sp., metasoma. 618, dorsal; 619, lateral; 620, ventral; 621, gaster apex, dorsal; 622, gaster apex, lateral. Scale bars=50 μm.

NEOMYMAR Crawford, 1913

(Figs 623–658)

Neomymar Crawford, 1913: 351. Type species: *Neomymar vierecki* Crawford, 1913, by original designation.
Bruchomymar Ogloblin, 1939: 218. Type species: *Bruchomymar mirabilicornis* Ogloblin, 1939, by original designation. Synonymy by Triapitsyn *et al*., 2006: 2.

Diagnosis. Body length 845–1560 µm. Toruli abutting transverse trabecula (Figs 624, 638); vertex with a thick, blunt and often long seta outside posterior apex of supraorbital trabecula (Figs 626, 627, 641); axillar seta extending almost to posterior margin of frenum (Figs 629, 644); fore wing narrow for at least half of length beyond apex of venation then widening abruptly into an oval disc with a brown spot at apex and sometimes also at base (Fig. 631); petiole apparently attached to gt_1 (Figs 633, 652).

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Palaeoneura*, *Polynema*, *Stephanodes*), *Neomymar* is the most similar to *Mymar*; both have the toruli high on face, abutting the transverse trabecula.

Important reference. Triapitsyn *et al.* (2006).

Neomymar islacaelestum Triapitsyn, Berezovskiy & Huber, 2006

Neomymar islacaelestum Triapitsyn *et al*., 2006: 6. Holotype ♀ (TAMU). **TL:** USA, Arizona, Cochise Co., Chiricahua Mts., Coronado National Forest, 1 mi. SW Onion Saddle. Triapitsyn *et al*., 2006: 4 (key).

Distribution. USA: AZ, NM.

Neomymar korsar Triapitsyn, Berezovskiy & Huber, 2006

Neomymar korsar Triapitsyn *et al.*, 2006: 7. Holotype ♀ (UCRC). **TL:** USA, Louisiana, East Baton Rouge Parish, Baton Rouge. Triapitsyn *et al*., 2006: 4 (key).

Distribution. USA: FL, LA, TX, VA.

Neomymar pozhar Triapitsyn, Berezovskiy & Huber, 2006

Neomymar pozhar Triapitsyn *et al*., 2006: 8. Holotype ♀ (CNC). **TL:** USA, Florida, Alachua Co., Gainesville. Triapitsyn *et al.*, 2006: 4 (key).

Distribution. USA: FL, VA.

Neomymar vierecki Crawford, 1913

Neomymar vierecki Crawford, 1913: 351. Holotype ♀ (USNM). **TL:** USA, Virginia, Rosslyn. Girault, 1929 [428]: 13 (key); Burks, 1979: 1031 (catalogue); Huber, 1997: 506 (key); Yoshimoto, 1990: 61 (list); De Santis, 1989: 73 (catalogue) [NT]; Triapitsyn *et al.*, 2006: 4 (key, description).
Neomymar vierecki vierecki: Peck, 1951: 418 (catalogue); Peck, 1963: 50 (catalogue).
Neomymar vierecki marilandi Girault, 1917 [332]: 2. Holotype ♀ (USNM). **TL:** USA: Maryland, Glen Dale. Synonymy by Burks, 1979: 1031 and Triapitsyn *et al.*, 2006: 4. Girault, 1929 [428]: 13 (key); Peck, 1951: 418 (unjustified emendation, catalogue); Burks, 1979: 1031 (catalogue).
Neomymar vierecki marylandi [*sic*]: Peck, 1963: 50 (catalogue).

Distribution. Canada: AB, ON, QC. USA: CA, FL, GA, IA, MA, MD, MI, MS, NC, NH, OR, RI, TN, TX, VA, WI.

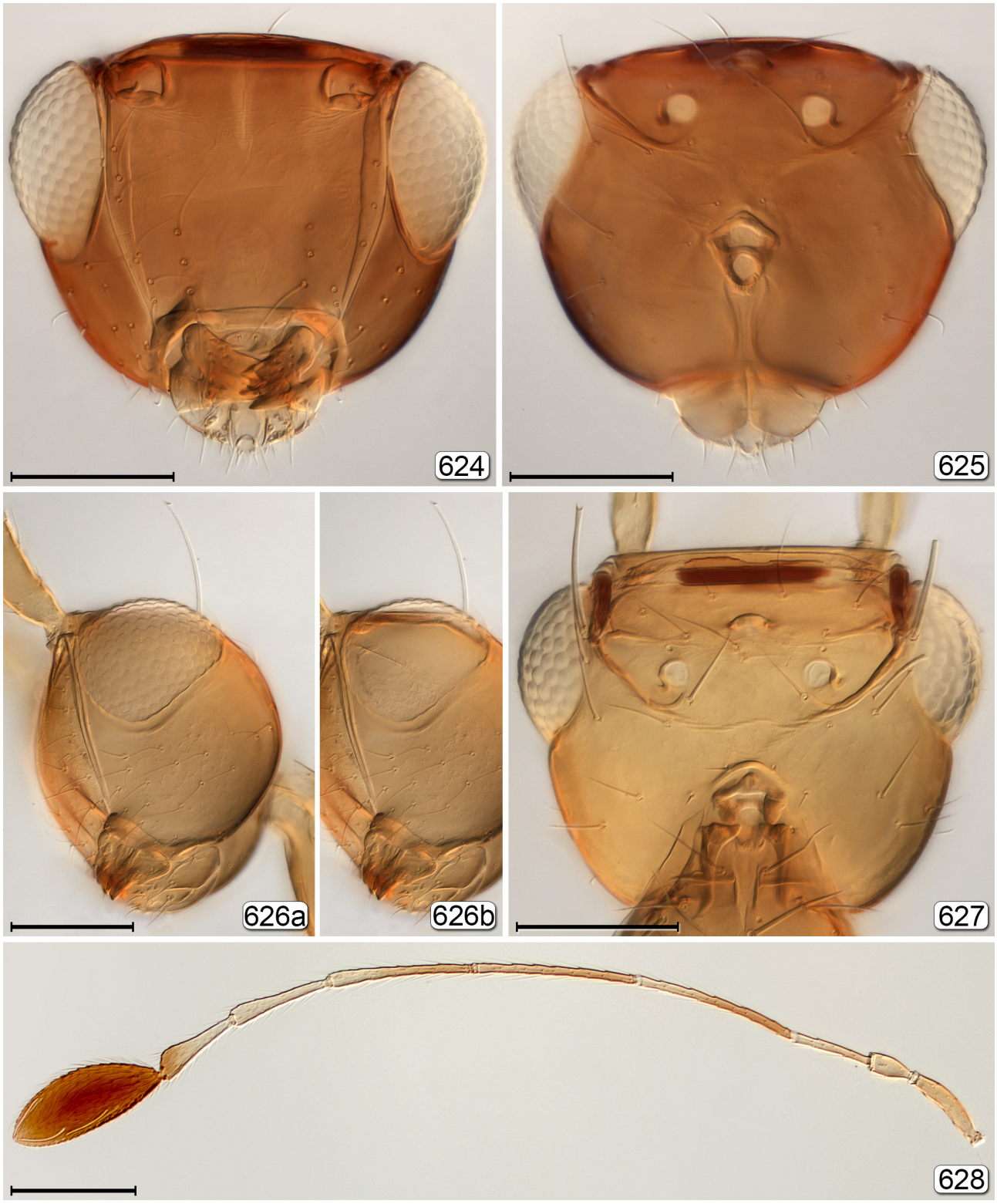
Neomymar zuparkoi Triapitsyn, Berezovskiy & Huber, 2006

Neomymar zuparkoi Triapitsyn *et al*., 2006: 7. Holotype ♀ (UCRC). **TL:** USA, Colorado, Mesa Co., Palisade (near Grand Junction). Triapitsyn *et al*., 2006: 4 (key).

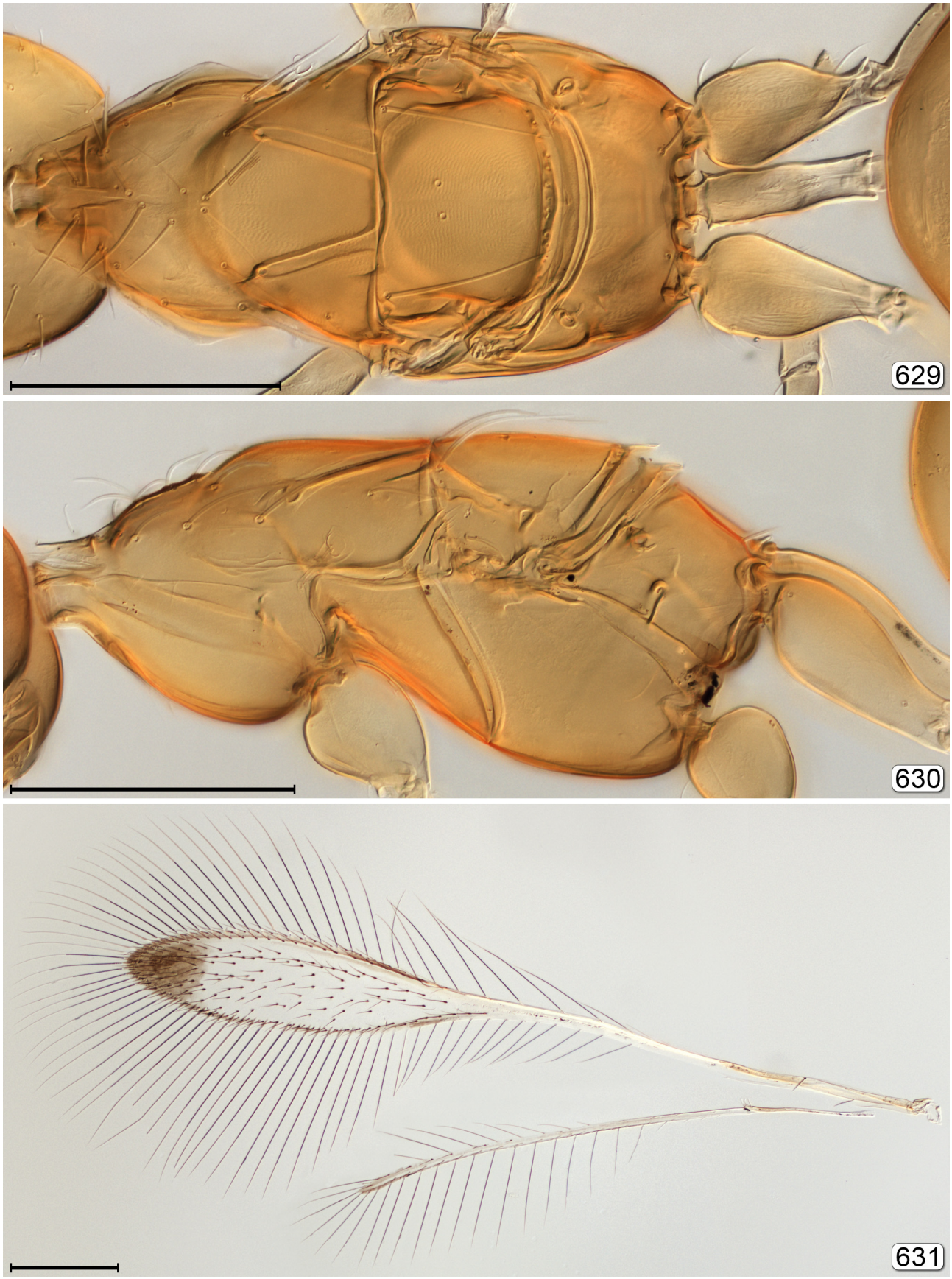
Distribution. USA: AZ, CA, CO.



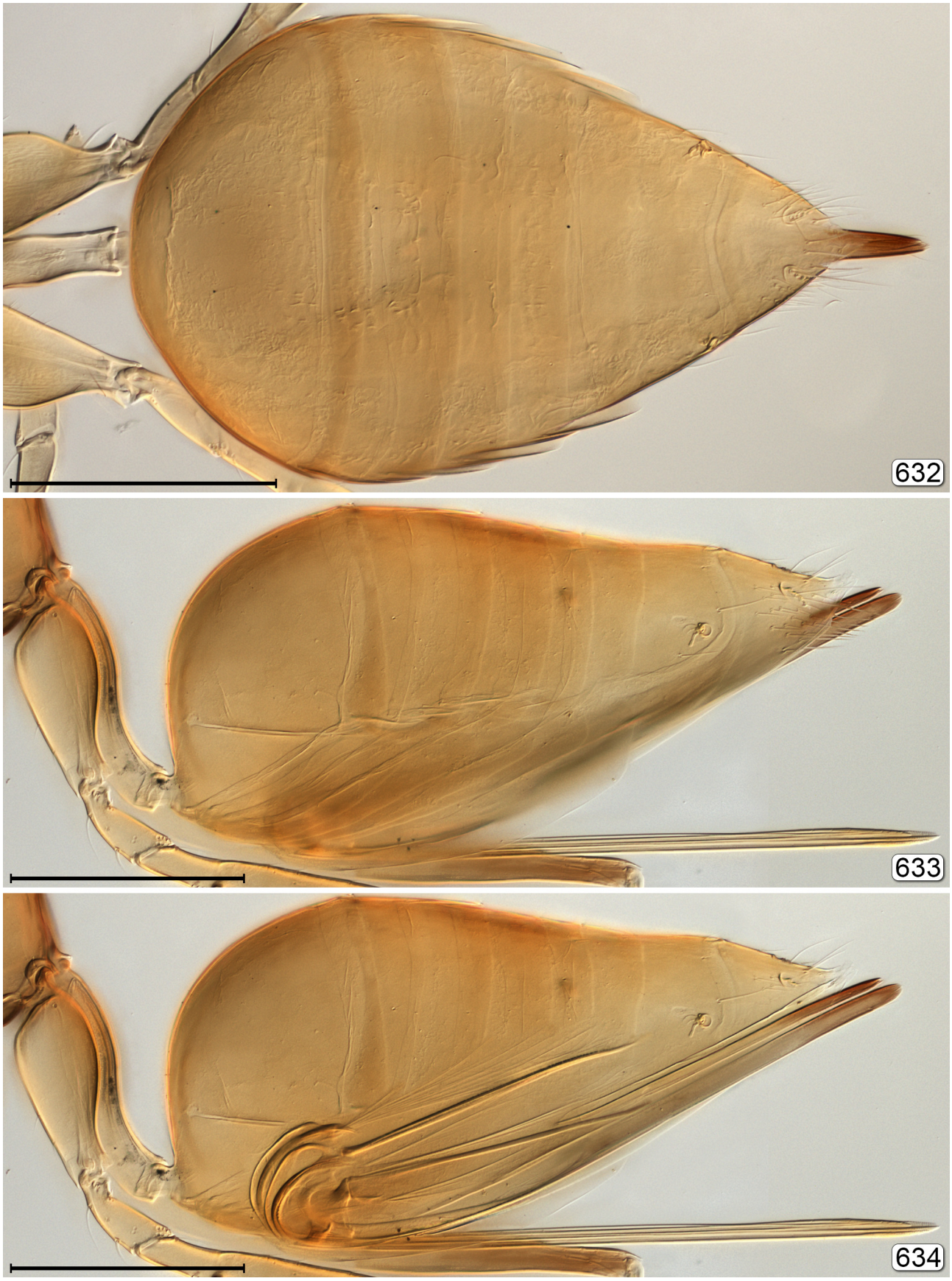
FIGURE 623. *Neomymar vierecki* Crawford, habitus. USA, Florida, Alachua Co., Gainesville, 1–28.ii.1987, W.R.M. Mason. Scale bar=1000 μm.



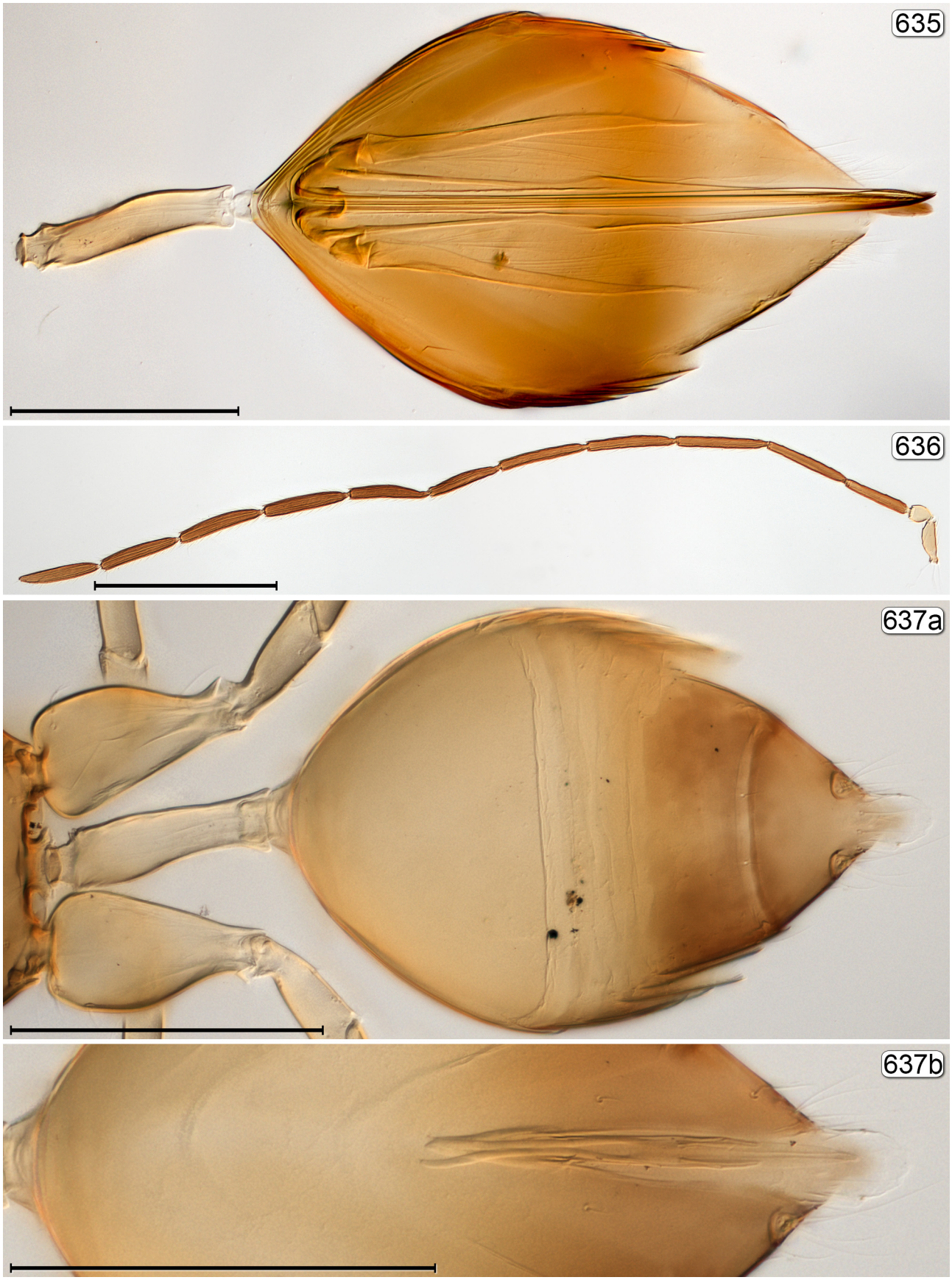
FIGURES 624–628. *Neomymar vierecki* Crawford, head except 628. 624, anterior, male; 625, posterior, male; 626a, lateral; 626b, lateral (internal) showing ocular apodeme; 627; dorsal; 628, antenna. Scale bars: 624–627=100 µm; 628=200 µm.



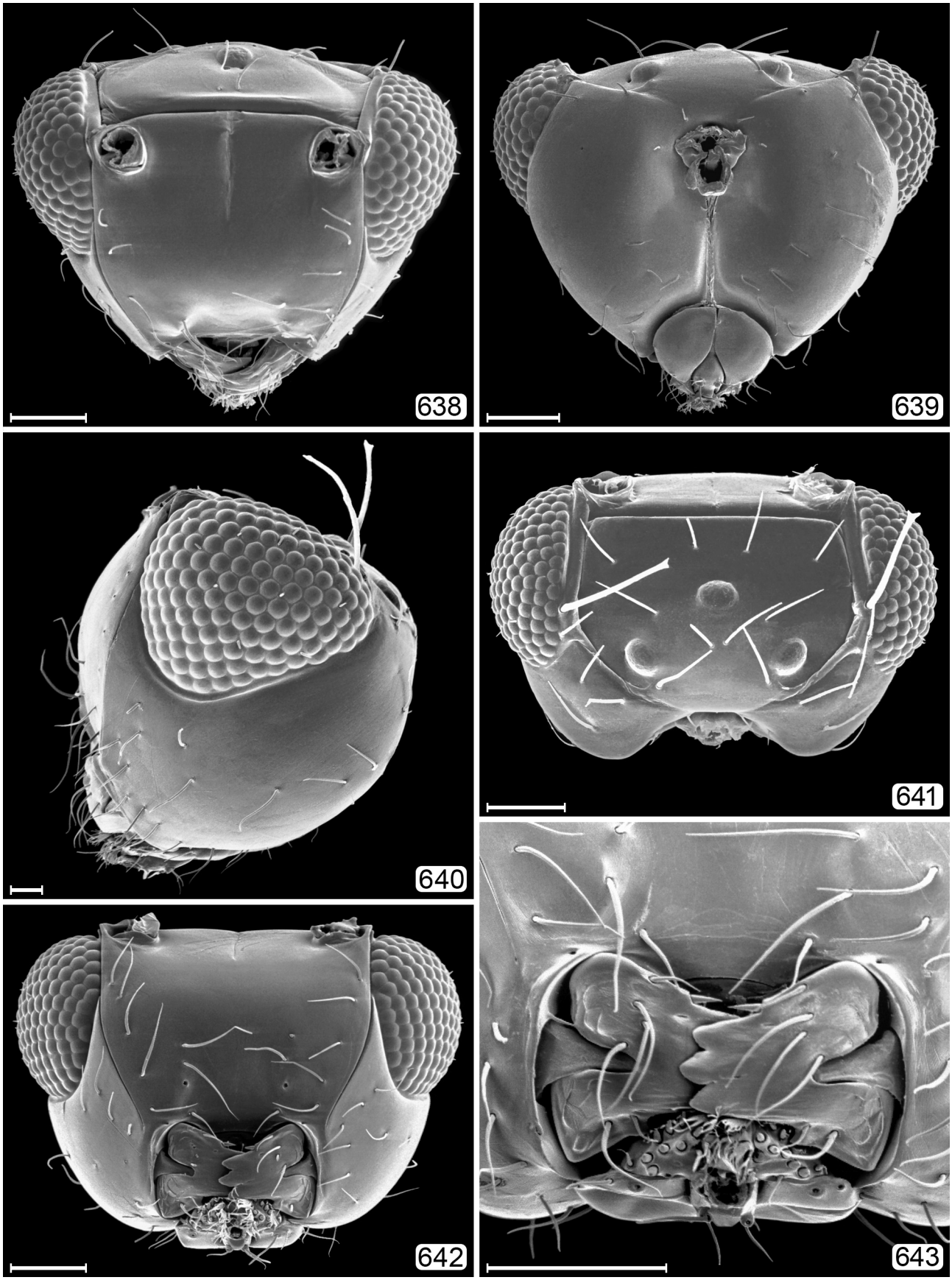
FIGURES 629–631. *Neomymar vierecki* Crawford. 629, mesosoma, dorsal; 630, mesosoma, lateral; 631, wings. Scale bars=200 μm.



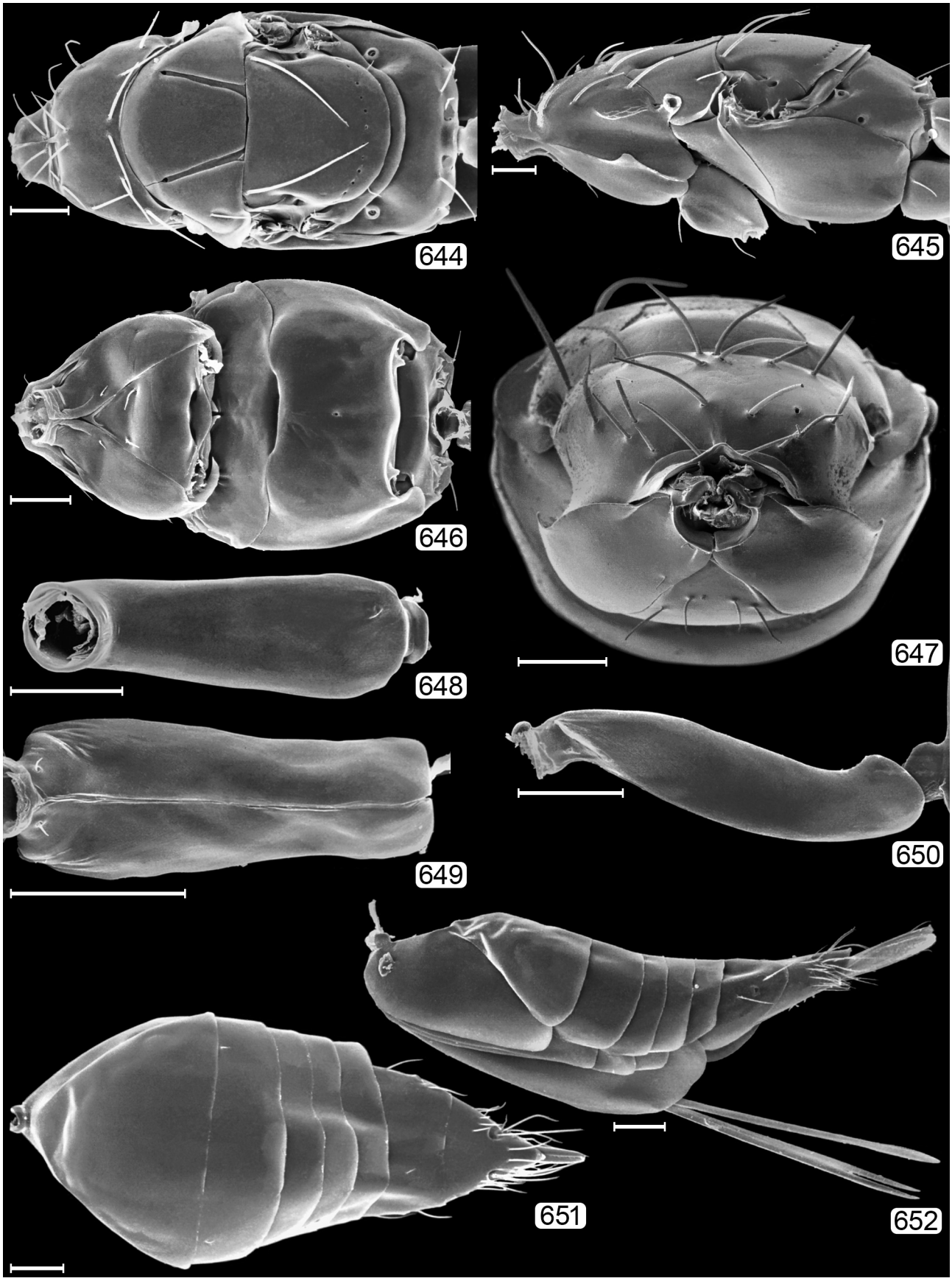
FIGURES 632–634. *Neomymar vierecki* Crawford, metasoma. 632, dorsal; 633, lateral; 634, lateral showing genitalia. Scale bars=200 μm.



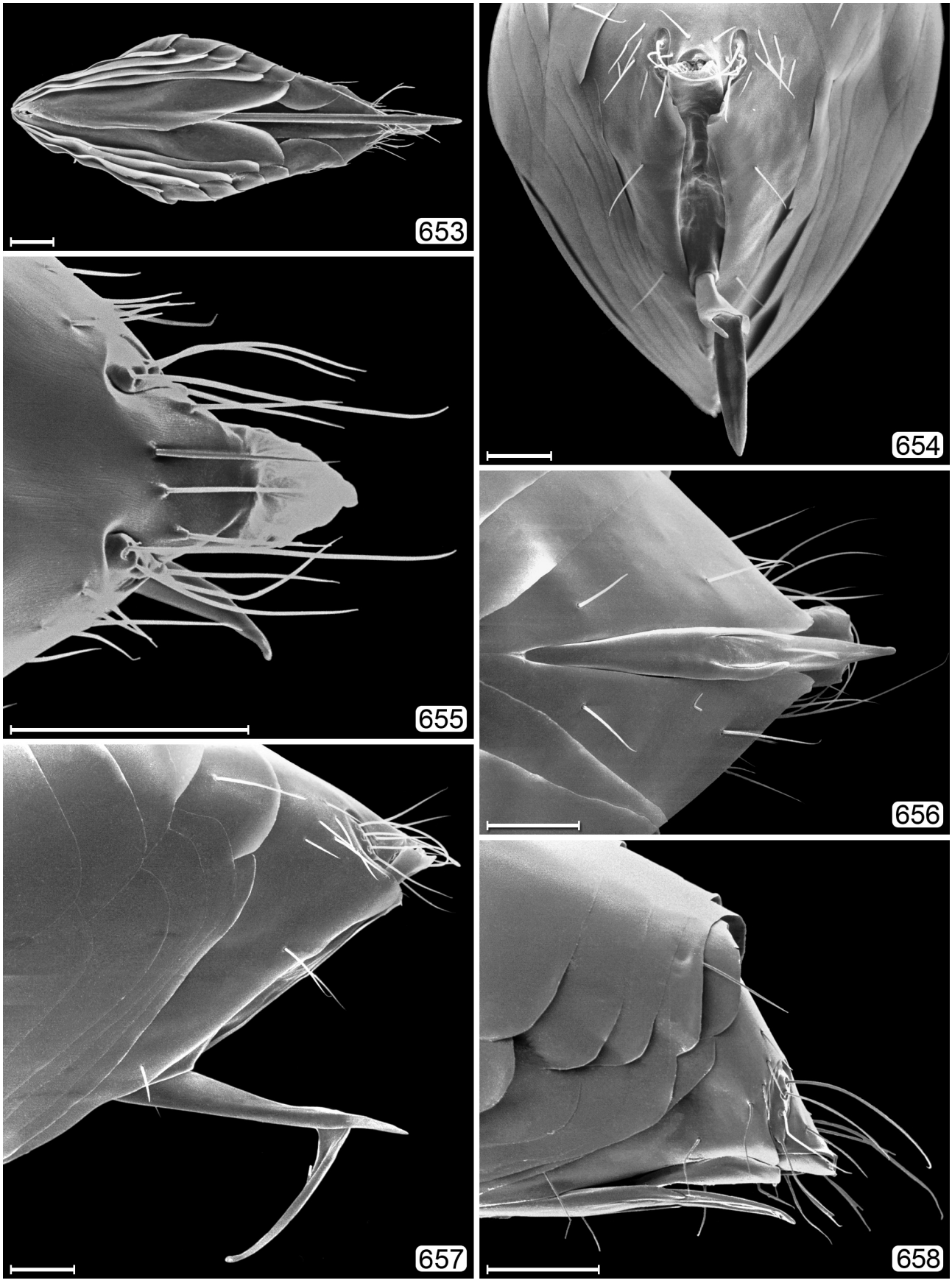
FIGURES 635–637. *Neomymar vierecki* Crawford, metasoma except 636. 635, ventral; 636, male antenna; 637a, male, dorsal; 637b, genitalia seen through gaster. Scale bars: 635, 637=100 μm; 636=500 μm.



FIGURES 638–643. *Neomymar* sp., head (Costa Rica, Guanacaste National Park). 638, anterior; 639, posterior; 640, lateral; 641, dorsal; 642; ventral; 643, mouthparts. Scale bars=50 μm.



FIGURES 644–652. *Neomymar* sp. (Costa Rica, Guanacaste National Park). 644, mesosoma, dorsal; 645, mesosoma, lateral; 646, mesosoma, ventral; 647, mesosoma, anterior; 648, petiole, dorsal; 649, petiole, ventral; 650, petiole, lateral; 651, gaster, dorsal; 652, gaster, lateral. Scale bars=50 μm.



FIGURES 653–658. *Neomymar* spp. (Costa Rica, Guanacaste National Park). 653, gaster, ventral; 654, male gaster, posterior, with genitalia lowered (aedeagus pointing ventrally); 655, male gaster apex, dorsal; 656, male gaster apex, ventral; 657, male gaster apex, lateral with genitalia lowered (aedeagus pointing ventrally); 658, male gaster apex, lateral. Scale bars=50 μm.

NEOSTETHYNIUM Ogloblin, 1964

(Figs 659–676)

Stethynium (*Neostethynium*) Ogloblin, 1964: 106. Type species: *Stethynium* (*Neostethynium*) *stenopterum* Ogloblin, 1964, by original designation. Raised to genus by Huber, 1987: 827 and Yoshimoto, 1990: 45.

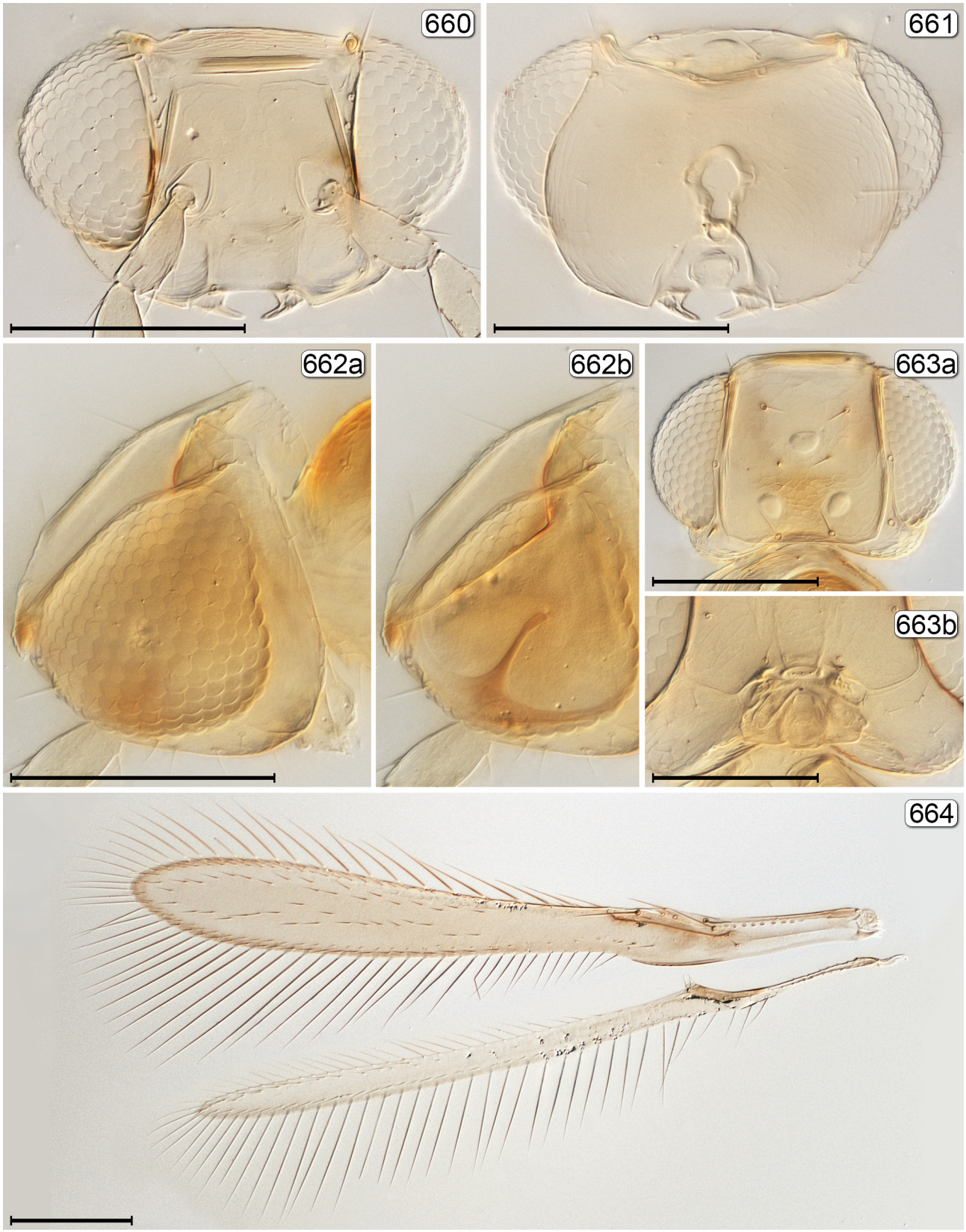
Diagnosis. Head in lateral view with vertex almost horizontal and forming a right angle with posterior surface of head (Fig. 659); face with faint subantennal sulci (Fig. 660); clava 3-segmented, the segments separated by transverse sutures (Figs 659, 665); mandibles small, their apices not touching when closed (Figs 660, 661); ocelli forming an equilateral triangle (Fig. 663a); scutellum with 1 posterolateral seta and with campaniform sensilla abutting (Fig. 666); frenum entire (Fig. 666); genitalia at base with a dark reddish colour (Figs 669, 671). Male mandibles large, crossing when closed, each with 2 equal ventral teeth and a dorsal serrate apically rounded tooth (Fig. 672, 673).

Discussion. *Neostethynium* is one of three Nearctic genera with clava 3-segmented. It differs from *Krokella* by having fore wing narrow, venation shorter than half length of wing, and frenum entire. It differs from *Stethynium* by the mandibles; in *Stethynium* the mandibles in both sexes have 4 equal teeth.

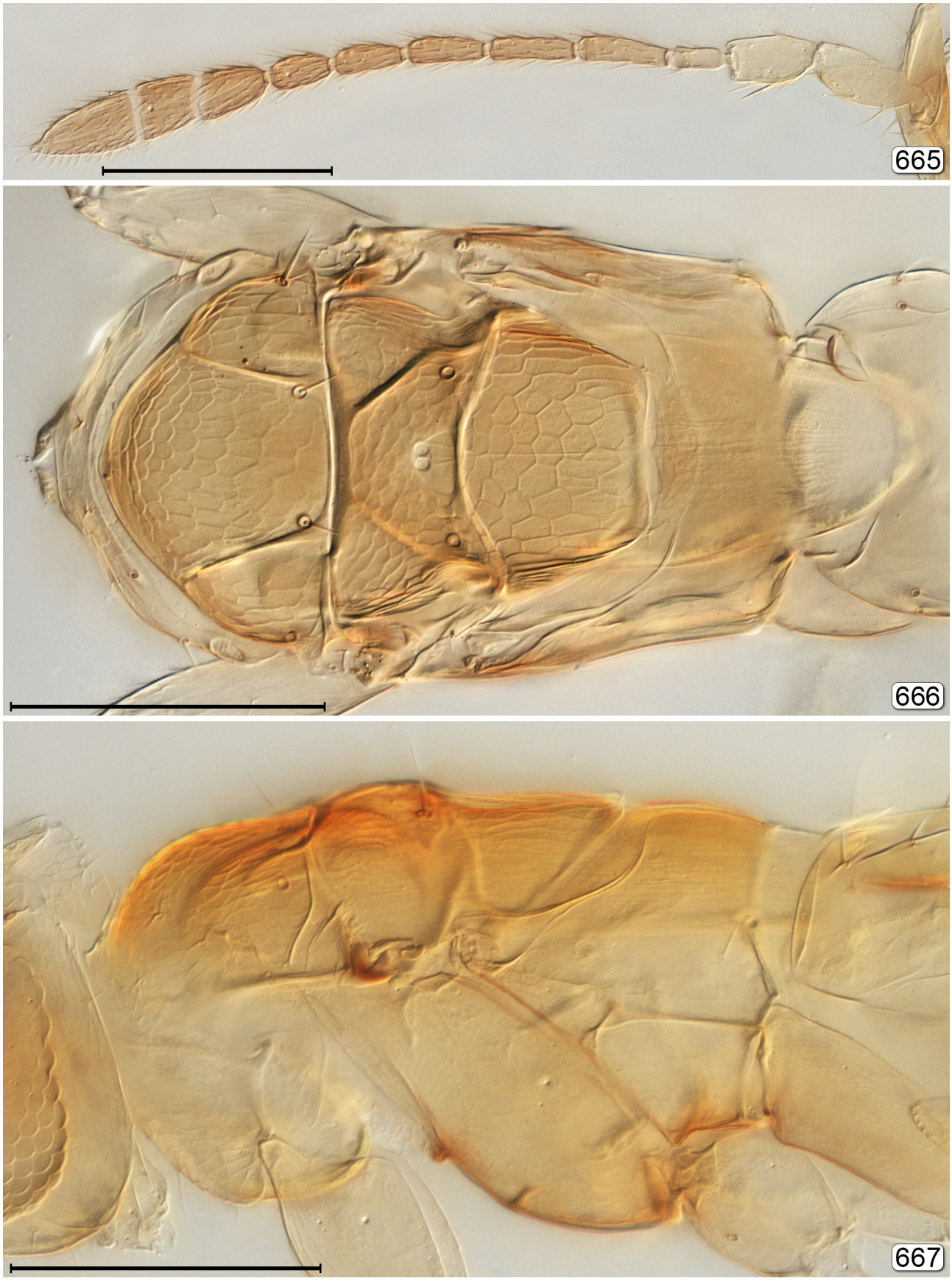
Important reference. Ogloblin (1964).



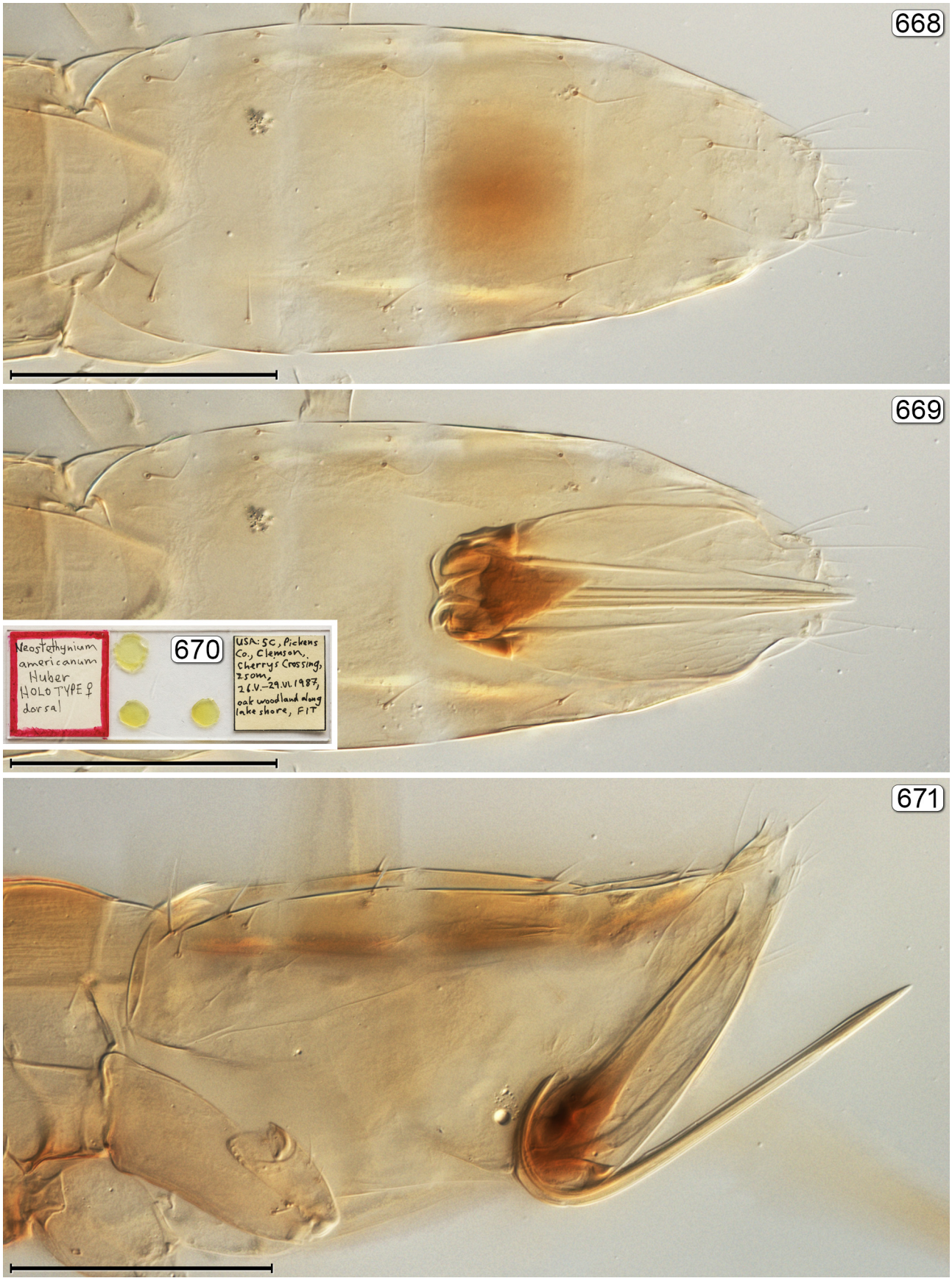
FIGURE 659. *Neostethynium americanum* Huber, paratype habitus. USA, South Carolina, Pickens Co., Clemson, Cherry's Crossing, 26.v–29.vi.1987, near lakeshore, J. Johnson. Scale bar=500 μm.



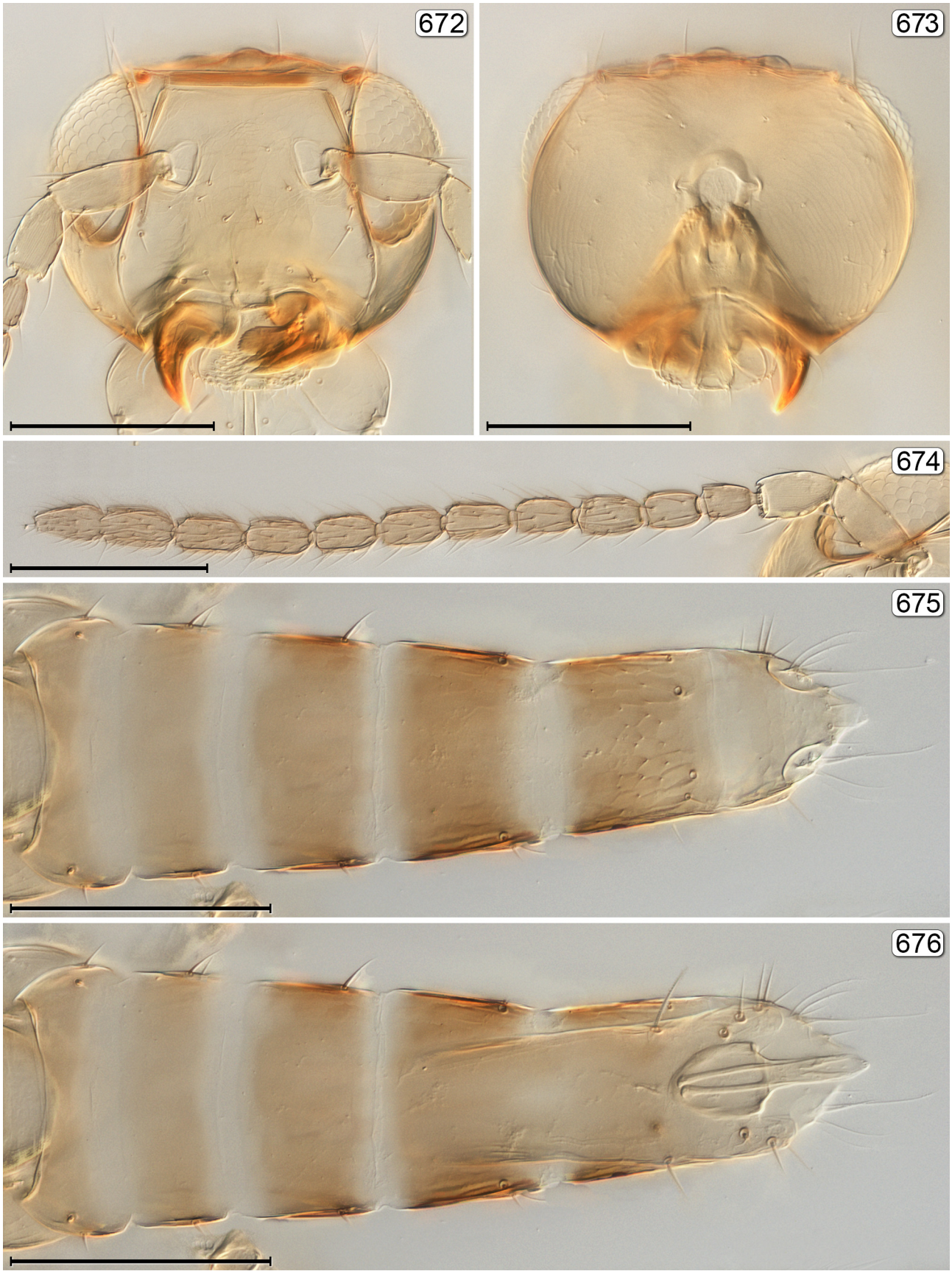
FIGURES 660–664. *Neostethynium americanum* Huber, paratype head except 664. 660, anterior; 661; posterior; 662a, lateral; 662b, lateral (internal) showing ocular apodeme; 663a, dorsal; 663b, mouthparts; 664, wings. Scale bars=100 μm.



FIGURES 665–667. *Neostethynium americanum* Huber, paratype. 665, antenna; 666, mesosoma, dorsal; 667, mesosoma, lateral. Scale bars=100 μm.



FIGURES 668–671. *Neostethynium americanum* Huber, paratype except 670. 668, metasoma, dorsal; 669, metasoma, showing genitalia through gaster; 670, holotype slide; 671, metasoma, lateral. Scale bars=100 μm.



FIGURES 672–676. *Neostethynium americanum* Huber, paratype male. 672, head, anterior; 673, head, posterior; 674, antenna; 675, metasoma, dorsal; 676, metasoma showing genitalia through gaster. Scale bars=100 μm.

***Neostethynium americanum* Huber, sp. n.**
(Figs 659–676)

Type material. Holotype ♀ (CNC), dissected under 4 coverslips on slide (Fig. 670) labelled: 1. "Holotype Neostethynium americanum Huber ♀ dorsal". 2. "USA: SC, Pickens Co., Clemson, Cherry's Crossing, 250m, 26.v-29.vi.1987, oak woodland along lake shore, FIT".

Paratypes. 97 ♀, 1 ♂. USA. **GA**: *Clarke Co.*, Athens, Oconee Forest Park, 11-12.vii.1987, G. Gibson (1 ♀, CNC). **SC**: same data as holotype (45 ♀, 1 ♂, CNC, NHMUK, UCRC, USNM), same data as holotype but 5.vi-7.vii.1987 (42 ♀, CNC, NHMUK, UCRC), same data as holotype but 8-20.vii.1987 (1 ♀, CNC). VA: *Warren Co.*, Shenandoah Nat. Park, Compton Gap, 800m, vii-23.viii.1987, MT, CNC Hym. Team (1 ♀, CNC).

Diagnosis. *Neostethynium americanum* is distinguished from *N. stenopterum* (Ogloblin), the only other described *Neostethynium* species, by the following combination: scutellar seta much closer to lateral margin of scutellum than to campaniform sensillum (Fig. 666) (midway between in *N. stenopterum*); mandible short, but still longer than its basal width (Fig. 662) (shorter in *N. stenopterum*, the mandible rudimentary); fu_2 and fu_6 relatively longer than wide (Fig. 665) (relatively shorter in *N. stenopterum*). Male with dorsal tooth an apically rounded and serrate lobe distinctly different from the 2 ventral teeth (Fig. 672) (dorsal tooth same as 2 ventral teeth in *N. stenopterum*).

Description. **Female**. Body length 455–605 (n=10), 564–626 (n=3, slide mounts). Colour. Body light brown except base of ovipositor dark reddish brown or almost black; eye and ocelli reddish; scape and pedicel yellow, flagellum brown; legs except apical tarsomeres yellowish except femora and tibiae with light brown areas; wings almost uniformly hyaline (Fig. 664). Head width (n=5, including holotype) 171–186. Mandibles short but distinct, when closed their apices not meeting medially (Fig. 660, 661). Antenna. Funicle segments without mps, claval segments each with 1 mps, apex of clava with short, indistinct nipple (Fig. 665); length/width measurements (ratios) (n=5) are: scape 48–62/18–21 (2.37–3.21), pedicel 40–42/20 (2.00–2.10), fu_1 25–29/9–11 (2.37–3.04), fu_2 39–42/10–12 (3.33–3.92), fu_3 33–38/10–11 (3.07–3.69), fu_4 35–36/11–12 (3.03–3.26), fu_5 30–34/10–12 (2.71–3.00), fu_6 28–33/12–14 (2.06–2.48), clava 88–104/20–25 (3.79–5.29). Wings. Fore wing with two uneven longitudinal rows of microtrichia beginning well beyond apex of venation and a few behind apex of venation; hind wing without median rows of microtrichia (Fig. 664). Fore wing length (n=7) 553–586, width 64–70, length/width 8.16–8.88, longest marginal setae 126–151; hind wing length 550–579, width 17–30, longest marginal setae 82–107. Ovipositor length 154–166 (n=6), 0.71–0.80× as long as metatibia length (202–228).

Male. Similar to female except for head and antenna (Fig. 674). Head width 189 (n=1); mandibles large, their apices crossing each other medially, with 3 teeth, the two ventral ones pointed and equal in size, the dorsal tooth a rounded finely serrate lobe (Figs 672, 673). Antenna. fl_1 and fl_2 apparently each with 2 mps, fl_3–fl_{10} apparently each with 3 or 4 mps, fl_{11} apparently with 1 mps (difficult to see any of them); length/width measurements (ratios) (n=1) are: scape 62/22 (2.77), pedicel 40/23 (1.75), fl_1 30/16 (1.87), fl_2 27/16 (1.72), fl_3 33/17 (1.95), fl_4 34/19 (1.83), fl_5 34/18 (1.89), fl_6 36/20 (1.75), fl_7 34/18 (1.83), fl_8 36–18 (1.93), fl_9 36/20 (1.78), fl_{10} 36/16 (2.17), fl_{11} 37/16 (2.24). Genitalia as in Fig. 676.

Derivation of species name. The species is named after the country it occurs in (USA, commonly referred to as America).

Distribution. USA: GA, SC, VA.

***OMYOMYMAR* Schauff, 1983**
(Figs 677–714)

Omyomymar Schauff, 1983: 544. Type species: *Paranaphoidea silvana* Ogloblin, 1935, by original designation.
Caenomymar Yoshimoto, 1990: 49–50. Type species: *Caenomymar howdeni* Yoshimoto, by monotypy. Synonymy by Aquino *et al.*, 2016: 588.

Diagnosis. Body length 495–950 µm. Clava 2-segmented, the apical segment usually with a nipple-like projection (Fig. 684); mandibles minute stubs with apices not overlapping or extending to each other when closed (Fig. 678) ovipositor long and usually distinctly exserted posterior to apex of gaster (Figs 677, 689, 690). Males are distinguished by the scape with inner surface covered in spine-like projections (Fig. 685).

Discussion. The head is strongly sexual dimorphic in *Omyomymar*, unlike the remaining three genera with fe-

male clava 2-segmented [*Anaphes* (*Patasson*), *Schizophragma*, *Platystethynium* (*Platypatasson*)] but like *Krokella*, in which the male head, especially the gena, is relatively enlarged (Figs 680, 683) compared to the female (Figs 678, 682) and this difference even applies to the pronotum where the female pronotum (Fig. 686) is much shorter than the male pronotum (Fig. 691), though it is not certain that the two specimens are conspecific. The male eye is relatively much smaller than the female eye. The slightly indented mesophragma, light coloured base of the gaster, and apical two segments of the male flagellum widely joined suggest that *Schizophragma* may be the most similar genus, though the considerable difference in head size between male and female is similar to that in *Krokella*.

Important references. Schauff (1983), Lin & Chiappini (1996).

Omyomymar alar Schauff, 1983

Omyomymar alar Schauff, 1983: 548. Holotype ♀ (USNM). **TL:** USA, Maryland, Prince Georges Co., Laurel, Patuxent Wildlife Research Center. Yoshimoto, 1990: 48 (list); Lin & Chiappini, 1996: 301 (key).

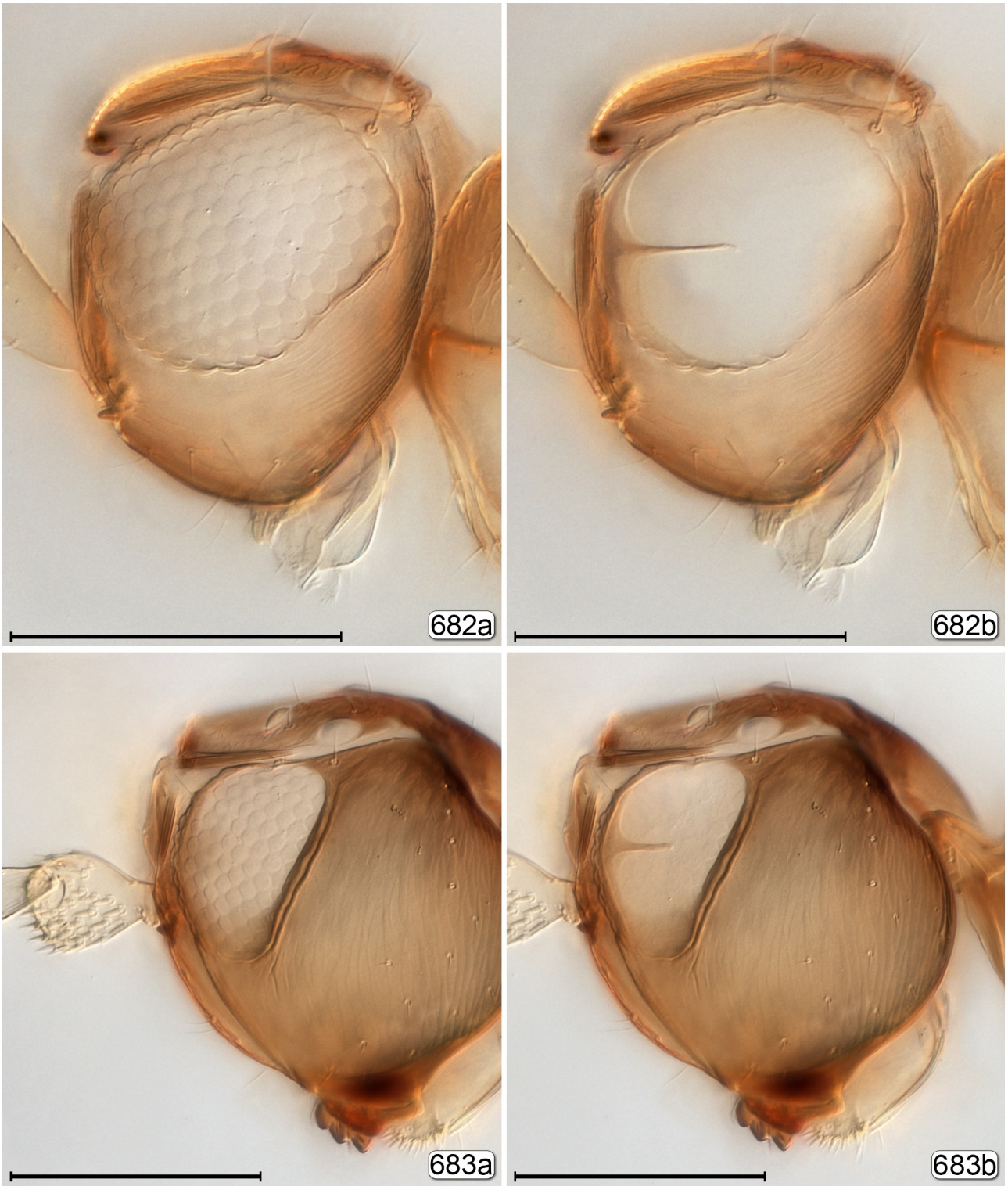
Distribution. USA: MD.



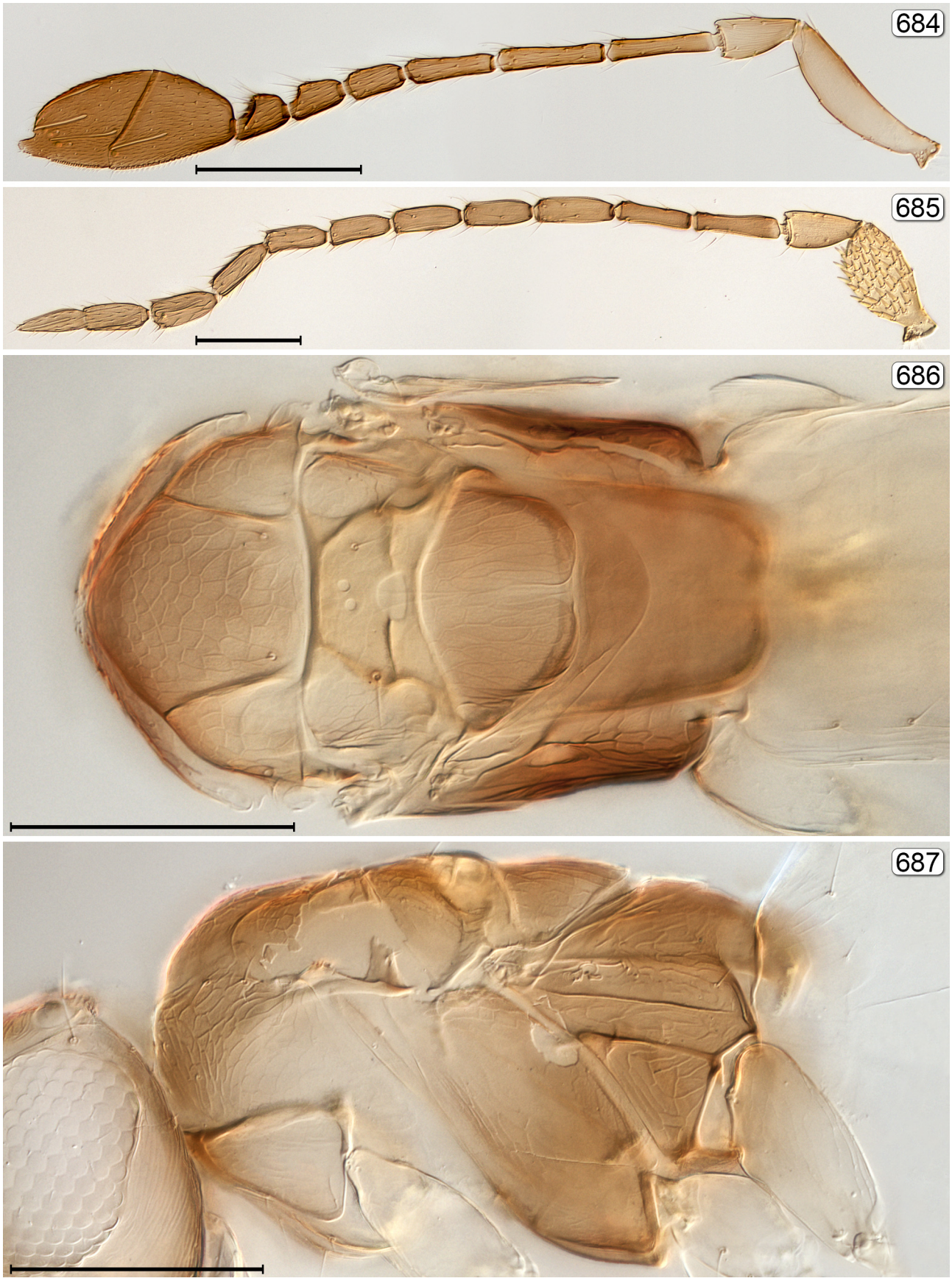
FIGURE 677. *Omyomymar* sp. habitus. Canada, Ontario, Hamilton, 31.viii–7.ix.1981, M. Sanborne. Scale bar=1000 μm.



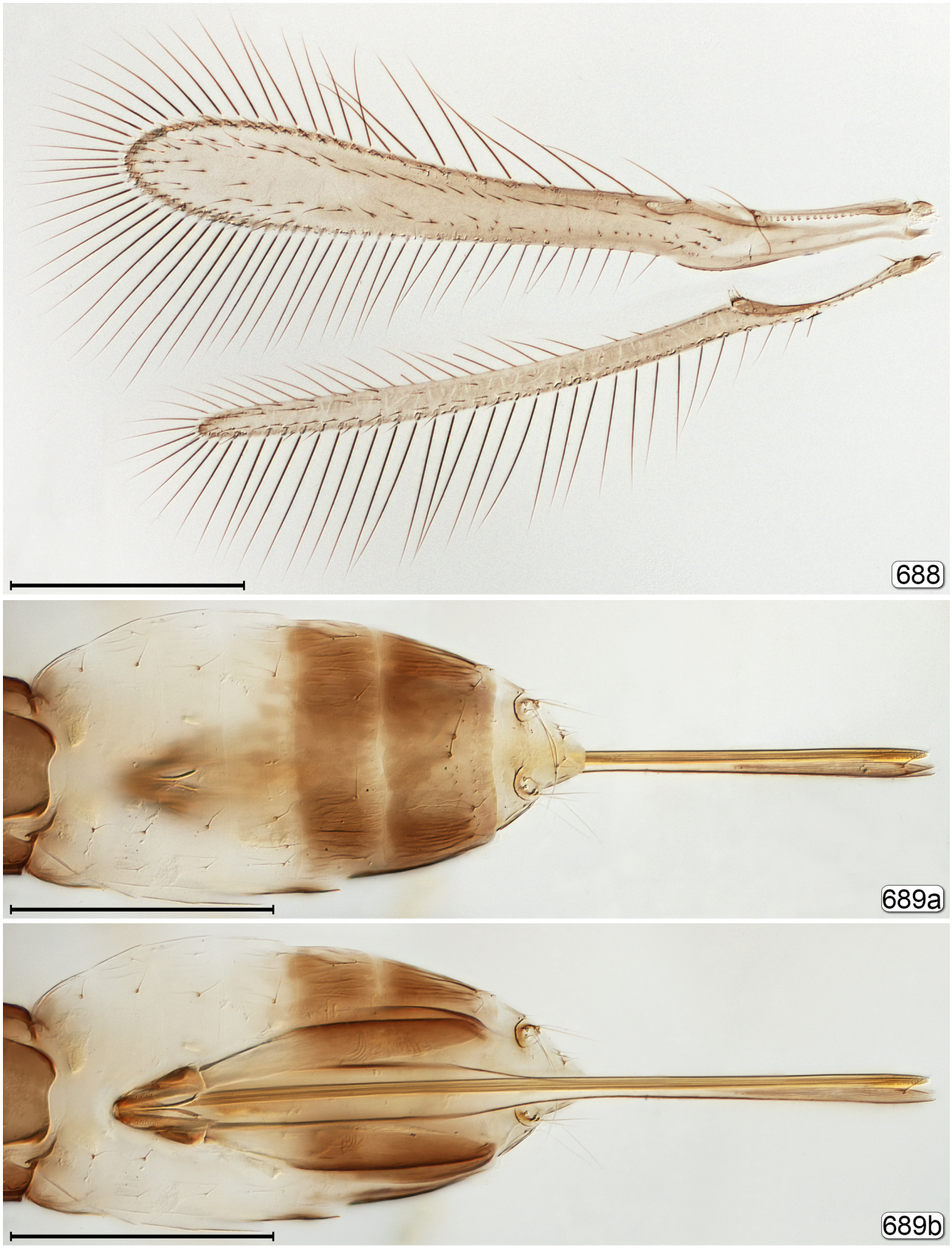
FIGURES 678–681. *Omyomymar* sp., head. 678, female, anterior (vertex separated from face); 679, female, posterior, and vertex; 680, male, anterior; 681, male, posterior, and vertex. Scale bars=100 μm.



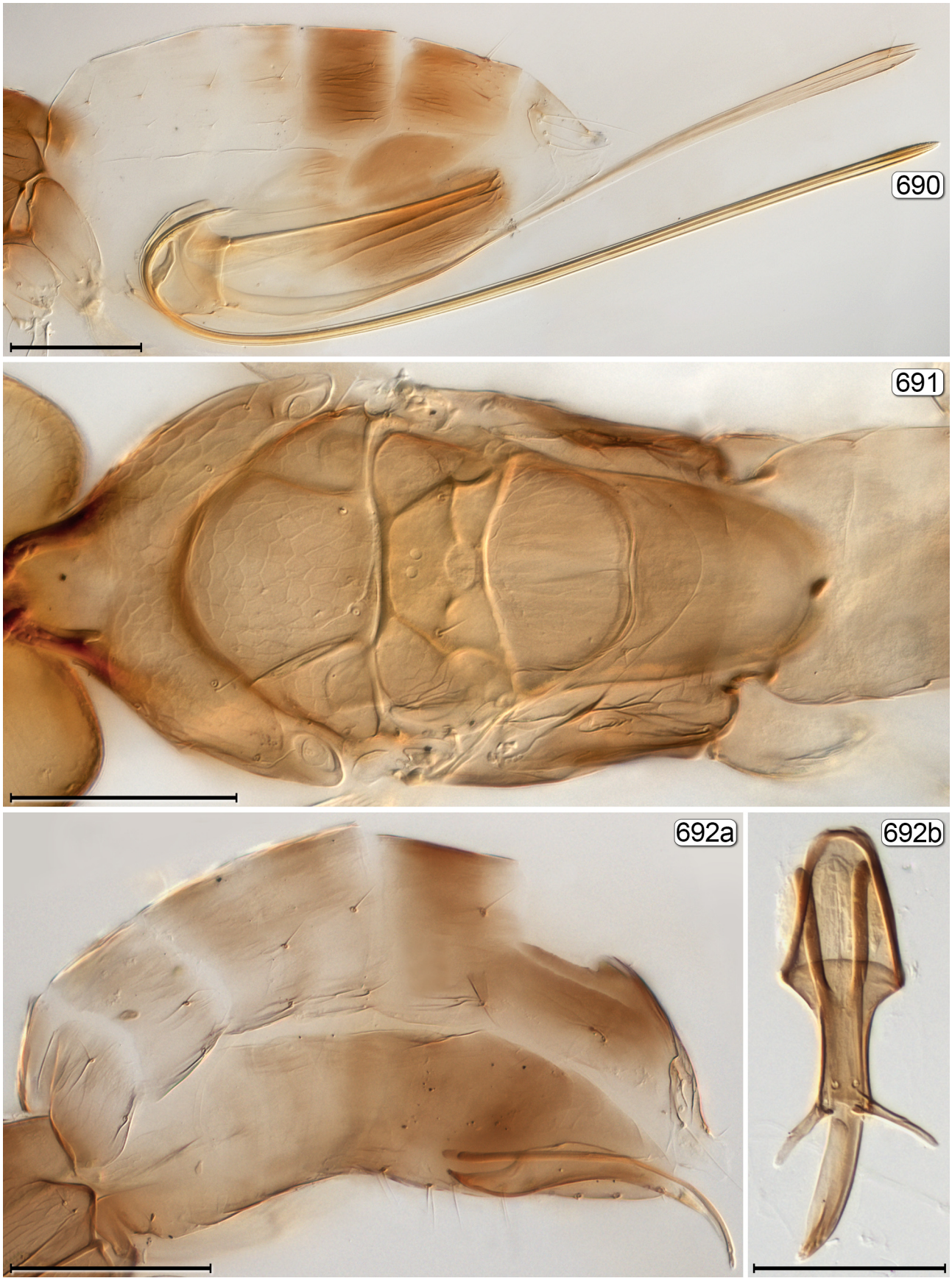
FIGURES 682, 683. *Omyomymar* sp., head. 682a, female, lateral; 682b, female, lateral (internal) showing ocular apodeme; 683a, male, lateral; 683b, male, lateral (internal) showing ocular apodeme. Scale bars=100 μm.



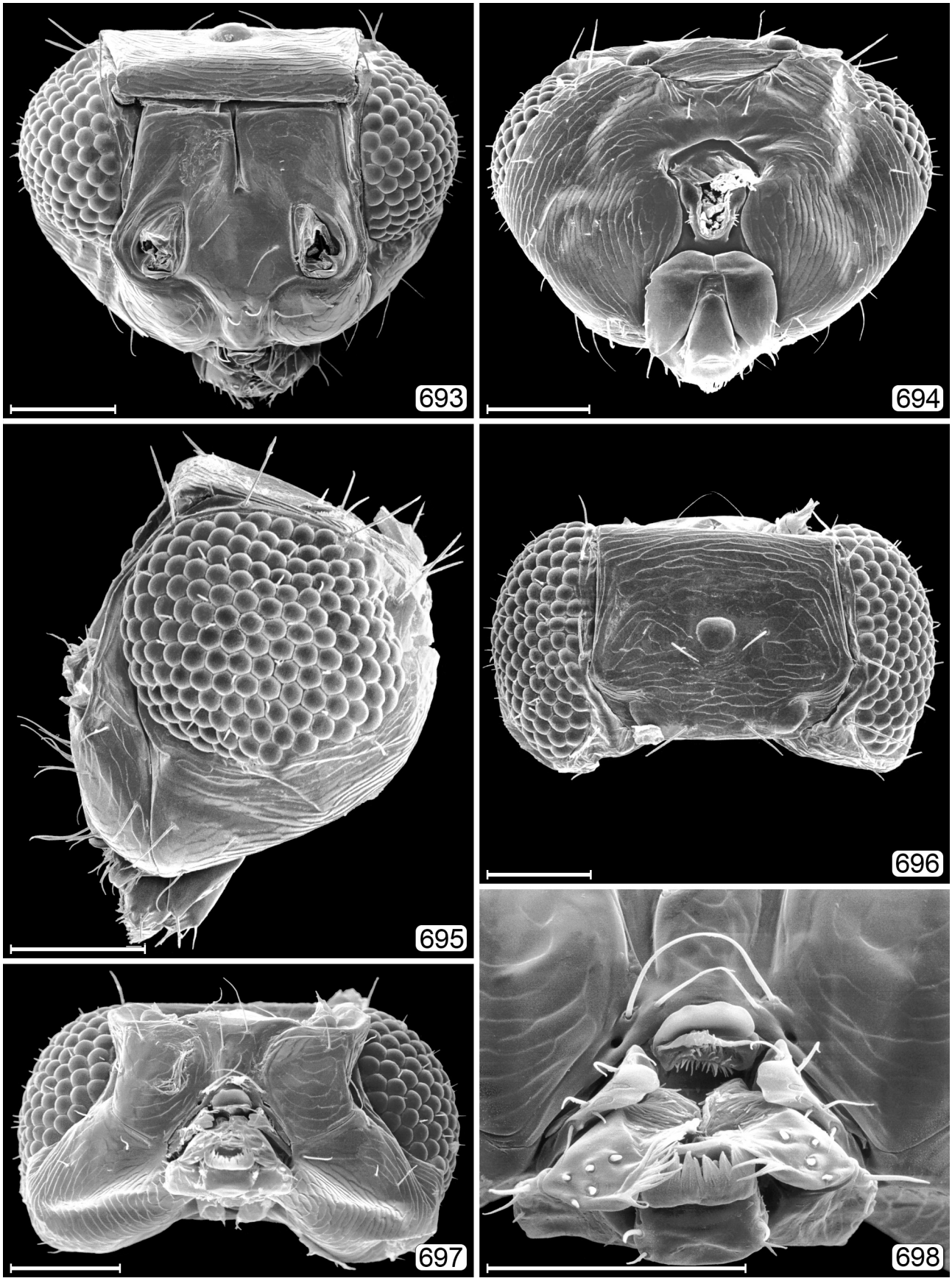
FIGURES 684–687. *Omyomymar* sp. 684, female antenna; 685, male antenna; 686, female mesosoma, dorsal; 687, female metasoma, lateral. Scale bars=100 μm.



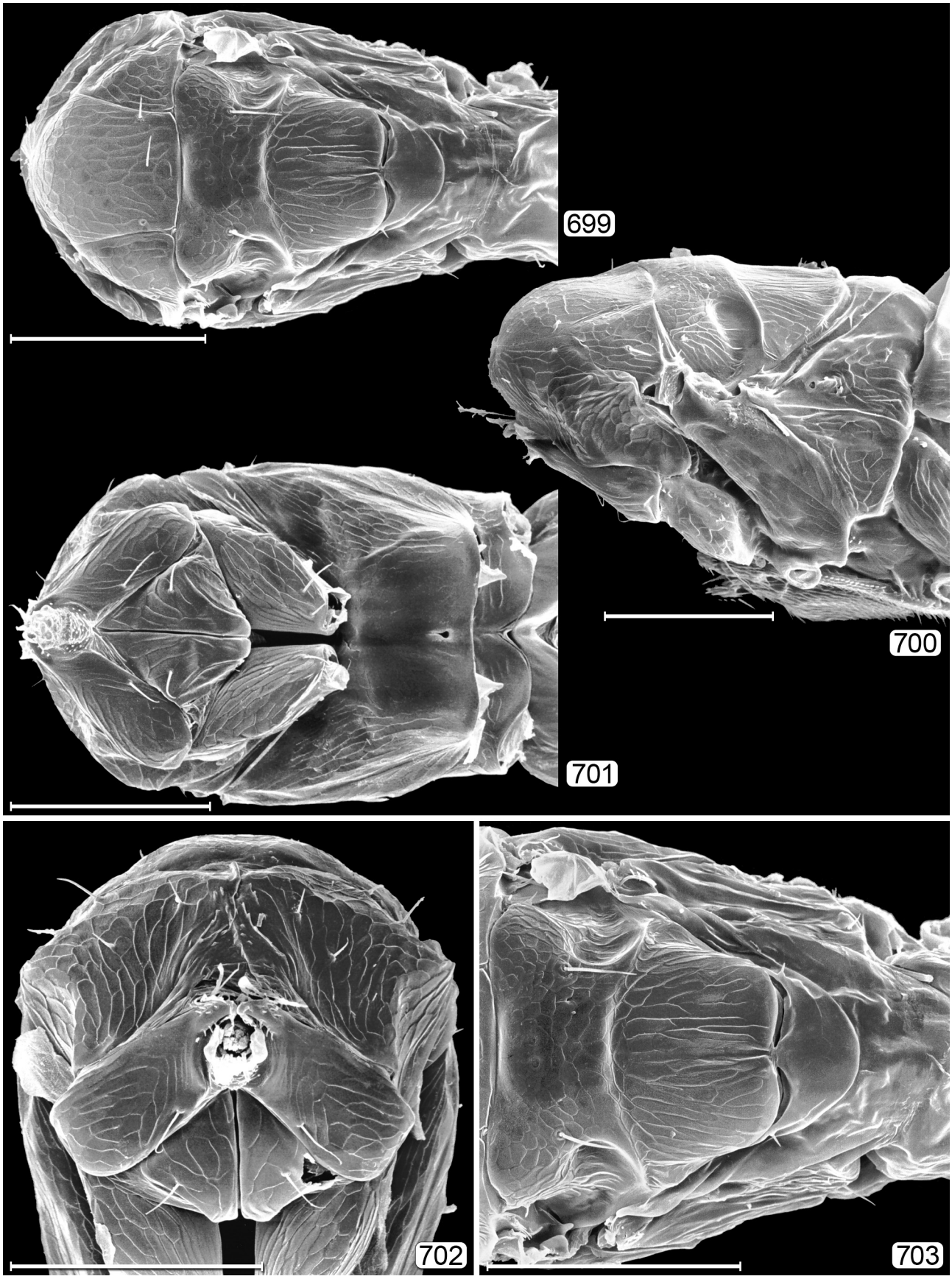
FIGURES 688, 689. *Omyomymar* sp. 688, wings, 689a, metasoma, dorsal; 698b, ovipositor seen through gaster. Scale bars=200 µm.



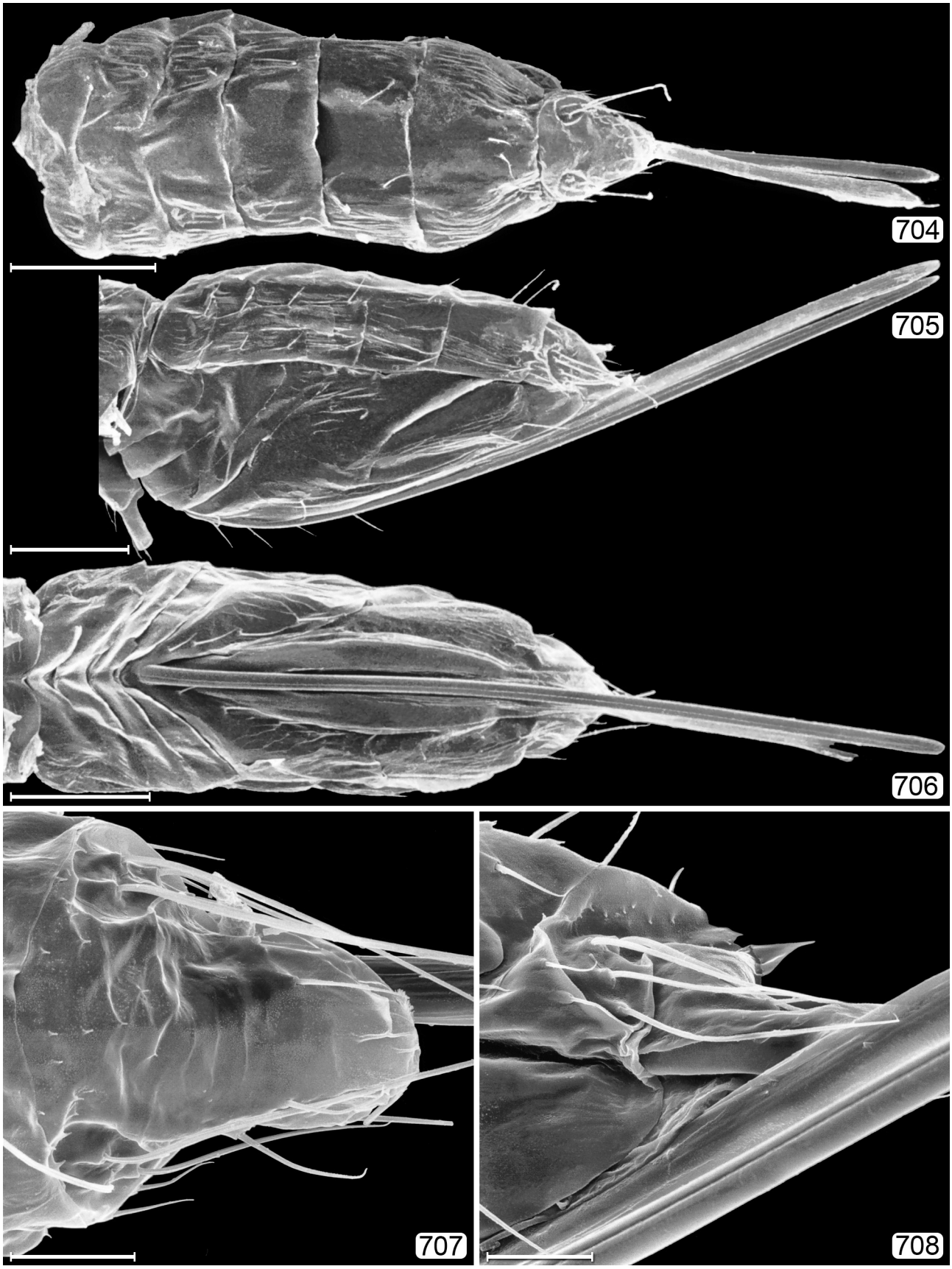
FIGURES 690–692. *Omyomymar* sp. 690, metasoma, lateral; 691, male mesosoma, dorsal; 692a, male metasoma, lateral; 692b, genitalia, dorsal. Scale bars: 690–692a=100 μm; 692b=50 μm.



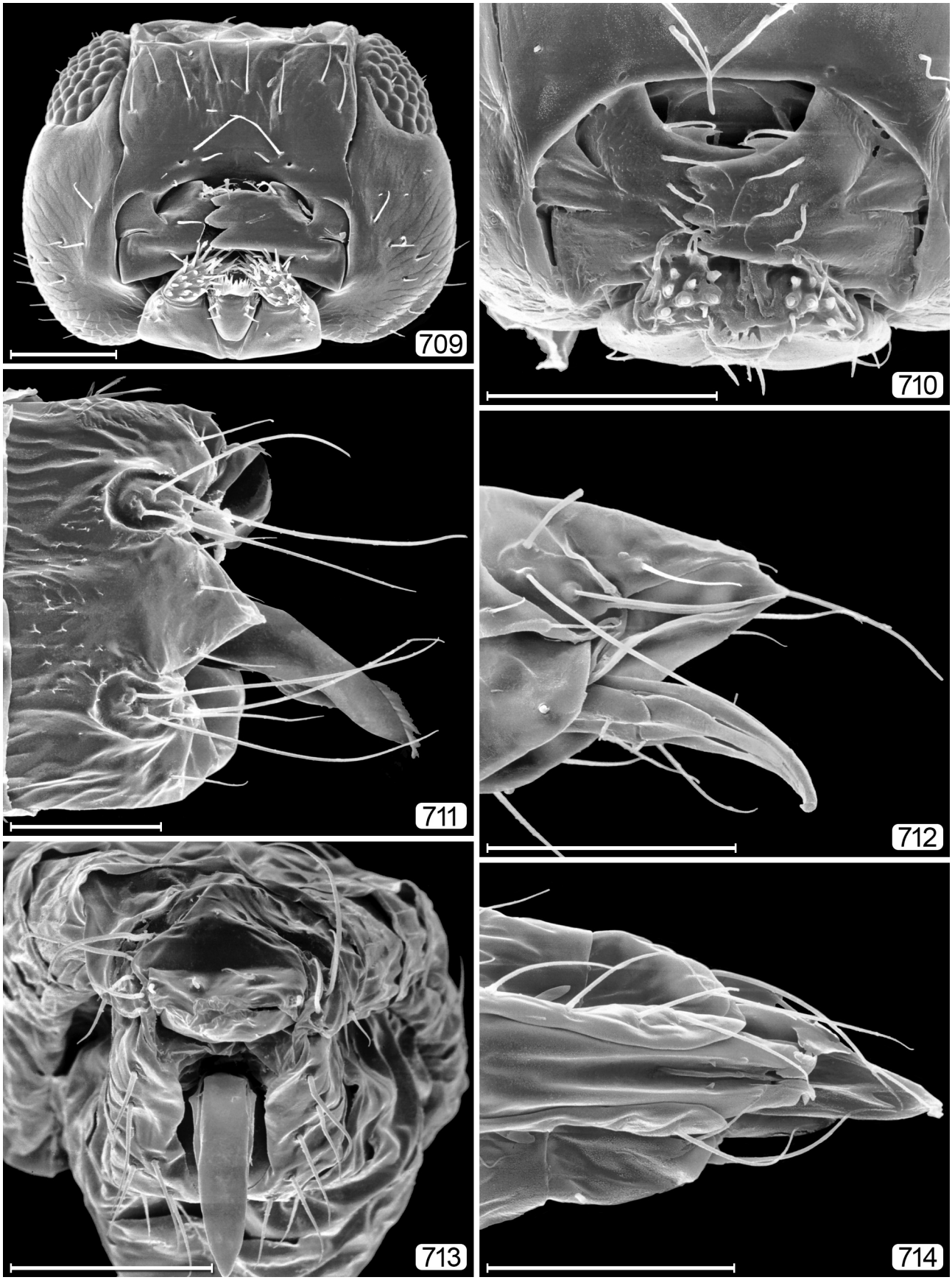
FIGURES 693–698. *Omyomymar* sp., female head. 693, anterior; 694, posterior; 695, lateral; 696, dorsal; 697, ventral; 698, mouthparts. Scale bars=50 μm.



FIGURES 699–703. *Omyomymar* sp., female mesosoma. 699, dorsal; 700, lateral; 701, ventral; 702, anterior; 703, scutellum–propodeum. Scale bars=100 μm.



FIGURES 704–708. *Omyomymar* sp., female metasoma. 704, dorsal; 705, lateral; 706, ventral; 707, apex of gaster, dorsal; 708, apex of gaster, lateral. Scale bars: 704–706=100 μm; 707, 708=20 μm.



FIGURES 709–714. *Omyomymar* sp., male. 709, head, ventral; 710, mouthparts; 711, apex of gaster, dorsal; 712, apex of gaster, lateral; 713, apex of gaster, posterior; 714, apex of gaster (most of genitalia), ventral. Scale bars=50 μm.

Omyomymar clavatum (Ogloblin, 1935)

Paranaphoidea clavata Ogloblin, 1935b: 152. Holotype ♀ (MLPA). **TL:** Argentina, Misiones, Loreto.
Omyomymar clavatum: Schauff, 1983: 546 (key), 547 (generic transfer, description); De Santis, 1989: 72 (catalogue) [NT]; Lin & Chiappini, 1996: 303 (key); Luft Albarracin *et al.*, 2009: 11 (list) [NT].
Omyomymar clavata: Yoshimoto, 1990: 48 (list).

Distribution. USA: TX.

Omyomymar grisselli Schauff, 1983

Omyomymar grisselli Schauff, 1983: 548. Holotype ♀ (USNM). **TL:** USA, Maryland, Prince Georges Co., Laurel, Patuxent Wildlife Research Center. Yoshimoto, 1990: 48 (list); Lin & Chiappini, 1996: 303 (key); Pricop, 2014a: S65 (comparison with extralimital species).

Distribution. USA: MD, MI.

Omyomymar silvanum (Ogloblin, 1935)

Paranaphoidea silvana Ogloblin, 1935b: 149. Lectotype ♀ (MLPA), designated by Schauff, 1983: 547. **TL:** Argentina, Misiones, Loreto.
Omyomymar silvanum: Schauff, 1983: 546 (key), 547 (generic transfer, description); De Santis, 1989: 72 (catalogue) [NT]; Lin & Chiappini, 1996: 303 (key); Manickavasagam *et al.*, 2011: 394 (distribution) [O]; Anis & Rehmat, 2013: 8 (list, distribution) [O].
Omyomymar silvana: Yoshimoto, 1990: 48 (list).

Distribution. Canada: ON. USA: MD.

OOCTONUS Haliday, 1833
(Figs 715–749)

Ooctonus Haliday, 1833a: 268, 1833b: 343. Type species: *Ooctonus insignis* Haliday, 1833, by subsequent designation by Westwood, 1839: 78.
Sphecomicrus Walker, 1846: 18, and Errata and Addenda: 50. Type species: *Ooctonus insignis* Haliday, 1833, by subsequent designation by Peck, 1951: 410.

Diagnosis. Body length 690–1845 μm. Funicle 8-segmented; tarsi 5-segmented; face without subantennal sulci (Figs 716, 730); pronotum entire, not divided by median longitudinal sulcus (Figs 723, 739); fore wing with hypochaeta next to proximal macrochaeta (Fig. 722); propodeum with diamond-like pattern of carinae, the incomplete median carina, costulae and plicae defining a central pentagonal areole and, sublaterally, several (usually 4) submedian areoles (Figs 723, 736, 740); petiole distinctly longer than wide (Figs 726, 727, 741, 742, 744); gt_1 in lateral view usually as long as remaining terga together (Fig. 744).

Discussion. *Ooctonus* is traditionally placed near the *Gonatocerus* group of genera but superficially resembles several genera in the *Polynema* group except for the obvious difference in number of antennal (in females) and tarsal segments. The position of the hypochaeta, close to the proximal macrochaeta is more similar to the latter group than to members of the *Gonatocerus* group.

Nearctic hosts. Hemiptera: Cercopidae.

Important reference. Huber (2012).

Ooctonus aphrophorae Milliron, 1947

Ooctonus aphrophorae Milliron, 1947: 217. Holotype ♀ (USNM). **TL:** USA, Wisconsin, Oconto Co., Lakewood. Peck, 1951: 410 (catalogue); Ewan, 1961: 43 (host); Peck, 1963: 18 (catalogue); Burks, 1967: 213 (catalogue); Herting, 1972: 10 (host catalogue); Wilson, 1978: 3 (percent parasitism); Burks, 1979: 1027 (catalogue); Wilson, 1987: 30 (percent parasitism); Yoshimoto, 1990: 36 (list); Huber, 2012: 20 (key), 22 (description, host, distribution).

Nearctic hosts. Cercopidae: *Aphrophora saratogensis* (Fitch).

Distribution. Canada: ON, QC. USA: NY, OH, WI.

Ooctonus arizonensis Huber, 2012

Ooctonus arizonensis Huber, 2012: 24. Holotype ♀ (CNC). **TL:** USA: Arizona, Cochise Co., Chiricahua Mts., Rustler Park. Huber, 2012: 22 (key).

Distribution. USA: AZ.

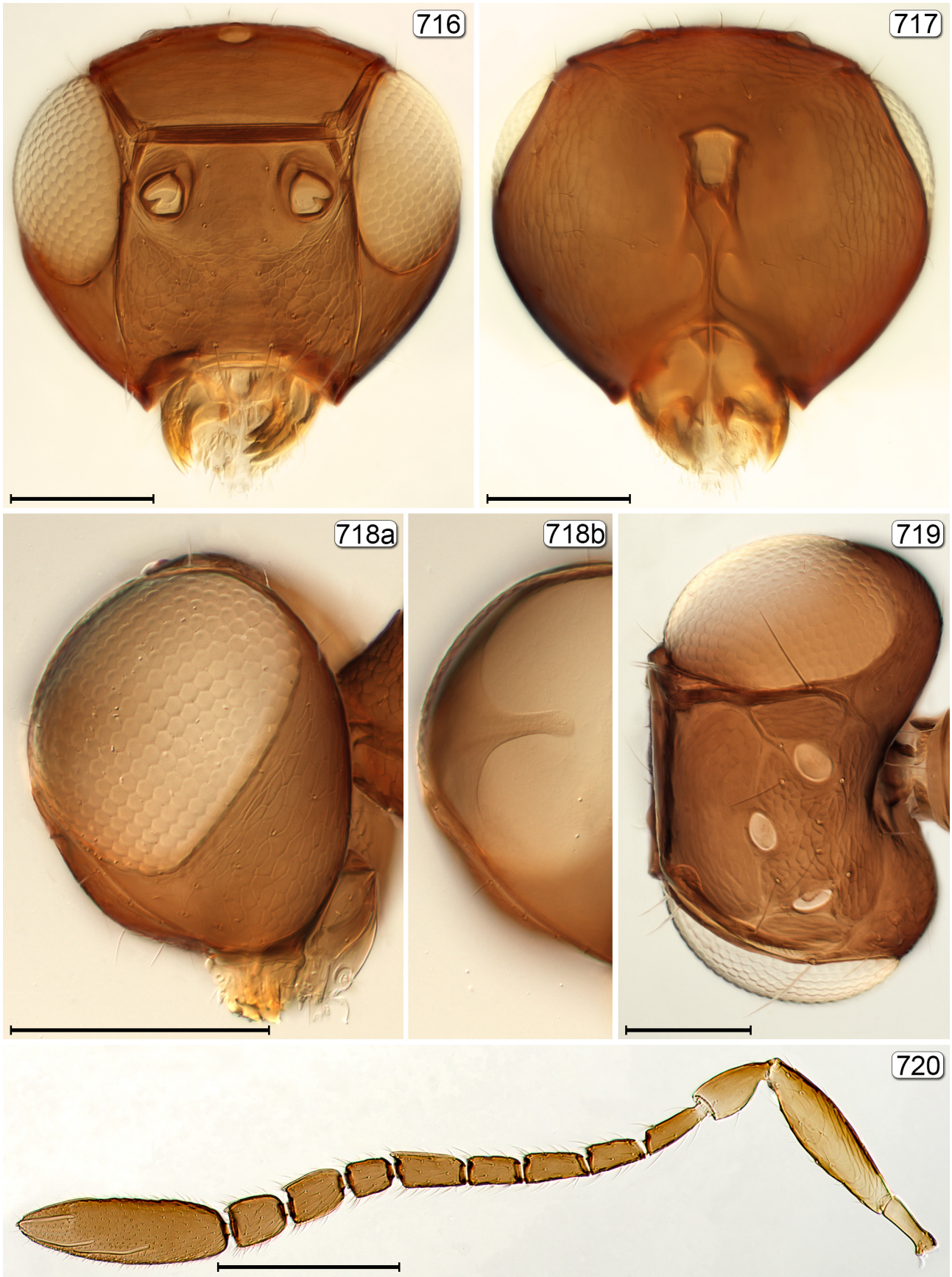
Ooctonus boltei Huber, 2012

Ooctonus boltei Huber, 2012: 26. Holotype ♀ (CNC). **TL:** Canada: Manitoba, Riding Mountain National Park, 3 km E. Clear Lake. Huber, 2012: 22 (key).

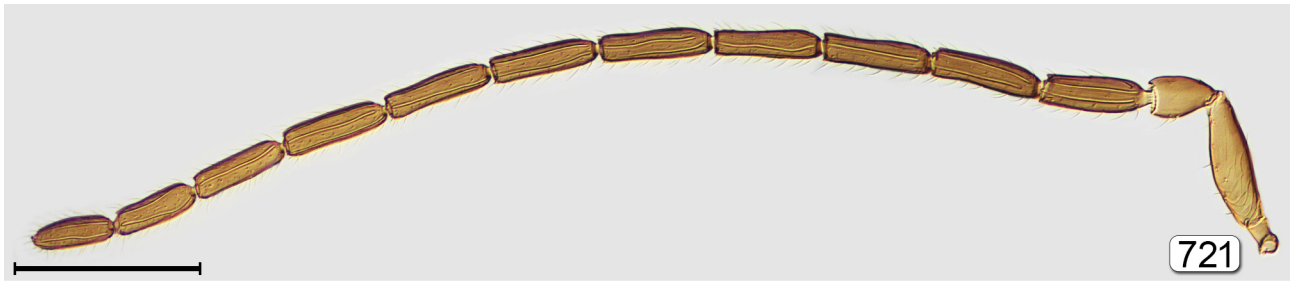
Distribution. Canada: MB, NB.



FIGURE 715. *Ooctonus vulgatus* Haliday, habitus. Canada, British Columbia, Victoria vicinity, 48°32'N 123°30'W, 248 m, 4–18.ix.2005, N. Winchester, rocky knoll, intact *Manzanita*/*Arbutus*. Scale bar=1000 µm.



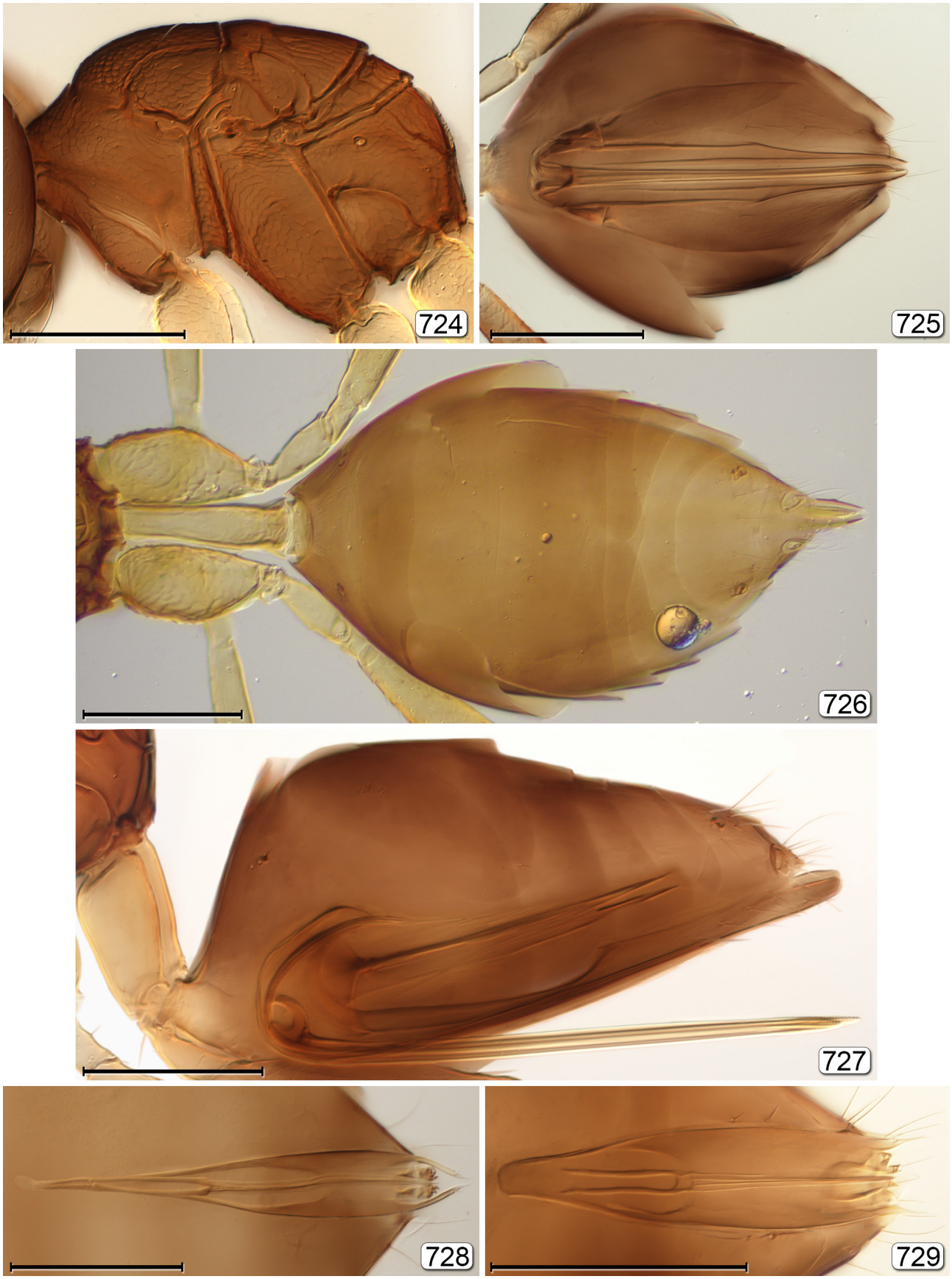
FIGURES 716–720. *Ooctonus* spp., head except 720. 716, *O. readae* Huber, anterior; 717, *O. readae* Huber, posterior; 718a, *O. hemipterus* Haliday, lateral; 718b, *O. hemipterus* Haliday, lateral (internal) showing ocular *apodeme;* 719, *O. occidentalis* Whittaker, dorsal; 720, *O. readae* Huber, antenna. Scale bars=100 µm.



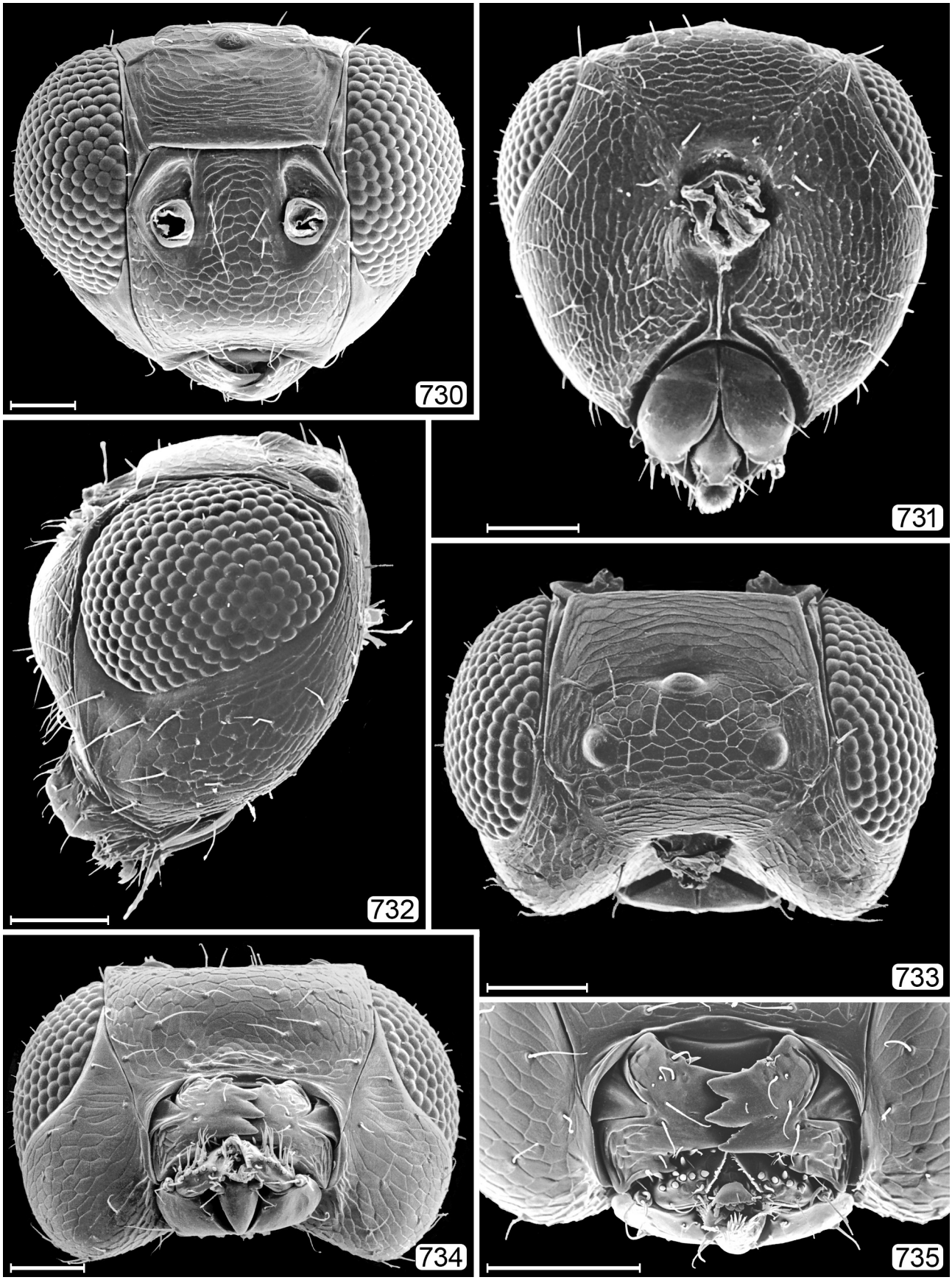




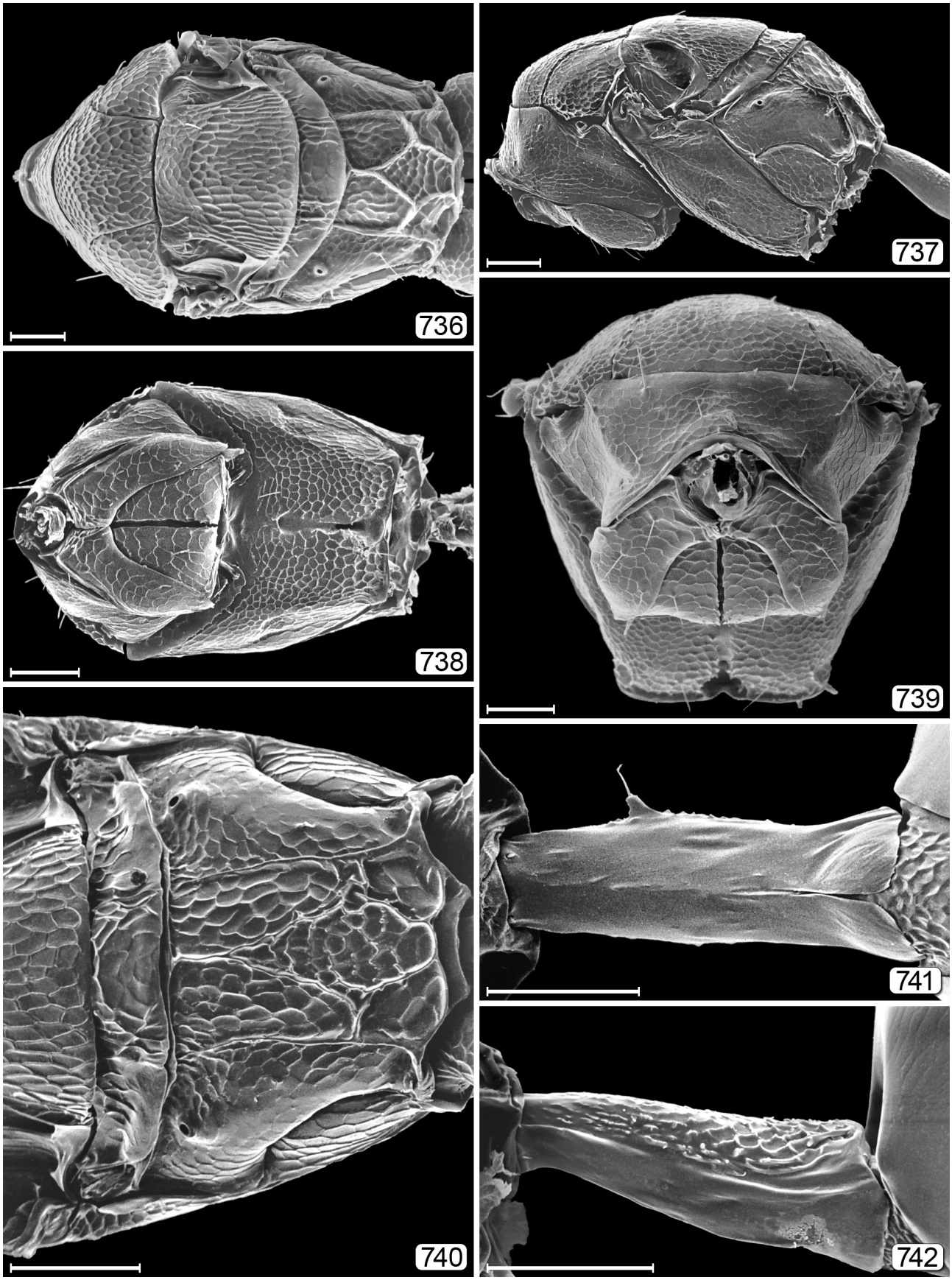
FIGURES 721–723. *Ooctonus* spp. 721, *O. readae* Huber, male antenna; 722, *O. readae* Huber, wings; 723, *O. boltei* Huber, mesosoma, dorsal. Scale bars=200 μm.



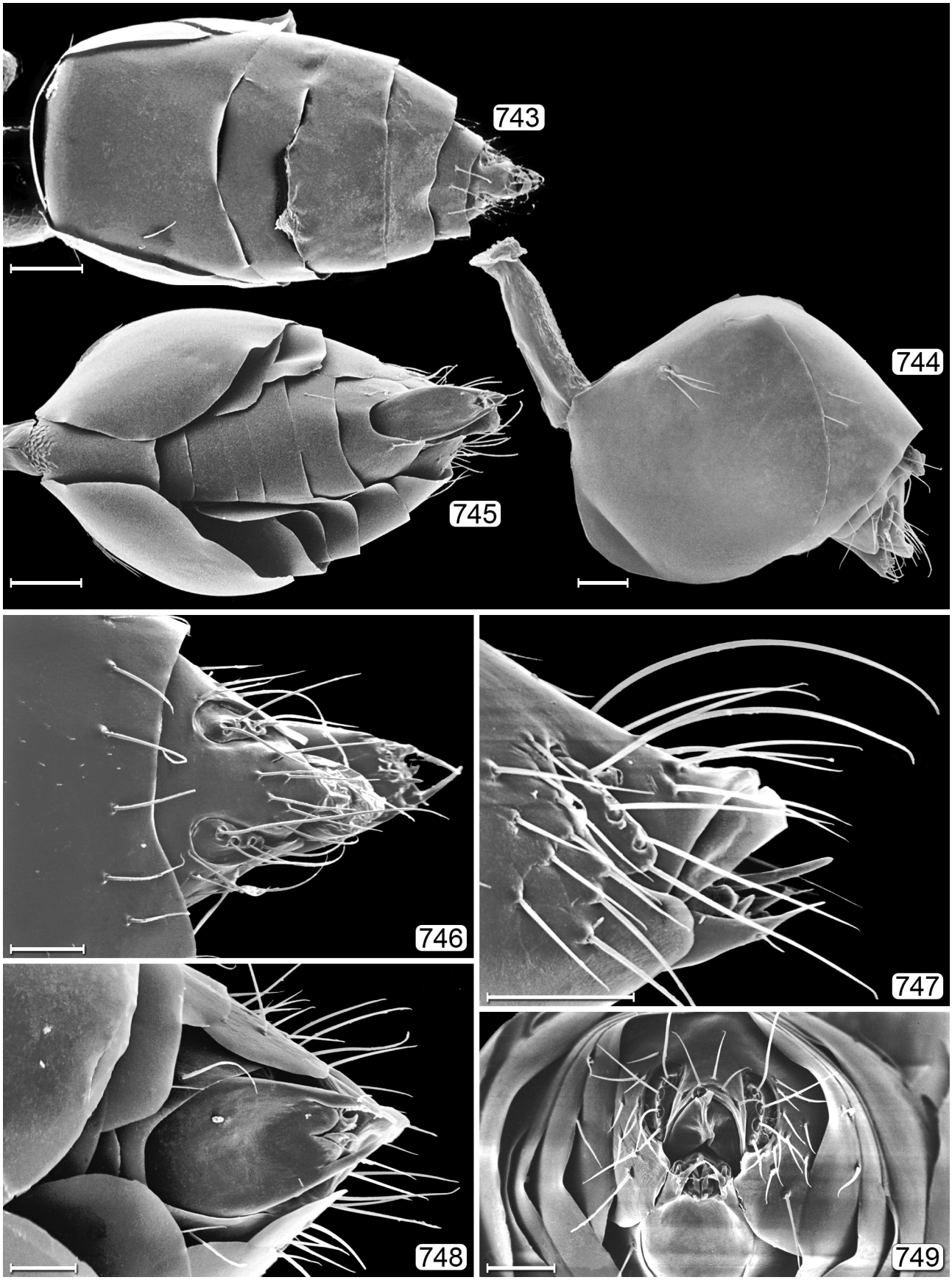
FIGURES 724–729. *Ooctonus* spp. 724, *O. hemipterus* Haliday, mesosoma, lateral; 725, *O. silvensis* Girault, ovipositor seen through gaster; 726, *O. canadensis* Whittaker, metasoma, dorsal; 727, *O. readae* Huber, metasoma, lateral; 728, *O. canadensis* Whittaker, genitalia seen through gaster; 729, *O. silvensis* Girault, genitalia seen through gaster. Scale bars 724–727=200 µm; 728, 729=100 µm;



FIGURES 730–735. *Ooctonus hemipterus* Haliday, head. 730, anterior; 731, posterior; 732, male, lateral; 733, dorsal; 734, ventral; 735, mouthparts. Scale bars=50 μm.



FIGURES 736–742. *Ooctonus hemipterus* Haliday, mesosoma, except 741, 742. 736, dorsal; 737, lateral; 738, ventral; 739, anterior; 740, metanotum + propodeum; 741, male petiole, dorsal; 742, petiole, lateral. Scale bars=50 μm.



FIGURES 743–749. *Ooctonus hemipterus* Haliday, male metasoma. 743, dorsal; 744, lateral; 745, ventral; 746, apex of gaster, dorsal; 747, apex of gaster, lateral; 748, apex of gaster, ventral; 749, apex of gaster, posterior. Scale bars: 743–745=50 μm; 746–749=20 μm.

Ooctonus canadensis Whittaker, 1931

Ooctonus canadensis Whittaker, 1931: 191. Lectotype ♀ (NHMUK), designated by Huber, 2012: 27. **TL:** Canada, British Columbia, Hollyburn. Whittaker, 1931: 192 (key); Peck, 1951: 410 (catalogue); Peck, 1963: 18 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Triapitsyn, 2010: 60 (distribution); Huber, 2012: 21 (key), 27 (description)..

Distribution. Canada: BC. USA: AK, CA, WA.

Ooctonus fuscipes Whittaker, 1931

Ooctonus fuscipes Whittaker, 1931: 189. Lectotype ♀ (NHMUK), designated by Huber, 2012: 29. **TL:** Canada, British Columbia, Hollyburn. Whittaker, 1931: 192 (key); Peck, 1951: 411 (catalogue); Peck, 1963: 18 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Huber, 2012: 22 (key), 29 (description).
Oöctonus [*sic*] *fuscipes*: Britton, 1938: 146 (misidentification).

Distribution. Canada: BC. USA: CA, OR.

Ooctonus hemipterus Haliday, 1833

Ooctonus hemipterus Haliday, 1833b: 344. Lectotype ♀ (NMID), designated by Hincks, 1952: 158. **TL:** not given, most likely England or Ireland. Curtis, 1837: 134 (list) [P]; Walker, 1846: 50 (description) [P]; Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 430 (catalogue) [P]; Enock, 1914: 46 (list) [P]; Hellén, 1968: 34 (list) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Graham, 1982: 226 (description) [P]; Viggiani & Jesu, 1988: 1024 (distribution) [P]; Pagliano & Navone, 1995: 36 (list) [P]; Ulrich, 2005: 47, 198 (phenology, density and biomass) [P]; Pricop, 2008: 46 (distribution) [P]; Pricop, 2009b: 126 (distribution) [P]; Triapitsyn, 2010: 14, 15 (key), 15 (synonyms, description) [P]; Nash & O'Connor, 2011: 90 (list) [P]; Huber, 2012: 20 (key), 32 (description); Pintureau, 2012: 37 (list) [P]; Triapitsyn, 2015a: 218 (correction to Haliday collection list) [P]; Koponen & Triapitsyn, 2016: 3 (distribution) [P]; Dale-Skey, 2016: 244 (checklist) [P].
Ooctonus amoenus Foerster, 1841: 45. Holotype, sex unknown (NHMW), lost. **TL:** Austria, no locality specified. Synonymy by Triapitsyn, 2010: 15.
Ooctonus atroclavatus Kieffer, 1913: 2. Lectotype ♀ (NHMUK), designated by Graham, 1982: 227. **TL:** UK, Scotland, Clober? Synonymy by Hincks, 1952: 58.
Ooctonus foersteri Soyka, 1941: 95. Lectotype ♀ (NHMW), designated by Triapitsyn, 2010: 16. **TL:** Germany, Aachen. Synonymy by Triapitsyn, 2010: 15.
Ooctonus hemipterus form *igneus* Debauche, 1948: 117. This has no nomenclatural standing since it is below the subspecific level so synonymy is not really necessary. Nevertheless, synonymy is by Triapitsyn, 2010: 16 and details may be found there.
Ooctonus pechlaneri Soyka, 1949d: 66. Holotype ♂ (NHMW). **TL:** Austria, Gschnitztal, Trins Padaster. Synonymy by Triapitsyn, 2010: 16.
Ooctonus wagneri Soyka, 1941: 96. Holotype ♀ (NHMW). **TL:** Poland, Sołtysowice near Wrocław. Synonymy by Triapitsyn, 2010: 16.
Ooctonus soykai Hincks, 1952: 160. **TL:** Netherlands, Valkenburg. Synonymy by Graham, 1982: 226.

Distribution. Canada: BC, MB, NB, NS, NT, ON, PE, SK. USA: AK, IL, MI, MS, NC, NH, NY, WI.

Ooctonus longipetiolus Huber, 2012

Ooctonus longipetiolus Huber, 2012, 36. Holotype ♀ (CNC). **TL:** Canada, Ontario, Nepean, Slack Road. Huber, 2012: 21 (key).

Distribution. Canada: ON, PE, QC. USA: FL, IL, MA, MO, NC, SC, VA.

Ooctonus notatus Walker, 1846

Ooctonus notatus Walker, 1846: 50. Lectotype ♀ (NMID), designated by Graham, 1982: 226. **TL:** Not specified but almost certainly England. Marshall, 1873: 23 (catalogue) [P]; Dalla Torre, 1898: 430 (catalogue) [P]; Enock, 1914: 46 (list) [P]; Graham, 1982: 226 (description) [P]; Viggiani & Jesu, 1988: 1024 (distribution) [P]; Pricop, 2008: 47 (distribution) [P]; Pricop, 2009b: 126 (distribution) [P]; Triapitsyn, 2010: 14, 15 (key), 28 (synonyms, description); Huber, 2012: 22 (key), 39 (description, distribution); Pintureau, 2012: 37 (list) [P]; Bai *et al.*, 2015: 26 (key) [P]; Dale-Skey, 2016: 244 (checklist) [P]; Triapitsyn, 2018a: 156 (distribution) [O].

Ooctonus atroflavus Soyka, 1949c: 45. Holotype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Triapitsyn, 2010: 28.
Ooctonus diversicornis Soyka, 1949c: 48. Holotype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Triapitsyn, 2010: 28.
Ooctonus heterotomus Foerster, 1847: 200. Lectotype ♀ (NHMW), designated by Triapitsyn, 2010: 29. **TL:** Germany, Aachen environs. Synonymy by Graham, 1982: 226.

Distribution. Canada: AB, BC, NB, NL, NS, ON, PE, QC. USA: AK, MT, NY, OH, VA, WA.

Ooctonus occidentalis Whittaker, 1931

Ooctonus occidentalis Whittaker, 1931: 191. Lectotype ♀ (NHMUK), designated by Huber, 2012: 41. **TL:** Canada, British Columbia, Hollyburn. Whittaker, 1931: 192 (key); Peck, 1951: 411 (catalogue); Peck, 1963: 19 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Huber, 2012: 21 (key), 41 (description, distribution).

Distribution. Canada: BC. USA: AK, CA, OR, WA.

Ooctonus quadricarinatus Girault, 1916

Ooctonus quadricarinatus Girault, 1916 [287]: 301. Lectotype ♂ (USNM), designated by Huber, 2012: 43. **TL:** USA, New York, Syracuse. Girault, 1929 [428]: 21 (key); Whittaker, 1931: 192 (key); Peck, 1951: 411 (catalogue); Thompson, 1958: 571 (host catalogue); Peck, 1963: 19 (catalogue); Bushing, 1965: 450, 481 (indefinite host association); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Huber, 2012: 20 (key), 43 (description, distribution).
Ooctonus quadrisignatus Blackman, 1915: 56 (*nomen nudum*, host [probably incorrect]).

Distribution. Canada: NB, ON, PE, QC. USA: AL, AR, NC, NY, SC, TN, VA.

Ooctonus readae Huber, 2012

Ooctonus readae Huber, 2012: 46. Holotype ♀ (CNC). **TL:** Canada, Ontario, Buckham's Bay, 45.4985°N 76.1108°W. Huber, 2012: 21 (key).

Distribution. Canada: ON.

Ooctonus silvensis Girault, 1916

Ooctonus silvensis Girault, 1916 [264]: 70. Holotype ♀ (USNM). **TL:** USA, District of Colombia, Rock Creek Park. Girault, 1929 [428]: 22 (key); Whittaker, 1931: 192 (key); Peck, 1951: 411 (catalogue); Peck, 1963: 19 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Triapitsyn, 2010: 25 (diagnosis, distribution); Huber, 2012: 22 (key), 48 (description, distribution).

Distribution. Canada: ON. USA: DC, CO, GA, IL, MD, MI, MO, OH, OK, TX, VA.

Ooctonus triapitsyni Huber, 2012

Ooctonus triapitsyni Huber, 2012: 50. Holotype ♀ (CNC). **TL:** Canada, Alberta, Writing-on-Stone Prov. Park. Huber, 2012: 22 (key), 50 (description, distribution).

Distribution. Canada: AB, ON, QC, SK. USA: AK, AZ, SD.

Ooctonus vulgatus Haliday, 1833

Ooctonus vulgatus Haliday, 1833b: 344. Lectotype ♀ (NMID), designated by Hincks, 1952: 157. **TL:** Not given, most likely England or Ireland. Curtis, 1837: 134 (list) [P]; Walker, 1846: 50 (description) [P]; Marshall, 1873: 23 (catalogue) [P]; Lameere, 1907: 246 (habitat) [P]; Enock, 1914: 46 (list) [P]; Hellén, 1968: 34 (list) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Graham, 1979: 286 (distribution) [P]; Graham, 1982: 226 (discussion) [P]; Viggiani & Jesu, 1988: 1023 (incorrect host) [P]; Pagliano & Navone, 1995: 36 (list) [P]; Baquero & Jordana, 2002: 82 (distribution) [P]; Gijswijt, 2003: 50 (Netherlands list) [P]; Ulrich, 2005: 47, 198 (phenology) [P]; Pricop, 2008: 126 (list [P]; Pricop, 2009b: 126 (distribution)

[P]; Pricop, 2009c: 22 (distribution) [P]; Triapitsyn, 2010: 14, 15 (key), 54 (synonyms, description, distribution); Nash & O'Connor, 2011: 90 (list) [P]; Huber 2012: 21 (key), 52 (description, host, distribution); Pintureau, 2012: 37 (list) [P]; Huber, 2013a: 11 (morphology); Bai *et al.*, 2015: 26 (key), 34 (description) [P]; Triapitsyn, 2015a: 217 (correction to Haliday collection list) [P]; Dale-Skey, 2016: 245 (checklist) [P]; Koponen & Triapitsyn, 2016: 3 (distribution) [P].

Ooctonus americanus Girault, 1916 [264]: 69. Holotype ♀ (USNM). **TL:** USA, District of Columbia, Rock Creek Park. Synonymy by Triapitsyn, 2010: 54. Girault, 1929 [428]: 21 (key); Whittaker, 1931: 192 (key); Peck, 1951: 410 (catalogue); Weaver & King, 1954: 17 (host, biology); Burks, 1958: 62 (correction to catalogue); Peck, 1963: 18 (catalogue); Burks, 1967: 213 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list).

Ooctonus auripes Whittaker, 1931: 190. Lectotype ♀ (NHMUK), designated by Huber, 2012: 53. **TL:** Canada, British Columbia, Chilliwack. Synonymy by Huber, 2012: 52. Whittaker, 1931: 192 (key); Peck, 1951: 410 (catalogue); Peck, 1963: 18 (catalogue); Burks, 1979: 1027 (catalogue); Yoshimoto, 1990: 36 (list); Triapitsyn, 2010: 54 (synonymy under *O. notatus*).

Ooctonus acutiventris Soyka, 1949b: 37. Holotype ♀ (NHMW). **TL:** Austria, Hundsheim. Synonymy by Triapitsyn, 2010: 54.

Ooctonus askhamensis Hincks, 1952: 156. Holotype ♀ (MMUE). **TL:** UK, England, Askham Bog. Synonymy by Triapitsyn, 2010: 54.

Ooctonus collinus Soyka, 1949c: 47. Holotype ♀ (NHMW). **TL:** Austria, Spitzerberg near Hundsheim. Synonymy by Triapitsyn, 2010: 54.

Ooctonus niger Soyka, 1950c: 131. Holotype ♀ (NHMW). **TL:** Austria, Krössbach. Synonymy by Triapitsyn, 2010: 54.

Ooctonus stammeri Soyka, 1949d: 69. Holotype ♀ (NHMW). **TL:** Poland, Krkonoše Mountains. Synonymy by Triapitsyn, 2010: 54.

Ooctonus viennensis Soyka, 1949d: 70. Holotype ♀ (NHMW). **TL:** Austria, Vienna, Leopoldsberg. Holotype ♀ (NHMW). Synonymy by Triapitsyn, 2010: 54.

Ooctonus wesmaeli Debauche, 1948: 122. Holotype ♀ (ISNB). **TL:** Belgium, Namur. Synonymy by Hincks, 1952: 157.

Nearctic hosts. Cercopidae: *Philaenus spumarius* (L.).

Distribution. Canada: AB, BC, NS, ON. USA: AR, KS, NJ, OH, PA, VA, WA.

PALAEONEURA Waterhouse, 1915

(Figs 750–799)

Palaeoneura Waterhouse, 1915: 537. Type species: *Palaeoneura interrupta* Waterhouse, 1915, by subsequent designation by Gahan & Fagan, 1923: 103.

Chaetomymar Ogloblin, 1946: 277. Type species *Chaetomymar kusnezovi* Ogloblin, by original designation. Synonymy by Triapitsyn & Berezovskiy, 2007: 38.

Acanthomymar Subba Rao, 1970: 667. Type species: *Acanthomymar nigrum* Subba Rao, 1970, by original designation. Synonymy by Triapitsyn & Berezovskiy, 2007: 38 (from previous synonymy under *Polynema* Haliday by Huber, 2003: 80).

Barypolynema (*Tarphypolynema*) Ogloblin, 1960: 79. Type species: *Anagrus saga* Ogloblin, 1960, by original designation. Synonymy under *Polynema* by Triapitsyn & Fidalgo, 2006: 60; synonymy under *Palaeoneura* by Triapitsyn, 2018b: 35.

Diagnosis. Body length 515–920 µm. Propleura abutting anterior to prosternum (Figs 762–764, 786, 787); fore wing with slight to distinct narrowing beyond apex of venation, the posterior margin of wing slightly to distinctly sinuate with a correspondingly slight to distinct lobe (Figs 753, 777); mesoscutum with notauli wide (Figs 776, 784) or narrow (Figs 752, 760); axilla sometimes with long axillar seta (Figs 752, 760); propodeum with a short median carina (Figs 752, 760) or without (Figs 776, 784).

Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus, Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Polynema*, *Stephanodes*), *Palaeoneura* is defined first by elimination of eight of them, i.e., all of the above except *Polynema* (see key). Depending on the subgenus of *Polynema* different features must be used to distinguish *Palaeoneura* from them. *Palaeoneura* is distinguished from *P*. (*Polynema*) by the propleura abutting medially, sometimes only narrowly, anterior to prosternum whereas the propleura do not abut in *P*. (*Polynema*). *Palaeoneura* is distinguished from *Polynema* (*Doriclytus*), by not having pits between the toruli whereas *P.* (*Doriclytus*) has pits between the toruli; in both *Palaeoneura* and *Polynema* (*Doriclytus*) the propleura abut anteriorly.

Palaeoneura is keyed out twice because in the Nearctic it contains four species representing at least two morphologically dissimilar groups. One species, *P. markhoddlei* Triapitsyn, has each notaulus narrow (as in Figs 752, 760) and axillar seta long, extending almost to apex of frenum (as in Figs 752, 760), shown in the extralimital *P. sophoniae* Huber (Figs 750–773). Both species are classified in the *kusnezovi* group of what used to be *Chaetomy-*

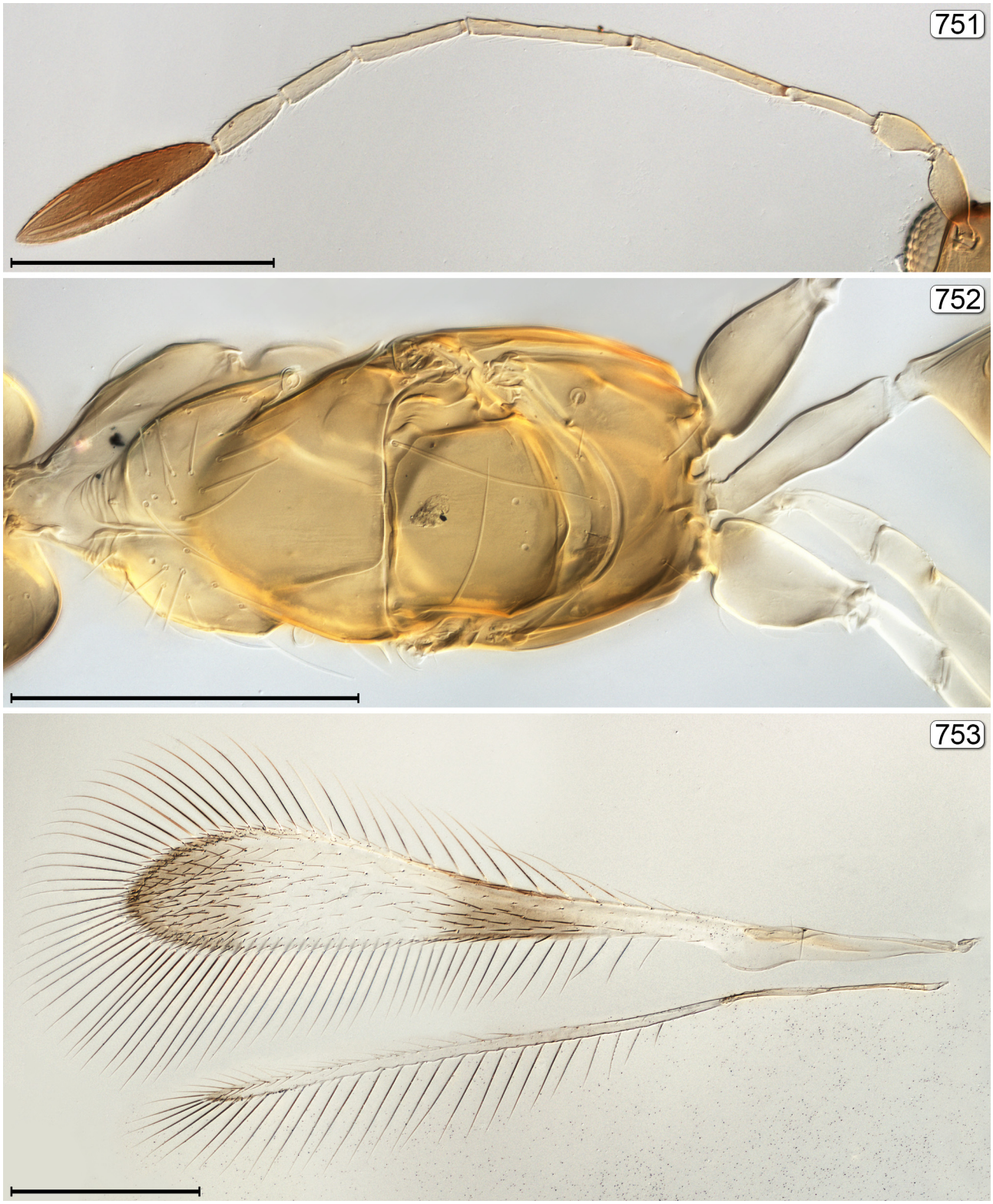
mar, currently treated as a synonym of *Palaeoneura* (Triapitsyn 2018). Another species, *P. mymaripennis* (Dozier) (Figs 774–798), has each notaulus wide (Figs 776, 784) and the axillar seta short (Figs 776, 784). The remaining two species are similar to one or, partly, the other of the above species. Until the genus is better defined on a world basis, with special attention to the diverse Australian fauna, it is premature to determine here whether the Nearctic species should be classified in more than one genus.

Nearctic hosts. Hemiptera: Cicadellidae.

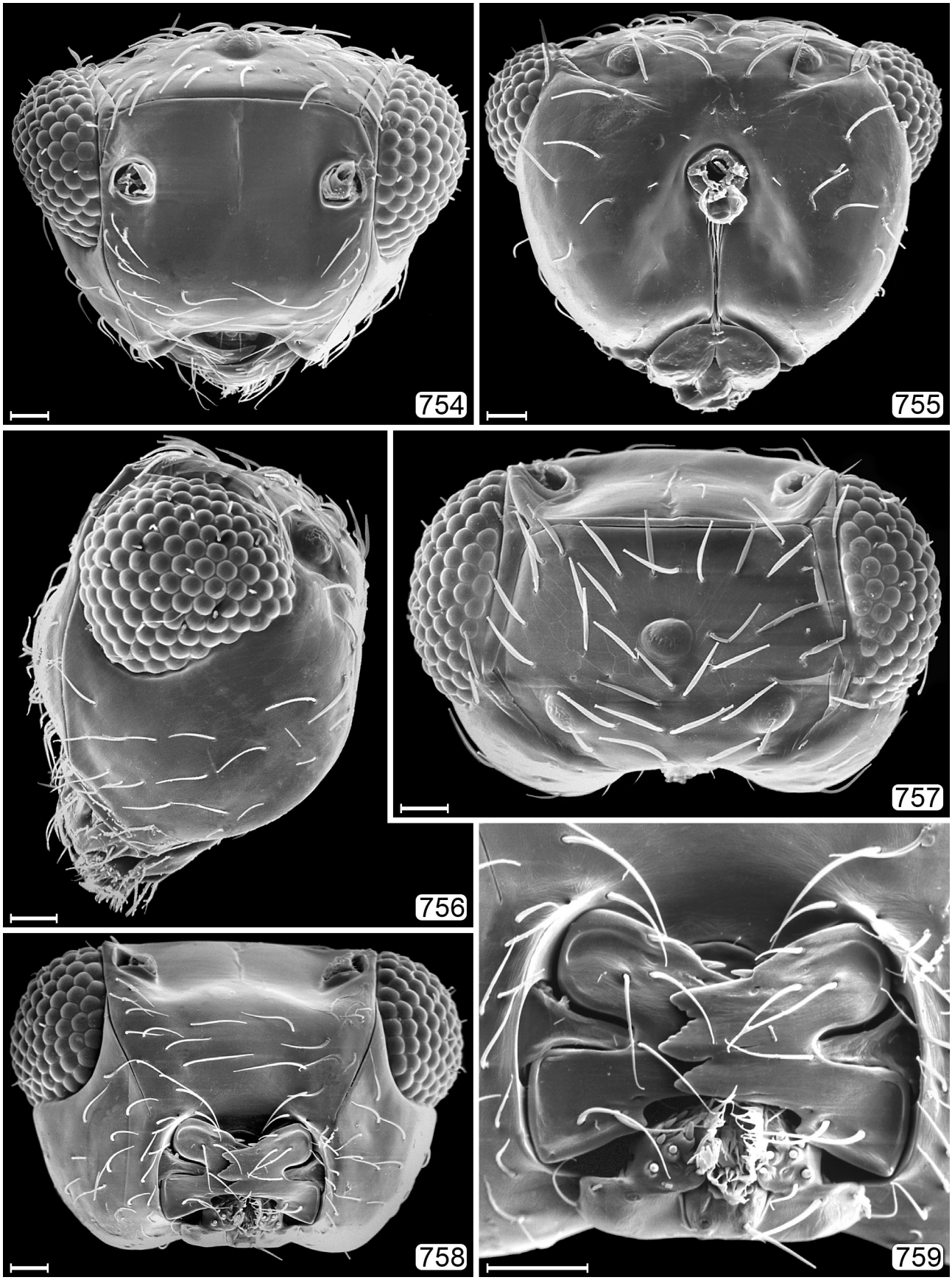
Important references. Triapitsyn & Aquino (2010), Triapitsyn (2018b).



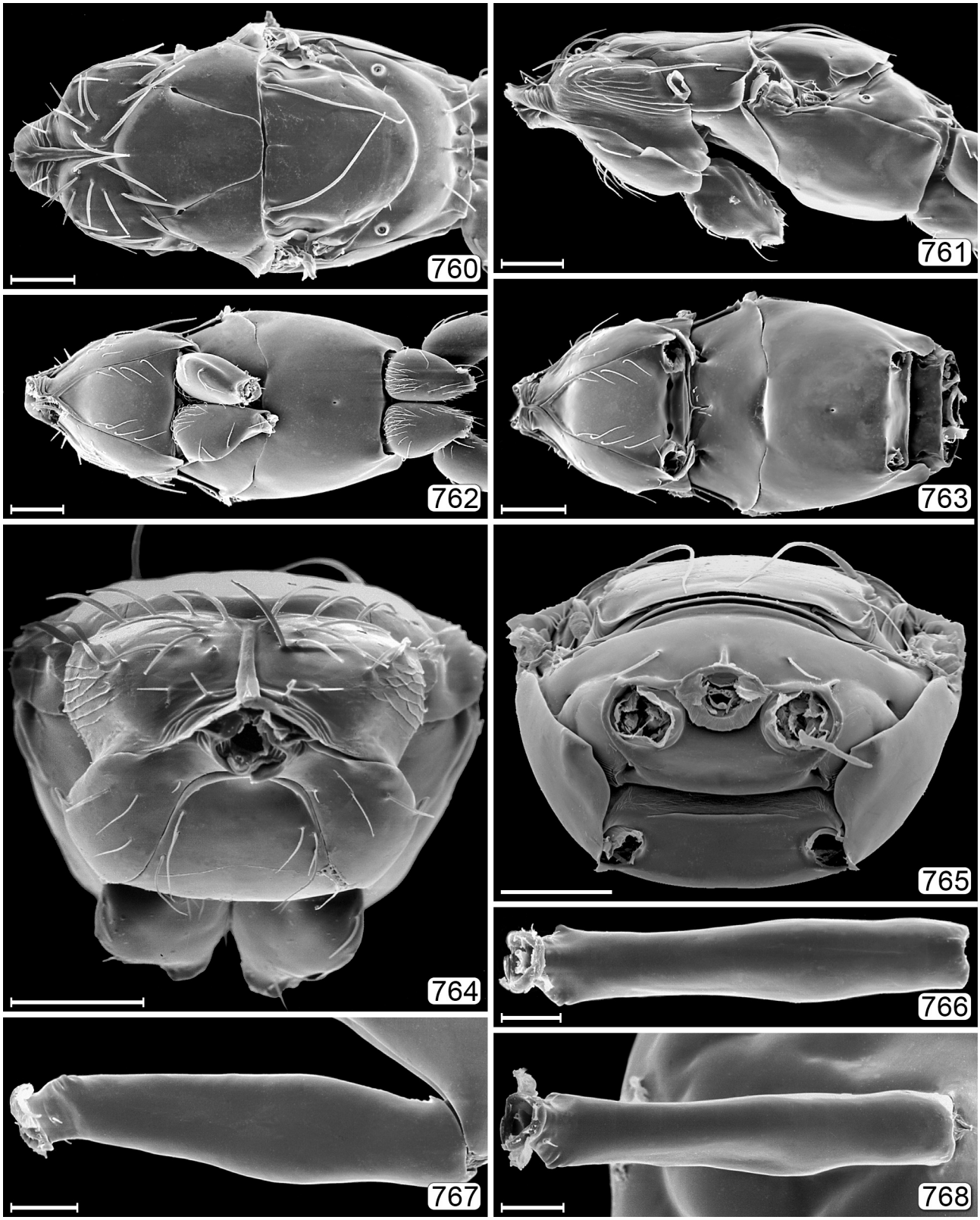
FIGURE 750. *Palaeoneura sophoniae* (Huber), habitus. Hawaiian Islands, Kauai, Guava Kai, 7.xii.1999, ex guava, P. Yang. Scale bar=500 µm.



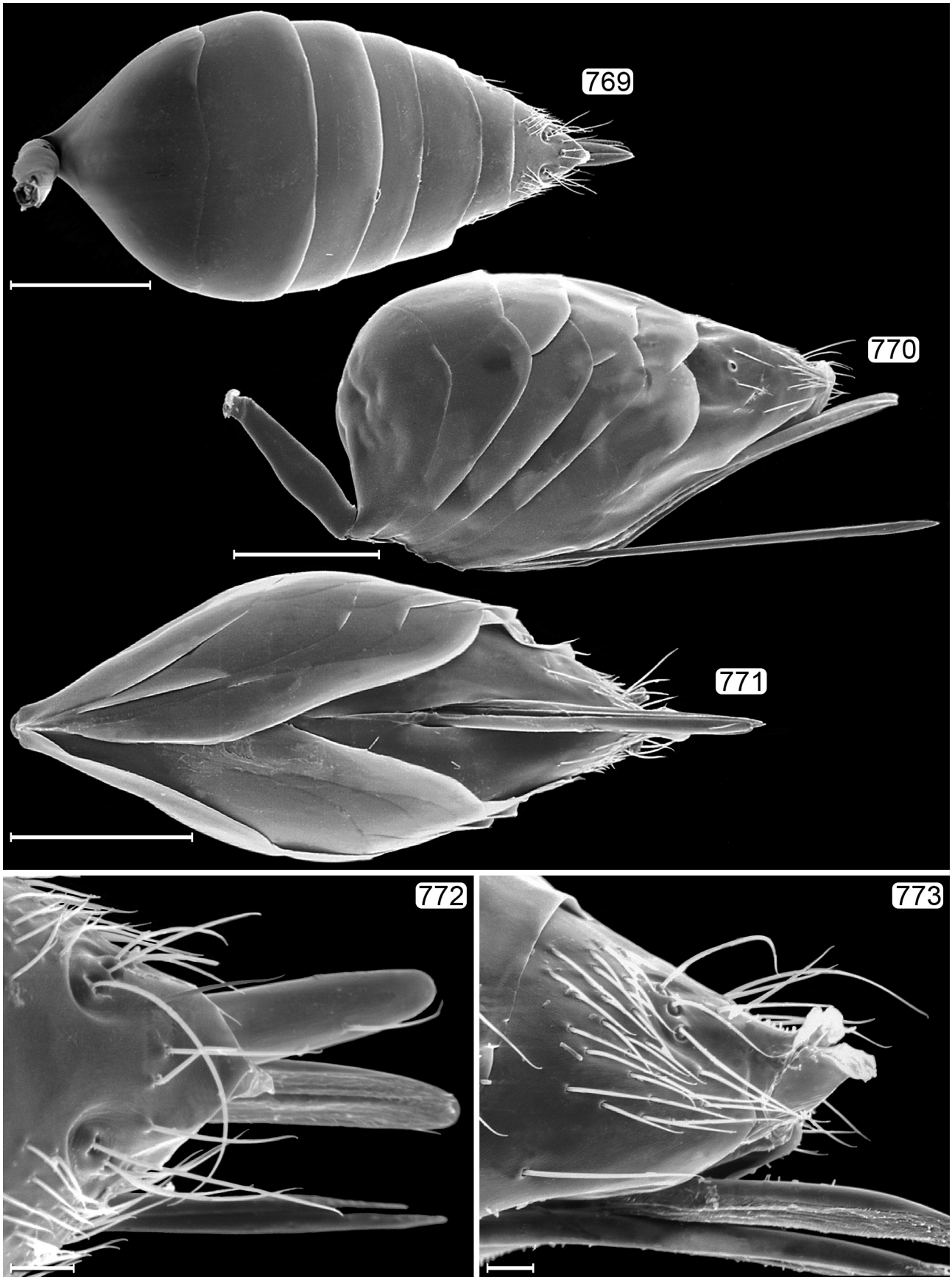
FIGURES 751–753. *Palaeoneura sophoniae* (Huber). 751, antenna; 752, mesosoma, dorsal; 753, wings. Scale bars=200 μm.



FIGURES 754–759. *Palaeoneura sophoniae* (Huber), head. 754, anterior; 755, posterior; 756, lateral; 757, dorsal; 758, ventral; 759, mouthparts. Scale bars=20 μm.



FIGURES 760–768. *Palaeoneura sophoniae* (Huber). 760, mesosoma, dorsal; 761, mesosoma, lateral; 762, mesosoma, ventral, with coxae; 763, mesosoma ventral, without coxae; 764, mesosoma, anterior; 765, mesosoma, posterior; 766, petiole, dorsal; 767, petiole, lateral; 768, petiole, ventral. Scale bars: 760–765=50 μm; 766–768=20 μm.



FIGURES 769–773. *Palaeoneura sophoniae* (Huber). 769, metasoma, dorsal; 770, metasoma, lateral; 771, metasoma, ventral; 772, apex of gaster, dorsal; 773, apex of gaster, lateral. Scale bars: 769–771=100 μm; 772, 773=10 μm.



FIGURE 774. *Palaeoneura mymaripennis* (Dozier), habitus. USA, New Hampshire, Strafford Co., 1 km S. Durham, 32 m, 43.118°N 70.9376°W, 21.ix–18.x.2007, D. Chandler, forest clearing. Scale bar=500 μm.

Palaeoneura durwest Triapitsyn, 2010

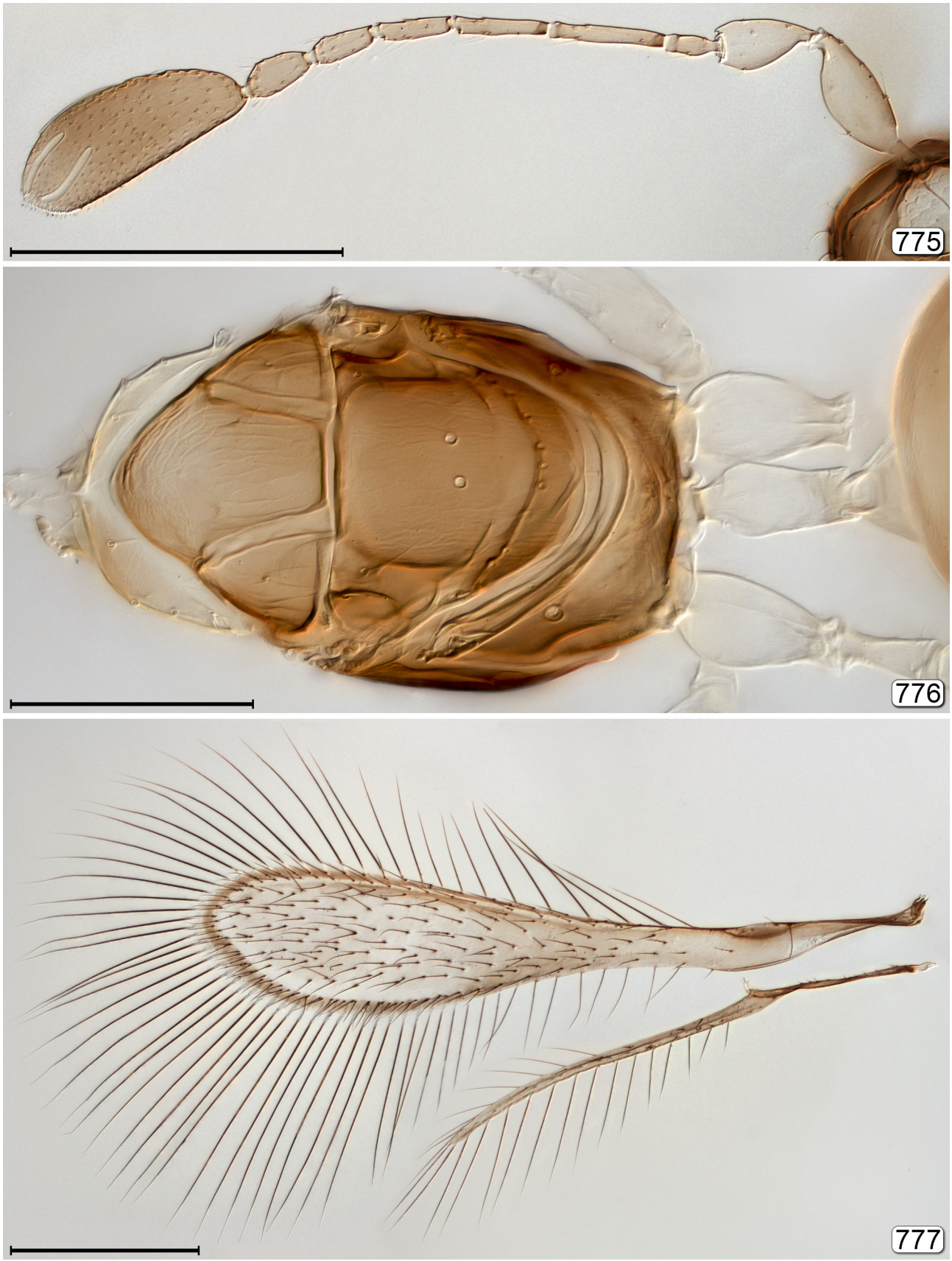
Palaeoneura durwest Triapitsyn, 2010: 73. Holotype ♀ (UCRC). **TL:** Guatemala, Sumpango, Durwest Farm. Triapitsyn, 2010: 76 (key); Triapitsyn, 2018b: 37 (key).

Distribution. USA: FL.

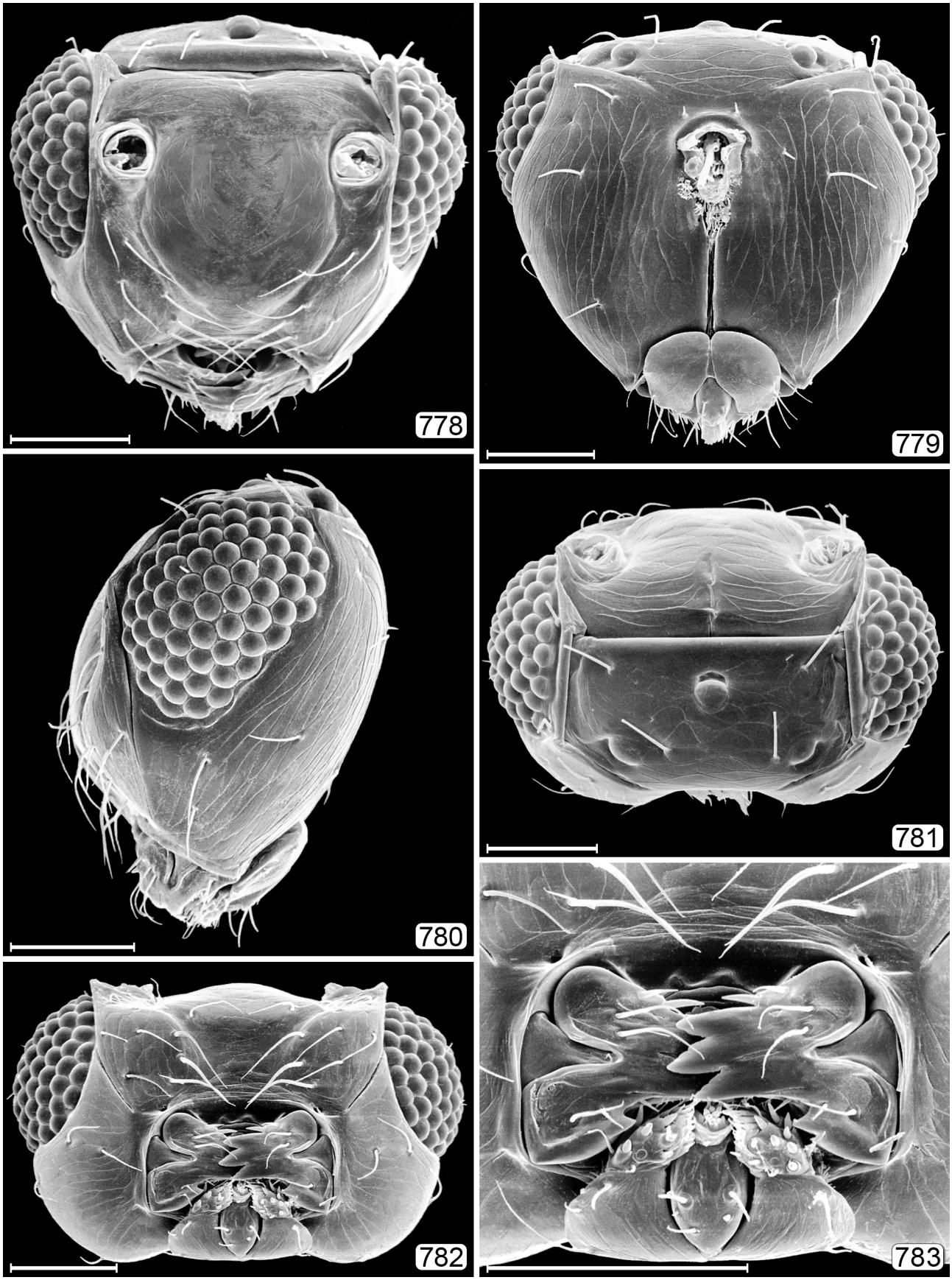
Palaeoneura markhoddlei Triapitsyn, 2018

Palaeoneura markhoddlei Triapitsyn, 2018b: 37. Holotype ♀ (UCRC). **TL:** USA, California, San Diego Co., Pauma Valley. Triapitsyn, 2018b: 37 (key).

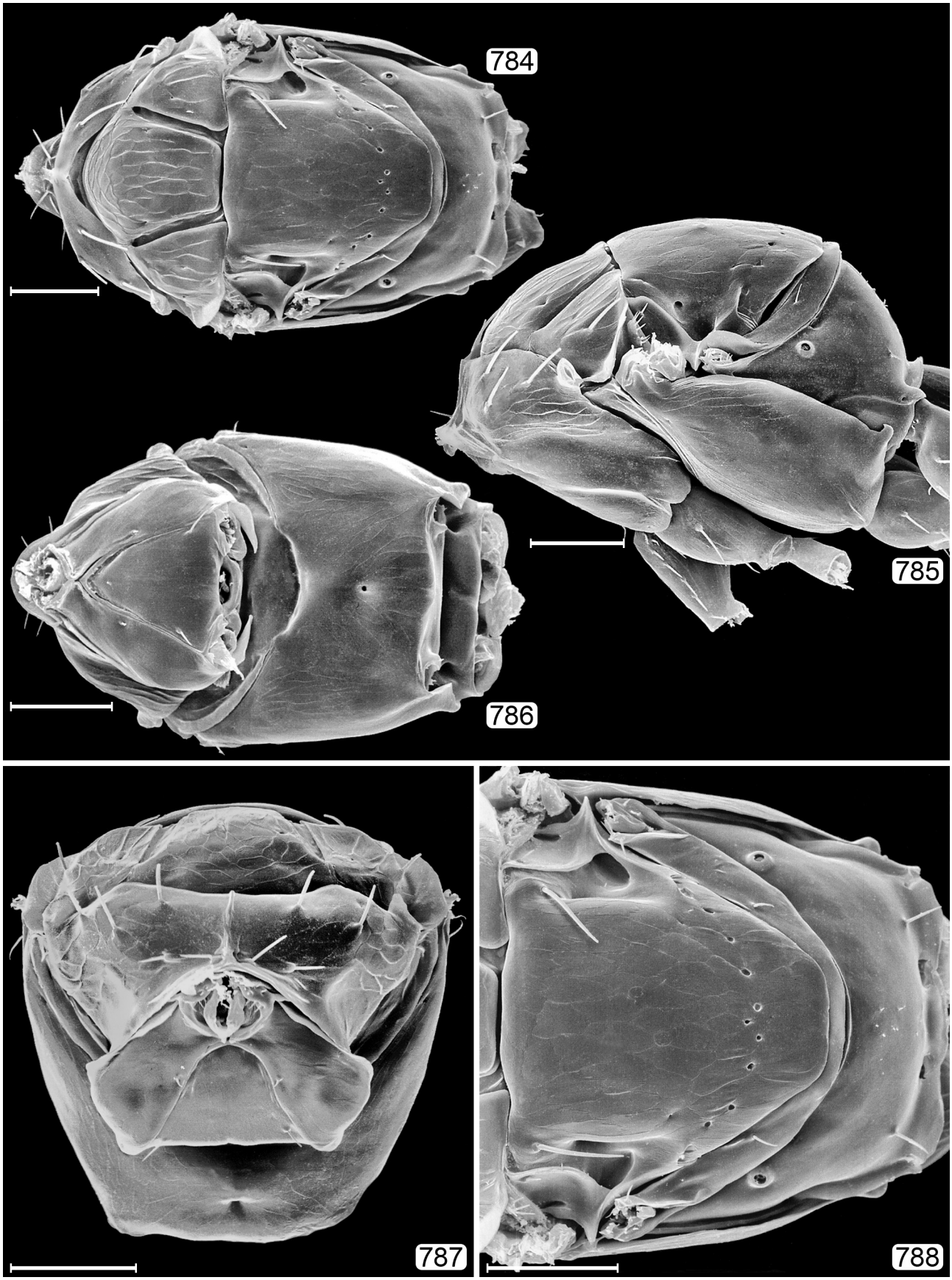
Distribution. USA: CA.



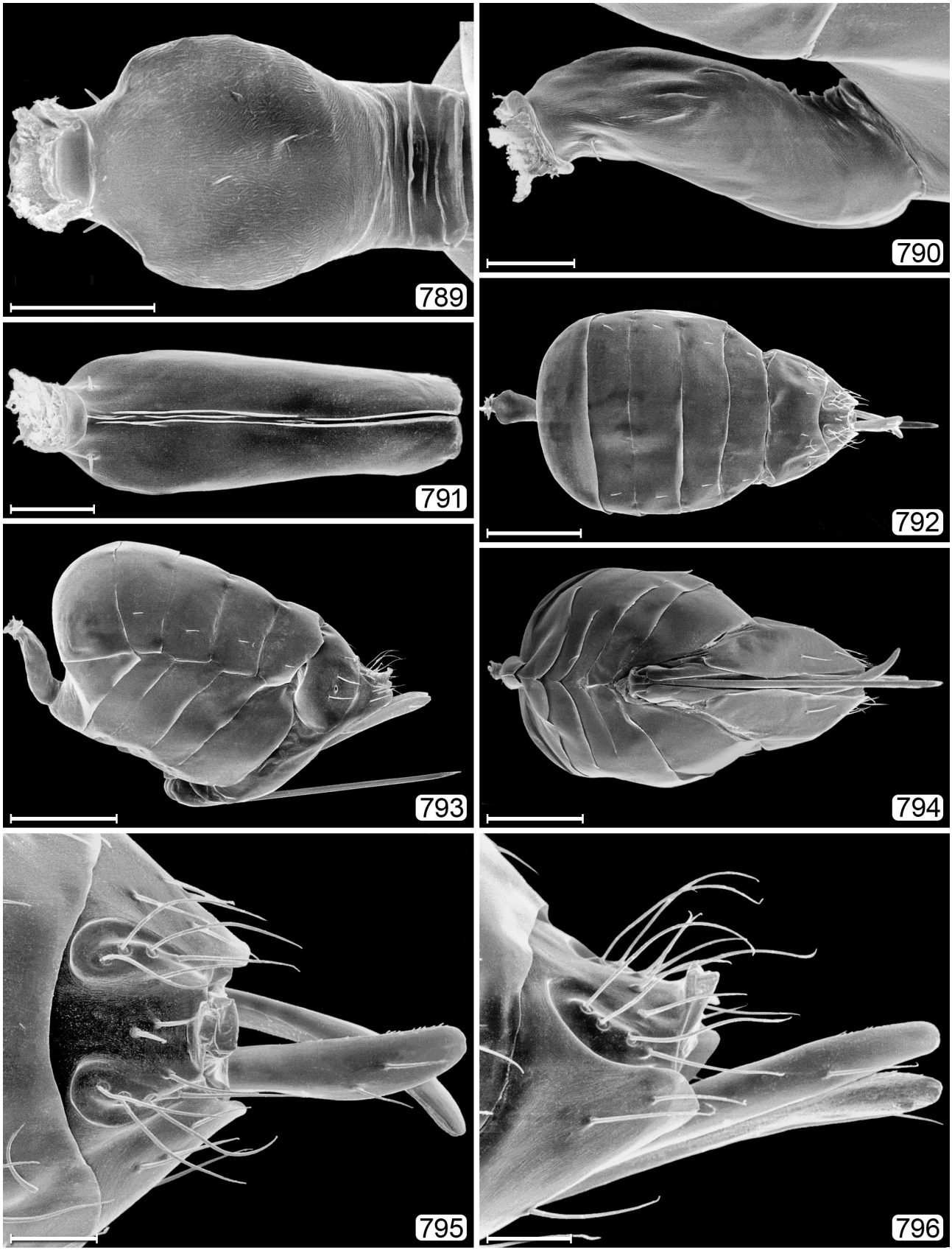
FIGURES 775–777. *Palaeoneura mymaripennis* (Dozier). 775, antenna; 776, mesosoma, dorsal; 777, wings. Scale bars: 775, 777=200 µm; 776=100 µm.



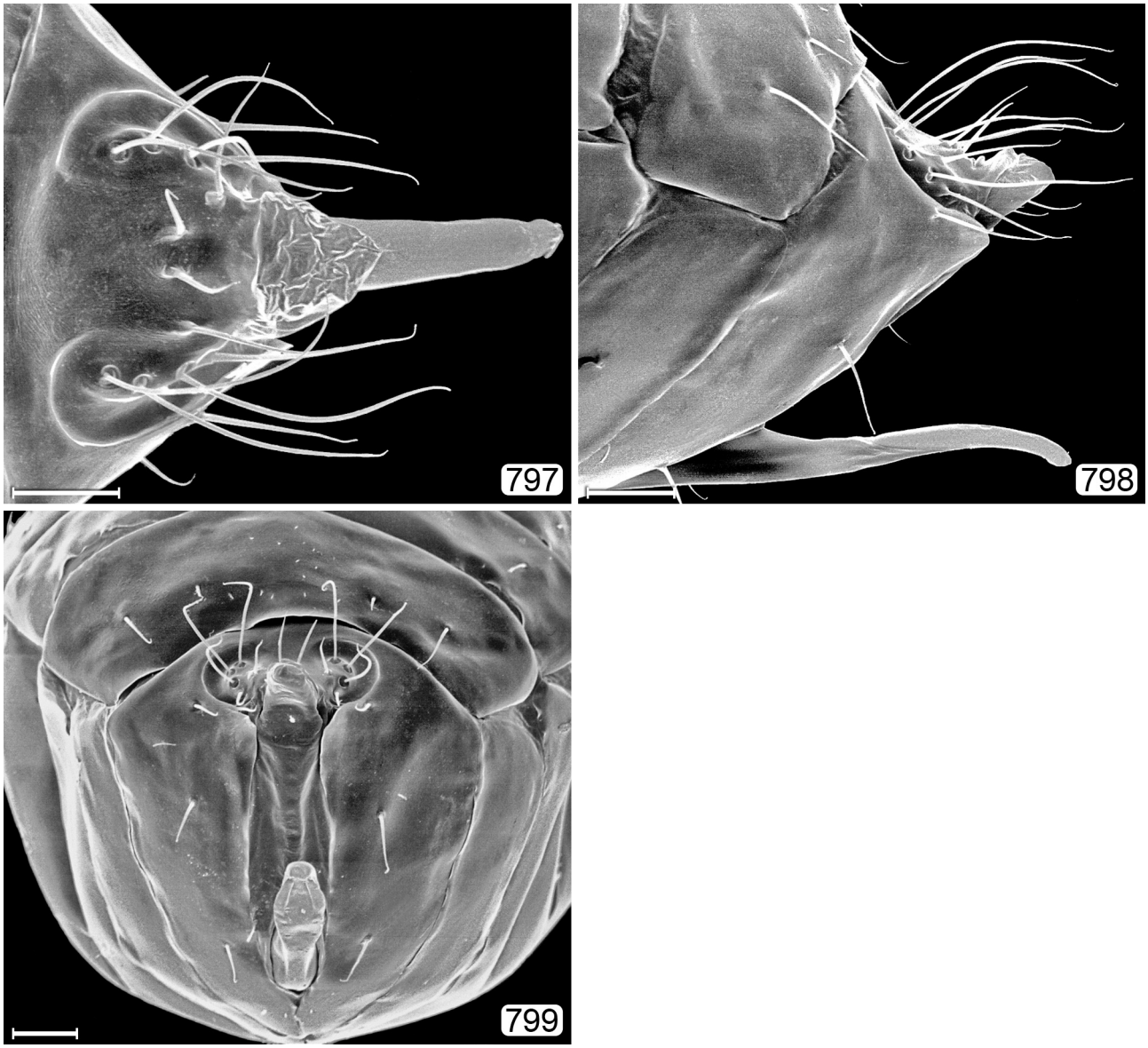
FIGURES 778–783. *Palaeoneura mymaripennis* (Dozier), head. 778, anterior; 779, posterior; 780, lateral; 781, dorsal; 782, male, ventral; 783, male mouthparts. Scale bars=50 μm.



FIGURES 784–788. *Palaeoneura mymaripennis* (Dozier), mesosoma. 784, dorsal; 785, lateral; 786, ventral; 787, male, anterior; 788, scutellum–propodeum. Scale bars=50 μm.



FIGURES 789–796. *Palaeoneura mymaripennis* (Dozier), metasoma. 789, petiole, dorsal; 790, male petiole, lateral; 791, petiole, ventral; 792, metasoma, dorsal; 793, metasoma, lateral; 794; metasoma, ventral; 795, apex of gaster, dorsal; 796, apex of gaster, lateral. Scale bars: 789–791, 795, 796=20 μm; 792–794=100 μm.



FIGURES 797–799. *Palaeoneura mymaripennis* (Dozier), male, apex of gaster showing exserted genitalia. 797, dorsal; 798, lateral; 799, posterior. Scale bars=20 μm.

***Palaeoneura mymaripennis* (Dozier, 1933)**

Polynema mymaripennis Dozier, 1933: 96. Holotype ♀ (USNM). **TL:** USA, Delaware, Newark, University of Delaware Agricultural Experiment Station. Peck, 1951: 417 (catalogue); Peck, 1963: 47 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).

Palaeoneura mymaripennis: Triapitsyn & Aquino, 2010: 69 (description), 76 (key); Triapitsyn, 2018b: 37 (key).

Distribution. Canada. NB, ON. USA: DE, IL, NC.

***Palaeoneura saga* (Girault, 1911)**

Anagrus saga Girault, 1911 [96]: 296. Holotype ♀ (USNM). **TL:** USA, District of Columbia, Washington. Girault, 1911 [96]: 298 (key); Crosby & Leonard, 1914a: 182 (key); Thompson, 1958: 567 (host catalogue).

Polynema saga: Girault, 1929 [428]: 17 (key); Lawson, 1929: 130 (host, percent parasitism, distribution); Swezey, 1929: 291 (list, host) [A]; Harding, 1930: 18 (host, percent parasitism, larval movement, emergence); Zimmerman, 1948: 83 (host) [A]; Yoshimoto, 1990: 83 (list, generic transfer); Wiesenborn, 2002: 116 (parasitism rate); Wiesenborn, 2005: 656 (host, distribution); Lin *et al.*, 2007: 45 (list) [A]; Luft Albarracin *et al.*, 2009: 12 (list) [NT]; Luft Albarracin *et al.*, 2017: 670 (host) [NT].

Barypolynema saga: Ogloblin, 1946: 285 (generic transfer); Peck, 1951: 416 (catalogue); Peck, 1963: 42 (catalogue); Burks, 1979: 1031 (catalogue).
Polynema (*Tarphypolynema*) *saga*: Ogloblin, 1960b: 79 (key, distribution) [AT]; De Santis, 1967: 112 (catalogue) [NT].
Polynema (*Polynema*) *saga*: Triapitsyn & Fidalgo, 2006: 60 (subgeneric placement).
Palaeoneura saga: Triapitsyn, 2018b: 37 (key), 41 (generic transfer, description, distribution).

Nearctic hosts. Cicadellidae: *Opsius stactogalus* Fieber.
Distribution. USA: AZ, CA, DC, KS, NV, UT.

PLATYSTETHYNIUM (*PLATYPATASSON* Ogloblin, 1946), stat. rev.

(Figs 800–811)

Platystethynium Ogloblin, 1946: 290. Type species: *Platystethynium onomarchicidum* Ogloblin, 1946, by original designation.
Platypatasson Ogloblin, 1946: 293. Type species: *Platypatasson fransseni* Ogloblin, 1946, by original designation. Synonymy by Donev & Huber, 2002: 118.



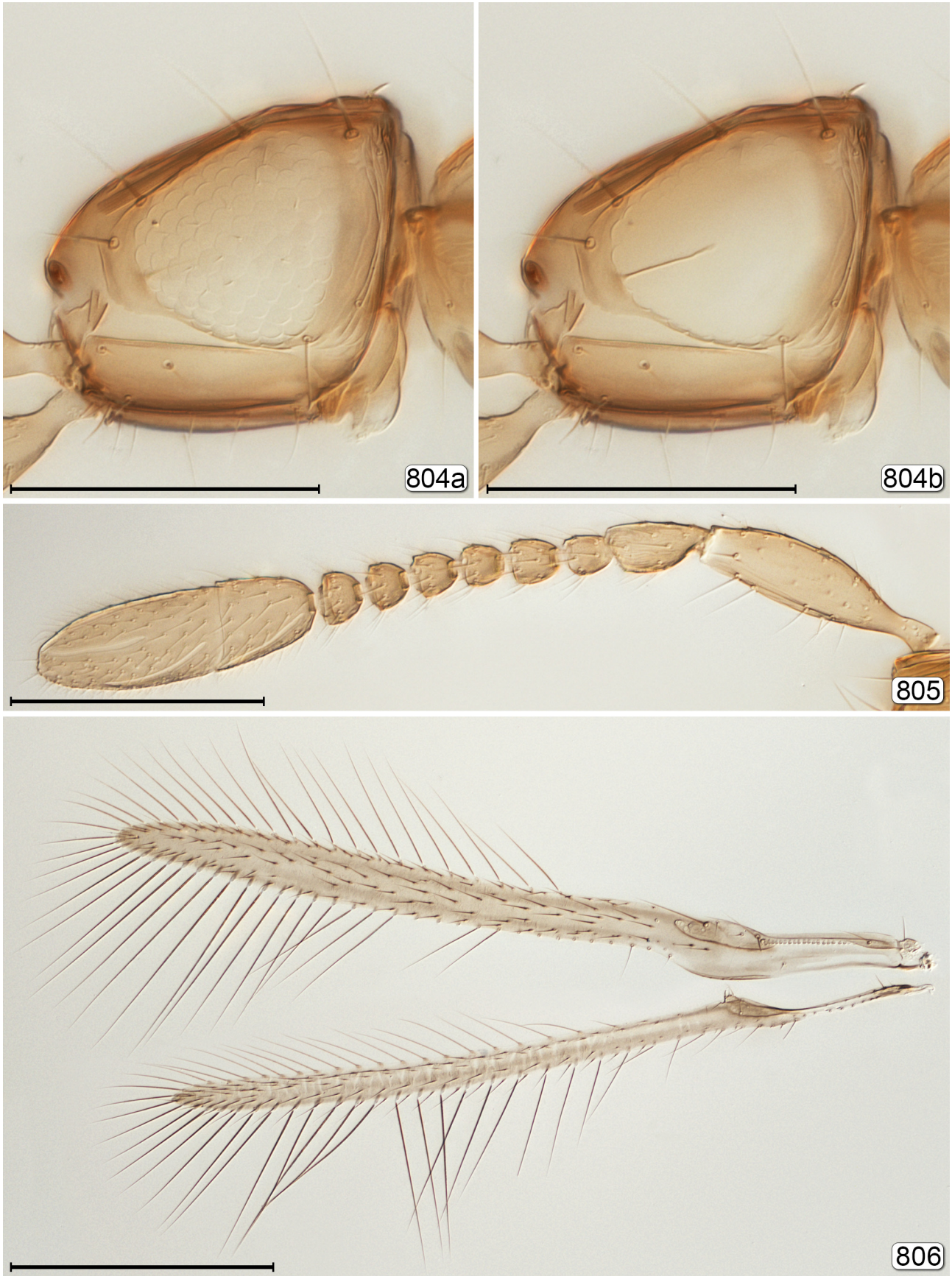
FIGURE 800. *Platystethynium* (*Platypatasson*) sp., habitus. Canada, Ontario, Buckham's Bay, 45.498548°N 76.110814°W, 24–30.vii.2010, J. Read. Scale bar=500 μm.



FIGURES 801–803. *Platystethynium* (*Platypatasson*) sp. 801, habitus (wings removed), dorsal; 802, head, dorsal; 803, head, ventral. Scale bars: 801=500 µm; 802, 803=100 µm.

Diagnosis. Body length 435–655 µm. Head in lateral view longer than high (Figs 800–803), with face strongly projecting anteriorly and mouthparts in almost same plane as toruli (Fig. 804); vertex with conspicuous, long setae next to eye (Figs 802–804); funicle segments shorter than wide (Fig. 805); clava 2-segmented (Fig. 805); fore wing narrow and parallel-sided (Fig. 806); frenum longitudinally divided medially (Fig. 807).

Discussion. *Cleruchus* and *Platystethynium* (*Platypatasson*) belong to the *Cleruchus* group of genera, which consists of species with dorsoventrally flattened bodies, claval segments quadrate or shorter than wide and head in



FIGURES 804–806. *Platystethynium* (*Platypatasson*) sp. 804a, lateral; 804b, lateral (internal) showing ocular apodeme; 805, antenna; 806, wings. Scale bars: 804, 805=100 µm; 806=200 µm.



FIGURES 807, 808. *Platystethynium* (*Platypatasson*) sp., mesosoma. 807, dorsal; 808, lateral. Scale bars=100 μm.

lateral view bluntly triangular, with face strongly projecting anteriorly so toruli well anterior to the mouthparts. This group could be treated as a subgroup within a larger *Anagrus* group of genera depending on which features are used to define the *Anagrus* group. Donev & Huber (2002) treated *Platypatasson* as a synonym of *Platystethynium* rather than of *Cleruchus* as proposed by Schauff (1984). The frenum is entire in *Cleruchus* but longitudinally divided in both the former genera. Similarities in head structure, as well as their hosts (Orthoptera), also suggest a closer relationship of *Platypatasson* to *Platystethynium* and perhaps *Anagrus*, *Omyomymar*, *Schizophragma* and *Stethynium* than to *Cleruchus*, which are parasitoids of Coleoptera. Here we give *Platypatasson* subgeneric status as *Platystethynium* (*Platypatasson*), **stat. rev.**, because the of their different number of claval segments, just as was done for *A*. (*Anaphes*) and *Anaphes* (*Patasson*). Only the subgenus *Platypatasson* occurs in the Nearctic.

Nearctic hosts. Unknown. Extralimital hosts are Orthoptera: Tettigoniidae (Ogloblin 1946).

Important reference. Ogloblin (1959b).

***Platystethynium* (*Platypatasson*) sp**.

Discussion. Whether the material examined represents one or several species and whether it (they) are the same as one or both species described from Argentina by Ogloblin (1959b) is not yet known. The length and position of the body setae differ somewhat from Ogloblin's illustrations.

Distribution. Canada: ON, QC. USA: MI, MO, OH, NC, SC, TN, VA.

POLYNEMA Haliday, 1833

(Figs 812–850)

Polynema Haliday, 1833a: 269. 1833b: 347. Type species: *Ichneumon flavipes* Walker, 1846, by subsequent designation by Huber & Bouček, 2001: 281.

Eutriche Nees, 1834: 196. Type species: *Eutriche gracilis* Nees, 1834, by monotypy. Synonymy by Foerster, 1847: 7, 218.

Doriclytus Foerster, 1847: 226. Type species: *Doriclytus vitripennis* Foerster, 1847, by monotypy. Synonymy by Schauff, 1984a: 52.

Callitriche Agassiz, 1848: 173. Unjustified emendation.

Cosmocoma Foerster, 1856: 117, 120. Unnecessary replacement name for *Polynema*, not *Polynemus* Gronovius (Gahan & Fagan, 1923: 39).

Maidliella Soyka, 1946b: 178. Type species: *Maidliella neofuscipes* Soyka, 1946, by original designation. Synonymy by Annecke & Doutt, 1961c: 36.

Novickyella Soyka, 1946b: 179. Type species: *Novickyella gracilior* Soyka, 1946, by original designation. Synonymy by Soyka, 1956b: 32.

Barypolynema Ogloblin, 1946: 282. Type species: *Barypolynema reticulatum* Ogloblin, 1946, by original designation. Synonymy by Schauff, 1984a: 53.

Barypolynema (*Notopolynema*) Ogloblin, 1960b: 77. Type species: *Barypolynema pallidiventre* Ogloblin, 1960, by original designation. Synonymy by Schauff, 1984a: 53.

Polynema (*Dorypolynema*) Hayat & Anis, 1999a: 318. Type species: *Polynema mendeli* Girault, 1913, by original designation.

Restisoma Yoshimoto, 1990: 68. Type species: *Restisoma howdeni* Yoshimoto, 1990, by original designation. Synonymy under *Polynema* (*Doriclytus*) by Triapitsyn & Fidalgo, 2006: 57.

Formicomymar Yoshimoto, 1990: 80. Type species: *Formicomymar venezuelaensis* Yoshimoto, by original designation. Synonymy under *Polynema* (*Doriclytus*) by Triapitsyn & Fidalgo, 2006: 57.

Diagnosis. Body length 545–2250 μm. Body dark brown or black (Figs 812, 827) but often with antenna, petiole and legs lighter, sometimes yellow; body sculpture shallow and body appearing mostly fairly smooth and shiny; clava 1-segmented; face with (Fig. 828) or without (Fig. 813) pits between toruli; vertex without pits outside ocelli (Figs 816, 831); fore wing without lobe (Fig. 826) so wing not or barely narrowing beyond venation, the wing posterior margin straight or almost so behind venation, and fore wing usually without distinct brown bands, sometimes with faint band(s) in some *P.* (*Doriclytus*) (Fig. 827); propodeum with (Fig. 839) or without (Fig. 818) median carina of varying length but without V-shaped median carinae.

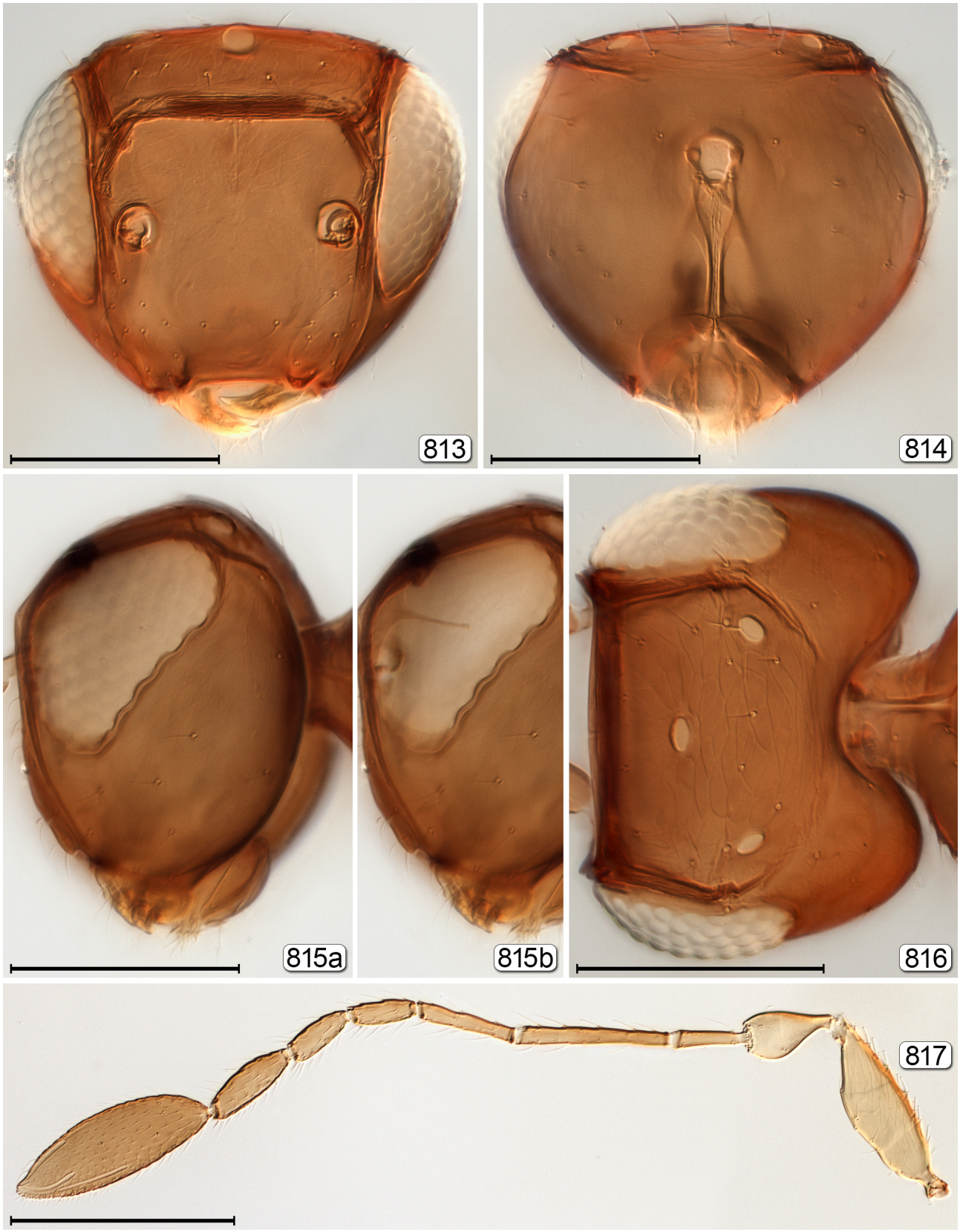
Discussion. Among the nine other Nearctic genera of the *Polynema* group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Stephanodes*), *Polynema* is identified by elimination, i.e., by not having the features of eight other genera in the group. The only genus it is easily confused with is *Palaeoneura* (itself not well defined, see above). The two subgenera of *Polynema* are distinguished from *Palaeoneura* by different features. *Polynema* (*Polynema*) is separated from *Palaeoneura* by the propleura not abutting medially anterior to the prosternum (Figs 820, 837); in *Palaeoneura* the propleura abut medially, albeit narrowly in Nearctic species at least, anterior to the prosternum (Figs 762–764, 786, 787). *Polynema* (*Doriclytus*) has the propleura abutting medially, as in *Palaeoneura* but for a greater part of their length (Fig. 836) but has pits between the toruli (Fig. 828) unlike in *Palaeoneura* (Figs 754, 778). *Polynema* is by far the most commonly collected genus of the *Polynema* group and is usually easily separated from several other genera of the *Polynema* group by the generally dark brown or black body colour.

Nearctic hosts. Hemiptera: Cicadellidae, Flatidae, Membracidae, Miridae, Nabidae. Odonata: Aeshnidae, Lestidae.

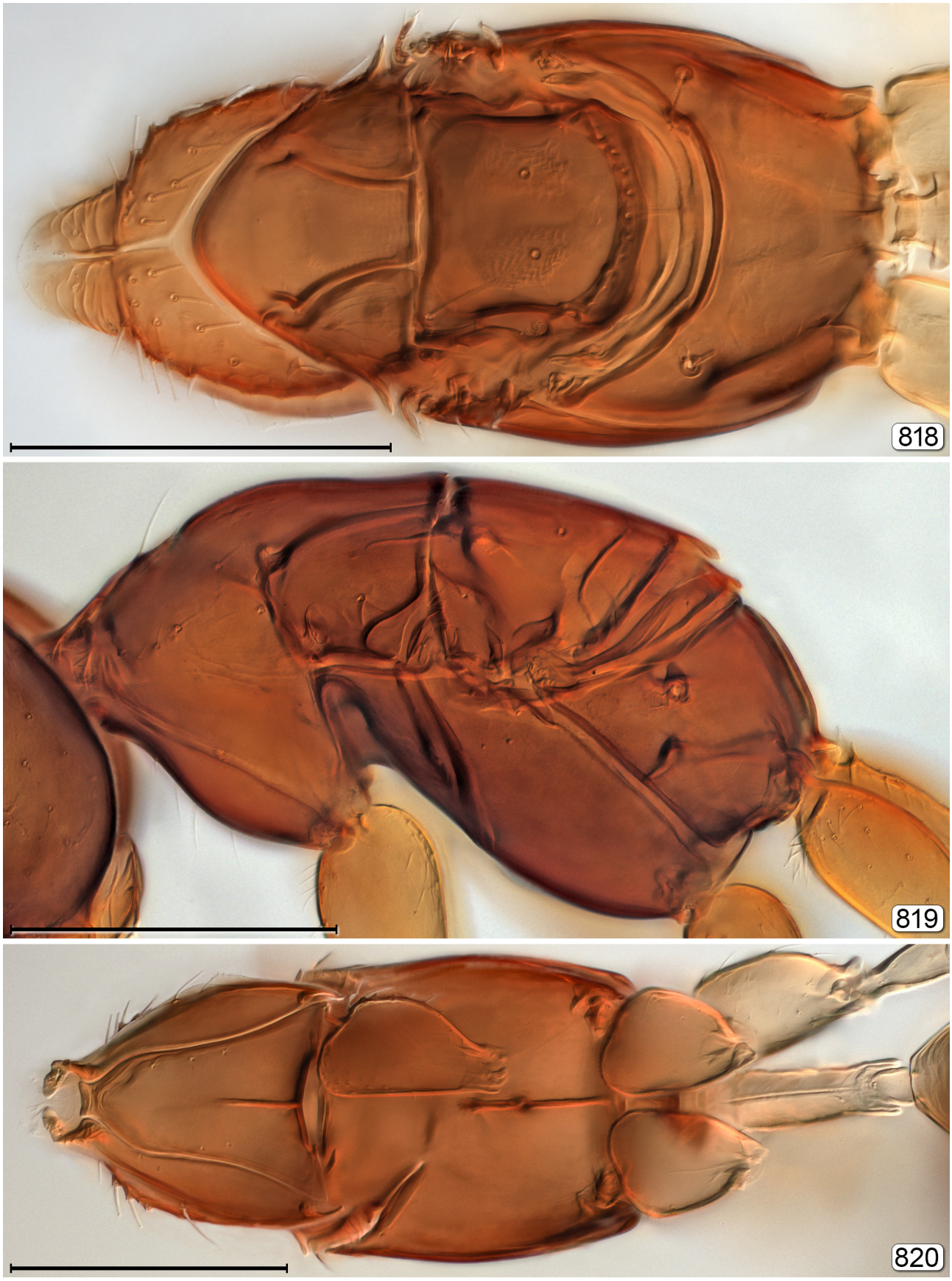
Important reference. Girault (1929 [428]).



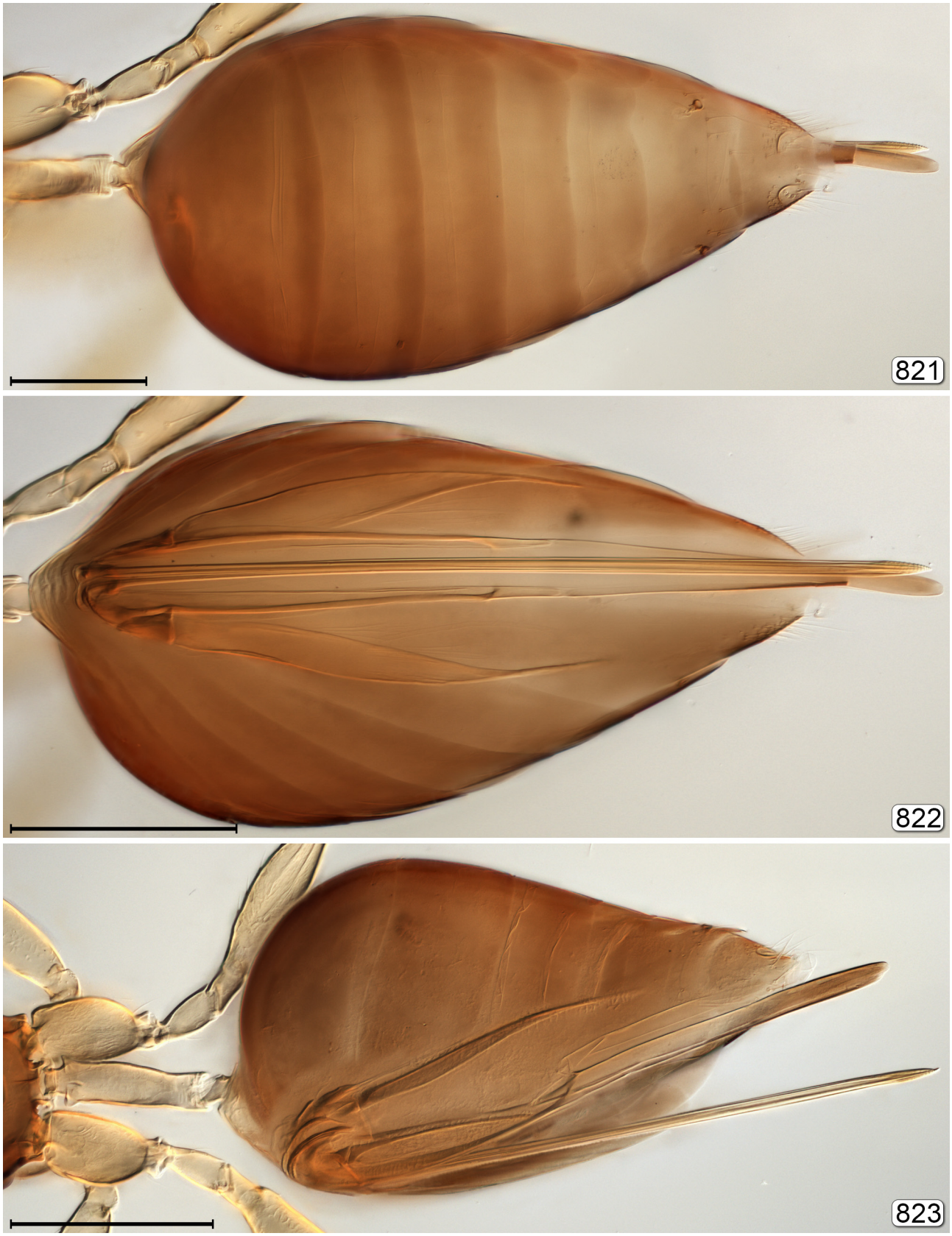
FIGURE 812. *Polynema pratensiphagum* Walley, habitus. Canada, Ontario, London, emerged 5.vi.2000, in lab. J. Whistlecraft, ex. *Lygus lineolaris* eggs placed in alfalfa block 2.vi.2000. Scale bar=500 μm.



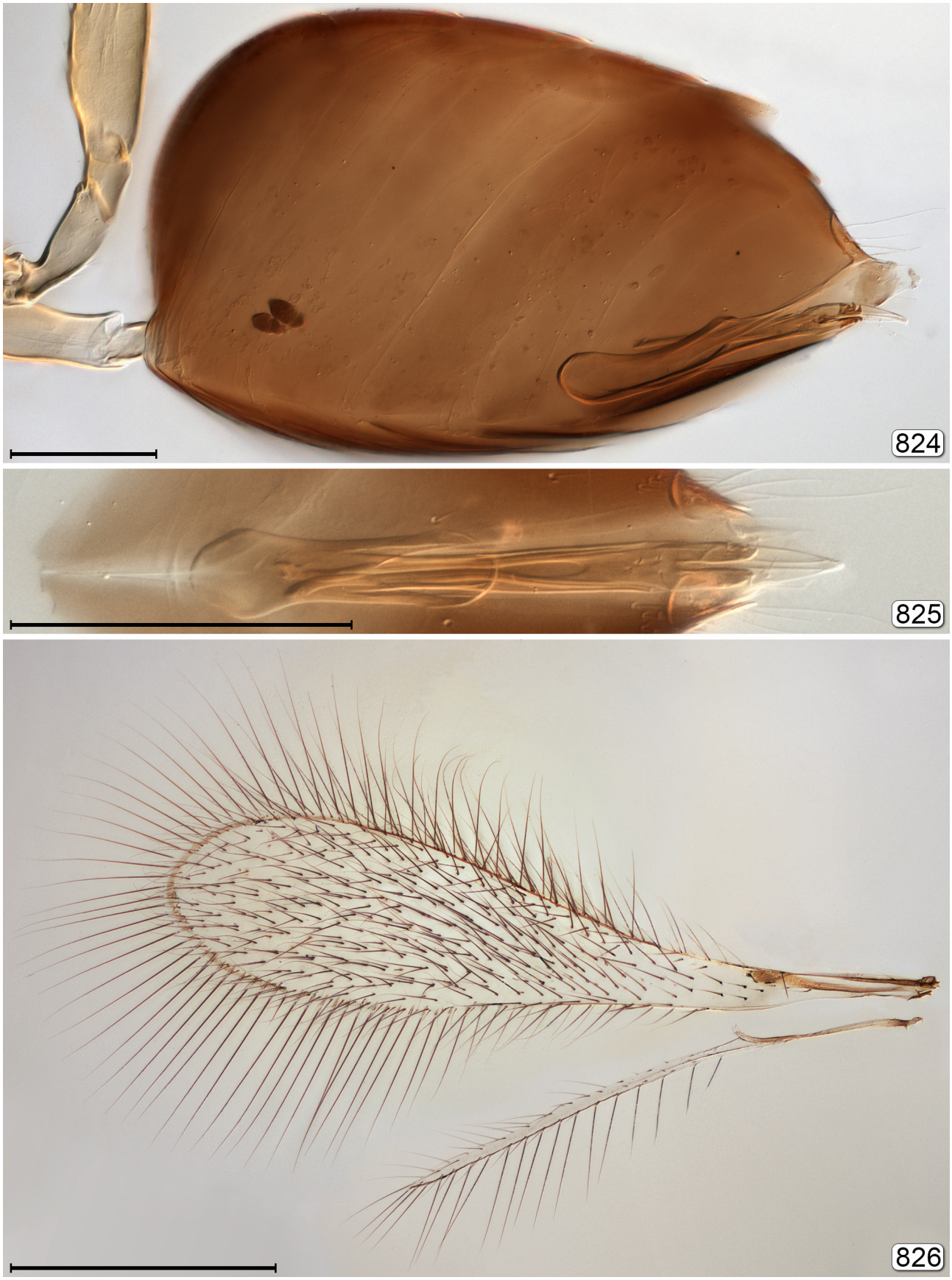
FIGURES 813–817. *Polynema* (*Polynema*) sp., head except 817. 813, anterior; 814, posterior; 815a, lateral; 815b, lateral (internal) showing ocular apodeme; 816, dorsal; 817, antenna. Scale bars: 813–816=100 µm; 817=200 µm.



FIGURES 818–820. *Polynema* (*Polynema*) sp., mesosoma. 818, dorsal; 819, lateral; 820, including petiole, ventral. Scale bars=200 μm.



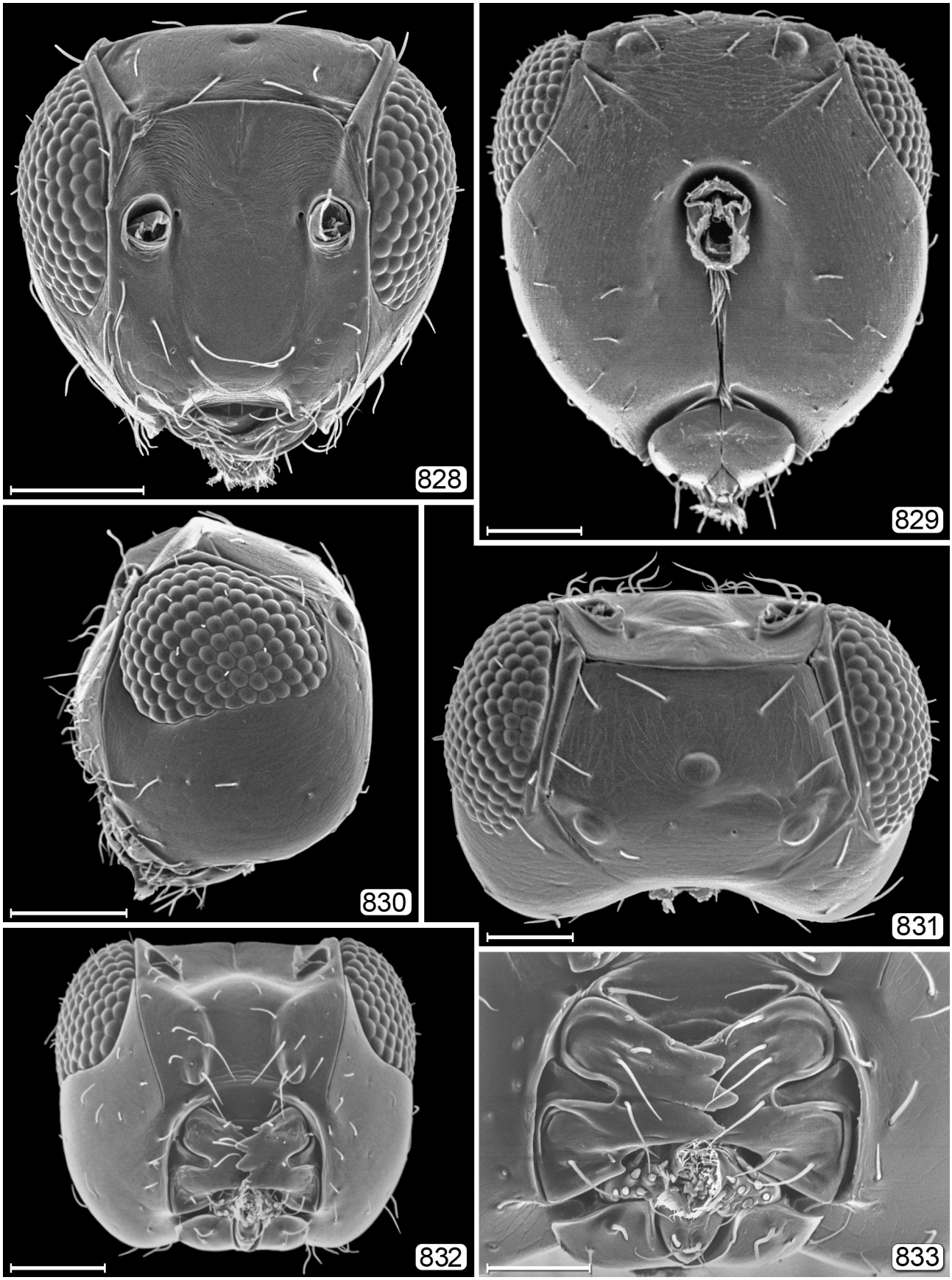
FIGURES 821–823. *Polynema* (*Polynema*) sp., metasoma. 821, dorsal; 822, ovipositor seen through gaster; 823, lateral. Scale bars=200 μm.



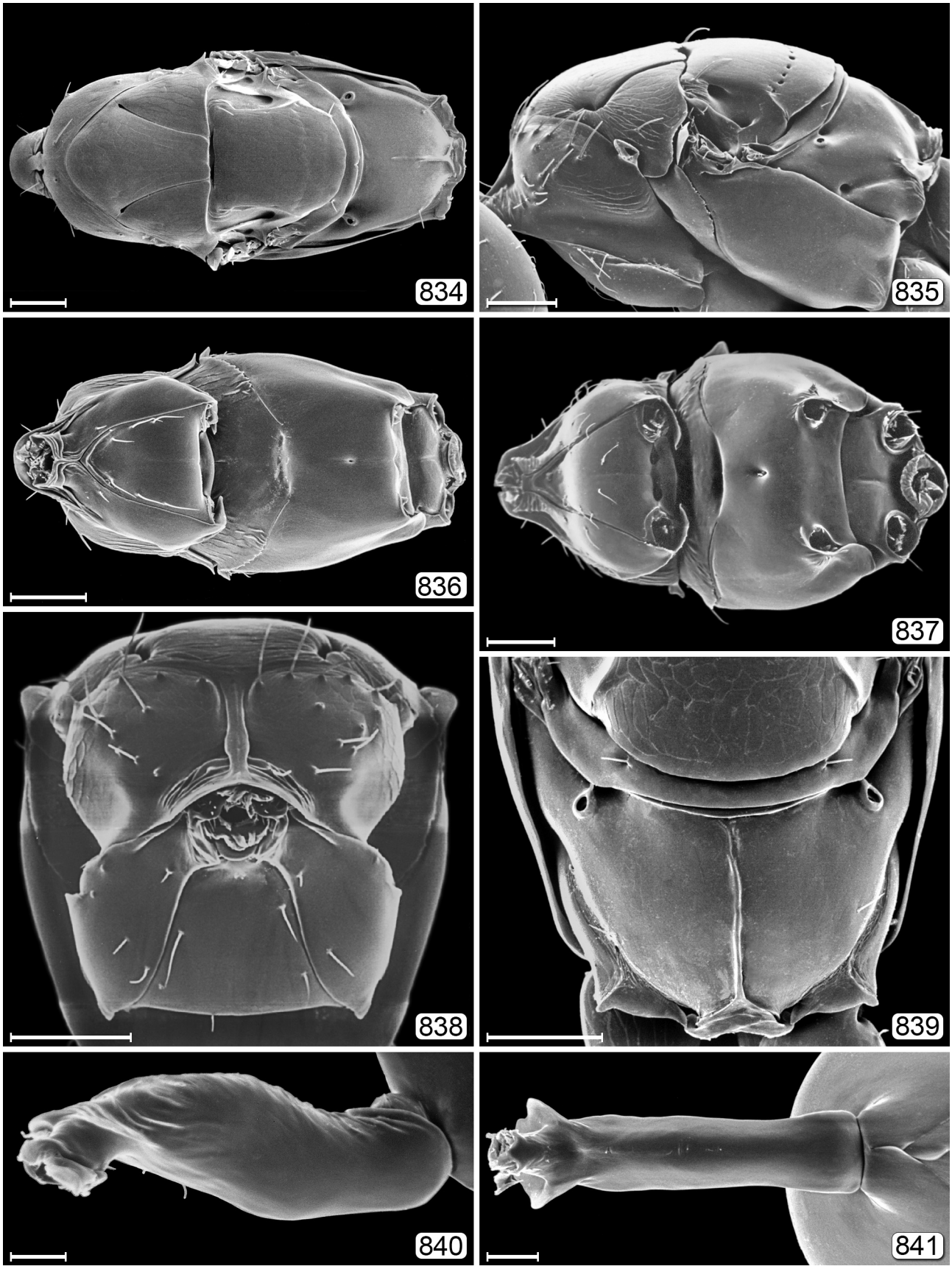
FIGURES 824–826. *Polynema* (*Polynema*) sp., male. 824, metasoma, lateral; 825, genitalia seen through gaster; 826, wings. Scale bars: 824, 825=100 µm; 826=500 µm.



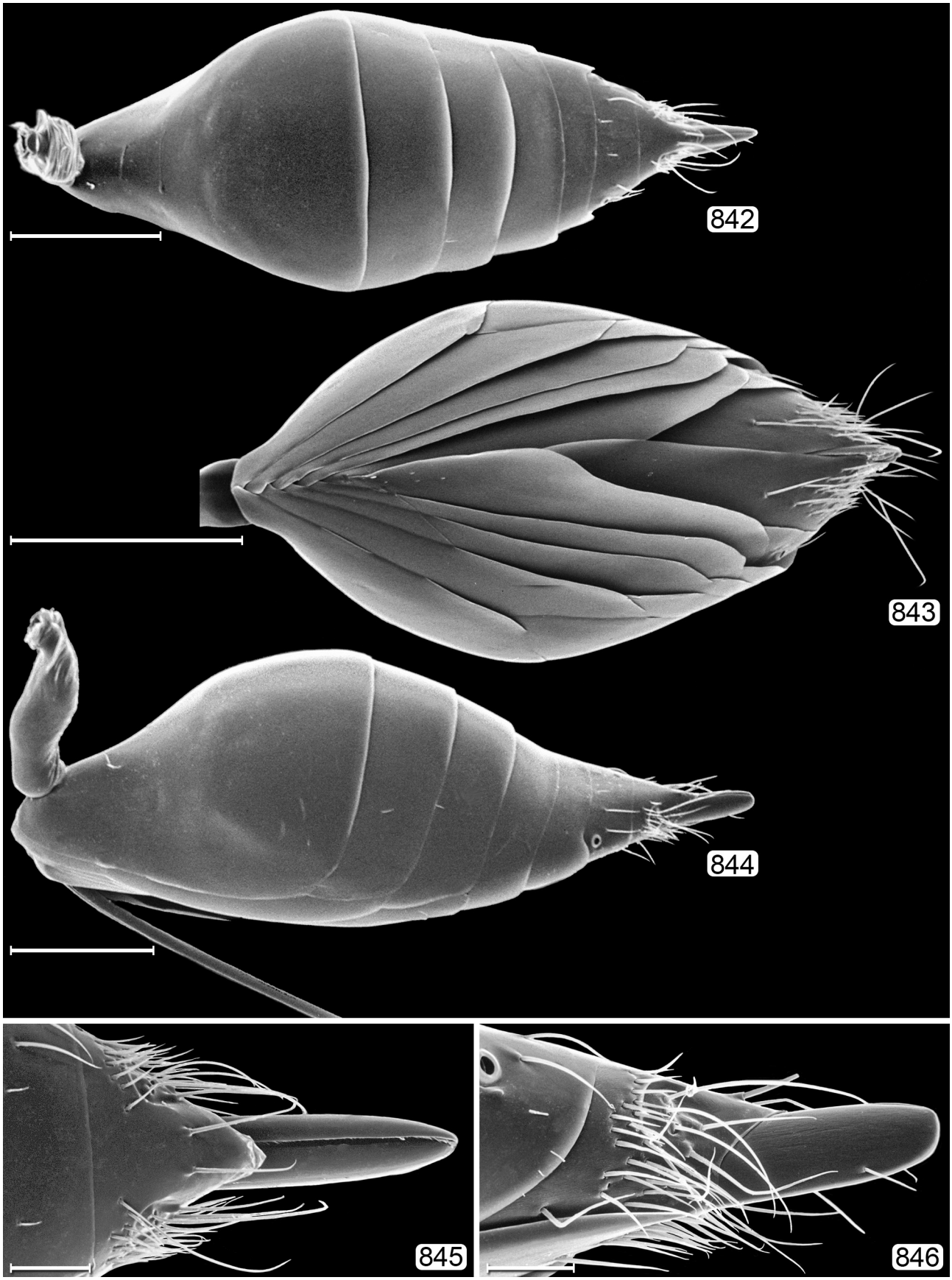
FIGURE 827. *Polynema* (*Doriclytus*) sp., habitus. Canada, Ontario, Malborough Forest, 45°05'42"N 75°50'42"W, 26.vi.2002, H. Goulet & C. Boudreault, maple/beech forest. Scale bar=500 µm.



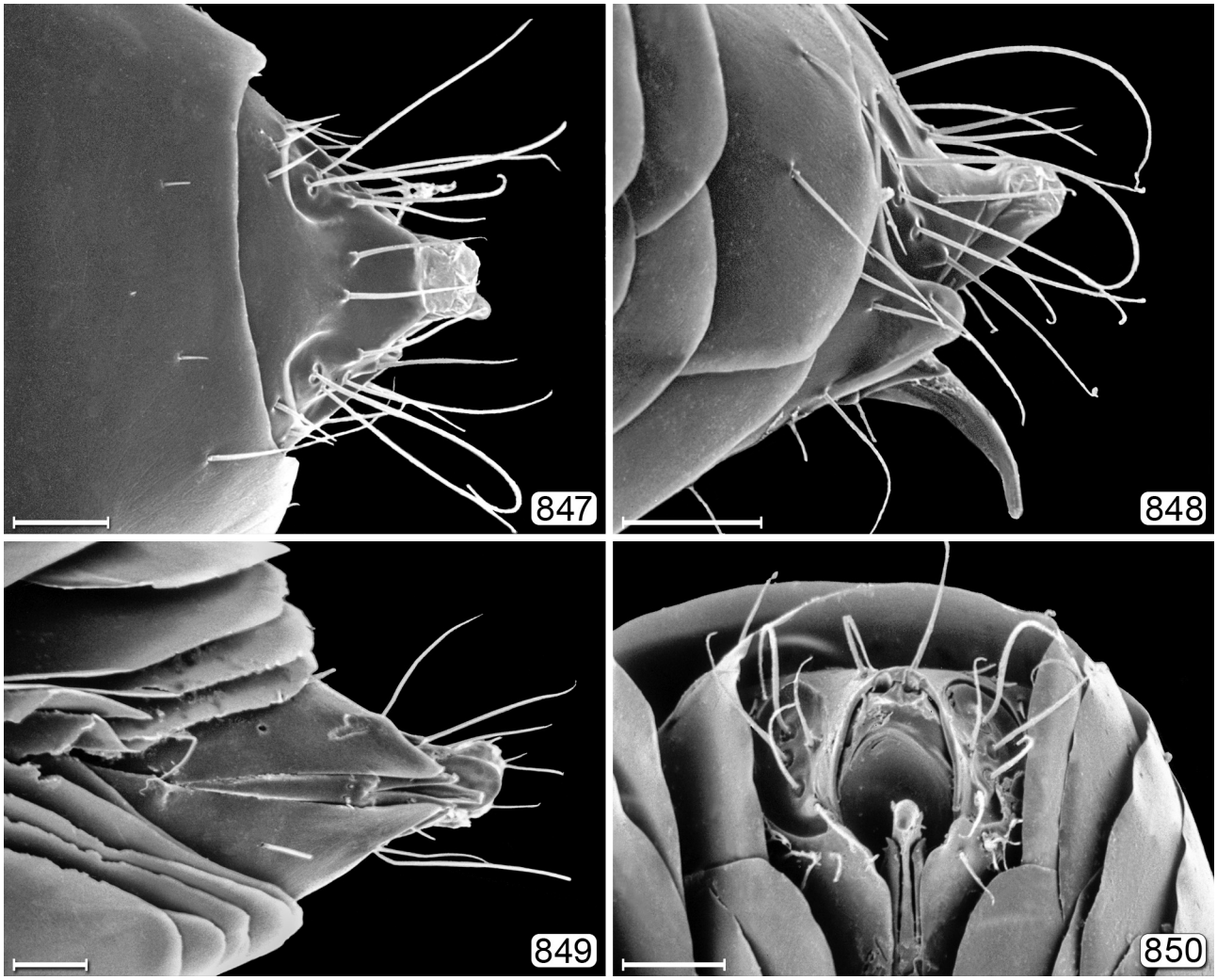
FIGURES 828–833. *Polynema* sp. (subgenus uncertain unless specified), head. 828, *Polynema* (*Doriclytus*) sp., anterior; 829, posterior; 830, lateral; 831, *Polynema* (*Doriclytus*) sp., dorsal; 832, *Polynema* (*Polynema*) sp., ventral; 833, mouthparts. Scale bars: 828–832=50 μm; 833=100 μm.



FIGURES 834–841. *Polynema* sp. (subgenus uncertain unless specified), mesosoma except 840 and 841. 834, dorsal; 835, lateral; 836, *Polynema* (*Doriclytus*) sp., ventral; 837, *Polynema* (*Polynema*) sp., ventral; 838, *Polynema* (*Polynema*) sp., anterior; 839, frenum–propodeum; 840, petiole, lateral; 841, petiole, ventral. Scale bars: 834–839=50 μm; 840, 841=20 μm.



FIGURES 842–846. *Polynema* sp. (subgenus uncertain), metasoma. 842, dorsal; 843, ventral; 844, lateral; 845, apex of gaster, dorsal; 846, apex of gaster, lateral. Scale bars: 842–844=100 μm; 845, 846=25 μm.



FIGURES 847–850. *Polynema* sp. (subgenus uncertain), male, apex of gaster. 847, dorsal; 848, lateral; 849, ventral; 850, ventroposterior. Scale bars=20 μm.

Polynema aspidioti Girault, 1911

Polynema aspidioti Girault, 1911 [94]: 358. Holotype ♀ (USNM). **TL**: Mexico, Morelos, Cuantla. Girault, 1911 [95]: 367 (comparison with *P. brittanum*); Girault, 1911 [96]: 324 ([incorrect] *nomen nudum*); Girault, 1912 [112]: 298 (correction to description); Girault, 1929 [428]: 18, 19 (key); Ogloblin, 1946: 285 (transfer to *Barypolynema*, description, host, distribution); Yoshimoto, 1990: 83 (list).
Barypolynema aspidioti: Peck, 1951: 416 (catalogue, host); Peck, 1963: 42 (catalogue); Burks, 1979: 1031 (catalogue).

Nearctic hosts. Miridae: *Pseudatomoscelis seriatus* (Reuter).
Distribution. USA: TX.

Polynema (*Doriclytus*) *bimaculatipenne* Girault, 1911

Polynema bimaculatipenne Girault, 1911 [96]: 304. Holotype ♀ (USNM). **TL:** USA, Texas, College Station. Girault, 1911 [89]: 139 (mention); Girault, 1911 [96]: 318 (key); Girault, 1917 [330]: 2 (contrast with *P. marilandicum*); Girault, 1929 [428]: 15 (key); Peck, 1963: 43 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).
Polynema bimaculatipennis [*sic*]: Peck, 1951: 417 (catalogue).

Distribution. USA: TX.

Polynema (*Polynema*) *boreum* Girault, 1916

Polynema striaticorne var. *boreum* Girault, 1915 [261]: 8. Holotype ♀ (USNM). **TL:** USA, South Dakota, Elk Point. Balduf, 1928: 423 (distribution); Peck, 1951: 418 (catalogue, under *P. striaticorne*).
Polynema striaticorne boreum: Benedict & Cothran, 1978: 41 (host, percent parasitism, distribution).
Polynema boreum: Girault, 1929 [428]: 251 (key, synonymy under *P. striaticorne*); Burks, 1967: 216 (given species status); Burks, 1979: 1032 (catalogue); Graham & Jackson, 1982: 58 (host, percent parasitism); Jackson & Graham, 1983: 772 (host, percent parasitism); Graham *et al*., 1984: 250 (D-vac sampling, host, distribution); Lakin *et al*., 1984: 391 (hosts, percent parasitism, distribution); Lakin, 1985: 26 (description, biology), 47 (key); Lattin, 1989: 390 (host, percent parasitism); Braman & Yeargan, 1990: 828 (host, distribution); Yoshimoto, 1990: 83 (list).

Nearctic hosts. Nabidae: *Nabis alternatus* Parshley, *N. americoferus* Carayon, *N. roseipennis* Reuter, *N. rufuscutus* Reuter.

Distribution. USA: AZ, CA, KY, SD.

Polynema (*Polynema*) *caesariatipenne* Girault, 1911

Polynema caesariatipenne Girault, 1911 [96]: 305. Holotype ♀ (USNM). **TL:** USA, District of Columbia, Washington. Girault, 1911 [96]: 318 (key); Girault, 1929 [428]: 16 (key); Schwitzgebel & Wilbur, 1943: 8 (host, distribution); Peck, 1963: 43 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).
Polynema caesariatipennis [*sic*]: Peck, 1951: 417 (catalogue).

Distribution. USA: DC, KS.

Polynema (*Polynema*) *consobrinum* Girault, 1911

Polynema consobrinum Girault, 1911 [96]: 309. Holotype ♂ (USNM). **TL:** USA, Illinois, Pulaski. Girault, 1911 [96]: 319 (key).
Cosmocoma maculipes: Nason, 1906: 8 (list) [misidentification (Girault, 1911 [96]: 308)].
Polynema consobrinus: Girault, 1911 [87]: 148 (host)*;* Girault, 1911 [91]: 189 (distribution); Girault, 1911 [95]: 365, 367 (description, host, distribution); Girault, 1911 [100]: 467 (description, distribution); Girault, 1913 [135]: 14 (mention); Girault, 1913 [137]: 197 (host, distribution); Girault, 1914 [187]: 175 (host); Girault, 1916 [261]: 8 (description); Girault, 1916 [265a]: 60 (host); Marcovitch, 1916a: 121 (host, distribution); Girault, 1917 [316]: 18 (description); Washburn, 1919: 184 (host, distribution); Frison, 1927: 228 (types listed); Girault, 1929 [428]: 18 (key); Peck, 1951: 417 (catalogue); Thompson, 1958: 572 (host catalogue); Peck, 1963: 43 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).

Nearctic hosts. Cicadellidae: ? *Empoasca fabae* (Harris). Membracidae: *Enchenopa binotata* (Say).

Distribution. USA: GA, IA, IL, MI, MN, OH.

Polynema (*Polynema*) *enchenopae* Girault, 1911

Polynema enchenopae Girault, 1911 [72]: 15. Syntypes ♀, ♂ (USNM). **TL:** USA, Illinois, Chicago. Girault, 1911 [72]: 319 (key); Girault, 1911 [87]: 148 (host); Girault, 1911 [89]: 139 (mention); Girault, 1911 [96]: 317 (distribution), 319 (key); Frison, 1927: 228 (paratype listing); Girault, 1929 [428]: 17 (key); Peck, 1951: 417 (catalogue); Peck, 1963: 44 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).

Nearctic hosts. Membracidae: *Enchenopa binotata* (Say).
Distribution. USA: IL.

Polynema (*Polynema*) *eutettexi* Girault, 1917

Polynema eutettexi Girault, 1917 [316]: 18, 28. Syntypes ♀, ♂ (USNM). **TL:** USA, California, Spreckels. Girault, 1916 [287]: 299 (*nomen nudum*); Boyd *et al*., 2008: 195 (description, host, distribution, distribution).
Polynema eutettixi [*sic*]: Stahl, 1920: 250 (host, life cycle); Severin, 1924: 371 (host, distribution); Essig, 1929: 817 (host, distribution); Girault, 1929 [428]: 18 (key); Knowlton & Bowen, 1930: 75 (host, distribution); Henderson, 1941: 2 (rearing technique, distribution); Peck, 1951: 417 (catalogue); Thompson, 1958: 572 (host catalogue); Flock *et al.*, 1962: 277 (host, seasonal abundance); Peck, 1963: 44 (catalogue); Herting, 1972: 21 (host catalogue); Burks, 1979: 1032 (catalogue); De Santis, 1979: 376; Yoshimoto, 1990: 83 (list); Bayoun *et al*., 2008: 415 (host, distribution).

Polynemia [*sic*] *eutettixi* [*sic*]: Knowlton, 1932: 43 (host, distribution).
Polynema eutettigis [*sic*]: Essig, 1931: 383 (host).

Nearctic hosts. Cicadellidae: *Neoaliturus* (*Circulifer*) *tenellus* (Baker).
Distribution. USA: CA, ID, UT.

Polynema florum Girault, 1929

Polynema florum Girault, 1929 [428]: 18, 28. syntypes? ♀ (USNM?), lost. **TL:** Canada, British Columbia, Vancouver. Girault, 1929 [428]: 18 (key), 28 (diagnosis); Peck, 1951: 417 (catalogue); Peck, 1963: 45 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).

Distribution. Canada: BC.

Polynema (*Polynema*) *graculum* Girault, 1911

Polynema graculus Girault, 1911 [96]: 308. Holotype ♂ (USNM). **TL:** USA, Wisconsin, Milwaukee Co., no locality specified. Girault, 1911 [91]: 189 (*nomen nudum*, distribution); Girault, 1911 [96]: 319 (key); Girault, 1913 [135]: 17 (mention); Girault, 1929 [428]: 18 (key); Peck, 1951: 417 (catalogue); Peck, 1963: 45 (catalogue); Burks, 1979: 1032 (catalogue); Yoshimoto, 1990: 83 (list).

Distribution. USA: IL, TX, WI.

Polynema howardii (Ashmead, 1887)

Cosmocoma elegans Howard, 1881: 371. Holotype? ♀ (USNM?). **TL:** USA, California, Santa Rosa. Cresson, 1887: 250 (catalogue); King, 1900: 84 (host, distribution).
C*osmocoma Howardii* Ashmead, 1887: 194 (replacement name for *C. elegans* Howard, not Foerster, 1841); Dalla Torre, 1890: 97 (replacement name for *C. elegans* again proposed, preoccupied by Ashmead, 1887).
Cosmocoma howardii: Dalla Torre, 1890: 425 (catalogue); Gillette & Baker, 1895: 66 (host, distribution).
Polynema elegans: Dalla Torre, 1898: 425 (generic transfer, catalogue) [P].
Polynema Howardi [*sic*]: Schmiedeknecht, 1909: 497 (catalogue).
Polynema howardii: Dalla Torre, 1898: 425 (catalogue); Ashmead, 1900b: 562 (list, distribution); Viereck, 1910: 637 (distribution); Girault, 1911 [72]: 14 (mention), 18 (diagnosis); Girault, 1911 [94]: 358 (contrast with *P. aspidioti*); Girault, 1911 [95]: 367 (contrast with *P. striaticorne*); Girault, 1911 [96]: 302 (misidentified), 319 (key); Girault, 1929 [428]: 19 (key); Peck, 1951: 417 (catalogue); Peck, 1963: 45 (catalogue); Yoshimoto, 1990: 83 (list).
Polynema howardi [*sic*]: Viereck, 1916: 446 (description, host [error?]); Essig, 1929: 817 (host correction, distribution); Essig, 1931: 542, 664 (list); Burks, 1979: 1032 (catalogue).

Nearctic hosts. Membracidae: *Ceresa bubalus* (Fabricius).
Distribution. USA: CA, CO, DC, NJ.

Polynema (*Polynema*) *imitatrix* Gahan, 1918

Polynema imitatrix Gahan, 1918: 24. Holotype ♀ (USNM). **TL:** USA, Arizona, Tempe. Essig, 1929: 817 (host, distribution); Peck, 1951: 417 (catalogue); Thompson, 1958: 572 (host catalogue); Peck, 1963: 45 (catalogue); Burks, 1979: 1033 (catalogue); Graham *et al*., 1984: 250 (D-vac sampling, host, distribution); Lakin, 1985: 26 (description, biology), key (47); Yoshimoto, 1990: 83 (list).

Nearctic hosts. Membracidae: *Spissistilus festinus* (Say).
Distribution. USA: AZ.

Polynema (*Polynema*) *longipes* (Ashmead, 1887)

Ooctonus longipes Ashmead, 1887: 192. Holotype ♀ (USNM). **TL:** USA, Florida, Jacksonville. Ashmead, 1887: 318 (key); Girault, 1911 [72]: 19 (generic transfer); Girault, 1911 [91]: 189 (distribution); Girault, 1911 [96]: 316 (generic transfer [again]), 318 (key); Girault, 1913 [129]: 63 (mention); Girault, 1913 [135]: 14 (mention); Girault, 1913 [147]: 219 (com-

parison with extralimital species); Davis, 1914: 14 (host not yet verified); Girault, 1929 [428]: 17 (key, 19 (common in wheat); Dozier, 1933: 96 (description, distribution); Peck, 1951: 417 (catalogue); Thompson, 1958: 572 (host catalogue); Peck, 1963: 46 (catalogue); New, 1976: 11 (comparison with extralimital species); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list); Bayoun *et al*., 2008: 415 (host, distribution).

Polynema logipes [*sic*]: Riherd, 1950: 19 (host).

Polynema citripes Girault, 1911 [72]: 19 (unavailable name). Girault, 1911 [72]: 22 (host); Girault, 1911 [91]: 189 (distribution); Frison, 1927: 228 (paratype listing); Peck, 1951: 417 (catalogue, under *longipes*); Webb, 1980: 118 (syntypes listing)

Cosmocema [*sic*] *citripes* Webster, 1894: 117 (*nomen nudum*, suspected host, distribution).

Polyneura [*sic*] *citripes*: Webster, 1903a: 33 (host) (*nomen nudum*); Webster, 1903b: 103 (exact host unknown, *nomen nudum*); Girault, 1909 [62]: 106 (*nomen nudum*).

Polyneura [*sic*] ((?) *Polynema*) *citripes*: Girault, 1907 [27]: 32 (*nomen nudum*).

Nearctic hosts. Cicadellidae: probably *Dorycephalus platyrhynchus* Osborn.

Distribution. USA: CA, DE, FL, IL, IN, OH, TN.

Polynema (*Polynema*) *maculipes* (Ashmead, 1887)

Cosmocoma maculipes Ashmead, 1887: 194. Holotype ♂ (USNM). **TL:** USA, Florida, Jacksonville. Ashmead, 1887: 194; Hart, 1895: 272 (distribution).

Polynema maculipes: Girault, 1911 [72]: 22 (generic transfer); Girault, 1911 [89]: 139 (comparison with extralimital species); Girault, 1911 [96]: 306 (description), 318 (key); Girault, 1929 [428]: 17 (key); Walley, 1929: 194 (mention); Peck, 1951: 417 (catalogue); Peck, 1963: 46 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).

Distribution. USA: FL, IL.

Polynema (*Doriclytus*) *marilandicum* Girault, 1917

Polynema marilandicum Girault, 1917 [330]: 2. Holotype ♀ (USNM). **TL:** USA, Maryland, Glendarden. Girault, 1929 [428]: 16 (key); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).

Polynema marylandicum [*sic*]: Peck, 1951: 417 (unjustified emendation [ICZN 1999, Article 32.3], catalogue); Peck, 1963: 47 (catalogue, invalid emendation).

Distribution. USA: MD.

Polynema (*Polynema*) *medicae* (Annecke & Doutt, 1961)

Barypolynema medicae Annecke & Doutt, 1961c: 57. Holotype ♀ (CAS). **TL:** USA, California, San Jacinto. Burks, 1979: 1031 (catalogue); Zuparko & Hamai, 1994: 316 (holotype depository).

Polynema medicae: Yoshimoto, 1990: 83 (generic transfer implied, list); Lakin, 1985: 26 (description, biology), 47 (key).

Distribution. USA: CA.

Polynema nativum Girault, 1929

Polynema nativum Girault, 1929 [428]: 28. Syntypes? ♀ (USNM?). **TL:** Canada, British Columbia, Vancouver. Girault, 1929 [428]: 19 (key); Peck, 1951: 417 (catalogue); Peck, 1963: 47 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).

Distribution. Canada: BC.

Polynema (*Polynema*) *needhami* Ashmead, 1900

Polynema needhami Ashmead, 1900a: 616. Syntypes ♀, ♂ (USNM). **TL:** USA, Illinois, Lake Forest. Ashmead, 1900a: 318 (key); Schultz, 1910b: 210 (parasitized by Tetrastichinae); Girault, 1911 [72]: 22 (list); Girault, 1911 [87]: 151 (host); Girault, 1911 [96]: 318 (key); Girault, 1916 [270]: 228 (leg colour); Girault, 1929 [428]: 16 (key); Peck, 1951: 418 (catalogue); Burks, 1958: 63 (distribution); Peck, 1963: 47 (catalogue); LaPlante, 1975: 291 (host); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list); Bennett, 2008a: 685 (host).

Polynema near *needhami*: Cebulski & O'Brien, 2013: 148 (host, percent parasitism).

Nearctic hosts. Aeshnidae: *Aeshna tuberculifera* Walker. Lestidae: *Lestes uncatus* Kirby, *L. unguiculatus* Hagen.
Distribution. Canada: QC. USA: CA.

Polynema picipes Girault, 1905

Polynema picipes Girault, 1905 [15]: 91. Syntypes ♀ (USNM). **TL:** USA, Georgia, Fort Valley. Girault, 1905 [15]: 319 (key); Peck, 1951: 418 (catalogue); Burks, 1958: 63 (catalogue); Peck, 1963: 47 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).
Polynema piceipes [*sic*]: Girault, 1911 [72]: 18, 22 (unjustified emendation [ICZN 1999, Article 32.3]); Girault, 1911 [96]: 313 (description), 319 (key); Gahan *et al*., 1928: 984 (list, distribution); Girault, 1929 [428]: 15 (key).

Distribution. USA: GA, NY.

Polynema (*Polynema*) *pratensiphagum* Walley, 1929

Polynema pratensiphaga Walley, 1929: 193. Holotype ♂ (CNC). **TL:** Canada, Ontario, Ottawa. Painter, 1929: 105 (host); Thompson, 1958: 572 (host catalogue).
Polynema pratensiphagum: Peck, 1951: 418 (catalogue); Peck, 1963: 47 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list); Sohati *et al*., 1992: 515 (percent parasitism); Al-Ghamdi *et al*., 1993: 407 (overwintering); Boivin, 1994: 237 (overwintering strategy); Al-Ghamdi *et al.*, 1995: 458 (synchrony with host); Ruberson & Williams III, 2000: 97 (biological control).

Nearctic hosts. Miridae: *Lygus lineatus* (Say).
Distribution. Canada: ON, QC.

Polynema regina Girault, 1912

Polynema regina Girault, 1912 [109]: 24. Holotype ♀ (USNM). **TL:** Canada, British Columbia, Vancouver. Gibson, 1913: 134 (distribution, distribution); Girault, 1913 [135]: 14 (mention); Girault, 1929 [428]: 18 (key), 28 (contrast with *P. florum*); Peck, 1951: 418 (catalogue); Peck, 1963: 48 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 83 (list).

Distribution. Canada: BC.

Polynema (*Polynema*) *sibylla* Girault, 1911

Polynema sibylla Girault, 1911 [96]: 311. Holotype ♀ (USNM). **TL:** USA, Wisconsin, Milwaukee. Girault, 1911 [96]: 319 (key); Girault, 1913 [135]: 15 (extralimital species compared) [A]; Frison, 1927: 228 (paratype listed); Girault, 1929 [428]: 18 (key); Peck, 1951: 418 (catalogue); Peck, 1963: 48 (catalogue); Burks, 1979: 1033 (catalogue); Yoshimoto, 1990: 84 (list).
Cosmocoma howardii: Nason, 1906: 8 [misidentification (Girault, 1911 [96]: 302)] (list, distribution).

Distribution. USA: IL, VA, WI.

Polynema (*Polynema*) *striaticorne* Girault, 1911

Polynema striaticorne Girault, 1911 [72]: 12. Syntypes ♀, ♂ (USNM). **TL:** USA, New York, Albany. Hodgkiss, 1910: 81, 91 [*nomen nudum*] (host, distribution); Girault, 1911 [87]: 149 (mention); Girault, 1911 [89]: 139 (contrast with extralimital species); Girault, 1911 [95]: 365 (contrast with extralimital species); Girault, 1911 [96]: 302 (distribution, description), 319 (key); Girault, 1912 [109]: 23 (distribution, distribution); Girault, 1912 [112]: 298 (Girault, 1911 [96]: 300 corrected); Girault, 1912 [135]: 14 (mention); Girault, 1915 [261]: 8 (distribution); Brittain, 1917: 39 (host, distribution); Funkhouser, 1917: 415 (host, distribution); Brittain, 1918: 19 (host, distribution); Washburn, 1919: 193 (distribution); Underhill, 1926: 17 (host, distribution); Frison, 1927: 228 (paratype listing); Balduf, 1928: 422 (biology); Sorenson, 1928: 16 (percent parasitism); Essig, 1929: 818 (hosts, distribution); Girault, 1929 [428]: 19 (key), 28 (contrast with *P. nativum*); Walley, 1929: 194 (contrast with *P. pratensiphagum*); Burks, 1938: 161 (fore wing figure); Clausen, 1940: 100, 101, 103 (life cycle); Craighead, 1950: 619 (life cycle, host, percent parasitism); Peck, 1951: 418 (catalogue); Thompson, 1958: 572

(host catalogue); Jackson, 1961b: 278 (larva); Peck, 1963: 48 (catalogue); Vidano, 1966: 55 (introduction) [P]; Anderson & Paschke, 1968: 4 (mention); Vidano, 1968a: 3 (introduction) [P]; Vidano, 1968b: 581 (phenology) [P]; Prota, 1970: 55 (mention) [P]; Viggiani, 1974a: 155 (host) [P]; Currado, 1975: 335 (spread in Italy) [P]; Vidano & Meotto, 1975: 297 (multiplication, dissemination) [P]; Bournier, 1976: 362 (mention) [P]; Ciampolini *et al*., 1977: 25204 (biological control) [P]; Burks, 1979: 1033 (catalogue); Cookson & New, 1980: 8 (mention); Huber, 1986: 197 (biological control) [P]; Alma *et al*., 1988: 597 (host, Italy) [P]; Viggiani & Jesu, 1988: 1024 (biocontrol) [P]; Pantaleoni, 1989: 5 (biocontrol) [P]; Yoshimoto, 1990: 83 (list); Schedl, 1991: 10 (biological control) [P]; Boivin *et al.*, 1993: 179 (larval instar number); Fursov, 1994: 12 (distribution) [P]; Nénon *et al*., 1995: 997 (larval instar number); Pagliano *et al.*, 1995: 36 (list [P]; Isidoro *et al.*, 1996: 216 (gustatory sensilla) [P]; Lenteren *et al.*, 2003: 28 (risk assessment) [P]; Viggiani, 2004: 69 (male genitalia) [P]; Pantaleoni & Tavella, 2006: 140 (biocontrol) [P]; Bennett, 2008a: 677 (larva description); Mills, 2010: 395 (biological control, minimal impact) [P]; Rasplus *et al.*, 2010: 674 (alien in Europe) [P]; Roy *et al.*, 2011: 492 (1966 European introduction) [P]; Świerczewski & Stroiński, 2011: 18 (biological control) [P]; Pintureau, 2012: 30 (list) [P]; Zandigiacomo *et al.*, 2017: 68 (introduction) [P].

Cosmocoma sp.: Marlatt, 1895: 12 (host, distribution) [identified by Girault, 1911 [72]: 15].
Polynema (*Cosmocoma*) n. sp.: Girault, 1907 [27]: 30 (host) [identified by Girault, 1911 [87]: 149].
Cosmocoma maculipes: Nason, 1906: 8 [misidentification (Girault [96]: 308)] (list).
Polynema howardii [misidentification (Girault, 1912 [112]: 298)]: Girault, 1911 [96]: 300 (distribution).
Polynema striaticorniss [*sic*]: Felt, 1915: 89, 176 (hosts, distribution).
Polynema striaticorna [*sic*]: Smith, 1923: 55 (host, distribution).
Polynema ? *striaticorne*: MacGown & Osgood, 1972: 1264 (mention).
Polynema Striaticorne [*sic*]: Waloff & Jervis, 1987: 292 (male aggression).
Polynema batiashvili Elerdashvili, 1987: 81. Lectotype ♀ (ZIN), designated by Fursov, 1994: 13. **TL:** Georgia, Mtskheta-Mtianeti Region, Dusheti. Synonymy by Fursov, 1994: 13.

Nearctic hosts. Membracidae: *Ceresa borealis* (Fairmaire), *C. bubalus* (Fabricius), *C. taurina* (Fitch), *Oncopsis sobrius* (Walker), *Stictocephala inermis* (Fabricius).

Distribution. Canada: BC, NS. USA: CO, DC, ID, IL, IN, KS, MD, MN, MO, NY, TX, VA.

Polynema (*Polynema*) *zetes* Girault, 1911

Polynema zetes Girault, 1911 [96]: 314. Holotype ♀ (INHS). **TL:** USA, Illinois, Urbana. Girault, 1911 [96]: 318 (key); Frison, 1927: 228 (holotype listing); Girault, 1929 [428]: 16, 17 (key); Peck, 1951: 418 (catalogue); Peck, 1963: 49 (catalogue); Burks, 1979: 1033 (catalogue); Webb, 1980: 118 (holotype listing); Yoshimoto, 1990: 83 (list).

Distribution. USA: DC, IL.

Polynema spp.

Polynema sp.: Scotland, 1940: 717 (host: *Mesovelia* sp. [Mesoveliidae]).
Polynema sp.: Hendrick & Stern, 1970: 389 (behaviour, larva, host: *Nabis americoferus* Carayon [Nabidae).
Polynema sp.: Meyerdirk & Hessein, 1985: 352 (host: *Neoaliturus* (*Circulifer*) *tenellus* (Baker) [Cicadellidae]).
Polynema sp.: Gordon *et al.*, 1987: 341 (hosts: *Nabis* sp. [Nabidae], *Spissistilus festinus* (Say) [Membracidae]).
Polynema sp.: Hoddle, 2004a: 112 (host: *Graphocephala atropunctata* (Signoret) [Cicadellidae]).
Polynema sp.: Hoddle & Boyd, 2005: 325 (host: *Graphocephala atropunctata* (Signoret) [Cicadellidae]).
Polynema sp. ? *eutettixi*: Boyd & Hoddle, 2006: 1158 (host: *Graphocephala atropunctata* (Signoret) [Cicadellidae]).
Polynema sp.: Boyd *et al.*, 2004: 96 (host: *Graphocephala atropunctata* (Signoret) [Cicadellidae]).
Polynema sp. near *eutettixi*: Boyd *et al.*, 2008: 195 (taxonomy, host: *Graphocephala atropunctata* (Signoret) [Cicadellidae]).
Polynema (*Doriclytus*) sp. (host: *Ollarianus strictus* (Ball) [Cicadellidae]). Unpublished record (CNC).

PTILOMYMAR Annecke & Doutt, 1961

(Figs 851–883)

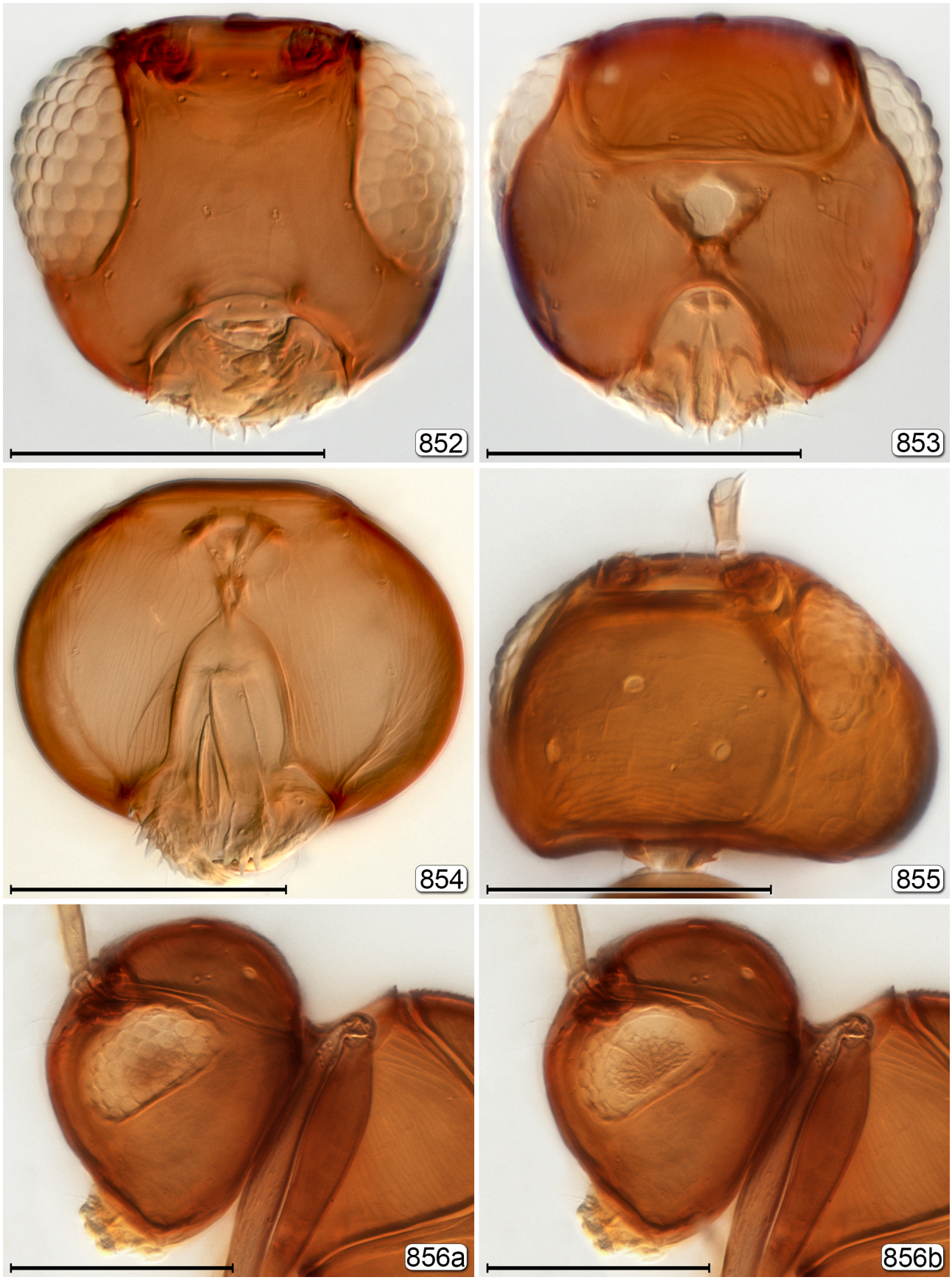
Ptilomymar Annecke & Doutt, 1961c: 24. Type species: *Ptilomymar rete* Annecke & Doutt, 1961, by original designation.

Diagnosis. Body length 350–665 µm (male 300). Propodeum, petiole and gt_1 with large translucent reticulate lamina (Figs 859, 860, 863, 864a, 875, 877–880); propodeal seta large and branched with its base anterior to level of spiracle (Figs 851, 860, 872, 873, 875).

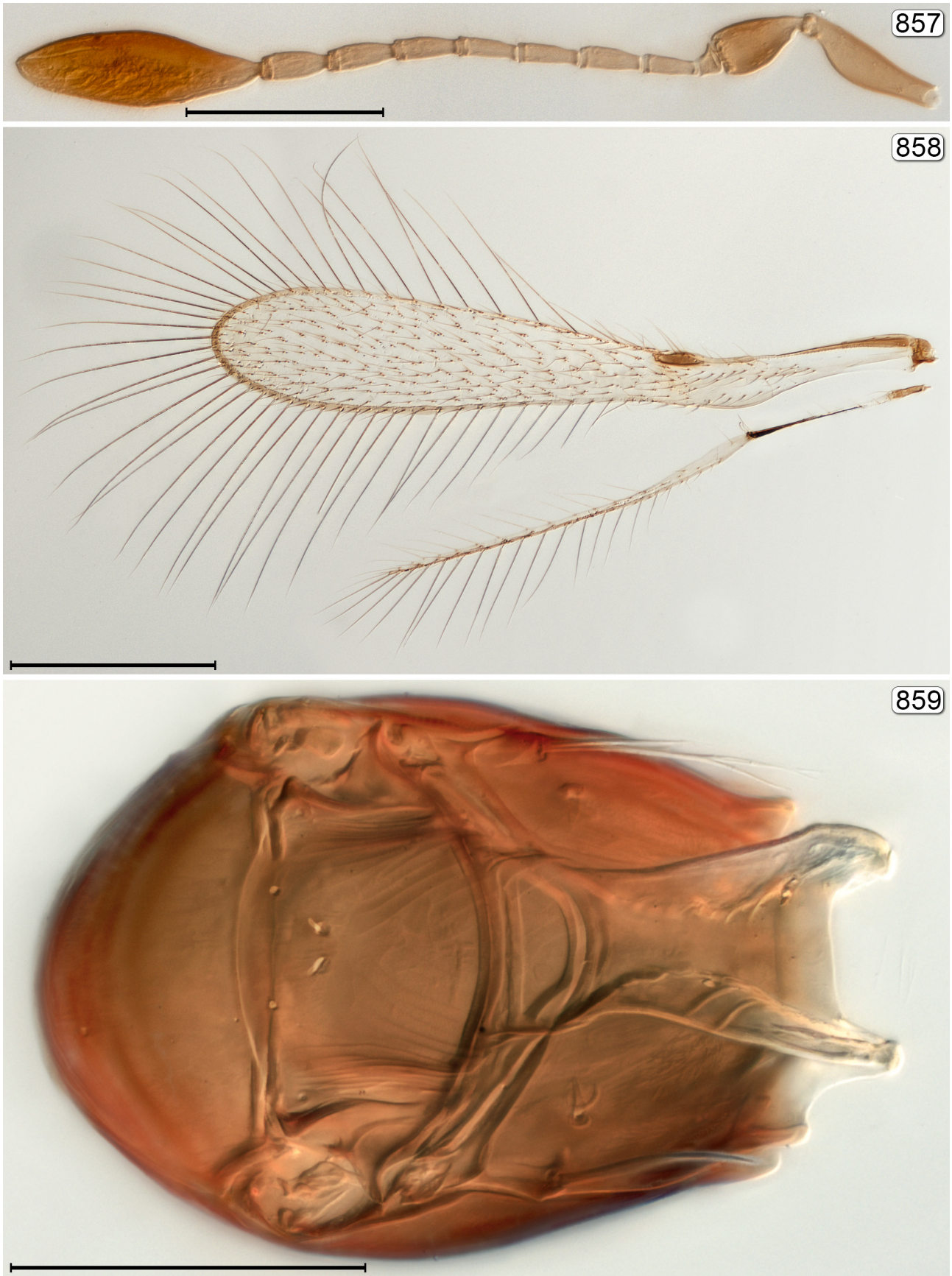
Discussion. *Ptilomymar* belongs to the *Camptoptera* group of genera together with *Camptoptera*, *Camptoteroides*, *Eofoersteria*, *Macrocamptoptera*, and *Stephanocampta*. Tarsomere 4 in both *Eofoersteria* and *Ptilomymar* is about 2× as long as tarsomere 3, indicating in both cases that tarsomere 4 consists of a fusion of 4 and 5. The peculiar translucent structures described above occur elsewhere only in *Stephanocampta* (not on gt_1, however) where they have a different configuration, and a few undescribed *Camptoptera* from the Afrotropical region.



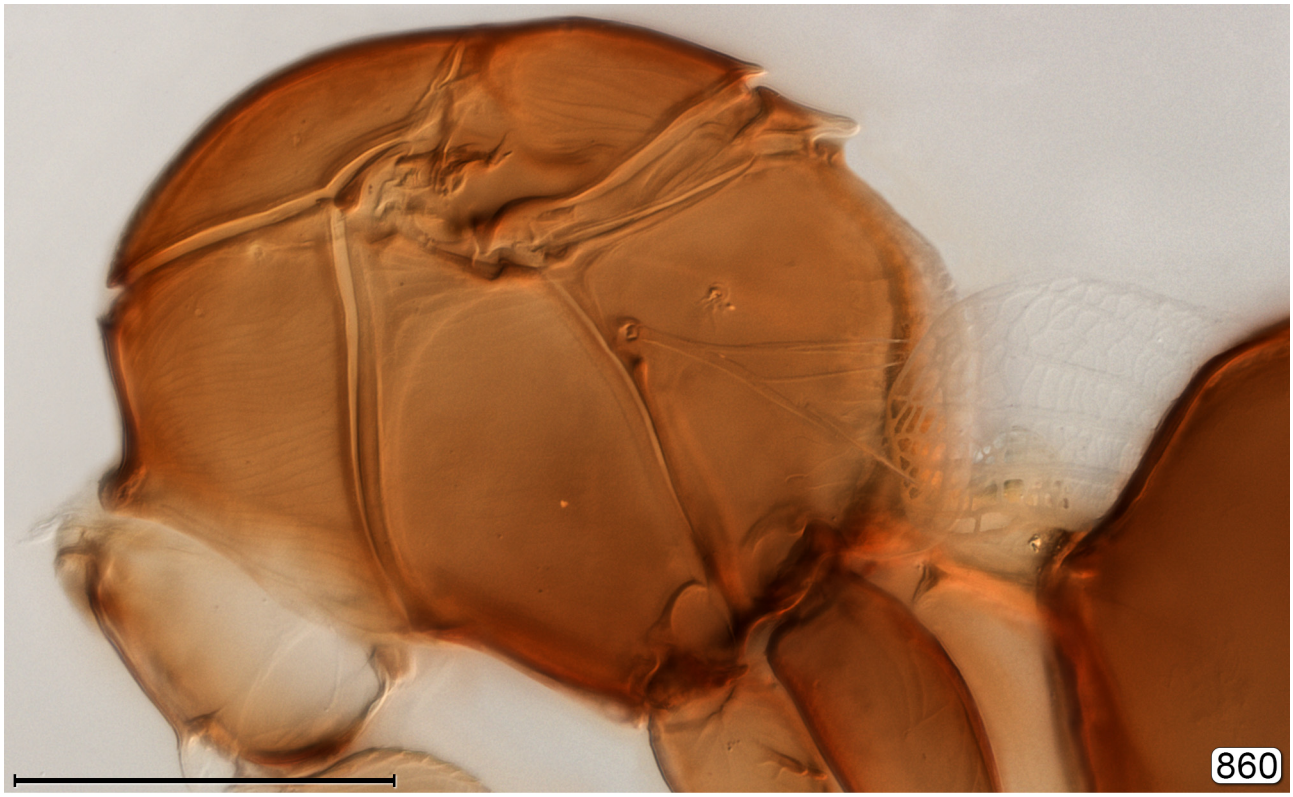
FIGURE 851. *Ptilomymar magnificum* Yoshimoto, habitus. Canada, Quebec, Lac Ronde, 46°15'21"N 75°54'44"W, 18.ix.2005, L. Masner. Scale bar=500 μm.

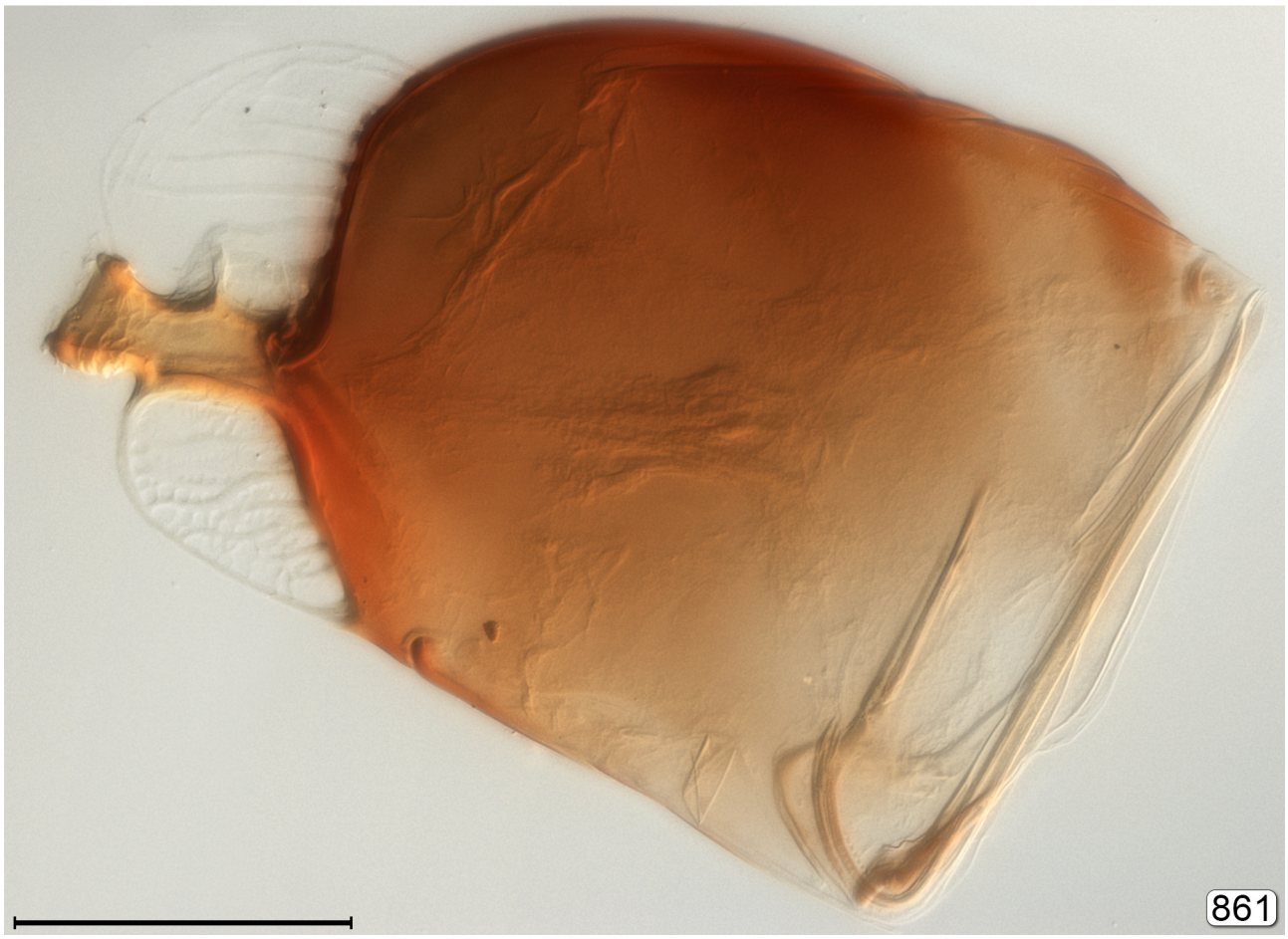


FIGURES 852–856. *Ptilomymar* sp., head. 852, male, anterior; 853, male, posterior (slightly dorsal); 854, posterior (slightly ventral); 855, dorsal; 856a, lateral; 856b, lateral (internal) showing ocular apodeme. Scale bars=100 μm.

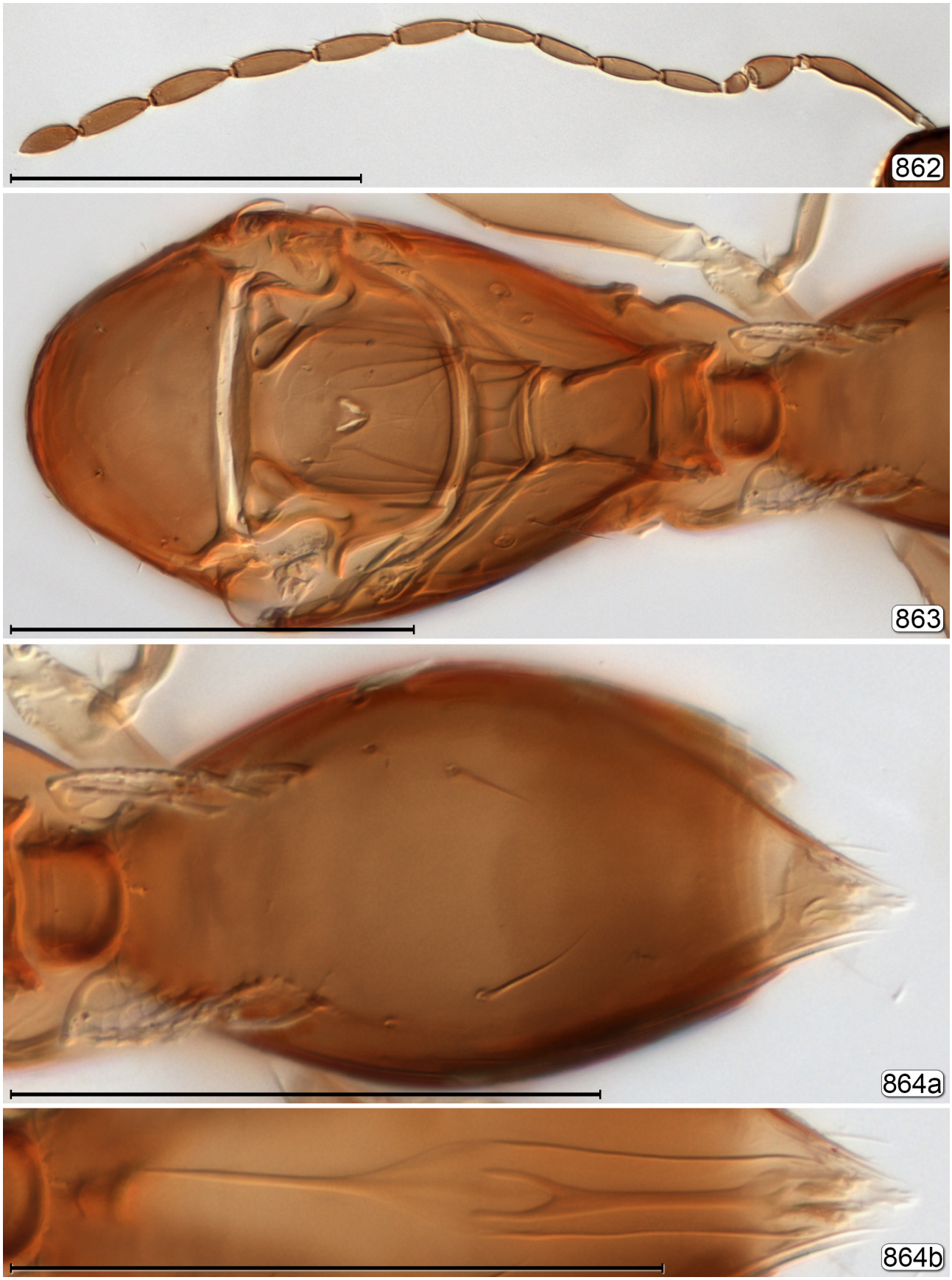


FIGURES 857–859. *Ptilomymar* sp. 857, antenna; 858, wings; 859, mesosoma, dorsal. Scale bars: 857, 859=100 μm; 858=200 μm.

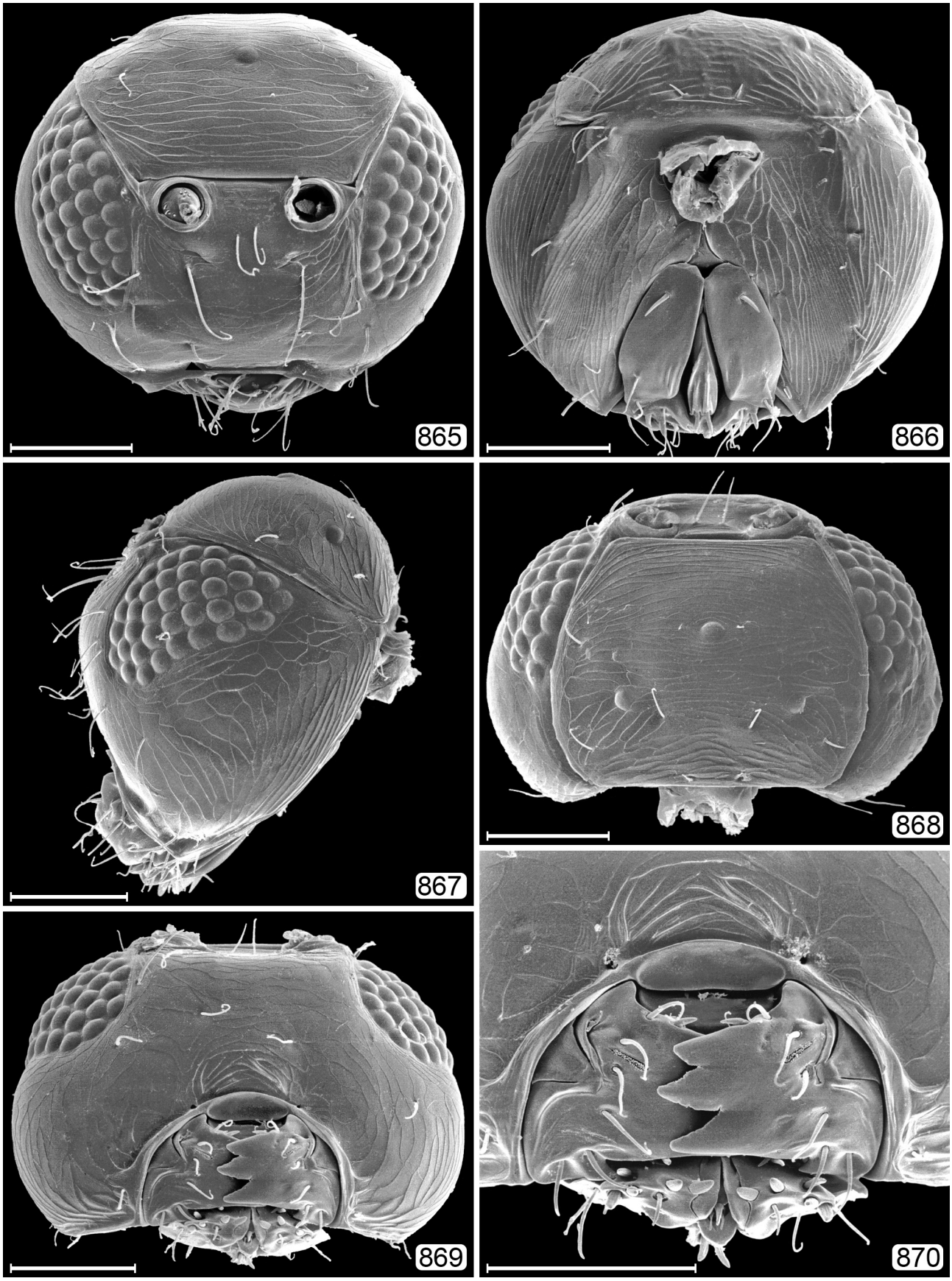




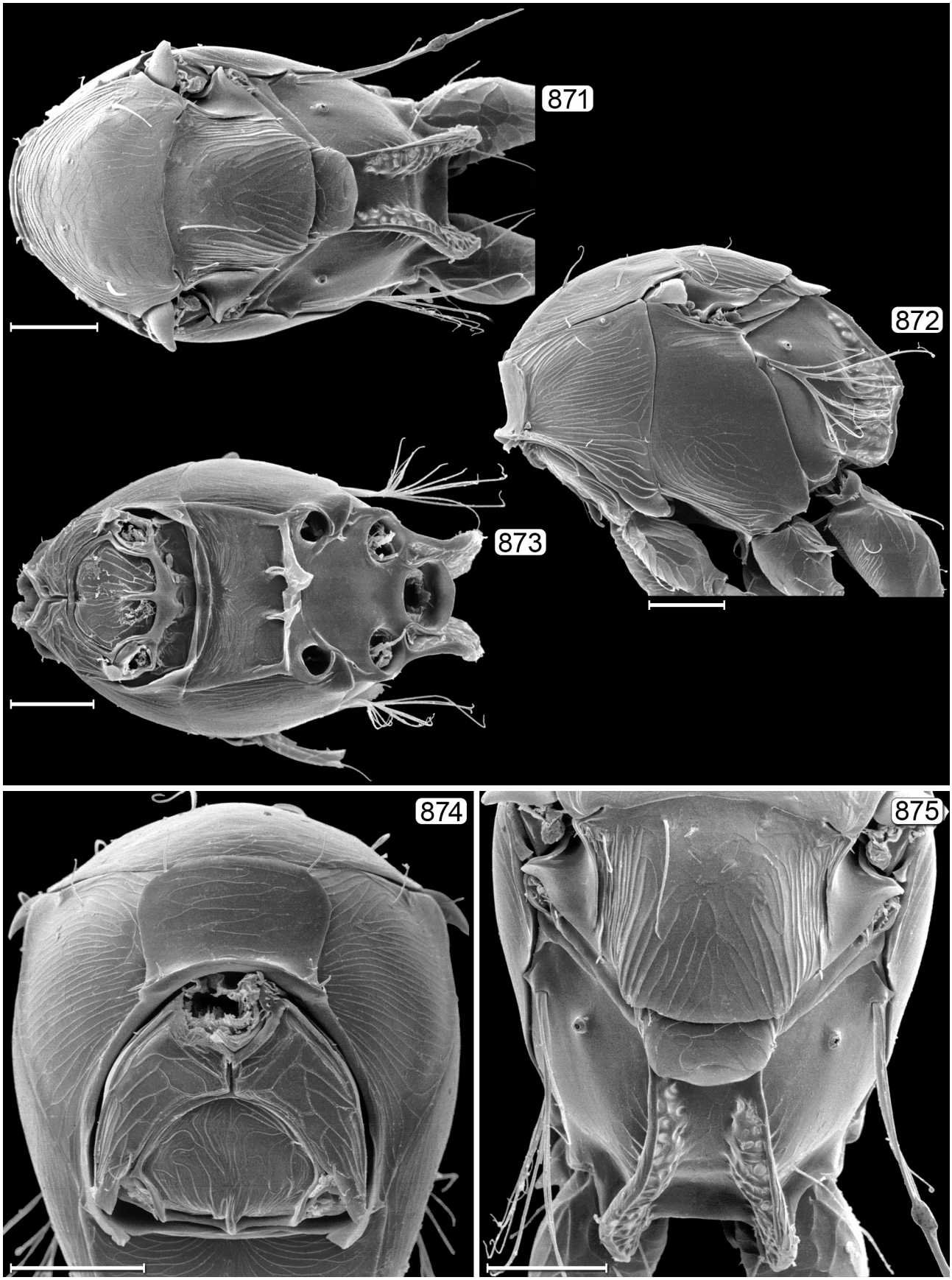
FIGURES 860, 861. *Ptilomymar* sp. 860, mesosoma–part of gt_1, lateral; 861, metasoma, lateral. Scale bars=100 µm.



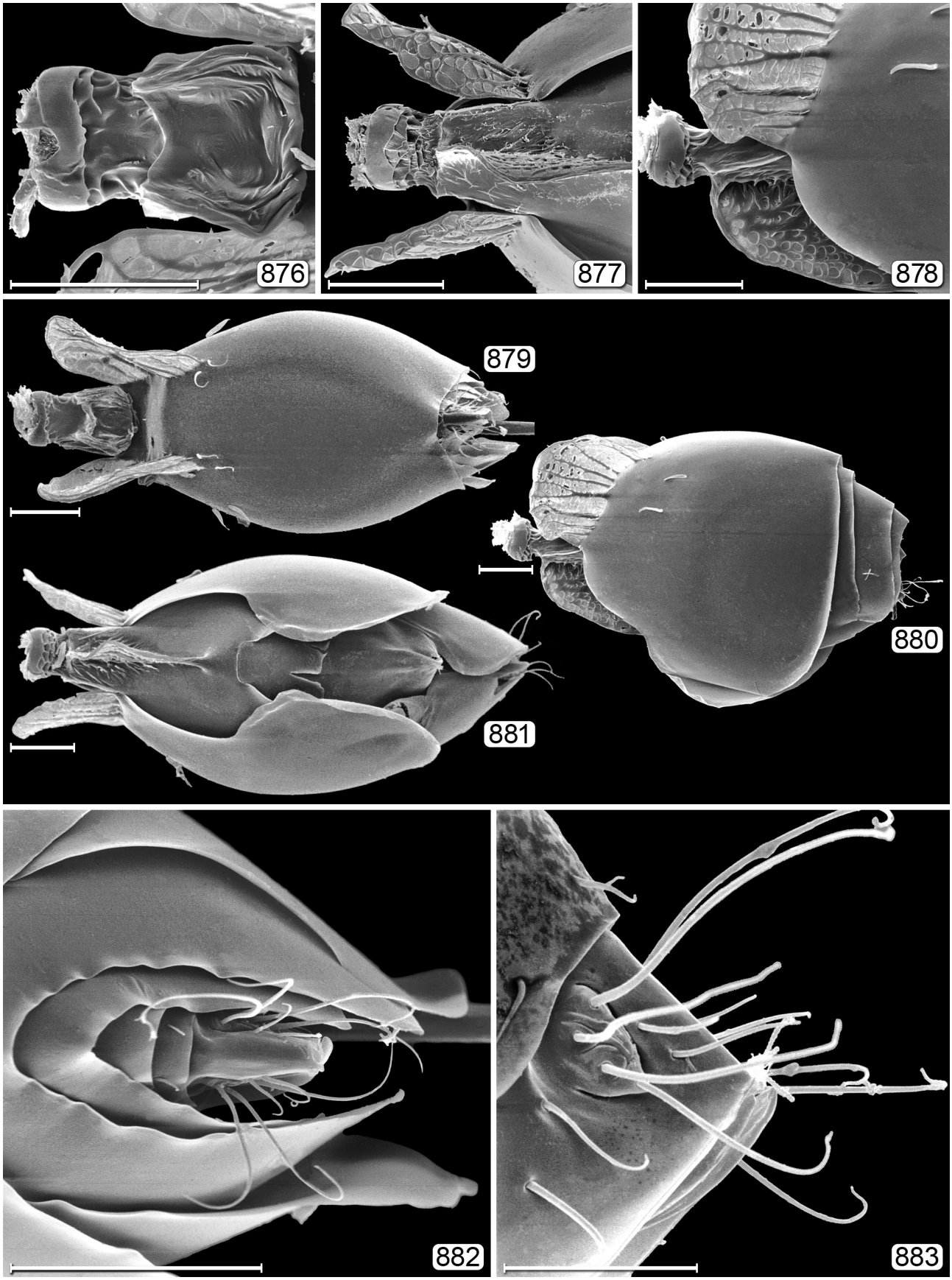
FIGURES 862–864. *Ptilomymar* sp., male. 862, antenna; 863, mesosoma–gt_1, dorsal; 864a, metasoma, dorsal; 864b, genitalia, seen through gaster. Scale bars: 862=200 μm; 863, 864=100 μm.



FIGURES 865–870. *Ptilomymar* sp., head. 865, anterior; 866, posterior; 867, lateral; 868, dorsal; 869, ventral; 870, mouthparts. Scale bars=50 μm.



FIGURES 871–875. *Ptilomymar* sp., mesosoma. 871, dorsal; 872, lateral; 873, ventral; 874, anterior; 875, scutellum–propodeum. Scale bars=50 μm.



FIGURES 876–883. *Ptilomymar* sp., metasoma. 876, petiole, dorsal; 877, petiole, ventral; 878, petiole, lateral; 879, metasoma, dorsal; 880, metasoma, lateral; 881, metasoma, ventral; 882, male?, apex of gaster, ventral; 883, apex of gaster, lateral. Scale bars: 876–882=50 μm; 883=20 μm.

Nearctic hosts. Unknown. *Ptilomymar* specimens are known to be associated with water. We hypothesize that the combination of modified propodeal seta and translucent outgrowths on propodeum and gt_1 is used to trap an air bubble that allows an individual to crawl under the water, presumably by walking down vegetation (not swimming with their wings as in *Caraphractus*—the air bubble would prevent it from doing that: the individual would just bob to the surface if it let go) to find and parasitize its presumed aquatic host.

Important reference. Yoshimoto (1990).

Ptilomymar magnificum Yoshimoto, 1990

Ptilomymar magnificum Yoshimoto, 1990: 93. Holotype ♀ (CNC). **TL:** Canada, Ontario, Oxford Mills. Yoshimoto, 1990: 57 (list); Hayat & Anis, 1999c: 15 (mention); Huber, 1997: 503 (key); Jin & Li, 2014: 128 (key), 129 (diagnosis); Manickavasagam & Palanivel, 2015: 322 (mention); Bennett, 2019: 923 (habitat).

Distribution. Canada: ON.

SCHIZOPHRAGMA Ogloblin, 1949

(Figs 884–911)

Schizophragma Ogloblin, 1949: 345. Type species: *Schizophragma basalis* Ogloblin, 1949, by original designation.

Diagnosis. Body length 465–740 µm. Face with subantennal sulci; mandible with 5 teeth (Figs 885, 902), clava 2-segmented (Fig. 890), frenum longitudinally divided, each half longer than wide (Figs 891, 903); second phragma (mesophragma) with indented apex (Fig. 896).

Discussion. Four other genera in the Nearctic have a longitudinally divided frenum: *Anagrus*, *Krokella*, *Platystethynium* (*Platypatasson*) and *Stethynium*. *Schizophragma* differs from *Anagrus* and *Stethynium* by having the clava 2-segmented, a feature shared only with *Anaphes* (*Patasson*), *Omyomymar* and *Platystethynium* (*Platypatasson*), and from the latter by the wide fore wing and body not dorsoventrally flattened. In some slide mounts a "secondary transverse trabecula" is visible between the toruli and the transverse trabecula (Fig. 885). It is divided into several (5) short horizontal sections. The longer vertical section along inner orbit lateral to each torulus is the preorbital trabecula separated from the true transverse trabecula by a wider gap than normal. This is an artefact of slide preparation when the head swells during maceration in KOH; the "secondary transverse trabecula" does not appear on micrographs (Fig. 897). It shows, at least in *Schizophragma*, that the trabecula may be more complex than previously thought.

Nearctic hosts. Unknown. Extralimital hosts are Hemiptera: Membracidae.

Important reference. Huber (1987).

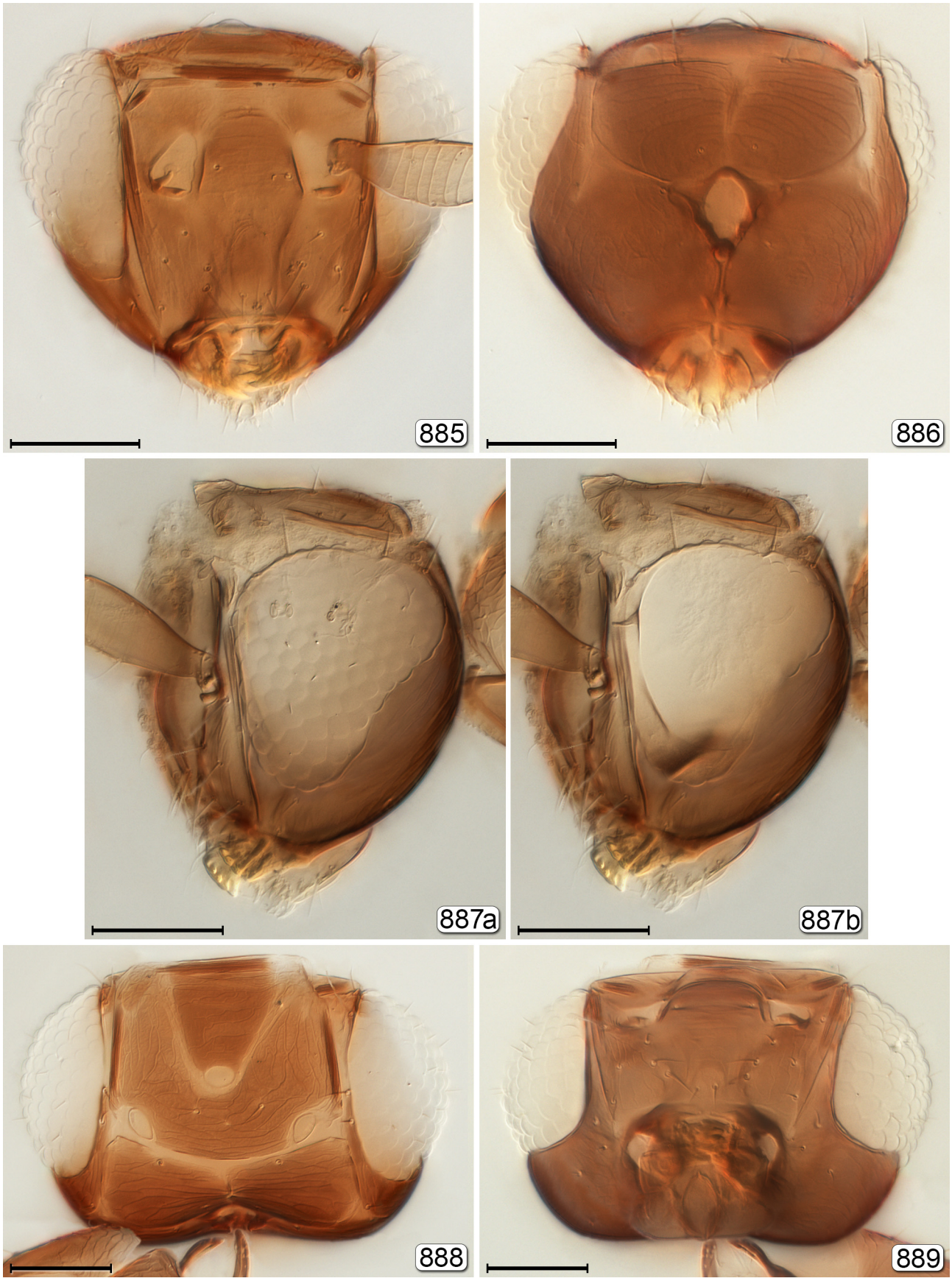
Schizophragma bicolor (Dozier, 1932)

Anaphes bicolor Dozier, 1932: 88. Lectotype ♀ (USNM), designated by Huber, 1987: 834. **TL:** Haiti, Damien.
Anagrus bicolor: Thompson, 1958: 568 (host catalogue) [NT].
Schizophragma bicolor: Huber, 1987: 834 (key, generic transfer, description); Yoshimoto, 1990: 55 (list); De Santis & Fidalgo, 1994: 126 (catalogue) [NT]; Beardsley & Huber, 2000: 16 (distribution) [A]; Yang *et al.*, 2000: 118 (abundance) [A]; Alyokhin *et al.*, 2001: 667 (host, sex ratio) [A]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Yang *et al.*, 2002: 237 (habitat preference) [O]; Viggiani, 2004: 70 (male genitalia); Santos & Costa, 2008: 140 (distribution) [NT]; Conant *et al.*, 2010: 22 (biological control) [O]; Santos *et al.*, 2011: 217 (distribution) [NT]; Santos & da Silva, 2013: 240 (distribution) [NT]; Rehmat & Anis, 2014: 307 (checklist); Koponen & Triapitsyn, 2016: 3 (distribution) [P].
Schizophragma near *bicolor*: Johnson *et al.*, 2001: 14 (host) [A].
Stethynium annulatum Doutt, 1947: 152. Holotype ♀ (CAS). **TL:** USA, California, Hecker Pass near Gilroy. Synonymy by Huber, 1987: 834. Peck, 1951: 414 (catalogue); Peck, 1963: 31 (catalogue); Burks, 1979: 1023 (catalogue); Schauff, 1984a: 49 (mention); Yoshimoto, 1990: 45 (list); Zuparko & Hamai, 1994: 316 (holotype depository).
Schizophragma annulatum: Huber, 1987: 834 (generic transfer).

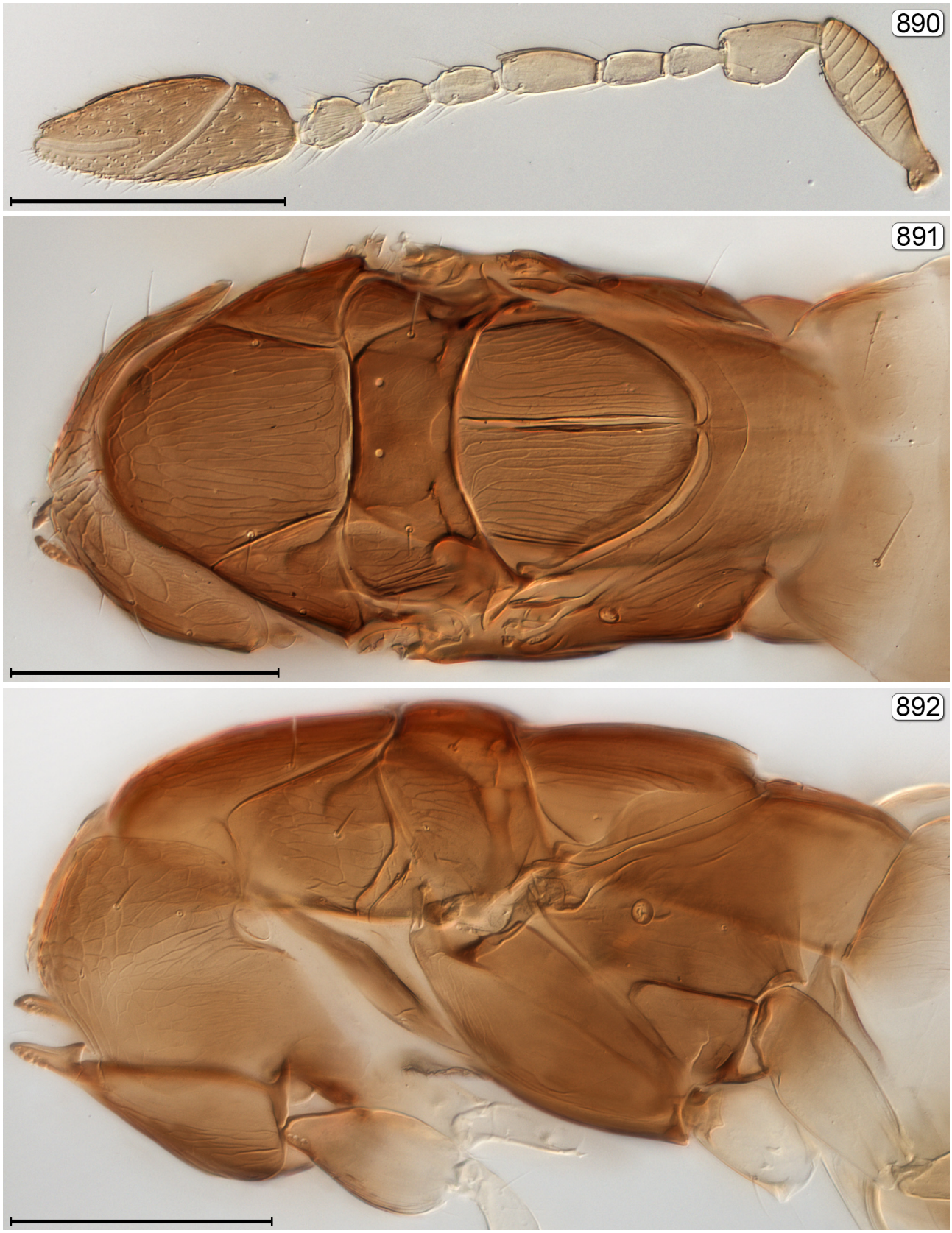
Distribution. USA: AZ, CA, GA, FL.



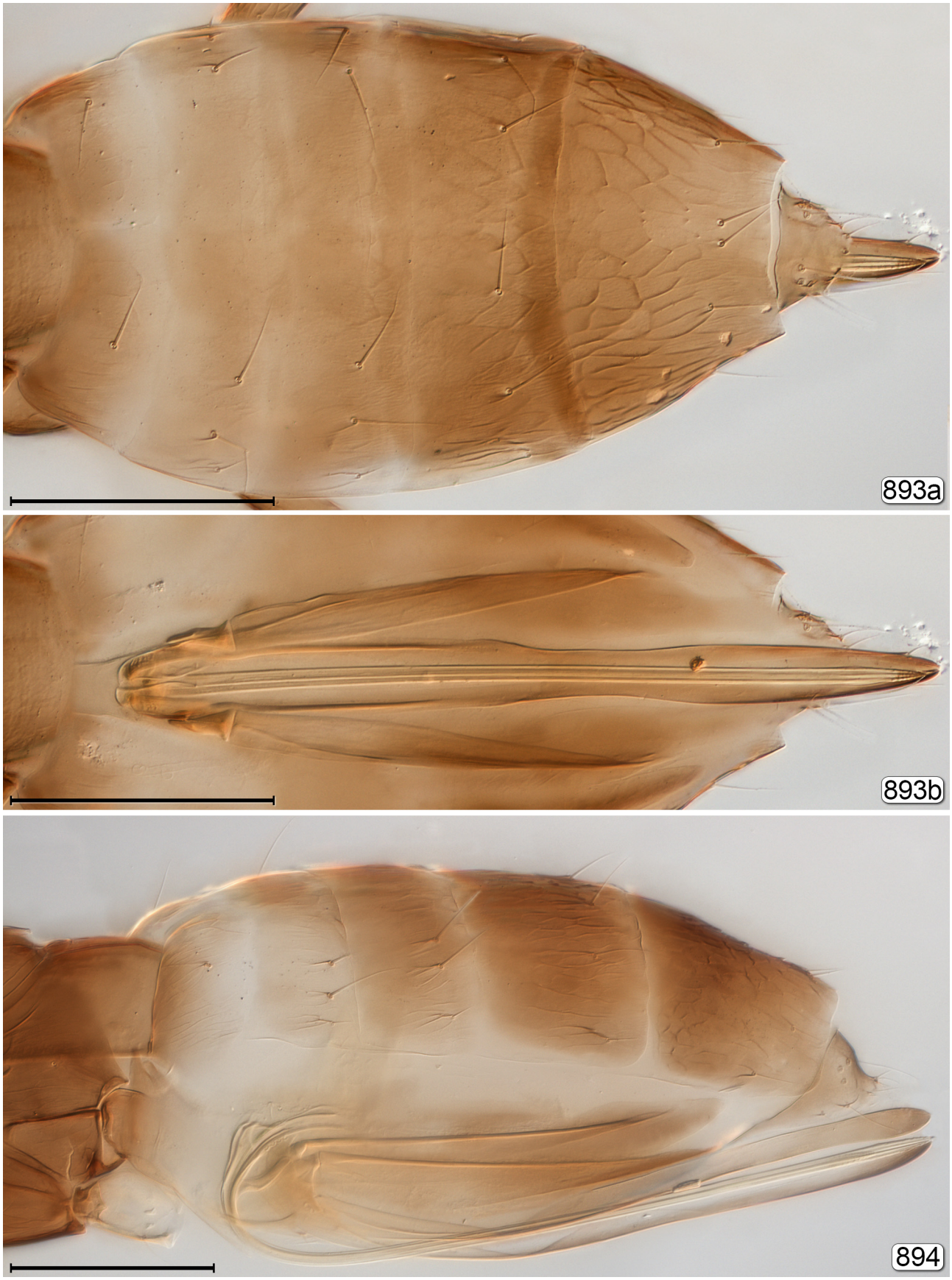
FIGURE 884. *Schizophragma bicolor* (Dozier), habitus. USA, Arizona, Cochise Co., Huachuca Mts., Ash Canyon Road, 0.5 mi. W. hwy 92, 5100', viii.1993, N. McFarland. Scale bar=500 μm.



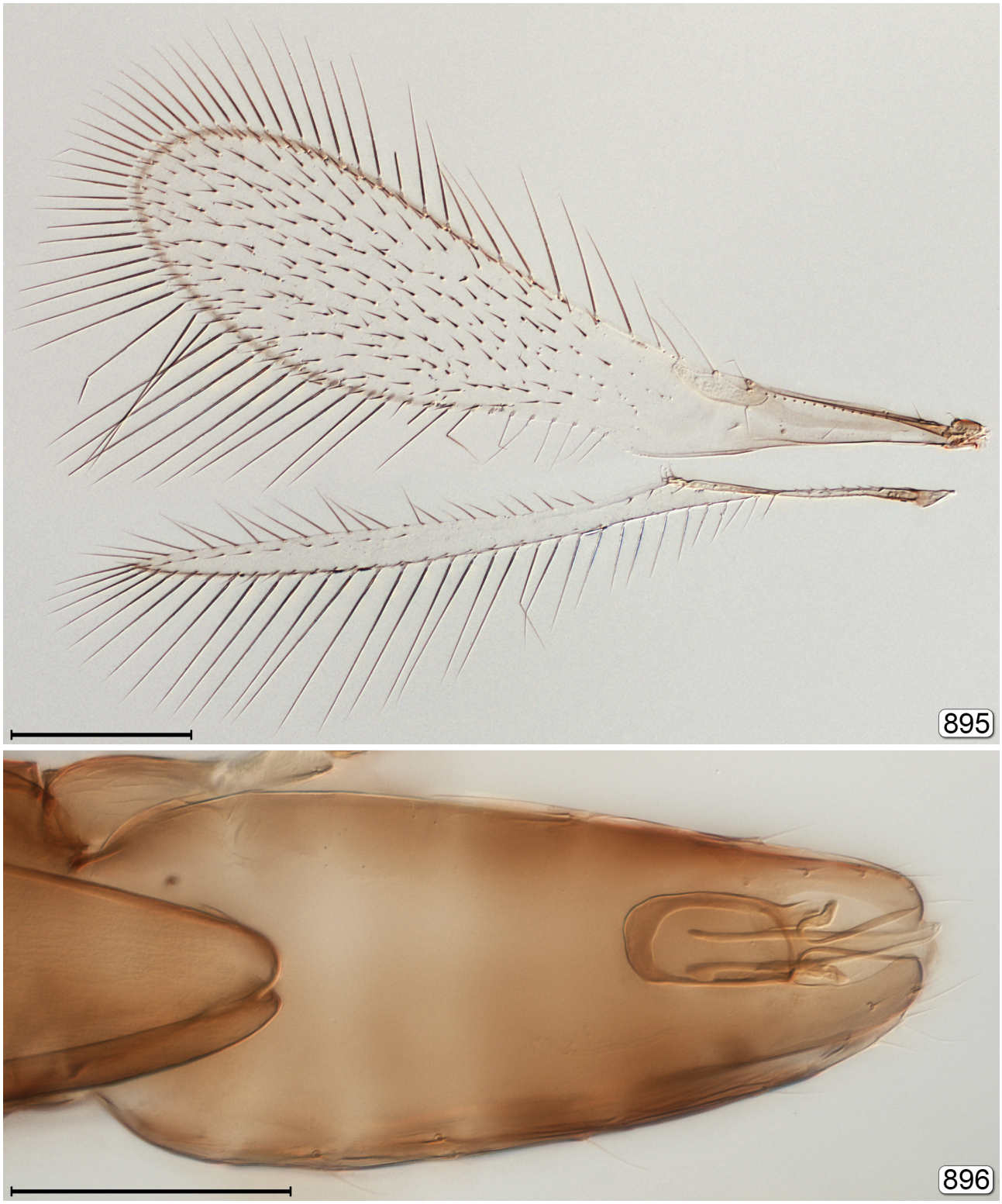
FIGURES 885–889. *Schizophragma bicolor* (Dozier), head. 885, anterior; 886, posterior; 887a, lateral; 887b, lateral (internal) showing apodeme; 888, dorsal; 889, ventral. Scale bars=50 μm.



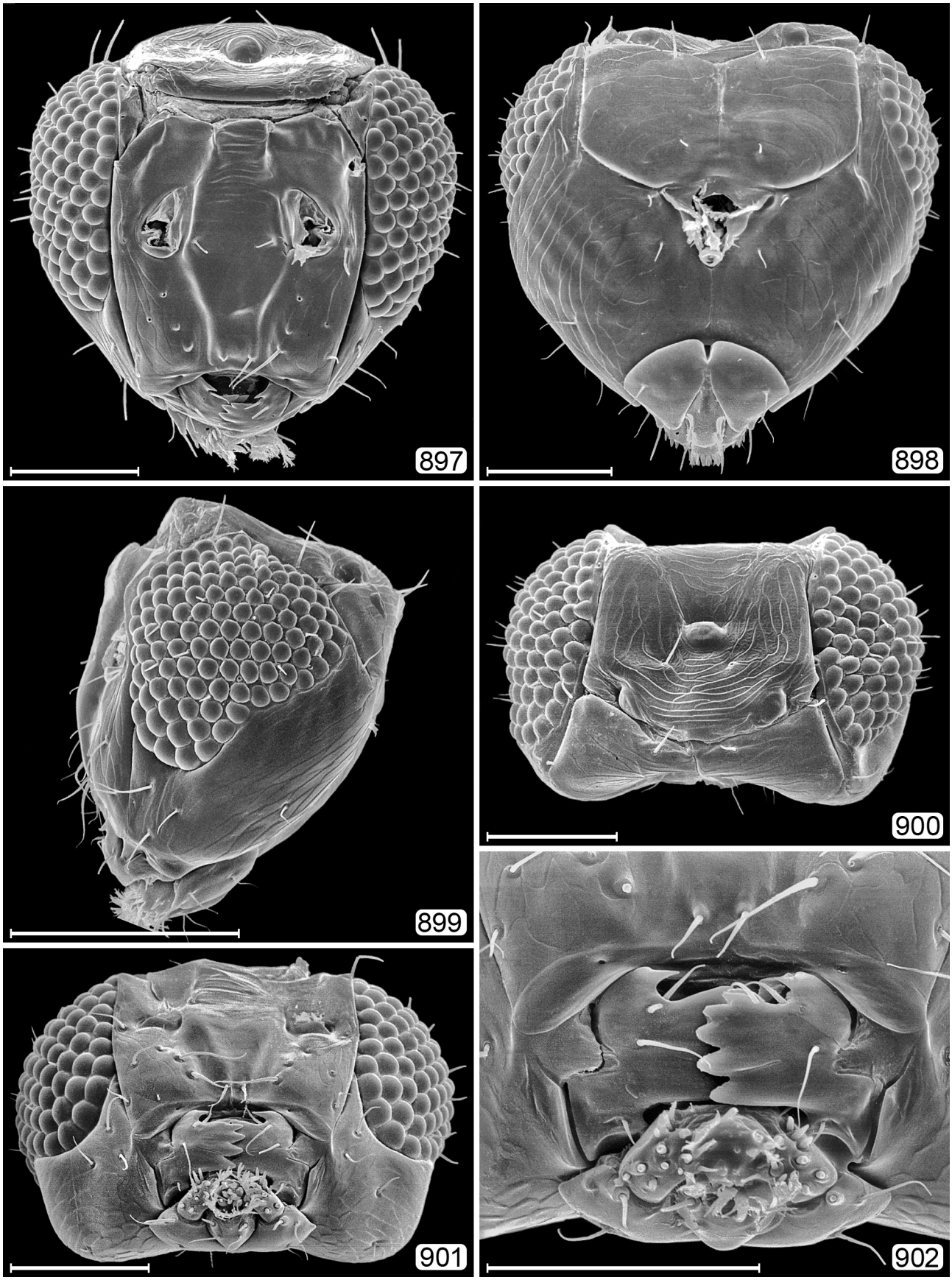
FIGURES 890–892. *Schizophragma bicolor* (Dozier). 890, antenna; 891, mesosoma, dorsal; 892, mesosoma, lateral. Scale bars=100 μm.



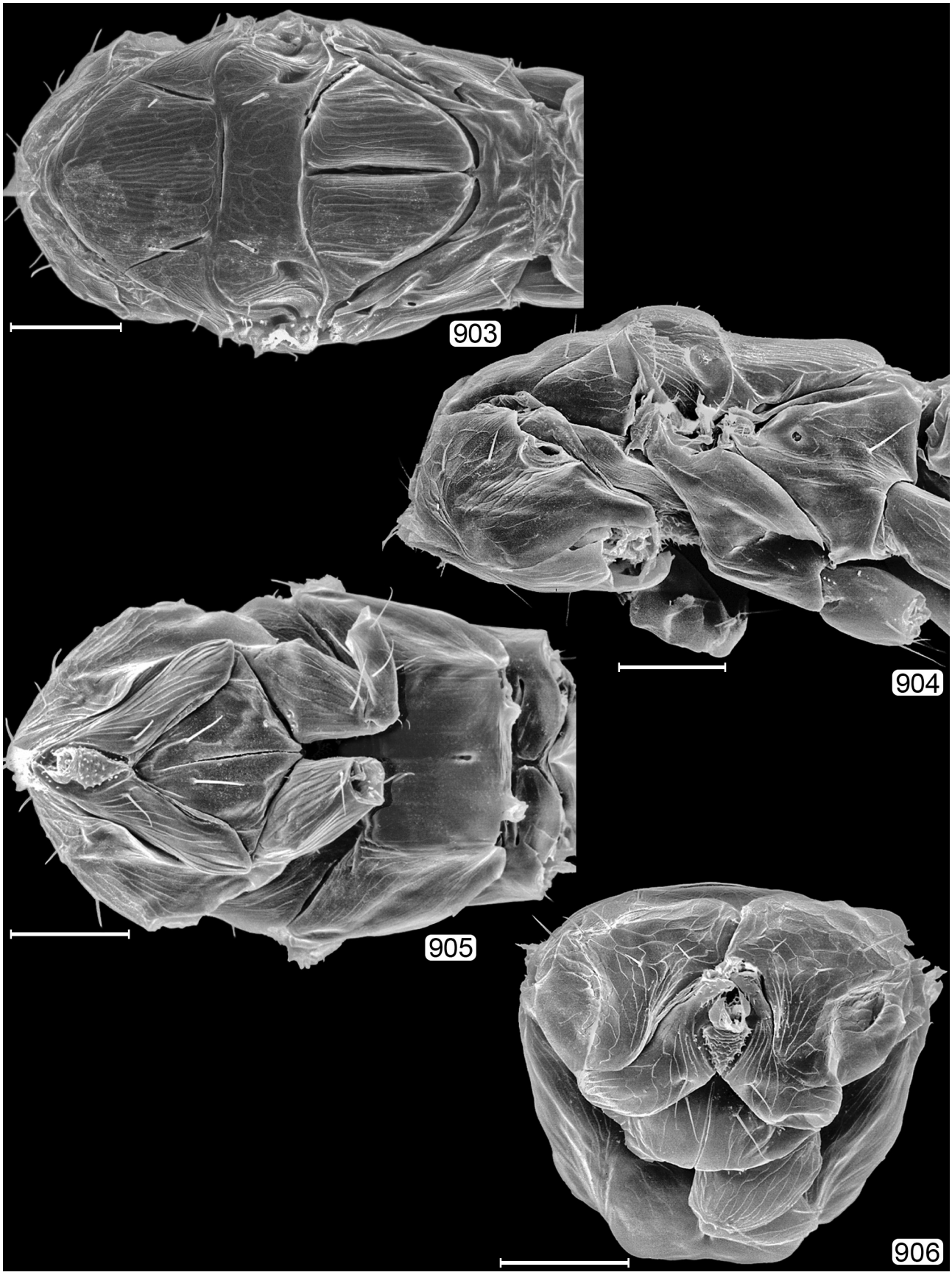
FIGURES 893, 894. *Schizophragma bicolor* (Dozier), metasoma. 893a, dorsal; 893b, genitalia seen through gaster; 894, lateral. Scale bars=100 μm.



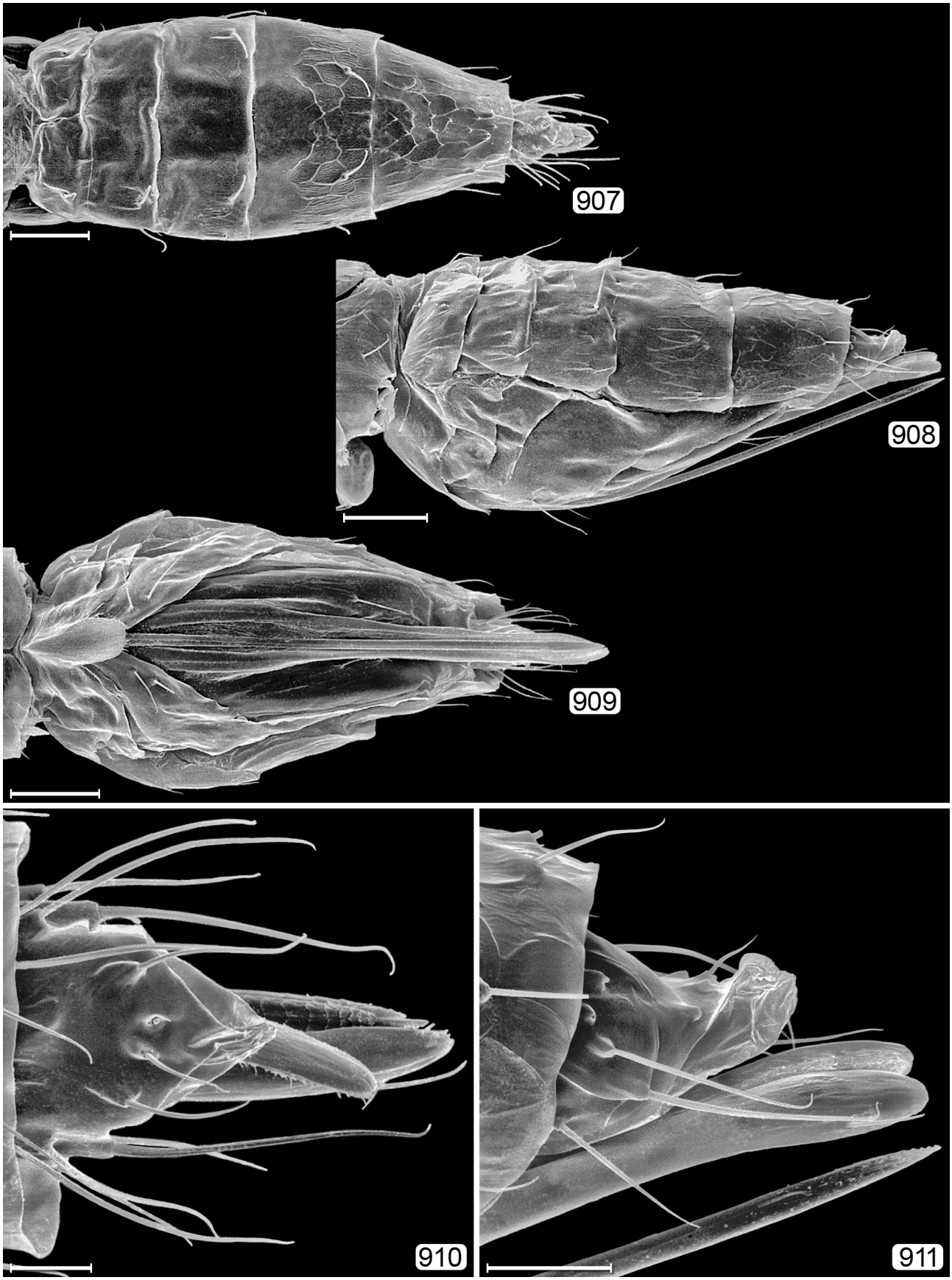
FIGURES 895, 896. *Schizophragma bicolor* (Dozier). 895, wings; 896, male metasoma, genitalia seen through gaster (also showing apex of apically-notched second phragma). Scale bars=100 µm.



FIGURES 897–902. *Schizophragma bicolor* (Dozier), head. 897, anterior; 898, posterior; 899, lateral; 900, dorsal; 901, ventral; 902, mouthparts. Scale bars=50 μm.



FIGURES 903–906. *Schizophragma bicolor* (Dozier), mesosoma. 903, dorsal; 904, lateral; 905, ventral; 906, anterior (deformed). Scale bars=50 μm.



FIGURES 907–911. *Schizophragma bicolor* (Dozier), metasoma. 907, dorsal; 908, lateral; 909, ventral; 910, apex of gaster, dorsal; 911, apex of gaster, lateral. Scale bars: 907–909=50 μm; 910, 911=20 μm.

STEPHANOCAMPTA Mathot, 1966

(Figs 912–941)

Stephanocampta Mathot, 1966: 219. Type species: *Stephanocampta yaosekoensis* Mathot, 1966, by original designation.
Hadromymar Yoshimoto, 1990: 30. Type species: *Hadromymar masoni* Yoshimoto, 1990, by original designation. Synonymy by Huber & Lin, 1999: 39.

Diagnosis. Propodeum with translucent reticulate lamina and propodeal seta lateral to spiracle (Figs 912b, 917, 925–930); gs_1 with translucent reticulate collar laterally and ventrally, concealing the petiole in lateral view (Figs 931–936).

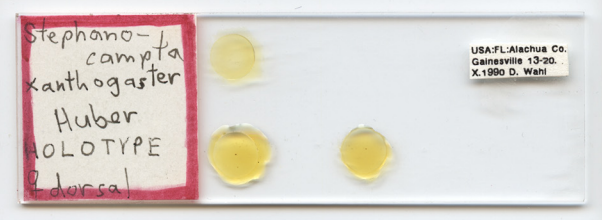
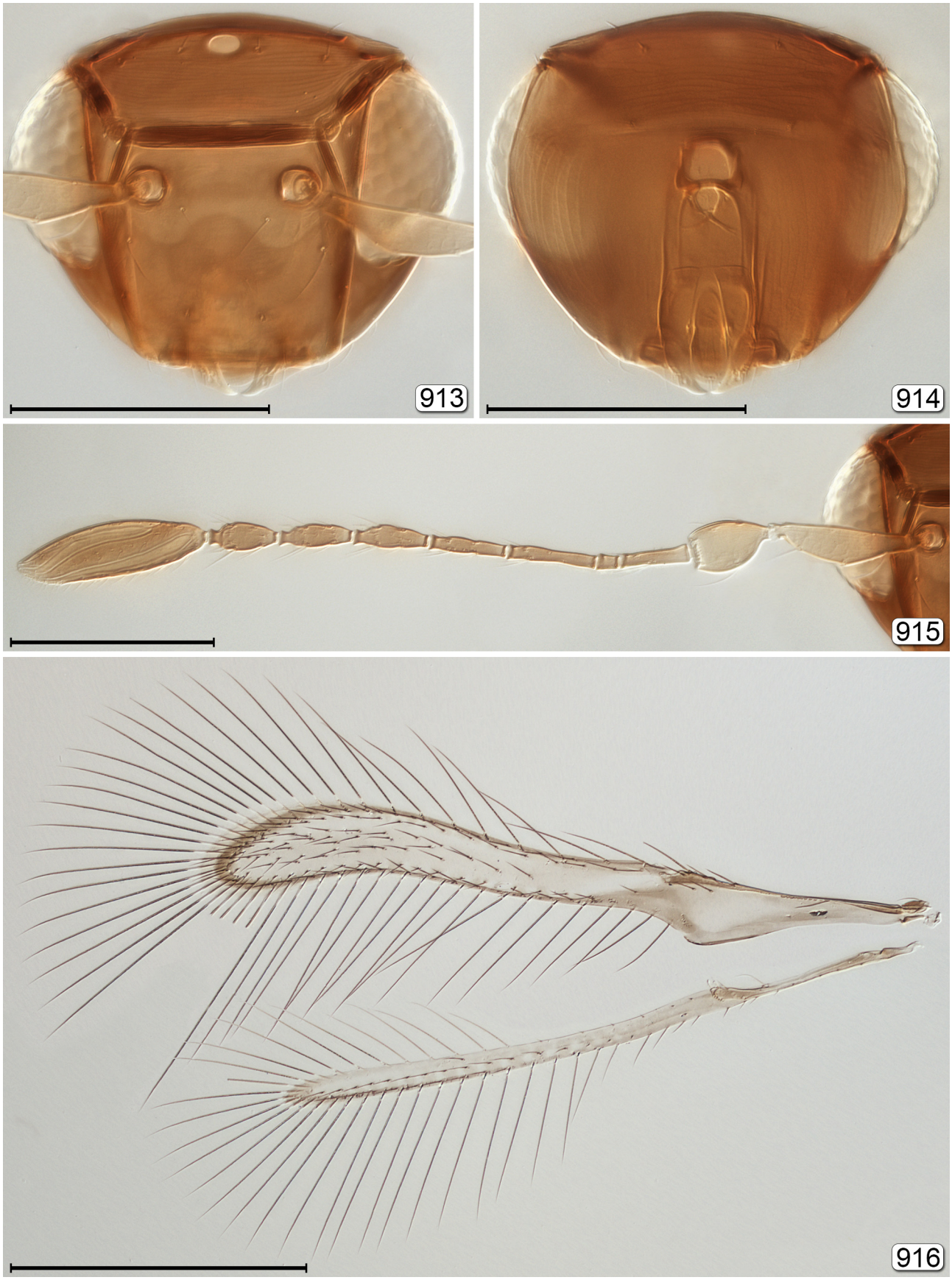
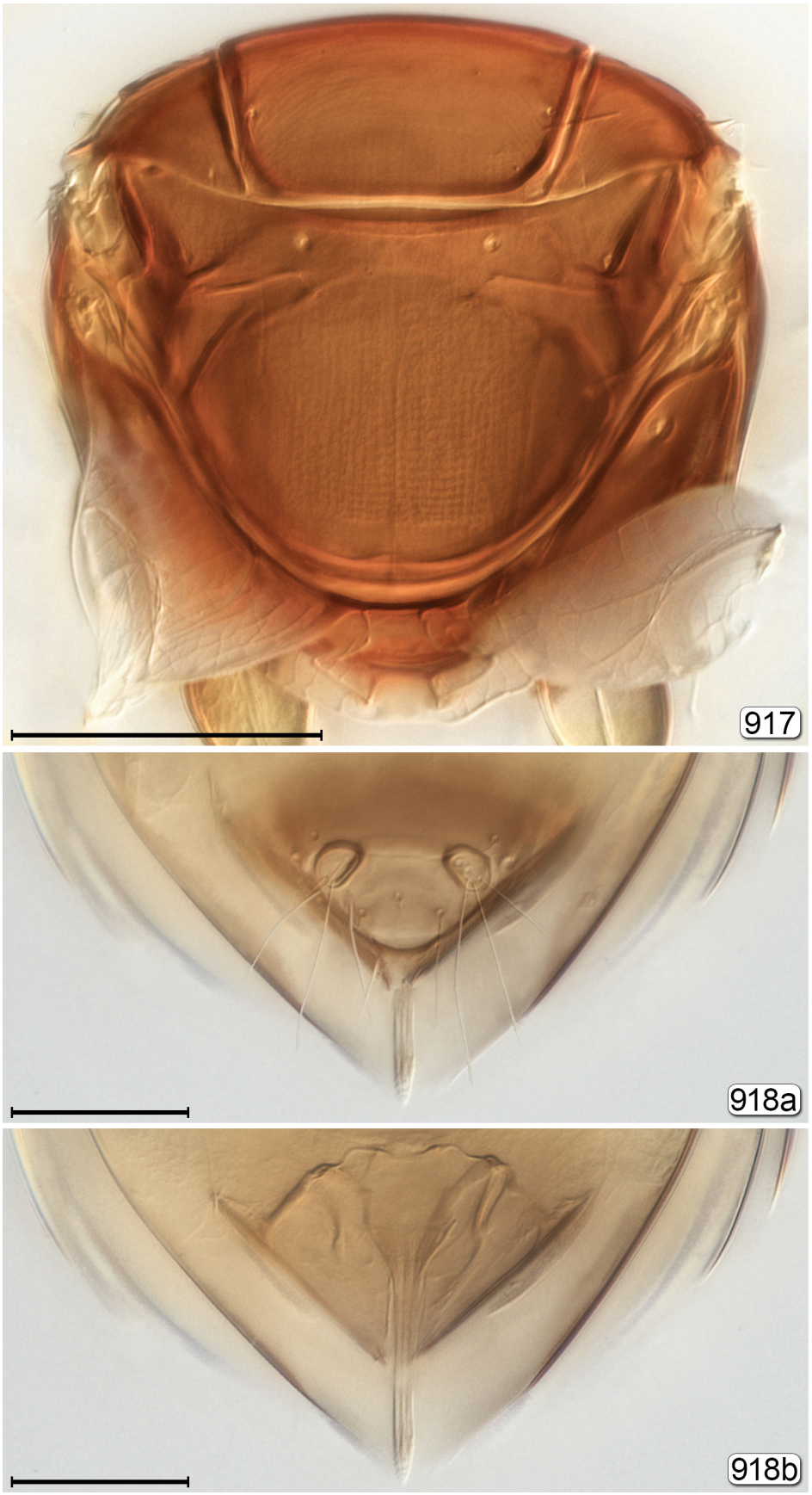




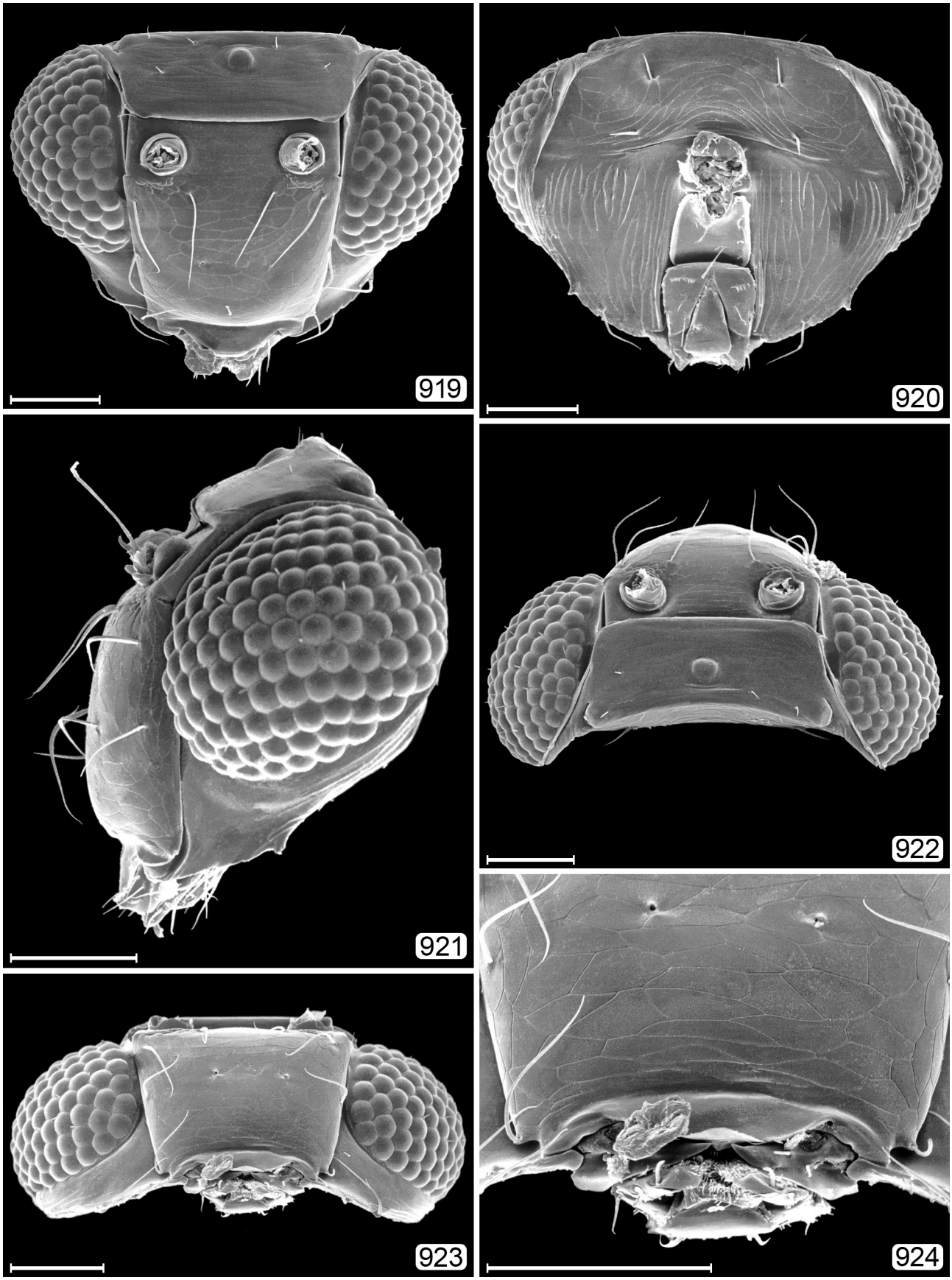
FIGURE 912. *Stephanocampta xanthogaster* Huber. 912a holotype slide; 912b, paratype habitus. USA, Florida.



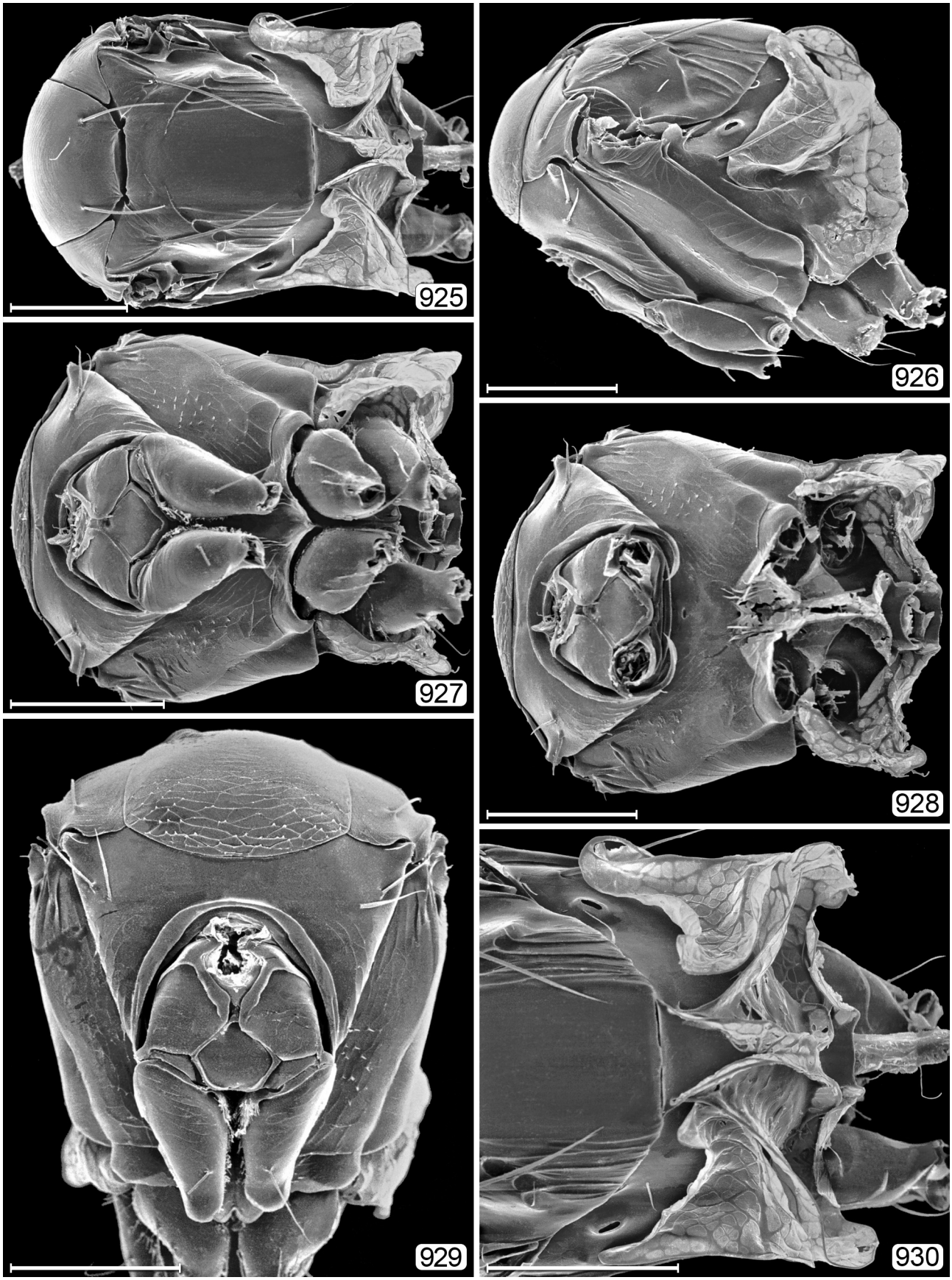
FIGURES 913–916. *Stephanocampta xanthogaster* Huber, holotype. 913, head, anterior; 914, head, posterior; 915, antenna; 916, wings. Scale bars: 913–915=100 μm; 916=200 μm.



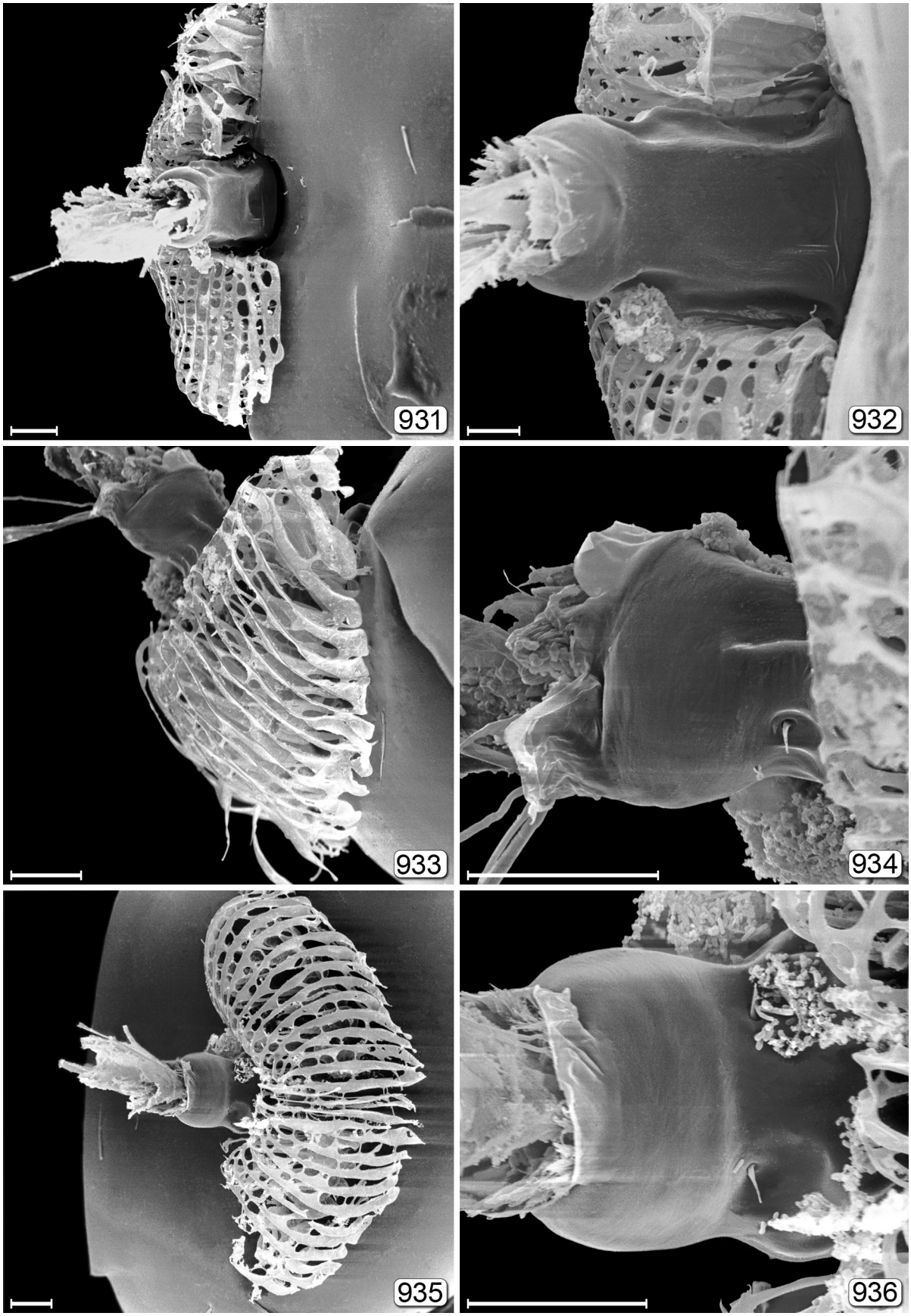
FIGURES 917, 918. *Stephanocampta xanthogaster* Huber, holotype. 917, mesosoma, dorsal; 918a, apex of gaster, dorsal; 918b, ovipositor seen through gaster. Scale bars=50 μm.



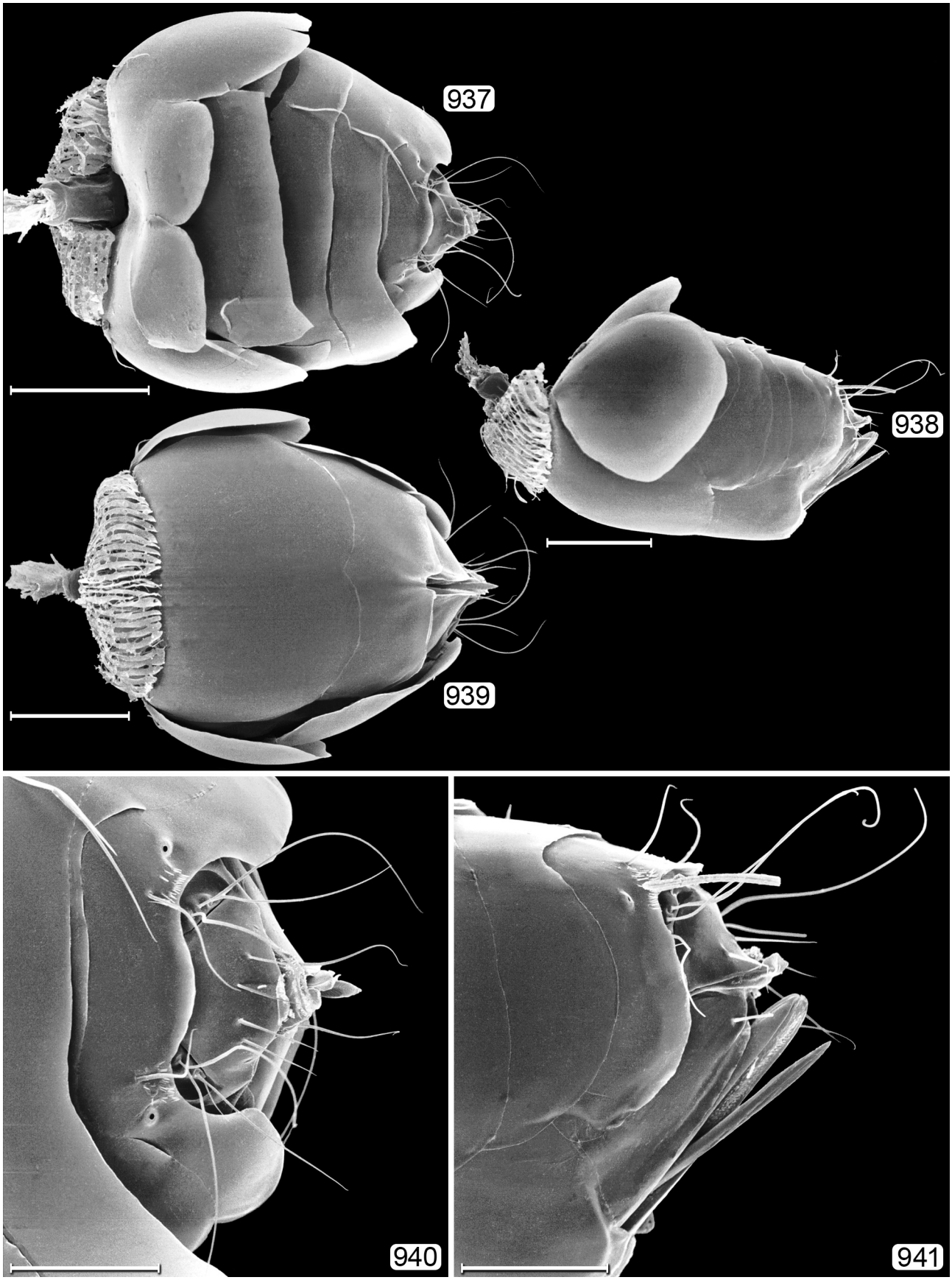
FIGURES 919–924. *Stephanocampta* sp. (Ecuador, Napo, Hacienda Aragon), head. 919, anterior; 920, posterior; 921, lateral; 922, dorsal; 923, ventral; 924, lower face + mouthparts. Scale bars=50 μm.



FIGURES 925–930. *Stephanocampta* sp. (Ecuador, Napo, Hacienda Aragon), mesosoma. 925, dorsal; 926, lateral; 927, ventral with coxae; 928, ventral; 929, anterior; 930, frenum–propodeum. Scale bars=100 μm.



FIGURES 931–936. *Stephanocampta* sp. (Ecuador, Napo, Hacienda Aragon), petiole. 931, dorsal; 932, dorsal enlarged; 933, lateral; 934, lateral enlarged; 935, ventral; 936, ventral enlarged. Scale bars=20 μm.



FIGURES 937–941. *Stephanocampta* sp. (Ecuador, Napo, Hacienda Aragon), metasoma. 937, dorsal; 938, lateral; 939, ventral; 940, apex of gaster, dorsal; 941, apex of gaster, lateral. Scale bars: 937–939=100 μm; 940, 941=50 μm.

Discussion. *Stephanocampta* belongs to the *Camptoptera* group of genera together with *Camptoptera*, *Camptopteroides*, *Eofoersteria*, *Macrocamptoptera*, and *Ptilomymar*. The peculiar translucent structures described above occur elsewhere only in *Ptilomymar* and a few undescribed *Camptoptera* in the Afrotropical region.

Important references. Huber & Lin (1999), Aquino & Triapitsyn (2014), Palanivel *et al.* (2015).

Remarks. Aquino & Triapitsyn (2014) recorded the genus from Florida but the specimen(s) they had were not examined by the first author so it is uncertain whether they belong to the same species as the one described below.

Stephanocampta xanthogaster Huber, sp. nov.
(Figs 912–918)

Type material. Holotype ♀ (CNC), dissected under 4 coverslips on slide (Fig. 916a) labelled: 1. "Stephanocampta xanthogaster Huber Holotype ♀ dorsal". 2."USA: FL, Alachua Co. Gainesville 13-20.X.1990 D. Wahl".

Paratypes. 5 ♀. USA. **FL**: *Alachua Co.*, Gainesville, AEI, 13-23.x.1997, L. Masner, pan trap (1 ♀, CNC). *Dade Co.*, Big Cypress National Preserve, Hwy 41, 16.iv.1992, L. Masner, sweeping (1 ♀, CNC); Miami, Old Cutler Hammock, 7900 SW 76 Street, 21.ii-1.iv.1986, S. & J. Peck, hammock. Malaise trap (1 ♀, CNC). *Sumter Co.*, 9 mi. E. Inverness, 22.i.1993, J. La Salle (1 ♀, CNC); 50 km SW Miami, Chekkika State Recreation Area, Grossman Hammock, 15.xi.1985-24.ii.1986, S. & J. Peck (1 ♀, CNC).

Diagnosis. **Female**. *Stephanocampta xanthogaster* is distinguished from all other described *Stephanocampta* species by the following combination: gaster mainly yellow to yellowish or light brown, contrasting distinctly with dark head and mesosoma (metasoma same colour as mesosoma in other species); fu_2 1.76× as long as wide, clava 3.77× as long as wide.

Five of the other six described species have a much longer clava than *S. xanthogaster*. *Stephanocampta chica* Aquino & Triapitsyn has a slightly shorter clava than in *S. xanthogaster* but fu_2 over 3× as long as wide whereas in *S. xanthogaster* fu_2 is less than 2× as long as wide.

Description. Body length 335–445 (n=3). Colour. Head and mesosoma dark brown to almost black; coxae brown except apex lighter; scape and pedicel basally light brown, rest of antenna brown; legs except coxae, trochanters, and sometimes base of femora, and metasoma yellow or to light brown. Head width 174 (holotype). Antenna (holotype) length/width measurements (ratios) are: scape 80/17 (4.65), pedicel 40/23 (1.71), fu_1 35/8 (4.35), fu_2 12/7 (1.76), fu_3 43/7 (6.00), fu_4 39/8 (4.85), fu_5 38/11 (3.56), fu_6 36/11 (3.37), fu_7 35/13 (2.64), clava 100/26 (3.77). Fore wing length 465, width 50, length/width 9.24, longest marginal setae 179; hind wing length 437, width 17, longest marginal setae 126. Ovipositor length ~80 (not exactly measurable) but distinctly shorter than metatibia length (177).

Male. Unknown.

Derivation of species name. The species is named after the colour of the gaster which is yellow (Greek: *xanthos*) to light brown.

Distribution. USA: FL.

STEPHANODES **Enock, 1909**
(Figs 942–978)

Stephanodes Enock, 1909: 457. Type species: *Stephanodes elegans* Enock, 1909, by monotypy.
Eustephanodes Ogloblin, 1967: 194. Type species: *Eustephanodes missionicus* Ogloblin, 1967, by original designation. Synonymy by Yoshimoto, 1990: 72.
Masonana Yoshimoto, 1990: 63. Type species: *Masonana polynemoides* Yoshimoto, 1990, by monotypy. Synonymy by Huber & Fidalgo, 1997: 34.

Diagnosis. Body length 970–1205 μm. Vertex with large shallow depressions outside each ocellus (Figs 952, 955–958); scape with inner surface rasp-like (Fig. 946); mesonotal spiracle much closer to anterior apex of notaulus than to dorsal apex of prepectus (Fig. 962), mesosoma and metasoma smooth (Figs 961–966) and shiny (Fig. 942); fore wing with parastigma slightly elongate (Fig. 949).

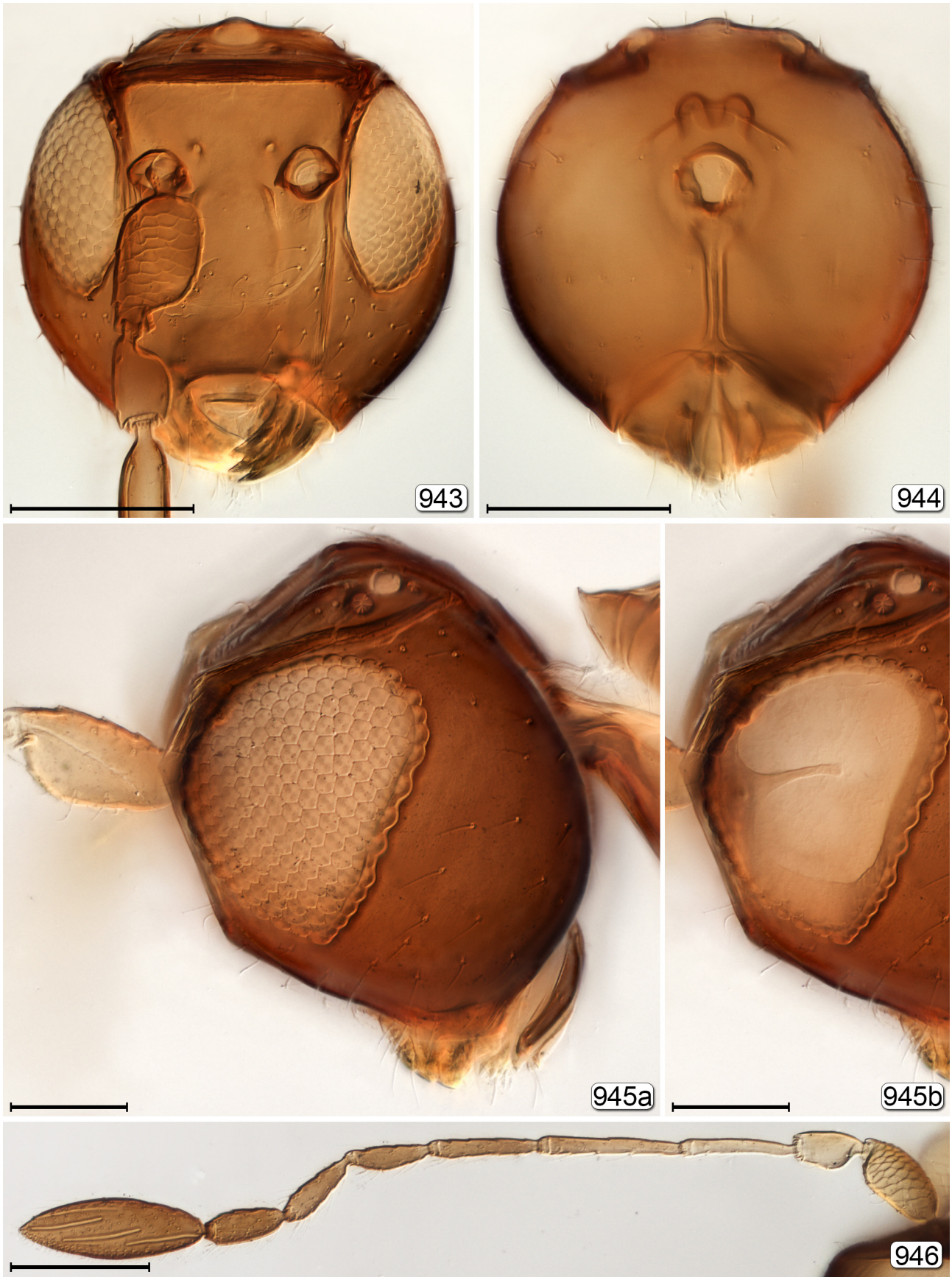


FIGURE 942. *Stephanodes septentrionalis* Huber, habitus. Canada, Quebec, James Bay hwy, km 221, 10.vi.1985, H. Goulet. Scale bar=1000 μm.

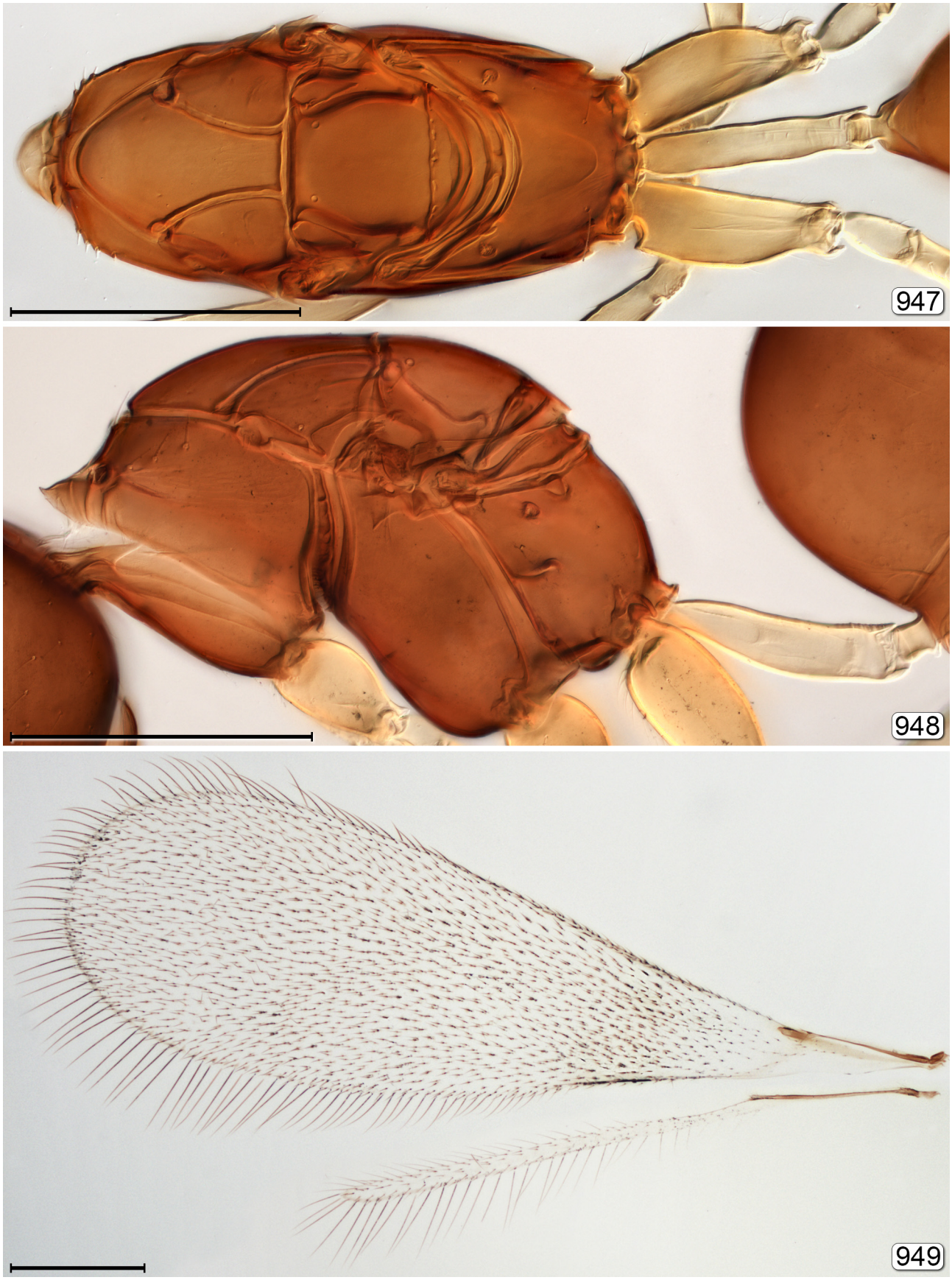
Discussion. Among the nine other Nearctic genera of this group (*Acmopolynema*, *Caraphractus*, *Cnecomymar*, *Eustochus*, *Kalopolynema*, *Mymar*, *Neomymar*, *Palaeoneura*, *Polynema*), *Stephanodes* is distinguished by the diagnostic features listed above. As is usual among this group of genera, different features taken alone suggest different relationships among the genera. For example, *Stephanodes* has faint subantennal sulci (Figs 943, 955) as, e.g., in *Kalopolynema*, petiole clearly attached to gs_1 (Fig. 971) as, e.g., in *Acmopolynema*, and propleura closed (Figs 963, 965) as, e.g., in *Polynema* (*Doriclytus*).

Nearctic hosts. Unknown. Extralimital hosts are Hemiptera: Cicadellidae, Nabidae.

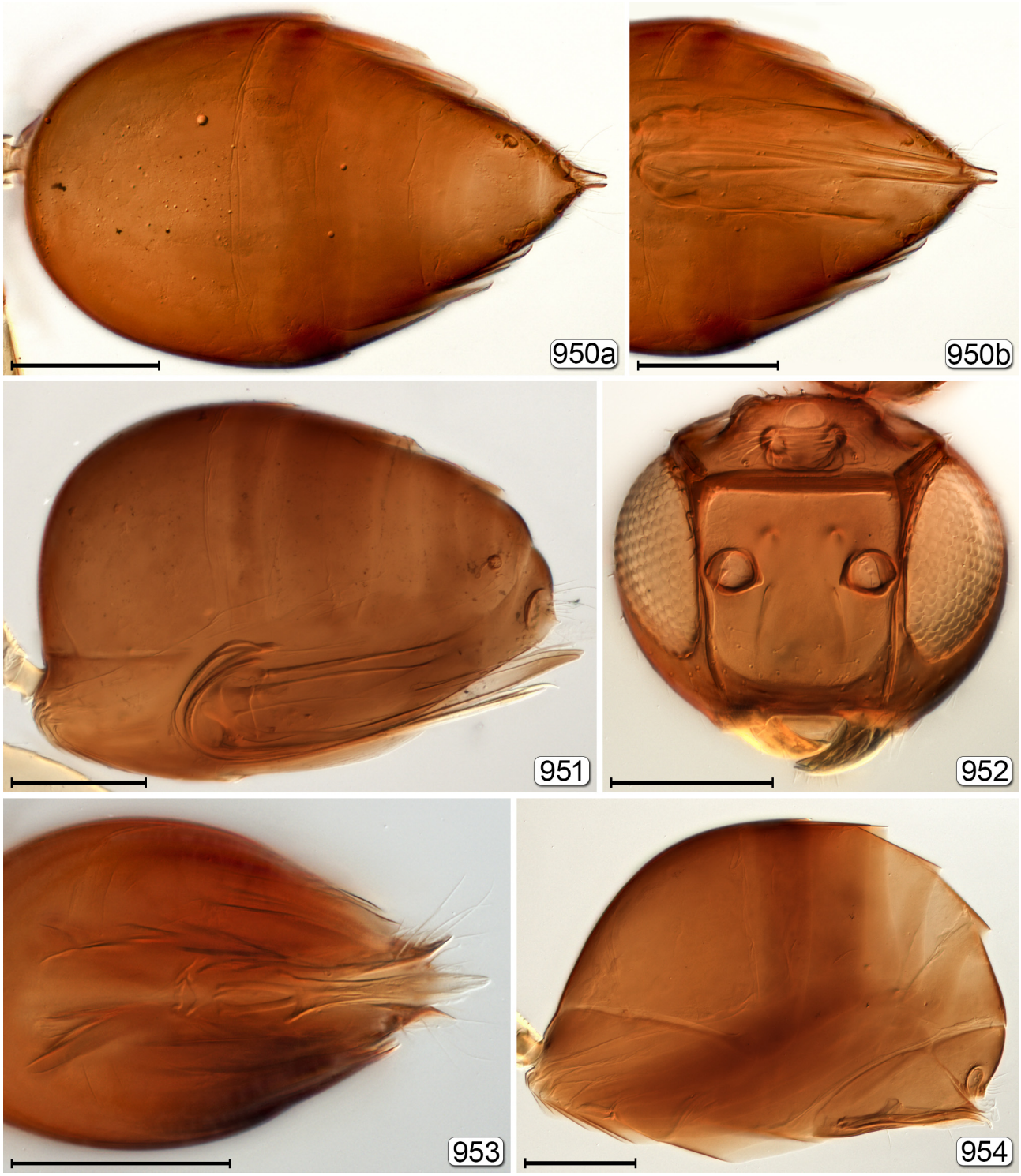
Important reference. Huber & Fidalgo (1997).



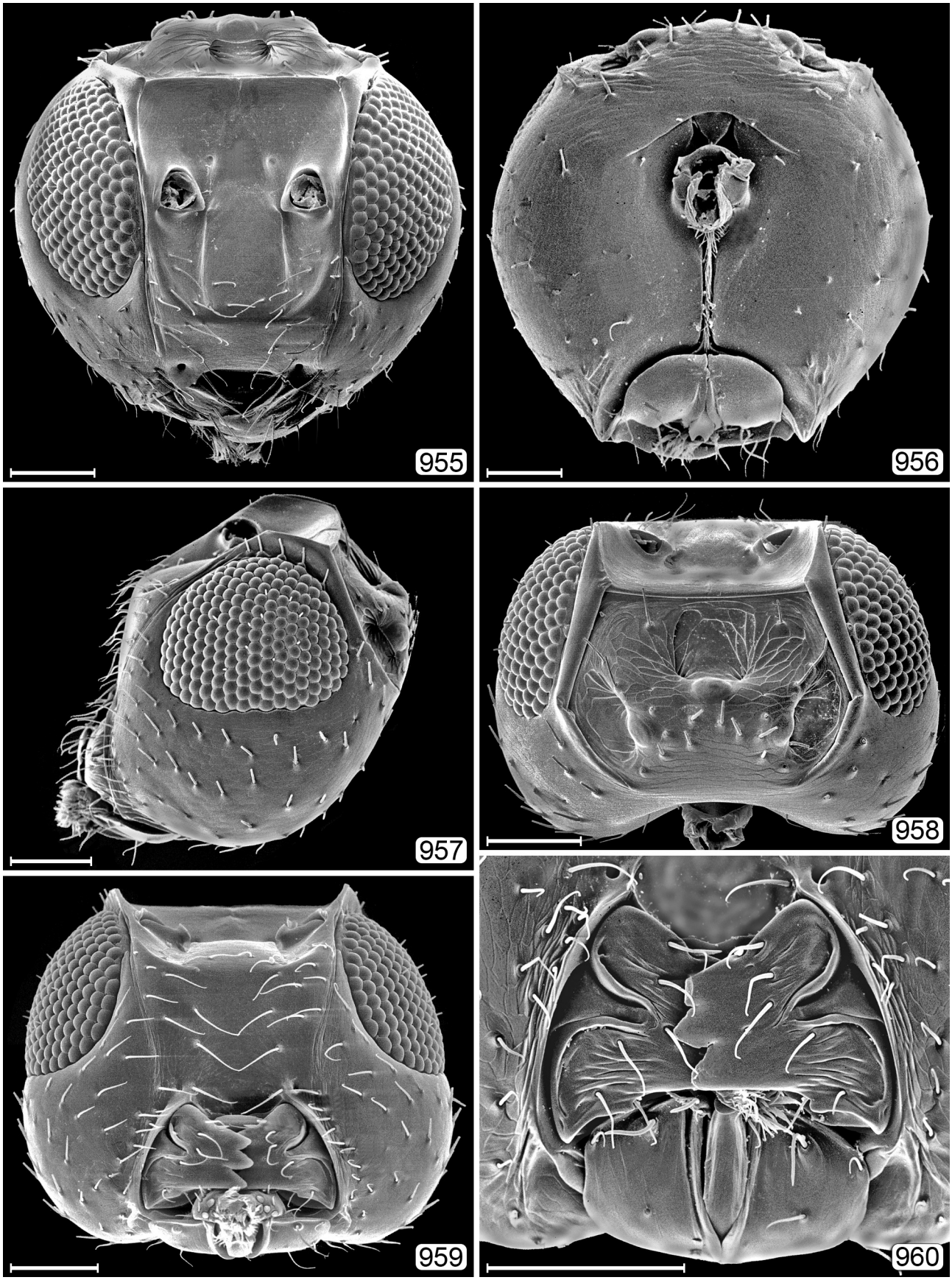
FIGURES 943–946. *Stephanodes septentrionalis* Huber, head except 946. 943, anterior; 944, posterior; 945a, lateral; 945b, lateral (internal) showing ocular apodeme; 946, antenna. Scale bars=100 µm.



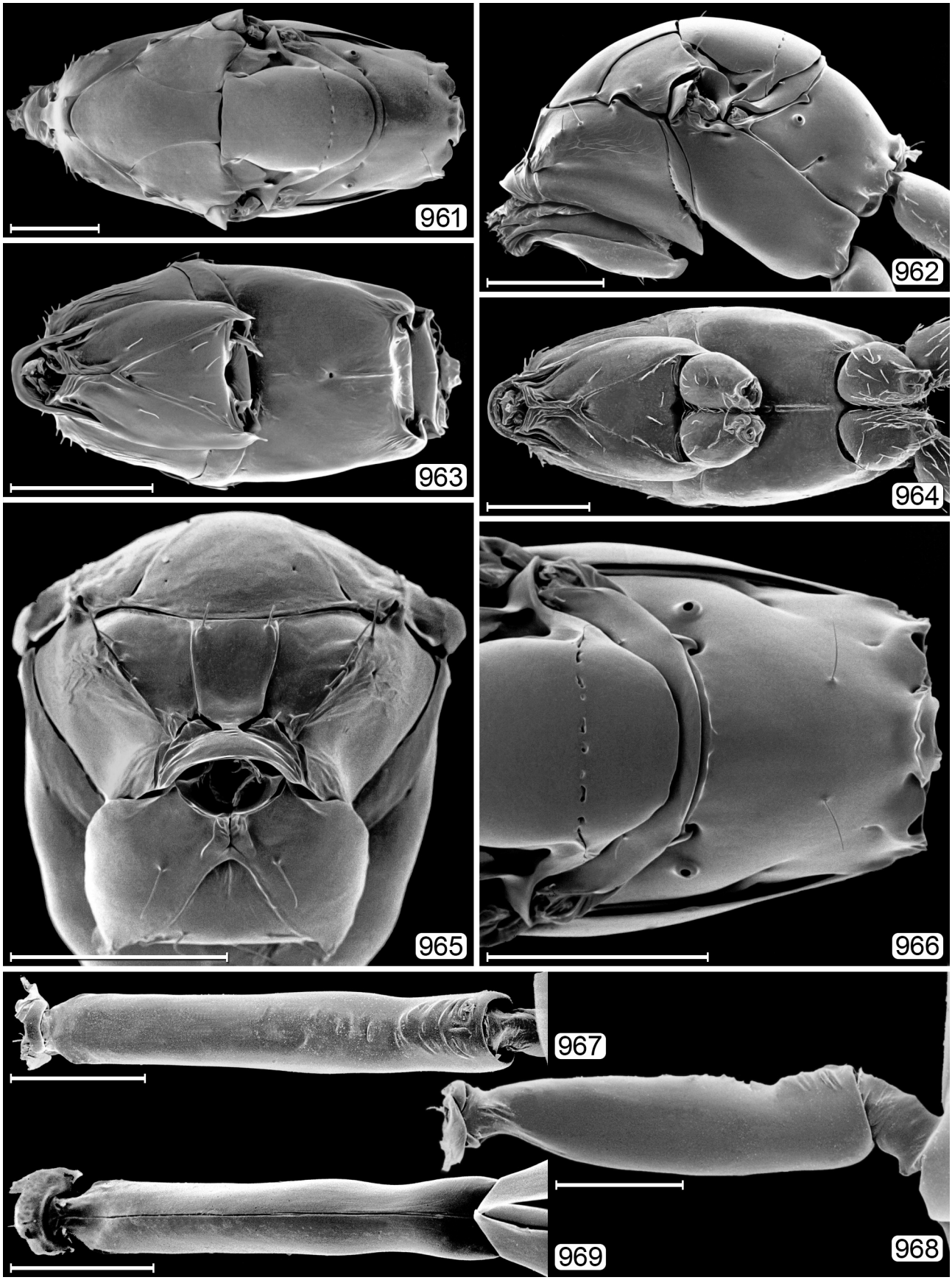
FIGURES 947–949. *Stephanodes septentrionalis* Huber. 947, mesosoma, dorsal; 948, mesosoma, lateral; 949, wings. Scale bars=100 μm.



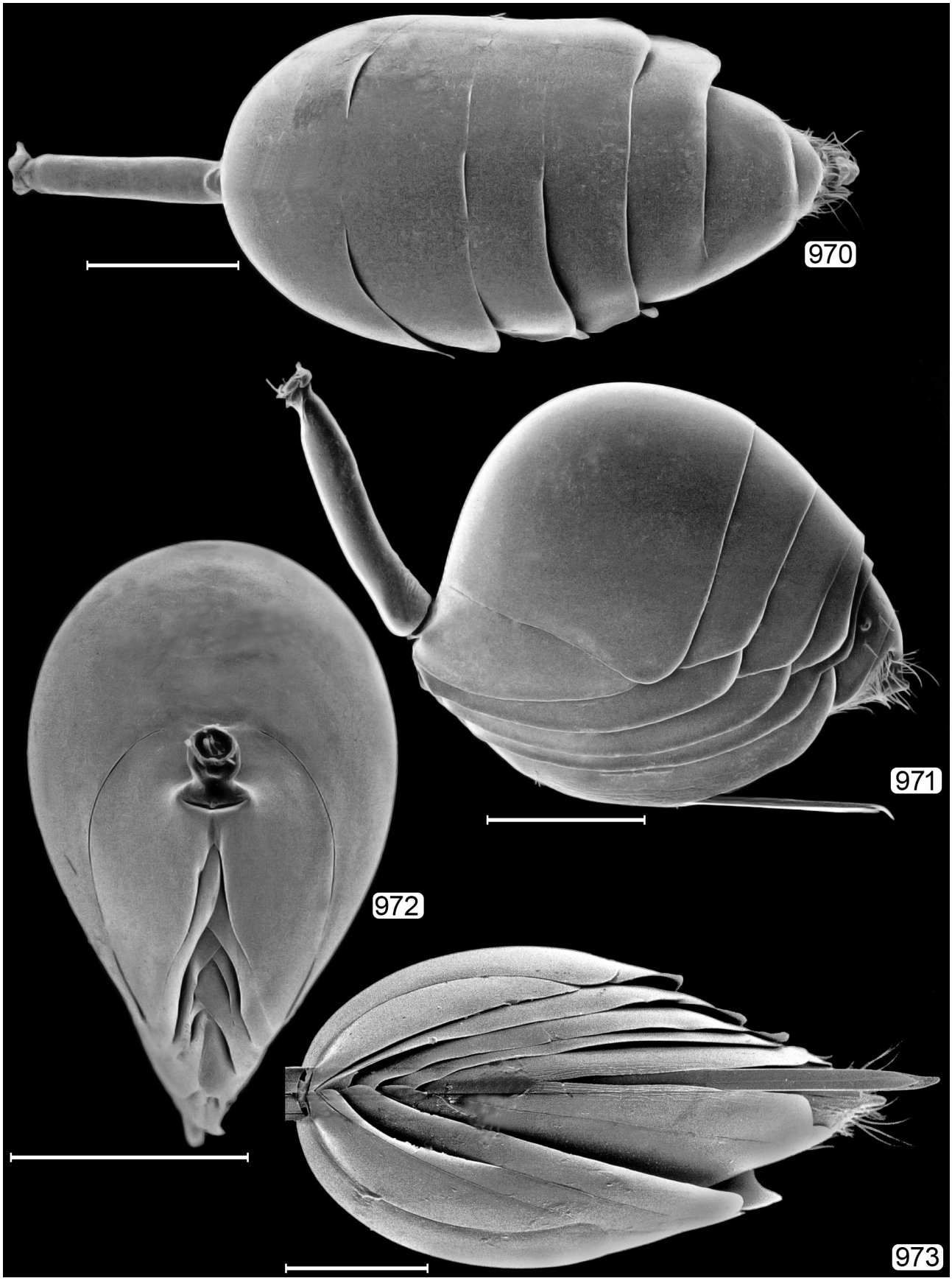
FIGURES 950–954. *Stephanodes septentrionalis* Huber, gaster except 952. 950a, dorsal; 950b, ovipositor seen through gaster; 951, lateral; 952, male head, anterior; 953, genitalia seen through gaster; 954, male, lateral. Scale bars=100 μm.



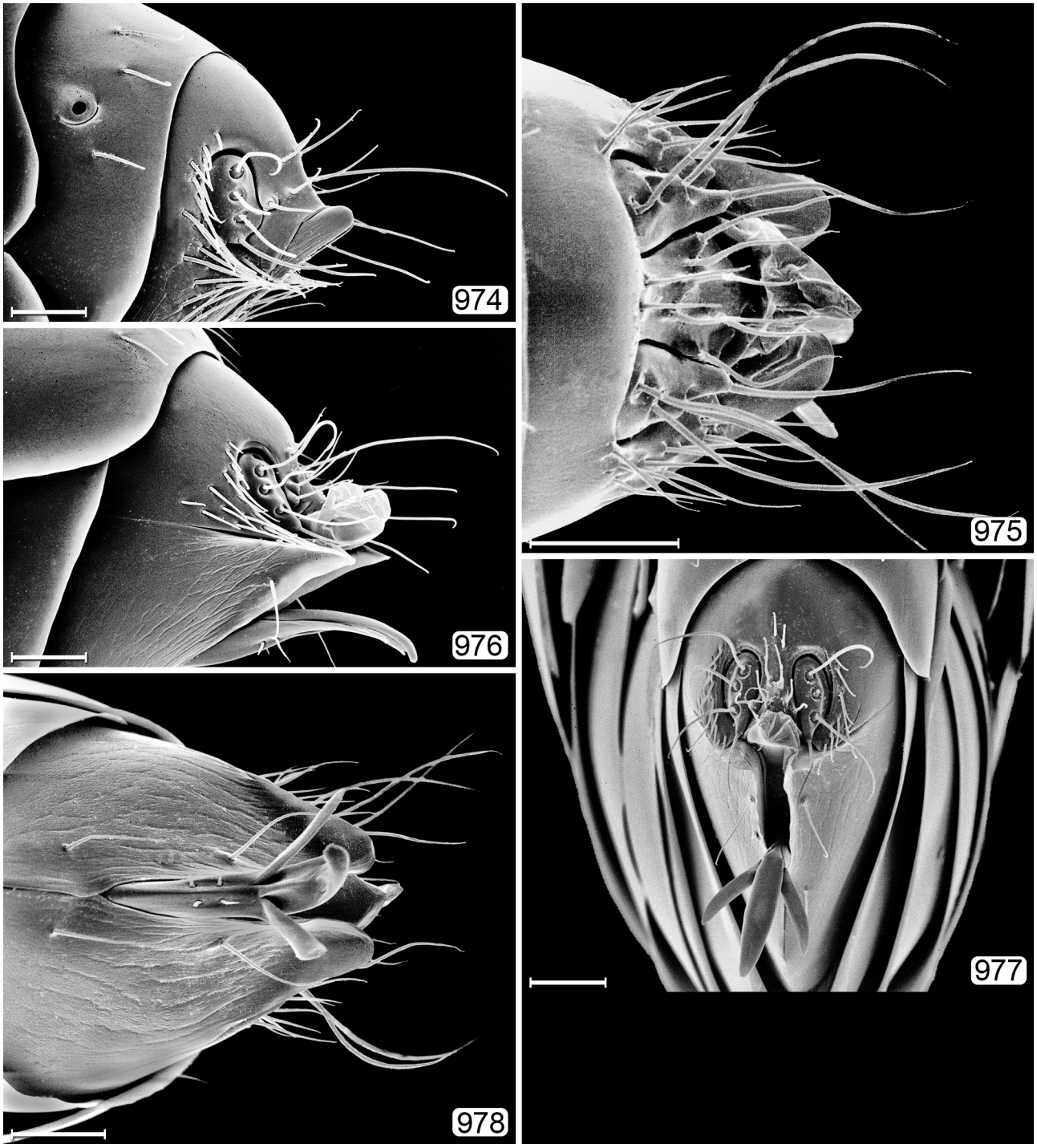
FIGURES 955–960. *Stephanodes* sp., head, male except for 958. 955, anterior; 956, posterior; 957, lateral; 958, dorsal; 959, ventral; 960, mouthparts. Scale bars=50 μm.



FIGURES 961–969. *Stephanodes* sp., mesosoma, except 967–969. 961, dorsal; 962, lateral; 963, ventral; 964, ventral with coxae; 965, anterior; 966, scutellum–propodeum; 967, petiole, dorsal; 968, petiole, lateral; 969, petiole, ventral. Scale bars: 961–966=100 μm; 967–969=50 μm.



FIGURES 970–973. *Stephanodes* sp., metasoma. 970, male, dorsal; 971, lateral; 972, male, anterior; 973, ventral. Scale bars=100 μm.



FIGURES 974–978. *Stephanodes* sp., male except 974, apex of gaster except 977. 974, female, lateral; 975, dorsal; 976, lateral; 977, metasoma, posterior; 978, ventral. Scale bars=20 μm.

***Stephanodes reduvioli* (Perkins, 1905)**

Polynema reduvioli Perkins, 1905: 196. Lectotype ♀ (NHMUK), designated by Huber & Fidalgo, 1997: 41. **TL:** Hawaiian Is., no locality specified. Girault, 1916 [265a]: 60 (host); Swezey, 1954: 103 (host) [O]; Thompson, 1958: 572 (host catalogue) [A].

Stephanodes reduvioli: Hayat, 1992: 87 (as *imbricatus*, distribution) [O]; Beardsley, 1999: 46 (distribution, host) [A]; Huber & Fidalgo, 1997: 41 (generic transfer, description); Hayat & Anis, 1999a: 325 (distribution) [O]; Beardsley & Huber, 2000: 17 (description, distribution) [A]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Triapitsyn & Berezovskiy, 2002a: 7

(description) [P]; Gonsalves, 2003: 10 (1 specimen on slide) [A]; Lin *et al.*, 2007: 49 (distribution) [A]; Hayat *et al.*, 2008: 329 (distribution) [O]; Huber *et al.*, 2009: 271 (checklist) [P]; Fallazadeh & Huber, 2011: 299 (distribution) [P]; Manickavasagam *et al.*, 2011: 396, 397 (distribution) [O]; Anis & Rehmat, 2013: 8 (list, distribution) [O]; Manickavasagam & Rameshkumar, 2013: 567 (checklist) [O]; Rameshkumar *et al.*, 2015b: 53 (distribution) [O]; Lotfalizadeh, 2015: 75 (distribution) [P]; Triapitsyn, 2018a: 156 (distribution) [O].

Polynema (*Stephanodes*) *imbricatus* Narayanan & Subba Rao, 1961: 667. Holotype ♀ (INPC). **TL:** India, New Delhi. Synonymy by Huber & Fidalgo, 1997: 41.

Stephanodes orientalis Taguchi, 1978: 73. Holotype ♀ (EUMJ), lost. **TL:** Japan, Ishihara near Fukuoka. Synonymy by Huber & Fidalgo, 1997: 42.

Distribution. USA: CA?

Stephanodes septentrionalis Huber, 1997

Stephanodes septentrionalis Huber in Huber & Fidalgo**,** 1997: 44. Holotype ♀ (CNC). **TL:** Canada, ON, 6 mi. W. Aylmer, Springwater Conservation Area. Huber, 1997: 44 (distribution).

Distribution. Canada: AB, BC, NB, NS, ON, QC. USA: NH, PA, WA, WI.

Stephanodes similis (Foerster, 1847)

Polynema similis Foerster, 1847: 218. Lectotype ♀ (NHMW), designated by Soyka, 1956b: 108 [Hincks, 1950: 177 stated that Foerster's type was in MHNG, but see Huber & Fidalgo, 1997: 38]. **TL:** Germany, Aachen. Lameere, 1907: 247 (habitat) [P]; Bakkendorf, 1934: 62 (habitat) [P]; Soyka, 1946a: 33 (synonymy under *S. elegans*) [P].

Stephanodes similis: Debauche, 1948: 205 (generic transfer implied, description, distribution) [P]; Hincks, 1950: 176 (generic transfer, distribution) [P]; Doutt, 1955: 17 (distribution) [A] [misidentification?]; Viggiani, 1967b: 160 (distribution) [P]; Hellén, 1968: 34 (list) [P]; Mathot, 1968: 275 (list) [P]; Viggiani, 1973b: 277 (male genitalia) [P]; Bouček, 1977: 123 (distribution) [P]; Bouček & Graham, 1978: 110 (catalogue) [P]; Taguchi, 1978: 75 (key) [P]; Graham, 1983: 36 (distribution) [P]; Viggiani, 1988: 147 (male genitalia) [P]; Viggiani & Jesu, 1988: 1025 (distribution) [P]; De Santis & Fidalgo, 1994: 127 (catalogue) [NT]; Pagliano & Navone, 1995: 37 (list) [P]; Baquero & Jordana, 2002: 82 (distribution) [P]; Triapitsyn & Berezovskiy, 2002a: 9 (distribution) [P]; Viggiani, 2004: 71 (male genitalia) [P]; Huber *et al*., 2009: 271 (list) [P]; Luft Albarracin *et al.*, 2009: 12 (list) [NT]; Pricop, 2009a: 81 (distribution) [P]; Pricop, 2009b: 126 (distribution) [P]; Pricop, 2009c: 22 (distribution) [P]; Pricop, 2010a: 74 (distribution) [P]; Pintureau, 2012: 31 (list) [P]; Haghayeghi-Nosrati *et al*., 2014a: 47 (distribution) [P]; Samin, 2015: 122 (distribution) [P]; Lotfalizadeh, 2015: 75 (distribution) [P]; Dale-Skey, 2016: 248 (checklist) [P]; Koponen & Triapitsyn, 2016: 3 (distribution) [P].

Stephanodes psecas Girault, 1912 [110]: 41. Lectotype ♀ (INHS), designated by Frison, 1927: 228. **TL**: USA, Illinois, Butler. Synonymy by Huber & Fidalgo, 1997: 38. Girault, 1912 [107]: 80 (possibly identical to *S. enocki*); Frison, 1927: 228 (types); Taguchi, 1978: 75 (key) [P]; Burks, 1979: 1032 (catalogue); Webb, 1980: 119 (lectotype listed); Huber, 1997: 506 (key); Yoshimoto, 1990: 72 (list).

Polynema psecas Girault, 1911 [96]: 319 [*nomen nudum*]; Girault, 1913 [135]: 13 (description, distribution; Girault, 1913 [137]: 196 (description, distribution); Girault, 1929 [428]: 16 (key); Peck, 1951: 418 (catalogue); Peck, 1963: 47 (catalogue).

Polynema isotoma Debauche, 1949: 7. Replacement name for *S. similis* (Förster).

Stephanodes elegans Enock, 1909: 457. Lectotype ♀ (NHMUK), designated by Huber & Fidalgo, 1997: 39. **TL:** England, Woking. Synonymy by Soyka, 1946a: 33.

Polynema enockii Girault, 1911 [96]: 321. Replacement name for *P. elegans* (Enock).

Distribution. Canada: AB, QC, YT. USA: IA, IL, MI, MO, WI.

STETHYNIUM Enock, 1909

(Figs 979–1010)

Stethynium Enock, 1909: 452. Type species: *Stethynium triclavatum* Enock, 1909, by monotypy.

Diagnosis. Body length 525–715 μm. Clava 3-segmented, the sutures between segments strongly oblique (Fig. 984); mandible with 4 teeth (Fig. 1000); frenum longitudinally divided, with paramedial plate longer than wide; second phragma with rounded (convex) apex (Figs 985, 1001); fore wing with distinct rounded lobe behind venation (Fig. 987). Male with complex asymmetrical genitalia (Figs 993, 1010).



FIGURE 979. *Stethynium triclavatum* Enock, habitus. Canada, British Columbia, Deas Island (between Vancouver and Whiterock), 9.vii.1988, A.T. Finnamore. Scale bar=500 µm.

Discussion. Among the four other genera in the Nearctic with frenum longitudinally divided: *Anagrus*, *Krokella*, *Platystethynium* (*Platypatasson*) and *Schizophragma*, only *Krokella* also has a 3-segmented clava. *Stethynium* differs from it by the mandible normal, with 4 equal teeth in both sexes, fore wing more evenly rounded and with a distinct lobe behind apex of venation, and venation shorter.

Nearctic hosts. Unknown. Extralimital hosts are Hemiptera: Cicadellidae, including an important pest in vineyards, *Empoasca vitis* (Goethe) (Viggiani 2002).

Important reference. Huber (1987).

Stethynium angustipenne Huber, 1987

Stethynium angustipenne Huber, 1987: 831. Holotype ♀ (CNC). **TL:** USA, California, San Bernardino Co., Oak Glenn.

Distribution. USA: CA.

Stethynium triclavatum Enock, 1909

Stethynium triclavatum Enock, 1909: 452. Lectotype ♀ (NHMUK), designated by Huber, 1987: 829. **TL:** England, Somerset, no locality specified. Girault, 1911 [82]: 121 (description), 123 (key); Bakkendorf, 1934: 42 (ex eggs in *Salix* twigs) [P]; Viggiani, 1967a: 147 (distribution, description) [P]; Bouček & Graham, 1978: 109 (checklist) [P]; Huber, 1987: 823

(description); Viggiani & Jesu, 1988: 1025 (hosts) [P]; Viggiani, 1989: 142 (male genitalia) [P]; Cerutti *et al.*, 1990: 49 (host, percent parasitism); Cerutti *et al.*, 1991: 178 (habitat management); Hayat, 1992: 88 (distribution) [O]; Pagliano & Navone, 1995: 36 (list) [P]; Beardsley & Huber, 2000: 19 (distribution) [A]; Herrmann & Eichler, 2000: 118 (density on host) [P]; Kreiter, 2000: 152 (parasitism rate, distribution) [P]; Helden & Decante, 2001: 293 (conversation biocontrol) [P]; Baquero & Jordana, 2002: 82 (distribution) [P]; Eldredge & Evenhuis, 2002: 74 (distribution) [A]; Triapitsyn, 2002b: 8 (distribution) [P]; Viggiani, 2002: 69 (host) [P]; Arnaldos *et al.*, 2003: 227 (carrion community, distribution) [P]; Böll & Schwappach, 2003: 176 (population dynamics) [P]; Viggiani, 2003: 199 (distribution, hosts) [P]; Viggiani & Jesu, 2003: 219 (trapping in vineyards) [P]; Arnaldos *et al*., 2004: 200 (carrion community) [P]; Viggiani *et al*., 2004: 5 (host, Italy) [P]; Böll & Herrmann, 2004: 33 (population dynamics) [P]; Böll *et al*., 2006: 175 (alternate host plant) [P]; Böll *et al.*, 2007: 14 (alternate host plant) [P]; Huber *et al.*, 2009: 271 (list) [P]; Pricop, 2009b: 127 (distribution) [P]; Manickavasagam *et al.*, 2011: 407 (distribution) [O]; Viggiani & Tesone, 2011: 89 (host, biology) [P]; Krishnamoorthy, 2012: 10 (phenology) [O]; Pintureau, 2012: 39 (list) [P]; Walton *et al.*, 2012: 102 (overwintering habitat) [P]; Manickavasagam & Rameshkumar, 2013: 567 (checklist) [O]; Pricop, 2013: 79 (distribution) [P]; Zanolli & Pavan, 2013: 276 (host) [P]; Pricop, 2014c: 58 (morphology, variation) [P]; Dale-Skey, 2016: 248 (checklist) [P]; Daane *et al.*, 2018: 198 (overwintering habitats) [P].

Stethynium faunum Girault, 1911 [96]: 298. Holotype ♀ (INHS). **TL:** USA, Illinois, Hendrix (Bloomington). Synonymy by Huber, 1987: 829. Girault, 1911 [82]: 121 (description), 123 (key); Frison, 1927: 229 (holotype listing); Girault, 1929 [428]: 7 (description); Doutt, 1947: 152 (description); Peck, 1951: 414 (catalogue); Peck, 1963: 31 (catalogue); Burks, 1979: 1023 (catalogue); Webb, 1980: 119 (holotype listing); Yoshimoto, 1990: 45 (list).

Distribution. Canada: BC, ON. USA: CA, CO, IL, KS, WA.

Mymaridae

Unidentified genus and sp.: Story & Robinson, 1979: 1090 (host: *Taphocerus schaefferi* Nicolay & Weiss [Buprestidae]).

Nomen dubium

Psilus ciliatus Say, 1828: 80 (*nomen dubium*). Catalogued under Mymaridae by Peck (1963: 43) and Burks (1979: 1032), listed under *Polynema* [as *ciliatum*] by Peck (1951: 417) and Yoshimoto (1990: 83) but not placed generically by Schauff & Grissell (1982: 530). The type is lost.

Lapsus calami

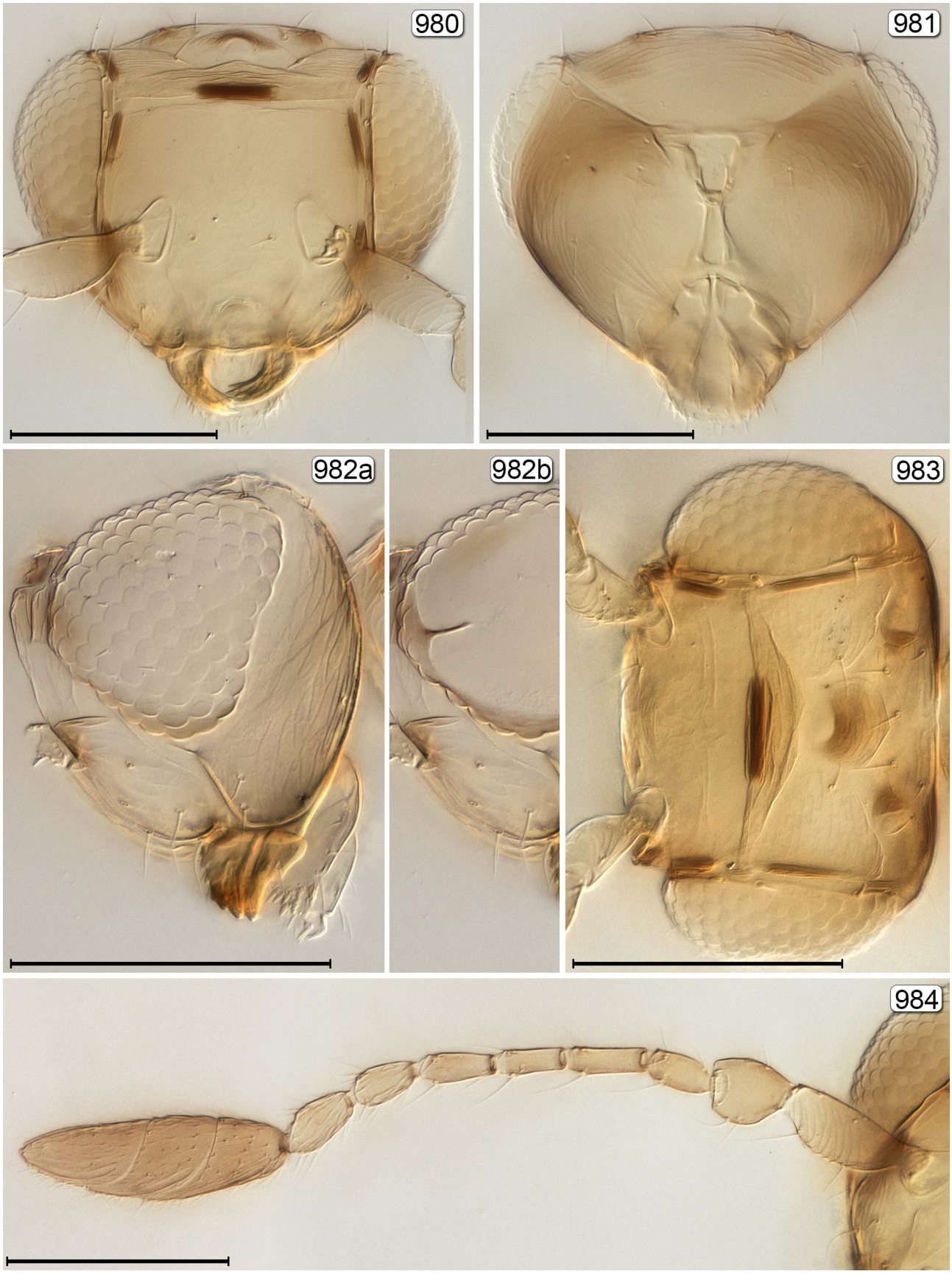
Discopus [*sic*]: Girault, 1912 [112]: 299. Corrected to *Dicopus*.
Polyneura [*sic*] *in* Webster, 1903a: 33. Corrected to *Polynema* by Girault, 1907 [27]: 28.

Nomina nuda

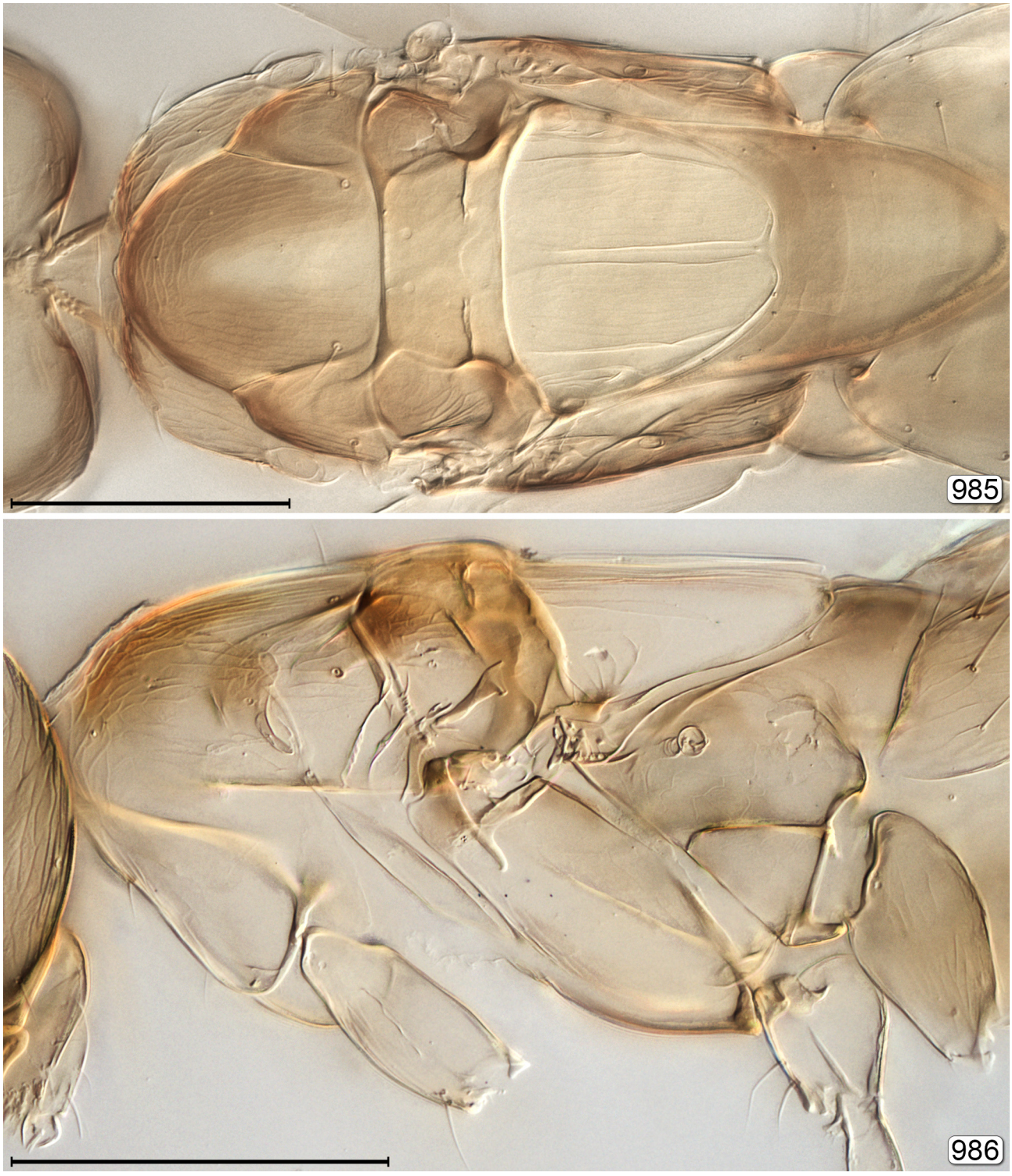
Anagrus lestini LaPlante, 1975: 291 (as *Anagrus lestini* Yoshimoto).
Gonatocerus welateri. See under *Lymaenon litoralis*.
Gonatocerus websteri: Girault, 1911 [96]: 324 (*nomen nudum* cited, spelling corrected).
Litus tenuipennis: Girault, 1911 [96]: 316, 324 ?=*Polynema longipes*; Peck, 1963: 913.
Ooctonus homalodiscae Sanderson: Peck, 1963: 914. See under *Cosmocomoidea ashmeadi*.
Ooctonus homolodiscae [*sic*], Girault, 1911 [96]: 316, 324; Peck 1963: 914.
Ooctonus quadrisignatus Blackman: Peck, 1963: 19. See under *O. quadricarinatus.*
Polynema citripes Ashmead: Girault 1911 [72]: 22 (footnote) placed this species in synonymy under *P. longipes* at the same time he provided its description; accordingly, the name is unavailable following ICZN Article 11.6 (ICZN 1999).
Polynema oecanthi Ashmead. See under *Acmopolynema bifasciatipennis*.

Species excluded from Mymaridae

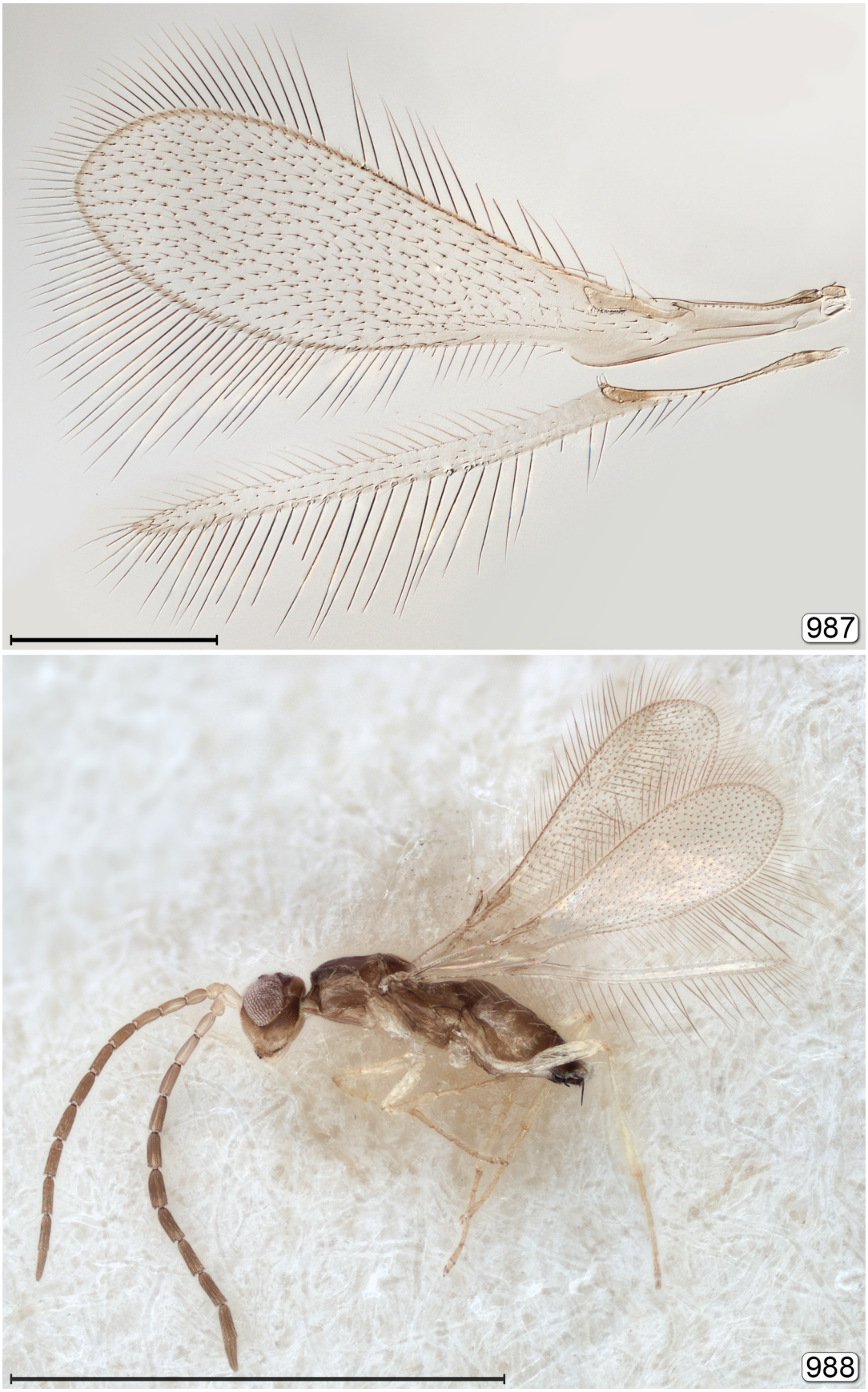
Aphelinus aspidioticola Ashmead, 1879: 159. Ashmead (1887: 192) transferred the species to *Limacis* [*sic*], a synonym of *Arescon*. Schauff (1984a: 39) reviewed information on the species and concluded it should provisionally be removed back to Aphelinidae. The type is lost. Askew & Misfud (2016) included the species in their checklist of Maltese Chalcidoidea, citing previous literature but not mentioning any voucher specimens.



FIGURES 980–984. *Stethynium triclavatum* Enock, head except 984. 980, anterior; 981, posterior; 982a, lateral; 982b, lateral (internal) showing ocular apodeme; 983, dorsal; 984, antenna. Scale bars=100 μm.



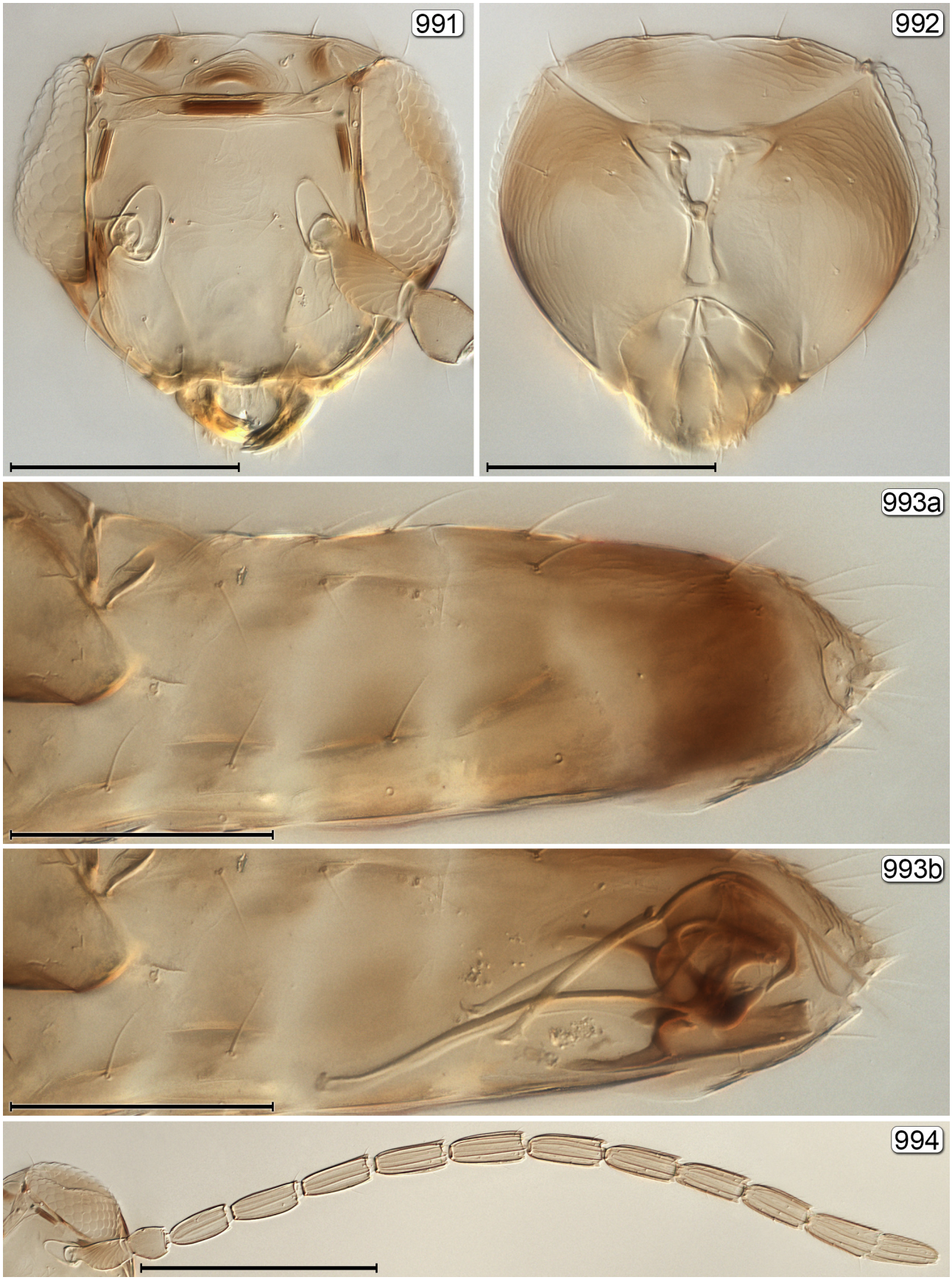
FIGURES 985, 986. *Stethynium triclavatum* Enock, mesosoma. 985, dorsal; 986, lateral. Scale bars=100 µm.



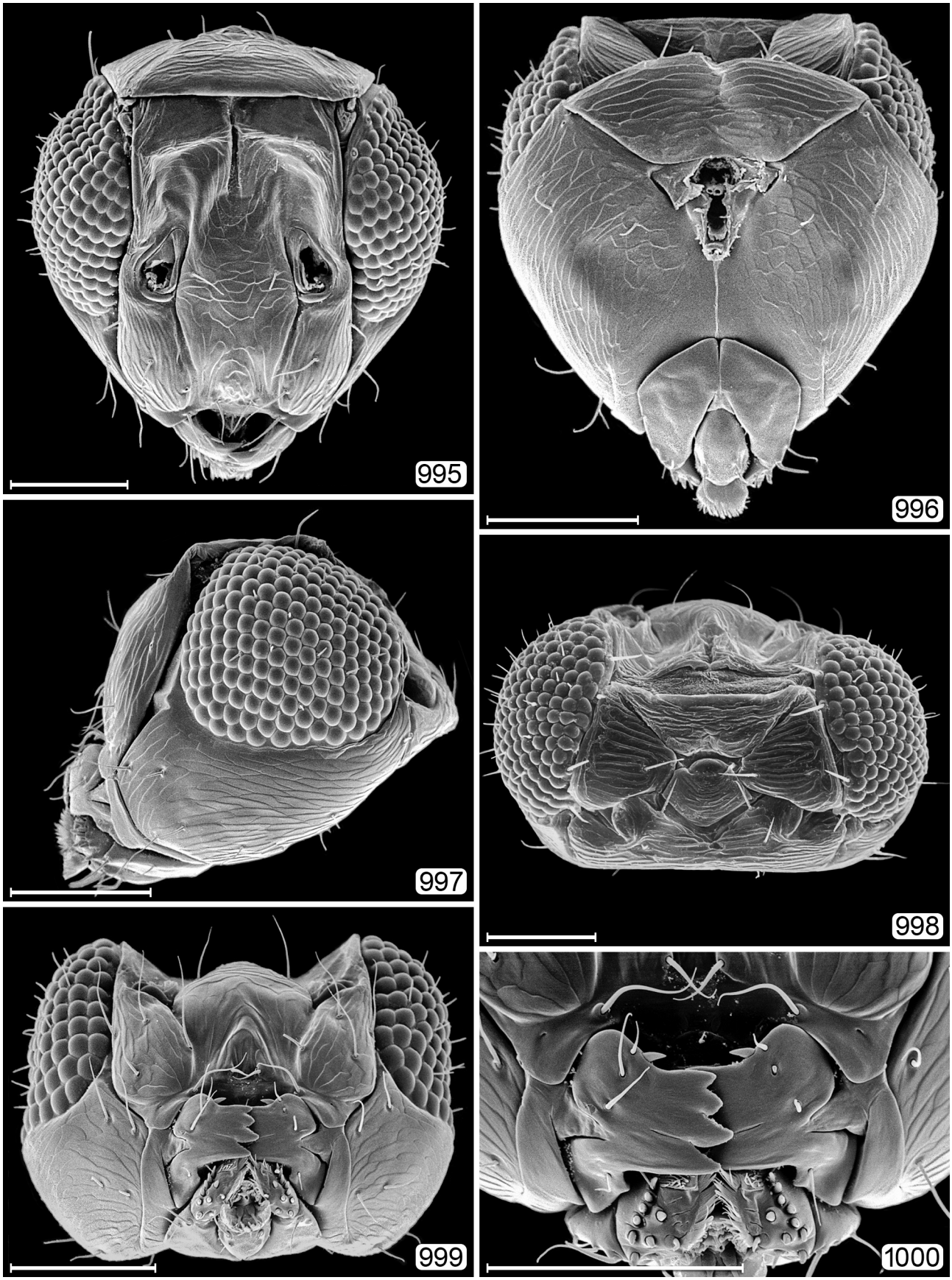
FIGURES 987, 988. *Stethynium triclavatum* Enock, male. 987, wings; 988, habitus, same data as Fig. 979. Scale bars: 987=100 µm; 988=500 µm



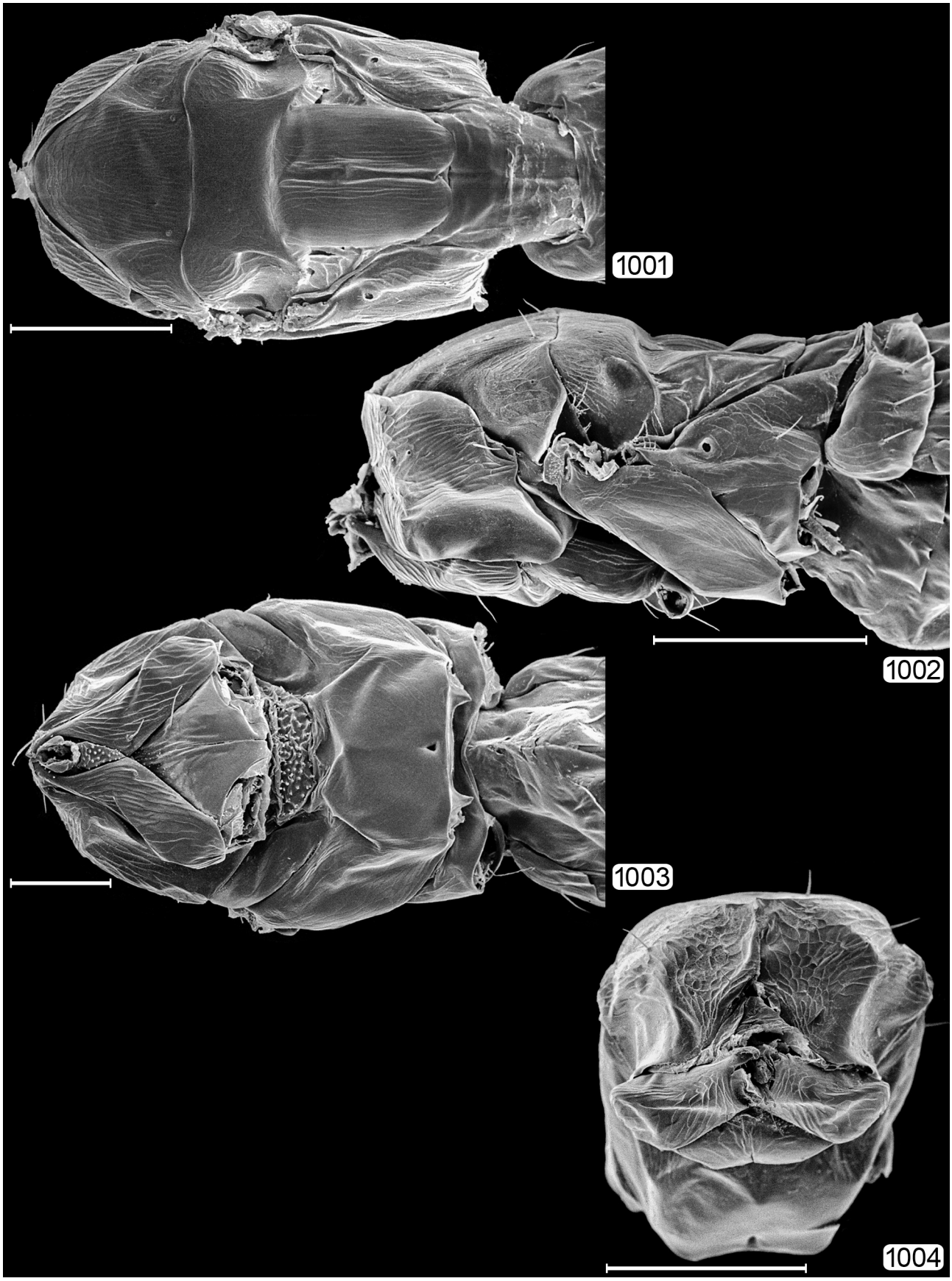
FIGURES 989, 990. *Stethynium triclavatum* Enock, metasoma. 989a, dorsal; 989b, genitalia seen through gaster; 990a, lateral; 990b, genitalia. Scale bars=100 μm.



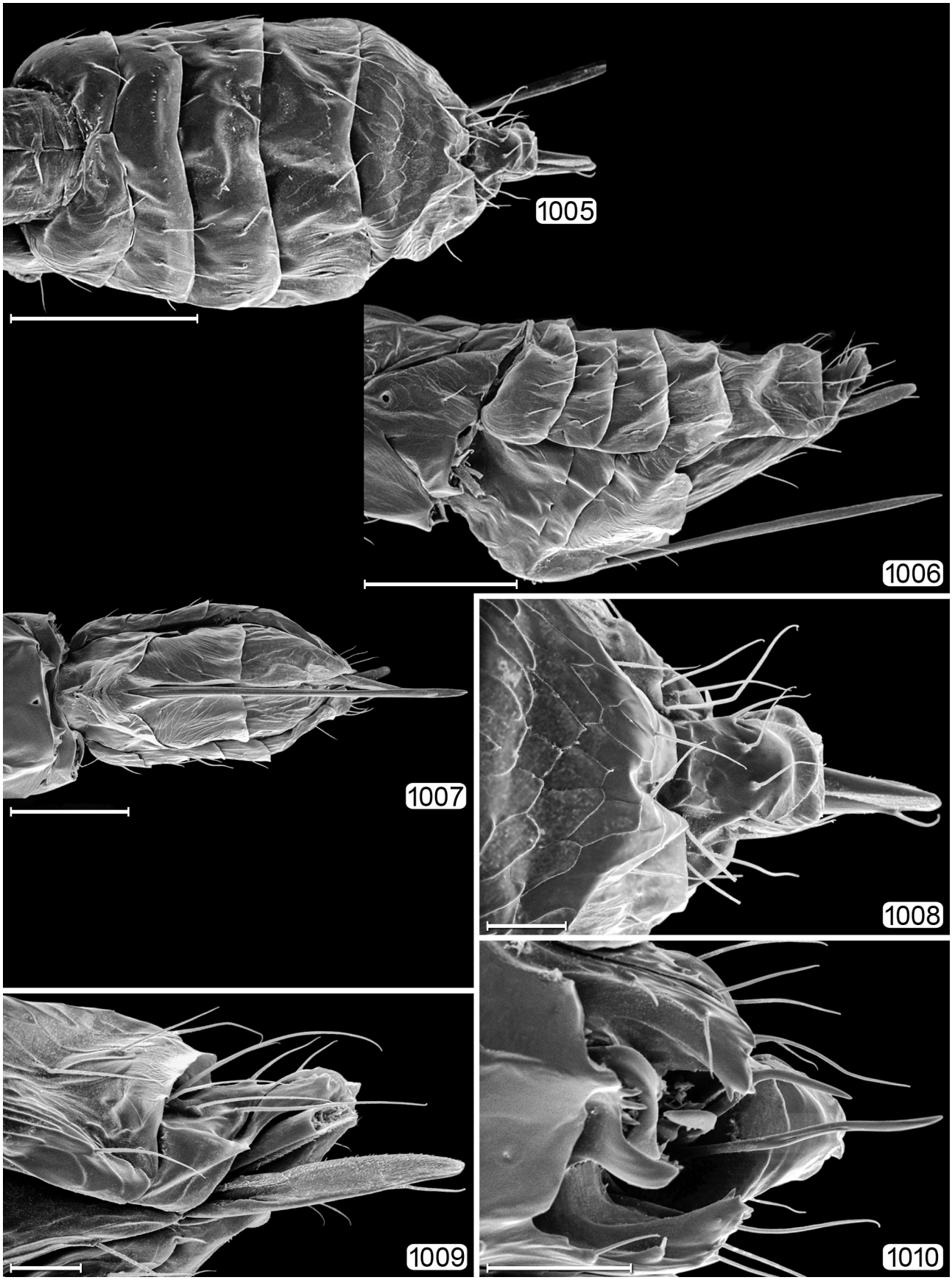
FIGURES 991–994. *Stethynium triclavatum* Enock, male. 991, head, anterior; 992, head, posterior; 993a, metasoma, dorsal; 993b, genitalia seen through gaster; 994, antenna. Scale bars: 991–993=100 μm; 994=200 μm.



FIGURES 995–1000. *Stethynium triclavatum* Enock, head. 995, anterior; 996, posterior; 997, lateral; 998, dorsal; 999, ventral; 1000, mouthparts. Scale bars=50 μm.



FIGURES 1001–1004. *Stethynium triclavatum* Enock, mesosoma. 1001, dorsal; 1002, lateral; 1003, ventral; 1004, anterior. Scale bars=100 μm.



FIGURES 1005–1010. *Stethynium triclavatum* Enock, metasoma. 1005, dorsal; 1006, lateral; 1007, ventral; 1008, apex of gaster, dorsal; 1009, apex of gaster, lateral; 1010, male, apex of gaster, ventral. Scale bars: 1005–1007=100 μm; 1008–1010=20 μm.

Acknowledgements

We thank K. Bolte (CNC, retired) who prepared most of the scanning electron micrographs. P. Janšta (Charles University, Prague, Czech Republic) is thanked for searching for the type of a Maláč species. H. Grillo Ravelo (Central University of Las Villas, Santa Clara, Cuba) kindly provided the rearing record of *Dicopus* from Psocoptera, the first reported for this genus.

References

Abdullah, K., Ellington, J.J. & Ysamin, S. (2009) Storage studies of *Anaphes iole* Girault (Hymenoptera: Mymaridae) at different developmental stages, temperatures and light-dark regimes. *Agriculturae Conspectus Scientificus*, 74 (4), 319–326.

Accinelli, F., Ferrari, R. & Burgio, G. (2004) Lotta a basso impatto ambientale ai miridi fitofagi. *Informatore Agrario*, 60 (29), 57–60.

Ackerman, A.J. (1919) Two leafhoppers injurious to nursery apple stock. *United States Department of Agriculture*, *Bulletin* 805, 1–35.
https://doi.org/10.5962/bhl.title.64407

Ackerman, A.J. & Isely, D. (1931) The leaf hoppers attacking apple in the Ozarks. *United States Department of Agriculture, Technical Bulletin*, 263, 1–40.

Aeschlimann, J.P. (1975) A method for the extraction of *Sitona* [Col.: Curculionidae] eggs from soil and occurrence of a mymarid [Hym.: Chalcidoidea] in the Mediterranean region. *Entomophaga*, 20 (4), 403–408.
https://doi.org/10.1007/BF02371595

Aeschlimann, J.P. (1977) Notes on *Patasson lameerei* [Hym.: Mymaridae], an egg parasitoid of *Sitona* spp. [Col.: Curculionidae] in the Mediterranean region. *Entomophaga*, 22 (1), 111–114.
https://doi.org/10.1007/BF02372996

Aeschlimann, J.P. (1979) Sampling methods and construction of life tables for *Sitona humeralis* populations (Col., Curculionidae) in Mediterranean climatic areas. *Journal of Applied Ecology*, 16, 405–415.
https://doi.org/10.2307/2402518

Aeschlimann, J.P. (1980) The *Sitona* [Col.: Curculionidae] species occurring on *Medicago* and their natural enemies in the Mediterranean region. *Entomophaga*, 25, 139–153.
https://doi.org/10.1007/BF02374316

Aeschlimann, J.P. (1986) Distribution and effectiveness of *Anaphes diana* [=*Patasson lameerei*] [Hym.: Mymaridae], a parasitoid of *Sitona* spp. eggs [Col.: Curculionidae] in the Mediterranean region. *Entomophaga*, 31 (2), 163–172.
https://doi.org/10.1007/BF02372367

Aeschlimann, J.P. (1990) Simultaneous occurrence of thelytoky and bisexuality in hymenopteran species, and its implications for the biological control of pests. *Entomophaga*, 35 (1), 3–5.
https://doi.org/10.1007/BF02374295

Aeschlimann, J.P., Hopkins, D.C., Cullen, J.M. & Cavanaugh, J.A. (1989) Importation and release of *Anaphes diana* Girault (Hym., Mymaridae), a parasitoid of *Sitona discoideus* Gyllenhal (Col., Curculionidae) eggs in Australia. *Journal of Applied Entomology*, 107, 418–423.
https://doi.org/10.1111/j.1439-0418.1989.tb00277.x

Agassiz, L. (1848) *Nomenclatoris Zoologici Index Universalis, continens nomina systematica classium, ordinum, familiarum et generum animalium omnium, tam viventum quam fossilium, secundum ordinem alphabeticum unicum disposita, adjectis homonymiis plantarum*. Jent et Gassmann, Soloduri, 1135 pp.
https://doi.org/10.5962/bhl.title.1819

Aguiar, A.M.F., Achterberg, K. van, Askew, R.R., Zwakhals, K., Santos, A.M.C. & Borges, A.V. (2010) Hymenoptera (outras famílias). *In*: Borges, P.A.V. & Vieira, V. (Coords.), Capítulo 11. Lista dos Arthópodes (Arthropoda). *In*: Borges, P.A.V., Cunha, R., Gabriel, R., Martins, A.M.F., Silva, L. & Vieira, V. (Eds.), *A list of the terrestrial fauna* (*Mollusca and Arthropoda*) *and flora* (*Bryophyta, Pteridophyta and Spermatophyta*) *from the Azores*. Direcção Regional de Ambiente and Universidade dos Açores, Horta, Angra do Heroísmo and Ponta Delgada, pp. 189– 246.

Ahlberg, O. (1925) Zikaden-Parasiten unter den Strepsipteren und Hymenopteren. *Meddelanden från Centralanstalten for Försöksväsendet på Jordbruksområdet*, No. 287 (Entomologi No. 46), 79–86.

Ahmed, K.S. (1996) Role of *Anaphes fuscipennis* Hal. (Hymenoptera: Mymaridae) as an egg parasitoid of *Sitona crinita* (Hbst.) (Coleoptera: Curculionidae) in Saudi Arabia with special reference to its biology. *Bulletin of the Entomological Society of Egypt* (*A.R.E.*), 74, 61–67.

Alayo, P. (1973 [1970]) *Catálogo de los Himenópteros de Cuba*. Instituto Cubano del Libro, La Habana, 218 pp.

Alayo, P. & Hernández, L.R. (1978) *Introducción al estudio de los himenópteros de Cuba*. Superfamilia Chalcidoidea. Dirección de Publicaciones de la Academia de Ciencias de Cuba, La Habana, 105 pp.

Alden, C.H. (1930) Peach insects and diseases and how to control them. *Georgia State Board of Entomology, Bulletin*, 71, 1–31.

Al-Ghamdi, K.M., Stewart, R.K. & Boivin, G. (1993) Note on overwintering of *Polynema pratensiphagum* (Walley) (Hymenoptera: Mymaridae) in southwestern Quebec. *Canadian Entomologist*, 125, 407–408.
https://doi.org/10.4039/Ent125407-2

Al-Ghamdi, K.M. & Stewart, R.K. (1995) Synchrony between populations of the tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois) (Hemiptera: Miridae), and its egg parasitoids in southwestern Quebec. *Canadian Entomologist*, 127 (4), 457–472.
https://doi.org/10.4039/Ent127457-4

Alma, A., Arnò, C. & Vidano, C. (1988) Particularities on *Polynema striaticorne* as egg parasite of *Stictocephala bisonia* (Rhynchota Auchenorrhyncha). *In*: Vidano, C & Arzone, A. (Eds.), *Proceedings of the 6th Auchenorrhyncha Meeting. Turin, Italy, 7–11 September 1987, CNR–IPRA*, pp. 597–603

Alyokhin, A.V., Yang, P. & Messing, R.H. (2001) Distribution and parasitism of *Sophonia rufofascia* (Homoptera: Cicadellidae) eggs in Hawaii. *Annals of the Entomological Society of America*, 94 (5), 664–669.
https://doi.org/10.1603/0013-8746(2001)094[0664:DAPOSR]2.0.CO;2

Al-Wahaibi, A.K. & Walker, G.P. (2000a) Oviposition behaviour of *Anagrus nigriventris*, an egg parasitoid of beet leafhopper, *Circulifer tenellus*. *BioControl*, 45 (2), 139–153.

Al-Wahaibi, A.K. & Walker, G.P. (2000b) Searching and oviposition behavior of a mymarid egg parasitoid, *Anagrus nigriventris*, on five host plant species of its leafhopper host, *Circulifer tenellus*. *Entomologia Experimentalis et Applicata*, 96 (1), 9–25.
https://doi.org/10.1046/j.1570-7458.2000.00674.x

Amer, F.S.K., Zeya, S.B. & Jamali, M.M. (2017) A new species of *Lymaenon* Walker (Hymenoptera: Mymaridae: Gonatocerini) from India with the country checklist and new records. *Oriental Insects*, 51 (4), 353–369.
https://doi.org/10.1080/00305316.2017.1313180

Anderson, R.C. & Paschke, J.D. (1968) The biology and ecology of *Anaphes flavipes* (Hymenoptera: Mymaridae), an exotic egg parasite of the cereal leaf beetle. *Entomological Society of America*, 61 (1), 1–5.
https://doi.org/10.1093/aesa/61.1.1

Anis, S.B. & Rehmat, T. (2013) An updated checklist of fairyflies (Hymenoptera–Chalcidoidea–Mymaridae occurring in India. *Colemania*, 36, 1–12.

Annecke, D.P. (1961a) The genus *Mymar* Curtis (Hymenoptera, Mymaridae). *South African Journal of Agricultural Science*, 4, 543–552.

Annecke, D.P. (1961b) Two new genera of Myridae [*sic*] from South Africa (Chalcidoidea, Hymenoptera). *Koedoe*, 4, 68–77.
https://doi.org/10.4102/koedoe.v4i1.829

Annecke, D.P. & Doutt, R.L. (1961c) The genera of the Mymaridae. Hymenoptera: Chalcidoidea. *Republic of South Africa. Department of Agricultural Technical Services. Entomology Memoirs*, 5, 1–71.

Anonymous (1970) Annual Report. *Fiscal Year 1968–1969 of the Division of Plant Industry*. Department of Agriculture, State of Hawaii, Honolulu, 43 pp.

Antolin, M.F. & Strong, D.R. (1987) Long-distance dispersal by a parasitoid (*Anagrus delicatus*, Mymaridae) and its host. *Oecologia, Berlin*, 73, 288–292.
https://doi.org/10.1007/BF00377520

Aquino, D.A. & Triapitsyn, S.V. (2014) New World *Stephanocampta* (Hymenoptera: Mymaridae)—descriptions of a new species from Argentina and of the male of *S. masoni*. *Zootaxa*, 3866 (3), 446–450.
https://doi.org/10.11646/zootaxa.3866.3.8

Aquino, D.A., Triapitsyn, S.V. & Huber, J.T. (2016) Nomenclatural changes in Mymaridae (Hymenoptera: Chalcidoidea). *Zootaxa*, 4205 (6), 581–592.
https://doi.org/10.11646/zootaxa.4205.6.6

Armstrong, T. (1936) Two parasites of the white apple leafhopper (*Typhlocyba pomaria* McA.). *Annual Report of the Entomological Society of Ontario*, 66, 16–31.

Arnaldos, M.I., García, M.D., Romera, E. & Baquero, E. (2003) New data on the Mymaridae fauna in the Iberian Peninsula (Hymenoptera, Chalcidoidea) from a carrion community. *Boletin de la Asociacion Espanola de Entomologia*, 27 (1/4), 225–228.

Arnaldos, M.I., Romera, E., Presa, J.J., Luna, A. & García, M.D. (2004) Studies on seasonal arthropod succession on carrion in the southeastern Iberian Peninsula. *International Journal of Legal Medicine*, 118, 197–205.
https://doi.org/10.1007/s00414-004-0446-3

Arnett, R.H.(1985) *American insects. A handbook of the insects of America north or Mexico*. Van Nostrand Reinhold, New York, New York, 850 pp.

Arzone, A., Alma, A. & Arnò, C. (1988 [1987]) Parasitoids and predators *of Rhytidodus decimusquartus* (Rhynchota Auchenorrhyncha). *In*: Vidano, C. & Arzone, A. (Eds.), *Proceedings of the Sixth Auchenorrhyncha Meeting, Turin, Italy*, *7–11 September 1987, CNR–IPRA*, pp. 575–580.

Ashmead, W.H. (1879) Injurious and beneficial insects found on the orange trees of Florida. *Canadian Entomologist*, 11, 159–160.
https://doi.org/10.4039/Ent11159-8

Ashmead, W.H. (1887) Studies of the North American Proctotrupidae, with descriptions of new species from Florida. *Canadian*

Entomologist, 19, 192–198.
https://doi.org/10.4039/Ent19192-10
Ashmead, W.H. (1900a) Some hymenopterous parasites from dragon-fly eggs. *Entomological News*, 11, 615–617.
Ashmead, W.H. (1900b) Order Hymenoptera. *In*: Smith, J.B., Insects of New Jersey. A list of the species occurring in New Jersey, with notes on those of economic importance. *Supplement to the Twenty-seventh Annual Report of the State Board of Agriculture,* 1899, pp. 501–613.
Ashmead, W.H. (1904) Classification of the superfamily Chalcidoidea. *Memoirs of the Carnegie Museum*, 1 (4), i–xi + 225–551, pls. 31–39.
Askew, R.R. & Mifsud, D. (2016) A preliminary check-list of the Chalcidoidea (Hymenoptera of the Maltese Islands. *Bulletin of the Entomological Society of Malta*, 8, 47–72.
Baaren van, J. & Boivin, G. (1998a) Genotypic and kin discrimination in a solitary hymenopterous parasitoid: implications for speciation. *Evolutionary Ecology*, 12 (5), 523–534.
https://doi.org/10.1023/A:1006500624683
Baaren van, J. & Boivin, G. (1998b) Learning affects host discrimination behavior in a parasitoid wasp. *Behavioral Ecology and Sociobiolo*gy, 42 (1), 9–16.
https://doi.org/10.1007/s002650050406
Baaren van, J., Boivin, G., Le Lannic, J. & Nénon, J.-P. (1997) The male and female first instar larvae of *Anaphes victus* and *A. listronoti* (Hymenoptera, Mymaridae). *Zoomorphology*, 117 (3), 189–197.
https://doi.org/10.1007/s004350050044
Baaren van, J., Boivin, G., Le Lannic, J. & Nénon, J.-P. (1999) Comparison of antennal sensilla of *Anaphes victus* and *A. listronoti* (Hymenoptera, Mymaridae), egg parasitoids of Curculionidae. *Zoomorphology*, 119 (1), 1–8.
https://doi.org/10.1007/s004350050076
Baaren van, J., Boivin, G. & Nénon, J.-P. (1994) Intra- and interspecific host discrimination in two closely related egg parasitoids. *Oecologia, Berlin*, 100 (3), 325–330.
https://doi.org/10.1007/BF00316961
Baaren van, J., Boivin, G. & Nénon, J.-P. (1995a) Intraspecific hyperparasitism in a primary hymenopteran parasitoid. *Behavioral Ecology and Sociobiology*, 36, 237–242.
https://doi.org/10.1007/s002650050145
Baaren van, J., Boivin, G. & Outreman, Y. (2005a) Patch exploitation strategy by an egg parasitoid in constant or variable environment. *Ecological Entomology*, 30 (5), 502–509.
https://doi.org/10.1111/j.0307-6946.2005.00718.x
Baaren van, J., Landry, B.L. and Boivin, G. (1999b) Sex allocation and larval competition in a superparasitizing solitary egg parasitoid: competing strategies for an optimal sex ratio. *Functional Ecology*, 13, 66–71.
https://doi.org/10.1046/j.1365-2435.1999.00283.x
Baaren van, Nénon, J.-P. & Boivin, G. (1995b) Comparison of oviposition behavior of a solitary and a gregarious parasitoid (Hymenoptera: Mymaridae). *Journal of Insect Behavior*, 8, 671–686.
https://doi.org/10.1007/BF01997237
Baaren van, J., Outreman, Y. & Boivin, G. (2005b) Effect of low temperature exposure on oviposition behaviour and patch exploitation strategy in parasitic wasps. *Animal Behavior*, 70 (1), 153–163.
https://doi.org/10.1016/j.anbehav.2004.10.016
Baccetti, B. (1957) Studi sui curculionidi italiani. I. Richerche morphologiche, etologiche ed istologiche su *Hypera trilineata* Marsham, *Rediai*, Series 2, 42, 62–121, 2 pls.
Baccetti, B. (1958) Studi sui curculionidi italiani. II. *Donus crinitus* Boheman, *Redia*, Serie 2, 43, 145–205.
Bai, H-F., Jin, X.-X. & Li, C.-D. (2015) A taxonomic study of *Ooctonus* (Hymenoptera, Mymaridae) from Heilongjiang, China. *ZooKeys*, 479, 25–36.
https://doi.org/10.3897/zookeys.479.9041
Bakkendorf, O. (1926) [1925] Recherches sur la biologie de l=*Anagrus incarnatus* Haliday. Microhyménoptère parasite (accidentel ?) des oeufs de divers Agrionides. *Annales de Biologie Lacustre*, 14, 249–270.
Bakkendorf, O. (1934) Biological investigations on some Danish hymenopterous egg-parasites, especially in homopterous and heteropterous eggs, with taxonomic remarks and descriptions of new species. *Entomologiske Meddelelser*, 19, 1–134.
Bakkendorf, O. (1962) Description of a new subterranean genus of Mymaridae (Hymen.). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 34 (4), 372–376.
Bakkendorf, O. (1964) Notes on *Patasson* Walk., *Anaphes* Hal. and *Cleruchus detritus* n. sp. (Hym., Mymaridae). *Entomophaga*, 9 (1), 3–7.
https://doi.org/10.1007/BF02375731
Bakkendorf, O. (1970) Description of *Anaphes lemae* n. sp. and notes on *Patasson declinata* Soyka [Hym., Mymaridae]. *Entomophaga*, 15 (2), 153–155.
https://doi.org/10.1007/BF02371868
Balduf, W.V. (1928) Observations on the buffalo tree hopper *Ceresa bubalus* Fabr. (Membracidae, Homoptera) and the bionomics of an egg parasite, *Polynema striaticorne* Girault (Mymaridae, Hymenoptera). *Annals of the Entomological Society of America*, 21, 419–435.

https://doi.org/10.1093/aesa/21.3.419
Baldwin, C.H. (1916) Insects of the year, 1914–1915. *Indiana State Entomologist, Annual Report*, 8, 12–29.
Balsdon, J.A., Braman, S.K. & Espelie, K.E. (1996) Biology and ecology of *Anagrus takeyanus* (Hymenoptera: Mymaridae), an egg parasitoid of the azalea lace bug (Heteroptera: Tingidae). *Environmental Entomology*, 25, 383–389.
https://doi.org/10.1093/ee/25.2.383
Balsdon, J.A., Braman, S.K., Pendley, A.F. & Espelie, K.E. (1993) Potential for integration of chemical and natural enemy suppression of azalea lace bug (Heteroptera: Tingidae). *Journal of Environmental Horticulture*, 11, 153–156.
Baquero, E. & Jordana, R. (1999) Species of *Anagrus* Haliday, 1833 (Hymenoptera, Chalcidoidea, Mymaridae) in Navarra (Spain). *Miscellánia Zoológica*, 22 (2), 39–50.
Baquero, E. & Jordana, R. (2002) Contribution to the knowledge the family Mymaridae Haliday (Hymenoptera: Chalcidoidea) in Navarra, North of Iberian Peninsula. *Boletín de la Asociación Española de Entomología*, 26 (3–4), 75–91.
Barnes, B.M. (2014) First record of a fairyfly, *Cleruchus depressus* (Annecke) (Hymenoptera: Mymaridae), parasitizing eggs of banded fruit weevil, *Phlyctinus callosus* Schönherr (Coleoptera: Curculionidae), in South Africa. *African Entomology*, 22 (4), 900–905.
https://doi.org/10.4001/003.022.0404
Bayegan, Z.A., Lotfalizadeh, H., Zargaran, M.R. & Pooraiiouby, R. (2014) New record of a genus and species of Mymaridae (Hymenoptera: Chalcidoidea) from Iran. *Turkish Journal of Zoology*, 38, 655–656.
https://doi.org/10.3906/zoo-1312-18
Bayoun, I.M. & Walker, G.P. (2003) Evaluation of egg parasitoids attacking the beat leafhopper, *Circulifer tenellus*. *In*: Van Driesche, R.G. (Ed.), 1st International Symposium on Biological Control of Arthropods. Honolulu, Hawaii, USA, January 14–18, 2002. *United States Department of Agriculture, Forest Service*, FHTET-03-05, pp. 176.
Bayoun, I.M., Walker, G.P. & Triapitsyn S.V. (2008) Parasitization of beet leafhopper eggs, *Circulifer tenellus*, in California. *Journal of Applied Entomology*, 132 (5), 412–424.
https://doi.org/10.1111/j.1439-0418.2008.01271.x
Bayoun, I.M., Walker, G.P., Zareh, N., Kenny, G. & Wilder, K. (2000) *In*: Hoddle, M.S. (Ed.), *Sampling egg parasites of beet leafhopper in Central and Southern California. California Conference on Biological Control II, July 11–12, 2000*, The Historic Mission Inn, Riverside, California, pp. 105–108.
Beach, J.P., Williams, L. III, Hendrix, D.L. & Price, L.D. (2003) Different food sources affect the gustatory response of *Anaphes iole*, an egg parasitoid of *Lygus* spp. *Journal of Chemical Ecology*, 29 (5), 1203–1222.
https://doi.org/10.1023/A:1023837808291
Beardsley, J.W. (1964) [Note on] *Patasson calendrae* (Gahan). *Proceedings of the Hawaiian Entomological Society*, 18, 340.
Beardsley, J.W. (1999) Hymenoptera from Midway atoll. *Bishop Museum Occasional Papers*, 58, 37–50.
Beardsley, J.W. (2000) The introduction and establishment of *Anaphes* (*Patasson*) *calendrae* (Gahan) in Hawaii (Hymenoptera: Mymaridae). *Proceedings of the Hawaiian Entomological Society*, 34, 209–211.
Beardsley, J.W. & Huber, J.T. (2000) Key to genera of Mymaridae in the Hawaiian Islands, with notes on some of the species (Hymenoptera: Chalcidoidea). *Proceedings of the Hawaiian Entomological Society*, 34, 1–22.
Beers, E.H. & Elsner, E.A. (1990a) Phenology of white apple leafhopper eggs and a mymarid egg parasitoid in central Washington, 1987–1988. *Melanderia*, 46, 48–56.
Beers, E.H. & Elsner, E.A. (1990b) Yellow sticky board trapping of *Typhlocyba pomaria Edwardsiana rosae*, and *Anagrus* sp. *Melanderia*, 46, 57–64.
Benedict, J.H. & Cothran, W.R. (1978) Parasitism of the common damsel bug, *Nabis americoferus*, in central California alfalfa. *Southwestern Entomologist*, 3 (1), 37–42.
Bennett, A.M.R. (2008a) Chapter 21. Aquatic Hymenoptera. *In*: Merritt, R.W., Cummins, K.W. & Berg, M.B. (Eds.), *An introduction to the aquatic insects of North America*. Kendall/Hunt, Dubuque, Iowa, pp. 673–686.
Bennett, A.M.R. (2008b) Global diversity of hymenopterans (Hymenoptera; Insecta) in freshwater. *Hydrobiologia*, 595, pp. 529–534.
https://doi.org/10.1007/s10750-007-9036-y
Bennett, A.M.R. (2019) Chapter 22. Aquatic Hymenoptera. *In*: Merritt, R.W., Cummins, K.W. & Berg, M.A. (Eds.), *An Introduction to the Aquatic Insects of North America. 5th Edition*. Kendall Hunt Publishing, Dubuque, Iowa, pp. 921–936.
Benrey, B. & Lamp, W.O. (1993) Biological control in the management of planthopper populations. *In*: Denno, R.F. & Perfect, T.J. (Eds.), *Planthoppers: their ecology and management*. Springer, Boston, MA, pp. 519–551.
https://doi.org/10.1007/978-1-4615-2395-6_15
Bensen, T.A. & Rao, S. (2003) The effects of habitat diversification on a generalist insect herbivore population and implications for biological control by a parasitoid wasp. *In*: Van Driesche, R.G. (Ed.), 1st International Symposium on Biological Control of Arthropods. Honolulu, Hawaii, USA, 14–18 January 2002. *United States Department of Agriculture, Forest Service*, FHTET–0305, pp. 435
Bernal, J., Castillo, A.F. & Rakitov, R. (2007) Importation of parasitoids of *Homalodisca* and other Proconiini genera from northwestern Mexico for biological control of the glassy-winged sharpshooter. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 67–69.
Betten, H. (1951) *Caraphractus cinctus* Hal., ein Wasserhymenopter (Mymaridae). *Bonner Zoologische Beiträge*, 2, 135–139.

Beyer, A.H. (1921) Garden flea-hopper in alfalfa and its control. *United States Department of Agriculture, Departmental Bulletin*, 964, 1–26.
https://doi.org/10.5962/bhl.title.108799
Bianchi, F.A. (1964) [Note on] *Patasson calendrae* (Gahan). *Proceedings of the Hawaiian Entomological Society*, 18, 346.
Bilewicz-Pawinska, T. (1983) *Anaphes fuscipennis* Haliday (Hymenoptera, Mymaridae), an egg parasite of *Lygus rugulipennis* Poppius (*Heteroptera,* Miridae) previously unrecorded in Poland. *Polskie Pismo Entomologiczne*, 53 (3), 417–423.
Bin, F. (1994) Biological control with egg parasitoids other than *Trichogramma. In*: Wajnberg, E. & Hassan, S. (Eds.), *Biological Control with egg Parasitoids*. CAB International, Wallingford, pp. 145–154.
Blackman, M.W. (1915) Observations on the life history and habits of *Pityogenes hopkinsi* Swaine. *The New York State College of Forestry at Syracuse University, Technical Publication*, No. 2, 16, 8–66.
Blanchard, E. (1840) *Histoire naturelle des Insectes: Orthoptères, Névroptères, Hémiptères, Hyménoptères, Lépidoptères et Diptères. Tome troisième*. P. Duménil, Paris, 67 pp.
https://doi.org/10.5962/bhl.title.59226
Bloem, K.A. & Yeargan, K.V. (1982a) Effects of extreme temperatures on *Patasson lameerei* survival and oviposition. *Journal of the Kansas Entomological Society*, 55 (1), 37–45.
Bloem, K.A. & Yeargan, K.V. (1982b) Host-finding behavior of *Patasson lameerei* [Hym., Chalcidoidea], a parasitoid of *Sitona* eggs [Col., Curculionidae]. *Entomophaga*, 27 (1), 93–97.
https://doi.org/10.1007/BF02371941
Boivin, G. (1986) *Anaphes sordidatus* (Girault) (Hymenoptera: Mymaridae), an egg parasite of the carrot weevil, *Listronotus oregonensis* (Le Conte). *Canadian Entomologist*, 118 (4), 393–394.
https://doi.org/10.4039/Ent118393-4
Boivin, G. (1988) Laboratory rearing of *Anaphes sordidatus* [Hym.: Mymaridae] on carrot weevil eggs [Col.: Curculionidae]. *Entomophaga*, 33 (2), 245–248.
https://doi.org/10.1007/BF02372660
Boivin, G. (1991) Density dependence of *Anaphes sordidatus* (Hymenoptera: Mymaridae) parasitism on eggs of *Listronotus oregonensis* (Coleoptera: Curculionidae). *Institut National de la Recherches Agronomiques, Les Colloques*, 56, 21–24.
Boivin, G. (1993) Density dependence of *Anaphes sordidatus* (Hymenoptera: Mymaridae) parasitism on eggs of *Listronotus oregonensis* (Coleoptera: Curculionidae). *Oecologia*, *Berlin*, 93 (1), 73–79.
https://doi.org/10.1007/BF00321194
Boivin, G. (1994) Overwintering strategies of egg parasitoids. *In*: Wajnberg, E. & Hassan, S. (Eds.), *Biological Control with egg Parasitoids*. CAB International, Wallingford, pp. 219–244.
Boivin, G. (1995) Sex allocation strategy in *Anaphes victus* (Hymenoptera: Mymaridae). *Institut National de la Recherches Agronomiques, Les Colloques*, 73, 65–69.
Boivin, G. (1999) Integrated management for carrot weevil. *Integrated Pest Management Reviews*, 4 (1), 21–37.
https://doi.org/10.1023/A:1009624714172
Boivin, G. (2010a) Phenotypic plasticity and fitness in egg parasitoids. *Neotropical Entomology*, 39 (4), 457–463.
https://doi.org/10.1590/S1519-566X2010000400001
Boivin, G. (2010b) Reproduction and immature development of egg parasitoids. *In*: Cônsoli, F.L., Parra, J.R.P. & Zucchi, R.A. (Eds.), *Egg parasitoids in agroecosystems with emphasis on Trichogramma*. *Progress in Biological Control* 9, Springer, Dordrecht, pp. 1–23.
https://doi.org/10.1007/978-1-4020-9110-0_1
Boivin, G. & Baaren van, J. (2000) The role of larval aggression and mobility in the transition between solitary and gregarious development in parasitoid wasps. *Ecology Letters*, 3 (6), 469–474.
https://doi.org/10.1046/j.1461-0248.2000.00174.x
Boivin, G., Coté, S.M. & Anciso, J.R. (1990) Egg parasitoid of a carrot weevil, *Listronotus texanus* (Stockton), in the lower Rio Grande Valley, Texas. *Journal of the Rio Grande Valley Horticultural Society*, 43, 91–92.
Boivin, G. & Ellers, J. (2016) Replacing qualitative life-history traits by quantitative indices in parasitoid evolutionary ecology. *Entomologia Experimentalis et Applicata*, 159, 163–171.
https://doi.org/10.1111/eea.12425
Boivin, G., Fauvergue, X. & Wajnberg, E. (2004) Optimal patch residence time in egg parasitoids, innate versus learned estimate of patch quality. *Oecologia*, 138 (4), 640–647.
https://doi.org/10.1007/s00442-003-1469-z
Boivin, G. & Martel, V. (2012) Size-induced reproductive constraints in an egg parasitoid. *Journal of Insect Physiology*, 58 (12), 1694–1700.
https://doi.org/10.1016/j.jinsphys.2012.10.014
Boivin, G. & Nénon, J.-P. (2003) Variability and inheritance of the chorionic tubercles on eggs of *Listronotus oregonensis* (Coleoptera, Curculionidae). *Canadian Entomologist*, 135 (6), 765–774.
https://doi.org/10.4039/n03-008
Boivin, G., Picard, C. & Auclair, J.L. (1993) Preimaginal development of *Anaphes* n. sp. (Hymenoptera: Mymaridae), an egg parasitoid of the carrot weevil (Coleoptera: Curculionidae). *Biological Control*, 3 (3), 176–181.
https://doi.org/10.1006/bcon.1993.1025

Böll, S. & Herrmann, J.V. (2004) A long-term study on the population dynamics of the grape leafhopper (*Empoasca vitis*) and antagonistic mymarid species. *Journal of Pest Science*, 77 (1), 33–42.
https://doi.org/10.1007/s10340-003-0025-2

Böll, S. & Schwappach, P. (2003) Species spectrum, dominance relationships and population dynamics of egg parasitoids (Mymaridae) of the grape leafhopper (*Empoasca vitis* Goethe) in the Franconian wine region. *IOBC/wprs Bulletin*, 26 (8), 173–180.

Böll, S., Schwappach, P. & Herrmann, J.V. (2006) Planting dog roses – an efficient method to promote mymarid populations in vineyards? *IOBC/wprs Bulletin*, 29 (11), 175–181.

Böll, S., Schwappach, P. & Herrmann, J.V. (2007) Promotion of antagonistic mymarids of the grape leafhopper by planting dog roses along vineyards. *In*: Alford, D.V., Feldmann, F., Hasler, J. & von Tiedemann, A. (Eds.), *Best practice in disease, pest and weed management: the state of the art. Proceedings of an International Symposium Held at Humboldt University, Berlin, Germany*, *10–12 May 2007*, pp. 14–15.

Bolte, K.B. (1996) Techniques for obtaining scanning electron micrographs of minute arthropods. *Proceedings of the Entomological Society of Ontario*, 127, 67–87.

Boţoc, M. (1963) Noi contribuţii la studiul calcidoidelor din R.P.R. (VIII). *Studia Universitatis Babeş-Bolyai, Series Biologia*, 1, 95–109. [1963]

Boţoc, M. (1964) Noi contribuţii la studiul calcidoidelor din R.P.R. (X). *Studia Universitatis Babeş-Bolyai, Series Biologia*, 9 (1), 79–85.

Bouček, Z. (1977) A faunistic review of the Yugoslavian Chalcidoidea (parasitic Hymenoptera). *Acta Entomologica Jugoslavica*, 13 (Supplement), 1–145.

Bouček, Z. & Graham, M.W.R. de V. (1978) Chalcidoidea. *In*: Fitton, M.G., Graham, M.W.R. de V., Bouček, Z.R.J., Fergusson, N.D.M., Huddleston, T., Quinlan, J. & Richards, O.W. A check list of British Insects. 2nd Edition. Completely Revised. Part 4. Hymenoptera. *Handbooks for the Identification of British Insects*, 11 (4), pp. 67–110.

Bournier, A. (1976) Grape insects. *Annual Review of Entomology*, 22, 355–376.
https://doi.org/10.1146/annurev.en.22.010177.002035

Bouskila, A., Robertson, I.C., Robinson, M.E., Roitberg, B.D., Tenhumberg, B., Tyre, A.J. & vanRanden, E. (1995) Submaximal oviposition rates in a mymarid parasitoid: choosiness should not be ignored. *Ecology*, 76 (6), 1990–1993.
https://doi.org/10.2307/1940730

Bowdish, T.I. & Stiling, P. (1998) The influence of salt and nitrogen on herbivore abundance: direct and indirect effects. *Oecologi*a, *Berlin*, 113 (3), 400–405.
https://doi.org/10.1007/s004420050392

Boyd, E.A. (2007) *Retroactive host specificity testing, biology, and ecology of sharpshooters* (*Hemiptera: Cicadellidae*) *and egg-parasitoids* (*Hymenoptera:* Mymaridae) *in California*. Ph. D. dissertation, University of California, Riverside, 178 pp.

Boyd, E.A., Hoddle, M.S. & Triapitsyn, S.V. (2004) Oviposition preferences of the blue-green sharpshooter and its first reported egg-parasitoids in southern California on wild grape. *In:* Hoddle, M.S. (Ed.), *California Conference on Biological Control, Berkeley, California*, 13–15 July 2004, pp. 95–99.

Boyd, E.A. & Hoddle M.S. (2006) Oviposition and flight activity of the blue-green sharpshooter (Hemiptera: Cicadellidae) on southern California wild grape and first report of associated egg parasitoids. *Annals of the Entomological Society of America*, 99 (6), 1154–1164.
https://doi.org/10.1603/0013-8746(2006)99[1154:OAFAOT]2.0.CO;2

Boyd, E.A. & Hoddle, M.S. (2007) Host specificity testing of *Gonatocerus* spp. egg-parasitoids used in a classical biological control program against *Homalodisca vitripennis*: a retrospective analysis for non-target impacts in southern California. *Biological Control*, 43 (1), 56–70.
https://doi.org/10.1016/j.biocontrol.2007.04.010

Boyd, E.A., Nay, J.E. & Hoddle, M.S. (2007) A new plastic soda bottle cage useful for standardizing biological studies of arthropods on plants. *Southwestern Entomologist*, 32 (3), 177–180.
https://doi.org/10.3958/0147-1724-32.3.177

Boyd, E.A., Triapitsyn, S.V. & Hoddle, M.S. (2008) Taxonomic notes on *Polynema eutettexi* (Hymenoptera: Mymaridae) and a similar species reared as an egg parasitoid of *Graphocephala atropunctata* (Signoret) (Hemiptera: Cicadellidae) in California. *Pan-Pacific Entomologist*, 84 (3), 194–199.

Boyd, E.A., Triapitsyn, S.V. & Hoddle, M.S. (2018) Parasitism of *Draeculacephala minerva* Ball, 1927 (Hemiptera: Cicadellidae) eggs by three species of Trichogrammatidae and Mymaridae (Hymenoptera) in California, U.S.A. *Pan-Pacific Entomologist*, 94 (3), 147–150.
https://doi.org/10.3956/2018-94.3.147

Braman, S.K. & Yeargan, K.V. (1990) Phenology and abundance of *Nabis americoferus*, *N. roseipennis*, and *N. rufusculus* (Hemiptera: Nabidae) and their parasitoids in alfalfa and soybean. *Journal of Economic Entomology*, 83 (3), 823–830.
https://doi.org/10.1093/jee/83.3.823

Brandhorst, C.T. (1943) A study of the relationship existing between certain insects and some native western Kansas forbes and weedy plants. *Transactions of the Kansas Academy of Sciences*, 46, 164–175.
https://doi.org/10.2307/3624946

Brèthes, J. (1922) Himenópteros y dípteros de varias procedencias. *Anales de la Sociedad Científica Argentina*, 93 (3–4), 119–146.
Brimley, C.S. (1942) *Supplement to Insects of North Carolina.* North Carolina Department of Agriculture, Division of Entomology, Raleigh, North Carolina, 39 pp.
Brittain, W.H. (1917) Notes of two species of tree-hoppers (Membracidae) ovipositing in the apple. *Proceedings of the Entomological Society of Nova Scotia for 1916*, 2, 34–39.
Brittain, W.H. (1918) Notes on the yellow leaf hopper of the birch. *Proceedings of the Entomological Society of Nova Scotia for 1917*, 3, 18–22.
Britton, W.E. (1920) Check-list of the insects of Connecticut. *State of Connecticut*. *State Geological and Natural History Survey, Bulletin*, 31, 1–397.
https://doi.org/10.5962/bhl.title.48679
Britton, W.E. (1938) Additions to the check-list of the insects of Connecticut (First supplement to Bulletin No. 31). *State of Connecticut. State Geological and Natural History Survey, Bulletin*, 60, 3–169.
Broadhead, E. & Cheke, R.A. (1975) Host spatial pattern, parasitoid interference and the modelling of the dynamics of *Alaptus fusculus* (Hym.: Mymaridae), a parasitoid of two *Mesopsocus* species (Psocoptera). *Journal of Animal Ecology*, 44 (3), 767–793.
https://doi.org/10.2307/3718
Brocher, R. (1910) Observations biologiques sur quelques diptères et hyménoptères dit "Aquatiques", *Annales de Biologie Lacustre*, 4, 171–186.
Brodeur, J. & Boivin, G. (2004) Functional ecology of immature parasitoids. *Annual Review of Entomology*, 49, 33–49.
https://doi.org/10.1146/annurev.ento.49.061703.153618
Brooks, F.E. (1910) Three snout beetles that attack apples: plum curculio, apple curculio, apple weevil. *West Virginia University Agricultural and Forestry Experiment Station, Bulletin*, 126, 103–124.
https://doi.org/10.33915/agnic.126
Brooks, F.E. (1911) Report of the work of the Experiment Station for the years 1909 and 1910. *West Virginia University Agricultural Experiment Station, Biennial Report* (*1909–1910*), 1911, 133–147. [Same paper as Brooks (1910) but under a different title]
Brooks, F.E. (1918) I. The grape curculio. *United States Department of Agriculture, Bureau of Entomology, Bulletin*, 730, 1–19.
Brunson, M.H. & Coles, L.W. (1968) The introduction, release, and recovery of parasites of the alfalfa weevil in eastern United States. *United States Department of Agriculture, Production Research Report*, 101, 1–12.
Bryan, D.E., Jackson, C.G. & Stoner, A. (1969) Rearing cotton insect parasites in the laboratory. *Production Research Report, Agricultural Research Service, United States Department of Agriculture*, 109, 1–13.
Bryan, M.D., Dysart, R.J. & Burger, T.L. (1993) Releases of introduced parasites of the alfalfa weevil in the United States, 1957–88. *United States Department of Agriculture, Animal and Plant Health Inspection Service, Miscellaneous Publication*, 1504, 1–203.
Burbutis, P.P., Bray, D.F. & Mason, A.H. (1967) Overwintering eggs of the alfalfa weevil in Delaware. *Journal of Economic Entomology*, 60, 1007–1010.
https://doi.org/10.1093/jee/60.4.1007
Burks, B.D. (1938) A study of chalcidoid wings (Hymenoptera). *Annals of the Entomological Society of America*, 31, 157–161.
https://doi.org/10.1093/aesa/31.2.157
Burks, B.D. (1958) Superfamily Chalcidoidea. *In*: Krombein, K.V. (Ed.), Hymenoptera of America north of Mexico Synoptic Catalog. *United States Department of Agriculture, Agriculture Monograph*, No. 2. (Supplement 1), pp. 62–84.
Burks, B.D. (1967) Superfamily Chalcidoidea. *In*: Krombein, K.V. & Burks, B.D. (Eds.), Hymenoptera of America north of Mexico Synoptic Catalog. *United States Department of Agriculture, Agriculture Monograph*, No. 2. (Supplement 2), pp. 213–282.
https://doi.org/10.5962/bhl.title.63670
Burks, B.D. (1979) Family Mymaridae. *In*: Krombein, K.V., Hurd, P.D., Jr., Smith, D.R. & Burks, B.D. (Eds.), *Catalogue of Hymenoptera in America North of Mexico. Vol. 1.* Smithsonian Institution Press, Washington, D.C., pp. 1022–1033.
Bushing, R.W. (1965) A synoptic list of the parasites of Scolytidae (Coleoptera) in North America north of Mexico. *Canadian Entomologist*, 97 (5), 449–492.
https://doi.org/10.4039/Ent97449-5
Byrne, F.J. & Toscano, N.C. (2006) Detection of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) parasitism of *Homalodisca coagulata* (Homoptera: Cicadellidae) eggs by polyacrylamide gel electrophoresis of esterases. *Biological Control*, 36 (2), 197–202.
https://doi.org/10.1016/j.biocontrol.2005.07.008
Byrne, F.J. & Toscano, N.C. (2007a) Evaluation of the impact of neonicotinoid insecticides on the glassy-winged sharpshooter and its egg parasitoids. *In*: *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 70–72
Byrne, F.J. & Toscano, N.C. (2007b) Lethal toxicity of systemic residues of imidacloprid against *Homalodisca vitripennis* (Ho-

moptera: Cicadellidae) eggs and its parasitoid *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae). *Biological Control*, 43 (1), 130–135.
https://doi.org/10.1016/j.biocontrol.2007.05.007

Carrillo, J.R., Jackson, C.G., Carillo, T.D. & Ellington, H. (1994) Evaluation of pesticide resistence in *Anaphes iole* collected from five locations in the western United States. *Southwestern Entomologist,* 19 (2), 157–160.

Cebulski, B.C. & O'Brien, M.F. (2013) Observations on egg parasitism of *Aeshna tuberculifera* (Odonata: Aeshnidae) by Eulophidae, Trichogrammatidae and Mymaridae (Hymenoptera) in Alger County, Michigan. *Great Lakes Entomologist*, 46 (3–4), 145–153.

Cerutti, F., Baumgärtner, J. & Delucchi, V. (1990) Ricerche sull'ecosistema «vigneto» nel Ticino: III. Biologia e fattori di mortalità di *Empoasca vitis* Goethe (Homoptera, Cicadellidae, Typhocybinae). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 63, 43–54.

Cerutti, F., Baumgärtner, J. & Delucchi, V. (1991) The dynamics of grape leafhopper *Empoasca vitis* Göthe populations in southern Switzerland and the implications for habitat management. *Biocontrol Science and Technology*, 1, 177–194.
https://doi.org/10.1080/09583159109355198

Cerutti, F. & Delucchi, V. (1989) L'énigme de la nuisibilité de la cicadelle de la vigne au Tessin. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 62, 247–252.

Cerutti, F., Delucchi, V., Baumgärtner, J. & Rubli, D. (1989) Ricerche sull'ecosistema «vigneto» nel Ticino: 2. La colonizzazione dei vigneti da parte della cicalina *Empoasca vitis* Goethe (Hom., Cicadellidae, Typhlocybinae) e del suo parassitoide *Anagrus atomus* Haliday (Hym., Mymaridae), e importanza della flora circostante. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 62, 253–267.

Chamberlin, T.R. (1924a) Introduction of parasites of the alfalfa weevil into the United States. *United States Department of Agriculture, Department Circular*, 301, 1–9.

Chamberlin, T.R. (1924b) Studies of the parasites of the alfalfa weevil in Europe. *Journal of Economic Entomology*, 17, 623–632.
https://doi.org/10.1093/jee/17.6.623

Charles, J.G. (2012) Assessing the non-target impacts of classical biocontrol agents: is host-testing always necessary? *BioControl*, 57, 619–626.
https://doi.org/10.1007/s10526-012-9449-z

Charles, J.G. & Logan, D.P. (2013) Predicting the distribution of *Gonatocerus ashmeadi*, an egg parasitoid of glassy winged sharpshooter, in New Zealand. *New Zealand Entomologist*, 36, 73–81.
https://doi.org/10.1080/00779962.2012.751776

Charlet, L.D. & Balsbaugh, E.U., Jr. (1984) *Anaphes conotracheli* (Hymenoptera: Mymaridae), an egg parasitoid of *Cylindrocopturus adspersus* (Coleoptera: Curculionidae). *Journal of the Kansas Entomological Society*, 57 (3), 526–528.

Cheke, R.A. (1974) Experiments on the effect of host spatial distribution on the numerical response of parasitoids. *Journal of Animal Ecology*, 43 (1), 107–113.
https://doi.org/10.2307/3160

Cheke, R.A. (1977) A quantitative study of the grooming behaviour of the mymarid wasp *Alaptus fusculus*. *Physiological Entomology*, 2 (1), 17–26.
https://doi.org/10.1111/j.1365-3032.1977.tb00074.x

Cheke, R.A. & Turner, B.D. (1973) Two new species of *Alaptus* Westwood (Hymenoptera: Mymaridae) parasitising eggs of Psocoptera. *The Entomologist*, 106, 279–283.

Chen, W.L. & Leopold, R.A. (2007) Progeny quality of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) reared on stored eggs of *Homalodisca coagulata* (Homoptera: Cicadellidae). *Journal of Economic Entomology*, 100, 685–694.
https://doi.org/10.1093/jee/100.3.685

Chen, W.L., Leopold, R.A. & Boetel, M.A. (2008a) Cold storage of adult *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) and effects on maternal and progeny fitness. *Journal of Economic Entomology*, 101, 1760–1770.
https://doi.org/10.1603/0022-0493-101.6.1760

Chen, W.L., Leopold, R.A. & Harris, M.O. (2006a) Parasitism of the glassy-winged sharpshooter, *Homalodisca coagulata* (Homoptera: Cicadellidae): functional response and superparasitism by *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae). *Biological Control*, 37 (1), 119–129.
https://doi.org/10.1016/j.biocontrol.2005.10.011

Chen, W.L., Leopold, R.A. & Harris, M.O. (2008b) Cold storage effects on maternal and progeny quality of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae). *Biological Control*, 46 (2), 122–132.
https://doi.org/10.1016/j.biocontrol.2008.04.007

Chen, W.L., Leopold, R.A., Morgan, D.J.W. & Harris, M.O. (2006b) Development and reproduction of the egg parasitoid, *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae), as a function of temperature. *Environmental Entomology*, 35 (5), 1178–1187.
https://doi.org/10.1093/ee/35.5.1178

Chiappini, E. (1987) Ricerche sulla variabilità di *Anagrus atomus* (L.) (Hymenoptera Mymaridae) e di una specie affine presente sul rovo. *Bollettino di Zoologia agraria e di Bachicoltura*, Series II, *19*, *71–97.*

Chiappini, E. (1989) Review of the European species of the genus *Anagrus* Haliday (Hymenoptera Chalcidoidea). *Bollettino di*

Zoologia Agraria e di Bachicoltura, 21, 85–119.
Chiappini, E. & Lin, N.-Q. (1998) *Anagrus* (Hymenoptera: Mymaridae) of China, with descriptions of nine new species. *Annals of the Entomological Society of America*, 91 (5), 549–571.
https://doi.org/10.1093/aesa/91.5.549
Chiappini, E. & Mazzoni, E. (2000) Differing morphology and ultrastructure of the male copulatory apparatus in species-groups of *Anagrus* Haliday. *Journal of Natural History*, 34, 1661–1676.
https://doi.org/10.1080/00222930050117549
Chiappini, E. & Triapitsyn, S.V. (1999 [1997]) Redescription of *Anagrus avalae* Soyka (Hymenoptera: Mymaridae), with new synonymies. *Frustula Entomologica*, 20 (33), 119–126.
Chiappini, E. & Triapitsyn, S.V. (2007) Neotype designation for *Anagrus atomus* (Linnaeus) (Hymenoptera: Mymaridae). *Journal of Hymenoptera Research*, 16, 1–6.
Chiappini, E., Triapitsyn, S.V. & Donev, A. (1996) Key to the Holarctic species of *Anagrus* Haliday (Hymenoptera: Mymaridae) with a review of the Nearctic and Palaearctic (other than European) species and descriptions of new taxa. *Journal of Natural History*, 30 (4), 551–595.
https://doi.org/10.1080/00222939600770301
Chiriac, I. & Poiras, A. (1995) Notes on parasites of *Sitona* weevils in the Republic of Moldova. *Buletinul Academiei de Ştiinţe a Republicii Moldova, Ştiinţe Biologici şi Chimice*, 2, 38–45.
Chiu, S.-C. (1979) Biological control of the brown planthopper. *In*: *Brown planthopper: threat to rice production in Asia*. International Rice Research Institute, Los Banos, pp. 335–355.
Christie, G.I. (1929 [1928]) *Forty-first annual report of the Purdue Agricultural Experimental Station for the year ending June 30, 1928*. Department of Entomology, Indiana Agricultural Experimental Station, Lafayette, Indiana, pp. 42–44.
Ciampolini, M., Carniel, P.L. & Zamarian, G.A. (1977) Diffusi attacchi di *Ceresa bubalus* F. alla vite nel Friuli-Venezia Giulia. *Informatore Agrario*, 33 (2), 25201–25204.
CIBC (1979) *Status Paper No. 15*. Possibilities for biological control of lygus bugs (Hemiptera: Miridae). Commonwealth Institute of Biological Control, London, 7 pp.
Clancy, D.W. & Pierce, H.D. (1966) Natural enemies of some *Lygus* bugs. *Journal of Economic Entomology*, 59, 853–858.
https://doi.org/10.1093/jee/59.4.853
Clausen, C.P. (1940) *Entomophagous insects*. McGraw-Hill, New York, 688 pp. [reprinted in 1962 by Hafner Publishing, New York]
Clausen, C.P. (1956) Biological control of insect pests in the continental United States. *United States Department of Agriculture, Technical Bulletin*, 1139, 1–151.
Clausen, C.P. (1978) Coleoptera. *In*: Clausen, P. (Ed.), Introduced parasites and predators of arthropod pests and weeds: a world review. *United States Department of Agriculture, Agricultural Research Service*, *Agriculture Handbook* 480, pp. 246–294.
Clouâtre, A., Coderre, D. & Gagnon, D. (1988) The occurrence of *Cleruchus biciliatus* (Ferrière) in North America (Hymenoptera, Chalcidoidea: Mymaridae). *Canadian Entomologist*, 120, 939–940.
https://doi.org/10.4039/Ent120939-10
Clouâtre, A., Coderre, D. & Gagnon, D. (1989) Habitat of a new Mymarommatidae found in southern Quebec, Canada (Hymenoptera: Terebrantes). *Canadian Entomologist*, 121, 825–826.
https://doi.org/10.4039/Ent121825-9
Cohen, J.E., Schoenly, K., Heong, K.L., Justo, H., Arida, G., Barrion, A.T. & Litsinger, J.A. (1994) A food web approach to evaluating the effects of insecticide spraying on insect pest population dynamics in a Philippine irrigated rice ecosystem. *Journal of Applied Ecology*, 31 (4), 747–763.
https://doi.org/10.2307/2404165
Colinet, H. & Boivin, G. (2011) Insect parasitoids cold storage: a comprehensive review of factors of variability and consequences. *Biological Control*, 58 (2), 83–95.
https://doi.org/10.1016/j.biocontrol.2011.04.014
Collins, R.D. & Grafius, E.J. (1983) A literature review of the egg parasitoid genus *Patasson* with references to the related genus *Anaphes*. *Department of Entomology Report 12.* Michigan State University, East Lansing, Michigan, 22 pp.
Collins, R.D. & Grafius, E. (1986a) Biology and life cycle of *Anaphes sordidatus* (Hymenoptera: Mymaridae), an egg parasitoid of the carrot weevil (Coleoptera: Curculionidae). *Environmental Entomology*, 15 (1), 100–105.
https://doi.org/10.1093/ee/15.1.100
Collins, R.D. & Grafius, E. (1986b) Impact of the egg parasitoid, *Anaphes sordidatus* (Hymenoptera: Mymaridae), on the carrot weevil (Coleoptera: Curculionidae). *Environmental Entomology*, 15 (3), 469–475.
https://doi.org/10.1093/ee/15.3.469
Collins, R.D. & Grafius, E. (1986c) Courtship and mating behavior of *Anaphes sordidus* (Hymenoptera, Mymaridae), a parasitoid of the carrot weevil, *Listronotus oregonensis* (Coleoptera, Curculionidae). *Annals of the Entomological Society of America*, 79 (1), 31–33.
https://doi.org/10.1093/aesa/79.1.31
Conant, P., Hauff, R., Loope, L. & King, C. (2010) Forest and forestry insect pests in Hawai'i: past, present, and future. *In*: Cram, M.M. (Ed.), *Proceedings of the seventh meeting IUFRO working party 7.03.04. Diseases and insects in forest nurs-*

eries, Hilo, Hawaii, 13–17 July 2009. Forest Health Protection Report 10–01.01. Forest Health Protection, United States Department of Agriculture Forest Service, Southern Region, Pineville, Louisiana, pp. 16–38.
Conti, E., Ejigu, B.A. & Bin, F. (1994) Distribuzione e parassitizzazione delle uova di Lygus spp. sul girasole in Italia centrale (Heteroptera: Miridae; Hymenoptera: Mymaridae). *Atti XVII Congresso Nationale Italiano di Entomologia, Udine*, 13–18 June 1994, pp. 523–526.
Conti, E., Jones, W.A., Bin, F. & Vinson, S.B. (1996) Physical and chemical factors involved in host recognition behavior of *Anaphes iole* Girault, an egg parasitoid of *Lygus hesperus* Knight (Hymenoptera: Mymaridae, Heteroptera: Miridae). *Biological Control*, 7, 10–16.
https://doi.org/10.1006/bcon.1996.0057
Conti, E., Jones, W.A. & Vinson, S.B. (1997) Oviposition behavior of *Anaphes iole*, an egg parasitoid of *Lygus hesperus* (Hymenoptera: Mymaridae; Heteroptera: Miridae). *Annals of the Entomological Society of America*, 90, 91–101.
https://doi.org/10.1093/aesa/90.1.91
Cooksey, D.A. (2011) Development of effective monitoring techniques for sharpshooters and their parasitoids. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2011 Pierce's Disease Research Symposium, 13–15 December 2011, Sheraton Grand Sacramento Hotel.* California Department of Food and Agriculture, Sacramento, California, pp. 25–27.
Cookson, L.J. & New, T.R. (1980) Observations on the biology of *Sextius virescens* (Fairmaire) (Homoptera, Membracidae) on *Acacia* in Victoria. *Australian Entomological Magazine*, 7 (11), 4–10.
Cooper, S. (1993) The biology and application of *Anagrus atomus* (L.) Haliday. *Bulletin OILB/SROP*, 16 (8), 42–43.
Corbett, A., Murphy, B.C., Rosenheim, J.A. & Bruins, P. (1996) Labeling an egg parasitoid, *Anagrus epos* (Hymenoptera: Mymaridae), with rubidium within an overwintering refuge. *Environmental Entomology*, 25 (1), 29–38.
https://doi.org/10.1093/ee/25.1.29
Corbett, A. & Rosenheim, J.A. (1996a) Impact of a natural enemy overwintering refuge and its interaction with the surrounding landscape. *Ecological Entomology*, 21 (2), 155–164.
https://doi.org/10.1111/j.1365-2311.1996.tb01182.x
Corbett, A. & Rosenheim, J.A. (1996b) Quantifying movement of a minute parasitoid, *Anagrus epos* (Hymenoptera: Mymaridae), using fluorescent dust marking and recapture. *Biological Control*, 6 (1), 35–44.
https://doi.org/10.1006/bcon.1996.0005
Cormier, D. (1998) *Seasonal and chemical ecology of Anaphes listronoti and A. victus* (*Hymenoptera: Mymaridae*), *egg parasitoids of the carrot weevil, Listronotus oregonensis* (*Coleoptera: Curculionidae*), *in central Ontario*. Ph. D. dissertation, McGill University, Montreal, 159 pp.
Cormier D., Royer, L., Vigneault, C., Panneton, B. & Boivin, G. (1998) Effect of female age on daily cycle of sexual pheromone emission in gregarious egg parasitoid *Anaphes listronoti*. *Journal of Chemical Ecology*, 24 (10), 1595–1610.
https://doi.org/10.1023/A:1020860326945
Cormier, D., Stevenson, A.B. & Boivin, G. (1996) Seasonal ecology and geographical distribution of *Anaphes listronoti* and *A. victus* (Hymenoptera: Mymaridae), egg parasitoids of the carrot weevil (Coleoptera: Curculionidae) in central Ontario. *Environmental Entomology*, 25 (6), 1376–1382.
https://doi.org/10.1093/ee/25.6.1376
Cotton, R.T. & Good, N.E. (1937) Annotated list of the insects and mites associated with stored grain and cereal products, and of their arthropod parasites and predators. *United States Department of Agriculture*, *Miscellaneous Publication*, 258, 1–81.
Coudron, T.A. & Goodman, C.L. (2004) Development of an artificial diet and evaluation of artificial ovipositional substrates for the *in vitro* rearing of *Gonatocerus* spp. parasitoids of the eggs of th glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. Blincoe, Ba, A., Lorick, T. & Esser, T. (Compilers)*, Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, December 7–10, 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 304–305.
Coulson, J.R. (1987) Studies on the biological control of plant bugs (Heteroptera: Miridae): an introduction and history, 1961–83. *In*: Hedlund, R.C. & Graham, H.M. (Eds.), *Economic importance and biological control of Lygus and Adelphocoris in North America*, *USDA-ARS–64.* United States Department of Agriculture, Agricultural Research Service, Washington, DC, pp. 1–12.
Cournoyer, M. (2003) *Host selection behavior of the adult parasitoid Microctonus hyperodae Loan* (*Hymenoptera: Braconidae: Euphorinae*) *and the egg parasitoid Anaphes victus Huber* (*Hymenoptera:* Mymaridae), *parasitoids of the carrot weevil, Listronotus oregonensis LeConte* (*Coleoptera: Curculionidae*). M. Sc. Thesis, McGill University, Montreal, 100 pp.
Cournoyer, M. & Boivin, G. (2005) Evidence for kairomones used by the egg parasitoid *Anaphes victus* (Hymenoptera: Mymaridae) when searching for its host. *Canadian Entomologist*, 137 (2), 230–232.
https://doi.org/10.4039/n04-090
Coutinot, D. & Hoelmer, K. (1999) Parasitoids of *Lygus* spp. in Europe and their potential for biological control of *Lygus* spp. in North America. *In*: *Fifth International Conference on Pests in Agriculture, Part 3, Montpellier, France, 7–9 December, 1999. ANPP – Cinquième conférence internationale sur les ravageurs en agriculture, Montpellier, 7, 8, 9 Décembre, 1999. Part 3* (*pp. 599–902*). Association of National Protection of Plants, Paris, pp. 641–648.
Couturier, A. (1935) Remarques sur *Anaphes pratensis* Forster ennemi des pontes du doryphore. *Revue de Zoologie Agricole et Appliquée*, 34, 88–92.
Cox, J.A. (1942) Effect of dormant sprays on parasites of the San Jose and terrapin scales. *Journal of Economic Entomology*,

35, 698–701.
https://doi.org/10.1093/jee/35.5.698
Craighead, F.C. (1950) *Insect Enemies of Eastern Forests*. *United States Department of Agriculture, Miscellaneous Publications 657*. United States Printing Office, Washington, D.C., ii + 679 pp.
https://doi.org/10.5962/bhl.title.65598
Crawford, J.C. (1913) Descriptions of new Hymenoptera. No. 8. *Proceedings of the United States National Museum*, 46, 343–352.
https://doi.org/10.5479/si.00963801.46-2029.343
Crawford, J.C. (1915) Descriptions of new Hymenoptera. No. 9. *Proceedings of the United States National Museum*, 48, 577–586.
https://doi.org/10.5479/si.00963801.48-2087.577
Cresson, E.T. (1887) Synopsis of the families and genera of the Hymenoptera of America, North of Mexico, together with a catalogue of the described species, and bibliography. *Transactions of the American Entomological Society*, Supplementary Volume, 1–350.
https://doi.org/10.5962/bhl.title.38716
Crevecoeur, F.F. (1922) Additions to the list of Kansas Hymenoptera. *Transactions of the Kansas Academy of Sciences*, 30, 385–388.
https://doi.org/10.2307/3624089
Cronin, J.T. (2003a) Matrix heterogeneity and host-parasitoid interactions in space. *Ecology*, 84 (6), 1506–1516.
https://doi.org/10.1890/0012-9658(2003)084[1506:MHAHII]2.0.CO;2
Cronin, J.T. (2003b) Patch structure, oviposition behavior, and the distribution of parasitism risk. *Ecological Monographs*, 73 (2), 283–300.
https://doi.org/10.1890/0012-9615(2003)073[0283:PSOBAT]2.0.CO;2
Cronin, J.T. (2004) Host-parasitoid extinction and colonization in a fragmented prairie landscape. *Oecologia*, *Berlin*, 139 (4), 503–514.
https://doi.org/10.1007/s00442-004-1549-8
Cronin, J.T. (2007a) Shared parasitoids in a metacommunity: indirect interactions inhibit herbivore membership in local communities. *Ecology*, 88 (12), 2977–2990.
https://doi.org/10.1890/07-0253.1
Cronin, J.T. (2007b) From population sources to sieves: the matrix alters host–parasitoid source–sink structure. *Ecology*, 88 (12), 2966–2976.
https://doi.org/10.1890/07-0070.1
Cronin, J.T. (2009a) Habitat edges, within-patch dispersion of hosts, and parasitoid oviposition behavior. *Ecology*, 90 (1), 196–207.
https://doi.org/10.1890/08-0208.1
Cronin, J.T. (2009b) Movement, colonization, and establishment success of a planthopper of prairie potholes, *Delphacodes scolochloa* (Hemiptera: Delphacidae). *Ecological Entomology*, 34, 114–124.
https://doi.org/10.1111/j.1365-2311.2008.01049.x
Cronin, J.T. & Haynes, K.J. (2004) An invasive plant promotes unstable host-parasitoid patch dynamics. *Ecology*, 85 (10), 2772–2782.
https://doi.org/10.1890/04-0303
Cronin, J.T. & Strong, D.R. (1990a) Biology of *Anagrus delicatus* (Hymenoptera: Mymaridae), an egg parasitoid of *Prokelisia marginata* (Homoptera: Delphacidae). *Annals of the Entomological Society of America*, 83, 846–854.
https://doi.org/10.1093/aesa/83.4.846
Cronin, J.T. & Strong, D.R. (1990b) Density-independent parasitism among host patches by *Anagrus delicatus* (Hymenoptera: Mymaridae): experimental manipulation of hosts. *Journal of Animal Ecology*, 59, 1019–1026.
https://doi.org/10.2307/5028
Cronin, J.T. & Strong, D.R. (1993a) Substantially submaximal oviposition rates by a mymarid egg parasitoid in the laboratory and field. *Ecology*, 74, 1813–1825.
https://doi.org/10.2307/1939939
Cronin, J.T. & Strong, D.R. (1993b) Superparasitism and mutual interference in the egg parasitoid *Anagrus delicatus* (Hymenoptera: Mymaridae). *Ecological Entomology*, 18, 293–302.
https://doi.org/10.1111/j.1365-2311.1993.tb01104.x
Cronin, J.T. & Strong, D.R. (1996) Genetics of oviposition success of a thelytokous fairyfly parasitoid, *Anagrus delicatus*. *Heredity*, 76, 43–54.
https://doi.org/10.1038/hdy.1996.6
Cronin, J.T. & Strong, D.R. (1999) Dispersal-dependent oviposition and the aggregation of parasitism. *American Naturalist*, 154 (1), 23–36.
https://doi.org/10.1086/303221
Cronin, J.T. & Wilson, S.W. (2007) Description, life history, and parasitism of a new species of delphacid planthopper (Hemiptera: Fulgoroidea). *Annals of the Entomological Society of America*, 100 (5), 640–648.

https://doi.org/10.1603/0013-8746(2007)100[640:DLHAPO]2.0.CO;2
Crosby, C.R. & Leonard, M.D. (1914a) An egg-parasite of the tarnished plant bug, *Lygus pratensis* L. *Canadian Entomologist*, 46, 181–182.
https://doi.org/10.4039/Ent46181-5
Crosby, C.R. & Leonard, M.D. (1914b) The tarnished plant-bug. *Bulletin of the Cornell University Agricultural Experiment Station*, 346, 463–526.
Cuda, J.P. & Burke, H.R. (1991) Biology of *Trichobaris bridwelli* (Coleoptera: Curculionidae), a possible agent for the biological control of *Datura stramonium* (Solanaceae). *Environmental Entomology*, 20 (3), 899–908.
https://doi.org/10.1093/ee/20.3.899
Currado, I. (1975 [1973]) Propagazione spontanea in Piedmont di *Polynema striaticorne* Girault (Hymenoptera Mymaridae). *Annali della Facoltà di Scienze Agrarie della Universit*à *degli Studi di Torino*, 9, 335–346.
Curtis, J. (1829) *A guide to an arrangement of British Insects; being a catalogue of all the named species hitherto discovered in Great Britain and Ireland*. F. Westley and A.H. Davis, London, 256 pp.
Curtis, J. (1832) *British entomology; being illustrations and descriptions of the genera of British insects found in Great Britain and Ireland: containing coloured figures from nature of the most rare and beautiful species, and many instances of the plants upon which they are found*. Printed for the author, London, 48 pls, text. [pp. 386–433]
http://doi.org/10.5962/bhl.title.8148
Curtis, J. (1837) *A guide to an arrangement of British Insects; being a catalogue of all the named species hitherto discovered in Great Britain and Ireland. 2nd Edition*. J. Pigot, London, 294 pp.
https://doi.org/10.5962/bhl.title.46860
Daane, K.M. (2001) Biology and ecology of GWSS in the San Joaquin Valley. *In*: Gleeson, P. (Compiler), *Glassy-winged sharpshooter and Pierce's disease research summaries*. California Department of Food and Agriculture, Sacramento, California, pp. 16–17.
Daane, K.M. & Johnson, M.W. (2002) Biology and ecology of the glassy-winged sharpshooter in the San Joaquin valley. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers)*, Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Hotel, San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 99–102.
Daane, K.M. & Johnson, M.W. (2003) Biology and ecology of the glassy-winged sharpshooter in the San Joaquin valley. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers)*, Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 247–249.
Daane, K.M. & Johnson, M.W. (2004) Biology and ecology of the glassy-winged sharpshooter in the San Joaquin valley. *In*: Tariq, M.A., Oswalt, S., Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers)*, Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California pp. 93–96.
Daane, K.M. & Johnson, M.W. (2005) Biology and ecology of the glassy-winged sharpshooter in the San Joaquin Valley. *In*: Tariq, M.A., Blincoe, P., Mochel, S., Oswalt, S. & Esser, T. (Compilers)*, Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 97–100.
Daane, K.M., Johnson, M.W., Ruiz, T. & Hashim, J.M. (2004) Host plant influence on glassy-winged sharpshooter and its natural enemies. *In*: Hoddle, M.S. (Ed.), *California Conference on Biological Control IV, Berkeley, Califor*nia *13–15 July 2004*. University of California, Berkeley, California, pp. 100–104.
Daane, K.M., Vincent, C., Isaacs, R. & Ioriatti, C. (2018) Entomological opportunities and challenges for sustainable viticulture in a global market. *Annual Review of Entomology*, 63, 193–214.
https://doi.org/10.1146/annurev-ento-010715-023547
Dahms, E.C. (1984) A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: III. Chalcidoidea species F–M with advisory notes. *Memoirs of the Queensland Museum*, 21, 579–842.
Dale-Skey, N., Askew, R.R., Noyes, J.S., Livermore, L. & Broad, G. (2016) Checklist of British and Irish Hymenoptera—Chalcidoidea and Mymarommatoidea. *Biodiversity Data Journal*, (4), 1–417.
Dalla Torre, C.G. de (1898) *Subfam. Mymarinae. Catalogus hymenopterorum hucusque descriptorum systematicus et synonymicus. Vol. 5. Chalcididae et Proctotrupidae*. Guilelmi Engelmann, Lipsiae [Leipzig], 598 pp. [pp. 422–431]
Dalla Torre, K.W. von (1890) Hymenopterologische Notizen. *Wiener Entomologische Zeitung*, 9, 97–99.
Davis, C.J. (1968) [Note on] billbug egg parasite. *Proceedings of the Hawaiian Entomological Society*, 20, 16–17.
Davis, C.J. & Chong, M. (1968) Recent introductions for biological control in Hawaii–XIII. *Proceedings of the Hawaiian Entomological Society*, 20 (1), 25–34.
Davis, C.J. & Chong, M. (1969) Recent introductions for biological control in Hawaii XIV. *Proceedings of the Hawaiian Entomological Society*, 20 (2), 317–322.
Davis, C.J. & Krauss, N.L.H. (1964) Recent introductions for biological control in Hawaii—IX. *Proceedings of the Hawaiian Entomological Society*, 18, 391–397.
Davis, J.J. (1914) The oat aphis. *United States Department of Agriculture*, *[Departmental] Bulletin*, 112, 1–16.
https://doi.org/10.5962/bhl.title.108219

Day, W.H. (1983 [1982]) Parasites of the alfalfa weevil: biological characteristics important to control programs. *In*: Flessel, J.K. & Treece, R.E. (Compilers), *Proceedings of the 19th northeastern alfalfa insects conference*. The Ohio State University, Wooster, Ohio, pp. 41.

Day, W.H. (1987) Biological control efforts against *Lygus* and *Adelphocoris* spp. infesting alfalfa in the United States, with notes on other associated mirid species. *In*: Hedlund, R.C. & Graham, H.M. (Eds.), *Economic importance and biological control of Lygus and Adelphocoris in North America, USDA-ARS 64.* United States Department of Agriculture, Agriculture Research Service, Washington, DC, pp. 20–39.

Debauche, H.R. (1948) Etude sur les Mymarommidae et les Mymaridae de la Belgique (Hymenoptera Chalcidoidea). *Mémoires du Musée Royal d'Histoire Naturelle de Belgique*, 108, 1–248, 24 pls.

Debauche, H.R. (1949) Mymaridae (Hymenoptera Chalcidoidea). *Exploration du Parc National Albert, Mission G. F. de Witte* (*1933–1935*), 49, 1–105, pls. I–VII and legends on unnumbered pages.

Debolt, J.W. (1987) Augmentation: rearing, release, and evaluation of plant bug parasites. *In*: Hedlund, R.C. & Graham, H.M. (Eds.), *Economic importance and biological control of Lygus and Adelphocoris in North America,* 64. United States Department of Agriculture, Agriculture Research Service, pp. 82–87.

Degrandi-Hoffman, G., Diehl, J., Li, D., Flexner, L., Jackson, G., Jones, W. & Debolt, J. (1994) BIOCONTROL-PARASITE: parasitoid-host and crop loss assessment simulation model. *Environmental Entomology*, 23 (5), 1045–1060. https://doi.org/10.1093/ee/23.5.1045

de León, J.H. (2004a) Extensive sequence divergence in the ITS2 RDNA fragment in a population of *Gonatocerus ashmeadi* from Florida: phylogenetic relationships of *Gonatocerus* species. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 309–313.

de León, J.H. (2004b) Genetic differentiation among geographic populations of *Gonatocerus ashmeadi*, a primary egg parasitoid of the glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 314–317.

de León, J.H. (2004c) Molecular distinction between populations of *Gonatocerus morrilli*, egg parasitoids of the glassy-winged sharpshooter, from Texas and California. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 318–321.

de León, J.H. (2004d) Sequence divergence in two mitochondrial genes (COI and COII) and in the ITS2 RDNA fragment in geographic populations of *Gonatocerus morrilli*, a primary egg parasitoid of the glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 322–325.

de León, J.H. (2005) The utility of inter-simple sequence repeat-polymerase chain reaction (ISSR–PCR) to distinguish geographic populations of the smoke-tree sharpshooter and egg parasitoid species of the genus *Gonatocerus*. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 298–301.

de León, J.H., Hagler, J.R. & Johnson, M. (2007a) Development of molecular markers toward glassy-winged sharpshooter (gwss) egg parasitoids to aid in both identifying key predators of the gwss egg stage and in taxonomic identifications. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 77–80.

de León, J.H. & Jones, W.A. (2005) Genetic differentiation among geographic populations of *Gonatocerus ashmeadi*, the predominant egg parasitoid of the glassy-winged sharpshooter, *Homalodisca coagulata*. *Journal of Insect Science*, 5, 1–9. https://doi.org/10.1673/031.005.0201

de León, J.H., Jones, W.A. & Morgan, D.J.W. (2004) Molecular distinction between populations of *Gonatocerus morrilli*, egg parasitoids of the glassy-winged sharpshooter from Texas and California: do cryptic species exist? *Journal of Insect Science*, 4, 1–7. https://doi.org/10.1673/031.004.3901

de León, J.H., Jones, W.A., Sétamou, M. & Morgan, D.J.W. (2005) Discovery of a cryptic species complex in *Gonatocerus morrilli*, a primary egg parasitoid of the glassy-winged sharpshooter. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 302–305. https://doi.org/10.1093/jis/5.1.2

de León, J.H., Jones, W.A., Sétamou, M. & Morgan, D.J.W. (2006a) Genetic and hybridization evidence confirms that a geographic population of *Gonatocerus morrilli* (Hymenoptera: Mymaridae) from California is a new species: egg parasitoids of the glassy-winged sharpshooter *Homalodisca coagulata* (Homoptera: Cicadellidae). *Biological Control*, 38 (2), 282–293. https://doi.org/10.1016/j.biocontrol.2006.03.005

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2006b) Genetic characterization of *Gonatocerus tuberculifemur* (Ogloblin) from South America uncovers divergent clades: prospective egg parasitoid candidate agent for the glassy-winged sharp-

shooter in California. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 40–43.

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2006c) ISSR–PCR DNA fingerprinting uncovers distinct banding patterns in *Gonatocerus* species 3 (*G*. sp. 3) individuals emerging from different host tribes: a prospective egg parasitoid candidate agent for the glassy-winged sharpshooter in California. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 48–51.

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2006d) Genetic studies of *Gonatocerus metanotalis* populations from Argentina uncover divergent clades: a prospective egg parasitoid agent for the glassy-winged sharpshooter in California. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, 27–29 November 2006, Westin Horton Plaza Hotel, San Diego*. California Department of Food and Agriculture, Sacramento, California, pp. 52–55.

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2006e) The utility of the internal transcribed spacer region 2 (ITS2) in confirming species boundaries in the genus *Gonatocerus*: comparison to the cytochrome oxidase subunit 1 (CO1) gene and taxonomic data: molecular key based on ITS2 sizes. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 56–59.

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2007b) Progress on resolving the *Gonatocerus tuberculifemur* complex: neither CO1 nor ITS2 sequence data alone can discriminate all the species within the complex, whereas, ISSR–PCR DNA fingerprinting can. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 73–76.

de León, J.H., Logarzo, G.A. & Triapitsyn, S.V. (2008) Molecular characterization of *Gonatocerus tuberculifemur* (Ogloblin) (Hymenoptera: Mymaridae), a prospective *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) biological control candidate agent from South America: Divergent clades. *Bulletin of Entomological Research*, 98 (1), 97–108. https://doi.org/10.1017/S0007485307005469

de León, J.H. & Morgan, D.J.W. (2005) Small scale post-release evaluation of a *Gonatocerus morrilli* program in California against the glassy-winged sharpshooter: utility of developed molecular diagnostic tools. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, California*, 5–7 December 2005, pp. 306–309.

de León, J.H. & Morgan, D.J.W. (2007a) Evaluation of molecular markers for discriminating *Gonatocerus morrilli*: a biological control agent imported from the origin of the glassy winged sharpshooter. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 81–85.

de León, J.H. & Morgan, D.J.W. (2007b) Evaluation of molecular markers for discriminating *Gonatocerus morrilli* (Hymenoptera: Mymaridae): a biological control agent for *Homalodisca vitripennis*. *Annals of the Entomological Society of America*, 100 (5), 749–757. https://doi.org/10.1603/0013-8746(2007)100[749:EOMMFD]2.0.CO;2

de León, J.H., Triapitsyn, S.V., Matteucig, G. & Viggiani, G. (2008) Molecular and morphometric analyses of *Anagrus erythroneurae* Trjapitzin et Chiappini and *Anagrus ustulatus* Haliday (Hymenoptera: Mymaridae). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 62, 19–32.

DeWitt, G. & Burks, B.D. (1968) *United States Department of Agriculture, Plant Pest Control Division, Cooperative Economic Insect Report*, 18 (9), 129.

De Santis, L. (1967) *Catálogo de los Himenópteros Argentinos de la Serie Parasitica, incluyendo Bethyloidea*. Comision de Investigacion Cientifica, La Plata, 337 pp.

De Santis, L. (1979) *Catálogo de los himénopteros calcidoideos de América al sur de los Estados Unidos*. *Publicación Especial Comisión de Investigaciones Cientificas Provincia de Buenos Aires*. Investigaciones Cientificas Provincia de Buenos Aires, Buenos Aires, 488 pp.

De Santis, L. (1983 [1981]) Catálogo de los Himenópteros Calcidoideos de América al Sur de los Estados Unidos—Primer Suplemento. *Revista Peruana de Entomología*, 24 (1), 1–38.

De Santis, L. (1989) Catálogo de los himenopteros calcidoideos (Hymenoptera) al sur de los Estados Unidos. Secundo supplemento. *Acta Entomologica Chilena*, 15, 9–90.

De Santis, L., Dagoberto, E.L., De Remes Lenicov, A.M.M. & Tesón, A. (1988) Notas sobre *Anagrus armatus* (Hymenoptera: Mymaridae) parasitoide oofago de *Delphacodes kuscheli* (Homoptera: Delphacidae). *Revista Chilena de Entomología*, 16, 93–95.

De Santis, L. & Fidalgo, P. (1994) Catálogo de los himenopteros calcidoideos. Tercer suplemento (Insecta). *Serie de la Academia Nacional de Agronomia y Veterinaria*, 13. 1–154.

Dickerson, E.L. & Weiss, H.B. (1917) *Idiocerus scurra* Germar, a poplar leafhopper. *Journal of the New York Entomological Society*, 25, 218–224, pl. 15.

Dickerson, E.L. & Weiss, H.B. (1920) The insects of the evening primroses in New Jersey. *Journal of the New York Entomological Society*, 28, 32–74, 3 pls.

Dingler, M. (1923) Beiträge zur Kenntnis von *Lecanium hesperidum* L., besonders seiner Biologie. *Zeitschrift für Angewandt Entomologie*, 9, 191–246, 2 pls.
https://doi.org/10.1111/j.1439-0418.1923.tb00234.x
Donev, A. (1978) Unknown genera and species of the family Mymaridae (Hymen. Chalc.) in the fauna of Bulgaria. *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 16 (4), 457–460. [in Bulgarian]
Donev, A. (1985a) A contribution to the studies on the species composition and distribution of the insects of the family Mymaridae in Greece. *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 23 (1), 61–64. [in Bulgarian]
Donev, A. (1985b) Mymaridae (Hym. Chalcidoidea) of Fruška Mountain, Yugoslavia. *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 23 (1), 65–69. [in Bulgarian]
Donev, A. (1987) Unknown genera and species of the family Mymaridae (Hym. Chalc.) for the fauna of Strandzha. *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 25 (6), 73–76. [in Bulgarian, German summary]
Donev, A. (1988a) A contribution to the studies on the species composition and distribution of the family Mymaridae (Hym. Chalcidoidea) in S. R. Macedonia, Yugoslavia. *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 26 (6), 177–180. [in Bulgarian]
Donev, A. (1988b) Species composition and distribution of the family Mymaridae in Rila Mountain (Hymenoptera, Chalcidoidea). *Plovdivski Universitet "Paisiy Hilendarski", Nauchni Trudove, Biologiya*, 26 (6), 203–207. [in Bulgarian]
Donev, A. (1989) A new genus and species of the family Mymaridae from Bulgaria (Insecta, Hymenoptera, Chalcidoidea). *Reichenbachia*, 27 (13), 79–83.
Donev, A. (1998) Distributional data about the species of genus *Anagrus* Haliday (Hymenoptera, Mymaridae) in the Balkan Peninsula with description of a new species. *Acta Zoologica Bulgarica*, 50 (1), 71–75.
Donev, A. (2004) The species of *Erythmelus* Enock, 1909 (Hymenoptera, Mimaridae [*sic*]) in the Balcan Peninsula. *Plovdivski Universitet "Paisii Hidenarski" Nauchni Trudove Biologiya-Animalia*, 40 (6), 119–127.
Donev, A. & Huber, J.T. (2002) Pseudocleruchus triclavatus, Donev and Huber, gen. and sp. nov. (Hymenoptera: Mymaridae), with notes on the Cleruchus-group of genera. *In*: Melika, G. & Thuróczy, C. (Eds.), *Parasitic wasps. Evolution, systematics, biodiversity and biological control*. Agroinform, Kiadó & Nyomba Kft, Budapest, pp. 117–123.
Donev, A. D. & Triapitsyn, S.V. (2010) A new species of *Mymar* (Hymenoptera: Mymaridae) from the Palaearctic region, with nomenclatural changes in the genus. *Zootaxa*, 2644 (1), 64–68.
https://doi.org/10.11646/zootaxa.2644.1.5
Doutt, R.L. (1947) The occurrence of the genus *Stethynium* in California (Hymenoptera: Mymaridae). *Pan-Pacific Entomologist*, 23, 152–154.
Doutt, R.L. (1949a) The genus *Erythmelus* in California (Hymenoptera, Mymaridae). *Pan-Pacific Entomologist*, 25, 77–81.
Doutt, R.L. (1949b) A synopsis of North American *Anaphoidea* (Hymenoptera: Mymaridae). *Pan-Pacific Entomologist*, 25 (4), 155–160.
Doutt, R.L. (1955) Insects of Micronesia. Hymenoptera: Trichogrammatidae and Mymaridae. *Insects of Micronesia*, 19 (1), 1–17.
Doutt, R.L. (1974) The genus *Dicopus* Enock (Hymenoptera: Mymaridae). *Pan-Pacific Entomologist*, 50, 165–168.
Doutt, R.L. (1975) *Dahmsia*, a new genus of Mymaridae (Hymenoptera: Chalcidoidea). *Pan-Pacific Entomologist*, 51 (3), 254–256.
Doutt, R.L. & Annecke, D.P. (1963) *Mymar* Curtis, 1829 (Insecta, Hymenoptera): Proposed designation of a type-species under the plenary powers. Z.N.(S.) 479. *The Bulletin of Zoological Nomenclature*, 20 (2), 134–136.
Doutt, R.L. & Nakata, J. (1965) Overwintering refuge of *Anagrus epos* (Hymenoptera: Mymaridae). *Journal of Economic Entomology*, 58, 586.
https://doi.org/10.1093/jee/58.3.586
Doutt, R.L. & Nakata, J. (1973) The *Rubus* leafhopper and its egg parasitoid: an endemic biotic system useful in grape-pest management. *Environmental Entomology*, 2, 381–386.
https://doi.org/10.1093/ee/2.3.381
Doutt, R.L., Nakata, J. & Skinner, F.E. (1966) Grape leafhopper parasites from a blackberry refuge. *California Agriculture*, 20 (10), 14–15.
Dozier, H.L. (1932) Descriptions of new mymarid egg parasites from Haiti and Puerto Rico. *Journal of the Department of Agriculture of Puerto Rico*, 16, 81–91.
Dozier, H.L. (1933) Miscellaneous notes and descriptions of chalcidoid parasites (Hymenoptera). *Proceedings of the Entomological Society of Washington*, 35, 95–100.
Dozier, H.L. (1936) Several undescribed mymarid egg-parasites of the genus *Anagrus* Haliday. *Proceedings of the Hawaiian Entomological Society*, 9, 175–178.
Dozier, H.L. (1937) Descriptions of miscellaneous chalcidoid parasites from Puerto Rico. (Hymenoptera). *Journal of Agriculture of the University of Puerto Rico*, 21 (2), 121–135.
Dozier, H.L. & Williams, L.L. (1929) Bionomics and control of the plum curculio. *Bulletin of the Delaware Agriculture Experiment Station*, 162, 34–37.
Dozier, H.L., Williams, L.L. & Buttler, H.G. (1932) Life history and habits of the plum curculio in Delaware. *Bulletin of the Delaware Agriculture Experiment Station*, 175, 5–43.
Dunbar, D.M. (1974) Bionomics of the Andromeda Lacebug, *Stephanitis takeyai*. *In*: Beard, R.I. (Ed.), *25th Anniversary Mem-*

oirs of the Connecticut Entomological Society, New Haven, Connecticut, pp. 277–289.
Dupuy, M.M. & Ramirez, R.A. (2016) Biology and management of billbugs (Coleoptera: Curculionidae) in turfgrass. *Journal of Integrated Pest Management*, 7 (1), 1–10.
https://doi.org/10.1093/jipm/pmw004
Dysart, R.J. (1971) Distribution of *Anaphes flavipes* in Europe and sources of its importation into the United States. *Entomophaga*, 16 (4), 445–452.
https://doi.org/10.1007/BF02370925
Dysart R.J. (1990) The introduction and recovery in the United States of *Anaphes diana* [Hym.: Mymaridae], an egg parasite of *Sitona* weevils [Col.: Curculionidae]. *Entomophaga*, 35 (3), 307–313.
https://doi.org/10.1007/BF02375254
Dysart, R.J. & Bingham, R.G. (1976) An introduced egg parasite of *Sitona* spp. *18th Forage Insect Research Conference, Ithaca, New York*, 1976, 29.
Dysart, R.J. & Day, W.H. (1976) Release and recovery of introduced parasites of the alfalfa weevil in eastern North America. *United States Department of Agriculture, Agriculture Research Service, Production Research Report*, 167, 1–61.
https://doi.org/10.5962/bhl.title.130551
Dysart, R.J., Maltby, H.L. & Brunson, M.H. (1973) Larval parasites of *Oulema melanopus* in Europe and their colonization in the United States. *Entomophaga*, 18 (2), 133–167.
https://doi.org/10.1007/BF02372026
Eldredge, L.G. & Evenhuis, N.L. (2002) Numbers of Hawaiian species for 2000. Records of the Hawaii Biological Survey for 2000. *Bishop Museum Occasional Papers*, 68, 71–78.
Elerdashvili, N.L. (1987) The biology of a new parasite of eggs of the buffalo treehopper. *In*: Yasnosh, V.A. & Mzhavanadze, A.V. (Eds.), *Biological control of fruit crop pests in Georgia*. Sabchota Sakartvelo, Tbilisi, pp. 81–84. [in Russian]
Ellis, C.R. (1973) Parasitism of *Hypera postica* eggs at Guelph, Ontario, by *Patasson luna* and *Fidiobia rugosifrons*. *Journal of Economic Entomology*, 66 (5), 1059–1061.
https://doi.org/10.1093/jee/66.5.1059
El M'Sadda, K. (1967) Le phytonome de la luzerne "*Hypera variabilis*" Herbst. (Coléoptère, Curculionidae) dans le sud-ouest de la France. *Revue de Zoologie Agricole et Appliquée*, 66 (1–3), 1–15.
English-Loeb, G., Rhainds, M., Martinson, T. & Ugine, T. (2003) Influence of flowering cover crops on *Anagrus* parasitoids (Hymenoptera: Mymaridae) and *Erythroneura leafhoppers* (Homoptera: Cicadellidae) in New York vineyards. *Agricultural and Forest Entomology*, 5 (2), 173–181.
https://doi.org/10.1046/j.1461-9563.2003.00179.x
Enock, F. (1895) An aquatic hymenopterous insect. *Science Gossip*, 2, 89.
https://doi.org/10.1038/052105c0
Enock, F. (1896) Aquatic Hymenoptera. *Nature*, *London*, 54, 28.
Enock, F. (1897) Discovery of the male of *Prestwichia aquatica* in Epping Forest. *Essex Naturalist*, 10, 10–11.
Enock, F. (1909) XI. New genera of British Mymaridae (Haliday). *Transactions of the Entomological Society of London*, 1909, 449–459, pls. XII–XV.
https://doi.org/10.1111/j.1365-2311.1909.tb02179.x
Enock, F. (1911a) A notable record. Capture of a new species of *Mymar*. *Knowledge*, 34 (516), 271–273.
Enock, F. (1911b) A new species of *Mymar*. *Transactions of the Entomological Society of London*, 1911, xxvii–xvix.
Enock, F. (1912 [1911]) Description of a new species of the Hymenopterous genus *Mymar*. *Transactions of the Entomological Society of London*, 1912, cviii–cix.
Enock, F. (1914) Fairy flies and their hosts. *Journal of the Royal Horticultural Society*, 40 (1), 45–49.
Essig, E.O. (1913) Injurious and beneficial insects of California. *Monthly Bulletin of the California State Commission of Horticulture*, 2, 1–801.
Essig, E.O. (1915) Injurious and beneficial insects of California (Second edition). *In*: *Monthly Bulletin of the California State Commission of Horticulture. Supplement.* California state printing office, Sacramento, pp. 1–541.
https://doi.org/10.5962/bhl.title.36435
Essig, E.O. (1929) *Insects of western North America*. Macmillan Co., New York, New York, 1035 pp.
Essig, E.O. (1931) *A history of entomology*. MacMillan, New York, New York, 1029 pp.
Essig, E.O. & Michelbacher, A.E. (1933) The alfalfa weevil. *California Agriculture Experiment Station, Bulletin*, 567, 1–99.
Evenhuis, N.L. (2019) The insect and spider collections of the world. Availabe from: http://hbs.bishopmuseum.org/codens/ (accessed January 2020)
Ewan, H.G. (1961) The Saratoga spittlebug. A destructive pest in red pine plantations. *United States Department of Agriculture Forest Service*, Technical Bulletin 1250, i–iii + 1–52.
Ewing, K.P. & Crawford, H.J. (1939) Egg parasites of the cotton flea hopper. *Journal of Economic Entomology*, 32, 303–305.
https://doi.org/10.1093/jee/32.2.303
Fallahzadeh, M., Huber, J.T. (2011) The occurrence of *Gonatocerus litoralis* (Haliday, 1833) (Chalcidoidea: Mymaridae) in Iran, with a new host record. *Munis Entomology & Zoology*, 6 (1), 297–300.
Fattig, P.W. (1955) The Cicadellidae or leafhoppers of Georgia. *Emory University Museum Bulletin*, 11, 1–68.
Felt, E.P. (1915) Twenty-ninth report of the state entomologist 1913. *New York State Museum*, *Museum Bulletin*, 175, 1–257.

Fenton, F.A. & Hartzell, A. (1923) Bionomics and control of the potato leafhopper, *Empoasca mali* Le Baron. *Iowa State Agricultural Experiment Station Research Bulletin*, 78, 377–440.
Fernald, H.T. (1914) Parasites of the San Jose scale (Hym.). *Entomological News*, 25, 39.
Ferrière, C. (1930) On some egg-parasites from Africa. *Bulletin of Entomological Research*, 21, 33–44. https://doi.org/10.1017/S0007485300021532
Ferrière, C. (1952) Un nouveau genre de Mymaridae. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 25, 41–43.
Fidalgo, P. (1989 [1987]) Revisión de las especies neotropicales del género *Acmopolynema* Ogl. (Hymenoptera: Mymaridae). *Revista de la Sociedad Entomológica Argentina*, 46 (1–4), 3–67.
Fisher, T.W., Schlinger, E.I. & Van Den Bosch, R. (1961) Biological notes on five recently imported parasites of the Egyptian alfalfa weevil, *Hypera brunneipennis*. *Journal of Economic Entomology*, 54 (1), 196–197. https://doi.org/10.1093/jee/54.1.196
Flaherty, D.L., Peacock, W.L. & Jensen, F.L. (1978) Grape pest management in the San Joaquin Valley. *California Agriculture*, 32 (2), 17–18.
Fletcher, J. (1902) Report of the entomologist and botanist. *Annual Report on Experimental Farms for the Year 1901*. Canada Department of Agriculture, Ottawa, pp. 197–262.
Fletchmann, C.H.W. & Castelo, F.P. (1982) On some insects and mites associated with dried and salted fish in Brazil. *Acta Amazonica*, 12, 489–490. https://doi.org/10.1590/1809-43921982122489
Flock, R.A., Doutt, R.L., Dickson, R.C. & Laird, E.F., Jr. (1962) A survey of beet leafhopper egg parasites in the Imperial Valley, California. *Journal of Economic Entomology*, 55, 277–281. https://doi.org/10.1093/jee/55.3.277
Foerster, A. (1841) *Beiträge zur monographie der familie der Pteromalinen. Nees. 1. Heft*. Jacob Anton Mayer, Aachen, 46 pp., XLV (figure legends page) pp., 1 pl. https://doi.org/10.5962/bhl.title.66014
Foerster, A. (1847) Ueber die Familie der Mymariden. *Linnaea Entomologie*, 2, 195–233.
Foerster, A. (1856) *Hymenopterologische Studien. II. Heft. Chalcidiae und Proctotrupii*. Ernst ter Meer, Aachen, 152 pp.
Frison, T.H. (1927) A list of the insect types in the collections of the Illinois State Natural History Survey and the University of Illinois. *Bulletin of the Illinois State Natural History Survey*, 16, 137–309.
Fullaway, D.T. (1944) Description of a new mymarid egg parasite collected at Los Mochis, Sinaloa, Mexico. *Proceedings of the Hawaiian Entomological Society*, 4, 57.
Funasaki, G. (1969) [Note on] *Patasson calendrae* (Gahan). *Proceedings of the Hawaiian Entomological Society*, 20, 285.
Funkhouser, W.D. (1917) Biology of the Membracidae of the Cayuga Lake Basin. *Memoirs of the Cornell University Agricultural Experiment Station*, 2, 176–445. https://doi.org/10.5962/bhl.title.7981
Fursov, V.N. (1994) New data on *Polynema striaticorne* (Hymenoptera, Mymaridae) and its host, buffalo tree hopper, *Stictocephala bisonia* (Homoptera, Membracidae). *Vestnik Zoologii*, 2, 12–19. [in Russian]
Fursov, V. (1995) A review of European Chalcidoidea (Hymenoptera) parasitizing the eggs of aquatic insects. *Bulletin of the Irish Biogeographical Society*, 18 (1), 2–12.
Gahan, A.B. (1913) New Hymenoptera from North America. *Proceedings of the United States National Museum*, 46, 431–443. https://doi.org/10.5479/si.00963801.46-2035.431
Gahan, A.B. (1918) Three new chalcidoid egg parasites. *Proceedings of the Entomological Society of Washington*, 20, 23–26.
Gahan, A.B. (1927a) Description of a new species of Mymaridae parasitic in psocid eggs (Hymn.). *Pan-Pacific Entomologist*, 3 (4), 180–181.
Gahan, A.B. (1927b) Miscellaneous descriptions of new parasitic Hymenoptera with some synonymical notes. *Proceedings of the United States National Museum*, 71, 1–39, 1 pl. https://doi.org/10.5479/si.00963801.71-2676.1
Gahan, A.B. (1932) Miscellaneous descriptions and notes on parasitic Hymenoptera. *Annals of the Entomological Society of America*, 25, 736–757. https://doi.org/10.1093/aesa/25.4.736
Gahan, A.B. (1937) Two new chalcidoid egg parasites (Eulophidae and Mymaridae). *Proceedings of the Entomological Society of Washington*, 39, 266–269.
Gahan, A.B. (1949) The status of the genus *Mymar* Curtis (Hymenoptera: Mymaridae). *Journal of the Washington Academy of Sciences*, 39, 204–205.
Gahan, A.B., Crosby, C.R. & Leonard, M.D. (1928) Superfamily Chalcidoidea. *In*: Leonard, M.D. (Ed.), A list of the insects of New York with a list of the spiders and certain other allied groups. *Memoirs of the Cornell University Agricultural Experiment Station*, 101, pp. 975–985.
Gahan, A.B. & Fagan, M.M. (1923) The type species of the genera of Chalcidoidea or chalcid-flies. *Bulletin of the United States National Museum*, 124, 1–173. https://doi.org/10.5479/si.03629236.124.i

Garman, P., Brigham, W.T. & De Caprio, A. (1953) Control of peach insects. *Connecticut Agricultural Experiment Station, Bulletin*, 575, 1–64.
Garman, P. & Townsend, J.F. (1952) Control of apple insects. *Connecticut Agricultural Experiment Station, Bulletin*, 552, 1–84.
George, R.S. (1981) *Mymar pulchellum* Curtis, 1832 (Hymenoptera, Mymaridae) in Cambridgeshire. *Entomologist=s Gazette*, 32 (3), 202.
Ghesquière, J. (1942) Contribution à l'étude des Hyménoptères du Congo belge. IX. Remarques sur la famille des Mymarides et description d'espèces nouvelles. *Revue de Zoologie et Botanique Africaines*, 36, 317–328.
Gibson, A.G. (1913 [1912]) The entomological record, 1912. *Annual Report of the Entomological Society of Ontario*, 43, 113–140.
https://doi.org/10.5962/bhl.title.65166
Gibson, E.H. (1915) The sharp-headed grain leafhopper. *Bulletin of the United States Department of Agriculture*, 254, 1–16.
https://doi.org/10.5962/bhl.title.108633
Gibson, G.A.P. (1986) Evidence for the monophyly and relationships of Chalcidoidea, Mymaridae, and Mymaommatidae (Hymenoptera: Terebrantes). *Canadian Entomologist*, 118, 205–240.
https://doi.org/10.4039/Ent118205-3
Gibson, G.A.P. (1997) Chapter 2. Morphology and Terminology. *In*: Gibson, G.A.P., Huber, J.T. & Woolley, J.B. (Eds.), *Annotated keys to the genera of Nearctic Chalcidoidea* (*Hymenoptera*). NRC Research Press, Ottawa, pp. 16–44.
Gijswijt, T. (2003) Naamlijst van de Nederlandse Bronswespen (Hymenoptera: Chalcidoidea). *Nederlandse Faunistische Mededelingen*, 18, 17–79.
Gillette, C.P. & Baker, C.F. (1895) A preliminary list of the Hemiptera of Colorado. *Colorado Agricultural Experiment Station Bulletin*, Technical Series 1, 31, 1–137.
Girault, A.A. (1905 [13]) *Anaphes conotracheli* sp.nov. An important egg parasite. *Entomological News*, 16, 220.
Girault, A.A. (1905 [15]) Two new Mymaridae. *Psyche*, 12, 91–92.
https://doi.org/10.1155/1905/64916
Girault, A.A. (1905 [16]) Descriptions of two new hymenopterous egg-parasites. *Entomological News*, 16, 287–289.
Girault, A.A. (1907 [27]) Hosts of insect egg-parasites in North and South America. *Psyche*, 14, 27–39.
https://doi.org/10.1155/1907/52586
Girault, A.A. (1908 [51]) A monographic catalogue of the mymarid genus *Alaptus* Haliday, with descriptions of three new North American forms and of *Alaptus iceryae* Riley from type material. *Annals of the Entomological Society of America*, 1, 179–195.
https://doi.org/10.1093/aesa/1.3.179
Girault, A.A. (1908 [55]) Descriptions of three new North American Chalcidoidea of the subfamilies Mymarinae and Aphelininae. *Psyche*, 15, 115–121.
https://doi.org/10.1155/1908/513972
Girault, A.A. (1909 [57]) A monographic catalogue of the mymarid genus *Camptoptera* Foerster, with description of one new North American form. *Annals of the Entomological Society of America*, 2, 22–29.
https://doi.org/10.1093/aesa/2.1.22
Girault, A.A. (1909 [61]) A new chalcidoid genus and species of the family Mymaridae from Illinois, parasitic on the eggs of the weevil *Tyloderma foveolatum* (Say). *Journal of the New York Entomological Society*, 17, 167–171.
Girault, A.A. (1909 [62]) *Oligosita amerigana* Ashmead species nova, a new chalcidoid of the family Trichogrammidae from Illinois. *Psyche*, 16, 106–110.
https://doi.org/10.1155/1909/91454
Girault, A.A. (1910 [69]) Synonymic and descriptive notes on the chalcidoid family Mymaridae. *Journal of the New York Entomological Society*, 18, 233–259.
Girault, A.A. (1911 [72]) Descriptions of three new North American species of the mymarid genus *Polynema* Haliday parasitic on membracid eggs, with a list of species described since the year 1898. *Journal of the New York Entomological Society*, 19, 12–23.
Girault, A.A. (1911 [73]) An egg-parasite of the codling moth belonging to the family Mymaridae. *Canadian Entomologist*, 43, 133–134.
https://doi.org/10.4039/Ent43133-4
Girault, A.A. (1911 [75]) A supposed occurrence of *Anagrus incarnatus* Haliday in the United States (Hym.). *Entomological News*, 22, 207–210.
Girault, A.A. (1911 [76]) The occurrence of the mymarid genus *Anaphoidea* Girault in England (Hymen.). *Entomological News*, 22, 215–216.
Girault, A.A. (1911 [82]) The occurrence of the mymarid genus *Stethynium* Enock in West Australia. *Proceedings of the Entomological Society of Washington*, 13, 120–123.
Girault, A.A. (1911 [84]) The occurrence of the mymarid genus *Mymar* Haliday in North America. *Journal of the New York Entomological Society*, 19, 92–96.
Girault, A.A. (1911 [87]) Hosts of insect egg-parasites in North and South America. II. *Psyche*, 18, 146–153.
https://doi.org/10.1155/1911/727548

Girault, A.A. (1911 [89]) Synonymic and descriptive notes on the Hymenoptera Chalcidoidea with descriptions of several new genera and species. *Archiv für Naturgeschischte*, 77, Band 1 (Supplment H.2), 119–140.
Girault, A.A. (1911 [90]) A new mymarid genus and species from North America allied with *Anthemus* Howard. *Proceedings of the Entomological Society of Washington*, 13, 185–187.
Girault, A.A. (1911 [91]) Notes on the Hymenoptera Chalcidoidea, with descriptions of several new genera and species. *Journal of the New York Entomological Society*, 19, 175–189.
Girault, A.A. (1911 [93]) The probable occurrence of the mymarid genus *Dicopus* Enock in North America (Hymen.). *Entomological News*, 22, 347–349.
Girault, A.A. (1911 [94]) A new *Polynema* from Mexico (Hymen.). *Entomological News*, 22, 358.
Girault, A.A. (1911 [95]) Critical notes on some species of Mymaridae (Hymen.). *Entomological News*, 22, 363–368.
Girault, A.A. (1911 [96]) Descriptions of North American Mymaridae with synonymic and other notes on described genera and species. *Transactions of the American Entomological Society*, 37, 253–324.
Girault, A.A. (1911 [100]) The occurrence of *Polynema consobrinus* Girault in Georgia. *Entomological News*, 22, 467.
Girault, A.A. (1912 [107]) On the occurrence of a European species of Mymaridae in North America. *Canadian Entomologist*, 44, 88–89.
https://doi.org/10.4039/Ent4488-3
Girault, A.A. (1912 [108]) On the probable occurrence of the mymarid genus *Dicopus* Enock in Fiji. *Proceedings of the Entomological Society of Washington*, 14, 22–23.
Girault, A.A. (1912 [109]) A new species of the mymarid genus *Polynema* Haliday from British Columbia. *Proceedings of the Entomological Society of Washington*, 14, 23–24.
Girault, A.A. (1912 [110]) The occurrence of the mymarid genus *Stephanodes* Enock in North America. *Journal of the New York Entomological Society*, 20, 40–44.
Girault, A.A. (1912 [112]) Notes on the Hymenoptera Chalcidoidea. *Entomological News*, 23, 296–299.
Girault, A.A. (1912 [120]) Australian Hymenoptera Chalcidoidea—II. The family Mymaridae with description of new species. *Memoirs of the Queensland Museum*, 1, 117–175.
https://doi.org/10.5962/bhl.title.9562
Girault, A.A. (1913 129]) Fragments on North American insects—III. *Entomological News*, 24, 53–63.
Girault, A.A. (1913 [135]) Critical notes on some species of Mymaridae from the Sandwich (Hawaiian) Islands, with comparative notes on Australian, North American, and European forms. (Hymenoptera; Chalcidoidea). *Proceedings of the Entomological Society of Washington*, 15, 9–20.
Girault, A.A. (1913 [137]) Fragments on North American insects—IV. *Entomological News*, 24, 195–197.
Girault, A.A. (1913) [147] A second addition to the Australian Hymenoptera, Mymaridae. *Canadian Entomologist*, 45, 216–220.
https://doi.org/10.4039/Ent45216-7
Girault, A.A. (1913 [149]) A second new genus of chalcidoid Hymenoptera of the family Mymaridae from Australia. *Canadian Entomologist*, 45, 276.
https://doi.org/10.4039/Ent45276-8
Girault, A.A. (1913 [155]) Additions to the Mymaridae and Trichogrammatidae of Australia. *Entomologist*, 46, 255–259.
Girault, A.A. (1913 [165]) Australian Hymenoptera Chalcidoidea CII. Supplement. *Memoirs of the Queensland Museum*, 2, 107–129.
https://doi.org/10.5962/bhl.title.9562
Girault, A.A. (1914 [187]) Hosts of insect eggparasites in Europe, Asia, Africa and Australasia, with a supplementary American list. *Zeitschrift für wissenshaftliche Insektbiologie*, 10, 175–178.
Girault, A.A. (1914 [219]) Descriptions of new chalcid-flies. *Proceedings of the Entomological Society of Washington*, 16, 109–119.
Girault, A.A. (1915 [228]) Australian Hymenoptera Chalcidoidea—II. Second supplement. *Memoirs of the Queensland Museum*, 2, 154–169.
Girault, A.A. (1915 [256]) Some new chalcidoid Hymenoptera from North and South America. *Annals of the Entomological Society of America*, 8, 272–278.
https://doi.org/10.1093/aesa/8.3.272
Girault, A.A. (1915 [261]) Notes on North American Mymaridae and Trichogrammatidae (Hym.). *Entomological News*, 27, 4–8.
Girault, A.A. (1916 [264]) Two new Mymaridae from the eastern United States. *Entomological News*, 27, 69–70.
Girault, A.A. (1916 [265]) Description of eleven new species of chalcid flies. *Canadian Entomologist*, 48, 100–103.
https://doi.org/10.4039/Ent48100-3
Girault, A.A. (1916 [265a]) Liste neuerdings beschriebener oder gezogener Parasiten und ihrer Wirte. V. Forsetzung. *Societas Entomológica*, 31, 39–40 + 50 + 60.
Girault, A.A. (1916 [270]) Descriptiones Hymenopterorum Chalcidoidicorum variorum cum observationibus. III. *Entomological News*, 27, 223–228.
Girault, A.A. (1916 [287]) New miscellaneous chalcidoid Hymenoptera with notes on described species. *Annals of the Entomological Society of America*, 9, 291–308.

https://doi.org/10.1093/aesa/9.3.291
Girault, A.A. (1916 [300]) New species of parasitic Hymenoptera. *Bulletin of the Brooklyn Entomological Society*, New Series, 11, 111–113.
Girault, A.A. (1917 [301]) Descriptions of miscellaneous chalcid-flies. *Insecutor Inscitiae Menstruus*, 4 (10–12), 109–121.
Girault, A.A. (1917 [303]) Descriptiones Hymenopterorum Chalcidoidicorum cum observationibus. IV. *The Entomologist*, 50, 36–38.
Girault, A.A. (1917 [316]) *Descriptiones stellarum novarum*. Privately printed, Hillmead Press, Glendale, Maryland, 22 pp.
Girault, A.A. (1917 [323]) New miscellaneous chalcid-flies from North America. *Psyche*, 24, 91–98.
https://doi.org/10.1155/1917/21718
Girault, A.A. (1917 [324]) A new species of the genus *Mymar* from the woods of Maryland with an important descriptive note. *Psyche*, 24, 99–100.
https://doi.org/10.1155/1917/69015
Girault, A.A. (1917 [330]) *Descriptiones Hymenopterorum Chalcidoidicorum cum observationibus*. *V*. Privately printed, Hillmead Press, Glendale, Maryland, 16 pp.
Girault, A.A. (1917 [331]) Notes and descriptions of miscellaneous chalcid-flies (Hymenoptera). *Proceedings of the United States National Museum*, 53, 445–450.
https://doi.org/10.5479/si.00963801.2213.445
Girault, A.A. (1917 [332]) *Chalcidoidea nova marilandensis*. *III*. Privately printed, Glenndale, Maryland, 6 pp.
Girault, A.A. (1917 [336]) New chalcid flies, with notes. *Bulletin of the Brooklyn Entomological Society*, New Series, 12, 86–89.
Girault, A.A. (1928 [420]) Australian chalcid-wasps. *Victorian Naturalist*, 44, 261–263.
Girault, A.A. (l929 [428]) *North American Hymenoptera Mymaridae. Addendum. New insects, mostly Australian*. Privately printed, Brisbane, 27 pp. [pp. 28–29]
Girault, A.A. (1930 [433]) *New pests from Australia. VIII*. Privately printed, Brisbane, 5 pp.
Girault, A.A. (1933 [440]) *Some beauties inhabitant not of commercial boudoirs but of nature's bosom, notably new insects*. Privately printed, Brisbane, 5 pp.
Glick, P.A. (1939) The distribution of insects, spiders, and mites in the air. *United States Department of Agriculture, Technical Bulletin*, 673, 1–150.
Gokhman, V.E. (2000) Karyotype of *Anaphes iole* (Hymenoptera, Mymaridae) and evolution of chromosome numbers in Chalcidoidea. *Zoologicheskii Zhurnal*, 79 (12), 1485–1487. [in Russian]
Gonsalves, R.M. (2003) Curatorial report on the midway arthropod collection. *Hawaii Biological Survey*, Contribution No. 2003–020, 1–10.
González, D. (1988) Biotypes in biological control – Examples with populations of *Aphidius ervi*, *Trichogramma pretiosum*, and *Anagrus epos* (parasitic Hymenoptera). *In*: Gupta, V. (Ed.), *Advances in parasitic Hymenoptera research. Proceedings of the II Conference on the Taxonomy and Biology of Parasitic Hymenoptera, University of Florida, Gainesville, Florida, 19–21 November 1987*. E.J. Brill, Leiden, pp. 475–482.
González, D., Cervenka, V., Moratorio, M., Pickett, C. & Wilson, L.T. (1988) Biological control of variegated leafhopper in grapes *California Agriculture*, 42 (1), 23–25.
Gordh, G. & Dunbar, D.M. (1977) A new *Anagrus* important in the biological control of *Stephanitis takeyai* and a key to the North American species. *Florida Entomologist*, 60, 85–95.
https://doi.org/10.2307/3494381
Gordon, R., Ellington, J., Faubion, G., Ferguson, G. & Graham, H. (1987) A survey of the insect parasitoids from alfalfa and associated weeds in New Mexico. *Southwestern Entomologist*, 12, 335–350.
Gould, W.P. (1986) *The biology and phenology of Anaphes luna and Anaphes fuscipennis, egg parasites of Hypera spp., and the phenology of the alfalfa weevil [Hypera postica] in northern and southern Wisconsin*. Ph. D. dissertation, University of Wisconsin-Madison, Madison, Wisconsin, 118 pp.
Gould, E. & Geissler, G.H. (1940) Parasites of the pistol case-bearer. *Journal of Economic Entomology*, 33, 814–815.
https://doi.org/10.1093/jee/33.5.814a
Grafton-Cardwell, E.E. & Haines, D. (2001) Evaluation of efficacy of Sevin® treatments in Porterville GWSS infestation. *In*: Tariq, M.A., Oswalt, S. and Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 35–36.
Grafton-Cardwell, E.E. & Kallsen, C. (2001) Efficacy of insecticides used for glassy-winged sharpshooter control in citrus. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 32–34.
Graham, H.M. & Jackson, C.G. (1982) Distribution of eggs and parasites of *Lygus* spp. (Hemiptera: Miridae), *Nabis* spp. (Hemiptera: Nabidae), and *Spissistilus festinus* (Say) (Homoptera: Membracidae) on plant stems. *Annals of the Entomological Society of America*, 75 (1), 56–60.
https://doi.org/10.1093/aesa/75.1.56
Graham, H.M., Jackson, C.G. & Debolt, J.W. (1986) *Lygus* spp. (Hemiptera: Miridae) and their parasites in agricultural areas of

southern Arizona. *Environmental Entomology*, 15, 132–142.
https://doi.org/10.1093/ee/15.1.132
Graham, H.M., Jackson, C.G. & Lakin, K.R. (1984) Comparison of two methods of using the D-vac to sample mymarids and their hosts in alfalfa. *Southwestern Entomologist*, 9 (3), 249–252.
Graham, M.W.R. de V. (1979) The Chalcidoidea (Hymenoptera) of Madeira: a preliminary list. *Entomologist's Gazette*, 30, 271–287
Graham, M.W.R. de V. (1982) The Haliday collection of Mymaridae (Insecta, Hymenoptera, Chalcidoidea) with taxonomic notes on some material in other collections. *Proceedings of the Royal Irish Academy*, B, 82, 189–243.
Graham, M.W.R. de V. (1983) Madeira insects: faunal notes, additions and descriptions of new species of Chalcidoidea (Hymenoptera). *Boletin do Museu Municipal do Funchal*, 35 (151), 5–40.
Grandgirard, J., Hoddle, M.S., Petit, J.N., Percy, D., Roderick, G.K. & Davies, N. (2007a) Pre-introductory risk assessment studies of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) for use as a classical biological control agent against *Homalodisca vitripennis* (Hemiptera: Cicadellidae) in the Society Islands of French Polynesia. *Biocontrol Science and Technology*, 17 (8), 809–822.
https://doi.org/10.1080/09583150701527573
Grandgirard, J., Hoddle, M.S., Petit, J.N., Roderick, G.K. & Davies, N. (2008a) Engineering an invasion: classical biological control of the glassy-winged sharpshooter, *Homalodisca vitripennis*, by the egg parasitoid *Gonatocerus ashmeadi* in Tahiti and Moorea, French Polynesia. *Biological Invasions*, 10 (2), 135–148.
https://doi.org/10.1007/s10530-007-9116-y
Grandgirard, J., Hoddle, M.S., Petit, J.N., Roderick, G.K. & Davies, N. (2008b). Engineering an invasion in tropical islands: classical biological control of the glassy-winged sharpshooter, *Homalodisca vitripennis*, by the egg parasitoid *Gonatocerus ashmeadi* in French Polynesia. *In*: Mason, P.G., Gillespie, D.R. & Vincent, C. (Eds.), *Proceedings of the Third International Symposium on Biological Control of Arthropods, Christchurch, New Zealand, 8–13 February 2009*. *FHTET-2008-06, December 2008*. United States Department of Agriculture, Forest Service, Morgantown, West Virginia, pp. 99–107.
Grandgirard, J., Hoddle, M.S., Petit, J.N., Roderick, G.K. & Davies, N. (2009) Classical biological control of the glassy-winged sharpshooter, *Homalodisca vitripennis*, by the egg parasitoid *Gonatocerus ashmeadi* in the Society, Marquesas and Austral archipelagos of French Polynesia. *Biological Control*, 48, 155–163.
https://doi.org/10.1016/j.biocontrol.2008.10.005
Grandgirard, J., Hoddle, M.S., Roderick, G.K., Petit, J.N., Percy, D., Putoa, R., Garnier, C.L. & Davies, N. (2006) Invasion of French Polynesia by the glassy-winged sharpshooter, *Homalodisca coagulata* (Hemiptera: Cicadellidae): a new threat to the South Pacific. *Pacific Science*, 60, 429–438.
https://doi.org/10.1353/psc.2006.0028
Grandgirard, J., Hoddle, M.S., Triapitsyn, S.V., Petit, J.N., Roderick, G.K. & Davies, N. (2007b) First records of *Gonatocerus dolichocerus* Ashmead, *Palaeoneura* sp., *Anagrus* sp. (Hymenoptera: Mymaridae), and *Centrodora* sp. (Hymenoptera: Aphelinidae) in French Polynesia, with notes on egg parasitism of the glassy-winged sharpshooter, *Homalodisca vitripenni*s (Germar) (Hemiptera: Cicadellidae). *Pan-Pacific Entomologist*, 83, 177–184.
https://doi.org/10.3956/0031-0603-83.3.177
Grebennikov, V.V. (2008) How small can you go: factors limiting body miniaturization in winged insects with a review of the pantropical genus *Discheramocephalus* and description of six new species of the smallest beetles (Pterygota: Coleoptera: Ptiliidae). *European Journal of Entomology*, 105, 313–328.
https://doi.org/10.14411/eje.2008.039
Groves, R.L. & Johnson, M.W. (2005) Dispersal and movement of the glassy-winged sharpshooter and associated natural enemies in a continuous, deficit-irrigated agricultural landscape. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 105–108
Groves, R.L. & Johnson, M.W. (2006) Dispersal and movement of the glassy-winged sharpshooter and associated natural enemies in a continuous, deficit-irrigated agricultural landscape. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 8–11.
Gunawardana, D., Ashcroft, T., Braithwaite, M. & Poeschko, M. (2008) Bio-control for glassy winged sharpshooter in Cook Islands. *Biosecurity*, 85, 12–13.
Guo, J.-W., Wang, H.-Q., Lin, N.-Q. & Hu, H.-Y. (2011) Two new species of the genus *Camptoptera* Förster (Hymenoptera, Mymaridae) from Xinjiang. *Acta Zootaxonomica Sinica*, 36 (2), 408–413.
Gupta, A. & Poorani, J. (2008) New distribution and host records of Chalcidoidea (Insecta: Hymenoptera) from various parts of India. *Check List*, 4 (4), 410–414.
https://doi.org/10.15560/4.4.410
Gut, L.J. & Brunner, J.F. (1998) Pheromone-based management of codling moth (Lepidoptera: Tortricidae) in Washington apple orchards. *Journal of Agricultural Entomology*, 15 (4), 387–406.
Gutierrez, A.P., Ponti, L., Hoddle, M., Almeida, R.P.P. & Irvin, N.A. (2011) Geographic distribution and relative abundance of the invasive glassy-winged sharpshooter: effects of temperature and egg parasitoids. *Environmental Entomology*, 40 (4), 755–769.

https://doi.org/10.1603/EN10174
Guzmán-Larralde, A.J., Huber, J.T. & Quiroz Martínez, H. (2017) Generic key and catalogue of Mymaridae (Hymenoptera) of Mexico, *Zootaxa*, 4254 (1), 1–38.
https://doi.org/10.11646/zootaxa.4254.1.1
Hagen, K.S. (1956) Aquatic Hymenoptera. *In*: Usinger, R.L. (Ed.), *Aquatic insects of California*. University of California Press, Berkeley, California, pp. 289–292.
Haghayeghi-Nosrati, F., Ghajarieh, H., Lotfalizadeh, H. & Triapitsyn, S.V. (2014a) New record of *Stephanodes similis* (Hym.: Mymaridae) from Iran. *Journal of the Entomological Society of Iran*, 34 (2), 47.
Haghayeghi-Nosrati, F., Lotfalizadeh, H. & Ghajarieh, H. (2014b) Species of the genus *Gonatocerus* (Hym.: Mymaridae) in East-Azerbaijan Province. *Applied Entomology and Phytopathology*, 81 (2), 143–152.
Hagler, J.R. & Jackson, C.G. (1998) An immunomarking technique for labeling minute parasitoids. *Environmental Entomology*, 27 (4), 1010–1016.
https://doi.org/10.1093/ee/27.4.1010
Haliday, A.H. (1833a) Essay on the classification of the parasitic Hymenoptera of Britain, which correspond with the Ichneumones minuti of Linnaeus. *Entomological Magazine*, 1 (3), 259–276.
Haliday, A.H. (1833b) An essay on the classification of the parasitic Hymenoptera, etc. (Continued). *Entomological Magazine*, 1 (4), 333–350.
Hambäck, P.A. & Björkman, C. (2002) Estimating the consequences of apparent competition: a method for host-parasitoid interactions. *Ecology*, 83 (6), 1591–1596.
https://doi.org/10.2307/3071979
Hamlin, J.C., Lieberman, F.V., Bunn, R.W., McDuffie, W.C., Newton, R.C. & Jones, L.J. (1949) Field studies of the alfalfa weevil and its environment. *United States Department of Agriculture, Technical Bulletin*, 975, 1–84.
Hance, Th. & Boivin, G. (1992) Etude de la resistance au froid des oeufs parasités et non parasités du charançon *Listronotus oregonensis* (Le Conte) (Col., Curculionidae). *Mémoires de la Société Royale d'Entomologie de Belgique*, 35 (1), 293–299.
Hance, Th. & Boivin G. (1993) Effect of parasitism by *Anaphes* sp. (Hymenoptera: Mymaridae) on the cold hardiness of *Listronotus oregonensis* (Coleoptera: Curculionidae) eggs. *Canadian Journal of Zoology*, 71 (4), 759–764.
https://doi.org/10.1139/z93-100
Hanks, L.M., Millar, J.G., Paine, T.D. & Campbell, C.D. (2000) Classical biological control of the Australian weevil *Gonipterus scutellatus* (Coleoptera: Curculionidae) in California. *Environmental Entomology*, 29, 369–375.
https://doi.org/10.1093/ee/29.2.369
Harcourt, D.G., Guppy, J.C. & Binns, M.R. (1977) The analysis of intrageneration change in eastern Ontario populations of the alfalfa weevil, *Hypera postica* (Coleoptera: Curculionidae). *Canadian Entomologist*, 109 (12), 1521–1534.
https://doi.org/10.4039/Ent1091521-12
Harding, L. (1930) The biology of *Opsius stactogalus* Fieber (Homoptera, Cicadellidae). *Journal of the Kansas Entomological Society*, 3 (1), 7–20, 2 pls.
Hart, C.A. (1895) On the entomology of the Illinois River and adjacent waters. *Illinois Natural History Survey, Bulletin*, 4, 149–273.
Hayat, M. (1977) *Mymar taprobanicum* Ward, a new record for Rajasthan, India (Hym.: Chalcidoidea, Mymaridae). *Newsletter of the Zoological Survey of India*, 3 (5), 283.
Hayat, M. (1992) Records of some Mymaridae from India, with notes (Hymenoptera: Chalcidoidea). *Hexapoda* 4 (1), 83–89.
Hayat, M. & Anis, S.B. (1999a) The Indian species of *Polynema* with notes on *Stephanodes reduvioli* (Hymenoptera: Mymaridae). *Oriental Insects*, 33, 315–331.
https://doi.org/10.1080/00305316.1999.10433797
Hayat, M. & Anis, S.B. (1999b) The Indian species of *Acmopolynema* with notes on *Acanthomymar* (Hymenoptera: Chalcidoidea: Mymaridae). *Oriental Insects*, 33, 297–313.
https://doi.org/10.1080/00305316.1999.10433796
Hayat, M. & Anis, S.B. (1999c) New record of two genera *Ptilomymar* and *Himopolynema* from India, with descriptions of two new species (Hymenoptera: Mymaridae). *Shashpa*, 6 (1), 15–22.
Hayat, M., Anis, S.B. & Khan, F.R. (2008) Descriptions of two new species of Mymaridae (Hymenoptera: Chalcidoidea) from India, with some records. *Oriental Insects*, 42, 327–333.
https://doi.org/10.1080/00305316.2008.10417557
Hedqvist, K.J. (1962) *Herulia* gen. n. *sundholmi* sp.n., eine neue Mymaridengattung mit einer neuen Art von Schweden (Hym. Chalcidoidea, Mymaridae). *Opuscula Entomologica*, 27, 103–105.
Hedqvist, K.-J. (2004) New genus and species of Braconidae, Elasmidae and Mymaridae (Ichneumonoidea and Chalcidoidea) from Sri Lanka. *In*: Rajmohana, K., Sudheer, K., Girish Kumar, P. & Santosh, S. (Eds.), *Perspectives on biosystematics and biodiversity. Prof. T.C Narendran commemoration volume*. Systematic Entomology Research Scholars Association (SERSA), Kerala, pp. 233–240.
Helden, M. van & Decant, D. (2001) The possibilities for conservation biocontrol as a management strategy against *Empoasca vitis*. *IOBC/wprs Bulletin*, 24 (7), 291–297.
Hellén, W. (1960) *Mymar pulchellus* Curt. fran Finland. *Notulae Entomologicae*, 40, 154.
Hellén, W. (1968) För Finlands fauna nya Mymaridae (Hymenoptera, Chalcididae). *Notulae Entomologicae*, 48, 34.

Hellén, W. (1974) Die Mymariden Finnlands (Hymenoptera: Chalcidoidea). *Fauna Fennica*, 25, 1–31.
Henderson, C.F. (1941) Apparatus and technique for the study of the egg parasites of the beet leafhopper. *United States Department of Agriculture*, Circular 593, 1–18.
Hendrick, R.D. & Stern, V.M. (1970) Biological studies of three parasites of *Nabis americoferus* (Hemiptera: Nabidae) in southern California. *Annals of the Entomological Society of America*, 63, 382–391. https://doi.org/10.1093/aesa/63.2.382
Heqvist, K.-J. (1954) Zwei neue Mymariden (*Hym.*) aust Schweden. *Entomologisk Tidskrift*, 75 (2–4), 272–275.
Heraty, J.M., Burks, R.A., Cruaud, A., Gibson, G.A.P., Liljeblad, J., Munro, J., Rasplus, J.-Y., Delvare, G., Janšta, P., Gumovsky, A., Huber, J., Woolley, J.B., Krogmann, L., Heydon, S., Polaszek, A., Schmidt, S., Darling, D.C., Gates, M.W., Mottern, J., Murray, E., Dal Molin, A., Triapitsyn, S., Baur, H., Pinto, J.D., van Noort, S., George, J. & Yoder, M. (2013) A phylogenetic analysis of the megadiverse Chalcidoidea (Hymenoptera). *Cladistics*, 29, 466–542. https://doi.org/10.1111/cla.12006
Herrmann, J.V. & Eichler, P. (2000) Epidemiological studies of the grape leafhopper *Empoasca vitis* Goethe and its antagonistic egg parasitoids in the Franconian wine growing region (Germany). *IOBC/wprs Bulletin*, 23 (4), 115–121.
Herting, B. (1971) Arachnida to Heteroptera. *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*. *Vol. 1.* Commonwealth Agricultural Bureaux, Slough, 129 pp
Herting, B. (1972) Homoptera. *In*: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*. *Vol. 1.* Commonwealth Agricultural Bureaux, Slough, 210 pp.
Herting, B. (1973) Coleoptera to Strepsiptera. *In*: *A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*. Commonwealth Agricultural Bureaux, Institute of Biological Control, 3, 1–185.
Hincks, W.D. (1950) Notes on some British Mymaridae (Hym.). *Transactions of the Society for British Entomology*, 10 (4), 167–207.
Hincks, W.D. (1952) The British species of the genus *Ooctonus* Haliday, with a note on some recent work on the fairy flies (Hym., Mymaridae). *Transactions of the Society for British Entomology*, 11 (7), 153–163.
Hincks, W.D. (1959) The British species of the genus *Alaptus* Haliday *in* Walker (Hym., Chalc., Mymaridae). *Transactions of the Society for British Entomology*, 13 (8), 137–148.
Hincks, W.D. (1960) Some additions to the British Mymaridae (Hym., Chalcidoidea). *Entomologist's Monthly Magazine*, 95, 210–216.
Hinton, H.E. (1981) *Biology of insect eggs in three volumes*. *Vol. II*. Pergamon Press, Oxford, pp. i–xviii + 475–778. https://doi.org/10.1016/B978-1-4832-8401-9.50018-0
Hirashima, Y., Aizawa, K., Miura, T. & Wongsiri, T. (1979) Field studies on the biological control of leafhoppers and planthoppers (Hemiptera: Homoptera) injurious to rice plants in south-east Asia. Progress report for the year 1977. *Esakia*, 13, 1–20.
Hoddle, M.S. (2002) Interspecific competition between *Gonatocerus ashmeadi* and *G. triguttatus* for glassy-winged sharpshooter egg masses. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 86–87.
Hoddle, M.S. (2003a) Interspecific competition between *Gonatocerus ashmeadi*, *G. triguttatus,* and *G. fasciatus* for glassy-winged sharpshooter egg masses. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 250–254.
Hoddle, M.S. (2003b) Investigating the behavior and biology of exotic mymarid parasitoids released for glassy-winged sharpshooter control, and evaluating techniques for enhancement in the field. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 255–256.
Hoddle, M.S. (2003c) Searching for and collecting egg parasitoids of the glassy-winged sharpshooter in the central and eastern USA. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, December 8–11, 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 261–262.
Hoddle, M.S. (2004a) Identification of the native parasitoid fauna associated with *Graphocephala atropunctata* and host specificity testing of *Gonatocerus ashmeadi* on *Homalodisca liturata*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 111–114.
Hoddle, M.S. (2004b) Realized lifetime parasitism and the influence of brochosomes on field parasitism rates of glassy-winged sharpshooter egg masses by *Gonatocerus ashmeadi*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 334–335.
Hoddle, M.S. (2004c) Reproductive and developmental biology of *Gonatocerus ashmeadi*, an egg parasitoid of the glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. Califor-

nia Department of Food and Agriculture, Sacramento, California, pp. 336–338.
Hoddle, M.S. (2005a) Realized lifetime parasitism of glassy-winged sharpshooter egg masses by *Gonatocerus ashmeadi*. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego, California, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 330–333.
Hoddle, M.S. (2005b) Reproductive and developmental biology of G*onatocerus ashmeadi*, an egg parasitoid of the glassy-winged sharpshooter. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego, California, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 334–337.
Hoddle, M.S. (2006a) Are glassy-winged sharpshooter populations regulated in California? Long-term phenological studies and construction of multi-cohort life tables for the glassy-winged sharpshooter in citrus orchards. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 73–75.
Hoddle, M.S. (2006b) Realized lifetime parasitism and the influence of brochosomes on field parasitism rates of glassy-winged sharpshooter egg masses by *Gonatocerus ashmeadi. In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 80–83
Hoddle, M.S. (2008a) Are glassy-winged sharpshooter populations regulated in California? Long-term phenological studies for glassy-winged sharpshooter in an organic lemon orchard. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2008 Pierce's Disease Research Symposium, Westin Camp Quarter Hotel, San Diego, 15–17 December 2008*. California Department of Food and Agriculture, Sacramento, California, pp 63–65.
Hoddle, M.S. (2008b) Should neoclassical biological control agents from Argentina be released in California for control of the glassy-winged sharpshooter? *In*: Esser, T. (Chief Ed.), *Proceedings of the 2008 Pierce's Disease Research Symposium, Westin Camp Quarter Hotel, San Diego, 15–17 December 2008*. California Department of Food and Agriculture, Sacramento, California, pp. 66–69.
Hoddle, M.S. (2009) Are glassy-winged sharpshooter (GWSS) populations regulated in California? Long-term phenological studies for GWSS in an organic lemon orchard. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2009 Pierce's Disease Research Symposium, Doubletree Hotel, Sacramento, 9–11 December 2009*. California Department of Food and Agriculture, Sacramento, California, pp. 19.
Hoddle, M.S. (2010) Are natural enemies controlling glassy-winged sharpshooter populations in southern California? *In*: Esser, T. (Chief Ed.), *Proceedings of the 2010 Pierce's Disease Research Symposium, Manchester Grant Hyatt Hotel, San Diego, 15–17 December 2010*. California Department of Food and Agriculture, Sacramento, California, pp. 16–19.
Hoddle, M.S. & Boyd, E.A. (2005) Oviposition and native parasitoids of the blue-green sharpshooter, and host specificity of *Gonatocerus ashmeadi* on the smoketree sharpshooter and the blue-green sharpshooter. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 325–319.
Hoddle, M.S. & Boyd, E.A. (2006) Non-target impact of the glassy-winged sharpshooter parasitoids *Gonatocerus ashmeadi* and *G. fasciatus* on sharpshooters native to California, with notes on indeginous parasitoids of the blue-green sharpshooter and the green sharpshooter. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 88–91.
Hoddle, M.S. & Irvin, N. (2007) Should neoclassical biological control agents from Argentina be released in California for control of the glassy-winged sharpshooter? *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 90–93.
Hoddle, M.S., Phillips, P. & Triapitsyn, S. (2001) Survey of egg parasitoids of glassy-winged sharpshooter in California. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings, 2001 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, p. 95.
Hoddle, M.S. & Stouthamer, R. (2002) Is the glassy-winged sharpshooter parasitoid *Gonatocerus morrilli* one species or a complex of morphologically indistinguishable sibling species? *In*: Tariq, M.A., Oswalt, S., Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, California*, 15–18 December 2002, pp. 93.
Hoddle, M.S. & Stouthamer, R. (2003) Is the glassy-winged sharpshooter parasitoid *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) one species or a complex of morphologically indistinguishable sibling species? *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 257–260.
Hoddle, M.S. & Stouthamer, R. (2004) Is the glassy-winged sharpshooter parasitoid *Gonatocerus morrilli* one species or a complex of closely related sibling species? *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10*

December 2004. California Department of Food and Agriculture, Sacramento, California, pp. 115–116.
Hoddle, M.S. & Stouthamer, R. (2005) Is the glassy-winged sharpshooter parasitoid *Gonatocerus morrilli* one species or a complex of closely related sibling species? *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego, California, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 338–340.
Hoddle, M.S. & Triapitsyn, S. (2004a) Searching for and collecting egg parasitoids of glassy-winged sharpshooter and other *Homalodisca* species in southeastern and southwestern Mexico. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 339–341.
Hoddle, M.S. & Triapitsyn, S. (2004b) Searching for and collecting egg parasitoids of glassy-winged sharpshooter in the central and eastern USA. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 342–344.
Hoddle, M.S. & Triapitsyn, S. (2005) Maintaining and evaluating quarantine cultures of *Gonatocerus* spp., promising egg parasitoids from Argentina and Mexico, for the classical biological control of the glassy-winged sharpshooter in California. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 341–342.
Hodgkiss, H.E. (1910) The apple and pear membracids. *New York State Agricultural Experiment Station* (*Geneva*), *Technical Bulletin*, 17, 1–112, 8 pls.
Hoebeke, E.R. (1980) *Catalogue of the Hymenoptera types in the Cornell University insect collection. Part I. Symphyta and Apocrita* (*Parasitica*). *Cornell University Agricultural Experiment Station 9*. Cornell University Agricultural Experiment Station, Ithaca, New York, 36 pp.
Hoffmann, C. (1932) Hymenopterous parasites from the eggs of aquatic and semi-aquatic insects. *Journal of the Kansas Entomological Society*, 5 (2), 33–37.
Hogg, D.B. & Kingsley, P.C. (1983) Parasitization by *Patasson luna* (Hymenoptera: Mymaridae) of alfalfa weevil (Coleoptera: Curculionidae) eggs laid in green alfalfa stems and in litter. *Journal of Economic Entomology*, 76 (1), 54–56. https://doi.org/10.1093/jee/76.1.54
Holloway, T.E. & Loftin, U.C. (1919) Insects attacking sugar cane in the United States. *Journal of Economic Entomology*, 12, 448–450. https://doi.org/10.1093/jee/12.6.448
Holman, J. (2002) The natural enemies of San Jose scale (*Quadraspidiotus perniciosus* Comstock) from the order Hymenoptera in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 50 (3), 41–54. [in Czech]
Honda, J.Y. & Walker, G.P. (1996) Olfactory response of *Anagrus nigriventris* (Hym.: Mymaridae): effects of host plant chemical cues mediated by rearing and oviposition experience. *Entomophaga*, 41 (1), 3–13. https://doi.org/10.1007/BF02893287
Hooper, L.R.E., Le Blanc, J.-P.R. & Boivin, G. (1996) The detection of *Anaphes* sp. nov. [Hymenoptera: Mymaridae], an egg parasitoid of the carrot weevil in Nova Scotia. *Phytoprotection*, 77 (2), 79–82. https://doi.org/10.7202/706103ar
Hopkins, D.C. (1978a) Sitona egg wasp. *Department of Agriculture & Fisheries, South Australia, Technote*, 1/78, 1–2.
Hopkins, D.C. (1978b) *Review of the literature on the genus Patasson* (*Hymenoptera Mymaridae*). *Department of Agriculture and Fisheries*, *South Australia*, *Agronomy Branch Report 103*. Department of Agriculture and Fisheries, Adelaide, 12 pp.
Horn, K.F., Farrier, M.H. & Wright, C.G. (1983) Some mortality factors affecting eggs of the sycamore lace bug, *Corythucha ciliata* (Say) (Hemiptera: Tingidae). *Annals of the Entomological Society of America*, 76, 262–265.
Horn, K.F., Wright, C.G. & Farrier, M.H. (1979) The lace bugs (Hemiptera: Tingidae) of North Carolina and their hosts. *North Carolina Agricultural Experiment Station, Technical Bulletin*, 257, 1–22.
Houser, J.S. (1918) Destructive insects affecting Ohio shade and forest trees. *Bulletin of the Ohio Agricultural Experiment Station*, 332, 165–487.
Howard, L.O. (1881) Part III. Report on the parasites of the Coccidae in the collection of this Department. *In*: *Comstock, J.H, Report of the entomologist of the United States Department of Agriculture for the year 1880*. United States Department of Agriculture, Washington, D.C., pp. 350–373, pls. xxiii + xxiv.
Howard, L.O. (1889) Annual address of the president. A commencement of a study of the parasites of cosmopolitan insects. *Proceedings of the Entomological Society of Washington*, 1, 118–135.
Howard, L.O. (1894a) The hymenopterous parasites of the California red scale. *Insect Life*, 6, 227–236.
Howard, L.O. (1894b) A new parasite of *Mytilaspis pomorum*. *Insect Life*, 7 (3), 256.
Howard, L.O. (1895) Some scale insects of the orchard. *Yearbook of the United States Department of Agriculture*, 1894, 249–276.
Howard, L.O. (1908) A new genus and species of Mymaridae (Hymenoptera, Chalcidoidea). *Proceedings of the Entomological Society of Washington*, 10, 68–70.
Howard, L.O. (1927) *Report of the entomologist*. United States Department of Agriculture, Bureau of Entomology, Washington, D.C., 29 pp.

Howard, L.O. & Marlatt, C.L. (1896) The San Jose scale: its occurrences in the United States with a full account of its life history and the remedies to be used against it. *United States Department of Agriculture, Division of Entomology, Bulletin*, New Series, 3, 1–80.
https://doi.org/10.5962/bhl.title.109968

Huber, J.T. (1985) *Revision of the sulphuripes and ater groups of Gonatocerus Nees* (*Hymenoptera: Mymaridae*) *in America North of Mexico, with a preliminary analysis of species groups*. Ph. D. dissertation, University of California, Riverside, xviii + 421 pp.

Huber, J.T. (1986) Systematics, biology, and hosts of the Mymaridae and Mymarommatidae (Insecta: Hymenoptera): 1758–1984. *Entomography*, 4, 185–243.

Huber, J.T. (1987) Review of *Schizophragma* Ogloblin and the non-Australian species of *Stethynium* Enock (Hymenoptera: Mymaridae). *Canadian Entomologist*, 119, 823–855.
https://doi.org/10.4039/Ent119823-9

Huber, J.T. (1988) The species groups of *Gonatocerus* Nees in North America with a revision of the *sulphuripes* and *ater* groups (Hymenoptera: Mymaridae). *Memoirs of the Entomological Society of Canada*, 141, 1–109.
https://doi.org/10.4039/entm120141fv

Huber, J.T. (1992) The subgenera, species groups, and synonyms of *Anaphes* (Hymenoptera: Mymaridae) with a review of the described Nearctic species of the *fuscipennis* group of *Anaphes s.s.* and the described species of *Anaphes* (*Yungaburra*). *Proceedings of the Entomological Society of Ontario*, 123, 23–110.

Huber, J.T. (1993) New genus and two new species of Mymaridae (Hymenoptera) from Florida and tropical America. *Florida Entomologist*, 76 (2), 348–358.
https://doi.org/10.2307/3495735

Huber, J.T. (2006 [2004]) Review of the described Nearctic species of the *crassicornis* group of *Anaphes s.s.* (Hymenoptera: Mymaridae). *Journal of the Entomological Society of Ontario*, 135, 3–86.

Huber, J.T. (2009) The genus *Dicopomorpha* (Hymenoptera, Mymaridae) in Africa and a key to *Alaptus*-group genera. *ZooKeys*, 20, 233–244.
https://doi.org/10.3897/zookeys.20.116

Huber, J.T. (2012) Revision of *Ooctonus* (Hymenoptera: Mymaridae) in the Nearctic region. *Journal of the Entomological Society of Ontario*, 143, 15–105.

Huber, J.T. (2013a) Revision of *Ooctonus* in the Neotropical region and comparison with *Boudiennyia* (Hymenoptera: Mymaridae). *Zootaxa*, 3701 (1), 1–23.
https://doi.org/10.11646/zootaxa.3701.1.1

Huber, J.T. (2013b) Redescription of *Mymarilla* Westwood, new synonymies under *Cremnomymar* Ogloblin (Hymenoptera: Mymaridae), and discussion of unusual wings. *ZooKeys*, 345, 47–72.
https://doi.org/10.3897/zookeys.345.6209

Huber, J.T. (2015a) World reclassification of the *Gonatocerus* group of genera (Hymenoptera: Mymaridae). *Zootaxa*, 3967 (1), 1–184.
https://doi.org/10.11646/zootaxa.3967.1.1

Huber, J.T. (2015b) Redescription of *Anaphes atomarius* (Brèthes) (Hymenoptera: Mymaridae) and comparison with similar species in Europe and North America. *Journal of the Entomological Society of Ontario*, 146, 23–39.

Huber, J.T. (2017) *Eustochomorpha* Girault, *Neotriadomerus* gen. n., and *Proarescon* gen. n. (Hymenoptera, Mymaridae), early extant lineages in evolution of the family. *Journal of Hymenoptera Research*, 57, 1–87.
https://doi.org/10.3897/jhr.57.12892

Huber, J.T. (2018) Neotype designation for *Anaphes brevis* Walker (Hymenoptera, Mymaridae). *Journal of Hymenoptera Research*, 63, 51–60.
https://doi.org/10.3897/jhr.63.24427

Huber, J.T. & Baquero, E. (2007) Review of *Eustochus*, a rarely collected genus of Mymaridae (Hymenoptera). *Journal of the Entomological Society of Ontario*, 138, 3–31.

Huber, J.T. & Beardsley, J.W. (2000) Key to *Gonatocerus* from the Hawaiian Islands, with notes on the species (Hymenoptera: Mymaridae). *Proceedings of the Hawaiian Entomological Society*, 34, 49–60.

Huber, J.T. & Bouček, Z. (2001) *Polynema* Haliday, 1833 (Insecta, Hymenoptera): Designation of *Polynema flavipes* Walker, 1846, as the type species. *Journal of Hymenoptera Research*, 10 (2), 280–281.

Huber, J.T., Côté, S. & Boivin, G. (1997) Description of three new *Anaphes* species (Hymenoptera: Mymaridae), egg parasitoids of the carrot weevil, *Listronotus oregonensis* (LeConte) (Coleoptera: Curculionidae), and redescription of *Anaphes sordidatus* Girault. *Canadian Entomologist*, 129, 959–977.
https://doi.org/10.4039/Ent129959-5

Huber, J.T. & Fidalgo, P. (1997) Review of the genus *Stephanodes* (Hymenoptera: Mymaridae). *Proceedings of the Entomological Society of Ontario*, 128, 27–63.

Huber, J.T. & Lin, N.-Q. (1999) World review of the *Camptoptera* group of genera (Hymenoptera: Mymaridae). *Proceedings of the Entomological Society of Ontario*, 130, 21–65.

Huber, J.T., Mendel, Z., Protasov, A. & La Salle, J. (2006) Two new Australian species of *Stethynium* (Hymenoptera: Mymaridae), larval parasitoids of *Ophelimus maskelli* (Ashmead) (Hymenoptera: Eulophidae) on *Eucalyptus*. *Journal of Natural*

History, 40, 1909–1921.
https://doi.org/10.1080/00222930601046428
Huber, J.T. & Prinsloo, G.L. (1990) Redescription of *Anaphes nitens* (Girault) and description of two new species of *Anaphes* (Hymenoptera: Mymaridae), parasites of *Gonipterus scutellatus* Gyllenhal (Coleoptera: Curculionidae) in Tasmania. *Journal of the Australian Entomological Society*, 29, 333–341.
https://doi.org/10.1111/j.1440-6055.1990.tb00373.x
Huber, J.T. & Rajakulendran, V.K. (1988) Redescription of and host-induced antennal variation in *Anaphes iole* Girault (Hymenoptera: Mymaridae), an egg parasite of Miridae (Hemiptera) in North America. *Canadian Entomologist*, 120, 893–901.
https://doi.org/10.4039/Ent120893-10
Huber, J.T. & Thuróczy, C. (2018) Review of *Anaphes* Haliday (Hymenoptera: Mymaridae) with keys to species in Europe and a world catalogue. *Zootaxa*, 4376 (1), 1–104.
https://doi.org/10.11646/zootaxa.4376.1.1
Huber, J.T. & Triapitsyn, S.V. (2015) Redescription of *Chrysoctonus* and description of *Chrysoctonoides* (Hymenoptera, Mymaridae), a new genus from the Australian region. *ZooKeys*, 505, 79–101.
https://doi.org/10.3897/zookeys.505.9472
Huber, J.T. & Triapitsyn, S.V. (2017) Two genera of Mymaridae (Hymenoptera) new to Africa, a remarkable new species of *Anaphes* and new generic synonymy. *ZooKeys*, 658, 39–61.
https://doi.org/10.3897/zookeys.658.11569
Huber, J.T., Viggiani, G. & Jesu, R. (2009) Order Hymenoptera, family Mymaridae. *Arthropod Fauna of the UAE*, 2, 270–297.
Hungerford, H.B. (1920 [1919]) The biology and ecology of aquatic and semiaquatic Hemiptera. *The Kansas University Science Bulletin*, 11, 3–265, 32 pls.
https://doi.org/10.5962/bhl.part.14881
Hussain, T. & Farooqi, S.I. (1996) Description of a new genus *Neonarayanella* (Mymaridae: Chalcidoidea) and new host record for two chalcid parasitoids from India. *Shashpa*, 3 (2), 83–85.
ICZN (1965) International Commission on Zoological Nomenclature. Opinion 729. *Mymar* Curtis, 1829 (Insecta, Hymenoptera): designation of a type-species under the plenary powers. *Bulletin of Zoological Nomenclature*, 22, 82–83.
ICZN (1999) Fourth Edition adopted by the International Union of Biological Sciences. International Trust for Zoological Nomenclature c/o The Natural History Museum, Cromwell Road, London, 306 pp.
ICZN (2017) Opinion 2401 (Case 3554)—*Anaphes* Haliday, 1833 (Insecta, Hymenoptera, Mymaridae): designation *of Anaphes fuscipennis* Haliday, 1833, as the type species. *Bulletin of Zoological Nomenclature*, 74, 122–124.
https://doi.org/10.21805/bzn.v74.a031
Irvin, N.A., Hagler, J.R. & Hoddle, M.S. (2012) Laboratory investigation of triple marking the parasitoid *Gonatocerus ashmeadi* with a fluorescent dye and two animal proteins. *Entomologia Experimentalis et Applicata*, 143, 1–12.
https://doi.org/10.1111/j.1570-7458.2012.01226.x
Irvin, N.A. & Hoddle, M.S. (2001) Egg age preference and "window of susceptibility" of *Homalodisca coagulata* eggs to attack by *Gonatocerus ashmeadi* and *G. triguttatus*. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings, 2001 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 135–136.
Irvin, N.A. & Hoddle, M.S. (2004) Oviposition preference of *Homalodisca coagulata* for two *Citrus limon* cultivars and influence of host plant on parasitism by *Gonatocerus ashmeadi* and *G. triguttatus* (Hymenoptera: Mymaridae). *Florida Entomologist*, 87, 504–510.
https://doi.org/10.1653/0015-4040(2004)087[0504:OPOHCF]2.0.CO;2
Irvin, N.A. & Hoddle, M.S. (2005a) The competitive ability of three mymarid egg parasitoids (*Gonatocerus* spp.) for glassy-winged sharpshooter (*Homalodisca coagulata*) eggs. *Biological Control*, 34, 205–214.
https://doi.org/10.1016/j.biocontrol.2005.04.010
Irvin, N.A. & Hoddle, M.S. (2005b) Determination of *Homalodisca coagulata* (Hemiptera: Cicadellidae) egg ages suitable for oviposition by *Gonatocerus ashmeadi*, *Gonatocerus triguttatus*, and *Gonatocerus fasciatus* (Hymenoptera: Mymaridae). *Biological Control*, 32 (3), 391–400.
https://doi.org/10.1016/j.biocontrol.2004.12.007
Irvin, N.A. & Hoddle, M.S. (2006) The effect of intraspecific competition on progeny sex ratio in *Gonatocerus* spp. for *Homalodisca coagulata* egg masses: Economic implications for mass rearing and biological control. *Biological Control*, 39 (2), 162–170.
https://doi.org/10.1016/j.biocontrol.2006.05.005
Irvin, N.A. & Hoddle, M.S. (2007) Evaluation of floral resources for enhancement of fitness of *Gonatocerus ashmeadi*, an egg parasitoid of the glassy-winged sharpshooter, *Homalodisca vitripennis*. *Biological Control*, 40, 80–88.
https://doi.org/10.1016/j.biocontrol.2006.09.004
Irvin, N.A. & Hoddle, M.S. (2008) Egg maturation, oosorption, and wing wear in *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae), an egg parasitoid of the glassy-winged sharpshooter, *Homalodisca vitripennis* (Hemiptera: Cicadellidae). *Biological Control*, 48, 125–132.
https://doi.org/10.1016/j.biocontrol.2008.10.013

Irvin, N.A. & Hoddle, M.S. (2010) Comparative assessments of *Gonatocerus ashmeadi* and the 'new association' parasitoid *G. tuberculifemur* (Hymenoptera: Mymaridae) as biological control agents of *Homalodisca vitripennis* (Hemiptera: Cicadellidae). *Biological Control*, 55, 186–196.
https://doi.org/10.1016/j.biocontrol.2010.09.005

Irvin, N.A. & Hoddle, M.S. (2011) Comparative assessments of *Gonatocerus ashmeadi* and the 'new association' parasitoid *G. deleoni* (Hymenoptera: Mymaridae) as biological control agents of *Homalodisca vitripennis* (Hemiptera: Cicadellidae). *Biological Control Science and Technology*, 21 (7), 839–863.
https://doi.org/10.1080/09583157.2011.588318

Irvin, N.A., Hoddle, M.S. & Castle, S.J. (2007) The effect of resource provisioning and sugar composition of foods on longevity of three *Gonatocerus* spp., egg parasitoids of *Homalodisca vitripennis*. *Biological Control*, 40, 69–79.
https://doi.org/10.1016/j.biocontrol.2006.09.005

Irvin, N.A., Hoddle, M.S. & Morgan, D.J.W. (2006) Competition between *Gonatocerus ashmeadi* and *G. triguttatus* for glassy winged sharpshooter (*Homalodisca coagulata*) egg masses. *Biocontrol Science and Technology*, 16 (4), 359–375.
https://doi.org/10.1080/09583150500532048

Irvin, N.A., Pinckard, T.R., Perring, T.M. & Hoddle, M.S. (2014) Evaluating the potential of buckwheat and cahaba vetch as nectar producing cover crops for enhancing biological control of *Homalodisca vitripennis* in California vineyards. *Biological Control*, 76, 10–18.
https://doi.org/10.1016/j.biocontrol.2014.04.006

Irvin, N., Suarez-Espinoza, J. & Hoddle, M. (2009) Functional response of *Gonatocerus ashmeadi* and the "new association" parasitoid, *G. tuberculifemur* attacking eggs of *Homalodisca vitripennis*. *Environmental Entomology*, 38 (6), 1634–1641.
https://doi.org/10.1603/022.038.0616

Irvin, N.A., Suarez Espinoza, J. & Hoddle, M.S. (2014) Maximum realized lifetime parasitism and occurrence of time limitation in *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) foraging in citrus orchards. *Biocontrol Science and Technology*, 24, 662–679.
https://doi.org/10.1080/09583157.2014.888537

Isidoro, N., Bin, F., Colazza, S. & Vinson, S.B. (1996) Morphology of antennal gustatory sensilla and glands in some parasitoid Hymenoptera with hypothesis on their role in sex and host recognition. *Journal of Hymenoptera Research*, 5, 206–239.

Ison, C.H. (1958) Fairy flies: their capture, mounting, and identication. *Journal of the Queckett Microscopical Club*, Series 4, 5, 59–72.

Jackson, C.G. (1982) *Parasitism of Lygus spp. eggs by the mymarid wasp Anaphes ovijentatus* (*Crosby and Leonard*). Ph. D. Dissertation, University of Arizona. 91 pp.

Jackson, C.G. (1986) Effects of cold storage of adult *Anaphes ovijentatus* on survival, longevity, and oviposition. *Southwestern Entomologist*, 11 (3), 149–153.

Jackson, C.G. (1987) Biology of *Anaphes ovijentatus* (Hymenoptera: Mymaridae) and its host, *Lygus hesperus* (Hemiptera: Miridae), at low and high temperatures. *Annals of the Entomological Society of America*, 80, 367–372.
https://doi.org/10.1093/aesa/80.3.367

Jackson, C.G. (2003) Oviposition by *Lygus hesperus* and its egg parasitoid, *Anaphes iole*, in cotton, alfalfa, and a wild mustard. *Southwestern Entomologist*, 28 (3), 167–176.

Jackson, C.G. & Cohen, A.C. (1984) Temperature and water relations of a parasitic wasp in its free-living adult stage and its phytophagous host. *Comparative Biochemistry and Physiology*, *Part A: Physiology*, 78 (3), 437–440.
https://doi.org/10.1016/0300-9629(84)90573-5

Jackson, C.G., Cohen, A.C. & Verdugo, C.L. (1988) Labelling *Anaphes ovijentatus* (Hymenoptera: Mymaridae), an egg parasite of *Lygus* spp. (Hemiptera: Miridae), with rubidium. *Annals of the Entomological Society of America*, 81, 919–922.
https://doi.org/10.1093/aesa/81.6.919

Jackson, C.G. & Debolt, J.W. (1987) Augmentative releases of parasites. *In*: Day, W.H. (Compilers), *Proceedings of the 4th regular meeting of the mirid work group, USDA Beneficial Insects Research Laboratory, NNewark, Delaware*, 14–15 October 1987, p. 12.

Jackson, C.G., Debolt, J.W. & Jones, W.A. (1998) Use of barriers to limit movement of parasitoids of *Lygus* spp. *Southwestern Entomologist*, 23 (4), 309–315.

Jackson, C.G. & Graham, H.M. (1983) Parasitism of four species of *Lygus* (Hemiptera: Miridae) by *Anaphes ovijentatus* (Hymenoptera: Mymaridae) and an evaluation of other possible hosts. *Annals of the Entomological Society of America*, 76, 772–775.
https://doi.org/10.1093/aesa/76.4.772

Jackson, D.J. (1956) Notes on hymenopterous parasitoids bred from eggs of Dytiscidae in Fife. *Journal of the Society for British Entomology*, 5, 144–149.

Jackson, D.J. (1958a) Observations on the biology of *Caraphractus cinctus* Walker (Hymenoptera: Mymaridae), a parasitoid of the eggs of Dytiscidae (Coleoptera). 1. Methods of rearing and numbers bred on different host eggs. *Transactions of the Royal Entomological Society of London*, 110 (17), 533–554 + 2 plates.
https://doi.org/10.1111/j.1365-2311.1958.tb01304.x

Jackson, D.J. (1958b) A further note on a *Chrysocharis* (Hym. Eulophidae) parasitizing the eggs of *Dytiscus marginalis* L., and a comparison of its larva with that of *Caraphractus cinctus* Walker (Hym. Mymaridae). *Journal of the Society for British*

Entomology, 6, 15–22.
Jackson, D.J. (1959) Observations on three gynandromorphs of *Caraphractus cinctus* Walker (Hym., Mymaridae), and notes on antennal variation in this species. *Entomologist's Monthly Magazine*, 95, 198–202.
Jackson, D.J. (1961a) Diapause in an aquatic mymarid. *Nature*, 192 (4805), 823–824.
https://doi.org/10.1038/192823a0
Jackson, D.J. (1961b) Observations on the biology of *Caraphractus cinctus* Walker (Hymenoptera: Mymaridae), a parasitoid of the eggs of Dytiscidae (Coleoptera). 2. Immature stages and seasonal history with a review of mymarid larvae. *Parasitology,* 51, 269–294.
https://doi.org/10.1017/S0031182000070530
Jackson, D.J. (1963) Diapause in *Caraphractus cinctus* Walker (Hymenoptera: Mymaridae), a parasitoid of the eggs of Dytiscidae (Coleoptera). *Parasitology*, 53, 225–251.
https://doi.org/10.1017/S0031182000072711
Jackson, D.J. (1966) Observations on the biology of *Caraphractus cinctus* Walker (Hymenoptera: Mymaridae), a parasitoid of the eggs of Dytiscidae. III. The adult life and sex ratio. *Transactions of the Royal Entomological Society of London*, 118 (2), 23–49.
https://doi.org/10.1111/j.1365-2311.1966.tb00833.x
Jackson, D.J. (1969) Observations on the female reproductive organs and the poison apparatus of *Caraphractus cinctus* Walker (Hymenoptera: Mymaridae). *Zoological Journal of the Linnean Society*, 48, 59–81.
https://doi.org/10.1111/j.1096-3642.1969.tb00705.x
James D.G. (2003) Synthetic herbivore-induced plant volatiles as field attractants for beneficial insects. *Environmental Entomology*, 32 (5), 977–982.
https://doi.org/10.1603/0046-225X-32.5.977
James, D.G. (2005) Further field evaluation of synthetic herbivore-induced plan volatiles as attractants for beneficial insects. *Journal of Chemical Ecology*, 31 (3), 481–495.
https://doi.org/10.1007/s10886-005-2020-y
James, D.G. & Grasswitz, T.R. (2005) Synthetic herbivore-induced plant volatiles increase field captures of parasitic wasps. *BioControl*, 50 (6), 871–880.
https://doi.org/10.1007/s10526-005-3313-3
Jeger, M., Bragard, C., Caffier, D., Candresse, T., Chatzivassiliou, E., Dehnen-Schmutz, K., Gilioli, G., Miret, J.A.J., MacLeod, A., Navarro, M.N., Niere, B., Parnell, S., Potting, R., Rafoss, T., Rossi, V., Urek, G., Van Bruggen, A. Van der Werf, W., West, J., Winter, S., Santolamazza-Carbone, S., Kertész, V., Aukhojee, M. & Grégoire, J.-C. (2018) Pest categorization of the *Gonipterus scutellatus* species complex. *EFSA Journal*, 16 (1), 1–34.
https://doi.org/10.2903/j.efsa.2018.5107
Jensen, F.L., Flaherty, D.L. & Chiarappa, L. (1969) Population densities and economic injury levels of grape leafhopper. *California Agriculture*, 23 (4), 9–10.
Jepsen, S.J., Rosenheim, J.A. & Bench, M.E. (2007) The effect of sulfur on biological control of the grape leafhopper, *Erythroneura elegantula*, by the egg parasitoid *Anagrus erythroneurae*. *BioControl*, 52 (6), 721–732.
https://doi.org/10.1007/s10526-006-9058-9
Jepsen, S.J., Rosenheim, J.A. & Matthews, C.E. (2007) The impact of sulfur on the reproductive success of *Anagrus* spp. parasitoids in the field. *BioControl*, 52 (5), 599–612.
https://doi.org/10.1007/s10526-006-9056-y
Jesu, R. (2002 [2001]) Descrizione de *Anaphes trijohanni* sp. n. per l'Italia (Hymenoptera: Chalcidoidea: Mymaridae). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»,* 57, 67–73.
Jetter, K. & Paine, T.D. (2004) Consumer preferences and willingness to pay for biolgical control in the urban landscape. *Biological Control*, 30, 312–322.
https://doi.org/10.1016/j.biocontrol.2003.08.004
Jin, X.-X. & Li, C.-D. (2014) A new species of *Ptilomymar* (Hymenoptera, Mymaridae) and a key to the described species. *ZooKeys*, 439, 127–134.
https://doi.org/10.3897/zookeys.439.8304
Johnson, F. & Girault, A.A. (1906) The plum curculio (*Conotrachelus nenuphar* Herbst.). *United States Department of Agriculture, Bureau of Entomology, Circular*, 73, 1–10.
Johnson, M.T., Yang, P., Huber, J.T. & Jones, V.P. (2001) Egg parasitoids of *Sophonia rufofascia* (Homoptera: Cicadellidae) in Hawaii Volcanoes National Park. *Biological Control*, 22, 9–15.
https://doi.org/10.1006/bcon.2001.0946
Johnson, W.G. (1898) Report on the San Jose scale in Maryland, and remedies for its suppression and control. *Bulletin of the Maryland Agricultural Experiment Station*, 57, 11–116.
Johnson, W.G. (1900) *Aphelinus fuscipennis* an important parasite upon the San Jose scale in the Eastern United States. *United States Department of Agriculture, Division of Entomology Bulletin*, New Series, 26, 73–75.
Jones, P.R., Glover, L.C. & Hansberry, R. (1946) An oil-DDT vapor spray to control grape leafhopper. *Journal of Economic Entomology*, 39, 770–774.
https://doi.org/10.1093/jee/39.6.770

Jones, W.A. (2001) Classical biological control of the glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings, 2001 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 50–51.

Jones, W.A. (2002) Biological control of *Homalodisca coagulata*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 88–89.

Jones, W.A. & Jackson, C.G. (1990) Mass production of *Anaphes iole* for augmentation against *Lygus hesperus*: effects of food on fecundity and longevity. *Southwestern Entomologist*, 15 (4), 463–468.

Joshi, B., Singh, S. & Nautiyal, R. (2017) New distributional records of Mymaridae (Hymenoptera: Chalcidoidea) from Uttarahkand, India. *Journal of Entomology and Zoology Studies*, 5 (3), 1809–1813.

Kalina, V. (1989) Chalcidoidea. *In*: Šedivý, J. (Ed.), Enumeratio Insectorum Bohemoslovakiae. Checklist of Czechoslovak Insects III (Hymenoptera). *Acta Faunistica Entomologica Musei Nationalis Pragae*, 19, pp. 97–127.

Kaufmann, O. (1939) Der Luzerenblattnager (*Phytonomus variabilis* Herbst). *Zeitschrift für angewandte Entomologie*, 26 (3), 387–448.
https://doi.org/10.1111/j.1439-0418.1939.tb01573.x

Kaufmann, O. (1941a) Der Kleeblattkäfer (*Phytonomus punctatus* F.), ein Schädling von Klee und Luzerne. *Zentblatt für Bakteriologie und ParasitKunde*, II, 104, 87–117.

Kaufmann, O. (1941b) Untersuchungen über der Kleeblattkäfer (*Phytonomus punktatus*). *Mitteilungen aus der Biologischen Reichsanstalt für Land- und Forstwirtschaft, Berlin*, 63, 83.

Khan, Z.R. & Saxena, R.C. (1985) A selected bibliography of the whitebacked planthopper *Sogatella furcifera* (Horváth) (Homoptera: Delphacidae). *Insect Science and its Applicatios*, 6 (2), 115–134.
https://doi.org/10.1017/S1742758400006500

Kido, H.A. (1980) A succession of insect pests. *California Agriculture*, 34 (7), 25–27.

Kido, H., Flaherty, D.L., Bosch, D.F. & Valero, K.A. (1983) Biological control of grape leafhopper. *California Agriculture*, 37 (5/6), 4–6.

Kido, H., Flaherty, D.L., Bosch, D.F. & Valero, K.A. (1984) The variegated grape leafhopper in the San Joaquin Valley, *California Agriculture*, 38 (1/2), 31–32.

Kieffer, J.J. (1913) Un nouveau mymaride d'Algérie (hyménoptères). *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord*, 4, 100–101.

King, G.B. (1900) The genus *Kermes* in North America. *Psyche*, 9, 78–84.
https://doi.org/10.1155/1900/56178

Kirchner, L. (1867) *Catalogus Hymenopterorum Europae.* C. Lieberreuter (M. Salzer), Vindobonae (Vienna), 2 (Vorwort, unnumbered) + 296 pp.

Knell, R.J. (1998) Generation cycles. *Trends in Ecology and Evolution*, 13 (5), 186–190.
https://doi.org/10.1016/S0169-5347(97)01321-9

Knight, A.L., Beers, E.H. & Elsner, E.A. (1991) Modeling postdiapause egg and nymphal development of the white apple leafhopper (Homoptera: Cicadellidae). *Environmental Entomology*, 20 (6), 1659–1664.
https://doi.org/10.1093/ee/20.6.1659

Knowlton, G.F. (1932) The beet leafhopper in northern Utah. *Utah Agricultural Experiment Station, Bulletin*, 234, 1–64.

Knowlton, G.F. & Bowen, M.F. (1930) Notes on parasites of the beet Ieafhopper. *Proceedings of the Utah Academy of Sciences*, 7, 75.

Koponen, M. & Triapitsyn, S.V. (2016) New records of Mymaridae (Hymenoptera, Chalcidoidea) from the Canary Islands and Madeira. *Bocagiana*, 243, 1–4.

Kreiter, S. (2000) Management of major arthropod pests in organic viticulture. *In*: Willer, H. & Meier, U. (Eds.), *Proceedings 6th International Congress on Organic Viticulture, Convention Center, Basel*, 22–26 *August 2000*, pp. 149–158.

Krishnamoorthy, A. (2012) Exploitation of egg parasitoids for control of potential pests in vegetable ecosystems in India. *Comunicata Scientiae*, 3 (1), 1–15.

Krugner, R. (2013) Suitability of fertilized and unfertilized eggs of the glassy-winged sharpshooter for the egg parasitoid *Gonatocerus morilli*. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2013 Pierce's Disease Research Symposium*. California Department of Food and Agriculture, Sacramento, California, pp. 11.

Krugner, R., Groves, R.L., Johnson, M.W., Nadel, H., Hagler, J. & Stenger, D.C. (2007) Dispersal and movement of the glassy-winged sharpshooter and associated natural enemies in a continuous, deficit-irrigated agricultural landscape. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium*, *Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 38–41.

Krugner, R., Hagler, J.R., Groves, R.L., Sisterson, M.S., Morse, J.G. & Johnson, M.W. (2012) Plant water stress effects on the net dispersal rate of the insect vector *Homalodisca vitripennis* (Hemiptera: Cicadellidae) and movement of its egg parasitoid, *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae). *Environmental Entomology*, 41 (6), 1279–1289.
https://doi.org/10.1603/EN12133

Krugner, R., Johnson, M.W., Daane, K.M. & Morse, J.G. (2008a) Olfactory responses of the egg parasitoid, *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae), to host plants infested by *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae). *Biological Control*, 47 (1), 8–15.

https://doi.org/10.1016/j.biocontrol.2008.06.004
Krugner, R., Johnson, M.W., Groves, R.L. & Morse, J.G. (2008b) Host specificity of *Anagrus epos*: a potential biological control agent of *Homalodisca vitripennis*. *BioControl*, 53 (3), 439–449.
https://doi.org/10.1007/s10526-007-9080-6
Krugner, R., Johnson, M.W., Morgan, D.J.W. & Morse, J.G. (2009) Production of *Anagrus epos* Girault (Hymenoptera: Mymaridae) on *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) eggs. *Biological Control*, 51, 122–129.
https://doi.org/10.1016/j.biocontrol.2009.06.013
Krugner, R., Wallis, C.M. & Walse, S.S. (2014) Attraction of the egg parasitoid, *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae) to synthetic formulation of a (*E*)-β-oximene and (*E*,*E*)-α-farnesene mixture. *Biological Control*, 77, 23–28.
https://doi.org/10.1016/j.biocontrol.2014.06.005
Kryger, J.P. (1934) Synonymic remarks on some generic names of Mymaridae (Hym.). *Entomologiske Meddelelser*, 18, 503–508.
Kryger, J.P. (1950) The European Mymaridae comprising the genera known up to c. 1930. *Entomologiske Meddelelser*, 26, 1–97.
Kuhn, W.R., Youngman, R.R., Wu, S. & Laub, C.A. (2013) Ecology, taxonomy, and pest management of billbugs (Coleoptera: Curculionidae) in orchardgrass of Virginia. *Journal of Integrated Pest Management*, 4 (3), 1–5.
https://doi.org/10.1603/IPM12022
Lakin, K.R. (1985) *Systematics and biology of the crop associated species of Polynema* (*Hymenoptera: Mymaridae*) *in southern Arizona* (*parasitoids, parasite, alfalfa hopers, leafhoppers*). Ph. D. dissertation, University of Arizona, Tucson, Arizona, 84 pp.
Lakin, K.R., Jackson, C.G. & Graham, H.M. (1984) Field and laboratory studies on parasitism of *Nabis* spp. by the wasp, *Polynema boreum*. *Southwestern Entomologist*, 9 (4), 391–396.
Lameere, A. (1907) *Manuel de la Faune de Belgique. III. Insectes supérieures*. Lamertin, Brussels, 869 pp.
Landry, B.S., Dextraze, L. & Boivin, G. (1993) Random amplified polymorphic DNA markers for DNA fingerprinting and genetic variability assessment of minute parasitic wasp species (Hymenoptera: Mymaridae and Trichogrammatidae) used in biological control programs of phytophagous insects. *Genome*, 36 (3), 580–587.
https://doi.org/10.1139/g93-078
LaPlante, J.-P. (1975) Observations sur la ponte de quatre odonates du genre *Lestes* (Zygoptera: Lestidae) au Québec. *Naturaliste Canadien*, 102 (3), 279–292.
Lattin, J.D. (1989) Bionomics of the Nabidae. *Annual Review of Entomology*, 34, 383–400.
https://doi.org/10.1146/annurev.en.34.010189.002123
Lauzière, I., Ciomperlik, M.A. & Wendel, L.E. (2002) Biological control of the glassy-winged sharpshooter in Kern County, California. *In*: Tariq, M.A., Oswalt, S., Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, San Diego, California*, 15–18 December 2002, pp. 81–82.
Lauzière, I. & Elzen, G. (2007) Effect of formulated insecticides on *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) and its parasitoid *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae). *Journal of Entomological Science*, 42, 11–19.
https://doi.org/10.18474/0749-8004-42.1.11
Lawson, P.B. (1929) A leafhopper parasite—*Polynema saga* (Girault). (Hymenoptera, Mymaridae). *Annals of the Entomological Society of America*, 22, 130.
https://doi.org/10.1093/aesa/22.1.130
Leibee, G.L., Pass, B.C. & Yeargan, K.V. (1979) Developmental rates of *Patasson lameerei* [Hym.: Mymaridae] and the effect of host egg age on parasitism. *Entomophaga*, 24 (4), 345–348.
https://doi.org/10.1007/BF02374172
Lenteren, J.C. van, Babendreier, D., Bigler, F., Burgio, G., Hokkanen, H.M.T., Kuske, S., Loomans, A.J.M., Menzler-Hokkanen, I., van Rijn, P.C.J., Thomas, M.B., Tommasini, M.G. & Zeng, Q.-Q. (2003) Environmental risk assessment of exotic natural enemies used in inundative biological control. *BioControl*, 48, 3–38.
https://doi.org/10.1023/A:1021262931608
Leonard, M.D. & Crosby, C.R. (1915) A new species of *Gonatocerus* (Mymaridae) parasitic on the eggs of a new species of *Idiocerus* (Bythoscopidae) feeding on poplar. *Journal of Economic Entomology*, 8, 541–547.
https://doi.org/10.1093/jee/8.6.541
Leopold, R.A. (2001) Cold Storage of parasitized and unparasitized eggs of glassy-winged sharpshooter, *Homalodisca coagulata*. *In*: Gleeson, P. (Compiler), *Glassy-winged sharpshooter and Pierce's disease research summaries FY 2000–2001 and FY 2001–2002*. California Department of Food and Agriculture, Sacramento, California, pp. 42.
Leopold, R.A. (2003a) Cold storage of parasitized and unparasitized eggs of the glassy-winged sharpshooter, *Homalodisca coagulata*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings, 2003 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 221–224.
Leopold, R.A. (2003b) A preliminary study on parasitism of *Homalodisca coagulata* egg masses by *Gonatocerus ashmeadi* and *G. triguttatus*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. Califor-

nia Department of Food and Agriculture, Sacramento, California, pp. 225–228.
Leopold, R.A. (2004a) Effects of using constant and cyclical stepwise-increasing temperatures on parasitized and unparasitized eggs of the glassy-winged sharpshooter during cold storage. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 124–127.
Leopold, R.A. (2004b) Parasitism of the glassy-winged sharpshooter: functional responses and superparasitism by the egg parasitoid *Gonatocerus ashmeadi. In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers), *Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 128–131.
Leopold, R.A. (2005a) The influence of temperature on development and reproduction of the egg parasitoid *Gonatocerus ashmeadi*. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 349–353.
Leopold, R.A. (2005b) Refrigerated storage of glassy-winged sharpshooter eggs used for propagation of the parasitoid, *Gonatocerus ashmeadi*. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, December 5–7, 2005, San Diego Marriott Hotel & Marina, San Diego*. California Department of Food and Agriculture, Sacramento, California, pp. 354–358.
Leopold, R.A. (2007) Cold storage of the adult stage of *Gonatocerus ashmeadi*: the impact on maternal and progeny quality. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego*, *12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 42–45.
Leopold, R.A. (2008) Cold storage of *Gonatocerus ashmeadi* Girault: extended emergence, and parental and progeny fitness. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2008 Pierce's Disease Research Symposium, Westin Camp Quarter Hotel, San Diego, 15–17 December 2008*. California Department of Food and Agriculture, Sacramento, California, pp. 35–38.
Leopold, R.A. & Yocum, G.D. (2001) Cold storage of parasitized and unparasitized eggs of the glassy-winged sharpshooter, *Homalodisca coagulata. In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings, 2001 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 65.
Leopold, R.A. & Yocum, G.D. (2002) Host selection and low temperature storage of the glassy-winged sharpshooter, *Homalodisca coagulata*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 90–92.
Letourneau, D.K. (1990) Abundance patterns of leafhopper enemies in pure and mixed stands. *Environmental Entomology*, 19 (3), 505–509.
https://doi.org/10.1093/ee/19.3.505
Li, Q., Hu, H., Triapitsyn, S.V., Yi, L. & Lu, J. (2018) *Anagrus dmitriev*i sp. n. (Hymenoptera, Mymaridae), an egg parasitoid of *Zyginidia eremit*a (Hemiptera, Cicadellidae), a pest of maize in Xinjiang, China. *ZooKeys*, 736, 43–57.
https://doi.org/10.3897/zookeys.736.20883
Lin, N.Q. & Chiappini, E. (1996) First record of *Omyomymar* (Hymenoptera: Mymaridae) from China, with the descriptions of three new species. *Proceedings of the Entomological Society of Washington*, 98 (2), 301–307.
Lin, N.-Q., Huber, J.T. & La Salle, J. (2007) The Australian genera of Mymaridae (Hymenoptera: Chalcidoidea). *Zootaxa*, 1596, 1–111.
Linné, C. (1767) *Systema naturae. Tom I. Pars II*. Editio duodecima reformata. Laur. Salvii, Holmiae, 796 + 36 pp. [pp. 533–1328 + 1–36]
Logarzo, G., Triapitsyn, S.V. & Jones, W.A. (2003) New host records for two species of *Gonatocerus* (Hymenoptera: Mymaridae), egg parasitoids of proconiine sharpshooters (Hemiptera: Clypeorrhyncha: Cicadellidae), in Peru. *Florida Entomologist*, 86 (4), 486–487.
https://doi.org/10.1653/0015-4040(2003)086[0486:NHRFTS]2.0.CO;2
López, R., Mizell III, R.F., Andersen, P.C. & Brodbeck, B.V. (2004) Overwintering biology, food supplementation and parasitism of eggs of *Homalodisca coagulata* (Say) (Homoptera: Cicadellidae) by *Gonatocerus ashmeadi* Girault and *Gonatocerus morrilli* (Howard) (Hymenoptera: Mymaridae). *Journal of Entomological Science*, 39 (2), 214–222.
https://doi.org/10.18474/0749-8004-39.2.214
Lotfalizadeh, H. (2015) Preliminary checklist of Iranian mymarids (Hymenoptera: Chalcidoidea, Mymaridae). *Journal of Entomological and Acarological Research*, 47, 73–78.
https://doi.org/10.4081/jear.2015.4838
Lotfalizadeh, H., Bayegan, Z.A. & Zargaran, M.R. (2016). Species diversity of Chalcidoidea (Hymenoptera) in the rice fields of Iran. *Journal of Entomological Research*, 18 (1), 99–111.
Lovett, D.L. (1980) Beneficial organisms and their enemies. Insects. *United States Department of Agriculture*, *Cooperative Plant Pest Report*, 5 (36), 688.
Lovinger, A., Liewehr, D. & Lamp, W.O. (2000) Glandular trichomes on alfalfa impede searching behavior of the potato leafhopper parasitoid. *Biological Control*, 18 (3), 187–192.
https://doi.org/10.1006/bcon.2000.0835

Lowery, D.T., Triapitsyn, S.V. & Judd, G.J.R. (2007) Leafhopper host plant associations for *Anagrus* parasitoids (Hymenoptera: Mymaridae) in the Okanagan Valley, British Columbia. *Journal of the Entomological Society of British Columbia*, 104, 9–15.

Lubbock, J. (1864) VI. On two aquatic Hymenoptera, one of which uses its wings in swimming. *Transactions of the Linnean Society of London*, 24 (2), 135–142.
https://doi.org/10.1111/j.1096-3642.1863.tb00156.x

Luck, R.F., Coviella, C.E. & Morgan, D. (2003) Evaluation of olfactory responses by *Gonatocerus ashmeadi,* a parasitoid of glassy-winged sharpshooter egg masses on various host plants. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 265–266.

Luft Albarracin, E. & Triapitsyn, S.V. (2012) First known host records for the egg parasitoid *Gonatocerus californicus* (Hymenoptera Mymaridae). *Bulletin of Insectology*, 65 (2), 297–299.

Luft Albarracin, E., Triapitsyn, S.V. & Virla, E.G. (2009) Annotated key to the genera of Mymaridae (Hymenoptera: Chalcidoidea) in Argentina. *Zootaxa*, 2129 (1), 1–28.
https://doi.org/10.11646/zootaxa.2129.1.1

Luft Albarracin, E., Triapitsyn, S.V. & Virla, E.G. (2017) Egg parasitoid complex of the corn leafhopper, *Dalbulus maidis* (DeLong) (Hemiptera: Cicadellidae), in Argentina. *Neotropical Entomology*, 46, 666–677.
https://doi.org/10.1007/s13744-017-0535-x

Luft Albarracin, E., Virla, E.G. & Triapitsyn, S.V. (2006) A new host record for the egg parasitoid *Anagrus nigriventris* (Hymenoptera: Mymaridae) of the corn leafhopper, *Dalbulus maidis* (Hemiptera: Cicadellidae). *Florida Entomologist*, 89 (2), 284–285.
https://doi.org/10.1653/0015-4040(2006)89[284:ANHRFT]2.0.CO;2

MacGown, M.W. & Osgood, E.A. Jr. (1972) Taxonomy and biology of chalcidoid and proctotrupoid Hymenoptera associated with *Dasineura balsamicola* (Diptera: Cecidomyiidae) in Maine. *Canadian Entomologist*, 104, 1259–1269.
https://doi.org/10.4039/Ent1041259-8

MacLean, S.F. Jr. & Pitelka, F.A. (1971) Seasonal patterns of abundance of tundra arthropods near Barrow. *Arctic*, 24 (1), 19–40.
https://doi.org/10.14430/arctic3110

Maddox, D.M. (1976) History of weevils on puncturevine in and near the Unites States. *Weed Science*, 24 (4), 414–419.
https://doi.org/10.1017/S0043174500066297

Madsen, B.J. & Morgan, C.V.G. (1975) Mites and insects collected from vineyards in the Okanagan and Similkameen Valleys, British Columbia. *Journal of the Entomological Society of British Columbia*, 72, 9–14.

Mailloux, G. & Pilon, J.-G. (1970) *Patasson luna* (Girault) (Hymenoptera: Mymaridae) and *Bathyplectes curculionis* (Thomson) (Hymenoptera: Ichneumonidae), two parasites of *Hypera postica* (Gyllenhal) (Coleoptera: Curculionidae) in Quebec. *Canadian Journal of Zoology*, 48 (3), 607–608.
https://doi.org/10.1139/z70-110

Mailloux, G. & Pilon, J.G. (1975) Morphologie, biologie et écologie des populations de *Hypera postica* (Gyllenhal) Coleoptera: Curculionidae au Québec. *Mémoires de la Société Entomologique du Québec*, 4, 1–151.

Makarova, A.A. & Polilov, A.A. (2013) Peculiarities of the brain organization and fine structure in small insects related to miniaturization. 2. The smallest Hymenoptera (Mymaridae, Trichogrammatidae) *Entomological Review*, 93 (6), 714–724.
https://doi.org/10.1134/S0013873813060055

Maláč, A. (1943) *Pterolinononyktera* nov. gen. *obenbergeri* nov. sp. *Entomologické Listy*, 6, 51.

Malenotti, E. (1917) *Metalaptus torquatus* n. gen. e n. specie di calcidite. *Redia*, 12, 339–341, pl. V.

Maltby, H.L., Stehr, F.W., Anderson, R.C., Moorehead, G.E., Barton, L.C. & Paschke, J.D. (1971) Establishment in the United States of *Anaphes flavipes*, an egg parasite of the cereal leaf beetle. *Journal of Economic Entomology*, 64, 693–697.
https://doi.org/10.1093/jee/64.3.693

Mani, M.S. (1938) *Catalogue of Indian Insects. Part 23. Chalcidoidea*. Government of India, Manager of Publications, Delhi, 174 pp.

Mani, M.S. (1942) Studies on Indian parasitic Hymenoptera—II. *Indian Journal of Entomology*, 4 (2), 153–161.

Manickavasagam, S. & Athithya, A. (2018) An updated checklist of Mymaridae (Hymenoptera: Chalcidoidea) of India. *Journal of Entomological and Zoological Studies*, 6 (4), 1654–1663.

Manickavasagam, S. & Menakadevi, C. (2012) A new species of *Eutrichosomella* Girault (Chalcidoidea: Aphelinidae) from India, with additional distribution records of chalcids. *Madras Agricultural Journal*, 99, 877–881.

Manickavasagam, S. & Palanivel, S. (2015 [2014]) A new mymarid of the genus *Ptilomymar* (Hymenoptera) with new records from India. *Oriental Insects*, 48 (3–4), 322–326.
https://doi.org/10.1080/00305316.2015.1013182

Manickavasagam, S. & Rameshkumar, A. (2013) A checklist of Mymaridae (Hymenoptera: Chalcidoidea) of India. *Madras Agriculture Journal*, 100 (4–6), 562–570.

Manickavasagam, S., Rameshkumar, A. & Rajmohana, K. (2011) First report of four species of fairyflies from India, key to Indian species of four genera and additional distributional records of Mymaridae (Hymenoptera: Chalcidoidea). *Madras*

Agriculture Journal, 98 (10–12), 393–408.
Manrique, V. (2005) *Host habitat location mediated by olfactory stimuli in Anaphes iole* (*Hymenoptera:* Mymaridae), *an egg parasitoid of Lygus hesperus* (*Hemiptera: Miridae*). M. Sc. thesis. Texas A&M University, College Station, Texas, 64 pp.
Manrique, V., Jones, W.A., Williams, L. III & Bernal, J.S. (2005) Olfactory responses of *Anaphes iole* (Hymenoptera: Mymaridae) to volatile signals derived from host habitats. *Journal of Insect Behavior*, 18, 89–104.
https://doi.org/10.1007/s10905-005-9349-5
Mapondera, T.S., Burgess, T., Matsuki, M. & Oberprieler, R.G. (2012) Identification and molecular phylogenetics of the cryptic species of the *Gonipterus scutellatus* complex (Coleoptera: Curculionidae: Gonipterini). *Australian Journal of Entomology*, 51, 175–188.
https://doi.org/10.1111/j.1440-6055.2011.00853.x
Marcovitch, S. (1916a) The strawberry weevil in Minnesota. *Sixteenth Report of the State Entomologist of Minnesota to the Governor for the years 1915 and 1916*, 1916, 108–134.
Marcovitch, S. (1916b) Insects attacking weeds in Minnesota. *Sixteenth Report of the State Entomologist of Minnesota to the Governor for the years 1915 and 1916*, 1916, 135–151.
Marlatt, C.L. (1895) The buffalo tree hoper (*Ceresa bubalus* Fabr.). *Insect Life*, 7, 8–14.
Marlatt, C.L. (1906) The San Jose or Chinese Scale. *United States Department of Agriculture, Bureau of Entomology, Bulletin*, 62, 1–89.
https://doi.org/10.5962/bhl.title.109919
Marlatt, C.L. (1929) *Report of the chief of the Bureau of Entomology*. United States Department of Agriculture, Bureau of Entomology, Washington, D.C., 39 pp.
Marshall, T.A. (1873) *A catalogue of British Hymenoptera; Oxyura*. The Entomological Society of London, London, viii + 27 pp.
Martinson, T., Williams III, L. & English-Loeb, G. (2001) Compatibility of chemical disease and insect management practices used in New York vineyards with biological control by *Anagrus* spp. (Hymenoptera: Mymaridae), parasitoids of *Erythroneura* leafhoppers. *Biological Control*, 22, 227–234.
https://doi.org/10.1006/bcon.2001.0975
Martinson, T.E. & Dennehy, T.J. (1995) Varietal preferences of *Erythroneura* leafhoppers (Homoptera: Cicadellidae) feeding on grapes in New York. *Environmental Entomology*, 24, 550–558.
https://doi.org/10.1093/ee/24.3.550
Matheson, R. & Crosby, C.R. (1912) Aquatic Hymenoptera in America. *Annals of the Entomological Society of America*, 5 (1), 65–71.
https://doi.org/10.1093/aesa/5.1.65
Mathot, G. (1966) Contribution à la connaissance des Mymaridae et Mymarommidae d'Afrique centrale (Hymenoptera Chalcidoidea). *Bulletin & Annales de la Société Royale d'Entomologie de Belgique*, 102, 214–239.
Mathot, G. (1968) Mymaridae nouveaux d'Afrique centrale. *Revue de Zoologie et de Botanique Africaines*, 78 (3–4), 265–276.
Mathot, G. (1969) Contribution à la connaissances des Mymaridae d'Europe et description d'especè nouvelles (Hymenoptera: Chalcidoidea). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique*, 45 (7), 1–23.
Matthews, M.J. (1986) The British species of *Gonatocerus* Nees (Hymenoptera: Mymaridae), egg parasitoids of Homoptera. *Systematic Entomology*, 11, 213–229.
https://doi.org/10.1111/j.1365-3113.1986.tb00177.x
McConnell, H.S. (1931) A leafhopper injuring peach. *Journal of Economic Entomology*, 24, 560–561.
McGregor, R.R., Gillespie, D.R., Quiring, D.M.J. & Higginson, D. (2000) Parasitism of the eggs of *Lygus shulli* and *Lygus elisus* (Heteroptera: Miridae) by *Anaphes iole* (Hymenoptera: Mymaridae). *Journal of the Entomological Society of British Columbia*, 97, 89–93.
McKenzie, L.M. & Beirne, B.P. (1972) A grape leafhopper, *Erythroneura ziczac* (Homoptera: Cicadellidae), and its mymarid (Hymenoptera) egg-parasite in the Okanagan Valley, British Columbia. *Canadian Entomologist*, 104, 1229–1233.
https://doi.org/10.4039/Ent1041229-8
Menozzi, C. (1947 [1942]) *Animali e vegetali dannosi alla barbabietola da zucchero e mezzi per combatterli*. Società Approvvigionamento Beitole e Vendita Zucchero di Genova, Genova, 211 pp., 12 pls.
Mercet, R.G. (1912) Mimáridos nuevos de España. *Boletin de la Real Sociedad Española de Historia Natural*, 12, 331–337.
Mercet, R.G. (1917) Microhimenópteros de España útiles a la agricultura. *Asociacion Espanola para el Progreso de las Ciencias, Congresso de Valladolid*, 4, 367–377.
Mesterton-Gibbons, M. (1988) On the optimal compromise for a dispersing parasitoid. *Journal of Mathematical Biology*, 26, 375–385.
https://doi.org/10.1007/BF00276368
Meyerdirk, D.E., Cunningham, G.L., Burger, T.L. & Wendel, L.E. (2000) Biological control operations, plant protection and quarantine. *In*: Coulson, J.R., Vail, P.V., Dix, M.E., Nordlund, D.A. & Kauffman, W.C. (Eds.), *110 years of biological control research and development in the United States Department of Agriculture, 1883–1993*. United Stated Department of Agriculture, Agricultural Research Service, Beltsville, Maryland, pp. 120–125.
Meyerdirk, D.E. & Hessein, N.A. (1985) Population dynamics of the beet leafhopper, *Circulifer tenellus* (Baker), and associ-

ated *Empoasca* spp. (Homoptera: Cicadellidae) and their egg parasitoids on sugar beets in southern California. *Journal of Economic Entomology*, 78 (2), 346–353.
https://doi.org/10.1093/jee/78.2.346

Meyerdirk, D.E. & Moratorio, M.S. (1987a) Biology of *Anagrus giraulti* (Hymenoptera, Mymaridae), an egg parasitoid of the beet leafhopper, *Circulifer tenellus* (Homoptera: Cicadellidae). *Annals of the Entomological Society of America*, 80, 272–277.
https://doi.org/10.1093/aesa/80.2.272

Meyerdirk, D.E. & Moratorio, M.S. (1987b) Seasonal population density of *Anagrus giraulti* (Hymenoptera: Mymaridae), an egg parasitoid of *Circulifer tenellus* and *Empoasca* spp. (Homoptera: Cicadellidae). *Journal of Economic Entomology*, 80, 362–365.
https://doi.org/10.1093/jee/80.2.362

Meyerdirk, D.E. & Moratorio, M.S. (1987c) *Circulifer tenellus* (Baker), the beet leafhopper (Homoptera: Cicadellidae): laboratory studies on fecundity and longevity. *Canadian Entomologist*, 119 (5), 443–447.
https://doi.org/10.4039/Ent119443-5

Meyerdirk, D.E. & Moratorio, M.S. (1987d) Morphometric study of *Anagrus giraulti* Crawford (Hymenoptera: Mymaridae) reared from eggs of three different cicadellid hosts. *Canadian Entomologist*, 119 (10), 909–912.
https://doi.org/10.4039/Ent119909-10

Meyers, D.M. & Deonier, D.L. (1992) A behavioral-ecological study of *Kleidotoma parydrae* Beardsley (Hymenoptera: Eucoilidae), with notes on *Anaphes* sp. (Hymenoptera: Mymaridae) parasites of *Parydra* spp. (Diptera: Ephydridae). *Contributions of the American Entomological Institute*, 27 (5), 7–29.

Millar, J.G., Hanks, L.M. & Paine, T.D. (1996) Control of the eucalyptus snout beetle *Gonipterus scutellatus* Gyllenhal in California by the egg parasitoid *Anaphes nitens* (Girault) (Coleoptera: Curculionidae—Hymenoptera: Mymaridae). Abstract 16–017. *In*: *Proceedings, XX International Congress of Entomology, Firenze, Italy, 25–31 August 1996*, pp. 508.

Miller, C.D.F. & Guppy, J.C. (1972 [1971]) Notes on the biology of the alfalfa weevil, *Hypera postica* (Gyllenhal) (Coleoptera: Curculionidae) in southern Ontario. *Proceedings of the Entomological Society of Ontario*, 102, 42–46.

Miller, M.C. (1970) Biological control of the alfalfa weevil in Massachusetts. *Journal of Economic Entomology*, 63 (2), 440–443.
https://doi.org/10.1093/jee/63.2.440

Milliron, H.E. (1947) Description of a new mymarid which parasitizes the eggs of the Saratoga spittlebug. *Annals of the Entomological Society of America*, 40 (2), 217–220.
https://doi.org/10.1093/aesa/40.2.217

Mills, N. (2010) Egg parasitoids in biological control and integrated pest management. *In*: Cônsoli, F.L., Parra, J.R.P. & Zucchi, R.A. (Eds.), *Egg parasitoids in agroecosystems with emphasis on Trichogramma.* Progress in Biological Control 9, Springer, Dordrecht, pp. 389–411.
https://doi.org/10.1007/978-1-4020-9110-0_15

Minteer, C.R., Tipping, P.W., Knowles, B.K., Valmonte, R.J., Foley, J.R. & Gettys, L.A. (2016) Utilization of an introduced weed biological control agent, *Megamelus scutellaris* (Hemiptera: Delphacidae), by a native parasitoid. *Florida Entomologist*, 99 (3), 576–577.
https://doi.org/10.1653/024.099.0343

Mitroiu, M.-D., Noyes, J., Cetkovic, A., Nonveiller, G., Radchenko, A., Polaszek, A., Ronquist, F., Forshage, M., Pagliano, G., Gusenleitner, J., Bartalucci, M.B., Olmi, M., Fusu, L., Madl, M., Johnson, N.F., Janšta, P., Wahis, R., Soon, V., Rosa, P., Osten, T., Barbier, Y. & de Jong, Y. (2015) Fauna Europaea: Hymenoptera—Apocrita (excl. Ichneumonoidea). *Biodiversity Data Journal*, 3 (e4186), 1–21.
https://doi.org/10.3897/BDJ.3.e4186

Mizell III, R.F. (2001) Keys to management of GWSS: interactions between host plants, malnutrition and natural enemies. *In*: Gleeson, P. (Compiler), *Glassy-winged sharpshooter and Pierce's disease research summaries FY 2000–2001 and FY 2001–2002*. California Department of Food and Agriculture, Sacramento, California, pp. 52.

Mizell III, R.F. & Andersen, P.C. (2001) Keys to management of glassy-winged sharpshooter: interactions between host plants, malnutrition, and natural enemies. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Sacramento, California, 5–7 December 2001*. Coronado Island Marriott Resort, San Diego, California, pp. 81–84.

Mizell III, R.F. & Andersen, P.C. (2002) Keys to management of glassy-winged sharpshooter: interactions between host plants, malnutrition, and natural enemies. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium* (*slightly revised*), *San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 109–110.

Mizell III, R.F. & Andersen, P.C. (2003) Keys to management of glassy-winged sharpshooter: interactions between host plants, malnutrition, and natural enemies. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Spencer, R., Houser, L., Ba, A. & Esser, T. (Compilers), *Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 8–11 December, 2003*. California Department of Food and Agriculture, Sacramento, California, pp. 271–273.

Mockford, E.L. (1997) A new species of *Dicopomorpha* (Hymenoptera: Mymaridae) with diminutive, apterous males. *Annals of the Entomological Society of America*, 90, 115–120.

https://doi.org/10.1093/aesa/90.2.115
Moffitt, H.R. & Reynolds, H.T. (1972) Bionomics *of Empoasca solana* DeLong on cotton in southern California. *Hilgardia*, 41 (11), 247–298.
https://doi.org/10.3733/hilg.v41n11p247
Moon, D.C., Rossi, A.M. & Stiling, P. (2000) The effects of abiotically induced changes in host plant quality (and morphology) on a salt marsh planthopper and its parasitoid. *Ecological Entomology*, 25 (3), 325–331.
https://doi.org/10.1046/j.1365-2311.2000.00268.x
Moon, D.C. & Stiling, P. (2000) Relative importance of abiotically induced direct and indirect effects on a salt-marsh herbivore. *Ecology*, 81 (2), 470–481.
https://doi.org/10.1890/0012-9658(2000)081[0470:RIOAID]2.0.CO;2
Moon, D.C. & Stiling, P. (2002) Top-down, bottom-up, or side to side? Within-trophic-level interactions modify trophic dynamics of a salt marsh herbivore. *Oikos*, 98 (3), 480–490.
https://doi.org/10.1034/j.1600-0706.2002.980312.x
Moon, D.C. & Stiling, P. (2003) The influence of legacy effects and recovery from perturbations in a tritrophic salt marsh complex. *Ecological Entomology*, 28, 457–466.
https://doi.org/10.1046/j.1365-2311.2003.00534.x
Morse, J.G. (2004) Seasonal population dynamics of glassy-winged sharpshooter egg parasitoids: variability across sites and host plants. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers)*, Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 365–366.
Morse, J.G. (2005) Seasonal population dynamics of glassy-winged sharpshooter egg parasitoids: variability across sites and host plants. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers)*, Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 370–372.
Morse, J.G. (2006) Seasonal population dynamics of glassy-winged sharpshooter egg parasitoids: variability across sites and host plants. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 92–94.
Morse, J.G. & Stouthamer, R. (2005) The *Anagrus epos* complex: a likely source of effective classical biological control agents for glassy-winged sharpshooter control. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers)*, Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 373–375.
Morse, J.G. & Stouthamer, R. (2006) The *Anagrus epos* complex: a likely source of effective classical biological control agents for glassy-winged sharpshooter control. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 95–98.
Morse, J.G. & Stouthamer, R. (2007) The *Anagrus epos* complex: a likely source of effective classical biological agents for glassy-winged sharpshooter control. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2007 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 12–14 December 2007*. California Department of Food and Agriculture, Sacramento, California, pp. 94–97.
Moulton, D. (1932) Division of entomology and pest control. *Monthly Bulletin, California Department of Agriculture*, 20 (12), 745–775.
Moultrie, L.G. (1952) Peach insects and diseases. *Georgia Department of Entomology, Bulletin*, 97, 1–31.
Mulla, M.S. & Madsen, H.F. (1955) A new leafhopper attacking prunes in California. *Journal of Economic Entomology*, 48, 476.
https://doi.org/10.1093/jee/48.4.476a
Mulla, M.S. (1956) Two mymarid egg parasites attacking *Typhlocyba* species in California. *Journal of Economic Entomology*, 49, 438–441.
https://doi.org/10.1093/jee/49.4.438
Mulla, M.S. (1957) The biology of *Typhlocyba prunicola* Edwards and *T. quercus* (Fabricius) (Cicadellidae-Homoptera). *Annals of the Entomological Society of America*, 50, 76–87.
https://doi.org/10.1093/aesa/50.1.76
Murphy, B.C., Rosenheim J.A., Dowell, R.V. & Granett, J. (1998) Habitat diversification tactic for improving biological control: parasitism of the western grape leafhopper. *Entomologia Experimentalis et Applicata*, 87 (3), 225–235.
https://doi.org/10.1046/j.1570-7458.1998.00326.x
Murphy, B.C., Rosenheim, J.A. & Granett, J. (1996) Habitat diversification for improving biological control: abundance of *Anagrus epos* (Hymenoptera: Mymaridae) in grape vineyards. *Environmental Entomology*, 25 (2), 495–504.
https://doi.org/10.1093/ee/25.2.495
Narayanan, E.S. (1960) New record and description of new species of parasites of San Jose scale. *Proceedings of the National Institute of Sciences of India*, 26, B (Silver Jubilee Supplement), 20–29.
Narayanan, E.S. & Subba Rao, B.R. (1961) Studies on Indian Mymaridae III. *Beiträge zur Entomologie*, 11, 655–671.

Nash, R. & O'Connor, J.P. (2011) Notes on the Irish entomologists Alexander Henry Haliday (1806–1870). *Bulletin of the Irish Biogeographical Society*, 35, 1–112.
Nason, W.A. (1906) Parasitic Hymenoptera of Algonquin, Illinois.—III. *Entomological News*, 17, 7–9.].
Nasr, F.N. (1998) *Anaphes luna* (Girault) (Hymenoptera: Mymaridae) a new record in Egypt: as an egg-parasitoid on the Egyptian alfalfa weevil, *Hypera brunneipennis* Boh., *Egg Parasitoid News*, 10, 17.
Nault, L.R. (1989) Leafhopper and planthopper transmission of plant viruses. *Annual Review of Entomology*, 34, 503–529. https://doi.org/10.1146/annurev.en.34.010189.002443
Nees ab Esenbeck, C.G. (1834) Hymenopterorum *Ichneumonibus affinium, monographiae, genera europaea et species illustrantes*. 2. J.G. Cottae, Stuttgartiae et Tubingae, 448 pp.
Nénon, J.-P., Boivin, G., Le Lannic, J. & Baaren, van, J. (1995) Functional morphology of the mymariform and sacciform larvae of the egg parasitoid *Anaphes victus* Huber (Hymenoptera: Mymaridae). *Canadian Journal of Zoology*, 73, 996–1000. https://doi.org/10.1139/z95-118
New, T.R. (1969) The biology of some species of *Alaptus* (Mymaridae) parasitising eggs of Psocoptera. *Transactions of the Society for British Entomology*, 18 (8), 181–193.
New, T.R. (1973) The Australian species of *Mymar* Curtis described by A. A. Girault [Hymenoptera, Mymaridae]. *Entomophaga*, 18 (2), 119–123. https://doi.org/10.1007/BF02372024
New, T.R. (1976) The Australian species of *Polynema* Haliday, s.l., (Hymenoptera: Mymaridae) described by A.A. Girault. *Australian Journal of Zoology, Supplementary Series*, 42, 1–65. https://doi.org/10.1071/AJZS042
Nicholls, C.I., Parrella, M.P. & Altieri, M.A. (2000) Reducing the abundance of leafhoppers and thrips in a northern California organic vineyard through maintenance of full season floral diversity with summer cover crops. *Agricultural and Forest Entomology*, 2 (2), 107–113. https://doi.org/10.1046/j.1461-9563.2000.00054.x
Nicholls, C.I., Parrella, M.P. & Altieri, M.A. (2001) The effects of a vegetational corridor on the abundance and dispersal of insect biodiversity within a northern California organic vineyard. *Landscape Ecology*, 16 (2), 133–146. https://doi.org/10.1023/A:1011128222867
Nielson, M.W. (1975) The leafhopper vectors of phytopathogenic viruses (Homoptera, Cicadellidae). Taxonomy, biology, and virus transmission. *United States Department of Agriculture, Agricultural Research Service, Technical Bulletin*, 1382, 1–386.
Niemczyk, H.D. & Flessel, J.K. (1970) Population dynamics of alfalfa weevil eggs in Ohio. *Journal of Economic Entomology*, 63 (1), 242–247. https://doi.org/10.1093/jee/63.1.242
Nikol'skaya, M.N. (1952) *Chalcids of the fauna of the USSR* (*Chalcidoidea*)*. Keys to the fauna of the USSR published by the Zoological Institute of the Academy of Sciences of the USSR. Issue 44*. Publishing House of the Academy of Sciences of the USSR, Moscow-Leningrad, 575 pp. [Table of Contents on pp. 575 (unnumbered), in Russian]
Nordlund, D.A. & King, E.G. (2000) Augmentation and conservation of parasites and predators. *In*: Coulson, J.R., Vail, P.V., Dix, M.E., Nordlund, D.A. & Kauffman, W.C. (Eds.), *110 years of biological control research and development in the United States Department of Agriculture, 1883–1993*. United Stated Department of Agriculture, Agricultural Research Service, Beltsville, Maryland, pp. 60–66.
Norton, A.P. & Welter, S.C. (1996) Augmentation of the egg parasitoid *Anaphes iole* (Hymenoptera: Mymaridae) for *Lygus hesperus* (Heteroptera: Miridae) management in strawberries. *Environmental Entomology*, 25 (6), 1406–1414. https://doi.org/10.1093/ee/25.6.1406
Norton, A.P., Welter, S.C., Flexner, J.L., Jackson, C.G., DeBolt, J.W. & Pickel, C. (1992) Parasitism of *Lygus hesperus* (Mitidae) by *Anaphes iole* (Mymaridae) and *Leiophron uniformis* (Braconidae) in California strawberry. *Biological Control*, 2, 131–137. https://doi.org/10.1016/1049-9644(92)90037-E
Noyes, J.S. (1982) Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *Journal of Natural History*, 16, 315–334. https://doi.org/10.1080/00222938200770261
Noyes, J.S. (1990) Section 2.7.2.5. Chalcid parasitoids. *In*: Rosen, D. (Ed.), *The armoured scale insects, their biology, natural enemies and control. Vol. B*. Elsevier Science Publishers, Amsterdam, pp. 247–262.
Noyes, J.S. (2001) Interactive catalogue of World Chalcidoidea 2001. *Journal of the New York Entomogolocal Society*, 111 (1) 61–63.
Noyes, J.S. (2019) Universal Chalcidoidea Database. World Wide Web electronic publication. [https://www.nhm.ac.uk/our-science/data/chalcidoids/database/]
Noyes, J.S. & Valentine, E.W. (1989) Mymaridae (Insecta: Hymenoptera)—Introduction, and review of genera. *Fauna of New Zealand*, 17, 1–100.
Nugnes, F. & Viggiani, G. (2014) Description and biological features of a new species of *Anagrus* Haliday (Hymenoptera, Mymaridae). *Entomologia*, 2 (176), 65–72. https://doi.org/10.4081/entomologia.2014.176

Ogloblin, A.A. (1935a) Um nuevo mimarido de Missiones (Hym. Mymaridae), *Revista de Entomología*, 5 (1), 59–64.
Ogloblin, A.A. (1935b) Dos especies nuevas del genero *Paranaphoidea* Gir. (Hym. Mymaridae). *Revista de Entomología*, 5 (2), 129–133.
Ogloblin, A.A. (1935c) Especies nueva o poco conocidas del género *Gonatocerus* (Hym. Mymaridae) de la República Argentina. *Revista de la Sociedad Entomológica Argentina*, 7, 65–78, 2 pls.
Ogloblin, A.A. (1939) Sobre la sinonimia del Mimárido parásito del gorgojo de Eucalyptus (Mymaridae, Hymenoptera). *Memorias del Jardín Zoológico, La Plata*, 9, 143–144.
Ogloblin, A.A. (1940) Dos Mymaridae nuevos de Misiones (Hym). *Revista de Entomología*, 11 (1–2), 597–603.
Ogloblin, A.A. (1946) Descriptions of new genera and species of Mymaridae (Hymenoptera: Chalcidoidea). *Iowa State College Journal of Science*, 20, 277–295.
Ogloblin, A.A. (1955) Los Mymaridae nuevos de la República Argentina (Hym.). *Mitteilungen der Münchener Entomologischen Gesellshaft*, 54/55, 492–502.
Ogloblin, A.A. (1957) Especies nuevas del género *Xenomymar* Crawford (Mymaridae, Hymenoptera). *Neotrópica*, 3 (11), 37–44.
Ogloblin, A.A. (1959a) Primera nota sobre los Mimárides de la República Ecuador (Mymaridae, Hymenopt.). *Mitteilungen der Münchner Entomologischen Gesellschaft*, 49, 43–62.
Ogloblin, A.A. (1959b) Dos especies nuevas del género *Platypatasson* (Hym. Mymaridae). *Revista de la Sociedad Entomológica Argentina*, 31 (3–4), 71–76.
Ogloblin, A.A. (1960a) Los representantes nuevos de la tribu Polynematini de la República Argentina (Hymenoptera, Mymaridae). *Neotropica*, 6, 1–11.
Ogloblin, A.A. (1960b) Las especies nuevas del gén. *Barypolynema* A. Ogl. (Hymenoptera, Mymaridae). *Neotrópica*, 6 (21), 71–80.
Ogloblin, A.A. (1962) Nuevo subgénero del género «*Anaphes*» Haliday («Mymaridae, Hymenoptera») de la Patagonia. *Revista de Investigaciones Agricolas, Buenos Aires*, 16, 49–57.
Ogloblin, A.A. (1963) Un nuevo género de la familia Mymaridae (Hymenoptera) de la República Argentina. *Neotrópica*, 9 (29), 65–79.
Ogloblin, A.A. (1964) Una especie nueva del género A*Stethynium@* Enock de la provincia de Missiones, Argentina. *Acta Zoologica Lilloana*, 20, 105–122.
Ogloblin, A.A. (1967) Mymaridos nuevos de Argentina (Hymenopt. Mymaridae). *Acta Zoológica Lilloana*, 22, 183–196.
Ogloblin, A.A. (1979) *Catálogo de los himenópteros calcidoideos de américa al sur de lost estados unidos*. Comisión de Investigaciones Científicas de la Provincia de Buenos Aires, Publicación especial, La Plata, 488 pp.
Ogloblin, A.A. & Annecke, D.P. (1961) Some new Mymaridae from South Africa and Argentina in the genus *Camptoptera* Foerster (Hymenopt.: Chalcidoidea). *Journal of the Entomological Society of South Africa*, 24, 293–307.
Pack, H.J. & Fife, L.C. (1930) Notes on miscellaneous insects of Utah. *Bulletin of the Utah Agricultural Experiment Station*, 216, 28–30.
Packard, A.S. (1864) The humble bees of New England and their parasites; with notices of a new species of *Anthophorabia*, and a new genus of Proctotrupidae. *Proceedings of the Essex Institute*, 4, 107–140.
Pagliano, G. & Navone, P. (1995) Fascicolo 97. Hymenoptera Chalcidoidea. *In*: Pagliano, G. & Navone, P., Minelli, A. Ruffo, S. & La Posta, S. (Eds.), *Checklist delle specie della fauna Italiana 97*. Calderini, Bologna, pp. 1–40.
Paine, T.D. (2016) Chapter 24. Insects colonizing eucalypts in California. *I*n: Paine, T. & Lieutier, F. (Eds), *Insects and Diseases of Mediterranean Forest Systems*. Springer, Cham, pp. 711–730.
https://doi.org/10.1007/978-3-319-24744-1_24
Paine, T.D., Dahlsten, D.L., Millar, J.G. & Hoddle, M. (2000) U.C. scientists apply IPM techniques to new eucalyptus pests. *California Agriculture*, 54 (6), 8–13.
https://doi.org/10.3733/ca.v054n06p8
Paine, T.D. & Millar, J.G. (2002) Insect pests of eucalypts in California: implications of managing invasive species. *Bulletin of Entomological Research*, 92, 147–151.
https://doi.org/10.1079/BER2002151
Paine, T.D. & Millar, J.G. (2003) Biological control of introduced pests of Eucalyptus in California. *In*: Van Driesche, R.G. (Ed.), *1st International Symposium on Biological Control of Arthropods, Honolulu, Hawaii, USA, 14–18 January 2002. United States Department of Agriculture, Forest Service, FHTET-03-05*. United States Department of Agriculture, Forest Service, Morgantown, West Virginia, pp. 66–69.
Paine, T.D., Millar, J.G., Hanks, L.M., Gould, J., Wang, Q., Daane, K., Dahlsten, D.L. & McPherson, E.G. (2015) Cost-benefit analysis for biological control programs that targeted insect pests of eucalypts in urban landscapes of California. *Journal of Economic Entomology*, 108 (6), 2497–2504.
https://doi.org/10.1093/jee/tov224
Painter, R.H. (1929) The tarnished plant bug, *Lygus pratensis* L.: a progress report. *Sixtieth Annual Report of the Entomological Society of Ontario*, 60, 102–107.
Palanivel, S., Manickavasagam, S. & Triapitsyn, S.V. (2015) *Stephanocampta* Mathot (Hymenoptera: Mymaridae): descriptions of two new species and the female of *S. indica* Anwar & Zeya from India and a key to world taxa. *Zootaxa*, 4012 (3), 479–492.

https://doi.org/10.11646/zootaxa.4012.3.4
Pang, X. & Wang, Y. (1985) New species of *Anagrus* from south China (Hymenoptera: Mymaridae). *Entomotaxonomia*, 7 (3), 175–184.
Pantaleoni, R.A. (1989) Modalità d'invasione di un nuovo areale in Metcalfa pruinosa (Say, 1830) (*Auchenorrhynca Flatidae*). *Bollettino del Instituto «G. Grandi» Universit*à *Bologna*, 43, 1–7.
Pantaleoni, R.A. & Tavella, L. (2006) Gli artropodi utili nei corileti Italiani. *Petria*, 16 (1), 135–148.
Parrot, P.J. & Fulton, B.B. (1914) Tree crickets injurious to orchard and garden fruits. *New York Agriculture Experiment Station, Bulletin*, 388, 417–461.
Peck, O. (1951) Superfamily Chalcidoidea. *In*: Muesebeck, C.F.W., Krombein, K.V. & Townes, H.K. (Eds.), Hymenoptera of America north of Mexico—synoptic catalog. *United States Department of Agriculture*, *Agriculture Monograph*, 2, pp. 410–594.
Peck, O. (1963) A catalogue of the Nearctic Chalcidoidea (Insecta: Hymenoptera). *Canadian Entomologist,* Supplement 30, 1–1092.
Peña, J.E., Duncan, R.E., Roltsch, W. & Carrillo, D. (2012) Mortality factors of the avocado lace bug, *Pseudcysta perseae* (Heteroptera: Tingidae), in Florida. *Florida Entomologist*, 95 (1), 179–182.
https://doi.org/10.1653/024.095.0127
Peña, J.E., Triapitsyn, S.V., Long, D., Evans, G.A. & Roltsch, W. (2009) First record of *Erythmelus klopomor* (Hymenoptera: Mymaridae) as a parasitoid of the avocado lace bug, *Pseudacysta perseae* (Heteroptera: Tingidae). *Florida Entomologist*, 92, 394–395.
https://doi.org/10.1653/024.092.0232
Perkins, R.C.L. (1905) Leaf-hoppers and their natural enemies (Pt. VI. Mymaridae, Platygasteridae). *Report of the Hawaiian Sugar Planters' Association, Division of Entomology*, Bulletin 1, Part 6. pp. 187–205, 13 pls.
Perkins, R.C.L. (1912) Parasites of insects attacking sugar cane. *Bulletin of the Hawaiian Sugar Planters' Association Experiment Station*, Entomology Series, 10, 1–27.
Petit, J.N., Hoddle, M.S., Grandgirard, J., Roderick, G.K. & Davies, N. (2007) Invasion dynamics of the glassy-winged sharpshooter *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) in French Polynesia. *Biological Invasions*, 10, 955–967.
https://doi.org/10.1007/s10530-007-9172-3
Petit, J.N., Hoddle, M.S., Grandgirard, J., Roderick, G.K. & Davies, N. (2008) Short-distance dispersal behavior and establishment of the parasitoid *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae) in Tahiti: implications for its use as a biological control agent against *Homalodisca vitripennis* (Hemiptera: Cicadellidae). *Biological Control*, 45 (3), 344–352.
https://doi.org/10.1016/j.biocontrol.2008.01.020
Petit, J.N., Hoddle, M.S., Grandgirard, J., Roderick, G.K. & Davies, N. (2009) Successful spread of a biocontrol agent reveals a biosecurity failure: elucidating long distance invasion pathways for *Gonatocerus ashmeadi* in French Polynesia. *Biocontrol*, 54, 485–495.
https://doi.org/10.1007/s10526-008-9204-7
Petty, H.B., Jr. (1968) A mymarid egg parasite (*Patasson luna*). *United States Department of Agriculture, Cooperative Economic Insect Report*, 18 (9), 129.
Pexton, J.J. & Mayhew, P.J. (2004) Competitive interactions between parasitoid larvae and the evolution of gregarious development. *Oecologia*, 141, 179–190.
https://doi.org/10.1007/s00442-004-1659-3
Picard, C., Auclair, J.L. & Boivin, G. (1991) Response to host age of the egg parasitoid *Anaphes* n.sp. (Hymenoptera: Mymaridae). *Biocontrol Science and Technology*, 1 (3), 169–176.
https://doi.org/10.1080/09583159109355197
Pickett, C.H., Wilson, L.T., Gonzalez, D. & Flaherty, D.L. (1987) Biological control of variegated leafhopper. *California Agriculture*, 41 (7–8), 14–16.
Pickett, C.H., Wilson, L.T., Flaherty, D.L. & Gonzalez, D. (1989) Measuring the host preference of parasites: an aid in evaluating biotypes of *Anagrus epos* (Hym.: Mymaridae). *Entomophaga*, 34, 551–558.
https://doi.org/10.1007/BF02374393
Picotti, P. & Pavan, F. (1993) Studi su *Anagrus atomus* (Linnaeus) (Hymenoptera, Mymaridae) parassitoide oofago di *Empoasca vitis* (Göthe) (Homoptera, Cicadellidae) su vite. 1. Dinamica di popolazione in assenza di trattamenti insetticidi. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»,* 48*,* 105–115.
Pielou, D.P. & Verma, A.N. (1968) The arthropod fauna associated with the birch bracket fungus, *Polyporus betulinus*, in eastern Canada. *Canadian Entomologist*, 100, 1179–1199.
https://doi.org/10.4039/Ent1001179-11
Pierce, W.D. (1907) Contributions to the knowledge of Rhynchophora. *Entomological News*, 18, 356–363.
Pierce, W.D. (1908) Studies of parasites of the cotton boll weevil. *United States Department of Agriculture, Bureau of Entomology, Bulletin*, 73, 1–63.
https://doi.org/10.5962/bhl.title.65126
Pierce, W.D. (1910) On some phases of parasitism displayed by insect enemies of weevils. *Journal of Economic Entomology*, 3, 451–458.

https://doi.org/10.1093/jee/3.6.451
Pilkington, L.J. & Hoddle, M.S. (2006a) Reproductive and developmental biology of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae), an egg parasitoid of *Homalodisca coagulata* (Hemiptera: Cicadellidae). *Biological Control*, 37 (3), 266–275.
https://doi.org/10.1016/j.biocontrol.2006.02.006
Pilkington, L.J. & Hoddle, M.S. (2006b) Use of life table statistics and degree-day values to predict the invasion success of *Gonatocerus ashmeadi* (Hymenoptera: Mymaridae), an egg parasitoid of *Homalodisca coagulata* (Hemiptera: Cicadellidae), in California. *Biological Control*, 37 (3), 276–283.
https://doi.org/10.1016/j.biocontrol.2006.02.007
Pilkington, L.J. & Hoddle, M.S. (2007a) Use of life tables to quantify reproductive and developmental biology of *Gonatocerus triguttatus* (Hymenoptera: Mymaridae), an egg parasitoid of *Homalodisca vitripennis* (Hemiptera: Cicadellidae). *Biological Control*, 42 (1), 1–8.
https://doi.org/10.1016/j.biocontrol.2007.04.006
Pilkington, L.J. & Hoddle, M.S. (2007b) Predictions of invasion success of *Gonatocerus triguttatus* (Hymenoptera: Mymaridae), an egg parasitoid of *Homalodisca vitripennis* (Hemiptera: Cicadellidae), in California using life table statistics and degree-day values. *Biological Control*, 42 (1), 9–15.
https://doi.org/10.1016/j.biocontrol.2007.04.009
Pilkington, L.J., Irvin, N.A., Boyd, E.A., Hoddle, M.S., Triapitsyn, S., Carey, B.G., Jones, W.A. & Morgan, D.J.W. (2005) Introduced parasitic wasps could control glassy-winged sharpshooter. *California Agriculture*, 59 (4), 223–228.
https://doi.org/10.3733/ca.v059n04p223
Pilkington, L.J., Irvin, N.A., Boyd, E.A., Hoddle, M.S., Triapitsyn, S., Carey, B.G. & Morgan, D.J.W. (2004) Biological control of glassy-winged sharpshooter in California. *In*: Hoddle, M.S. (Ed.), *California Conference on Biological Control, Berkeley, California*, *13–15 July 2004*, pp. 133–136.
Pintureau, B. (2012) Famille Mymaridae. *In*: *Les Hyménoptères parasitoïdes oophages d'Europe*. Editions Quae, c/o INRA, Versailles, pp. 26–39.
Pintureau, B., Bourarach, K. & Rohi, L. (2003) Preliminary inventory of Hymenopteran egg parasitoids from Morocco. *Actes de l'Institut Agronomique et Vétérinaire Hassan II*, 23 (2–4), 163–183.
Pintureau, B. & Iglesias Calvin, M. del P. (1996) Review of the European species of *Mymar* Curtis (Hymenoptera: Mymaridae: Mymarini). *Entomologist*, 115 (2), 114–123.
Pintureau, B. & Keita, F.B. (1990) Études des Hyménoptères parasitoïdes oophages dans deux biotopes de la region Lyonnaise. *Annales de la Société Entomologique de France*, 26 (2), 231–248.
Pitcairn, M.J., Getz, W.M. & Williams, D.W. (1990) Resource availability and parasitoid abundance in the analysis of host-parasitoid data. *Ecology*, 71 (6), 2372–2374.
https://doi.org/10.2307/1938648
Poinar, G.O., Jr. & Gyrisco, G.C. (1963) Hymenopterous parasites of the alfalfa weevil, *Hypera postica*, in New York. *Journal of Economic Entomology*, 56, 533–534.
https://doi.org/10.1093/jee/56.4.533
Poiras, A.A. (1996) The weevils (Coleoptera: Apionidae, Curculionidae) on the leguminous plants in the Republic of Moldova. *Buletinul Academiei de Ştiinţe a Republicii Moldova. Stiinte Biologice si Chimice*, 1, 33–37.
Polilov, A.A. (2015) How small is the smallest? New record and remeasuring of *Scydosella musawasensis* Hall, 1999 (Coleoptera, Ptiliidae), the smallest known free-living insect. *ZooKeys*, 526, 61–64.
https://doi.org/10.3897/zookeys.526.6531
Poole, R.W. & Gentili, P. (1996) *Nomina Insecta Nearctica*. *A check list of the insects of North America. Volume 2. Hymenoptera, Mecoptera, Megaloptera, Neuroptera, Rhaphidioptera, Trichoptera*. Entomological Information Services, Rockville, Maryland, 793 pp.
Porco, D., Rougerie, R., Deharveng, L. & Hebert, P. (2010), Coupling non-destructive DNA extraction and voucher retrieval for small soft-bodied arthropods in a high-throughput context: the example of Collembola. *Molecular Ecology Resources*, 10, 942–945.
https://doi.org/10.1111/j.1755-0998.2010.2839.x
Porter, B.A. (1922) Notes and exhibition of specimens (by Cushman, R.A., recording secretary). *Journal of the Washington Academy of Sciences*, 12, 165.
Porter, B.A. (1928) The apple maggot. *United States Department of Agriculture, Technical Bulletin*, 66, 1–48.
Porter, B.A. & Alden, C.H. (1921) *Anaphoidea conotracheli* Girault (Hym.) an egg parasite of the apple maggot. *Proceedings of the Entomological Society of Washington*, 23 (3), 62–63.
Portilla, M. (2014) Biological control as an alternative measure for tarnished plant bug control in Mississippi. *Midsouth Entomologist*, 7, 70–78.
Prabhaker, N., Morse, J.G., Castle, S.J., Naranjo, S.E., Henneberry, T.J. & Toscano, N.C. (2007) Toxicity of seven foliar insecticides to four insect parasitoids attacking citrus and cotton pests. *Journal of Economic Entomology*, 100 (4), 1053–1061.
https://doi.org/10.1093/jee/100.4.1053
Pricop, E. (2008) Mymarid wasps (Hymenoptera, Chalcidoidea, Mymaridae) new to Romanian fauna. *Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi* (*serie nouă*), *Secţiunea I, Biologie Animală*, 54, 35–48.

Pricop, E. (2009a) Mymarid wasps (Hymenoptera, Chalcidoidea, Fam. Mymaridae) associated with *Medicago sativa* L. (first note). *Studii şi Cercetări, Biologie, Universitatea din Bacău*, 17, 80–85.
Pricop, E. (2009b [2008]) A faunistic review of the Romanian Mymaridae and Mymarommatidae (Hymenoptera Chalcidoidea and Mymarommatoidea). *In*: *Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi. Serie Nouă. Secţiunea I. Biologie Animală*. *Supliment*. *Lucrările Simpozionului „Entomofagii şi rolul lor în păstrarea echilibrului natural", Agigea-Constanţa, 6–8 June 2008*. Editura Universitatii „Alexandru Ioan Cuza" Iaşi, pp. 121–128.
Pricop, E. (2009c) Preliminary studies of the Mymaridae (Hym., Chalcidoidea) from Neamţ county, Romania, species distribution, vascular flora/vegetation, an ecological approach. *AES Bioflux*, 1 (1), 13–29.
Pricop, E. (2010a) First record of *Alaptus extremus* Soyka in Romania, with additional notes on some Mymaridae species. *Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi* (*serie nouă*), *Secţiunea I, Biologie Animală*, 56, 69–75.
Pricop, E. (2010b) Fairy flies diversity (Hym: Chalcidoidea: Mymaridae) in Europe, subfam. *Alaptinae* (Annecke & Doutt, 1961) [sic] (first note). *In*: *Lucrările Simpozionului „Entomofagii şi rolul lor în păstrarea echilibrului natural"*. Universitatea "Alexandru Ioan Cuza", Iaşi, 91–95.
Pricop, E. (2013) Identification key to European genera of the Mymaridae (Hymenoptera: Chalcidoidea), with additional notes. *ELBA Bioflux*, 5 (1), 69–81.
Pricop, E. (2014a) First record of *Omyomymar* (Hymenoptera: Chalcidoidea: Mymaridae) from Europe, with description of a new species from Romania. *North-Western Journal of Zoology*, Supplement 1, S62–S66.
Pricop, E. (2014b) First record of *Litus camptopterus* Novicky, 1953 (Hymenoptera: Mymaridae) from Moldova Province (Romania), with a key to the European species. *Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi*, *serie Biologie Animală*, 60, 19–26.
Pricop, E. (2014c) Notes on *Anagrus* group of genera (Hymenoptera: Mymaridae) of western Palearctic. *ELBA Bioflux*, 6 (1), 56–61.
Pricop, E. & Moglan, I. (2016) First record of the rare Mymarid genus *Eustochus* Haliday (Hymenoptera: Mymaridae) from Romania, with notes on biology. *North–western Journal of Zoology*, 12 (2), 377–382.
Prischmann, D.A., James, D.G., Gingras, S.N. & Snyder, W.E. (2005) Diversity and abundance of insects and spiders on managed and unmanaged grapevines in southcentral Washington State. *Pan-Pacific Entomologist*, 81 (3/4), 131–144.
Prischmann, D.A., James, D.G., Storm, C.P., Wright, L.C. & Snyder, W.E. (2007) Identity, abundance, and phenology of *Anagrus* spp. (Hymenoptera: Mymaridae) and leafhoppers (Homoptera: Cicadellidae) associated with grape, blackberry, and wild rose in Washington State. *Annals of the Entomological Society of America*, 100 (1), 41–52.
https://doi.org/10.1603/0013-8746(2007)100[41:IAAPOA]2.0.CO;2
Procter, W. (1938) *Biological survey of the Mount Desert region*. *Part VI. The insect fauna with references to methods of capture, food plants, the flora and other biological features*. Wistar Institute of Anatomy and Biology, Philadelphia, 496 pp.
Procter, W. (1946) *Biological Survey of the Mount Desert Region Incorporated. Part VII. Being a revision of Parts I and VI with the addition of 1100 species. The insect fauna with references to methods of capture, food plants, the flora and other biological features*. Wistar Institute of Anatomy and Biology, Philadelphia, 566 pp.
Prota, R. (1970) Un nuovo insetto danoso ai fruttiferi della Sardengna: la *Ceresa bubalus* F. *Studi Sassaresi*, 18 (3), 48–56.
Puttler, B., Bailey, W.C. & Triapitsyn, S. (2014) Notes on distribution, host associations, and bionomics of *Erythmelus klopomor* Triapitsyn (Hymenoptera, Mymaridae), an egg parasitoid of lace bugs in Missouri, USA, with particular reference to its primary host *Corythucha arcuata* (Say) (Hemiptera, Tingidae). *Journal of Entomological and Acarological Research*, 46 (1), 30–34.
https://doi.org/10.4081/jear.2014.1857
Puttler, B., Thewke, S.E. & Warner, R.E. (1973) Bionomics of three Nearctic species, one new, of *Hypera* (Coleoptera: Curculionidae), and their parasites. *Annals of the Entomological Society of America*, 66, 1299–1306.
https://doi.org/10.1093/aesa/66.6.1299
Puttler, B. & Triapitsyn, S.V. (2006) A new species of *Anagrus* (Hymenoptera: Mymaridae) from Missouri (U.S.A.), egg parasitoid of *Corythucha marmorata* (Hemiptera: Tingidae). *Entomological News*, 117, 25–30.
https://doi.org/10.3157/0013-872X(2006)117[25:ANSOAH]2.0.CO;2
Quaintance, A.L. (1906) The principal insect enemies of the peach. *Yearbook of the United States Department of Agriculture*, 1905, 325–348.
Quaintance, A.L. (1916) The San Jose scale and its control. *United States Department of Agriculture, Farmers' Bulletin*, 650, 1–27.
Quaintance, A.L. & Jenne, E.L. (1912) The plum curculio. *United States Department of Agriculture, Bureau of Entomology, Bulletin*, 103, 1–250, 20 pls.
https://doi.org/10.5962/bhl.title.109926
Quaintance, A.L. & Sasscer, E.R. (1910) The oyster-shell scale and the scurfy scale. *United States Department of Agriculture*, *Bureau of Entomology, Circular*, 121, 1–15.
https://doi.org/10.5962/bhl.title.123803
Quaintance, A.L. & Sasscer, E.R. (1916) The oyster-shell scale and the scurfy scale. *United States Department of Agriculture, Farmers, Bulletin*, 723, 1–16.
Quayle, H.J. (1911) The red or orange scale. *California Agricultural Experiment Station, Bulletin*, 222, 99–152.

https://doi.org/10.5962/bhl.title.58923
Radcliffe, E.B. & Flanders, K.L. (1998) Biological control of alfalfa weevil in North America. *Integrated Pest Management Reviews*, 3 (4), 225–242.
https://doi.org/10.1023/A:1009611219360
Radu, V.G. & Boţoc, M. (1960) Noi contribuţii la studiul Calcidoidelor din jurul clujului. *Comunicarile Academiei Republicii Populare Romane, Bucuresti*, 10, 321–329.
Rajakulendran, S.V. (1986) *A survey for the parasitoids of the cotton fleahopper Pseudatomoscelis seriatus* (*Reuter*) *in its wild habitat and the biology of two egg parasitoids of this pest*. Ph. D. dissertation, Texas A&M University, College Station, 153 pp.
Rajakulendran, S.V. & Cate, J.R. (1986) Laboratory rearing procedures for two egg parasitoids of cotton fleahopper *Pseudatomoscelis seriatus* (Reuter). *Southwestern Entomologist*, 11 (4), 255–261.
Rameshkumar, A., Manickavasagam, S. & Jebanesan, A. (2011) New distributional records of fairyflies (Hymenoptera: Chalcidoidea: Mymaridae) from Pudhucherry, India. *Madras Agricultural Journal*, 98 (7–9), 279–281.
Rameshkumar, A., Mohanraj, P. & Veenakumari, K. (2017) First report of *Dicopomorpha zebra* Huber (Hymenoptera: Mymaridae) for India and distributional records of mymarids from Andaman and Nicobar Islands. *Journal of Entomology and Zoology Studies*, 5 (4), 228–232.
Rameshkumar, A., Poorani, J. & Naveen, V. (2015a) Additions to the Encyrtidae and Mymaridae (Chalcidoidea) of India with new distribution and host records for some species. *Biodiversity Data Journal*, 3, 1–18.
Rameshkumar, A., Poorani, J. & Naveen, V. (2015b) Additions to the Chalcidoidea (Hymenoptera) of Meghalaya with special reference to Encyrtidae, Mymaridae and Aphelinidae. *Journal of Biological Control*, 29 (2), 49–61.
https://doi.org/10.18641/jbc/29/2/79808
Rasplus, J.-Y., Villemant, C., Paiva, M.R., Delvare, G. & Roques, A. (2010) Hymenoptera. Chapter 12. In: Roques, A., Kenis, M., Lees, D., Lopez-Vaamonde, C., Rabitsch, W., Rasplus, J.-Y. & Roy, D. (Eds.), Alien terrestrial arthropods in Europe. *Biorisk*, 4 (2), pp. 669–776.
https://doi.org/10.3897/biorisk.4.55
Rathé, A.A., Pilkington, L.J., Gurr, G.M., Hoddle, M.S., Daugherty, M.P., Constable, F.E., Luck, J.E., Powell, K.S., Fletcher, M.J. & Edwards, O.R. (2012) Incursion preparedness: anticipating the arrival of an economically important plant pathogen *Xylella fastidiosa* Wells (Proteobacteria: Xanthomonadaceae) and the insect vector *Homalodisca vitripennis* (Germar) (Hemiptera: Cicadellidae) in Australia. *Australian Journal of Entomology*, 51, 209–220.
https://doi.org/10.1111/j.1440-6055.2011.00856.x
Rathé, A.A., Pilkington, L.J., Hoddle, M.S., Spohr, L.J., Daugherty, M.P. & Gurr, G.M. (2014) Feeding and development of the glassy-winged sharpshooter, *Homalodisca vitripennis*, on Australian native plant species and implications for Australian biosecurity. *PLoS One*, 9 (3), 1–10.
https://doi.org/10.1371/journal.pone.0090410
Rauber, M., Köhler, A., Pezzini, C. & Ferreira, V. (2016) Gonatocerini Ashmead (Hymenoptera, Mymaridae) na região central do Estado do Rio Grande do Sul, Brasil: novos registros e chave de identificação. *EntomoBrasilis*, 9 (2), 129–136.
https://doi.org/10.12741/ebrasilis.v9i2.587
Redak, R.A. (2001) Developing an integrated pest management solution for Pierce's disease spread by the GWSS in Temecula. *In*: Gleeson, P. (Compiler)*, Glassy-winged sharpshooter and Pierce's disease research summaries FY 2000-2001 and FY 2001–2002*. California Department of Food and Agriculture, Sacramento, California, pp. 71–72.
Reeve, J.D., Cronin, J.T. & Strong, D.R. (1994a) Parasitism and generation cycles in a salt-marsh planthopper. *Journal of Animal Ecology*, 63, 912–920.
https://doi.org/10.2307/5268
Reeve, J.D., Cronin, J.T. & Strong, D.R. (1994b) Parasitoid aggregation and the stabilization of a salt marsh host-parasitoid system. *Ecology*, 75, 288–295.
https://doi.org/10.2307/1939534
Rehmat, T. & Anis, S.B. (2014) Record of genus *Schizophragma* Ogloblin (Hymenoptera: Mymaridae) in Oriental region, with description of a new species from India. *Oriental Insects*, 48 (3–4), 306–311.
https://doi.org/10.1080/00305316.2015.1013179
Rehmat, T., Anis, S.B. & Hayat, M. (2009) Record of the genus *Litus* Haliday (Hymenoptera: Chalcidoidea: Mymaridae) from India, with description of two species. *Journal of Threatened Taxa*, 1 (7), 370–374.
https://doi.org/10.11609/JoTT.o2199.370-4
Rhéaume, A.-J. (2009) *Modélisation d'un écosystème agricole tritrophique: la carotte cultivée, le charançon de la carotte* (*Listronotus oregonensis*) *et Anaphes victus, un parasitoïde des oeufs*. M. Sc. thesis, University of Laval, Quebec City, ix + 59 pp.
Richards, O.W. & Davies, R.G. (1977) *Imms' general textbook of entomology. Vol. 2. Classification and Biology. Tenth Edition*. Chapman & Hall, London, 1354 pp.
https://doi.org/10.1007/978-94-011-6516-7
Richards, O.W. & Waloff, N. (1965) Some records of Mymaridae (Hymenoptera: Chalcidoidea) from Silwood Park, Berks. *Entomologist's Monthly Magazine*, 101, 202.
Riddick, E.W. (2003a) Parasitoid density and arena size effects on progeny production of *Anaphes iole* Girault (Hymenoptera:

Mymaridae). *Journal of Entomological Science*, 38 (3), 334–341.
https://doi.org/10.18474/0749-8004-38.3.334
Riddick, E.W. (2003b) Factors affecting progeny production of *Anaphes iole*. *BioControl*, 48, 177–189.
https://doi.org/10.1023/A:1022691512074
Riddick E.W. (2004) Effects of exposure time and food on propagation of the fairyfly *Anaphes iole* Girault (Hymenoptera: Mymaridae). *Journal of Entomological Science* 39 (1), 147–149.
https://doi.org/10.18474/0749-8004-39.1.147
Riddick, E.W. (2005a) Egg load of lab-cultured *Anaphes iole* and effects of mate presence and exposure time on load depletion. *BioControl*, 50, 53–67.
https://doi.org/10.1007/s10526-004-1071-2
Riddick, E.W. (2005b) Are lab-cultured *Anaphes iole* females strictly proovigenic? *Biocontrol*, 50, 911–919.
https://doi.org/10.1007/s10526-005-1311-0
Riherd, P.T. (1950) Biological notes on *Anagyrus antoninae* Timberlake (Hymenoptera-Encyrtidae) and its host *Antonina graminis* (Maskell) (Homoptera-Coccidae). *Florida Entomologist*, 33 (1), 18–22.
https://doi.org/10.2307/3492187
Riley, C.V. (1888) Some recent entomological matters of international concern *Insect Life*, 1 (5), 126–137.
Riley, C.V. (1889) *Report of the entomologist for the year 1888. In*: *From the Annual Report of the Department of Agriculture*. United States Department of Agriculture, Washington, D.C., pp. 53–144, 12 pls.
Riley, C.V. (1895) The San Jose Scale (*Aspidiotus perniciosus* Comstock). A serious and recent importation into Maryland. *Bulletin of the Maryland Agricultural Experiment Station*, 32, 87–112.
Rimsky-Korsakov, M.N. (1917 [1916]) Observations biologiques sur les Hyménoptères aquatiques (Avec 3 figures). *Russkoe Entomologicheskoe Obozrenie*, 16 (3–4), 209–225. [in Russian]
Rimsky-Korsakov, M.N. (1920) Parasites of insects injurious to pisciculture. *Bulletin of 2nd All-Russian Entomol-Phytopathological Meeting held in Petrograd 25–30 October 1920, Petrograd*, No. 7 (1 December 1920), pp. 6–8. [in Russian]
Rimsky-Korsakov, M.N. (1925) On the aquatic parasitoid wasps from the genus *Caraphractus* Haliday. *Trudy Leningradskogo Obshchestva Estestvoispytateley, Leningrad*, 54 (2), 97–113. [in Russian]
Rimsky-Korsakov, M.N. (1940) Hymenoptera. *In*: Zhadin, V.I. (Ed.), *Life in fresh waters of the USSRI*. Publishing House of the Academy of Sciences of the USSR, Moscow, Leningrad, pp. 227–232. [in Russian]
Romani, R., Isidoro, N. & Bin, F. (2010) Antennal structures used in communication by egg parasitoids. *In*: Cônsoli, F.L., Parra, J.R.P. & Zucchi, R.A. (Eds.), *Egg parasitoids in agroecosystems with emphasis on Trichogramma*. Progress in Biological Control 9. Springer, Dordrecht, pp. 57–96.
https://doi.org/10.1007/978-1-4020-9110-0_3
Romney, V.E. (1946) The insect community found on a perennial peppergrass in southern New Mexico and southwestern Texas. *Ecology*, 27 (3), 258–262.
https://doi.org/10.2307/1932901
Romney, V.E. & Cassidy, T.P. (1945) *Anaphes ovijentatus*, an egg-parasite of *Lygus hesperus*. *Journal of Economic Entomology*, 38, 497–498.
https://doi.org/10.1093/jee/38.4.497a
Rondani, C. (1877) Vesparia parasita non vel minus cognita observata et descripta. *Bolletino della Società Entomologica Italiana*, 9, 166–213, pls. IIIa–VIa.
Rose, R.I., Lewis, D.R. & Tollefson, J.J. (1996) Parasitism of *Lygus lineolaris* Palisot de Beauvois (Heteroptera: Miridae) by *Anaphes iole* Girault (Hymenoptera: Mymaridae) in strawberries. *Journal of the Kansas Entomological Society*, 69 (4), 357–359.
Rosenheim, J.A. (1999a) The relative contributions of time and eggs to the cost of reproduction. *Evolution*, 53, 376–385.
https://doi.org/10.1111/j.1558-5646.1999.tb03773.x
Rosenheim, J.A. (1999b) Characterizing the cost of oviposition ion insects: A dynamic model. *Evolutionary Ecology*, 13 (2), 141–165.
https://doi.org/10.1023/A:1006612519265
Rosenheim, J.A. & Mangel, M. (1994) Patch-leaving rules for parasitoids with imperfect host discrimination. *Ecological Entomology*, 19, 374–380.
https://doi.org/10.1111/j.1365-2311.1994.tb00255.x
Rossi, A.M., Reeve, J.D. & Cronin, J.T. (1994) The effect of plant- and parasitoid-induced egg mortality on the interspecific distribution of an oligophagous herbivore. *Oecologia*, Berlin, 100 (1/2), 89–93.
https://doi.org/10.1007/BF00317134
Rousseau, E. (1908) Les Hyménoptères aquatiques avec description de deux espèces nouvelles par W.-A. Schulz. *Annales de Biologie Lacustre*, 2, 388–402.
Roy, H.E., Roy, D.B. & Roques, A. (2011) Inventory of terrestrial alien arthropod predators and parasites established in Europe. *BioControl*, 56 (4), 477–504.
https://doi.org/10.1007/s10526-011-9355-9
Ruberson, J.R. & Williams III, L.H. (2000) Biological control of *Lygus* spp.: a component of areawide management. *Southwestern Entomologist Supplement*, 23, 96–110.

Sahad, K.A. & Hirashima, Y. (1984) Taxonomic studies on the genera *Gonatocerus* Nees and *Anagrus* Haliday of Japan and adjacent regions, with notes on their biology (Hymenoptera, Mymaridae). *Bulletin of the Institute of Tropical Agriculture, Kyushu University*, 7, 1–78.

Salerno, G., Frati, F., Conti, E. & Bin, F. (2007) Influence of different diets and oviposition substrates on *Lygus rugulipennis* biology (Heteroptera: Miridae). *European Journal of Entomology*, 104 (3), 417–423. https://doi.org/10.14411/eje.2007.061

Samin, N. (2015) A faunistic study on some families of Chalcidoidea (Hymenoptera) from Iran. *Arquivos Entomolóxicos*, 14, 119–124.

Samková, A., Hadrava, J., Skuhrovec, J. & Janšta, P. (2018) Reproductive strategy as a major factor determining female body size and fertility of a gregarious parasitoid. *Journal of Applied Entomology*, 143, 441–450. https://doi.org/10.1111/jen.12615

Samková, A., Hadrava, J., Skuhrovec, J. & Janšta, P. (2019) Effect of adult feeding and timing of host exposure on the fertility and longevity of the parasitoid *Anaphes flavipes*. *Entomologia Experimentalis et Applicata*, 167 (11), 932–938. https://doi.org/10.1111/eea.12843

Samková, A., Janšta, P. & Huber, J.T. (2017) *Anaphes flavipes*: redescription, neotype designation, and comparison with *A. nipponicus* (Hymenoptera: Chalcidoidea: Mymaridae). *Acta Entomologica Musei Nationalis Pragae*, 57 (2), 677–711. https://doi.org/10.1515/aemnp-2017-0095

Sanderson, E.D. (1906) Report on miscellaneous cotton insects in Texas. *United States Department of Agriculture, Bureau of Entomology, Bulletin*, 57, 1–63. https://doi.org/10.5962/bhl.title.109972

Santos, A.M.C., Borges, P.A.V. & Loes, D.J.H. (2008) Parasitoid (Hymenoptera: Parasitica) diversity in fruit orchards of Terceira Island (Azores), with new records for the Azores and Portugal. *Boletin do Museu Municipal do Funchal*, *Suplemento*, 14, 139–144.

Santos, R.S. & Costa, V.A. (2008) Primeiro registro de *Schizophragma bicolor* (Dozier, 1932) (Hymenoptera: Mymaridae) no Brasil. *Revista de Agricultura, Piracicaba*, 83 (2), 140–143.

Santos, R.S. & da Silva, J.M. (2013) Dinâmica populacional do parasitoide de ovos *Erythmelus tingitiphagus* (Hymenoptera: Mymaridae) em clone de seringueira em Itiquira, MT. *Revista Árvore, Viçosa*, 37 (2), 237–244. https://doi.org/10.1590/S0100-67622013000200005

Santos, R.S., Silva, J.M. & Neto, R.C.A. (2011) Ocorrência de *Erythmelus tingitiphagus* (Hymenoptera Mymaridae) na bordadura de talhões de seringueira vizinhos ao cerrado e mata ripária em Itiquira, MT. *Revista de Agricultura*, 86 (3), 215–221.

Satterthwaite, A.F. (1931) *Anaphoidea calendrae* Gahan, a mymarid parasite of eggs of weevils of the genus *Calendra*. *Journal of the New York Entomological Society*, 39, 171–190.

Say, T. (1828) A description of some new species of Hymenoptera in the United States. *Contributions of the Maclurian Lyceum of Philadelphia*, 1, 67–83.

Scales, A.L. (1973) Parasites of the tarnished plant bug in the Mississippi delta. *Environmental Entomology*, 2 (2), 304–306. https://doi.org/10.1093/ee/2.2.304

Schaber, B.D. (1981) Recovery of *Patasson luna* (Hymenoptera: Mymaridae) a parasite of the alfalfa weevil, *Hypera postica* (Coleoptera: Curculionidae), in Alberta. *Quaestiones Entomologicae*, 17 (1/2), 169–170.

Schauff, M.E. (1981) A review of the Nearctic species of *Acmopolynema* Ogloblin (Hymenoptera: Mymaridae). *Proceedings of the Entomological Society of Washington*, 83, 444–460.

Schauff, M.E. (1983) A new genus of Mymaridae (Hymenoptera: Chalcidoidea) from the New World. *Proceedings of the Entomological Society of Washington*, 85, 543–551.

Schauff, M.E. (1984a) The Holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). *Memoirs of the Entomological Society of Washington*, 12, 1–64.

Schauff, M.E. (1984b) Taxonomic notes on *Anaphes diana* (Girault), an imported mymarid (Hymenoptera: Mymaridae) egg parasite of *Sitona* weevils (Coleoptera: Curculionidae). *Proceedings of the Entomological Society of Washington*, 86 (1), 214–216.

Schauff, M.E. (1987) Taxonomy and identification of the egg parasites (Hymenoptera: Platygastridae, Trichogrammatidae, Mymaridae, and Eulophidae) of citrus weevils (Coleoptera: Curculionidae) *Proceedings of the Entomological Society of Washington*, 89 (1), 31–42.

Schauff, M.E. & Grissell, E.E. (1982) Nomenclatural notes on *Polynema* (Hymenoptera: Mymaridae), with description of a new species. *Proceedings of the Entomological Society of Washington*, 84, 529–534.

Schedl, W. (1991) Invasion der Amerikanischen Büffelzikade (*Stictocephala bisonia* Kopp und Yonke, 1977) nach Östereich (Homoptera, Auchenorrhyncha, Membracidae). A*nzieger für Schädlingskunde, Planzenschutz, Umweltschutz*, 64, 9–13. https://doi.org/10.1007/BF01906190

Schlinger, E.I. (1958) Notes on the biology of a mud egg-case making fulgorid, *Hysteropterum beameri* Doering (Homoptera: Fulgoridae). *Journal of the Kansas Entomological Society*, 31, 104–106.

Schmiedeknecht, O. (1909) Hymenoptera Fam. Chalcididae. *Genera Insectorum*, 97, 1–550, 8 pls.

Schröder, M.L. Nahrung, H.F., Lawson, S.A., Slippers, B., Wingfield, M.J. & Hurley, B.P. (2017) 6.3 Biological control of the *Gonipterus scutellatus* species complex: testing the species, climatic or phenological mismatch hypotheses. *In*: Mason, P.G., Gillespie, D.R. & Vincent, C. (Eds.), *Proceedings of the 5th International Symposium on Biological Control of Arthro-*

pods. *Langwaki, Malaysia, September 11–15 2017*. CAB International, Wallingford, pp. 99–101. https://doi.org/10.1079/9781786394118.0099
Schultz, W.A. (1910a) Neuer Beitrag zur Kenntnis der Wasserimmen. *Annales de Biologie Lacustre*, 4, 187–193.
Schultz, W.A. (1910b) Süsswasser-Hymenopteren aus dem See von Overmeire. *Annales de Biologie Lacustre*, 4, 194–210.
Schuster, M.F. (1987) Biological control of plant bugs in cotton. *In*: Hedlund, R.C. & Graham, H.M. (Eds.), *Economic importance and biological control of Lygus and Adelphocoris in North America. USDA-ARS 64*. United States Department of Agriculture, Agricultural Research Service, Washington, DC, pp. 13–19.
Schwitzgebel, R.B. & Wilbur, D.A. (1943) Diptera associated with ironweed, *Veronica interior* Small in Kansas. *Journal of the Kansas Entomological Society*, 16, 1–13.
Scotland, M.B. (1939) The Lemna fly and some of its parasites. *Annals of the Entomological Society of America*, 32, 713–718. https://doi.org/10.1093/aesa/32.4.713
Scotland, M.B. (1940) Review and summary of studies of insects associated with *Lemna minor*. *Journal of the New York Entomological Society*, 48, 319–333.
Scott, W.G. (1933) *Anatomical and biological studies of Anagrus epos Girault*. M. Sc. thesis. University of California, Berkeley, 19 pp.
Segoli, M. (2016) Effects of habitat type and spacial scale on density dependent parasitism in *Anagrus* parasitoids of leafhopper eggs. *Biological Control*, 92, 139–144. https://doi.org/10.1016/j.biocontrol.2015.10.011
Segoli, M. & Rosenheim, J.A. (2013a) The link between host density and egg production in a parasitoid insect: comparison between agricultural and natural habitats. *Functional Ecology*, 27 (5), 1224–1232. https://doi.org/10.1111/1365-2435.12109
Segoli, M. & Rosenheim, J.A. (2013b) Limits to the reproductive success of two insect parasitoid species in the field. *Ecology*, 94 (11), 2498–2504. https://doi.org/10.1890/13-0262.1
Segoli, M. & Rosenheim, J.A. (2015) The effect of body size on oviposition success of a minute parasitoid in nature. *Ecological Entomology*, 40 (4), 483–485. https://doi.org/10.1111/een.12194
Segoli, M., Stouthamer, R., Stouthamer, C.M., Rugman-Jones, P. & Rosenheim, J.A. (2013) The effect of *Wolbachia* on the lifetime reproductive success of its insect host in the field. *Journal of Evolutionary Biology*, 26 (12), 2716–2720. https://doi.org/10.1111/jeb.12264
Settle, W.H. & Wilson, L.T. (1990a) Invasion by the variegated leafhopper and biotic interactions: parasitism, competition, and apparent competition. *Ecology*, 71, 1461–1470. https://doi.org/10.2307/1938283
Settle, W.H. & Wilson, L.T. (1990b) Behavioural factors affecting differential parasitism by *Anagrus epos* (Hymenoptera: Mymaridae), of two species of erythroneuran leafhoppers (Homoptera: Cicadellidae). *Journal of Animal Ecology*, 59, 877–891. https://doi.org/10.2307/5020
Settle, W.H., Wilson, L.T., Flaherty, D.L. & English-Loeb, G.M. (1986) The variegated leafhopper, an increasing pest of grapes. *California Agriculture*, 40 (7–8), 30–32.
Severin, H.H.P. (1924) Natural enemies of beet leafhopper (*Eutettix tenella* Baker). *Journal of Economic Entomology*, 17, 369–377. https://doi.org/10.1093/jee/17.3.369
Seyedoleslami, H. & Croft, B.A. (1980) Spatial distribution of overwintering eggs of the white apple leafhopper, *Typhlocyba pomaria*, and parasitism by *Anagrus epos*. *Environmental Entomology*, 9 (5), 624–628. https://doi.org/10.1093/ee/9.5.624
Shamim, S.M. & Shafee, S.A. (1984) Descriptions of three new species of *Gonatocerus* Nees (Hymenoptera: Mymaridae) from Aligarh (India). *Journal of the Bombay Natural History Society*, 80 (3), 623–626.
Shaw, F.R. & Miller, M.C. (1965) Some observations on the biological control of the alfalfa weevil in western Massachusetts. *Cooperative Economic Insect Report*, 15 (39), 1131.
Shaw, F.R. & Ziener, W.H. (1964) Survey of parasites of the alfalfa weevil in western Massachusetts. *United States Department of Agriculture*, *Cooperative Economic Insect Report*, 14 (9), 138.
Sillings, J.O. (1971) The parasites of the tarnished plant bug *Lygus lineolaris* in Indiana. *Proceedings of the North Central Branch of the Entomological Society of America*, 26, 105.
Sillings, J.O. & Broersma, D.B. (1974) The parasites of the tarnished plant bug *Lygus lineolaris* in Indiana. *Proceedings of the North Central Branch of the Entomological Society of America*, 29, 120–125.
Silvestri, F. (1915) Struttura dell'ovo e prime fasi di sviluppo di alcuni imenotteri parassiti. *Bollettino del Laboratorio di Zoologia Generale e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 10, 66–88, 6 pls.
Smith, R.A. & Nordlund, D.A. (2000) Mass rearing technology for biological control agents of *Lygus* spp. *Southwestern Entomologist*, Supplement 23, 121–127.
Smith, R.H. (1923) The clover aphis: biology, economic relationships and control. *Idaho Agricultural Experiment Station, Research Bulletin*, 3, 1–75.

Smits van Burgst, C.A.L. (1914) Een klein sluipwespje, *Litus nigriceps* n.sp. *Entomologische Berichten*, 4 (80), 125–127.
Snapp, O.I. (1930) Life history and habits of the plum curculio in the Georgia peach belt. *United States Department of Agriculture, Technical Bulletin*, 188, 1–90.
Snodgrass, G.L. & Ertle, L.R. (1987) Quarantine procedures for imported parasites of *Lygus* spp. *In*: Hedlund, R.C. & Graham, H.M. (Eds), *Economic importance and biological control of Lygus and Adelphocoris in North America, USDA-ARS 64.* United States Department of Agriculture, Agriculture Research Service. Washington, DC, pp. 88–93.
Sohati, P.H., Boivin, G. & Stewart, R.K. (1992) Parasitism of *Lygus lineolaris* eggs on *Coronilla varia*, *Solanum tuberosum*, and three host weeds in southeastern Québec. *Entomophaga*, 37, 515–523.
https://doi.org/10.1007/BF02372321
Sohati, P.H., Stewart, R.K. & Boivin, G. (1989) Egg parasitoids of the tarnished plant bug, *Lygus lineolaris* (P. de B.) (Hemiptera, Miridae), in Quebec. *Canadian Entomologist*, 121, 1127–1128.
https://doi.org/10.4039/Ent1211127-12
Solomon, B. (1985) Weevils cloud sunflower scene. *Agricultural Research, USA*, 33 (1), 12–13.
Sommerman, K.M. (1943a) Bionomics of *Lachesilla nubilis* (Aaron) (Corrodentia, Caeciliidae). *Canadian Entomologist*, 75, 99–105.
Sommerman, K.M. (1943b) Description and bionomics of *Caecilius manteri* n. sp. (Corrodentia). *Proceedings of the Entomological Society of Washington*, 45 (2), 29–39.
Sommerman, K.M. (1943c) Bionomics of *Ectopsocus pumilis* (Banks) (Corrodentia, Caeciliidae). *Psyche*, 50, 53–64.
https://doi.org/10.1155/1943/57806
Son, Y., Nadel, H., Baek, S., Johnson, M.W. & Morgan, D.J.W. (2012) Estimation of developmental parameters for adult emergence of *Gonatocerus morgani*, a novel egg parasitoid of the glassy-winged sharpshooter, and development of a degree-day model. *Biological Control*, 60 (3), 233–240.
https://doi.org/10.1016/j.biocontrol.2011.04.008
Sorenson, C.J. (1928) Treehopper injury in Utah orchards. *Utah Agricultural Experiment Station Bulletin*, 206, 1–18.
Sosa, O., Jr. (1985) The sugarcane delphacid, *Perkinsiella saccharicida* (Homoptera: Delphacidae), a sugarcane pest new to North America detected in Florida (Una plaga de la caña de azúcar nueva para norteamérica detectada en la Florida). *Florida Entomologist*, 68 (2), 357–360.
https://doi.org/10.2307/3494376
Soyka, W. (1932) Neue Trichogramminen- und Mymarinenarten aus Sud-Limburg. *Natuurhistorisch Maandblad*, 21, 82–84.
Soyka, W. (1937) Beiträge zur Klärung der europäischen Arten der Mymariden. Das Genus Alaptus Haliday. *Natuurhistorisch Maandblad*, 26, 74–76.
Soyka, W. (1939a) Beiträge zur Klärung der europäischen Arten der Mymariden. (Mymaridae, Chalc., Hymenopt.) [Fortsetzung]. *Natuurhistorisch Maandblad*, 28 (3), 27–31.
Soyka, W. (1939b) Beiträge zur Klärung der europäischen Arten der Mymariden. (Mymaridae, Chalc., Hymenopt.) [Fortsetzung]. *Natuurhistorisch Maandblad*, 28 (3), 27–31.
Soyka, W. (1941) Beiträge zur Klärung der europaischen Arten der Mymariden. Das Genus „*Ooctonus"* Haliday (Fortsetzung). *Natuurhistorisch Maandblad*, 30, 95–96.
Soyka, W. (1946a) Revision einiger Mymridengattungen [sic]. *Zentralblatt für das Gesamtgebiet der Entomologie*, 1 (2), 33–44.
Soyka, W. (1946b) Beiträge zur Klärung der europäischen Arten und Gattungen der Mymariden (Hym. Chalcidoid.). *Zentralblatt für das Gesamtgebiet der Entomologie*, 56, 177–185.
Soyka, W. (1948) Drei neue Arten der Gattung Alaptus Haliday. *Entomologisches Nachrichtenblatt, Burgdorf*, 2 (9), 71–75.
Soyka, W. (1949a) Monographie der *Mymar*-Gruppe, mit den Gattungen *Mymar* Curtis, *Synanaphes*, Soyka, *Ferrierella* Soyka, *Anaphoidea* Girault, *Hofenederia* Soyka, *Fulmekiella* Soyka, and *Yungaburra* Girault (Hymenoptera, Chalcidoidea, Mymaridae). *Revista de Entomologia, Rio de Janeiro*, 20, 301–422.
Soyka, W. (1949b) Das Genus "Ooctonus" Haliday. (Mymaridae, Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt, Burgdorf*, 3 (3), 32–37.
Soyka, W. (1949c) Das Genus "Ooctonus" Haliday. (Mymaridae, Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt, Burgdorf*, 3 (4), 45–50.
Soyka, W. (1949d) Das Genus "Ooctonus" Haliday (Mymaridae, Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt, Burgdorf*, 3 (6), 66–71.
Soyka, W. (1950a) Drei neuer Mymaridengattungen. *Entomologisches Nachrichtenblatt,* Burgdorf, 3 (11), 129–125.
Soyka, W. (1950b) New and known Alaptids and Mymarids from Egypt [Hymenoptera-Chalcidoidea]. *Bulletin de la Société Fouad 1er d'Entomologie*, 34, 121–131.
Soyka, W. (1950c) Das Genus "Ooctonus" Haliday (Mymaridae, Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt, Burgdorf*, 3 (12), 130–133.
Soyka, W. (1956a [1955]) Überblick über das Genus Anagrus Haliday (Alaptidae-Mymaridae, Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt Österreicher und Schweizer Entomologen, Vienna*, 7, 23–26.
Soyka, W. (1956b) Monographie der Polynemagruppe mit den Gattungen *Acmopolynema* Ogloblin, *Barypolynema* Ogloblin, *Doryclitus* Förster, *Erdösiella* g.n., *Grangeriella* g.n., *Maidliella* Soyka, *Palaeoneura* Waterhouse, *Polynema* Haliday, *Richteria* Girault, *Stephanodes* Enock, *Tetrapolynema* Ogloblin. *Abhandlungen der Zoologisch-botanischen Gesellschaft*

in Wien, 19, 1–115.
Soyka, W. (1961) Neue monographische Revision der *Camptoptera*-Gruppe mit den Gattungen *Camptoptera* Förster, *Stichothrix* Förster, *Macrocamptoptera* Girault und *Wertanekiella* n.g.* (Mymaridae, Chalcidoidea, Hymenoptera). *Publicaties van het Natuurhistorish Genootschap in Limburg*,12, 72–89.
Spruyt, F.J. (1927) Notes on *Alaptus psocidivorus* Gahan, a new species of Mymaridae (Hymenoptera). *Pan-Pacific Entomologist*, 3, 182–184.
Stahl, C.F. (1920) Studies on the life history and habits of the beet leafhopper. *Journal of Agricultural Research*, 20, 245–252, pls. 42 and 43.
Stark, J.D. & Goyer, R.A. (1983) Life cycle and behavior of *Neochetina eichhorniae* Warner (Coleoptera: Curculionidae) in Louisiana: a biological control agent of waterhyacinth. *Environmental Entomology*, 12 (1), 147–150.
https://doi.org/10.1093/ee/12.1.147
Stegmaier, C.E., Jr. (1973) Colonization of the puncture vine stem weevil, *Microlarinus lypriformis* (Coleoptera: Curculionidae) with notes on parasitism in south Florida. *Florida Entomologist*, 56 (3), 235–241.
https://doi.org/10.2307/3493130
Steiner, H.M. (1936) New nymphal-adult parasite of white apple leafhopper. *Journal of Economic Entomology*, 29, 632–633.
Steiner, H.M. (1938a) Effects of orchard practices on natural enemies of the white apple leafhopper. *Journal of Economic Entomology*, 31, 232–240.
https://doi.org/10.1093/jee/31.2.232
Steiner, H.M. (1938b) White apple leafhopper parasites in relation to control. *Proceedings of the forty-seventh annual meeting. The Connecticut Pomological Society*, 47, 23–25.
Stiling, P. & Bowdish, T.I. (2000) Direct and indirect effects of plant clone and local environment on herbivore abundance. *Ecology*, 81 (1), 281–285.
https://doi.org/10.1890/0012-9658(2000)081[0281:DAIEOP]2.0.CO;2
Stiling, P.D. & Strong, D.R. (1982a) The parasitoids of the plant hopper *Prokelisia marginata* (Homoptera: Delphacidae). *Florida Entomologist*, 65 (1), 191–192.
https://doi.org/10.2307/3494165
Stiling, P.D. & Strong, D.R. (1982b) Egg density and the intensity of parasitism in *Prokelisia marginata* (Homoptera: Delphacidae). *Ecology*, 63 (6), 1630–1635.
https://doi.org/10.2307/1940103
Stiling, P., Throckmorton, A., Silvanima, J. & Strong, D.R. (1991) Does spatial scale affect the incidence of density dependence? A field test with insect parasitoids. *Ecology*, 72 (6), 2143–2154.
https://doi.org/10.2307/1941566
Stoner, A. & Surber, D.E. (1969) Notes on the biology and rearing of *Anaphes ovijentatus*, a new parasite of *Lygus hesperus* in Arizona. *Journal of Economic Entomology*, 62, 501–502.
https://doi.org/10.1093/jee/62.2.501
Stoner, A. & Surber, D.E. (1971) Development of *Anaphes ovijentatus*, an egg parasite of *Lygus hesperus*, in relation to temperature. *Journal of Economic Entomology*, 64, 1566–1567.
https://doi.org/10.1093/jee/64.6.1566
Story, R.N. & Robinson, W.H. (1979) Biological control potential of *Taphrocerus schaefferi* (Coleoptera: Buprestidae), a leafminer of yellow nutsedge. *Environmental Entomology*, 8 (6), 1088–1091.
https://doi.org/10.1093/ee/8.6.1088
Strand, M.R. (1986) The physiological interactions of parasitoids with their hosts and their influence on reproductive strategies. *In*: Waage, J. & Greathead, D. (Eds.), *Insect Parasitoids*. Academic Press, London, pp. 97–119.
Streams, F.A. & Fuester, R.W. (1966) *Patasson luna* in overwintering eggs of the alfalfa weevil. *Journal of Economic Entomology*, 59 (2), 331–333.
https://doi.org/10.1093/jee/59.2.331
Strong, D.R. (1989) Density independence in space and inconsistent temporal relationships for host mortality cause by a fairyfly parasitoid. *Journal of Animal Ecology*, 58, 1065–1076.
https://doi.org/10.2307/5142
Strong, L.A. (1936) Report of the chief of the Bureau of Entomology and Plant Quarantine, 1936. *United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, Annual Report* (*1936*). United States Department of Agriculture, Washington, D.C., 121 pp.
Strong, L.A. (1937) Report of the chief of the Bureau of Entomology and Plant Quarantine, 1937. *United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, Annual Report* (*1937*). United States Department of Agriculture, Washington, D.C., 98 pp.
Strong, L.A. (1938) *Report of the chief of the Bureau of Entomology and Plant Quarantine, 1938. United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, Annual Report* (*1938*). United States Department of Agriculture, Washington, D.C., 84 pp.
Subba Rao, B.R. (1966) Records of known and new species of mymarid parasites of *Empoasca devastans* Distant from India. *Indian Journal of Entomology*, 28 (2), 187–196.
Subba Rao, B.R. (1976) *Narayana* gen. nov. from Burma and some synonyms (Hymenoptera: Mymaridae). *Oriental Insects*,

10 (1), 87–91.
https://doi.org/10.1080/00305316.1976.10432324
Subba Rao, B.R. (1984) Descriptions of new species of Oriental Mymaridae and Aphelinidae (Hymenoptera: Chalcidoidea). *Proceedings of the Indian Academy of Sciences* (*Animal Sciences*), 93, 251–262.
https://doi.org/10.1007/BF03186285
Subba Rao, B.R. & Hayat, M. (1983) Key to genera of Oriental Mymaridae, with a preliminary catalog (Hymenoptera: Chalcidoidea). *Contributions to the American Entomological Institute*, 20, 125–150.
Swezey, O.H. (1916) "*Gonatocerus mexicanus*," a mymarid parasitic in the eggs of "*Draeculacephala mollipes*" in Hawaii. *Proceedings of the Hawaiian Entomological Society*, 3 (146), 223.
Swezey, O.H. (1929) Notes on the egg parasites of insects in Hawaii. *Proceedings of the Hawaiian Entomological Society*, 7 (2), 282–292
Swezey, O.H. (1954) *Forest entomology in Hawaii. An annotated check-list of the insect faunas of the various componemts of the Hawaiian forests*. Bernice P. Bishop Museum, Special Publication 44. 266 pp.
Świerczewski, D. & Stroiński, A. (2011) The first records of the Nearctic treehopper *Stictocephala bisonia* in Poland (Hemiptera: Cicadomorpha: Membracidae) with some comments on this potential pest. *Polish Journal of Entomology*, 80, 13–22.
https://doi.org/10.2478/v10200-011-0002-7
Taguchi, H. (1971) Mymaridae of Japan, I (Hymenoptera: Chalcidoidea). *Transactions of the Shikoku Entomological Society* 11 (2), 49–59.
Taguchi, H. (1978) A new species of the genus *Stephanodes* from Japan and Taiwan (Hymenoptera: Mymaridae). *Transactions of the Shikoku Entomological Society*, 14 (1–2), 73–76.
Takasu, K. & Nordlund, D.A. (2001) Host recognition kairomones for *Anaphes iole* Girault, an egg parasitoid of the western tarnished plant bug. *Biological Control*, 22 (1), 60–65.
https://doi.org/10.1006/bcon.2001.0945
Tedders, W.L. & Payne, J.A. (1986) Biology, life history, and control of *Conotrachelus schoofi* (Coleoptera: Curculionidae) on pecans. *Journal of Economic Entomology*, 79 (2), 490–496.
https://doi.org/10.1093/jee/79.2.490
Thier, R.W., Zack, R.S. & Foote, B.A. (1976) *Anaphes* (Hymenoptera: Mymaridae) reared from the eggs of a shore fly (Diptera: Ephydridae). *Great Lakes Entomologist*, 9 (4), 205–206.
Thompson, W.R. (1958) A catalogue of the parasites and predators of insect pests. Section 2. Host parasite Catalogue, Part 5, Hosts of the Hymenoptera (Microgasteridae to Trigonalidae), Lepidoptera and Strepsiptera. *Commonwealth Institute of Biological Control, Ottawa*. pp. 562–698.
Timberlake, P.H. (1924) Records of the introduced and immigrant chalcid-flies of the Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society*, 5, 418–449.
Tin, M.M.-Y., Economo, E.P. & Mikheyev, A.S. (2014) Sequencing degraded DNA from non-destructively sampled museum specimens for RAD-tagging and low-coverage shotgun phylogenetics. *PloS One*, 9 (5), e96793.
https://doi.org/10.1371/journal.pone.0096793
Tipping, C. (2004) Overwintering biology of the glassy-winged sharpshooter and *Gonatocerus ashmeadi*. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers)*, Proceedings of the 2004 Pierce's Disease Research Symposium, December 7–10, 2004, Coronado Island Marriott Resort, Coronado*. California Department of Food and Agriculture, Sacramento, California, pp. 153–156.
Tipping, C., Triapitsyn, S.V. & Mizell III, R.F. (2006) First record of an egg parasitoid for the North American proconiine sharpshooter *Paraulacizes irrorata* (Hemiptera: Cicadellidae), with note on rearing techniques. *Florida Entomologist*, 89 (2), 288–289.
https://doi.org/10.1653/0015-4040(2006)89[288:FROAEP]2.0.CO;2
Tooke, F.G.C. (1953) The Eucalyptus snout-beetle, *Gonipterus scutellatus* Gyll. A study of its ecology and control by biological means. *Entomology Memoirs, Department of Agriculture Union of South Africa*, 3: iii + 282 pp.
Toscano, N. & Morse, J.G. (2006) Compatibility of select insecticides with natural enemies of the glassy-winged sharpshooter and other pests. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2006 Pierce's Disease Research Symposium, Westin Horton Plaza Hotel, San Diego, 27–29 November 2006*. California Department of Food and Agriculture, Sacramento, California, pp. 107–110.
Toscano, N., Morse, J. & Henneberry, T.J. (2005) Compatibility of select insecticides with natural enemies of the glassy-winged sharpshooters and other pests. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers), *Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005*. California Department of Food and Agriculture, Sacramento, California, pp. 388–391.
Toscano, N., Morse, J.G., Prabhaker, N., Castle, S.J. & Naranjo, S. (2004) Compatibility of insecticides with natural enemies of the glassy-winged sharpshooter. *In*: Tariq, M.A., Oswalt, S. Blincoe, P., Ba, A., Lorick, T. & Esser, T. (Compilers)*, Proceedings of the 2004 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, Coronado, 7–10 December 2004*. California Department of Food and Agriculture, Sacramento, California, pp. 378–381.
Traoré, L., Pilon, J.-G., Fournier, F. & Boivin, G. (2006) Adaptation of the developmental process of *Anaphes victus* (Hymenoptera: Mymaridae) to local climatic conditions across North America. *Annals of the Entomological Society of America*, 99 (6), 1121–1126.

https://doi.org/10.1603/0013-8746(2006)99[1121:AOTDPO]2.0.CO;2
Triapitsyn, S.V. (1997) The genus *Anagrus* (Hymenoptera: Mymaridae) in America south of the United States: a review. *Revista Ceiba*, 38 (1), 1–12.
Triapitsyn, S.V. (1998) The H.R. Debauche collection of *Anagrus* (Hymenoptera: Mymaridae): an annotated catalog. *Bulletin & Annales de la Société Royale Belge d'Entomologie*, 134 (2), 139–146.
Triapitsyn, S.V. (2000a [1999]) A review of the species of *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) collected by A.A. Ogloblin in Argentina. *Russian Entomological Journal*, 8, 213–222.
Triapitsyn, S.V. (2000b) A new *Anagrus* (*Anagrella*) (Hymenoptera Mymaridae), apparently associated with psocid eggs. *Belgian Journal of Entomology*, 2, 295–298.
Triapitsyn, S.V. (2000c) A new *Anagrus* (Hymenoptera: Mymaridae), egg parasitoid of *Idona minuenda* (Homoptera: Cicadellidae), a pest of avocado in Mexico. *Folia Entomológica Mexicana*, 110, 89–94.
Triapitsyn, S.V. (2001) Review of the Australasian species of *Anagrus* (Hymenoptera Mymaridae). *Belgian Journal of Entomology*, 3, 267–289.
Triapitsyn, S.V. (2002a) Descriptive notes on a new and other little known species of *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) from the New World tropics and subtropics. *Entomotropica*, 17, 213–223.
Triapitsyn, S.V. (2002b) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Cleruchus* Enock and *Stethynium* Enock. *Far Eastern Entomologist*, 122, 1–13.
Triapitsyn, S.V. (2002c) Species of the genus *Alaptus* Westwood (Hymenoptera, Mymaridae) reared from psocid eggs (Psocoptera) by V. N. Vishnyakova (Gorlova) in Russia and Byelorussia. *Entomologicheskoe Obozrenie*, 81 (1), 215–217. [in Russian, English translation: Tryapitzin, S.V. (2002) Species of the genus *Alaptus* Westwood (Hymenoptera, Mymaridae), reared from psocid eggs (Psocoptera) by V. N. Vishnyakova (Gorlova) in Russia and Belarus. *Entomological Review*, 82 (2), 183–184.]
Triapitsyn, S.V. (2002d) Species-level taxonomy of Mymaridae (Hymenoptera): current status and implications for biological control of leafhoppers of economic importance. *In* Melika, G. & Thuróczy, C. (Eds.), *Parasitic wasps. Evolution, systematics, biodiversity and biological control*. Agroinform, Kiadó & Nyomba Kft., Budapest, pp. 89–94.
Triapitsyn, S.V. (2003a) Description of a new species of *Anagrus* from China related to *A. takeyanus* (Hymenoptera: Mymaridae). *Belgian Journal of Entomology*, 5, 117–124.
Triapitsyn, S.V. (2003b) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genus *Erythmelus* Enock, with taxonomic notes on some extralimital species. *Far Eastern Entomologist*, 126, 1–44.
Triapitsyn, S.V. (2005) Preparing and submitting for publication a pictorial, annotated key to *Gonatocerus* species and other genera and species of Mymaridae (Hymenoptera) – egg parasitoids of *Homalodisca* spp. and other proconiine sharpshooters in North America, with emphasis on the species native or introduced to California. *In*: Tariq, M.A., Blincoe, P., Mochel, M., Oswalt, S. & Esser, T. (Compilers)*, Proceedings of the 2005 Pierce's Disease Research Symposium, San Diego Marriott Hotel & Marina, San Diego, 5–7 December 2005.* California Department of Food and Agriculture, Sacramento, California, pp. 392–394.
Triapitsyn, S.V. (2006) A key to the Mymaridae (Hymenoptera) egg parasitoids of proconiine sharpshooters (Hemiptera: Cicadellidae) in the Nearctic region, with descriptions of two new species of *Gonatocerus*. *Zootaxa*, 1203 (1), 1–38.
https://doi.org/10.11646/zootaxa.1203.1.1
Triapitsyn, S.V. (2008) New records of *Erythmelus* (Hymenoptera: Mymaridae) from the Neotropical region, with description of a new species from Argentina. *Zootaxa*, 1842 (1), 66–68.
https://doi.org/10.11646/zootaxa.1842.1.6
Triapitsyn, S.V. (2010) Revision of the Palaearctic species and review of the Oriental species of *Ooctonus* (Hymenoptera: Mymaridae), with notes on extralimital taxa. *Zootaxa*, 2381 (1), 1–74.
https://doi.org/10.11646/zootaxa.2381.1.1
Triapitsyn, S.V. (2011a) Taxonomic notes on *Caraphractus* (Hymenoptera: Mymaridae). *Sahlbergia*, 17 (2), 20–29.
Triapitsyn, S.V. (2011b) Vouchering specimens of egg parasitoids of the glassy-winged sharpshooter collected by the CDFA Pierce's Disease biological control program in California and Texas A&M in Texas. *In*: Esser, T. (Chief Ed.), *Proceedings of the 2011 Pierce's Disease Research Symposium, Sheraton Grand Sacramento Hotel, 13–15 December 2011.* California Department of Food and Agriculture, Sacramento, California, pp. 17–18.
Triapitsyn, S.V. (2012a) Revision of *Macrocamptoptera* Girault, 1910 (Insecta: Hymenoptera: Mymaridae). *Annalen der Naturhistorisches Museum Wien, B*, 113, 95–107.
Triapitsyn, S.V. (2012b) Vouchering specimens of egg parasitoids of the glassy-winged sharpshooter collected by the CDFA Pierce's Disease biological control program in California and Texas A&M University in Texas. *In:* Esser, T. (Chief Ed.)*, Pierce's Disease Research Progress Reports, December 2012*. California Department of Food and Agriculture, Sacramento, California, pp. 8–11.
Triapitsyn, S.V. (2013a) Review of *Gonatocerus* (Hymenoptera: Mymaridae) in the Palaearctic region, with notes on extralimital distributions. *Zootaxa*, 3644 (1), 1–178.
https://doi.org/10.11646/zootaxa.3644.1.1
Triapitsyn, S.V. (2013b) Genus *Gonatocerus* Nees ab Esenbeck, 1834 (Hymenoptera: Mymaridae) in the Nearctic region: taxonomic notes and descriptions of three new species. *Russian Entomological Journal*, 22, 211–222.
Triapitsyn, S.V. (2013c) A new species of *Anagrus* (Hymenoptera: Mymaridae) from Tahiti, with notes on egg parasitoids of

proconiine sharpshooters (Hemiptera: Cicadellidae: Proconiini) in the world. *Journal of Taiwan Agricultural Research*, 62 (4), 289–299.
Triapitsyn, S.V. (2014a) Review of the Palaearctic species of *Cleruchus* Enock (Hymenoptera: Mymaridae). *Far Eastern Entomologist*, 274, 1–59.
Triapitsyn, S.V. (2014b) Revision of the genus *Camptoptera* Foerster (Hymenoptera: Mymaridae) in the Palaearctic region, with taxonomic notes on some extralimital species. *Far Eastern Entomologist*, 285, 1–85.
Triapitsyn, S.V. (2014c [2013]) Notes and corrections on some records of Mymaridae (Hymenoptera: Chalcidoidea) from India. *Biosystematica*, 7 (2), 39–41.
Triapitsyn, S.V. (2015a) Taxonomic notes on *Anagrus incarnatus* Haliday and some other fairyflies (Insecta: Hymenoptera: Mymaridae) from the A. H. Haliday collection in the National Museum of Ireland. *Bulletin of the Irish Biogeographical Society*, 39, 215–220.
Triapitsyn, S.V. (2015b) Taxonomy of the genus *Anagrus* Haliday [Hymenoptera: Mymaridae] of the world: an annotated key to the described species, discussion of the remaining problems, and a checklist. *Acta Zoológica Lilloana*, 59 (1–2), 3–50.
Triapitsyn, S.V. (2015c) New records of Eulophidae, Mymaridae, Pteromalidae, and Tetracampidae (Hymenoptera: Chalcidoidea) from Russia, with annotations and description of a new species of *Dicopus* Enock. *Far Eastern Entomologist*, 292, 1–12.
Triapitsyn, S.V. (2016) Review of the Oriental species of the genus *Arescon* Walker, 1846 (Hymenoptera: Mymaridae). *Eurasian Entomological Journal*, 1, 137–151.
Triapitsyn, S.V. (2017) Revision of *Alaptus* (Hymenoptera: Mymaridae) in the Holarctic region, with taxonomic notes on some extralimital species. *Zootaxa*, 4279 (1), 1–92.
https://doi.org/10.11646/zootaxa.4279.1.1
Triapitsyn, S.V. (2018a) An annotated checklist of Mymaridae (Hymenoptera: Chalcidoidea) in Taiwan, with descriptions of five new species. *Journal of Taiwan Agricultural Research*, 67 (2), 113–165.
Triapitsyn, S.V. (2018b) A new species of *Palaeoneura* Waterhouse (Hymenoptera: Mymaridae) from California, USA, with taxonomic notes on *Palaeoneura saga* (Girault) comb. n. *Journal of the Entomological Society of Ontario*, 149, 33–47.
Triapitsyn, S.V. (2018c) Identification of the egg parasitoids of Auchenorrhyncha (Hemiptera) of economic importance in Taiwan: collaborative research between Taiwan Agricultural Research Institute and University of California at Riverside scientists. *In*: Shih, H.-T. & Chang, C.-J. (Eds), *Proceedings of the 2018 International Symposium on Proactive Technologies for Enhancement of Integrated Pest Management of Key Crops*. Special publication of TARI, 215, pp. 4–13.
Triapitsyn, S.V., Adachi-Hagimori, T., Rugman-Jones, P.F., Barry, A., Abe, A., Matsuo, K. & Ohno, K. (2019) Egg parasitoids of the tea green leafhopper *Empoasca onukii* (Hemiptera, Cicadellidae) in Japan, with description of a new species of *Anagrus* (Hymenoptera, Mymaridae). *ZooKeys*, 836, 93–112.
https://doi.org/10.3897/zookeys.836.32634
Triapitsyn, S.V. & Aquino, D.A. (2010) On the occurrence of *Polynema* Haliday (*Dorypolynema* Hayat and Anis) and *Palaeoneura* Waterhouse (Hymenoptera: Mymaridae) in the New World, with description of two new species. *Acta Zoológica Lilloana*, 54 (1–2), 61–77.
Triapitsyn, S.V. & Beardsley, J.W. (2000) A review of the Hawaiian species of *Anagrus* (Hymenoptera: Mymaridae). *Proceedings of the Hawaiian Entomological Society*, 34, 23–48. [https://hdl.handle.net/10125/8641]
Triapitsyn, S.V. & Berezovskiy, V.V. (2001) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genus *Mymar* Curtis. *Far Eastern Entomologist*, 100, 1–20.
Triapitsyn, S.V. & Berezovskiy, V.V. (2002a) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Chaetomymar* Ogloblin, *Himopolynema* Taguchi, and *Stephanodes* Enock. *Far Eastern Entomologist*, 110, 1–11.
Triapitsyn, S.V. & Berezovskiy, V.V. (2002b) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Anagroidea* Girault and *Eubroncus* Yoshimoto, Kozlov et Trjapitzin. *Far Eastern Entomologist*, 114, 1–17.
Triapitsyn, S.V. & Berezovskiy, V.V. (2002c) Revision of *Kalopolynema*, with notes on *Platypolynema* (Hymenoptera: Mymaridae). *Florida Entomologist*, 85, 611–619.
https://doi.org/10.1653/0015-4040(2002)085[0611:ROKWNO]2.0.CO;2
Triapitsyn, S.V. & Berezovskiy, V.V. (2003) Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Arescon* Walker and *Dicopomorpha* Ogloblin. *Far Eastern Entomologist*, 124, 1–15.
Triapitsyn, S.V. & Berezovskiy, V.V. (2004a) Review of the genus *Litus* Haliday, 1833 in the Holarctic and Oriental regions, with notes on the Palaearctic species of *Arescon* Walker, 1846 (Hymenoptera: Mymaridae). *Far Eastern Entomologist*, 141, 1–24.
Triapitsyn, S.V. & Berezovskiy, V.V. (2004b) Review of the genus *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) in Russia, with notes on some extralimital species. *Far Eastern Entomologist*, 139, 1–36.
Triapitsyn, S.V. & Berezovskiy, V.V. (2007) Review of the Oriental and Australasian species of *Acmopolynema*, with taxonomic notes on *Palaeoneura* and *Xenopolynema* stat. rev. and description of a new genus (Hymenoptera: Mymaridae). *Zootaxa*, 1455 (1), 1–68.
https://doi.org/10.11646/zootaxa.1455.1.1
Triapitsyn, S.V., Berezovskiy, V.V., Hoddle, M.S. & Morse, J.G. (2007) A review of the Nearctic species of *Erythmelus* (Hymenoptera: Mymaridae), with a key and new additions to the New World fauna. *Zootaxa*, 1641 (1), 1–64.
https://doi.org/10.11646/zootaxa.1641.1.1

Triapitsyn, S.V., Berezovskiy, V.V. & Huber, J.T. (2006) Review of the Nearctic species of *Neomymar* (Hymenoptera: Mymaridae). *Contributions in Sciences, Natural History Museum of Los Angeles County*, 505, 1–26.
Triapitsyn, S.V., Berezovskiy, V.V. & Jałoszyński, P. (2017) Redescription of *Erythmelus dichromocnemus* Novicky, 1953 stat. rev. (Hymenoptera, Mymaridae) and a new synonymy. *Polish Journal of Entomology*, 86, 181–191 https://doi.org/10.1515/pjen-2017-0012
Triapitsyn, S.V., Berezovskiy, V.V. & Viggiani, G. (2013) Taxonomic notes on three little-known species of *Cleruchus* Enock (Hymenoptera: Mymaridae) described by S. Novicky from Europe. *North-Western Journal of Zoology*, 9 (1), 6–15.
Triapitsyn, S.V. & Bernal, J.S. (2009) Egg parasitoids of Proconiini (Hemiptera: Cicadellidae) in northwestern Mexico, with description of a new species of *Gonatocerus* (Hymenoptera: Mymaridae). *Journal of Insect Science*, 9 (5), **1**–9. https://doi.org/10.1673/031.009.0501
Triapitsyn, S.V. & Fidalgo, P. (2006) Definition of *Doriclytus*, stat. rev. as a subgenus of *Polynema* and redescription of its type species, *P.* (*Doriclytus*) *vitripenne*. (Hymenoptera: Mymaridae). *Zootaxa*, 1362 (1), 55–68. https://doi.org/10.11646/zootaxa.1362.1.4
Triapitsyn, S.V. & Hoddle, M.S. (2001) Search for and collect egg parasitoids of glassy-winged sharpshooter in southeastern USA and northeastern Mexico. *In*: Tariq, M.A., Oswalt, S. & Esser, T. (Compilers)*, Proceedings, 2001 Pierce's Disease Research Symposium, Coronado Island Marriott Resort, San Diego. 5–7 December 2001*. California Department of Food and Agriculture, Sacramento, California, pp. 133–134.
Triapitsyn, S.V. & Hoddle, M.S. (2002) Search for and collect egg parasitoids of glassy-winged sharpshooter in southeastern USA and northeastern Mexico. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers)*, Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Hotel, San Diego. 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 94–95.
Triapitsyn, S.V. & Hoddle, M.S. (2003) Searching for and collecting egg parasitoids of the glassy-winged sharpshooter in the central and eastern USA. *In*: Tariq, M.A., Oswalt, S. Blincoe, P. & Esser, T. (Compilers)*, Proceedings of the Pierce's Disease Research Symposium, Coronado Island Marriott Hotel, San Diego, 15–18 December 2002*. California Department of Food and Agriculture, Sacramento, California, pp. 261–262.
Triapitsyn, S.V., Hoddle, M.S. & Morgan, D.J.W. (2002) A new distribution and host record for *Gonatocerus triguttatus* in Florida, with notes on *Acmopolynema sema* (Hymenoptera: Mymaridae). *Florida Entomologist*, 85, 654–655. https://doi.org/10.1653/0015-4040(2002)085[0654:ANDAHR]2.0.CO;2
Triapitsyn, S.V. & Huber, J.T. **(**2000) *Family Mymaridae*. *In*: Ler, P.A. (Ed.) *Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 4*. Dal'Nauka, Vladivostok, pp. 603–614. [in Russian]
Triapitsyn, S.V. Huber, J.T., Logarzo, G.A., Berezovskiy, V.V. & Aquino, D.A. (2010) Review of *Gonatocerus* (Hymenoptera: Mymaridae) in the Neotropical region, with description of eleven new species. *Zootaxa*, 2456 (1), 1–243. https://doi.org/10.11646/zootaxa.2456.1.1
Triapitsyn, S.V., Logarzo, G.A., de León, J.H. & Virla, E.G. (2008a) A new *Gonatocerus* (Hymenoptera: Mymaridae) from Argentina, with taxonomic notes and molecular data on the *G. tuberculifemur* species complex. *Zootaxa*, 1949 (1), 1–29. https://doi.org/10.11646/zootaxa.1949.1.1
Triapitsyn, S.V., Mizell III, R.F., Bossart, J.L. & Carlton, C.E. (1998) Egg parasitoids of *Homalaodisca coagulata* (Homoptera: Cicadellidae). *Florida Entomologist*, 81 (2), 241–243. https://doi.org/10.2307/3496094
Triapitsyn, S.V. & Moraal, L.G. (2008) Two new species of *Cleruchus* (Hymenoptera: Mymaridae) from The Netherlands and California, USA, apparently associated with Ciidae (Coleoptera) in bracket fungi. *Entomologische Berichten*, 68, 62–68.
Triapitsyn, S.V. & Moratorio, M.S. (1998) Host associations of *Anagrus nigriventris* Girault (Hymenoptera: Mymaridae) and techniques for its rearing under insectary conditions. *In*: Hassan, S.A. (Ed.), *Egg parasitoids. 5th International Symposium. International Organization for Biological Control, Cali, Colombia, March 1998*. *Mitteilungen aus der Biologischen Bundesanstalt für Land und Forstwirtschaft, Berlin-Dahlem. H. 356*. Parey Buchverlag, Berlin, pp. 185–191.
Triapitsyn, S.V., Morgan, D.J.W., Hoddle, M.S. & Berezovskiy, V.V. (2003) Observations on the biology of *Gonatocerus fasciatus* Girault (Hymenoptera: Mymaridae), egg parasitoid of *Homalodisca coagulata* (Say) and *Oncometopia orbona* (Fabricius) (Hemiptera: Clypeorrhyncha: Cicadellidae). *Pan-Pacific Entomologist*, 79, 75–76.
Triapitsyn, S.V. & Phillips, P.A. (1996) Egg parasitoid of glassy-winged sharpshooter. *Citrograph*, 81 (9), 10.
Triapitsyn, S.V. & Phillips, P.A. (2000) First record of *Gonatocerus triguttatus* (Hymenoptera: Mymaridae) from eggs of *Homalodisca coagulata* (Homoptera: Cicadellidae), with notes on the distribution of the host. *Florida Entomologist*, 83 (2), 200–203. https://doi.org/10.2307/3496158
Triapitsyn, S.V., Querino, R.B. & Feitosa, M.C.B. (2008b) A new species of *Anagrus* (Hymenoptera: Mymaridae) from Amazonas, Brazil. *Neotropical Entomology*, 37, 681–684. https://doi.org/10.1590/S1519-566X2008000600009
Triapitsyn, S.V., Rugman-Jones, P.F., Jeong, G., Morse, J.G. & Stouthamer, R. (2010) Morphological and molecular differentiation of the *Anagrus epos* species complex (Hymenoptera: Mymaridae), egg parasitoids of leafhoppers (Hemiptera: Cicadellidae) in North America. *Zootaxa*, 2428 (1), 1–21. https://doi.org/10.11646/zootaxa.2428.1.1
Triapitsyn, S.V., Rugman-Jones, P.F., Tretiakov, P.S., Luft Albarracin, E., Moya-Raygoza, G. & Querino, R.B. (2019) Molecular,

morphological, and biological differentiation between *Anagrus virlai* sp. n., an egg parasitoid of the corn leafhopper *Dalbulus maidis* (Hemiptera: Cicadellidae) in the New World, and *Anagrus incarnatus* from the Palaearctic region. *Neotropical Entomology*, 48 (1), 87–97.
https://doi.org/10.1007/s13744-018-0606-7

Triapitsyn, S.V., Rugman-Jones, P.F., Tretiakov, P.S., Shih, H.-T. & Huang, S.-H. (2018) New synonymies in the *Anagrus incarnatus* Haliday 'species complex' (Hymenoptera: Mymaridae) including a common parasitoid of economically important planthopper (Hemiptera: Delphacidae) pests of rice in Asia. *Journal of Natural History*, 52 (43–44), 2795–2822.
https://doi.org/10.1080/00222933.2018.1552333

Triapitsyn, S.V. & Shih, H.-T. (2014) Egg parasitoids (Hymenoptera: Mymaridae and Trichogrammatidae) of *Kolla paulula* (Walker) (Hemiptera: Cicadellidae) in Taiwan. *Journal of Asia-Pacific Entomology*, 17, 673–678.
https://doi.org/10.1016/j.aspen.2014.06.010

Triapitsyn, S.V., Sosa, A.J. & Hernández, M.C. (2011 [2010]) Egg parasitoids of *Megamelus* spp. (Hemiptera: Delphacidae) in Argentina. *Revista de la Sociedad Entomológica Argentina*, 69 (3–4).

Triapitsyn, S.V., Vikberg, V. & Martikainen, P. (2011) An interesting *Cleruchus* sp. (Hymenoptera: Mymaridae) from bracket fungi on aspen in Karelia, Russia. *Sahlbergia*, 17 (1), 8–10.

Trjapitzin, S.V. (1993) A new *Erythmelus* (Hymenoptera: Mymaridae) from central Asia, an egg parasitoid of *Circulifer* spp. (Homoptera: Cicadellidae). *Entomological News*, 104, 267–271.

Trjapitzin, S.V. (1995) The identities of *Anagrus* (Hymenoptera: Mymaridae) egg parasitoids of the grape and blackberry leafhoppers (Homoptera: Cicadellidae) in California. *Pan-Pacific Entomologist*, 71, 250–251.

Trjapitzin, S.V. & Chiappini, E. (1994) A new *Anagrus* (Hymenoptera: Mymaridae), egg parasitoid of *Erythroneura* spp. (Homoptera: Cicadellidae). *Entomological News*, 105, 137–140.

Trjapitzin, S.V. & Strong, D.R. (1995) A new *Anagrus* (Hymenoptera: Mymaridae), egg parasitoid of *Prokelisia* spp. (Homoptera: Delphacidae). *Pan-Pacific Entomologist*, 71, 199–203.

Trjapitzin, V.A. (1978) 18. Fam. Mymaridae—mymarids. *In*: Medvedev, G.S. (Chief Ed.) & Trjapitzin, V.A. (Ed.), *Keys to the insects of the European part of the USSR. Vol. III. Hymenoptera Part 2*. Nauka, Leningrad Division, Leningrad, pp. 516–538. [in Russian]

Trjapitzyn, V.A. (1987) 18. Family Mymaridae (Mymarids). *In*: Medvedev, G.S. (Chief Ed.), *Keys to the insects of the European part of the USSR. III. Part II.* Amerind Publishing Co., New Delhi, pp. 942–982. [English translation of Trjapitzin, V.A. (1978)]

Tsukada, M. (1992) A new record of *Anagrus takeyanus* Gordh et Dunbar (Hymenoptera, Mymaridae) from Japan. *Japanese Journal of Entomology*, 60 (1), 136.

Tsukada, M. (1999) Interpopulation variation of hibernal-aestival-diapause in the egg parasitoid wasp *Anagrus takeyanus*: adaptation to seasonal host-plant alternation of the tingid host, *Stephanitis takeyai*. *Entomologia Experimentalis et Applicata*, 92 (1), 37–43.
https://doi.org/10.1046/j.1570-7458.1999.00522.x

Tsukada, M. (2000a) Migration and diapause in ecological interactions: a case study in the tingid bug, *Stephanitis takeyai*. *Entomological Science*, 3 (1), 167–175.

Tsukada, M. (2000b) Frass-cover on egg masses decreases parasitization in the andromeda lace bug, *Stephanitis takeyai* (Heteroptera: Tingidae). *Entomological Science*, 3 (2), 303–307.

Tucker, E.S. (1917) Determinations and records of insects collected at Plano, Tex. *Transactions of the Kansas Academy of Science*, 28, 291–312.
https://doi.org/10.2307/3624372

Tullgren, A. (1916) Rosenstriten (*Typhlocyba rosae*, L.), och en ny äggparasit på densamma. *Meddelanden från Centralanstalten for Försöksväsendet på Jordbruksområdet, No 132* (*Entomologiska Afdelningen*), 24, 1–13.

Turner, W.F. & Pollard, H.N. (1959) Life histories and behavior of five insect vectors of phony peach disease. *United States Department of Agriculture*, *Technical Bulletin*, 1188, 1–28.

Udayagiri, S., Norton, A.P. & Welter, S.C. (2000a) Integrating pesticide effects with inundative biological control: interpretation of pesticide toxicity curves for *Anaphes iole* in strawberries. *Entomologia Experimentalis et Applicata*, 95, 87–95.
https://doi.org/10.1046/j.1570-7458.2000.00645.x

Udayagiri, S. & Welter, S.C. (2000) Escape of *Lygus hesperus* (Heteroptera: Miridae) eggs from parasitism by *Anaphes iole* (Hymenoptera: Mymaridae) in strawberries: plant structure effects. *Biological Control*, 17 (3), 234–242.
https://doi.org/10.1006/bcon.1999.0802

Udayagiri, S., Welter, S.C. & Norton, A.P. (2000b) Biological control of *Lygus hesperus* with inundative releases of *Anaphes iole* in a high cash value crop. *Southwestern Entomologist Supplement*, 23, 27–38.

Udine, E.J. & Pinckney, J.S. (1940) Some egg parasites of *Oecanthus quadripunctatus* Beut. and of a species of *Orchelimum*. *Proceedings of the Pennsylvania Academy of Sciences*, 14, 81–84.

Ulrich, W. (2004) Soil-living parasitic Hymenoptera: comparison between a forest and an open landscape habitat. *Pedobiologia*, 48 (1), 59–69.
https://doi.org/10.1016/j.pedobi.2003.07.001

Ulrich, W. (2005) Die Hymenopteren einer Wiese auf Kalkgestein: Ökologishe Muster einer lokalen Tiergemeinschaft. Nicolaus Copernicus University, Toruń, 201 pp.

Underhill, G.W. (1924) The lesser clover weevil. *Quarterly Bulletin of the Virginia State Crop Pest Commission*, 6 (1), 1–7.
Underhill, G.W. (1926) Studies on the potato tuber moth during the winter of 1925–26. *Bulletin of the Virginia Agricultural Experiment Station*, 251, 1–21.
Van Driesche, R., Cock, M.J.W., Winston, R.L., Reardon, R. & Weeks, R.D. Jr. (2018) *Catalog of species introduced into Canada, Mexico, the USA, or the USA overseas territories for classical biological control of arthropods, 1985–2018*. *Forest Health Assessment and Applied SciencesTeam* (*FHAAST*). United States Department of Agriculture, Morgantown, West Virginia, 190 pp.
Van Driesche, R.G. & Hauschild, K. (1987) Potential for increased use of biological control agents in small fruit crops in Massachusetts. *In*: Van Driesche, R. & Carey, E. (Eds.), Opportunities for increased use of biological control in Massachusetts. *Massachusetts Agricultural Experiment Station Research, Bulletin*, 718, pp. 22–34.
Van Duzee, E.P. (1896) Pests of house and ornamental plants. *Michigan Agricultural Experiment Station, Special Bulletin*, 2, 1–43.
Varis, A.L. (1972) The biology of *Lygus rugulipennis* Popp. (Het., Miridae) and the damage caused by this species to sugar beet. *Annales Agriculturae Fenniae*, 11, 1–56.
Vaurie, P. (1951) Revision of the genus *Calendra* (formerly *Sphenophorus*) in the United States and Mexico (Coleoptera, Curculionidae). *Bulletin of the American Museum of Natural History*, 98 (2), 29–186.
Velema, H.-P., Hemerik, L., Hoddle, M.S. & Luck, R.F. (2005) Brochosome influence on parasitisation efficiency of *Homalodisca coagulata* (Say) (Hemiptera: Cicadellidae) egg masses by *Gonatocerus ashmeadi* Girault (Hymenoptera: Mymaridae). *Ecological Entomology*, 30 (5), 485–496.
https://doi.org/10.1111/j.0307-6946.2005.00731.x
Vickerman, D.B., Hoddle, M.S., Triapitsyn, S. & Stouthamer, R. (2004) Species identity of geographically distinct populations of the glassy-winged sharpshooter parasitoid *Gonatocerus ashmeadi*: morphology, DNA sequences, and reproductive compatibility. *Biological Control*, 31 (3), 338–345.
https://doi.org/10.1016/j.biocontrol.2004.07.001
Vidal, S. (2001) Chalcidoidea. *In*: Dathe, H.H., Taeger, A. & Blank, S.M. (Eds.), *Entomofauna Germanica*. 4. Verzeichnis der Hautflügler Deutschlands. *Entomologische Nachrichten und Berichte, Dresden*, *Supplement*, 7, pp. 51–69.
Vidano, C. (1966) Introduzione in Italia di *Polynema striaticorne* Girault parassita oofago di *Ceresa bubalus* Fabricius. *Bollettino della Società Entomologica Italiana*, 96, 55–58.
Vidano, C. (1968a) Riuscita acclimatazione in Italia di un parassita oofago della cicalina-bufalo Americana. *Giornale di Agricoltura*, 78 (8), 1–6.
Vidano, C. (1968b) Precisione e labilità fenologiche di un caldidoideo mymaride (*). *Atti della Accademia delle Scienze di Torino. Classe de Scienze Fisiche, Matematiche e Naturali*, 102, 581–587.
Vidano, C. & Meotto, F. (1975) Moltiplicazione e disseminazione di *Polynema striaticorne* Girault (Hymenoptera Mimaridae). *Annali della Facoltà di Scienze Agrarie della Universit*à *di Torino*, 4, 297–316.
Viereck, H.L. (1910) Order Hymenoptera. *In*: *Smith, J.B., Annual Report of the New Jersey State Museum, including a report of the insects of New Jersey*. MacCrellish & Quigley, Trenton, New Jersey, pp. 579–699.
Viereck, H.L. (1916) Guide to the insects of Connecticut. Prepared under the direction of W.E. Britton. Part III. The Hymenoptera or wasp-like insects of Connecticut. *Connecticut State Geological and Natural History Survey, Bulletin*, 22, 1–824, 10 pls.
Viggiani, G. (1966) Una specie di *Mymar* Curtis (*M. taprobanicum* Ward) nuova per l'Europa. *Bollettino della Società Entomologica Italiana*, 96 (7–8), 113–117.
Viggiani, G. (1967a) Ricerche sugli Hymenoptera Chalcidoidea. X. Nuovi reperti di Calcidoidei italiani (Encyrtidae, Eulophidae, Aphelinidae, Mymaridae). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 25, 119–149.
Viggiani, G. (1967b) Calcidoidei del Parco Gussone (1ª Nota). Ricerche sugli Hymenoptera Chalcidoidea XI. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 25, 150–162.
Viggiani, G. (1969) Ricerche sugli Hymenoptera Chalcidoidea. XX. Le specie paleartiche del genere *Lymaenon* Walker (Mymaridae) gruppo *longicauda* (Enock), con descrizione di nuovo specie. *Entomologica*, 5, 37–50.
Viggiani, G. (1970) Ricerche sugli Hymenoptera Chalcidoidea XXIV. Sul valore tassinomico dell'organo copulatore nei Mimaridi del genere *Anagrus* Hal. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 28, 10–18.
Viggiani, G. (1973a) Ricerche sugli Hymenoptera Chalcidoidea XXXVIII. Descrizione del maschio di *Litus* Haliday (1833) (Mymaridae). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 30, 231–234.
Viggiani, G. (1973b) Ricerche sugli Hymenoptera Chalcidoidea XXXIX. Notizie preliminari sulla struttura e sul significato dell'armatura genitale esterna maschile dei Mimaridi. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 30, 269–281.
Viggiani, G. (1974a [1973]) Richerche sulla entomofauna del nocciuolo IX. Notizie su alcuni omotteri (*Ceresa bubalus* - Fbrc. -, *Ledra aurita* - L. - e *Cicadella viridis* - L.). *Annali della Facoltà di Scienze Agrarie della Università degli Studi di Napoli*, 7, 153–160.
Viggiani, G. (1974b) Notizie sui mimaridi terricoli, con proposte sinonimiche per il genere *Cleruchus* Enock (Ricerche sugli Hymenoptera Chalcidoidea: XLI). *Bollettino della Società Entomologica Italiana*, 106, 86–88.
Viggiani, G. (1974c) Ricerche sugli Hymenoptera Chalcidoidea XLII. Nuovi Mimaridi di Ceylon (*Camptopteroides armata*, n. gen. e n. sp., *Ptilomymar besucheti*, n. sp.). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 31,

3–9.
Viggiani, G. (1988) Biosystematics of mymarid egg-parasitoids of Auchenorrhyncha. *In*: Vidano, C. & Arzone, A. (Eds.), *Proceedings of the 6th Auchenorrhyncha meeting, Turin, Italy*, 7–11 September 1987, CNR-IPRA, pp. 555–565.
Viggiani, G. (1989 [1988]) A preliminary classification of the Mymaridae (Hymenoptera: Chalcidoidea) based on the external male genitalic characters. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 45, 141–148.
Viggiani, G. (1994) L'armatura genitale esterna maschile di alcune species di *Anaphes* Haliday. *Memorie della Società Entomologica Italiana*, 72, 469–483.
Viggiani, G. (2002) Egg parasitoids of vineyard leafhoppers and their alternative hosts in the Mediterranean basin. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 58, 63–76.
Viggiani, G. (2003) Functional biodiversity for the vineyard agroecosystem: aspects of the farm and landscape management in Southern Italy. *IOBC wprs Bulletin*, 26 (4), 197–202.
Viggiani, G. (2004 [2003]) A further contribution to the knowledge of the male genitalia in the Mymaridae (Hymenoptera: Chalcidoidea). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 59, 59–74.
Viggiani, G. (2013) First record of *Gonatocerus litoralis* (Haliday) ((Hymenoptera: Mymaridae) from *Anoplotettix putoni* Ribaut (Hemiptera: Cicadellidae). *Journal of Entomological and Acarological Research*, 45 (3), 117–119.
https://doi.org/10.4081/jear.2013.e21
Viggiani, G., Guerrieri, E. & Filella, F. (1994 [1992]) Observations and data on *Empoasca decedens* Paoli and *Zygina flammigera* (Fourcroy) (Homoptera: Typhlocibidae) infesting peach trees in Campania. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 49, 127–160.
Viggiani, G. & Jesu, R. (1985) Due nuove specie palaertiche del genere *Erythmelus* Enock (Hymenoptera: Mymaridae). *Redia*, 68, 485–491.
Viggiani, G. & Jesu, R. (1988) Considerazioni sui mimaridi italiani ed i loro ospiti. *Atti dei XV Congrèsso Nazionale Italiano di Entomologia, L'Aquila*, 1988, 1019–1029.
Viggiani, G. & Jesu, R. (1995) New Species of Mymaridae from Cape Verde Islands (Hymenoptera: Chalcidoidea). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 50, 93–107.
Viggiani, G. & Jesu, R. (2003) Preliminary notes on the biodiversity of egg parasitoids (Hymenoptera: Mymaridae and Trichogrammatidae) in vineyards of Southern Italy. *IOBC/wprs Bulletin*, 26 (8), 217–220.
Viggiani, G., Jesu, R. & Sasso, R. (2004 [2003]) Cicaline della vite e loro ooparassitoidi in vigneti del Sud Italia. *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 59, 3–31.
Viggiani, G. & Tesone, T. (2011 [2009]) Morpho-biological notes on the elm leafhopper, *Edwardsiana plebeja* (Edwards) (Homoptera: Cicadellidae, Typhlocybinae), and its egg parasitoids in Campania. *Frustula Entomologica*, New Series, 32 (45), 85–92.
Viggiani, G. & van Harten, A. (1996) Aphelinidae, Signiphoridae, Mymaridae and Trichogrammatidae of Cape Verde Islands (Hymenoptera: Chalcidoidea). *Bollettino del Laboratorio di Entomologia Agraria «Filippo Silvestri»*, 51, 67–81.
Vigneault, C., Panneton, B., Cormier, D. & Boivin, G. (1997) Automated system to quantify the behavior of small insects in a four-point star olfactometer. *Applied Engineering in Agriculture*, 13, 545–550.
https://doi.org/10.13031/2013.21622
Vikberg, V. (1982) Additions to the chalcid fauna of Finland (Hymenoptera, Chalcidoidea). *Notulae Entomologicae*, 62, 129–142.
Vilhelmsen, L. (2011) Head capsule characters in the Hymenoptera and their phylogenetic implications. *In*: Shcherbakov, D.E., Engel, M.S. & Sharkey, M.J. (Eds.), Advances in the systematics of fossil and modern insects: honouring Alexandr Rasnitsyn. *ZooKeys*, 130, pp. 343–361.
https://doi.org/10.3897/zookeys.130.1438
Vinson, S.B. (2010) Nutritional ecology of egg parasitoids. *In*: Cônsoli, F.L., Parra, J.R.P. & Zucchi, R.A. (Eds.), *Egg parasitoids in agroecosystems with emphasis on Trichogramma.* Progress in Biological Control 9. Springer, Dordrecht, pp. 25–55.
https://doi.org/10.1007/978-1-4020-9110-0_2
Wajnberg, E., Bernhard, P., Hamelin, F. & Boivin, G. (2006) Optimal patch time allocation for time-limited foragers. *Behavioral Ecology and Sociobiology*, 60 (1), 1–10.
https://doi.org/10.1007/s00265-005-0131-7
Walker, F. (1846) VIII.—Descriptions of the Mymaridae. *The Annals and Magazine of Natural History*, Series 1, 18 (116), 49–54 + viii (Errata and Addenda).
https://doi.org/10.1080/037454809494390
Walker, F. (1873) Notes on the Mymaridae. *Entomologist*, 6, 498–502.
Walker, G.P., Zareh, N., Bayoun, I.M. & Triapitsyn, S.V. (1997) Introduction of western Asian egg parasitoids into California for biological control of beet leafhopper, *Circulifer tenellus*. *Pan-Pacific Entomologist*, 73, 236–242.
Walker, I. (1979) Some British species of *Anagrus* (Hymenoptera: Mymaridae). *Zoological Journal of the Linnean Society, London*, 67, 181–202.
https://doi.org/10.1111/j.1096-3642.1979.tb01111.x
Walley, G.S. (1929) Descriptions of new Canadian parasitic Hymenoptera. *Canadian Entomologist*, 61, 190–194.
https://doi.org/10.4039/Ent61190-8
Waloff, N. & Jervis, M.A. (1987) Communities of parasitoids associated with leafhoppers and planthoppers in Europe. *Ad-*

vances in Ecological Research, 17, 281–402.
https://doi.org/10.1016/S0065-2504(08)60248-2
Walton, V.M., Daane, K.M. & Addison, P. (2012) Biological control of arthropods and its application in vineyards. *In*: Bostanian, N.J., Vincent, C. & Isaacs, R. (Eds.), *Arthropod management in vineyards: pests, approaches, and future directions*. Springer, Dordrecht, pp. 91–117.
https://doi.org/10.1007/978-94-007-4032-7_5
Ward, A.O. (1875) Description of a new species of Proctotrypidae from Ceylon. *Entomologist's Monthly Magazine*, 11, 197.
Washburn, F.L. (1919 [1918]) The Hymenoptera of Minnesota. *Seventeenth Report, State Entomologist of Minnesota to the Governor*, 1918, pp. 145–240, 3 colour pls.
Waterhouse, C.O. (1913) On a new species of Mymaridae from Trinidad. *Bulletin of Entomological Research*, 4, 87–88.
https://doi.org/10.1017/S0007485300016990
Waterhouse, C.O. (1915) XX. Descriptions of two new genera, and new species of Mymaridae from Tasmania. *Transactions of the Entomological Society of London*, 62 (3–4), 536–539, pl. XCII.
https://doi.org/10.1111/j.1365-2311.1915.tb02992.x
Weaver, C.R. & King, D.R. (1954) Meadow spittlebug *Philanenus leucophthalmus* (L.). *Ohio Agricultural Experiment Station, Research Bulletin*, 741, 1–99.
Weaver, J.E. & Gallo, T.S. (1977) Studies on the parasites associated with the alfalfa weevil in West Virginia. *Western Virginia Agricultural and Forestry Experiment Station, Bulletin*, 652, 1–14.
https://doi.org/10.33915/agnic.652
Webb, D.W. (1980) Primary insect types in the Illinois Natural History Survey Collection, exclusive of the Collembola and Thysanoptera. *Illinois State Natural History Survey Bulletin*, 32 (2), 55–191.
Webster, F.M. (1894) The apple plant louse. *In*: Miscellaneous entomological papers. *Ohio Agricultural Experiment Station, Bulletin*, 51, pp. 111–117
Webster, F.M. (1903a) Some insects attacking the stems of growing wheat, rye, barley, and oats, with methods of prevention and suppression. *United States Department of Agriculture, Division of Entomology Bulletin*, 42, 1–62.
https://doi.org/10.5962/bhl.title.114379
Webster, F.M. (1903b) Notes on reared Hymenoptera from Indiana. *Proceedings of the Indiana Academy of Science*, 1902, 101–103.
Webster, F.M. (1912) Preliminary report on the alfalfa weevil. *United States Department of Agriculture, Bureau of Entomology Bulletin*, 112, 1–47.
https://doi.org/10.5962/bhl.title.109949
Weigand, S. (1990) Development of an integrated pest management system in food legumes in the ICARDA region. *Proceedings: 89 Integrated Pest Management in Tropical and Subtropical Cropping Systems, Bad Durkheim, Federal Republic of Germany*, 18–15 February 1989, 53–76.
Wells, J.D., Cone, W.W. & Conant, M.M. (1988) Chemical and biological control of *Erythroneura* leafhoppers on *Vitis vinifera* in southcentral Washington. *Journal of the Entomological Society of British Columbia*, 85, 45–52.
Westwood, J.O. (1839) Appendix: Synopsis of the genera of British insects. *In*: *Introduction to the modern classification of insects; founded on the natural habits and corresponding organisation of the different families. Vol. 2*. Longman, Orme, Brown, Green, and Longmans, London, pp. 1–158 pp.
Westwood, J.O. (1879) XXIV. Descriptions of some minute hymenopterous insects. *Transactions of the Linnean Society of London, Second Series*, *Zoology*, 1, 583–593, pl. LXX111.
https://doi.org/10.1111/j.1096-3642.1879.tb00496.x
Wheeler, E.W. (1923) Some braconids parasitic on aphids and their life-history. (Hym.). *Annals of the Entomological Society of America*, 16, 1–29.
https://doi.org/10.1093/aesa/16.1.1
Whittaker, O. (1931) Four new species of Mymaridae from British Columbia (Hymenoptera). *Proceedings of the Entomological Society of Washington*, 33, 189–192.
Wiesenborn, W.D. (2002) Weak dependence of *Polynema saga* (Girault) (Hymenoptera: Mymaridae) parasitism rate on *Opsius stactogalus* Fieber (Homoptera: Cicadellidae) egg density. *Journal of the Kansas Entomological Society*, 75 (2), 116–122.
Wiesenborn, W.D. (2005) Biomass of arthropod trophic levels on *Tamarix ramosissima* (Tamaricaceae) branches. *Environmental Entomology*, 34 (3), 656–663.
https://doi.org/10.1603/0046-225X-34.3.656
Williams, D.W. (1984) Ecology of the blackberry-leafhopper-parasite system and its relevance to California grape agroecosystems. *Hilgardia*, 52 (4), 1–33.
https://doi.org/10.3733/hilg.v52n04p032
Williams, F.X. (1929a) The introduction of *Anaphoidea calendrae* Gahan into Hawaii as a possible egg-parasite of our sugar cane beetle borer, *Rhabdocnemis obscura* (Boisd.). *Hawaiian Planters' Record*, 33, 29–33.
Williams, F.X. (1929b) Note on] *Anaphoidea calendrae* Gahan. *Proceedings of the Hawaiian Entomological Society*, 7, 227.
Williams, F.X. (1931) The insects and other invertebrates of Hawaiian sugar cane fields. *Experiment Station of the Hawaiian Sugar Planters' Association, Honolulu*. 400 pp.
Williams, L. III & Hendrix, D.L. (2008) Comparing different floral resources on the longevity of a parasitic wasp. *Agricultural*

and Forest Entomology, 10, 23–28.
https://doi.org/10.1111/j.1461-9563.2007.00355.x
Williams, L. III & Martinson, T.E. (2000) Colonization of New York vineyards by *Anagrus* spp. (Hymenoptera: Mymaridae): overwintering biology, within-vineyard distribution of wasps, and parasitism of grape leafhopper, *Erythroneura* spp. (Homoptera: Cicadellidae) eggs. *Biological Control*, 18, 136–146.
https://doi.org/10.1006/bcon.2000.0817
Williams, L. III & Price, L.D. (2004) A space-efficient contact toxicity bioassay for minute Hymenoptera, used to test the effects of novel and conventional insecticides on the egg parasitoids *Anaphes iole* and *Trichogramma pretiosum*. *BioControl*, 49, 163–185.
https://doi.org/10.1023/B:BICO.0000017287.50875.de
Williams, L. III, Price, L.D. & Mandrique, V. (2003a) Toxicity of field-weathered insecticide residues to *Anaphes iole* (Hymenoptera: Mymaridae), an egg parasitoid of *Lygus lineolaris* (Heteroptera: Miridae), and implications for inundative biological control in cotton. *Biological Control*, 26, 217–223.
https://doi.org/10.1016/S1049-9644(02)00157-3
Williams, L. III, Price, L.D., Manrique, V., Adams, L.C. & Hardee, D.D. (2003b) Residual toxicity of insecticides used in cotton to the egg parasitoid *Anaphes iole* (Hymenoptera: Mymaridae), and implications for inundative biological control. *In*: Van Driesche, R.G. (Ed.), *1st International Symposium on Biological Control of Arthropods. Honolulu, Hawaii, USA, 14–18 January 2002*. United States Department of Agriculture, Forest Service, FHTET-03-05, pp. 534–539.
Williams, L. III & Roane, T.M. (2007) Nutritional ecology of a parasitic wasp: food source affects gustatory response, metabolic utilization, and survivorship. *Journal of Insect Physiology*, 53, 1262–1275.
https://doi.org/10.1016/j.jinsphys.2007.06.017
Williams, L. III, Roane, T.M. & Beach, J.P. (2005) Gustatory acceptance, longevity, and utilization of nectar and honeydew sugars by *Anaphes iole*, an egg parasitoid of *Lygus* bugs. *In*: Hoddle, M.S. (Compiler), *Second International Symposium on Biological Control of Arthropods*, Davos, Switzerland, 12–16 September 2005. *United States Department of Agriculture, Forest Service*, FHTET-2005-03, pp. 409–419.
Williams, L. III, Rodriguez-Saona, C., Castle, S.C. & Zhu, S. (2008) EAG-active herbivore-induced plant volatiles modify behavioral responses and host attack by an egg parasitoid. *Journal of Chemical Ecology*, 34, 1190–1201.
https://doi.org/10.1007/s10886-008-9520-5
Williams, L. III, Zhu, Y.C., Snodgrass, G.L. & Manrique, V. (2012) Plant-mediated decisions by an herbivore affect oviposition pattern and subsequent egg parasitism. *Arthropod-Plant Interactions*, 6, 159–169.
https://doi.org/10.1007/s11829-011-9165-0
Wilson, H., Miles, A.F., Daane, K.M. & Altieri, M.A. (2016) Host plant associations of *Anagrus* spp. (Hymenoptera: Mymaridae) and *Erythroneura elegantula* (Hemiptera: Cicadellidae) in northern California. *Environmental Entomology*, 45 (3), 602–615.
https://doi.org/10.1093/ee/nvw033
Wilson, H. & Triapitsyn, S.V. (2017) Records of *Anagrus tretiakovae* Triapitsyn, 1998 (Hymenoptera: Mymaridae) in California vineyards. *The Pan-Pacific Entomologist*, 93 (2), 53–55.
https://doi.org/10.3956/2017-93.2.53
Wilson, L.F. (1978) Saratoga spittlebug. *United States Forest Service, Forest Insect & Disease Leaflet*, 3, 1–4.
Wilson, L.F. (1987) *Saratoga spittlebug—its ecology and management. Agriculture Handbook 657*. United States Department of Agriculture, Forest Service, Washington, D.C., 56 pp.
Wilson, S.W. & McPherson, J.E. (1981) Life history of *Megamelus davisi* with descriptions of immature stages. *Annals of the Entomological Society of America*, 74, 345–350.
https://doi.org/10.1093/aesa/74.4.345
Wolcott, G.N. (1951 [1948]) The insects of Puerto Rico. Hymenoptera. *Journal of Agriculture of the University of Puerto Rico*, 32 (1), 749–975.
Worner, S.P., Goldson, S.L. & Frampton, E.R. (1989) Comparative ecoclimatic assessments of *Anaphes diana* (Hymenoptera: Mymaridae) and its intended host, *Sitona discoideus* (Coleoptera: Curculionidae), in New Zealand. *Journal of Economic Entomology*, 82, 1085–1090.
https://doi.org/10.1093/jee/82.4.1085
Wright, L.C. & James, D.G. (2007) *Anagrus* spp. (Hymenoptera: Mymaridae) reared from plants collected during winter in south central Washington and north central Oregon. *Journal of the Entomological Society of British Columbia*, 104, 17–24.
Wu, Z.X. & Nordlund, D.A. (2002) Superparasitism of *Lygus hesperus* Knight eggs by *Anaphes iole* Girault in the laboratory. *Biological Control*, 23, 121–126.
https://doi.org/10.1006/bcon.2001.0997
Xu, M. & Lin, N.Q. (2002) A taxonomic study on the genus *Acmopolynema* Ogloblin (Hymenoptera: Mymaridae) from China. *Entomotaxonomia*, 24, 141–150.
Xu, M. & Lin, N.Q. (2003) A new species of the genus *Eustochus* Haliday (Hymenoptera: Chalcidoidea: Mymaridae) in China. *Entomologia Sinica,* 10 (1), 65–68.
https://doi.org/10.1111/j.1744-7917.2003.tb00366.x
Yang, P., Follett, P.A. & Jones, V.P. (2000) Oviposition behavior and egg parasitoids of *Sophonia rufofascia* (Homoptera: Cic-

adellidae) in Hawaii Volcanoes National Park. *Proceedings of the Hawaiian Entomological Society*, 34, 115–119.
Yang, P., Foote, D., Alyokhin, A.V., Lenz, L. & Messing, R.H. (2002) Distribution and abundance of mymarid parasitoids (Hymenoptera: Mymaridae) of *Sophonia rufofascia* Kuoh and Kuoh (Homoptera: Cicadellidae) in Hawaii. *Biological Control*, 23, 237–244.
https://doi.org/10.1006/bcon.2001.1017
Yeargan, K.V. (1985) Alfalfa: status and current limits to biological control in the eastern U.S. *In*: Hoy, M.A. & Herzog, D.C. (Eds.), *Biological control in agricultural IPM systems*. Academic Press, Orlando, pp. 521–536.
https://doi.org/10.1016/B978-0-12-357030-7.50034-X
Yeargan, K.V. & Shuck, C.I. (1981) Longevity and reproductive rate of *Patasson lameerei* [Hym.: Mymaridae], a parasitoid of *Sitona* spp. [Col.: Curculionidae] eggs. *Entomophaga*, 26 (2), 119–124.
https://doi.org/10.1007/BF02375025
Yoshimoto, C.M. (1971) A new genus of mymarid wasp (Hymenoptera, Chalcidoidea: Mymaridae) from New Brunswick, Canada. *Canadian Entomologist*, 103 (8), 1079–1082.
https://doi.org/10.4039/Ent1031079-8
Yoshimoto, C.M. (1990) *A review of the genera of New World Mymaridae* (*Hymenoptera: Chalcidoidea*). *Flora & Fauna Handbook No. 7*. Sandhill Crane Press, Gainesville, 166 pp.
Zandigiacomo, P., Cargnus, E. & Buian, F.M. (2017) Artropodi alloctoni segnalati su "Flora e Fauna". *In*: Zanetti, M. (Ed.), *Flora e fauna della pianura Veneta orientale, Ossservazione di campagna, Associazione Naturalistica Sandonatese a San Donà di Piave*, 2016 (19), 67–74.
Zanolli, P. & Pavan, F. (2013) Occurrence of different development time patterns induced by photoperiod in *Anagrus atomus* (Hymenoptera: Mymaridae), an egg parasitoid of *Empoasca vitis* (Homoptera: Cicadellidae). *Physiological Entomology*, 38, 269–278.
https://doi.org/10.1111/phen.12029
Zeya, S.B. & Hayat, M. (1995) A revision of the Indian species of *Gonatocerus* Nees (Hymenoptera: Chalcidoidea: Mymaridae). *Oriental Insects*, 29, 47–160.
https://doi.org/10.1080/00305316.1995.10433741
Zeya, S.B., Usman, S.U. & Veenakumari, K. (2014) *Journal of Insect Systematics*, 1 (1), 62–67.
Zhao, D.X., Boivin, G. & Stewart, R.K. (1991) Simulation model for the population dynamics of the carrot weevil, *Listronotus oregonensis* (LeConte) (Coleoptera: Curculionidae). *Canadian Entomologist*, 123 (1), 63–76.
https://doi.org/10.4039/Ent12363-1
Zhu, Y.C. & Williams, L. III (2002) Detecting the egg parasitoid *Anaphes iole* (Hymenoptera: Mymaridae) in tarnished plant bug (Heteroptera: Miridae) eggs by using a molecular approach. *Annals of the Entomological Society of America*, 95, 359–365.
https://doi.org/10.1603/0013-8746(2002)095[0359:DTEPAI]2.0.CO;2
Zimmerman, E.C. (1948) Homoptera: Auchenorrhyncha. *Insects of Hawaii*, 4, 1–268.
Zimmerman, R., Kondratieff, B., Nelson, E. & Sclar, C. (1996) The life history of two species of grape leafhoppers on wine grapes in western Colorado. *Journal of the Kansas Entomological Society*, 69 (4), 337–345.
Zuparko, R.L. & Hamai, J. (1994) Depositions of parasitic Hymenoptera (Insecta) types from the University of California, Berkeley. *Pan-Pacific Entomologist*, 70, 313–317.

Appendix

Corrections and literature additions to Guzmán-Larralde, A.J., Huber, J.T. & Quiroz-Martínez, H. (2017) Generic key and catalogue of Mymaridae (Hymenoptera) of Mexico. *Zootaxa* 4254 (1): 001–038.

In the species catalogue all the species of *Cosmocomoidea* except for *C. morrilli* should have parentheses placed around the author name and the genus-species combination given in the original description must be *Gonatocerus*, as follows:

P. 13, line 19. *Cosmocomoidea ashmeadi* (Girault)
P. 13, line 20. *Gonatocerus dolichocerus ashmeadi* Girault
P. 13, line 32. *Cosmocomoidea atriclava* (Girault)
P. 13, line 33. *Gonatocerus triguttatus atriclavus* Girault
P. 14, line 5. *Cosmocomoidea barbos* (Triapitsyn)
P. 14, line 6. *Gonatocerus* (*Cosmocomoidea*) *barbos* Triapitsyn
P. 14, line 10. *Cosmocomoidea bonariensis* (Brèthes)
P. 14, line 11. *Foersterella bonariensis* Brèthes
P. 14, line 18. *Cosmocomoidea bucculenta* (Huber)

P. 14, line 19. *Gonatocerus bucculentus* Huber
P. 14, line 26. *Cosmocomoidea capitatus* (Gahan)
P. 14, line 27. *Gonatoceros* [*sic*] *capitatus* Gahan
P. 14, line 34. *Cosmocomoidea chula* (Triapitsyn & Bernal)
P. 14, line 35. *Gonatocerus chula* (Triapitsyn & Bernal)
P. 15, line 1. *Cosmocomoidea dolichocerus* (Ashmead)
P. 15, line 2. *Gonatocerus dolichocerus* Ashmead
P. 15, line 9. *Cosmocomoidea flagellata* (Huber)
P. 15, line 10. *Gonatocerus flagellatus* Huber
P. 15, line 16. *Cosmocomoidea gerasim* (Triapitsyn)
P. 15, line 17. *Gonatocerus* (*Cosmocomoidea*) *gerasim* Triapitsyn
P. 15, line 21. *Cosmocomoidea inflatiscapus* (Huber)
P. 15, line 22. *Gonatocerus inflatiscapus* Huber
P. 15, line 30. *Cosmocomoidea latipennis* (Girault)
P. 15, line 31. *Gonatocerus latipennis* Girault
P. 16, line 10. *Cosmocomoidea novifasciata* (Girault)
P. 16, line 11. *Gonatocerus novifasciatus* Girault
P. 16, line 21. *Cosmocomoidea triguttata* (Girault)
P. 16, line 22. *Gonatocerus triguttatus* Girault
P. 16, line 34. *Cosmocomoidea uat* (Triapitsyn)
P. 16, line 35. *Gonatocerus uat* S. Triapitsyn
The last part of the author name is missing; it should be:
P. 17, line 16. *Erythmelus* (*Erythmelus*) *cingulatus* Ogloblin

The scale lines and associated number of micrometers on all Figures on Plates 1–6 are wrong (due to faulty calibration of the microscope, not noticed when measurements were taken) and completely misleading for most specimens. They should be ignored. Correct body length (from anterior margin of transverse trabecula of head to apex of gaster but excluding exserted part of ovipositor) measured with an eyepiece micrometer in a Leitz Wetzlar microscope at 160 × magnification and converted into micrometers (rounded to nearest 5 micrometers) are given below. The photographed specimens of *Cleruchus*, *Dicopomorpha*, *Mymar*, and *Neomymar* were not found so could not be measured; the scale bars for the latter two are more or less correct. Measurements of very similar species from Costa Rica are given for *Cleruchus* and *Dicopomorpha.*

Figure 1 A–F. A, *Chrysoctonus* 555; B, *Ooctonus zolnerowichi* Huber 1200; C, *Lymaenon* 800; D, *Gastrogonatocerus* 565; E, *Gonatocerus* 800; F, *Cosmocomoidea* 890.
Figure 2 A–F. A, *Arescon* 645; B *Litus* 415; C, *Alaptus* 345, D, *Dicopus* 307; F, *Callodicopus* 720; G, *Dicopomorpha* ca. 435.
Figure 3 A–F. A, *Camptopteroides* (*Alalinda*) 1200; B, *Camptoptera* 445; C, *Ptilomymar* 315; D, *Omyomymar* 1075; E, *Anagrus stethynioides* Triapitsyn (incorrectly identified and labelled as *Stethynium*); F, *Neostethynium* 35.
Figure 4 A–F. A, *Anaphes* 740; B, *Schizophragma* 585; C, *Platystethynium* 575; D, *Australomymar* 1200; E, *Anagrus* 525; F, *Erythmelus* 870.
Figure 5 A–F. A, *Cleruchus* ca. 640; B, *Anagroidea* 845; E, *Cnecomymar*, 1355; F, *Tetrapolynema* 1150.
Figure 6 A–F. A, *Stephanodes* (from Venezuela) 1150; B, *Acmopolynema* 1255; C, *Platyfrons* 1000; D, *Entrichopteris* (from Costa Rica) 870; E, *Polynema* (*Polynema*) 1100; F, *Palaeoneura* 545.

Additions to literature on Mexican Mymaridae since Guzmán-Larralde *et al.* (2017)

Becerra-Chiron, I.M. & Moya-Raygoza, G. (2018) Egg parasitoids of *Dalbulus maidis* (Hemiptera: Cicadellidae) within maize agroecosystems and in the edge zones of maize fields, and on maize varieties during the wet season in Mexico. *Journal of Insect Science*, 18 (6), 1–6.
Coronado-Blanco, J.M. & Ruíz Cancino, E. (2017) Familia Mymaridae. *In*: Cibrían Tovar, D. (Ed.), Fundamentos de entomología forestal. Universidad Autónoma de Chapingo, Texcoco, Mexico, pp. 379–380.

Moya-Raygoza, G. & Triapitsyn, S.V. (2017a) Two new records of egg parasitoids for *Dalbulus maidis* (Hemiptera: Cicadellidae): *Ufens niger* (Hymenoptera: Trichogrammatidae) and *Anagrus nigriventris* (Hymenoptera: Mymaridae). *Florida Entomologist*, 100 (4), 807–808. [*Anagrus nigriventris* Girault].

Moya-Raygoza, G. & Triapitsyn, S.V. (2017b) Egg parasitoids of *Dalbulus maidis* on wild teosintes in Mexico. *Southwestern Entomologist*, 42 (3), 691–700.

Moya-Raygoza, G. & Triapitsyn, S.V. (2017) Two new records of egg parasitoids for *Dalbulus maidis* (Hemiptera: Cicadellidae): *Ufens niger* (Hymenoptera: Trichogrammatidae) and *Anagrus nigriventris* (Hymenoptera: Mymaridae). *Florida Entomologist*, 100 (4), 807–808.

Triapitsyn, S.V., Rugman-Jones, P.F., Tretiakov, P.S., Shih, H.-T. & Huang, S.-H. (2018) New synonymies in the *Anagrus incarnatus* Haliday 'species complex' (Hymenoptera: Mymaridae) including a common parasitoid of economically important planthopper (Hemiptera: Delphacidae) pests of rice in Asia. *Journal of Natural History*, 52 (43–44), 2795–2822.

Triapitsyn, S.V., Rugman-Jones, P.F., Tretiakov, P.S., Luft Albarracin, E., Moya-Raygoza, G. & Querino, R.B. (2019) Molecular, morphological, and biological differentiation between *Anagrus virlai* sp. n., an egg parasitoid of the corn leafhopper *Dalbulus maidis* (Hemiptera: Cicadellidae) in the New World, and *Anagrus incarnatus* from the Palaearctic region (Hymenoptera: Mymaridae). *Neotropical Entomology*, 48 (1), 87–97.