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## World reclassification of the *Gonatocerus* group of genera (Hymenoptera: Mymaridae)

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## Abstract

The 400+ nominal species of the worldwide genus *Gonatocerus* Nees are reclassified into 14 genera that are placed in Gonatocerini, which is defined by three putative autapomorphies. A key to the 13 extant genera of Gonatocerini is given, based on females. Five previously described genus-group taxa are recognized: *Cosmocomoidea* Howard **stat. rev.** (= *ater* group, of authors), *Gahanopsis* Ogloblin **stat. rev.** (= *deficiens* group, of authors), *Gastrogonatocerus* Ogloblin **stat. n.** (= *membraciphagus* group, of authors), *Gonatocerus* (= *sulphuripes* group, of authors), and *Lymaenon* Walker **stat. rev.** (= *litoralis* group, of authors). One new fossil genus, *Archigonatocerus* Huber **gen. n.**, with two fossil species, *A. balticus* Huber **sp. n.**, and *A. longivena* Huber **sp. n.** and one fossil species in *Gonatocerus*, *G. janzeni* Huber **sp. n.**, are described, all from Baltic amber from the Eocene epoch. Eight new extant genera and 16 new extant species are described and their species keyed: *Cosmocomopsis* Huber **gen. n.**, with *C. flopsis* Huber **sp. n.** and *C. mopsis* Huber **sp. n.**; *Heptagonatocerus* Huber **gen. n.**, with *H. madagascarensis* Huber **sp. n.**, *H. magnificus* Huber **sp. n.**, *H. parvus* Huber **sp. n.**, and *H. pulchellus* Huber **sp. n.**; *Krateriske* Huber **gen. n.**, with *K. ecuadorensis* Huber **sp. n.**, *K. guianensis* Huber **sp. n.**, and *K. peruensis* Huber **sp. n.**; *Octomicromeris* Huber **gen. n.**, with *O. compacta* Huber **sp. n.** and *O. brevis* Huber **sp. n.**; *Progonatocerus* Huber **gen. n.**, with *P. albiclava* Huber **sp. n.** and *P. brunneiclava* Huber **sp. n.**; *Tanyxiphium* Huber **gen. n.**, with *T. breviovipositor* Huber **sp. n.**, *T. longissimum* Huber **sp. n.**, and *T. seychellense* Huber **sp. n.** *Yoshimotoana* Huber **gen. n.** (= *masneri* group, of authors) with one included species and *Zeyanus* Huber, **gen. n.** (= *asulcifrons* group, of authors) with 9 included species. Keys to the species of seven genera: *Archigonatocerus*, *Cosmocomopsis*, *Heptagonatocerus*, *Krateriske*, *Octomicromeris*, *Progonatocerus*, and *Tanyxiphium* are provided. Information for each nominal species catalogued includes the original reference, kind, sex and depository of primary type, and subsequent references that include relevant previous generic combinations, if applicable. The type locality is given, based on original descriptions or, where necessary, subsequent publications that provide clarification on the collection locality. Two new synonyms are proposed: *Gonatocerus similis* Gupta & Poorani, 2008, **syn. n.** under *G. bialbifuniculatus* Subba Rao, 1989; and *Gonatocerus hispaniolus* Triapitsyn & Huber, 2010, **syn. n.** under *G. masneri* Yoshimoto, 1990. Among the species, 245 new combinations are proposed: 82 in *Cosmocomoidea*, 1 in *Cosmocomopsis*, 4 in *Gahanopsis*, 8 in *Gastrogonatocerus*, 3 in *Gonatocerus*, 135 in *Lymaenon*, 2 in *Tanyxiphium*, 1 in *Yoshimotoana*, and 9 in *Zeyanus*. Revived combinations are proposed for Twelve species: 1 in *Cosmocomoidea*, 1 in *Gahanopsis*, 2 in *Gonatocerus*, and 8 in *Lymaenon*. The 410 nominal species group names are catalogued under their currently accepted genus and also listed alphabetically in an appendix. A tentative generic phylogeny is proposed.

**Key words:** Gonatocerini, world key, new genera, species catalogue

## Introduction

*Gonatocerus* Nees is the most speciose genus of Mymaridae, with 410 nominal species (Lin *et al.* 2007; Triapitsyn *et al.* 2010; Triapitsyn 2013a, 2013b; Noyes 2013) including those described in the present paper. Speciose genera such as *Gonatocerus* may be treated in different ways by different authors. Ogloblin (1935, 1946, 1959b) and Debauche (1948, 1949) had recognized that *Gonatocerus* (often called *Lymaenon* Walker) was a heterogeneous assemblage of species and proposed subgenera or species groups, respectively. Annecke & Doult (1961) treated the genus as having two subgenera. For about 25 years beginning in 1986, the Ogloblin subgenera were treated as informal species groups (Matthews 1986; Huber 1988; Yoshimoto 1990; Zeya & Hayat 1995; Lin *et al.* 2007). Triapitsyn *et al.* (2010) redefined *Gonatocerus*, recognized subgenera again, and reclassified the Neotropical species into them. However, Zeya & Khan (2012) and Manickavasagam & Rameshkumar (2013b) continued to use a species-group classification. Triapitsyn (2013a, 2013b) treated the Palaearctic and Nearctic fauna and again used subgenera. All these studies were geographically limited to varying degrees. In particular, the diverse southeastern Asia and Afrotropical (including Madagascar) faunas were not covered.

Based on a worldwide study of thousands of specimens of *Gonatocerus* undertaken intermittently over the past three decades I found that the genus is better subdivided into several related genera clearly united by one venational feature, mentioned previously by Triapitsyn *et al.* (2010). The existing subgenera are removed from synonymy under *Gonatocerus* and given generic status here, and I propose new genera for several distinct groups of species that cannot satisfactorily be placed into the previously described taxa. The resulting classification does greater justice to the morphological and biogeographical diversity found among the 400+ nominal species and better illustrates convergences/parallelisms among the genera in which they are classified, while showing that the underlying generic features remain invariant on a world basis. Differences in biology, where known, may also be better reflected. All described species of *Gonatocerus sensu lato* are reclassified into the genera characterized below. These are placed in a tribe defined by three putative autapomorphies.

## Material and methods

Diagnoses and generic descriptions of all genera are given though the descriptions of previously described genera (*Cosmocomoidea* Howard, *Gahanopsis* Ogloblin, *Gastrogonatocerus* Ogloblin, *Gonatocerus*, and *Lymaenon*) and the fossil genus *Archigonatocerus* are relatively short compared to those of the eight extant new genera. The new species descriptions are based on specimens cleared and mounted in Canada balsam, and on card- or point-mounted specimens. The latter were used to describe or illustrate habitus and colour. Some structures, e.g., the dorsellum, appear to have different shapes depending on whether a photograph or a scanning electron micrograph is examined. Descriptions of the dorsellum shape are based on its appearance in micrographs, where only the surface is seen so its boundaries are clear; corresponding photographs of slide mounts show the underlying structures and thus the dorsellum shape may appear to be different from the description. Also, composite photographs created from layers will be distorted. Measurements are in micrometers ( $\mu\text{m}$ ) and are the maximum width or length of the structure measured. Total body length of females excludes the exerted part of the ovipositor sheaths. Measurements are taken from slide-mounted specimens except for total body length. The width, length and height of the head, mesosoma, and, occasionally, metasoma, are taken from critical-point dried specimens. The head, mesosoma and metasoma measurements are presented as ratios, e.g., head width/height. Head width is the distance across the compound eyes in dorsal or anterior view; head length is the longest distance, usually from the transverse trabecula to the posterior margin of the gena in dorsal or lateral view; and head height is the longest distance in anterior view from top of the vertex to the lateral angle of the mouth opening. Face width is the distance between the inner eye margins, measured across the toruli. Measurements for the three fossil species described are approximate.

**Slide preparation.** The method used for slide preparations was initially developed, but not published, by Judith Mynhardt, a technician at the Division of Entomology, Department of Agricultural Technical Services, Pretoria, who worked for the well-known South African entomologist, David Annecke. Noyes (1982, 1990) refined the method and described it in detail. He noted that specimens killed in ethanol tended to collapse during slide mounting in Canada balsam compared to those never immersed in preservative. Because most specimens examined for the present study were originally collected in Malaise or pan traps and preserved for varying lengths of time in 70% ethanol this problem of collapse had to be overcome. The Noyes method is redescribed below for Mymaridae, with modifications that will greatly reduce or prevent the collapse of weakly sclerotized specimens, such as those of the *Gonatocerus* group of genera. Ensuring a gradual change in viscosity over several days among the different chemicals used for slide preparation is the key to preventing collapse of body parts, especially the gaster and female clava. It is important to keep specimens dust free as much as possible during all stages of preparation by placing a glass cover on each spot plate and, in addition, placing the spot plates under a 14×20 cm clear plastic box about 4 cm high (Fig. 1).

- 1) Remove the wings from a card or point mounted specimen using a minuten pin or tungsten wire sharpened to a fine point by electrolysis (Galbreath & Galbreath 1977) and place directly into a drop of clove oil in one well of a 9- or 12-well white ceramic spot plate (Fig. 1). The wings may have to be pushed into the clove oil as they tend to float on the surface. Leave overnight in clove oil, which replaces air in the hollow veins, thus ensuring the veins do not appear black (from trapped air) when they are slide mounted.

- 2) Dissect the rest of the specimen by removing the head + antennae, or antennae and then the head depending on whether a dorsal view of the head (without antennae) still attached to the mesosoma is desired. Immerse the body parts in 10% KOH in a well of a glass spot plate (Fig. 1) for 48 h (24 h for weakly sclerotized specimens) at room temperature ( $\sim 20^{\circ}\text{C}$ ) to remove internal soft tissue.

- 3) After 12 h transfer the wings from the clove oil directly into a thin layer of balsam on a clean slide labeled with the appropriate collection data and scientific name (if known). I use a minuten pin in a wood or metal pin vice to do this. Orient all wings in the same direction (apex to the right) and with posterior margin facing top of slide so as to have one pair of wings in dorsal view and one in ventral view with apex facing left when viewed under a compound microscope (which causes  $180^{\circ}$  image reversal). If the balsam layer becomes too stiff add a minute droplet of suitable solvent, e.g. xylene, to the balsam before continuing to orient the wings.

- 4) Dehydrate completely the body parts by passing them through the following seven solutions for about 15 minutes each: 35% acetic acid (to neutralize the KOH), distilled water (to remove by dilution the acetic acid), 35% ethanol, 70% ethanol, two changes of 95% or 100% ethanol, and clove oil (miscible with Canada balsam). Take care not to allow the parts to dry out at any time. To avoid this, it is best to use a clear glass 9-well spot plate with

deep wells and steep sides to reduce “creeping” of a liquid up the well wall or accidental complete evaporation of the higher concentrations of ethanol. Leave the specimen parts immersed in liquid and replace one liquid mostly, but not entirely, by the next liquid using a Pasteur pipette—the body parts remain untouched in the previous liquid at the bottom of the well during liquid changes. Use a Pasteur pipette with very fine tip for small mymarids to lower the risk of accidentally sucking up a body part during the changes. Before adding the drop of clove oil, remove about half of the 95% or 100% ethanol first (for weakly sclerotized specimens, do not remove any ethanol before adding the first drop of clove oil). The clove oil/ethanol mixture will swirl around and tend to creep up the side of the well for a minute or two until the ethanol completely evaporates so it is best to observe the well carefully under a stereoscope to ensure that parts are not lost or suddenly left dry at the bottom of the well. If necessary, another drop of clove oil can be added to prevent the body parts from being exposed to air.

5) After 24 h add a drop of Canada balsam.

6) Repeat step 5 every day for 2 or 3 days until the mixture is almost as thick as pure Canada balsam at which point one can carefully transfer the body parts to drops of Canada balsam on the same slide as the wings using a minuten pin or tungsten wire loop. I arrange the parts with wings at top left, body at bottom left, antennae at top right, and head (or head + antennae) at bottom right (Fig. 2). If male genitalia or the metasoma are mounted separately they would be in the middle of the slide under a fifth coverslip. Mount each body part with the posterior apex facing away from you to account for image reversal when studying the specimen under a compound microscope. Check the final slide preparation after a few hours to ensure that the parts have not moved around, which happens if the balsam is too liquid or the layer too thick. If necessary, carefully reposition the body parts after diluting the balsam with a minute droplet of a suitable solvent.

7) Place the slide in an oven at 40°C for at least two weeks until the first layer of balsam is hardened. Several slides separated by cardboard spacers of suitable thickness may be conveniently stacked in a Petri dish to protect them from dust (Fig. 2).

8) Depending on the thickness of the body, and whether the first layer of balsam completely covers it, add a second layer of balsam to cover the specimen completely and allowed to dry for another two weeks.

9) Add a third drop of balsam and carefully place a clean cover slip onto each body part and let the slide dry for at least two more weeks. Because Canada balsam shrinks by up to 30% when completely dry (after several months to several years) it is important to have the body parts completely covered and fairly well dried before adding the final layer of balsam and cover slip or the specimen parts will eventually be crushed. Circular 6-mm diameter cover slips are best for all but the largest specimens. Prepare dorsal and/or lateral views of body parts depending on the number of specimens available. Different views allow more features to be seen that might be important in defining a species. Good slide preparations are essential not only for proper study of specimens but especially for illustration (e.g., Huber 2012).

Noyes (2010, p. 9) adapted a published protocol for non-destructive extraction of DNA from Encyrtidae prior to slide mounting. If DNA extraction is not required the procedure can still be used to clean and partially clear specimens for slide mounting though is important to remove the wings first. I have not yet tried this method for Mymaridae. If DNA extraction becomes routinely used the method should provide useful information to help associate the sexes and determine species limits.

**Illustrations.** Photographs of slide preparations were taken with a ProgRes™ C14<sup>plus</sup> digital camera attached to a Nikon Eclipse E800 compound microscope, and the resulting layers combined electronically using Auto-Montage® or Zerene Stacker® and, except for primary types, retouched as needed with Adobe® Photoshop. The layers chosen for combining are usually only a subset of all the layers taken and depend on the structure to be illustrated, e.g., front, middle or back of the head (Fig. 14), dorsal or ventral surface of mesosoma, or male genitalia as seen through the gaster. Depending on how many specimens of a species were available for study, some specimens were examined without gold coating in an environmental scanning electron microscope (SEM) or with gold coating using standard high vacuum techniques. Carbon conductive tabs placed on metal stubs provide a smooth surface for dissected body parts. For the new genera a combination of SEM micrographs (black and white) and photographs (colour) are provided. For the previously recognized genera or subgenera at least one habitus illustration and SEMs are provided.

**Morphological terms.** Terms used in the descriptions are mostly as defined in Gibson (1997) and Huber (2012). Terms for the antennal cleaner (= strigil + calcar) (Figs 27f, 35c, d) and pretarsus (Fig. 30) follow Basibuyuk & Quicke (1995) and Gladun & Gumovsky (2006), respectively. The male genitalia are not described in

detail though evidently there are considerable differences, among some of the genera at least; the few terms used follow Viggiani (1989, 1991). Abbreviations used in the descriptions are: fl = funicle segment, gs = gastral sternum, gt = gastral tergum, mps = multiporous plate sensilla, and TL = type locality. Abbreviations used on the illustrations are listed in Appendix 2. The female antenna (Figs 12, 13, 15), mouthparts (Fig. 16), wings (Figs 19–26) and legs (Figs 27–37) are illustrated in detail using specimens of two relatively large species that could be prepared fairly easily for study. Leg proportions and setation may have value in helping to define taxa though these characters have been little studied in Mymaridae. Except for their colour, legs are not described in the generic treatments. On all legs campaniform sensilla occur in rows or clusters on two or three surfaces (anterior, posterior, ventral) of the trochanter, basal ring (trochantellus) of the femur, and base of the tibia (Figs 32–37). Their number and position appear to be constant and may be useful in taxonomy. In the descriptions, a structure described as ‘normal’ is usually illustrated and may be compared with the illustrations in Figs 10 and 16b (mandibles), Figs 5, 17 and 49 (axillae), Fig. 22 (hind wing), Figs 51, 52 (propleura), and Fig. 52 (propodeal spiracle) to understand what ‘normal’ is.

**Colour.** Colour and colour pattern is more important in helping to characterize and recognize species in Gonatocerini than species of many other genera of Mymaridae. However, care must be taken in using colour because of intraspecific variation. Body colour pattern of males and females of a species is usually similar. When differences occur, as in most, lighter coloured (not in uniformly black or dark brown) species the male almost always has more extensive dark areas. Convergent colour patterns among different genera frequently occur, e.g., a yellow mesosoma with patterns of dark spots (Figs 6, 7). Because colour and colour pattern are important features, some specimens of a series representing a given species should be critical-point dried and card mounted to observe and describe colour properly.

Colours usually fade with time in dry specimens exposed to light or in specimens kept in ethanol or other preservatives at room temperature for more than a year or two, even if kept in the dark. Black will fade to brown and yellow will fade almost to white. Therefore, it is important to have fully sclerotized, relatively fresh specimens to interpret colour correctly. Colour degradation is greatly retarded by keeping ethanol-preserved specimens in a freezer at minus 20°C.

Freshly emerged (teneral or callow) specimens of some genera may have a bright red gaster but the colour soon disappears as the adult hardens and full sclerotization is attained. The specimen is then typically yellow or brown. Teneral adults may also have light H-shaped markings dorsally on the thorax, and the vertex pale (Fig. 5a) or have pale lines that gradually disappear once the adult is fully sclerotized (Figs 5b, c). Such specimens may sometimes have the vertex anteriorly and laterally separated more or less distinctly from the face and the white (rarely coloured) intersegmental membrane between the sclerites more or less expanded and visible (Fig. 4). In such specimens the cuticle of the transverse trabecula is unrolled and flattens out.

**Variation.** A perennial and fundamental problem in species recognition is intraspecific variation in body size, wing proportions and other features besides colour. When the variation occurs in flagellomere proportions and in number and distribution of mps in females, and in ovipositor sheath length, as shown by Viggiani (2013) for one *Lymaenon* (as *Gonatocerus*) species reared from a particular host species, this is a significant problem because mymarid taxonomy depends considerably on these features to define species. The problem can be mitigated by studying many specimens from a given host or collecting event to try and ascertain the extent of intraspecific variation and record it in the descriptions.

**Species catalogue.** Species group names are catalogued under their currently accepted genera. Excluding syntypes, there are 379 primary types, as follows: 322 holotypes, 54 lectotypes, and 3 neotypes. Of these, 19 species are represented only by males. In addition, 19 species are represented by syntypes, usually consisting of several females and males, except in one case by males only; in at least two cases the syntype series consists of two species. The primary types of 26 species appear to be lost. The generic combination for each species, as proposed in this paper, is given first. This is followed by the original combination and literature citation, and primary type specimen information: kind of type and sex, the institution in which it is deposited, and the type locality or, for newly described species, the label data. The genus or subgenus in which the species was **last** placed is then given after the proposed generic combination, together with the relevant reference. Earlier references giving changes in combination are usually not cited. Other nomenclatural changes in literature subsequent to the original description may sometimes be listed, if relevant. This includes the earliest reference I could find for any generic transfer. The generic placement of some species bounced back and forth for about 40 years between *Gonatocerus* and

*Lymaenon*, depending on which genus was treated as the senior synonym at a particular time, e.g., Burks (1958, 1979) and Peck (1963). The complete nomenclatural history for each species is in Noyes (2013). Junior synonyms are catalogued under each senior synonym. *Nomina nuda* are listed separately. The American entomologist A.A. Girault (1884–1941) described several thousand insect species (mostly Chalcidoidea) in about 470 papers. Thirty-one of them include descriptions of species now placed in Gonatocerini, as defined below. To simplify tracking his papers here I have placed the paper number in brackets after the year, following the list in Dahms (1978). The German entomologist, A. Förster was the third person to study Mymaridae, after Haliday and Walker in England. His publications give two different spellings for his surname: Förster and Foerster—these different spellings are used in the literature cited here, for accuracy.

Almost all species can be placed confidently in a given genus, either because the types were seen or the original descriptions enable the correct genus to be clearly determined (except in very few cases) or other workers reliably placed them in the correct species group or subgenus because they had examined the types. As might be expected for a group this speciose, several homonyms were created. Replacement names were previously proposed for nine of them, but five are unnecessary and in one case there was, in fact, no junior homonym that required replacing. For ease of retrieval, the nominal species in Gonatocerini are listed alphabetically in Appendix 1 with their accepted generic combination.

Acronyms (codens) for 41 museums in which primary types of the species are deposited are listed below. The entire Boțoc collection (Romania: Cluj), including two relevant primary types, is lost. The Klebs collection (Russia: Kaliningrad [formerly Königsberg]) (one fossil type) was destroyed except for material on loan at the time.

AMNH	American Museum of Natural History, New York, New York, USA.
BMNH	Natural History Museum, London, England, UK.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA.
CAS	California Academy of Sciences, San Francisco, California, USA.
CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada.
CUIC	Cornell University Insect Collection, Cornell University, Ithaca, New York, USA.
DEZA	Dipartimento di Entomologia e Zoologia Agraria, Portici, Italy.
EDAU	Entomology Department, Annamalai University, Chidambaram, Tamil Nadu, India.
IARI	Indian Agricultural Research Institute, New Delhi, India.
IAVH	Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Bogotá, Distrito Capital, Colombia.
ICXU	College of Life Science and Technology, Xinjiang University, Urumqi, Xinjiang, China.
INHS	Illinois Natural History Survey Collection, Urbana, Illinois, USA.
IRSNB	Institut Royale des Sciences Naturelles de Belgique, Brussels, Belgium.
KUEC	Entomological Laboratory, Kyushu University, Fukuoka, Japan.
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina.
MCPM	Milwaukee City Public Museum, Milwaukee, Wisconsin, USA.
MHNG	Muséum d’Histoire Naturelle, Geneva, Switzerland.
MLPA	Museo de la Plata, Universidad Nacional de la Plata, La Plata, Argentina.
MMUE	Department of Entomology, Manchester Museum, University of Manchester, England, UK.
MNHN	Muséum Nationale d’Histoire Naturelle, Paris, France.
MRAC	Museum Royale de l’Afrique Centrale, Tervuren, Belgium.
MVMA	Entomology Collection, Museum of Victoria, Melbourne, Australia.
NBAIL	National Bureau of Agriculturally Important Insects, Bengaluru, India.
NHMW	Naturhistorisches Museum, Vienna, Austria.
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden.
NMID	National Museum of Ireland, Dublin, Ireland.
NPC	National Pusa Collection, Division of Entomology, IARI (see above), New Delhi, India.
NTNU	Museum of Natural History and Archaeology, Royal Norwegian Society of Science and Letters, Trondheim, Norway.
NZSI	National Zoological Collection, Zoological Survey of India, Calcutta, India.



OUMNH	Hope Entomological Collections, Oxford University Museum of Natural History, Oxford, England, UK.
PPDD	Plant Protection Department, Ministry of Agriculture, Dokki, Cairo, Egypt.
PUPB	Department of Zoology, University of Plovdiv “Paisii Hilendarski”, Plovdiv, Bulgaria.
QMBA	Queensland Museum, Brisbane, Australia.
QSBG	Queen Sirikit Botanic Garden, Chiang Mai, Thailand.
UCRC	Entomology Research Museum, University of California, Riverside, California, USA.
USNM	National Museum of Natural History, Washington, District of Columbia, USA.
ZDAMU	Aligarh Muslim University, Aligarh, India.
ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.
ZMH	Zoological Museum, University of Finland, Helsinki, Finland.
ZMHB	Museum für Naturkunde, Humboldt-Universität, Berlin, Germany.
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark.

## Historical review

Debauche (1948), Bouček & Graham (1972), Sahad & Hirashima (1984), Huber (1988) and Triapitsyn *et al.* (2010) presented historical reviews of *Gonatocerus*. Here, I summarize the main events that caused confusion for subsequent workers in two different respects: a) use of generic names—a nomenclatural problem, and b) taxon concepts—a taxonomic problem.

a) Nees (1834) described *Gonatocerus* with one included species and Walker (1846) described *Lymaenon* for two Haliday species. The debate over which of these two names should be used began when Kryger (1934) decided, based on the original description (not on a Nees specimen, which was lost), that *Gonatocerus* could not possibly belong to Mymaridae. Thereafter, for almost 40 years, various authors used one or other of the names depending on whether or not they agreed with Kryger. The confusion in name use was resolved when Bouček & Graham (1972) designated a neotype for *G. longicornis* Nees, the only originally included species in *Gonatocerus*, and Graham (1972) designated a lectotype for *Lymaenon acuminatus* Walker, the type species of *Lymaenon*. The type species of both generic names were at last defined objectively and thus could be examined morphologically. If one name had been generally accepted as a synonym of the other no discussion would be needed but, as shown by Triapitsyn *et al.* (2010) and below, both names represent valid taxa that are distinctly different from each other.

b) The taxonomic problems began with Haliday (1833) who included two species, *Ooctonus litoralis* Haliday and *O. pictus* Haliday, in the second section of his genus *Ooctonus*, i.e., species with a ‘subsessile’ gaster. Walker (1846) placed these two species in *Lymaenon*. The two Haliday species actually belong to two different species groups defined about 100 years later—the *litoralis* and the *sulphuripes* groups of Debauche (1948). Foerster (1847) described *Rachistus* and included five species: the same two Haliday species (an unavoidable error as he was working in Germany and evidently did not realize that Walker had published in the previous year the name *Lymaenon* for those species), *Gonatocerus ater* (Förster) described 6 years earlier (Förster 1841), and two new species, *Rachistus terebrator* Foerster and *R. sulphuripes* Foerster. When he did find out about *Lymaenon*, Foerster (1856) correctly synonymized *Rachistus* with it—the type species of both genera belong to the *litoralis* group—but incorrectly synonymized both names under *Gonatocerus*, whose species belong to the *sulphuripes* group. As did previous authors, Förster (1841) used colour and body size almost exclusively in his species descriptions and therefore he overlooked important structural features that would have indicated that the species known at the time formed a heterogeneous group. Foerster (1847) produced better descriptions with various morphological features in addition to colour but he did not mention features of the mesosoma, which are critical to understanding how the species should be classified correctly. Another likely reason that Förster synonymized the three genera was because his two *Gonatocerus* species, *G. ater* and *G. flavus* (Förster 1841), and his *Rachistus* species, *R. sulphuripes* and *R. terebrator*, belong to three different species groups. His *G. flavus* Förster, synonymized by Foerster (1847) himself under Haliday’s *O. pictus*, belongs to the *sulphuripes* group. His *G. ater* was described, very unfortunately, from four superficially similar-looking specimens representing two or three species in two species groups—the *litoralis* group, and a new group not represented by any previously described species—the *ater* group of Matthews (1986). Triapitsyn (2013a) clarified their status and subgeneric placement.

Ever since Förster's synonymies the species continued to be confused and were all classified in *Gonatocerus* (or *Lymaenon*, because of the nomenclatural problem described above). Almost a century passed before Debauche (1948) recognized that *O. litoralis* and *O. pictus* were different enough to be classified in two different species groups within the same genus. Unfortunately, Debauche placed too much emphasis on venational and antennal features and gaster shape to separate his species groups, with the result that two of his four species groups contained species belonging in other groups. Debauche (1949) continued this emphasis on venational/antennal features in his treatment of African species so his species group concepts remained confused.

Working on the diverse South American fauna, Ogloblin (1935, 1946, 1959b) was the first to appreciate that the species diversity in *Gonatocerus* was great enough to warrant formal subgenera, and he proposed three—*Gonatocerus* (*Gastrogonatocerus*), *Lymaenon* (*Gahanopsis*), and *Lymaenon* (*Cosmocomoidea*). Ogloblin emphasized features of the gaster and antenna, and one feature of the mesosoma to define his subgenera though it was unfortunate that he defined *L.* (*Gahanopsis*) based on an exceptional species that had a reduced number of funicle segments in females.

None of the above authors, except Ogloblin to some extent, realized the importance of mesosomal features in defining groups within *Gonatocerus*. Using mesosomal features in particular, Matthews (1986) finally classified the British species properly into three, well defined species groups but, following Debauche, chose to use informal species group names (*ater*, *litoralis* and *sulphuripes* groups) rather than formal subgenera. Huber (1988), Yoshimoto (1990), and Zeya & Hayat (1995) followed Matthews and provided keys to species groups. Finally, Triapitsyn *et al.* (2010) and Triapitsyn (2013a, 2013b) used subgenera for most of the previously proposed species groups.

Although it may appear simpler and more convenient to treat all the nominal species described to date as the single speciose genus, *Gonatocerus*, subdivided into several species groups or subgenera (or both), to do so minimizes important differences that illustrate interesting biogeographical patterns and possibly also host relationships. The species group concept was informal and flexible, and brought some order to the numerous species included in *Gonatocerus* but it does not adequately reflect the numerous and considerable morphological differences among the species groups and subgenera proposed to date. Genera are needed, particularly to highlight the great diversity and many superficial convergences among species from different groups that tend to mask the stable fundamental differences between groups. The non-European fauna, especially from southeast Asia, Madagascar, and South America, is important in showing this generic diversity and superficial species convergences both within and among different biogeographic regions.

## Generic relationships

'*Gonatocerus*' was defined historically as encompassing species with 5-segmented tarsi, an 8-segmented funicle in females (later, a few species with 7-segments were described), an 11-segmented flagellum in males, and a short and narrow petiole (= a 'subpetiolate' or, occasionally, a 'subsessile' gaster, of authors). These features were usually easily seen and appeared to define the taxon unequivocally, though the choice of defining features meant that some species of *Ooctonus* and *Gonatocerus* were misplaced generically, e.g., by Girault for a few Australian species (Lin *et al.* 2007). The number of antennal and tarsal segments were often the only features that could be clearly determined on poorly prepared slide or card mounts, hence their frequent use. But the above features are ancestral and shared by various other, evidently unrelated, genera of Mymaridae. As a result, based mainly on the 8-segmented funicle in females and 5-segmented tarsi, *Gonatocerus* was incorrectly treated by many early authors and, most recently, by Schauff (1984) as the sister taxon to *Ooctonus*. Ashmead (1904: 362), however, had emphasized the gastral petiole and placed *Gonatocerus* into his tribe Gonatocerini and *Ooctonus* into his tribe Ooctonini. Although Ashmead did not understand the correct relationships of *Ooctonus* he at least correctly understood that it was very different from *Gonatocerus*, much more so than most subsequent workers realized. *Ooctonus* was regarded as a basal genus of Mymarini (Huber 2002) or in a separate taxon somehow related to *Boudiennyia* Girault, which in turn was proposed either as the basal genus within an expanded Mymarini (Huber 2013), or as a genus in its own tribe, sister to Mymarini. Triapitsyn *et al.* (2010) and Huber (2013) summarized the various relationships proposed by previous authors.

## Tribe Gonatocerini

The *Gonatocerus* group of genera is distinctly separated from other genera. Ashmead (1904) realised this and first proposed Gonatocerini in a key but, apart from *Gonatocerus*, the genera he included belong elsewhere. Viggiani (1989) defined Lymaenonini, the tribal name used by Ghesquière (1942), on the basis of the aedeagus not being encapsulated in a phallobase and with two apodemes fused basally and articulated with the body of the genitalia, which are connected directly to  $gs_7$ , the genital sternite of Viggiani (1989). Triapitsyn *et al.* (2010) provided a diagnosis of *Gonatocerus* (*s. l.*) which serves fairly well as a tribal diagnosis. An additional feature not mentioned in Triapitsyn *et al.* (2010) is the presence of a distinct malar sulcus in almost all the included species. This feature, almost unique to Gonatocerini, may be a plesiomorphy but is nevertheless a useful feature to recognize most of the species as belonging to Gonatocerini.

The following key should distinguish any member of Gonatocerini from other Mymaridae.

- 1     **Both sexes.** With most of the following combination of features: fore wing hypochaeta (in extant species) far from proximal macrochaeta, about mid-way between proximal and distal macrochaetae (Figs 19b, 20b); parastigma usually slanting away proximally from anterior margin of fore wing (Figs 20a, 38, 59, 60) but its base usually slightly curving towards anterior margin (Fig. 21); malar sulcus usually present (Figs 111, 138), tarsi 5-segmented. **Female.** Antenna with funicle usually 8-segmented, occasionally 7-segmented. **Male.** Genitalia usually not encapsulated, attached directly to  $gs_7$ , with the aedeagal apodemes usually slender, distinct and strongly diverging and fused at junction with aedeagus (V-shaped) (Fig. 74) or not fused at junction (rather U-shaped) but occasionally thick (Figs 155, 156, 197, 198), parallel (Fig. 326) or apparently absent (Fig. 129) ..... Gonatocerini
- **Both sexes.** With at least three of the following features: fore wing hypochaeta next to proximal macrochaeta; parastigma parallel for its entire length with anterior margin of fore wing; malar sulcus absent, tarsi 4- or 5-segmented, exceptionally 3-segmented. **Female.** Antenna with funicle usually with 6 or fewer segments, occasionally 7-segmented, rarely 8-segmented. **Male.** Genitalia usually separated from  $gs_7$  and with aedeagal apodemes not fused, usually parallel and enclosed in a genital capsule. .... other genera of Mymaridae

The three putative derived features (apomorphies) defining the tribe are: 1) hypochaeta(e) far from proximal macrochaeta (about midway between the two macrochaetae), 2) parastigma proximally slanting angle away from fore wing margin, and 3) male genitalia not encapsulated, attached directly to  $gs_7$  (the apical gastral sternum). Their polarity is based on distribution of these features in other genera of Mymaridae, where these apomorphies are rarely or not found. The position of the hypochaeta almost midway between the macrochaeta (usually slightly closer to the proximal hypochaeta) and the genitalia not encapsulated are features that occur in *Arescon* so these apomorphies are homoplasies. Other mymaridae have the hypochaeta, when present (it is absent in *Eustochomorpha*) next to the proximal hypochaeta. In other Mymaridae the parastigma remains next to the fore wing margin throughout its length or (again in *Arescon*) almost so. Although at least one genus within Gonatocerini may lack one of the putative apomorphies, taken together the key features will reliably separate members of the tribe from other Mymaridae.

The remaining features of Gonatocerini are putatively ancestral (plesiomorphies). Tarsi with 5 segments occur in several genera of Mymaridae not related to Gonatocerini, and in several other families of Chalcidoidea. A funicle with 8 segments (in females) occurs in *Eustochomorpha* and the fossil genera *Myanmymar* and *Triadomerus*, arguably the most ancestral genera of Mymaridae. A malar sulcus occurs in both genera of Rotoitidae, arguably the most primitive lineage of Chalcidoidea after Mymaridae.

A key to genera of Gonatocerini based on females is presented below. For males, the key will work fairly well up to couplet 12, if the genitalic and antennal characters are ignored. Males of all Gonatocerini have the flagellum 11-segmented. The number of mps on each flagellar segment is sometimes helpful in identifying genera, as is structure of the scape (e.g., relative length of radicle) and pedicel. However, for the most part, male antennal features cannot be used reliably for generic level identification.

### Hosts, biology and habitats

Host records that appear to be reliable are known for about 35 species in six genera. Noyes (2013) gave all host records, whether correct, doubtful, or almost certainly incorrect. Triapitsyn & Shih (2014) tabulated *Gonatocerus* (*s.l.*) species and other mymarid genera reared from 16 named Cicadellini host species and indicated some of the likely mymarid misidentifications. Because either the host egg or the parasitoid adult may have been misidentified

or the association was incorrectly made, the chance that a given host record for a named parasitoid species is wrong may be quite high. Nevertheless, a few generalizations can be made. Species of *Cosmocomoidea* parasitize mainly Proconiini (Cicadellidae), rarely Cicadellini, e.g., Logarzo *et al.* (2012). One species of *Cosmocomopsis* Huber has been recorded from eggs of Orthoptera. Species of *Gahanopsis* parasitize Membracidae and Cicadellidae (Aethalioninae). Species of *Gastrogonatocerus* parasitize Membracidae. Species of *Gonatocerus* and *Lymaenon* parasitize mostly Cicadellidae other than Proconiini, rarely also Membracidae. Hosts have not yet been recorded for the remaining seven extant genera of Gonatocerini.

Little is known about the biology of most species. Usually only a single parasitoid emerges per host egg but at least one species is gregarious, with at two or three adults emerging from the same host egg (Triapitsyn *et al.* 2003). The best studied species are those that parasitize economically important hosts on major crops, e.g., rice in the Oriental region (Sahad 1982a; Sahad & Hirashima 1984), and grapes in the Nearctic region (Irvin & Hoddle 2005). The ovipositor sheaths at rest in their normal position are almost parallel with the ventral margin of the gaster (Fig 38b) and in living specimens enclose the ovipositor. During oviposition the female sterna are extended posteriorly so the ovipositor sheaths become vertical while the ovipositor rotates about 180 degrees relative to the sheaths (Figs 38c, e) for insertion into a host egg. Specimens are occasionally preserved in intermediate positions of ovipositor extension (Figs 38a, d).

The habitats for many if not most species of most genera are forested areas, particularly tropical rainforests, but exceptions occur. Species of *Lymaenon* are most often found in drier, open habitats such as woodlands, grasslands, and deserts. Obviously, the essential requirement is presence of suitable hosts for oviposition. Therefore, wherever their hosts are found is where a given parasitoid species will likely also occur. The complete host range of most species is unknown.

### Key to genera of extant Gonatocerini. Females

1. Dorsellum strap shaped, narrow, at least 5× as wide as long, with anterior and posterior margins parallel and posterior margin straight or almost so (Figs 7, 175–177, 185, 186); pronotum longitudinally divided, with the two lobes widely separated by membranous or sclerotized trapezoidal median area defined laterally by longitudinal sutures, carinae or pale lines (Figs 8, 186, 188); propodeum almost always with two longitudinal, parallel or slightly converging, usually light-coloured submedian sulci (Fig. 7), usually clearly separated from each other, and the area between them with minute spicules or smooth (Fig. 185); ocellar triangle usually with 3 setae (Fig. 180), occasionally with 4, rarely with 2; fore wing with apex of stigmal vein truncate (Figs 175–178) ..... ***Lymaenon* Walker**
- Dorsellum rhomboidal, triangular, or biconvex (Figs 5, 6, 49), usually much less than 5× as wide as long and the anterior margin not at all parallel with posterior margin, but sometimes dorsellum narrow, almost parallel-sided (posterior margin still slightly and evenly convex) and about 5× as wide as long, e.g., *Cosmocomopsis sevae* (Risbec) (Fig. 65) or *Cosmocomoidea portoricensis* Dozier, or dorsellum with posterior margin slightly sinuate and with a small, blunt median projection (many *Gahanopsis*) (Figs 90, 91); pronotum entire (Figs 90, 238, 239, 242) or apparently so (Figs 213, 214) or if longitudinally divided medially then with the lobes abutting (Figs 5, 6, 9, 17, 49) or almost so (Fig. 79); propodeum not exactly as above, without spicules medially and either smooth or with various structural modifications (carinae, sulci, punctures); ocellar triangle usually with 2 setae; fore wing with apex of stigmal vein usually oblique (Figs 3, 41, 42, 127) ..... 2
- 2(1) Face with subantennal sulcus extending from ventral margin of each torulus to mouth margin (Figs 10, 14, 43) ..... 3
- Face without, or apparently without, subantennal sulci (Figs 136, 319, 329) ..... 12
- 3(2) Pronotum longitudinally divided, the lobes abutting or apparently abutting one another medially (Figs 5, 6, 9, 17, 49), sometimes with a small, separate triangular area visible posteromedially at junction with mesoscutum (Fig. 118, and fig. 4 in Matthews 1986) or if pronotum apparently entire then with a median longitudinal membranous area in dorsal half (Figs 213, 214) ..... 4
- Pronotum entire, without a longitudinal median suture (Figs 90, 227, 239) ..... 9
- 4(3) Propodeum medially usually with 1–3, faint, long or short longitudinal carinae between submedian carinae (Fig. 102); propodeal spiracle often huge, distinctly larger than pronotal spiracle (Fig. 102), but sometimes normal in size; gaster usually extending distinctly forward under mesosoma (Figs 95, 105–107) though sometimes only slightly so; occiput divided into dorsal and ventral sections by transverse, curved suture dorsal to foramen medially and extending to lower eye margin laterally (Fig. 99); fore wing with microtrichia usually absent behind and just beyond venation and rather sparse further beyond venation (Fig. 95) ..... ***Gastrogonatocerus* Ogloblin**
- Propodeum without longitudinal carinae between submedian carinae; propodeal spiracle normal, the same size as or smaller than pronotal spiracle (Figs 17, 52); gaster not extending forward under mesosoma; occiput entire, usually not divided by transverse suture (Figs 11, 45), rarely with sulcus constricting occiput so it appears to be divided into upper and lower sclerites (Fig. 46) fore wing microtrichia denser, present proximally from base of parastigma (Figs 40, 42, 83, 109, 146, 194, 221) to beyond apex of stigmal vein (Figs 3, 121, 63, 135, 292) ..... 5
- 5(4) Fore wing with 2 hypochaetae midway between proximal and distal macrochaetae (Figs 157–159); propodeum with oval, cra-

- ter-like median area not extending to anterior margin (Figs 159, 171, 172). . . . . **Krateriske Huber, gen. n.**
- Fore wing with 1 hypochaeta between proximal and distal macrochaetae (Fig. 19b); propodeum not as above, often with carinae in other configurations . . . . . 6
- 6(5) Propodeum with a median carina but without submedian carinae (Figs 65, 71, 76); pronotum with a median carina separating the closely approximate (but not abutting) lateral lobes (Fig. 71, 76);  $gt_1$  with posterior margin sinuate sublaterally and deeply notched medially (Fig. 77) . . . . . **Cosmocomopsis Huber, gen. n.**
- Propodeum without a median carina but usually with submedian carinae, these entire or not but usually clearly separated from each other (Figs 17, 49, 54, 195), or sometimes apparently without carinae (Fig. 6); pronotum without median carina, the lateral lobes abutting (Figs 5, 6, 9, 49, 53, 118, 195);  $gt_1$  usually straight posteriorly, not exactly as above . . . . . 7
- 7(6) Propodeum at posterior margin above metacoxa with a short, oblique carina between short or long submedian carina and the lateral sulcus or carina separating metanotum from propodeum (propodeum thus appears to have 4 carinae: 2 submedian and 2 sublateral) (Figs 195, 202, 211); parastigma very short, at most  $0.6\times$  as long as submarginal vein (Figs 191, 194, 201) . . . . . **Octomicromeris Huber, gen. n.**
- Propodeum smooth or with two carinae, but without additional carina as described above; parastigma longer, at least  $0.7\times$  as long as submarginal vein . . . . . 8
- 8(7) Fore wing with microtrichia uniformly distributed to base of parastigma (Fig. 108) and usually fairly narrow, at least  $3.8\times$  as long as wide, with rounded apex; dorsellum triangular to rhomboidal (Fig. 6) and sometimes margined with lighter colour; propodeum smooth medially (Fig. 6), rarely with two submedian carinae (Matthews 1986, fig. 3; Triapitsyn 2013, fig. 22); funicle of female often with  $fl_1$  obliquely truncate dorsoapically, and  $fl_2$  and  $fl_3$  almost always longer than following funicle segments . . . . . **Gonatocerus Nees**
- Fore wing almost always bare behind venation (Figs 3, 19) or, if setose, then microtrichia usually not uniformly distributed and less densely spaced than those beyond venation (Fig. 41) but if microtrichia uniformly distributed to base of parastigma (on one surface at least, e.g., *Cosmocomoidea schajovskoi* Ogloblin [Fig. 20]), then other features not all as above . . . . . **Cosmocomoidea Howard**
- 9(3) Propodeum with a longitudinal median sulcus bordered by closely parallel carinae that abruptly flare out laterally at anterior margin of propodeum, paralleling posterior margin of dorsellum but separated from it by a gap (Fig. 91); dorsellum with posterior margin slightly sinuate, with a short obtuse projection (Fig. 91) or, rarely, a small notch medially; ovipositor usually projecting distinctly anteriorly under mesosoma (Figs 83, 92–94), rarely (*G. deficiens*) extending anteriorly under propodeum only . . . . . **Gahanopsis Ogloblin**
- Propodeum without a longitudinal median sulcus or carinae as described above; dorsellum not sinuate and without median projection or notch; ovipositor not projecting anteriorly under mesosoma . . . . . 10
- 10(9) Petiole much longer than wide, longer than gaster (Figs 289, 309–311); propodeum densely pitted with deep pits (Figs 304, 308) . . . . . **Yoshimotoana Huber, gen. n.**
- Petiole at most slightly longer than wide, much shorter than gaster (Figs 227, 229, 236, 245, 253, 254, 257, 262, 269, 288); propodeum not pitted, usually faintly reticulate with engraved meshes (Figs 245, 286) . . . . . 11
- 11(10) Scutellum anteriorly with a short, longitudinal internal carina (visible in cleared slide mounts or pinned specimens but not in scanning electron micrographs) just lateral to each campaniform sensillum and extending posteriorly from transscutal articulation (Fig. 227); ovipositor sheath scarcely exerted; mandibles normal, crossing medially when closed, each with 3 distinct teeth . . . . . **Progonatocerus Huber, gen. n.**
- Scutellum anteriorly without internal carina as described above (Figs 252, 262, 269); ovipositor sheaths greatly exerted, at least  $2.0\times$  as long as gaster (Fig. 248) in Old World species but often scarcely exerted (Figs 253, 254) in New World species; mandibles reduced, barely or not meeting medially when closed, each with 3 small teeth (Figs 273, 276, 279) . . . . . **Tanyxiphium Huber, gen. n.**
- 12(2) Funicle 8-segmented; ovipositor sheaths distinctly exerted beyond apex of gaster and usually upcurved; each sheath with numerous setae along most of its exerted part (Figs 318, 323, 335, 339), rarely with as few as 3 setae . . . . . **Zeyanus Huber, gen. n.**
- Funicle 7-segmented; ovipositor sheaths barely exerted beyond apex of gaster; each sheath with one subapical seta . . . . . 13
- 13(12)  $Fl_7$  much shorter than wide and distinctly shorter than  $fl_6$  (Figs 121, 122, 131, 133); ovipositor not projecting anteriorly under mesosoma . . . . . **Heptagonatocerus Huber, gen. n.**
- $Fl_7$  longer than wide and as long as  $fl_6$ ; ovipositor strongly projecting anteriorly under mesosoma (Figs 83, 92–94). . . . . some **Gahanopsis Ogloblin**

**Archigonatocerus Huber, gen. n.**

(Figs 39, 40)

**Type species.** *Archigonatocerus balticus* Huber, by present designation.

**Diagnosis.** Within Gonatocerini, females of *Archigonatocerus* are distinguished from those of the genera of extant Gonatocerini as well as from the four previously described fossil species in Gonatocerini, all originally classified in *Gonatocerus*, by the following combination of features: fore wing venation almost 0.5 wing length or more; hypochaeta (only visible in one species) next to proximal macrochaeta.

**Description. FEMALE.** Large specimens, 1820–1840 in length. **Colour.** Body uniformly dark brown (but apparently yellow in *A. longivena* Huber because entire body enclosed in thin layer of trapped air). **Head.** Face bulging below toruli, so toruli apparently horizontal, facing upward. Length about 0.8× height. **Antenna.** Funicle with 8 segments. **Mesosoma.** Dorsellum rhomboidal. **Wings.** Fore wing wide, with venation almost half (0.45×) or more (0.6×) (Figs 39b, 40b) as long as fore wing length, with an asetose line or fold (not always visible depending on lighting) extending from stigmal vein apex to posterior margin of wing near the apex (Figs 39a, 40a), and with microtrichae present behind venation (in one species sparser behind base of venation). Parastigma with hypochaeta much closer to proximal than to distal macrochaeta (Fig. 39b). Stigmal vein with apex apparently truncate apically. Postmarginal vein apparently present in one species (Fig. 40b) and possibly several times as long as its width, longer than stigmal vein. **Metasoma.** Petiole evidently short, not visible. Gaster longer than mesosoma. Ovipositor sheaths as long as gaster and slightly exerted.

**MALE.** Unknown

**Discussion.** Two plesiomorphic features suggest that *Archigonatocerus* is the most ancestral of the genera included in Gonatocerini. The long venation (almost half the wing length or more) and the position of the hypochaeta in next to the proximal macrochaetae (only visible in one of the species). A third feature that may be plesiomorphic is the longitudinal fold that extends obliquely from the stigma almost to the posterior margin of the wing towards the apex (Figs 39, 40).

The three extinct species from the Kishenehn shale formation in Montana, USA (Huber and Greenwalt 2011), transferred below from *Gonatocerus* to *Cosmocomoidea*, differ from the two new species of *Archigonatocerus* by having a much shorter gaster and ovipositor sheaths, shorter fore wing venation, and shorter, thicker funicle segments. The fourth previously described fossil species in *Gonatocerus*, *G. henneberti* Meunier from Baltic amber (Meunier 1905), may indeed belong correctly to *Gonatocerus* based on the relatively narrow fore wing, but the type is lost so the specimen cannot be re-examined to confirm its placement; it has much narrower fore wing and shorter gaster than the new fossil species of *Gonatocerus*, described below. The fossil record for Gonatocerini thus includes three genera with at least one fossil species in each: *Archigonatocerus*, *Cosmocomoidea*, and *Gonatocerus*.

**Etymology.** From *archi-*, Greek for beginning + *Gonatocerus*. The name refers to the fact that this is a fossil genus, assumed to be the earliest lineage in Gonatocerini. The gender is masculine.

**Included species:**

*Archigonatocerus balticus* Huber. **TL:** Eocene Baltic amber, present day European locality not given.

*Archigonatocerus longivena* Huber. **TL:** Eocene Baltic amber, present day European locality not given.

**Key to species of *Archigonatocerus*. Females**

- 1 Fl<sub>3</sub> and fl<sub>4</sub> without mps; fore wing venation slightly less than 0.5× wing length. . . . . *A. alticus* Huber, sp. n.
- Fl<sub>3</sub> and fl<sub>4</sub> with 2 mps; fore wing venation about 0.6× wing length . . . . . *A. longivena* Huber, sp. n.

***Archigonatocerus balticus* Huber, sp. n.**

(Fig. 39)

**Type material.** Holotype ♀ (AMNH), box containing amber inclusion labelled “Holotype ♀ *Archigonatocerus balticus* Huber”. The type locality is somewhere in the present day Baltic region.

**Diagnosis.** The female of *Archigonatocerus balticus* differs from that of *A. longivena* by the apparently shorter venation, 0.46× wing length (0.60× in *A. longivena*), funicle without mps on fl<sub>3</sub> and fl<sub>4</sub> (with mps in *A. longivena*), more slender apical three funicle segments (wider in *A. longivena*), and relatively shorter gaster and ovipositor sheaths.

**Description. FEMALE.** Body length 1690 (holotype). **Colour.** Body dark brown (Fig. 39); scape, radicle and legs brown. **Head.** Eye fairly small, ventrally well separated from back of head. Gena width in lateral view at level of lower margin of eye about equal to eye length. Occiput without transverse suture. **Antenna.** Scape with ventral margin moderately convex, radicle very short, about 0.11× scape length. Funicle segments fl<sub>5</sub>–fl<sub>8</sub> apparently with 2

mps; clava undoubtedly with mps but these not visible in the holotype. Antennal measurements (length/width): scape 270/55, pedicel 60/45, fl<sub>1</sub> 50/30, fl<sub>2</sub> 85/25, fl<sub>3</sub> 80/25, fl<sub>4</sub> 80/25, fl<sub>5</sub> 80/30, fl<sub>6</sub> 80/30, fl<sub>7</sub> 80/40, fl<sub>8</sub> 80/40, clava 180/60. **Wings.** Fore wing length 1305, width 455, length/width 2.87, longest marginal setae 70. Venation length 595, 0.46× wing length. Parastigma + stigmal vein length 340. Hind wing length 930, width 50, longest marginal setae 110. **Mesosoma.** As in generic description. **Metasoma.** Petiole short (not visible). Gaster about 1.7× as long as mesosoma. Ovipositor sheath length 1180, 1.36× metatibial length (870) and slightly exserted (50) beyond gaster apex.

**MALE.** Unknown.

**Etymology.** The species name refers to the origin of the amber inclusion, the Baltic area. It is treated as an adjective.

### *Archigonatocerus longivena* Huber, sp. n.

(Fig. 40)

**Type material.** Holotype ♀ (AMNH), box containing amber inclusion labelled “Holotype ♀ *Archigonatocerus longivena* Huber”. The type locality is somewhere in the present day Baltic region.

**Diagnosis.** *Archigonatocerus longivena* is a slightly larger species than *A. balticus*. The main differences are the longer venation and ovipositor sheaths, and presence of mps on fl<sub>3</sub> and fl<sub>4</sub>.

**Description. FEMALE.** Body length 1715 (holotype). **Colour.** Body probably brown, but entirely covered by a thin cloudy film of air so head, mesosoma, metasoma and legs appear yellow. **Head.** Eye large, ventrally moderately separated from back of head. Gena width at level of lower margin of eye much narrower than eye length. Occiput apparently without transverse suture. **Antenna.** Funicle segments fl<sub>3</sub>–fl<sub>8</sub> apparently with 2 mps; clava undoubtedly with mps but these not visible. Antennal measurements (length/width): scape 350/60, pedicel 80/50, fl<sub>1</sub> 70/30, fl<sub>2</sub> 90/30, fl<sub>3</sub> 90/40, fl<sub>4</sub> 80/40, fl<sub>5</sub> 80/40, fl<sub>6</sub> 70/40, fl<sub>7</sub> 70/50, fl<sub>8</sub> 70/60, clava 210/70. Scape with ventral margin slightly convex, and with radicle 130, about 0.37× scape length. **Wings.** Fore wing length 1610, width 565, length/width 2.86, longest marginal setae 150. Venation length 970, 0.60× wing length. Parastigma + stigmal vein length 540. Hind wing length 1075, width 130, longest marginal setae 110. **Mesosoma.** As in generic description. **Metasoma.** Petiole presumably short (not visible). Gaster about 2.5× as long as mesosoma. Ovipositor sheath length 1435, 2.34× metatibial length (615) and slightly exserted (300) beyond gaster apex.

**MALE.** Unknown.

**Etymology.** The species name refers to the long venation. It is treated as a noun in apposition.

### *Cosmocomoidea* Howard, stat. rev. (= *ater* species group, of authors)

(Figs 3–5, 9–38, 41–60)

*Cosmocomoidea* Howard, 1908: 69; Girault, 1929 [428]: 21 (implied synonymy under *Ooctonus*); Ogloblin, 1959a: 44 (subgenus under *Lymaenon*); De Santis, 1979: 367 (subgenus under *Gonatocerus*); Matthews, 1986: 220 (species group [the *ater* group] within *Gonatocerus*); Triapitsyn *et al.*, 2010: 94 (subgenus under *Gonatocerus*), 95 (key to Neotropical species); Triapitsyn, 2013a: 117 (subgenus under *Gonatocerus*), 118 (key to Palaearctic species), Triapitsyn, 2013b: 213 (key to Nearctic species).

**Type species.** *Cosmocomoidea morrilli* Howard, by monotypy.

**Diagnosis.** Within Gonatocerini, the species of *Cosmocomoidea* are distinguished by the following combination of features: subantennal sulci strongly converging and close together at mouth margin (Fig. 43); ocellar triangle with 2 setae (Fig. 43); pronotum with lobes abutting (Fig. 49); dorsellum rhomboidal, with anterior and posterior margins not parallel (Fig. 49); fore wing with microtrichia behind venation usually absent (Fig. 19) but, if present, only on one surface (Fig. 20) or less dense than beyond venation; propodeum with two submedian carinae (Figs 17, 49).

**Description. FEMALE.** Face with subantennal sulci present, strongly converging and close together, almost touching ventrally at mouth margin, the distance between them at mouth margin much less than their distance from preorbital sulcus (Figs 10, 14a, 43, 48). Vertex with 2 setae between lateral ocelli (Figs 9, 43, 46). Occiput entire,

without a transverse suture dividing it into upper and lower portions (Figs 11, 14e, 45) but in the *bucculentus* subgroup of Huber (1988: 49) and Triapitsyn *et al.* (2010: 95) with a circular or oval sulcus constricting the gena behind and below eye (Figs 5c, 46, 48). Funicle 8-segmented (Figs 3, 12, 13, 15a, b, 41, 42), the basal four segments often as long as apical four and at least one of the basal four with mps (apical four segments always have mps on some segments). Pronotum longitudinally divided, the lobes abutting medially (Figs 5, 9, 17, 49, 53). Dorsellum rhomboidal, slightly to considerably longer medially than laterally, with anterior and posterior margins clearly not parallel (Figs 5, 17, 18, 49), rarely narrow and almost parallel. Pronotal spiracle about the same diameter as propodeal spiracle (Figs 50, 52). Propodeum with one pair of submedian carinae varying considerably in shape, thickness, length, and distance apart (Figs 5, 17, 49, 54), the carinae sometimes very short and/or faint and sometimes (*morrilli* subgroup of Triapitsyn *et al.* 2010) with transverse wrinkles or carinae lateral to the submedian carinae (Figs 49, 50). Fore wing relatively wide, usually without microtrichia behind parastigma (Figs 3, 19, 38) but, if present, the microtrichia usually not as dense or as uniformly distributed as beyond venation (Fig. 41), except on dorsal surface in the *chusqueicolus* subgroup (Triapitsyn *et al.* 2010: 94) (Figs 20a, 42). Stigmal vein with apex oblique (Figs 3, 38, 41, 42).

**MALE.** Radicle short to very short, not or barely separated from scape by a faint line or sulcus. Scape short, at most about 3× as long as often small pedicel. Flagellum usually with relatively wide flagellomeres, sometimes with fl<sub>1</sub> almost wide as long. Genitalia with apodeme of genital sternum longer than aedeagus; aedeagal apodemes not fused at junction with aedeagus and almost as long as apodeme of genital sternum; genitalia with fairly wide scoop-like lateral projections (volsellae?) lateral to base of aedeagal apodemes (see examples in Triapitsyn 2010).

**Discussion.** With almost 100 nominal species, *Cosmocomoidea* is the second most speciose genus in Gonatocerini. Specimens of most species are relatively large and often have the fore wing with faint to pronounced colour band or bands but some are small and superficially resemble some *Lymaenon* species.

Triapitsyn *et al.* (2010) divided the Neotropical *Cosmocomoidea* (treated as a subgenus of *Gonatocerus*) into two species groups, the *ater* and *masneri* groups. They subdivided the *ater* group into the *ater*, *bucculentus*, *chusqueicolus*, and *morrilli* subgroups. The two species they placed in the *masneri* group are transferred to *Yoshimotoana*, described below.

It was unfortunate that Matthews (1986) and Huber (1988) named the species here placed in *Cosmocomoidea* as the *ater*-group of *Gonatocerus*. As Triapitsyn (2013a) explained, the type series of *C. ater* (Förster) consists of four specimens representing at least three species belonging, in his classification, to two different subgenera, *G.* (*Cosmocomoidea*) and *G.* (*Lymaenon*). Triapitsyn upheld the type fixation by Matthews (1986) but noted it is a lectotype, not a holotype; this female definitely belongs to *Cosmocomoidea*. One male has a strap-like dorsellum and two rows of microtrichia behind the parastigma and definitely belongs to *Lymaenon*. A third specimen, a female, belongs to a second species of *Cosmocomoidea*. Förster's fourth specimen is a male of uncertain identity. All four specimens are part of Förster's original material, upon which he based his description and redescription of *ater* (Förster 1841; Foerster 1847—Foerster stated the number of specimens in this paper).

The gender of *Cosmocomoidea* is feminine (Huber 2002). Because almost all the included species were originally described in *Gonatocerus* or *Lymaenon*, which are masculine, the names of the species listed under *Cosmocomoidea* have been changed to agree in gender, where necessary. In some cases it was difficult to determine if the name is an adjective or a noun in apposition. When in doubt I assumed, in the absence of other evidence, that the name was a noun in apposition and therefore the ending remains unchanged from the original spelling.

**Distribution.** *Cosmocomoidea* species occur in the Nearctic, Neotropical, Palaearctic and Oriental regions. In the latter region *Cosmocomoidea* species occur as far east as the Philippines. The genus is absent from the Ethiopian and Australian regions except for one Nearctic species deliberately introduced for biological control into French Polynesia (Grandgirard *et al.* 2008), two other species accidentally introduced into the Hawaiian Islands (Huber & Beardsley 2000), and *C. novifasciatus* (Girault) accidentally introduced into both the Hawaiian Islands and Guam (new records).

The greatest number and diversity of species occur in the Neotropical region. The Old World has relatively few species. In the Palaearctic region most species are dark brown or black and, especially in Europe, similar to each other but in the Oriental region they are usually more colourful and diverse.

**Hosts and habitat.** Cicadellidae (Proconini). A few species have been studied in detail because of their importance in biological control of the glassy-winged sharpshooter, *Homalodisca vitripennis* (Germar)



(Cicadellidae) (Triapitsyn 2006, Grandgirard *et al.* 2008). The greatest diversity of species is in forested habitats.

**Included species:**

- Cosmocomoidea abbreviata* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon abbreviatus* Ogloblin 1953: 7; holotype ♀ in MLPA. De Santis in De Santis & Esquivel, 1967: 50 [transferred to *Gonatocerus* (*Gonatocerus*)]; Triapitsyn *et al.*, 2010: 99 [(transferred to *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea annulicornis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon annulicornis* Ogloblin, 1936: 41; lectotype ♀ in MLPA (examined). *Lymaenon* (*Cosmocomoidea*) *annulicornis* Ogloblin, 1959a: 50 (assigned to subgenus); De Santis, 1967: 10, 106 [(transferred to *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea ashmeadi* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon dolichocerus ashmeadi* Girault, 1915 [261]: 8; lectotype ♀ in USNM (examined). Girault, 1929 [428]: 25 (given species status); Triapitsyn *et al.*, 2010: 103 [(placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, Texas, no locality given.
- Cosmocomoidea atra* (Förster), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus ater* Förster, 1841: 45; lectotype ♀ in NHMW (examined) (fixed by Triapitsyn, 2013a: 119 [incorrectly designated as holotype by Matthews 1986: 221]). Foerster, 1847: 206 (transferred to *Rachistus*); Dalla Torre, 1898: 429 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 103 [(placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Germany, Aachen.
- Cosmocomoidea empoasca* (Subba Rao). *Lymaenon empoasca* Subba Rao, 1966: 195; holotype ♀ in IARI. Subba Rao, 1983: 135 (transferred to *Gonatocerus*). **TL:** India, Punjab, Jullundur. Synonymy under *G. ater* by Zeya & Hayat, 1995: 70.
- Cosmocomoidea indica* (Subba Rao & Kaur). *Lymaenon indicus* Subba Rao & Kaur, 1959: 229; holotype ♀ in IARI. Subba Rao 1983: 135 (transferred to *Gonatocerus*). **TL:** India, New Delhi. Synonymy under *G. ater* by Zeya & Hayat, 1995: 70.
- Cosmocomoidea intermedia* (Boțoc). *Lymaenon intermedius* Boțoc, 1962: 108; holotype ♀ in Boțoc collection (lost). **TL:** Romania, Cluj-Napoca, Someș river floodplain. Synonymy under *G. ater* by Matthews, 1986: 222; treated as valid species by Pricop, 2010: 113. Synonymy under *G. ater s.l.* by Triapitsyn, 2013a: 119, but see his discussion on p. 129.
- Cosmocomoidea nigroides* (Narayanan & Subba Rao). *Lymaenon nigroides* Narayanan & Subba Rao, 1961: 656; holotype ♀ in IARI. Subba Rao, 1983: 136 (as *nigriodes* [sic], transferred to *Gonatocerus*). **TL:** India, Delhi. Synonymy under *G. ater* by Zeya & Hayat, 1995: 70.
- Cosmocomoidea pannonica* (Soyka). *Gonatocerus pannonicus* Soyka, 1946: 39; holotype ♀ in NHMW. **TL:** Austria, Hundsheim. Synonymy under *G. ater* by Matthews, 1986: 221 and under *G. ater, s.l.* by Triapitsyn, 2013a: 119.
- Cosmocomoidea populi* (Viggiani). *Lymaenon populi* Viggiani, 1969: 40; holotype ♀ in DEZA, but see Triapitsyn, 2013a: 122. Graham, 1973: 48 (transferred to *Gonatocerus*). **TL:** Italy, Rome. Synonymy under *G. ater* by Matthews, 1986: 222; synonymy accepted by Triapitsyn, 2013a: 119, but see his discussion on p. 133.
- Cosmocomoidea schmitzi* (Debauche). *Lymaenon schmitzi* Debauche, 1948: 86; holotype ♀ in IRSNB. Matthews, 1986: 221 (transferred to *Gonatocerus*). **TL:** Belgium, Héverlé. Synonymy under *G. ater* by Matthews, 1986: 221.
- Cosmocomoidea atriclava* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus triguttatus atriclavus* Girault, 1917 [316]: 19; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2002: 35 [(placed in *Gonatocerus* (*Cosmocomoidea*) and given species status)]. **TL:** Trinidad and Tobago, Trinidad, Mitan.
- Cosmocomoidea barbosa* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *barbosa* Triapitsyn in Triapitsyn *et al.*, 2010: 111; holotype ♀ in UCRC. **TL:** Mexico, Veracruz, Tuxpan.
- Cosmocomoidea blefuscus* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *blefuscus* Triapitsyn in Triapitsyn *et al.*, 2010: 114; holotype ♀ in UCRC. **TL:** Costa Rica, Cartago, Parque Nacional Tapantí.
- Cosmocomoidea blesticus* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon blesticus* Ogloblin, 1957: 39; holotype ♀ in MLPA. De Santis, 1967: 10, 103 (as *biesticus* [sic], transferred to

- Gonatocerus*); Triapitsyn *et al.*, 2010: 116 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina, Puerto Blest, Lago Nahuel Huapí, Río Negro.
- Cosmocomoidea bonariensis* (Brèthes), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Foersterella bonariensis* Brèthes, 1922: 129; lectotype ♀ in MACN. De Santis, 1967: 10, 103 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 118 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina, Buenos Aires, General Urquiza.
- Cosmocomoidea enicmophila* (Huber). *Gonatocerus enicmophilus* Huber, 1988: 79; holotype ♀ in USNM (examined). **TL:** USA, California, Riverside Co., Riverside, UCR Campus. Synonymy under *G. bonariensis* by Triapitsyn *et al.*, 2010: 118.
- Cosmocomoidea necator* (Ogloblin). *Lymaenon necator* Ogloblin, 1939: 241; De Santis in De Santis & Esquivel, 1967: 50 (transferred to *Gonatocerus*); lectotype ♀ in MLPA (examined). **TL:** Argentina, Buenos Aires, José C. Paz. Synonymy under *G. bonariensis* by Triapitsyn *et al.*, 2010: 118.
- Cosmocomoidea brachyura* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon brachyurus* Ogloblin, 1938a: 32; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 103 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 122 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina: Buenos Aires, Tigre.
- Cosmocomoidea bucculenta* (Huber), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Gonatocerus bucculentus* Huber, 1988: 76; holotype ♀ in CNC (examined). Triapitsyn *et al.*, 2010: 125 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** USA, Arizona, Cochise Co., 5 mi. W. Portal, Southwestern Research Station.
- Cosmocomoidea capitata* (Gahan), **comb. n.** from *Gonatocerus*. *Gonatoceros [sic] capitatus* Gahan, 1932: 754; lectotype ♀ in USNM (examined). **TL:** USA, Utah, Centerville.
- Cosmocomoidea carahuensis* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon carahuensis* Ogloblin, 1957: 36; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 127 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina: Neuquén, Pucará, Lago Lacar.
- Cosmocomoidea caudata* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Gonatocerus caudatus* Ogloblin 1935: 74; lectotype ♀ in MLPA (examined). Triapitsyn *et al.*, 2010: 131 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea chusqueicola* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon chusqueicolus* Ogloblin, 1957: 33; holotype ♀ in MLPA. De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 135 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina: Neuquén, Pucará, Lago Lacar.
- Cosmocomoidea concinna* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon concinnus* Ogloblin, 1936: 46; lectotype ♀ in MLPA (examined). De Santis, 1967: 11, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 137 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Argentina: Misiones, Loreto.
- Cosmocomoidea coxalis* (Ogloblin), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon (Cosmocomoidea) coxalis* Ogloblin, 1959a: 51; holotype ♀ in MLPA (examined). De Santis, 1979: 368 (transferred to *Gonatocerus [Cosmocomoidea]*). **TL:** Ecuador, Esmeraldas, San Mateo.
- Cosmocomoidea crassicornis* (Viggiani), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Lymaenon crassicornis* Viggiani, 1969: 44; holotype ♂ in DEZA. Triapitsyn, 2013a: 137 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** Russia, Adzarskoj RSSA, Sosna (but see Triapitsyn, 2013a: 137 for correct locality).
- Cosmocomoidea cuscus* (Triapitsyn), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Gonatocerus (Cosmocomoidea) cuscus* Triapitsyn in Triapitsyn *et al.*, 2010: 141; holotype ♀ in UCRC (examined). **TL:** Peru, Cuzco, Picol, 3728 m.
- Cosmocomoidea deleari* (Triapitsyn, Logarzo & Virla), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Gonatocerus deleari* Triapitsyn, Logarzo & Virla, in Triapitsyn *et al.*, 2008: 5; holotype ♀ in MPLA. **TL:** Argentina, Buenos Aires.
- Cosmocomoidea dolichocerus* (Ashmead), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Gonatocerus dolichocerus* Ashmead, 1887: 192; holotype ♀ in USNM (examined). Triapitsyn, 2013a: 145 [placed in *Gonatocerus (Cosmocomoidea)*]. **TL:** USA, Florida, Duval Co., Jacksonville.
- Cosmocomoidea elizavetae* (Triapitsyn), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Cosmocomoidea elizavetae* Triapitsyn, 2013b: 214; holotype ♀ in USNM. **TL:** USA, Illinois, Elizabethtown.
- Cosmocomoidea ermi* (Triapitsyn), **comb. n.** from *Gonatocerus (Cosmocomoidea)*. *Cosmocomoidea ermi* Triapitsyn, 2013b: 215; holotype ♀ in UCRC. **TL:** USA, California, Riverside Co., near Temecula, Sandia

Creek near De Luz road.

- Cosmocomoidea fasciata* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus fasciatus* Girault, 1911 [96]: 265; lectotype ♀ in USNM (examined). **TL:** USA, Virginia, Arlington.
- Cosmocomoidea flagellaris* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon flagellaris* Ogloblin, 1959a: 61; holotype ♂ in MLPA (examined). De Santis, 1979: 12, 365 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 147 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Ecuador, Pichincha, vicinity of Quito.
- Cosmocomoidea flagellata* (Huber), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus flagellatus* Huber, 1988: 78; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 148 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, Texas, Weslaco.
- Cosmocomoidea garchamp* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *garchamp* Triapitsyn in Triapitsyn *et al.*, 2010: 150; holotype ♀ in MPLA (examined). **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea garyi* (Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus garyi* Manickavasagam & Rameshkumar, 2013a: 89; holotype ♀ in EDAU. **TL:** India, Karnataka, Bengaluru, IWST campus.
- Cosmocomoidea gerasim* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *gerasim* Triapitsyn in Triapitsyn *et al.*, 2010: 153; holotype ♀ in UCRC (examined). **TL:** Mexico, Tamaulipas, Gómez Farías, Estación Los Cedros, 340 m.
- Cosmocomoidea gracilicornis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon gracilicornis* Ogloblin, 1936: 50; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 154 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea grandis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon grandis* Ogloblin, 1936: 38; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 157 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina: Misiones, Loreto.
- †*Cosmocomoidea greenwalti* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus greenwalti* Huber in Huber & Greenwalt, 2011: 486; holotype ♀ in USNM (examined). **TL:** USA, Montana, Flathead River, Kishenehn Formation.
- Cosmocomoidea gunathilagaraji* (Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus gunathilagaraji* Manickavasagam & Rameshkumar, 2013a: 92; holotype ♀ in EDAU. **TL:** India, Karnataka, Bengaluru, IWST campus.
- Cosmocomoidea hayati* (Zeya & Khan), **comb. n.** from *Gonatocerus*. *Gonatocerus hayati* Zeya & Khan, 2012: 59; holotype ♀ in NPC. **TL:** India, West Bengal, Islampur, Sibdargipara.
- Cosmocomoidea helavai* (Yoshimoto), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus helavai* Yoshimoto, 1990: 87; holotype ♂ in CNC (examined). Triapitsyn *et al.*, 2010: 160 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Panama, Cerro Campana, 850m [8.333°N 81.967°W].
- Cosmocomoidea heratyi* (Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus heratyi* Manickavasagam & Rameshkumar, 2013a: 97; holotype ♀ in EDAU. **TL:** India, Karnataka, Bengaluru, IWST campus.
- Cosmocomoidea impar* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus impar* Huber, 1988: 69; holotype ♀ in USNM (examined). **TL:** USA, CA, Menifee Valley, hills on W. end, 1800'.
- Cosmocomoidea inaudita* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon inauditus* Ogloblin, 1936: 36; lectotype ♀ in MLPA, (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 166 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Loreto, Misiones.
- Cosmocomoidea incompta* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus incomptus* Huber, 1988: 67; holotype ♀ in USNM (examined). **TL:** USA, California, Riverside Co., Riverside.
- Cosmocomoidea inexpectata* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus inexpectatus* Huber, 1988: 75; holotype ♀ in CNC (examined). **TL:** Canada, Ontario, Constance Bay.
- Cosmocomoidea inflatiscapus* (Huber), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus inflatiscapus* Huber 1988: 70; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 170 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, California, Barton Flats, hwy. 38, Hathaway Creek.
- Cosmocomoidea kashipurensis* (Zeya & Khan), **comb. n.** from *Gonatocerus*. *Gonatocerus kashipurensis* Zeya &

- Khan, 2012: 58; holotype ♀ in NPC. **TL:** India, Uttarakhand, Kashipur, Pipalia.
- Cosmocomoidea kikimora* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) Triapitsyn, 2013a: 141; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Cosmocomoidea kiskis* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) Triapitsyn in Triapitsyn *et al.*, 2010: 172; holotype ♀ in MPLA (examined). **TL:** Argentina, Tucumán, Tafi Viejo.
- Cosmocomoidea kodaiana* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Ooctonus kodaianus* Mani & Saraswat, 1973: 78; holotype ♀ in USNM (examined). Zeya & Hayat, 1995: 66 (transferred to *Gonatocerus*) **TL:** India, Tamil Nadu, Anamalai-Kodaikanal Hills, Berijam.
- †*Cosmocomoidea kootenai* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus kootenai* Huber in Huber & Greenwalt, 2011: 481; holotype ♀ in USNM (examined). **TL:** USA, Montana, Flathead River, Kishenehn Formation.
- Cosmocomoidea latipennis* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus latipennis* Girault, 1911 [96]: 268; holotype ♂ in USNM (examined). Triapitsyn, 2013a: 145 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** North America, no locality given.
- Cosmocomoidea maxima* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus maximus* Girault, 1911 [96]: 264; holotype ♀ in INHS (lost). **TL:** USA, Illinois, Pulaski. Synonymy under *G. latipennis* by Huber, 1988: 60.
- Cosmocomoidea logarzoi* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) Triapitsyn in Triapitsyn *et al.*, 2010: 174; holotype ♀ in MPLA (examined). **TL:** Argentina, Corrientes, 20 km E. Corrientes, Centro Nacional de Actividades Agrícolas.
- Cosmocomoidea lucida* (Dodd), **comb. n.** from *Gonatocerus*. *Gonatocerus lucidus* Dodd, 1919: 161; holotype ♀ in BMNH (examined). **TL:** Indonesia, Java, Tjibodas.
- Cosmocomoidea maculipennis* (Ashmead), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Litus maculipennis* Ashmead 1900: 265; holotype ♂ in BMNH (examined). Triapitsyn *et al.*, 2010: 176 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** St. Vincent and the Grenadines, St. Vincent Island.
- Cosmocomoidea marilandica* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus marilandicus* Girault, 1917 [301]: 115; holotype ♀ in USNM (examined). **TL:** USA, Maryland, Glenn Dale.
- Cosmocomoidea metanotalis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon metanotalis* Ogloblin, 1938a: 35; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 179 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Puerto Rico.
- Cosmocomoidea monticola* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus monticolus* Zeya in Zeya & Hayat, 1995: 68; holotype ♀ in BMNH (examined). **TL:** India, Uttar Pradesh, Mussoorie.
- Cosmocomoidea morgani* (Triapitsyn), **comb. n.** from *Gonatocerus*. *Gonatocerus morgani* S. Triapitsyn, 2006: 9; holotype ♀ in UCRC. **TL:** USA, California, Orange Co., Irvine, Irvine Ranch.
- Cosmocomoidea morrilli* Howard, **comb. rev.** from *Gonatocerus* (*Cosmocomoidea*). *Cosmocomoidea morrilli* Howard, 1908: 69; lectotype ♀ in USNM (examined). Girault, 1929 [428]: 21 (transferred to *Ooctonus*); Ogloblin, 1959a: 50 [(transferred to *Lymaenon* (*Cosmocomoidea*)]; Bouček & Graham, 1972: 127 (transferred to *Gonatocerus*); De Santis, 1979: 12, 367 [(placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, Florida, Orlando.
- Cosmocomoidea mumu* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *mumu* Triapitsyn in Triapitsyn *et al.*, 2010: 185; holotype ♀ in MLPA (examined). **TL:** Argentina, Misiones, Loreto, Ruinas Jesuíticas.
- Cosmocomoidea nasuta* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon nasutus* Ogloblin, 1939: 244; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 187 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Loreto.
- Cosmocomoidea nigriflagellum* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Ooctonus nigriflagellum* Girault, 1914 [195]: 150; holotype ♀ in ZMHB. Mendonça Filho, 1972: 39 (transferred to *Lymaenon*); De Santis, 1979: 12, 366 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 189 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Paraguay, San Bernardino.

- Cosmocomoidea h-lutea* (Ogloblin). *Lymaenon h-luteum* Ogloblin, 1938a: 29; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*). **TL:** Argentina: Buenos Aires, Villa Ballester. Synonymy under *nigriflagellum* by Triapitsyn *et al.*, 2010: 189.
- Cosmocomoidea nigrithorax* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon nigrithorax* Ogloblin, 1953: 2; lectotype ♀ in MLPA. De Santis, 1967: 104 [transferred to *Gonatocerus* (*Gonatocerus*)]; Triapitsyn *et al.*, 2010: 194 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Misiones, Monte Carlo.
- Cosmocomoidea novifasciata* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus novifasciatus* Girault, 1911 [96]: 266; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 200 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, Tennessee, no locality given.
- Cosmocomoidea oxypygus* (Foerster), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus oxypygus* Foerster, 1856: 118; neotype ♀ in MHNG, designated by Triapitsyn, 2013a: 150. Triapitsyn, 2013a: 150 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Europe, possibly Germany, Aachen (see Triapitsyn, 2013a: 150, for discussion of locality).
- Cosmocomoidea megalura* Mathot. *Lymaenon megalura* Mathot, 1969: 8; holotype ♀ in IRSNB. **TL:** Belgium, Louvain. Synonymy under *G. oxypygus* by Triapitsyn, 2013a: 150.
- Cosmocomoidea ovicenatus* (Leonard & Crosby). *Gonatocerus ovicenatus* Leonard & Crosby, 1915: 545; lectotype ♀ in CUIC (examined). **TL:** USA, New York, Ithaca. Synonymy under *G. oxypygus* by Triapitsyn, 2013a: 150.
- Cosmocomoidea parcepilosa* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon parcepilosus* Ogloblin, 1957: 35; holotype ♀ in MLPA. De Santis, 1967: 10, 105 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 202 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina: Neuquén, Pucará, Lago Lacar.
- Cosmocomoidea portoricensis* (Dozier), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus portoricensis* Dozier, 1937: 131; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 205 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Puerto Rico, Isabela.
- Cosmocomoidea quadrivittata* (Dozier), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus quadrivittatus* Dozier, 1932: 81; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 207 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Haiti, Port-au-Prince.
- Cosmocomoidea quirogai* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon quirogai* Ogloblin, 1936: 44; holotype ♀ in MLPA (examined). **TL:** Argentina, Misiones, Tedyú Cuaré, opposite San Ignacio. Ogloblin, 1959a: 50 [placed in *Lymaenon* (*Cosmocomoidea*)]; De Santis, 1967: 10, 106 [(transferred to *Gonatocerus* (*Cosmocomoidea*)].
- Cosmocomoidea rakitovi* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) *rakitovi* Triapitsyn, in Triapitsyn *et al.*, 2010: 212; holotype ♀ in UCRC (examined). **TL:** Costa Rica, Cartago, Parque Nacional Tapantí, 1290 m.
- †*Cosmocomoidea rasnitsyni* (Huber), **comb. n.** from *Gonatocerus*. *Gonatocerus rasnitsyni* Huber in Huber & Greenwalt, 2011: 483; holotype ♀ in USNM (examined). **TL:** USA, Montana, Flathead River, Kishenehn Formation.
- Cosmocomoidea rogersi* (Matthews), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus rogersi* Matthews, 1986: 222; holotype ♀ in BMNH. Triapitsyn, 2013a: 161 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** England, Hampshire, Awbridge.
- Cosmocomoidea rufescens* (Ashmead), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Polynema rufescens* Ashmead, 1904: 521; holotype ♂ in USNM (examined). Ogloblin, 1946: 286 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 213 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Brazil, Pernambuco.
- Cosmocomoidea sahadevani* (Subba Rao & Kaur), **comb. n.** from *Gonatocerus*. *Lymaenon sahadevani* Subba Rao & Kaur, 1959: 231; holotype ♀ in IARI. Subba Rao & Hayat, 1983: 136 (transferred to *Gonatocerus*). **TL:** India, New Delhi.
- Cosmocomoidea schajovskoi* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon schajovskoi* (Ogloblin, 1957: 37); holotype ♀ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*). Triapitsyn *et al.*, 2010: 215 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina: Neuquén, Pucará, Lago Lacar.
- Cosmocomoidea seminigra* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon*

- (*Cosmocomoidea*) Ogloblin, 1959a: 53; holotype ♀ in MLPA. De Santis, 1979: 12, 368 [transferred to *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Ecuador, Esmeraldas, San Mateo.
- Cosmocomoidea tremulae* (Bakkendorf), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon tremulae* Bakkendorf, 1934: 30; lectotype ♀ in ZMUC (lost). Bakkendorf did not specify a holotype or state the number of specimens he examined so the holotype designation by Matthews (1986) is deemed a lectotype under ICZN Rule 74.6. Bouček & Graham, 1978a: 109 (transferred to *Gonatocerus*); Triapitsyn, 2013a: 163 [placed in *Gonatocerus* (*Cosmocomoidea*), and lectotype fixation]. **TL:** Denmark, Copenhagen, Fortunens Indelukke. Synonymy under *G. ovicenatus* by Baquero & Jordana, 2002: 16; treated as separate species by Pricop, 2010: 117.
- Cosmocomoidea trialbifuniculatus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus trialbifuniculatus* Subba Rao 1989: 147; holotype ♀ in BMNH (examined). **TL:** India, Karnataka, 25 km W. Mudigere.
- Cosmocomoidea triangulifera* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon triangulifer* Ogloblin, 1959a: 56; holotype ♀ in MLPA (examined). De Santis, 1979: 367 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 221 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Ecuador, Esmeraldas, San Mateo
- Cosmocomoidea triguttata* (Girault), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus triguttatus* Girault, 1916 [287]: 297; lectotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 222 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Trinidad, Caroni.
- Cosmocomoidea tuberculifemur* (Ogloblin), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Lymaenon tuberculifemur* Ogloblin, 1957: 38; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 225 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina: Neuquén, Pucará, Lago Lacar.
- Cosmocomoidea uat* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus uat* S. Triapitsyn in Triapitsyn *et al.*, 2006: 58, holotype ♀ in UCRC (examined). Triapitsyn *et al.*, 2010: 227 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Mexico, San Luis Potosí, Ciudad Valles.
- Cosmocomoidea udakamanda* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus udakamandus* Mani & Saraswat, 1973: 96; holotype ♀ in USNM (examined). **TL:** India, Ootacamund, Doddabetta.
- Cosmocomoidea virlai* (Triapitsyn, Logarzo & de León), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus virlai* S. Triapitsyn, Logarzo & de León in Triapitsyn *et al.*, 2007: 62; holotype ♀ in MLPA (examined). Triapitsyn *et al.*, 2010: 229 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** Argentina, Tucumán, Tafí Viejo.
- Cosmocomoidea walkerjonesi* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus walkerjonesi* S. Triapitsyn, 2006: 15; holotype ♀ in UCRC (examined). Triapitsyn *et al.*, 2010: 231 [placed in *Gonatocerus* (*Cosmocomoidea*)]. **TL:** USA, California, Ventura Co., Fillmore.
- Cosmocomoidea woohoo* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Cosmocomoidea*). *Gonatocerus* (*Cosmocomoidea*) Triapitsyn, 2013a: 168; holotype ♀ in CAS. **TL:** Russia, Sakhalinskaya Oblast', Sakhalin Island, ~ 6 km E. Sokol.

### ***Cosmocomopsis* Huber, gen. n.**

(Figs 61–82)

**Type species.** *Cosmocomopsis sevae* (Risbec), by present designation.

**Diagnosis.** Within *Gonatocerini*, specimens of *Cosmocomopsis* are distinguished by the following combination of features: face with subantennal sulci (Figs 67, 75); vertex with 2 setae between ocelli (Figs 75, 76); clava with at least 15 mps in 3 whorls (Fig. 68); fl<sub>8</sub> with 4 mps; pronotum longitudinally divided, the lobes almost abutting medially, only slightly separated by a longitudinal carina (Figs 71, 79); metanotum with dorsellum thin, almost parallel-sided but with slight bulge medially (Figs 65, 71, 79); fore wing without microtrichia behind and just beyond venation (Figs 61, 63, 70); propodeum with submedian lines almost abutting, appearing almost as a single median carina (Figs 65, 71, 79); petiole as long as metacoxa (Figs 61, 71); gt<sub>1</sub> with posterior margin strongly sinuate (Fig. 80).

**Description. FEMALE.** Large specimens, 2125–2380 µm in length. **Colour.** Body generally yellow except trabeculae brown and funicle dark brown with 2–4 segments white (Figs 61, 62, 68). Fore wing with faint brown tinge and a more or less distinct brown area beyond venation (Figs 61, 63). **Head.** Head (Figs 75–77) 1.93–2.04×

as wide as long and 1.77–1.78× as wide as high; in lateral view anterior surface below torulus curving smoothly to mouth margin. Face about 0.93–0.96× as wide as high; subantennal sulci present, moderately converging ventrally, the distance between them at mouth margin less than their distance from preorbital sulci (Figs 67, 75); preorbital sulcus almost straight, appressed against eye at level of torulus, then separated from eye and curving gently to mouth margin, and meeting malar sulcus just lateral to lateral-most angle of mouth (Figs 64, 77). Toruli separated from transverse trabecula by about half to all its length (Figs 64, 67, 75). Eye in lateral view as long as or slightly longer than high, dorsally not extending to back of head (Fig. 77). Malar space about 0.5× eye height; malar sulcus present, straight and extending from just posterior to ventral angle of eye to mouth (Fig. 77). Gena in lateral view narrow dorsally, wide ventrally and merging smoothly into occiput (Fig. 77). Vertex in lateral view horizontal, forming an almost right angle with face (separated by transverse trabecula) (Fig. 77), posteriorly separated from occiput by transverse sulcus behind and between ocelli. Ocelli with LOL about 0.45–0.50× POL and OOL about 0.82–0.90× POL. Occiput entire, with short transverse median carina above foramen. Labrum with 4 setae. Mandible with 3 teeth but the upper tooth distinctly notched apically, giving the appearance of 4 teeth. **Antenna.** Scape about 8.8× as long as wide, with radicle distinct, narrow, about 0.30× scape length; pedicel about 0.16× scape length, slightly longer than fl<sub>1</sub>; funicle 8-segmented, all the segments longer than wide; fl<sub>3</sub>–fl<sub>1</sub>, with at least 4 mps (more on apical segments); clava about 0.36× funicle length, with about 15 mps in 3 slightly overlapping whorls. **Mesosoma.** About 1.8× as long as wide, 1.9–2.2× as long as high, and 1.0–1.2× wide as high. Pronotum in dorsal view about half length of mesoscutum, divided into two closely abutting lobes separated by a narrow carinate median sclerite (Figs 71, 79); in lateral view with lateral surface merging smoothly into anterior surface with a fine line separating the two surfaces, and with dorsal (median) surface almost horizontal (Fig. 78). Pronotal spiracle about same size as propodeal spiracle (Fig. 78). Propleura normal. Prosternum triangular, divided posteriorly by longitudinal median sulcus extending less than half its length. Mesoscutum in dorsal view with fine, slightly curved and diverging notauli, barely visible in micrographs (Fig. 79). Transscutal articulation almost straight. Scutellum slightly wider than long. Axilla normal. Prepectus wide and triangular. Mesopleuron spindle shaped and truncate at both ends, with very shallow femoral depression and fine line separating very narrow mesepimeron from wide mesepisternum (Fig. 78). Metanotum with dorsellum almost strap-like but with its anterior and posterior margins slightly convex so median length at most about twice lateral length (Figs 65, 71, 79). Metapleuron separated from propodeum by wide, strongly curved sulcus. Propodeum in lateral view sloping slightly, in same plane as dorsellum (Fig. 78); in dorsal view with usually complete median carina sometimes flaring slightly and appearing double at apices, and a short sublateral carina above metacoxa (Figs 71, 79). Propodeal spiracle small, similar to pronotal spiracle and separated by less than its diameter from metanotum. **Wings.** Fore wing (Figs 63 [not fully formed], 70) about 3.8× as long as wide, and without microtrichia behind and just beyond apex of stigmal vein. Venation almost 4.0× wing length. Submarginal vein with the usual basal setae (1 macrochaeta and 1 hypochaeta) and a hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigmal vein) almost equal to length of submarginal vein, with 1 hypochaeta about midway between proximal and distal macrochaeta, and 1 long setae between hypochaeta and distal macrochaetae. Stigmal vein with apex slightly oblique. Hind wing normal. Venation about 0.5× wing length. **Metasoma.** Petiole much longer than wide (Figs 61, 65, 71, 81). Gaster about 1.6–2.2× as long as high. Terga with white membrane not or narrowly visible between them. Ovipositor sheaths lightly longer than gaster length, slightly shorter than metatibia length, at most very slightly exerted (Figs 61, 66, 73), and with 1 subapical seta.

**MALE.** Body length 1562 µm (n=1). **Colour.** Body dark yellow with extensive brown on scape, dorsally on vertex, mesosoma except pronotum (but midline dark brown), and gaster (especially dorsoapically); flagellum light brown. The only known males have an H-shaped yellow mark along notauli and laterally along scutellum, frenum and dorsellum. **Antenna.** Scape 1.17× as long as wide, with radicle about 0.22× scape length and not very clearly separated; pedicel about 0.38× scape length and 0.32× as long as fl<sub>1</sub>; flagellomeres increasing in length apically, 2.6–4.8× as long as wide, each with about 10–15 mps in two widely overlapping whorls. **Metasoma.** Genitalia with aedeagal apodemes fused at junction with aedeagus, not extending anteriorly as far as apex of apodeme of genital sternum (Fig. 74).

**Discussion.** *Cosmocopsis* specimens resemble those of *Ooctonus* or some *Cosmocomoidea* because of their long, slender petiole, which is probably why Risbec originally described the type species in *Ooctonus*. They also resemble some *Cosmocomoidea* by having one or more funicle segments white, contrasting strongly with the remaining, dark funicle segments. *Cosmocopsis* species are most similar structurally to some species of *Lymaenon* from Madagascar. These *Lymaenon* also have only 2 setae between the ocelli, a long gastral petiole, and

clava and apical funicle segments with more numerous mps than usual, but the fore wing microtrichia extend to the base of the parastigma, the pronotal lobes are well separated from each other, and the dorsellum is more distinctly strap-like.

**Etymology.** From *Cosmocompa*, and “-opsis”, Greek for resembling or like. The name is chosen for its similarity to the name *Cosmocomoidea* because the types species of both genera are strikingly, though superficially, similar (compare Figs 3 and 61). The gender is feminine.

**Distribution.** *Cosmocomopsis* species occur only in Madagascar.

**Hosts and habitat.** The type species was reared from eggs of an unidentified species of Orthoptera laid on Seva (Risbec 1955). Seva is a local name for a naturalized plant of South American origin, *Solanum mauritanum* Scopoli (Solanaceae). The remaining species were collected in or near forests. Their hosts are unknown.

**Included species:**

*Cosmocomopsis flossis* Huber; holotype ♀ in CAS. **TL:** Madagascar, Antsiranana, Ampasindava Forêt d’Ambilanivy.

*Cosmocomopsis mopsis* Huber; holotype ♀ in USNM. **TL:** Madagascar, Antsiranana R.N. 1 de Marojejy, 14°26.2'S 49°44.5'E.

*Cosmocomopsis sevae* (Risbec), **comb. n.** from *Gonatocerus (Lymaenon). Ooctonus sevae* Risbec, 1955: 311; lectotype ♀ in MNHN (examined). **TL:** Madagascar, Antsiranana, Ambilobé.

**Key to species of *Cosmocomopsis*. Females**

- 1 Antenna with fl<sub>7</sub> dark brown, same colour as fl<sub>8</sub> (Fig. 62) . . . . . *C. sevae* (Risbec)
- Antenna with fl<sub>7</sub> white, strongly contrasting in colour with fl<sub>8</sub> (Figs 61, 68) . . . . . 2
- 2(1) Antenna with three funicle segments white (Fig. 68), fl<sub>5</sub> white or sometimes light brown but still contrasting with darker fl<sub>4</sub>; midlobe of mesoscutum in anterior half orange and petiole yellow (Fig. 71) . . . . . *C. flossis* Huber, sp. n.
- Antenna with two funicle segments white (Fig. 61), fl<sub>5</sub> dark brown, same colour as fl<sub>4</sub>; midlobe of mesoscutum with midlobe dark brown in anterior half and side lobe with oval orange spot anteriorly, and petiole brown (Fig. 61) . . . . . *C. mopsis* Huber, sp. n.

***Cosmocomopsis flossis* Huber, sp. n.**  
(Figs 67–73)

**Type material.** Holotype ♀ (CAS), on slide (Fig. 69) labelled: 1. “Madagascar: Prov. d’Antsiranana Ampasindava Forêt d’Ambilanivy, 800 m 3.9 km 181° S Ambaliha 13°47'55"S, 46°09'42"E, 4–9.iv.2001 Fisher, Griswold et al., CAS MT, rainforest BLF3251, CAS lot # 007134”. 2. “*Cosmocomopsis flossis* Huber ♀ Holotype”.

**Paratypes.** 2♀. **MADAGASCAR. Toamasina.** Botanic garden near entrance to Andasibe-Mantadia National Park, 18°55.58'S 48°24.47'E, 1025m, 16–24.x.2001, R. Harin’Hala, MT in tropical forest, MA-01-08B-16 (2 ♀, CAS).

**Diagnosis.** This species is distinguished from the other two described *Cosmocomopsis* by having three white funicle segments and fl<sub>4</sub> lighter brown than the preceding segments (Fig. 68). An additional specimen, not treated as a paratype, may belong to this species or to *C. sevae*; it has only two white funicle segments (fl<sub>6</sub> and fl<sub>7</sub>) and fl<sub>5</sub> is lighter brown than the preceding segments. More material is needed to determine how reliable antenna (and body) colour pattern is for species identification in *Cosmocomopsis*.

**Description. FEMALE.** Body length 2200–2227 (n=2). **Colour.** Body almost uniform yellow, slightly darker on mesoscutum anteromedially; scape apically and most of pedicel brown; trabecula and flagellum except fl<sub>5</sub>–fl<sub>7</sub> dark brown; fl<sub>5</sub>–fl<sub>7</sub> white (Fig. 68); gt<sub>1</sub> with a longitudinal brownish streak medially and a brown spot medially at apex of gt<sub>1</sub> and base of gt<sub>2</sub>. **Head.** Head width 590 (holotype); mandible with 4 teeth. **Antenna.** Funicle segments fl<sub>5</sub> with 2 mps, fl<sub>6</sub> with 3 mps, and fl<sub>7</sub> and fl<sub>8</sub> each with 4 mps. Antennal measurements (holotype), length/width (ratios of flagellar segments): scape 577/84, pedicel 106/54, fl<sub>1</sub> 95/38 (2.50), fl<sub>2</sub> 128/38 (3.37), fl<sub>3</sub> 126/48 (2.63), fl<sub>4</sub> 118/53 (2.23), fl<sub>5</sub> 128/60 (2.13), fl<sub>6</sub> 126/64 (1.97), fl<sub>7</sub> 118/65 (1.82), fl<sub>8</sub> 114/75 (1.52), clava 425/88. **Mesosoma.** As in generic description. **Wings.** Fore wing length (holotype) 2124, width 570, length/width 3.72, longest marginal seta 96. Hind wing length 1700, width 67, longest marginal setae 122. **Metasoma.** Ovipositor sheath length (holotype) 677, distinctly shorter than metatibia length (~710).



**MALE.** Unknown.

**Etymology.** The species name is an arbitrary combination of letters that rhymes with the genus name.

***Cosmocomopsis mopsis* Huber, sp. n.**

(Fig. 61)

**Type material.** Holotype ♀ (USNM), on card, with three labels: 1. “Madagascar, Antsiranana R.N. 1 de Marojejy 11 km NW. Manantenina”. 2. “14°26.2'S 49°44.5'E 1225m 25.x–3.xi.1996, E.L. Quinter”. 3. “Holotype *Cosmocomopsis fopsis* Huber ♀”.

The latitude and longitude on the holotype label indicates a forested area in Marojejy Nature Reserve. Presumably this is where the specimen was collected. The other label information indicates 11 km NW Manantenina, a city much further south in Madagascar. This is presumably a label error.

**Diagnosis.** This species is distinguished from *C. sevae* by fl<sub>6</sub> and fl<sub>7</sub> being white (Fig. 61) instead of fl<sub>5</sub> and fl<sub>6</sub>.

**Description. FEMALE.** Body length 2480 (holotype). **Colour.** Body mostly yellow of various shades; trabeculae and most of flagellum brown, fl<sub>5</sub> and fl<sub>6</sub> white; mesoscutal midlobe in anterior half dark brown; posterior apex of propodeum, petiole, median longitudinal streak on gt<sub>1</sub>, and dorsal transverse band on gt<sub>3</sub> brown. **Head.** Head width 584. **Antenna.** Funicle segments fl<sub>3</sub>–fl<sub>8</sub> each with at least 4 mps. Antennal measurements (n=1), length/width (ratios of flagellar segments): scape 575/94, pedicel 119/99, fl<sub>1</sub> 109/99 (1.10), fl<sub>2</sub> 129/54 (2.39), fl<sub>3</sub> 149/59 (2.53), fl<sub>4</sub> 149/69 (2.53), fl<sub>5</sub> 144/74 (1.95), fl<sub>6</sub> 129/79 (1.63), fl<sub>7</sub> 129/79 (1.63), fl<sub>8</sub> 119/89 (1.34), clava 406/119. **Mesosoma.** As in generic description. **Wings.** Fore wing length 2458, width 666, length/width 3.69, longest marginal seta 115. Hind wing length 1894, width 51, longest marginal setae 154. **Metasoma.** Ovipositor sheath length 653, distinctly shorter than metatibia length (880).

**MALE.** Unknown.

**Etymology.** The species name is an arbitrary combination of letters that rhymes with the genus name.

***Cosmocomopsis sevae* (Risbec), comb. n.**

(Figs 62–66, 74–82)

Triapitsyn, 2010: 13 [transferred to *Gonatocerus* (*Lymaenon*), distribution]

Huber *et al.*, 2010: 233 (invalid lectotype designation because ICZN Rules 74.7.2 and 74.7.3 not followed).

**Diagnosis.** *Cosmocomopsis sevae* is distinguished from the two other species by having two funicle segments, fl<sub>5</sub> and fl<sub>6</sub>, white (Fig. 62), the mesosomal midlobe orange in anterior half, and the petiole dorsally yellow or light yellow. *Cosmocomopsis fopsis* has three funicle segments (fl<sub>5</sub>–fl<sub>7</sub>) white, and *C. mopsis* has two (fl<sub>6</sub> and fl<sub>7</sub>) white, the mesoscutum anteriorly with a distinct brown spot, and the petiole brown.

**Description. FEMALE.** Body length 2125–2380 (n=5, non-type specimens). **Colour.** Body yellow, with lighter and darker shades; trabeculae and most of flagellum brown, fl<sub>5</sub> and fl<sub>6</sub> white; darker yellow areas are vertex, spots on pronotum sublaterally and laterally, anterior third or half of mesoscutum, axillae, and transverse bands on terga of gt<sub>2</sub>–gt<sub>7</sub>. **Head.** Head width 625 (n=1). **Antenna.** Funicle segments fl<sub>4</sub>–fl<sub>8</sub> (also fl<sub>3</sub> in lectotype) each with at least 4 mps. Antennal measurements (n=1), length/width (ratios of flagellar segments): scape 678/77, pedicel 108/56, fl<sub>1</sub> 88/46 (1.91), fl<sub>2</sub> 150/50 (3.00), fl<sub>3</sub> 161/53 (3.04), fl<sub>4</sub> 158/60 (2.63), fl<sub>5</sub> 160/66 (2.42), fl<sub>6</sub> 146/66 (2.21), fl<sub>7</sub> 134/69 (1.94), fl<sub>8</sub> 122/78 (1.56), clava 402/100 (4.02). **Mesosoma.** As in generic description. **Wings.** Fore wing length (n=1) 2290, width 608, length/width 3.77, longest marginal seta 122. Hind wing (n=1) length 1727, width 62, longest marginal setae 144. **Metasoma.** Ovipositor sheath length (n=1) 808, distinctly shorter than metatibia length (~ 870).

**MALE.** Body length 1587 (n=1). **Colour.** As in generic description. **Antenna.** Measurements (n=1): scape length/width 187/160, pedicel length/width 72/54, flagellar segments length: fl<sub>1</sub> 224, fl<sub>2</sub> 275, fl<sub>3</sub> 271, fl<sub>4</sub> 253, fl<sub>5</sub> 266, fl<sub>6</sub> 251, fl<sub>7</sub> 252, fl<sub>8</sub> 239, fl<sub>9</sub> 259, fl<sub>10</sub> 237, fl<sub>11</sub> 318; total flagellar length 2846; fl<sub>6</sub> length/width 3.14, with about 15 mps. **Metasoma.** Genitalia as in generic description (Fig. 74).

**Material examined.** Lectotype ♀ (MNHN). The specimen on a slide is redesignated (validly) here as

lectotype to avoid confusion about the status of the type specimen of this species. The lectotype (Figs 62–66) is in Canada balsam on a slide labelled 1.” 860. Ex ponte Orthoptère [followed by illegible word] feuille sur [sentence incomplete]”. 2. “*Ooconus sevae* Risbec Lectotype ♀”. 3. “Deux paralectotypes remontés sur paillettes par J. Huber, 2005”. 4. [on back of slide] “*Ooconus sevae* Risbec”.

Paralectotypes. 2 ♀ mounted on cards, with same data as lectotype. Risbec’s original description indicated that the rearing was from 4.v.1951, with adult emergence (3 females) on 7.v.1951 from Orthoptera laying [“ponte”] on the edge of a leaf of Seva [local name of a plant].

Despite a certain amount of variation in antennal proportions, a much fainter brown area just beyond the venation, and absence of mps on fl<sub>3</sub>, I assign nine more specimens to *C. sevae*, from the following localities, with some repetition of Triapitsyn (2010) locality records. More material is needed to assess variation better and determine whether a species complex exists. **MADAGASCAR. Antsiranana** (Diego Suarez). 7 km N. Joffreville, 12°20'S 49°15'E, 360m, 7–27.iv.2001, R. Harin’Hala, dry forest (1 ♀, CAS). **Fianarantsoa**. Ranomafana, JIRAMA water works, 21°14.91'S 47°27.13'E, 690 m, 21–24.xii.2001, R. Harin’Hala, MT (1 ♀, CAS); Ranomafana National Park, 21°15.05'S 47°24.43'E, 1130 m, 27.vi–7.vii and 7–17.vii.2003, R. Harin’Hala, MT (2 ♀, CAS); Ranomafana National Park, Belle Vue at Talatakely, 21°15.99'S 47°25.21'E, 1020 m, 22–28.xi.2001 and 12–23.iv.2003, R. Harin’Hala, MT in secondary tropical forest (1 ♀, 1 ♂, CAS); Ranomafana National Park, Vohiparara, 21°13.57'S 47°22.19'E, 1110 m, 6–15.xii.2001 and 2–28.i.2002, R. Harin’Hala, MT in high altitude rainforest (2 ♀, CAS). **Toamasina**. Botanic garden near entrance to Andasibe-Mantadia National Park, 1855.58'S 48°24.47'E, 1025 m, 8–16.x.2001, R. Harin’Hala, MT in tropical forest (1 ♀, CAS).

### ***Gahanopsis* Ogloblin, stat. rev. (= *deficiens* species group, of authors)**

(Figs 83–94)

*Lymaenon* (*Gahanopsis*) Ogloblin, 1946: 286; Annecke & Doutt, 1961: 13 (given generic status); Huber 1988: 33 (discussion of species placement, treated as a species group); Triapitsyn *et al.*, 2010: 11 (subgenus under *Gonatocerus*), 80 (key to species).

**Type species.** *Lymaenon* (*Gahanopsis*) *deficiens* Ogloblin, by monotypy.

**Diagnosis.** Within Gonatocerini, species of *Gahanopsis* are distinguished by the following feature: propodeum with divided medially by a deep longitudinal sulcus that continues uninterrupted as a wide sulcus behind the metanotum almost to the spiracle and posteriorly widening above the petiole (Figs 90, 91).

**Description. FEMALE.** Face with subantennal sulci usually present though sometimes (in the type species) faint and poorly defined (Figs 84, 88). Vertex usually with 3 setae (Fig. 85), rarely 2, in ocellar triangle. Occiput forming sharp angle with vertex (Fig. 87), and either entire (Fig. 86) or, more often, divided by a weak, curved sulcus above foramen magnum and close to posterior eye orbit. Mandible with 3 normal teeth (Fig. 89). Antenna with 8 or 7 funicle segments, with apical funicle segment usually with 4 mps. Pronotum entire and very short, vertical and usually barely visible in dorsal view (Fig. 90). Pronotal spiracle sometimes huge, much larger than propodeal spiracle. Mesoscutum with notauli fine, appearing as thin (?internal) lines, not visible in micrograph (Fig. 90). Scutellum with campaniform sensilla at or close to anterior margin (Fig. 90). Dorsellum with posterior margin slightly sinuate, medially with a short oblique projection or notch (Figs 90, 91). Fore wing microtrichia as dense behind venation as distally and present to base of parastigma (Fig. 83), though sometimes with a central clear area free of microtrichia behind parastigma. Parastigma with apex truncate. Propodeum with median longitudinal sulcus continuing uninterrupted as a wide sulcus behind metanotum almost to spiracle and posteriorly widening above petiole (Figs 90, 91). Metasoma closely abutting mesosoma (Fig. 94). Petiole extremely short, much wider than long. Metasomal terga with posterior margin sometimes deeply indented medially, V-shaped (Fig. 92), and hypopygium usually well developed, sometimes short (Figs 93, 94) and rather inconspicuous, often extending to apex of gaster. Ovipositor extending slightly to considerably under the mesosoma, sometimes almost to level of head (Figs 92–94).

**MALE.** Radicle short, separated from scape by a line or sulcus. Scape at most about 3× as long as pedicel. Genitalia with aedeagal apodemes fused at junction with aedeagus, not extending anteriorly as far as apex of apodeme of genital sternum (see Triapitsyn 2010).

**Discussion.** *Gahanopsis* species appear superficially similar to those of *Gastrogonatocerus*.

*Gastrogonatocerus* specimens also have an ovipositor that extends anteriorly to varying degrees under the mesosoma but they can be distinguished from those of *Gahanopsis* by the pronotal and propodeal structure, and fore wing setation. Specimens of a few Old World *Lymaenon* species also have the ovipositor extending anteriorly under the mesosoma.

**Distribution.** *Gahanopsis* species occur only in the Neotropical region, from Belize, Costa Rica and Trinidad south to Argentina.

**Hosts.** Cicadellidae (Aethalioninae) and Membracidae are reported as host for four of the currently recognized *Gahanopsis* species, as follows: *Aethalion reticulatum* (L.) for *G. aethalionis* (Ogloblin), *Acanophora pugionata* Germar for *G. acanophorae* (Ogloblin), *Entylia gemmata* Germar for *G. pusilus* (Ogloblin), and *Tylopelta monstrosa* Fairemaire for *G. deficiens*.

**Included species:**

*Gahanopsis acanophorae* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gahanopsis*). *Lymaenon* (*Gastrogonatocerus*) *acanophorae* Ogloblin, 1938b: 97; lectotype ♀ in MLPA (examined). De Santis in De Santis & Esquivel, 1967: 50 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]; Triapitsyn *et al.*, 2010: 81 [placed in *Gonatocerus* (*Gahanopsis*)]. **TL:** Argentina: Misiones, Loreto.

*Gahanopsis aethalionis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gahanopsis*). *Lymaenon* (*Gastrogonatocerus*) *aethalionis* Ogloblin, 1938b: 93; lectotype ♀ in MLPA (examined). De Santis in De Santis & Esquivel, 1967: 50 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]; Triapitsyn *et al.*, 2010: 83 [placed in *Gonatocerus* (*Gahanopsis*)]. **TL:** Argentina: Misiones, Loreto.

*Gahanopsis arkadak* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Gahanopsis*). *Gonatocerus* (*Gahanopsis*) *arkadak* Triapitsyn in Triapitsyn *et al.*, 2010: 87; holotype ♀ in UCRC (examined). **TL:** Colombia, Parque Nacional Natural Amacayacu, Matamata.

*Gahanopsis deficiens* (Ogloblin), **comb. rev.** from *Gonatocerus* (*Gahanopsis*). *Lymaenon* (*Gahanopsis*) *deficiens* Ogloblin, 1946: 288; holotype ♀ in USNM (examined). Annecke & Doutt, 1961: 13 (transferred to *Gahanopsis*); Huber, 1988: 7 (placed informally in *deficiens* group of *Gonatocerus*); Triapitsyn *et al.*, 2010: 88 [placed in *Gonatocerus* (*Gahanopsis*)]. **TL:** Trinidad, St. Augustine.

*Gahanopsis pusilus* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gahanopsis*). *Gonatocerus* (*Gastrogonatocerus*) *pusilus* Ogloblin, 1935: 68; holotype ♀ in MLPA (examined). Ogloblin, 1938b: 105 [transferred to *Lymaenon* (*Gastrogonatocerus*), as *pusillus* (*sic*)]; De Santis & Esquivel, 1967: 50 [(transferred to *Gonatocerus* (*Gastrogonatocerus*)]; Triapitsyn *et al.*, 2010: 90 [placed in *Gonatocerus* (*Gahanopsis*)]. **TL:** Argentina: Misiones, Loreto.

***Gastrogonatocerus* Ogloblin, stat. n. (= *membraciphagus* species group, of authors)**

(Figs 95–107)

*Gonatocerus* (*Gastrogonatocerus*) Ogloblin, 1935: 66. Triapitsyn *et al.*, 2010: 57 (subgenus under *Gonatocerus*), 58 (key to species).

**Type species.** *Gonatocerus* (*Gastrogonatocerus*) *membraciphagus* Ogloblin by original designation.

**Diagnosis.** Within Gonatocerini, specimens of *Gastrogonatocerus* are distinguished by the following combination of features: occiput divided transversely by a curved suture above foramen (Fig. 99); propodeal spiracle huge (Fig. 102); ovipositor extending at least slightly anterior to posterior margin of metasoma (Fig. 95).

**Description. FEMALE.** Face with narrow, deep subantennal sulci (Figs 96, 100). Vertex with 2 setae between lateral ocelli (Figs 97, 98). Occiput divided into dorsal and ventral portions by a transverse or oblique sulcus (Fig. 99). Mandible with 3 normal teeth (Fig. 101). Pronotum longitudinally divided, the lobes abutting medially (Fig. 102). Dorsellum rhomboidal (Figs 103, 104). Fore wing microtrichia mostly absent behind venation and usually relatively sparse beyond venation, the distance between their bases mostly greater than their length (Fig. 95). Propodeum usually with one to several fine, incomplete longitudinal carinae or wrinkles between submedian carinae (Fig. 102). Propodeal spiracle often huge (Figs 102, 103), much larger than the pronotal spiracle. Ovipositor more or less produced anteriorly under mesosoma (Figs 105–107), sometimes extending to level of head.

**MALE.** Radicle short, not separated from scape by a line or sulcus. Scape at most about twice as long as

pedicel. Propodeal spiracle sometimes much smaller than in female. Genitalia with aedeagal apodemes fused at junction with aedeagus and much shorter than to almost as long as apodeme of genital sternum (see examples in Triapitsyn 2010).

**Distribution.** *Gastrogonatocerus* species occur in the Western Hemisphere from USA (southern Illinois, Kansas, Missouri, Tennessee) to Argentina (Huber 1988; Triapitsyn *et al.*, 2010), except for one, likely introduced, species in the Hawaiian islands (Huber & Beardsley 2000).

**Hosts and habitat.** Membracidae are reported as hosts for three of the eight currently recognized *Gastrogonatocerus* species (Triapitsyn *et al.* 2010), as follows: *Horiola picta* (Coquebert) [as *H. arcuata* (Fabricius)] for *G. anomocerus* (Crawford), *Kronides incumbens* (Germar) [as *K. decumbens*] for *G. dimorphus* (Ogloblin), and *Bolbonota pictipennis* Fairemaire for *G. membraciphagus* (Ogloblin). The records of ‘fulgorid eggs on sugarcane’ for *G. juvator* (Perkins 1912) and ‘jassid eggs’ for *G. anomocerus* (Ogloblin 1953) suggest a wider host range than just Membracidae. The species have been collected mainly from tropical rain forests but also from deserts in southwestern USA.

**Included species:**

*Gastrogonatocerus anomocerus* (Crawford), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Gonatocerus anomocerus* Crawford, 1913: 350; lectotype ♀ in USNM (examined). Ogloblin, 1953: 5 (transferred to *Lymaenon*); De Santis, 1979: 365 (transferred to *Gonatocerus s.s.*); Triapitsyn *et al.*, 2010: 58 [placement in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Trinidad, Verdant Vale.

*Gastrogonatocerus juvator* (Perkins), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Gonatocerus juvator* Perkins, 1912: 23; lectotype ♀ in BPBM (examined). Triapitsyn *et al.*, 2010: 60 [placed in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Mexico, Morelos, Cuantla.

*Gastrogonatocerus margiscutum* (Girault), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Gonatocerus margiscutum* Girault 1914 [195]: 150; lectotype ♂ in ZMHB. Triapitsyn *et al.*, 2010: 63 [placed in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Paraguay, San Bernardino.

*Gastrogonatocerus dimorphus* (Ogloblin). *Lymaenon* (*Gastrogonatocerus*) *dimorphus* Ogloblin, 1938b: 101; lectotype ♀ in MLPA (examined). De Santis, in De Santis & Esquivel 1967: 50 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Argentina: Misiones, Apóstoles. Synonymy under *G. margiscutum* by Triapitsyn *et al.*, 2010: 63.

*Gastrogonatocerus monrosi* (Ogloblin). *Lymaenon* (*Gastrogonatocerus*) *monrosi* Ogloblin, 1959b: 185; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 106 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Argentina: Buenos Aires, Bella Vista. Synonymy under *G. margiscutum* by Triapitsyn *et al.*, 2010: 64.

*Gastrogonatocerus membraciphagus* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Gonatocerus* (*Gastrogonatocerus*) *membraciphagus* Ogloblin, 1935: 65; lectotype ♀ in MLPA (examined). **TL:** Argentina: Misiones, Loreto.

*Gastrogonatocerus dorsiniger* (Ogloblin). *Lymaenon* (*Gastrogonatocerus*) *dorsiniger* Ogloblin, 1959a: 48; holotype ♀ in MLPA (lost). De Santis, 1979: 12, 365 (transferred to *Gonatocerus s.s.*); Triapitsyn *et al.*, 2010: 68 [placed in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Ecuador: Esmeraldas, San Mateo. Synonymy under *G. membraciphagus* by Triapitsyn *et al.*, 2010: 68.

*Gastrogonatocerus setulosus* (Ogloblin). *Lymaenon* (*Gastrogonatocerus*) *setulosus* Ogloblin, 1959a: 46; holotype ♀ in MLPA. De Santis, 1979: 12, 366 (transferred to *Gonatocerus s.s.*); Triapitsyn *et al.*, 2010: 68 [placed in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Ecuador: Esmeraldas, San Mateo. Synonymy under *G. membraciphagus* by Triapitsyn *et al.*, 2010: 68.

*Gastrogonatocerus nigriceps* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Lymaenon* (*Gastrogonatocerus*) *nigriceps* Ogloblin, 1955: 19; holotype ♀ in MLPA. De Santis, 1967: 10, 106 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Argentina: Jujuy, Bella Vista, Piquete.

*Gastrogonatocerus piriformis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Lymaenon* (*Gastrogonatocerus*) *piriformis* Ogloblin, 1955: 19; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 106 [transferred to *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Argentina: Misiones, San Ignacio, Yabebirí.

*Gastrogonatocerus spiracularis* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Gonatocerus* (*Gastrogonatocerus*) *spiracularis* Ogloblin, 1935: 70; holotype ♀ in MLPA (examined). **TL:** Argentina: Misiones, Loreto.

*Gastrogonatocerus valentinae* (Ogloblin), **comb. n.** from *Gonatocerus* (*Gastrogonatocerus*). *Lymaenon valentinae* Ogloblin, 1959b: 192; holotype ♂ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 78 [placed in *Gonatocerus* (*Gastrogonatocerus*)]. **TL:** Argentina: Misiones, Oberá.

***Gonatocerus* Nees (= *sulphuripes* species group, of authors)**  
(Figs 109–120)

*Gonatocerus* Nees, 1834: 192; Bouček & Graham, 1972: 125 (validity of genus name and identity of the type-species); Triapitsyn *et al.*, 2010: 12 (subgenus under *Gonatocerus*, *s. l.*), 14 (key to Neotropical species); Triapitsyn, 2013a: 8 (subgenus under *Gonatocerus*, *s. l.*), 9 (key to Palaearctic species).

**Type species.** *Gonatocerus longicornis* Nees, by monotypy; recognized by Ashmead, 1904: 376 and most subsequent authors.

**Diagnosis.** Within Gonatocerini, specimens of *Gonatocerus* are distinguished by the following combination of features: pronotum with lobes abutting medially; fore wing relatively narrow with microtrichia extending to base of venation and as dense behind as beyond venation; dorsellum rhomboidal; propodeum usually without carinae.

**Description. FEMALE.** Occiput entire (Fig. 112). Vertex with 2 setae between lateral ocelli (Figs 110, 112). Malar sulcus distinct (Figs 109, 111, 113). Pronotum longitudinally divided, the lobes abutting medially except sometimes slightly separated posterodorsally (Fig. 116). Pronotal spiracle about same size pronotal spiracle (Fig. 116). Fore wing relatively narrow, with microtrichia usually as dense behind venation as beyond venation (Fig. 108b) but sometimes sparse or absent behind parastigma, the cubital line of setae always present and complete to base of parastigma. Stigmal vein with apex oblique (Fig. 108b). Dorsellum rhomboidal (Figs 6, 115). Propodeum with faint, converging sublateral carinae or carinae absent (Fig. 115). Ovipositor not produced anteriorly under mesosoma but sometimes exerted beyond gastral apex (Fig. 120).

**MALE.** Radicle usually long (up to half length of scape), separated from scape by a line or sulcus. Scape several times as long as pedicel. Genitalia with aedeagal apodemes fused at junction with aedeagus and almost as long as apodeme of genital sternum.

**Discussion.** *Gonatocerus* is not as easy to characterize as other genera. It is most easily confused with some *Cosmocomoidea* species. Additional features that may help distinguish *Gonatocerus* species are: fl<sub>2</sub> and fl<sub>3</sub> are often the longest funicle segments and the apex of fl<sub>1</sub> is often oblique. The dorsellum is often more distinctly triangular than in *Cosmocomoidea* and its margin may be lighter in colour than it is medially. Species such as *G. stenopterus* (Ogloblin) with a very large pronotal spiracle, but not as large as in some *Gastrogonatocerus* species, are placed in *Gonatocerus* based on the relatively narrow wings with fore wing microtrichia extending uniformly to the base of the venation.

A fossil in Baltic amber is described below. The relatively narrow fore wing, venation length (as a proportion of the fore wing length) the same as in most extant *Gonatocerus* species, microtrichia extending proximally past the base of the parastigma, and lack of a hair line or fold extending posteroapically from the stigma indicated that the species is better placed in *Gonatocerus* than in *Archigonatocerus*. The species is described because it represents the second species of the genus to be found in amber (the first was *G. henneberti* Meunier) and the only one that can be described and illustrated in some detail.

**Distribution.** The genus occurs worldwide.

**Hosts and habitat.** Cicadellidae (Hemiptera). A few *Gonatocerus* species have reliably recorded hosts, e.g., *Exitianus obscurinervis* (Stål) and *Spangbergiella vulnerata lacerdae* Signoret for *G. californicus* Girault (Albarracin & Triapitsyn 2012), *Nephotettix cincticeps* Uhler for *G. cincticipitis* Sahad, and *Cicadella viridis* (L.) for *G. cicadellae* Nikol'skaya (Sahad & Hirashima 1984). Habitats range from forests to grasslands and deserts.

**Included species:**

*Gonatocerus aegyptiacus* Soyka, **comb. rev.** from *Lymaenon*. *Gonatocerus aegyptiacus* Soyka, 1950: 125; holotype ♀ in PPDD (lost). 1 ♀ and 2 ♂ paratypes in NHMW (examined). Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Egypt, Giza, Shareh El-Haram.

*Gonatocerus alami* Shamim & Adam Shafee, 1984: 623; holotype ♀ in ZDAMU. **TL:** India, Uttar Pradesh, Aligarh. Synonymy under *G. tarae* by Zeya & Hayat, 1995: 84. Synonymy under *aegyptiacus* by Triapitsyn, 2013a: 9.

- Gonatocerus minor* Matthews, 1986: 220; holotype ♀ in BMNH (examined). **TL:** England, Essex, Hatfield Forest. Synonymy under *G. aegyptiacus* by Triapitsyn, 2013a: 9.
- Gonatocerus miurai* Sahad, 1982b: 195; holotype ♀ in KUEC. **TL:** Japan, Shimane, Matsue. Synonymy under *G. tarae* by Zeya & Hayat, 1995: 84. Synonymy under *G. aegyptiacus* by Triapitsyn, 2013a: 9.
- Gonatocerus saipanensis* (Doutt). *Lymaenon saipanensis* Doutt, 1955: 13; holotype ♀ in USNM (examined). **TL:** Mariana Islands, Saipan. Synonymy under *G. aegyptiacus* by Triapitsyn, 2013: 9.
- Gonatocerus tarae* (Narayanan & Subba Rao). *Lymaenon tarae* Narayanan & Subba Rao, 1961: 657; holotype ♀ in IARI. Subba Rao & Hayat, 1983: 137 (transferred to *Gonatocerus*). **TL:** India, Delhi. Synonymy under *G. aegyptiacus* by Triapitsyn, 2013a: 9.
- Gonatocerus aequatorianus* Ogloblin. *Lymaenon aequatorianus* Ogloblin, 1959a: 58; holotype ♂ in MLPA. De Santis, 1979: 12, 364 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 15 [placed in *Gonatocerus* (*Gonatocerus*)]. **TL:** Ecuador: Esmeraldas, San Mateo.
- Gonatocerus alberti* (Debauche), **comb. n.** from *Lymaenon*. *Lymaenon alberti* Debauche, 1949: 56; holotype ♀ in MRAC (lost). **TL:** Congo, Parc National Albert, Kabasha escarpment.
- Gonatocerus antillensis* Dozier, 1937: 132; holotype ♀ in USNM (examined). **TL:** Puerto Rico, Mayaguez.
- Gonatocerus appendiculatus* (Ogloblin). *Lymaenon appendiculatus* Ogloblin, 1939: 239; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 103 (transferred to *Gonatocerus*). **TL:** Argentina: Misiones, Loreto.
- Gonatocerus bonaerensis* (Ogloblin). *Lymaenon bonaerensis* Ogloblin, 1939: 246; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*). **TL:** Argentina: Buenos Aires, José C. Paz.
- Gonatocerus ogloblini* De Santis, 1967: 105. Unnecessary replacement name for *Gonatocerus bonaerensis* (Ogloblin, 1939), not *bonariensis* (Brèthes, 1922) [now in *Cosmocomoidea*].
- Gonatocerus bukashka* Triapitsyn. *Gonatocerus* (*Gonatocerus*) *bukashka* Triapitsyn, 2013a: 15; holotype ♀ in CAS. **TL:** Russia, Sakhalinskaya Oblast', Sakhalin Island, ~ 6 km E. Sokol.
- Gonatocerus californicus* Girault, 1911 [96]: 271; holotype ♀ in USNM (lost). **TL:** USA, California, Siskiyou Co., no locality given.
- Gonatocerus utahensis* Girault, 1917 [331]: 446; lectotype ♀ in USNM (examined). **TL:** USA, Utah, Salt Lake City. Synonymy under *G. californicus* by Triapitsyn, 2013b: 212.
- Gonatocerus titillatus* Girault, 1917 [336]: 87; holotype ♀ in USNM (examined). **TL:** USA, Utah, Salt Lake City. Synonymy under *G. utahensis* by Huber, 1988: 37.
- Gonatocerus cincticipitis* Sahad, 1982b: 192; holotype ♀ in KUEC. **TL:** Japan, Shimane, Matsue.
- Gonatocerus comptei* Girault, 1912 [120]: 135; 3 ♀ syntypes in QMBA. The original number and sex of the syntypes is unclear from the original description. According to Dahms (1983: 193) only 1 ♀ still exists. **TL:** Australia, Queensland, Nelson (= Gordonvale).
- Gonatocerus edentulus* Zeya in Zeya & Hayat, 1995: 78; holotype ♀ in BMNH (examined). **TL:** India, Bihar, Ranchi.
- Gonatocerus excisus* (Ogloblin). *Lymaenon excisus* Ogloblin, 1936: 53; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*). **TL:** Argentina: Misiones, Loreto.
- Gonatocerus floridensis* Huber, 1988: 46; holotype ♀ in CNC (examined). **TL:** USA, Florida, Collier Co., Collier Seminole State Park.
- Gonatocerus fuscicornis* (Walker). *Lymaenon fuscicornis* Walker, 1846: 51; lectotype ♀ in MVMA. Dalla Torre, 1898: 429 (transferred to *Gonatocerus*). **TL:** probably England.
- Gonatocerus alecto* (Debauche). *Lymaenon alecto* Debauche, 1948: 105; holotype ♀ in IRSNB (examined). Matthews, 1986: 218 (transferred to *Gonatocerus*). **TL:** Belgium, Eegenhoven. Synonymy under *G. sulphuripes* by Matthews, 1986: 218. Synonymy under *G. fuscicornis* by Triapitsyn, 2013a: 17.
- Gonatocerus crassipes* (Debauche). *Lymaenon crassipes* Debauche, 1948: 109; holotype ♀ in IRSNB (examined). Matthews, 1986: 218 (transferred to *Gonatocerus*). **TL:** Belgium, Eegenhoven. Synonymy under *G. sulphuripes* by Matthews, 1986: 218. Synonymy under *G. fuscicornis* by Triapitsyn, 2013a: 17.
- Gonatocerus pictosimilis* Soyka, 1946: 38; holotype ♀ in NHMW. **TL:** Germany, Ramischau near Breslau. Synonymy under *G. sulphuripes* by Matthews, 1986: 218. Synonymy under *G. fuscicornis* by Triapitsyn, 2013a: 17.
- Gonatocerus sulphuripes* (Foerster). *Rachistus sulphuripes* Foerster, 1847: 204; lectotype ♀ in NHMW (examined). Dalla Torre, 1898: 430 (transferred to *Gonatocerus*); Bakkendorf, 1934: 29 (transferred to

- Lymaenon*); Thompson, 1958: 571 (transferred to *Gonatocerus*); Triapitsyn, 2013a: 19 (lectotype designation and discussion). **TL:** Germany, Aachen. Synonymy under *G. fuscicornis* by Triapitsyn, 2013a: 17.
- Gonatocerus synaptus* (Debauche). *Lymaenon synaptus* Debauche, 1948: 102; holotype ♀ in IRSNB (examined). Matthews, 1986: 218 (transferred to *Gonatocerus*). **TL:** Belgium, Eegenhoven. Synonymy under *G. sulphuripes* by Matthews, 1986: 218. Synonymy under *G. fuscicornis* by Triapitsyn, 2013a: 17.
- Gonatocerus granulatus* (Ogloblin). *Lymaenon (Lymaenon) granulatus* Ogloblin, 1959b: 189; holotype ♂ [on same slide as a ♀] in MLPA (examined). De Santis, 1967: 10, 104 (transferred to *Gonatocerus*). **TL:** Argentina: Misiones, 25 de Mayo. [This species may better be placed in *Cosmocomoidea*.]
- Gonatocerus hallami* Girault, 1920 [353]: 99; ?15 ♀ and ♂ syntypes in QMBA (examined). **TL:** Australia, Queensland, Nelson (= Gordonvale).
- †*Gonatocerus henneberti* Meunier, 1905: 2; holotype ♀ in Klebs Collection, Provincial Museum of Königsberg (now Kaliningrad) (lost, presumed destroyed). **TL:** Baltic amber (perhaps from Samland Peninsula), mid-Eocene at the earliest (Weitschat & Wichard 2010).
- Gonatocerus huberi* Zeya in Zeya & Hayat, 1995: 83; holotype ♀ in BMNH (examined). **TL:** India, Kerala, Mukkal.
- Gonatocerus inaequalis* (Debauche), **comb. n.** from *Lymaenon*. *Lymaenon inaequalis* Debauche, 1949: 54; holotype ♀ in MRAC (lost). **TL:** Congo, Kivu, Rutshuru, river Fuku.
- Gonatocerus ipswichia* Girault, 1922 [361]: 104; ?holotype ♀ in QMBA (lost). **TL:** Australia, Queensland, Ipswich.
- Gonatocerus ipswichia variguttus* Girault, 1938 [452]: 393; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Ashgrove.
- †*Gonatocerus janzeni* Huber; holotype ♀ in AMNH. **TL:** Eocene Baltic amber. No present day locality given.
- Gonatocerus koebelei* Perkins, 1912: 22; lectotype ♀ in BPBM (examined). **TL:** Mexico, Veracruz, Orizaba.
- Gonatocerus koziavka* Triapitsyn, 2013. *Gonatocerus (Gonatocerus) koziavka* Triapitsyn, 2013a: 26; holotype ♀ in UCRC. **TL:** Kyrgyzstan, Osh, Karakuldzha, Lajsu Ravine.
- Gonatocerus lissonotus* Huber, 1988: 47; holotype ♀ in CNC. **TL:** Canada, Ontario, Oxford Mills.
- Gonatocerus longicornis* Nees, 1834: 127; neotype ♀ in BMNH (examined), designated by Bouček & Graham, 1972: 129. **TL:** Italy, Aosta Province, Quart.
- Gonatocerus britteni* (Hincks). *Lymaenon britteni* Hincks, 1960: 211; holotype ♀ in MMUE. Bouček & Graham, 1978a: 109 (transferred to *Gonatocerus*). **TL:** UK, Cumberland, Skirwith. Synonymy under *G. longicornis* by Bouček & Graham, 1978b: 235.
- Gonatocerus cicadellae* Nikol'skaya, 1951: 575; 30 ♀ and 10 ♂ syntypes in ZIN (lost). **TL:** Kyrgyzstan (then Kyrgyz SSR), Bishkek (then Frunze) region, Kyzyl-Asker district. Synonymy under *G. longicornis* by Triapitsyn, 2003: 211.
- Gonatocerus longiventris* (Boțoc). *Lymaenon longiventris* Boțoc, 1963: 96; ?1 ♀ and ?1 ♂ syntypes in Boțoc collection (lost). Matthews, 1986: 218 (transferred to *Gonatocerus*). **TL:** Romania, Cluj environs. Synonymy under *G. longicornis* by Matthews, 1986: 218.
- Gonatocerus shasthryi* (Subba Rao & Kaur). *Lymaenon shasthryi* Subba Rao & Kaur, 1959: 234; holotype ♀ in IARI. Zeya & Hayat, 1995: 80 (transferred to *Gonatocerus*). **TL:** India, Karnataka, Mandya. Synonymy under *G. longicornis* by Zeya & Hayat, 1995: 80.
- Gonatocerus terebrator* (Foerster). *Rachistus terebrator* Foerster, 1847: 203; lectotype ♀ in NMV. Dalla Torre, 1898: 430 (transferred to *Gonatocerus*); Debauche, 1948: 81 (transferred to *Lymaenon*); Bouček & Graham, 1972: 127 (transferred to *Gonatocerus*). **TL:** Germany, Aachen. Synonymy under *G. longicornis* by Bouček & Graham, 1972: 127.
- Gonatocerus uttarodeccanus* Mani & Saraswat, 1973: 97, holotype ♀ in USNM. **TL:** India, Tamil Nadu, Anamalai Hills, Munnar. Synonymy under *G. longicornis* by Zeya & Hayat, 1995: 81.
- Gonatocerus longicrus* Kieffer, 1913: 201; holotype ♀ in NZSI (lost). Zeya & Hayat, 1995: 125 (species incertae sedis). **TL:** India, Orissa, Puri.
- Gonatocerus maga* Girault, 1911 [96]: 267; holotype ♀ in INHS (lost). **TL:** USA, Illinois, Litchfield.
- Gonatocerus mandyanus* Zeya & Usman, 2014: 64; holotype ♀ in NBAIL. **TL:** India, Karnataka, Mandya.
- Gonatocerus meghalayanus* Zeya, 2011: 33. Replacement name for *Gonatocerus orientalis* Zeya, 1995, not *G.*

*orientalis* (Girault, 1917), which is now in *Lymaenon*.

*Gonatocerus orientalis* Zeya in Zeya & Hayat, 1995: 89; holotype ♀ in BMNH (examined). **TL:** India, Meghalaya [no town locality given], botanic garden.

*Gonatocerus zeyai* Özdikmen, 2011: 840. Unnecessary replacement name for *G. orientalis* Zeya; *G. meghalayanus* is a pre-existing replacement name.

*Gonatocerus mexicanus* Perkins, 1912: 21; lectotype ♀ in BPBM (examined). **TL:** Mexico, Distrito Federal, Chapultepec.

*Gonatocerus eximius* Gahan, 1913: 441; lectotype ♀ in USNM (examined). **TL:** USA, Florida, Orlando.

Synonymy under *G. mexicanus* by Girault, 1929 [428]: 254.

*Gonatocerus gibsoni* Crawford, 1915: 586; lectotype ♀ in USNM (examined). **TL:** USA, AZ, Tempe.

Synonymy under *G. mexicanus* by Girault, 1929 [428]: 254.

*Gonatocerus petrarchi* Girault, 1920 [353]: 99; 3 ♀ syntypes in QMBA (examined). **TL:** Australia, Queensland, Port Douglas, Nelson.

*Gonatocerus pictus* (Haliday). *Ooctonus pictus* Haliday, 1833: 344; lectotype ♀ in NMID. Walker, 1846: 51 (transferred to *Lymaenon*); Foerster, 1847: 205 (transferred to *Rachistus*); Dalla Torre, 1898: 429 (transferred back to *Gonatocerus*). **TL:** ?Ireland, no locality given.

*Gonatocerus flavus* Förster, 1841: 45; 2 ♀ syntypes in NHMW (lost). Foerster, 1847: 205 (implied transfer to *Rachistus*); Dalla Torre, 1898: 429 (transferred back to *Gonatocerus*); Triapitsyn (2013a: 34) implied there was only one type specimen but Foerster (1847: 206) stated he had two specimens. **TL:** Germany, ?Aachen area. Synonymy under *G. pictus* by Foerster, 1847: 205.

*Gonatocerus orthopenitus* Guo, Lin & Hu, 2011: 55; holotype ♀ in ICXU. **TL:** China Xinjiang, Uyghur Autonomous Region, Wujiaqu. Synonymy under *G. pictus* by Triapitsyn, 2013a: 34.

*Gonatocerus risbeci* (Heqvist), **comb. n.** from *Lymaenon*. *Lymaenon risbeci* Heqvist, 1960: 430. Replacement name for *Gonatocerus africanus* Risbec, 1956, not *G. africanus* (Soyka, 1950), which is now in *Lymaenon*.

*Gonatocerus africanus* Risbec, **comb. rev.** from *Lymaenon*. *Gonatocerus africanus* Risbec, 1956a: 153; 14 ♀ and 1 ♂ syntypes in MNHN (5 ♀ examined). Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Cameroon, Garoua.

*Gonatocerus camerounensis* Özdikmen, 2011: 840. Unnecessary replacement name for *G. africanus* Risbec; *G. risbeci* is a pre-existing replacement name.

*Gonatocerus rivalis* Girault, 1911 [96]: 257; holotype ♀ in USNM (examined). **TL:** USA, Illinois, Butler.

*Gonatocerus sarawakensis* Sveum, 1982: 81; holotype ♀ in NTNU. **TL:** Malaysia, Sarawak, 20 km S. Kuching, Semengo.

*Gonatocerus shamimi* Subba Rao & Hayat, 1986: 187. Replacement name for *Gonatocerus terebrator* Shamim & Adam Shafee, 1984, not *G. terebrator* (Foerster, 1847), which is now a synonym of *G. longicornis*.

*Gonatocerus terebrator* Shamim & Adam Shafee, 1984: 624; holotype ♀ in ZDAMU. **TL:** India, Uttar Pradesh, Aligarh.

*Gonatocerus stenopterus* (Ogloblin). *Lymaenon stenopterus* Ogloblin, 1936: 33; lectotype ♀ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*). **TL:** Argentina, Misiones, Loreto.

*Gonatocerus urocerus* Ogloblin, 1935: 72; lectotype ♀ in MLPA (examined). **TL:** Argentina: Buenos Aires, La Plata.

*Gonatocerus utkalensis* Subba Rao, 1989: 144; holotype ♀ in BMNH (examined). **TL:** India, Orissa, Cuttack, Central Rice Research Institute.

### ***Gonatocerus janzeni* Huber, sp. n.**

(Fig. 108)

**Type material.** Holotype ♀ (AMNH), box with Baltic amber inclusion labelled: “Holotype ♀ *Gonatocerus janzeni* Huber”. The type locality is somewhere in the present day Baltic region.

**Diagnosis.** Among fossils species of Gonatocerini (two species of *Archigonatocerus* and three of *Cosmocomoidea*), *G. janzeni* differs by the combination of relatively slender funicle segments, narrow fore wing, and long gaster and ovipositor sheaths (Fig. 108a).

**Description. FEMALE.** Body length 780 (holotype). **Colour.** Body dark brown; scape, radicle and legs



brown (Fig. 108a). **Head.** Eye large, ventrally separated moderately from back of head. Gena width in lateral view at level of lower margin of eye less than eye length. Occiput without transverse sutures. **Antenna.** Funicle segments fl<sub>5</sub>–fl<sub>8</sub> with 2 mps; clava undoubtedly with mps but these not visible. Antennal measurements (length/width): scape ~95/34, pedicel 49/36, fl<sub>1</sub> 38/18, fl<sub>2</sub> 39/20, fl<sub>3</sub> 42/20, fl<sub>4</sub> 47/22, fl<sub>5</sub> 60/24, fl<sub>6</sub> 59/24, fl<sub>7</sub> 64/24, fl<sub>8</sub> 62/31, clava 144/40. Scape with ventral margin moderately convex and with radicle ~40, about 0.33× scape length. **Mesosoma.** As in generic description. **Wings.** Fore wing length 475, width 122, length/width 3.89, longest marginal setae 58. Venation length 200, about 0.42× wing length. Parastigma + stigmal vein length 150, hypochaeta not visible (broken off?) (Fig. 108b) but presumably present. Hind wing length ~340, width 12, longest marginal setae 55. **Metasoma.** Petiole short (not visible). Gaster about 1.3× as long as mesosoma. Ovipositor sheath length 580, 2.1× metatibia length (276) and slightly exerted (40) beyond gaster apex.

**MALE.** Unknown.

**Etymology.** The species is named after Jens-Wilhelm Janzen, Seevetal, Germany, a dedicated collector and identifier of amber fossils, whose collection is now in AMNH.

### *Heptagonatocerus* Huber, gen. n.

(Figs 121–145)

**Type species.** *Heptagonatocerus pulchellus* Huber, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Heptagonatocerus* are distinguished by the following combination of features: female antenna with 7-segmented funicle; fl<sub>7</sub> wider than long and distinctly shorter than fl<sub>6</sub> (Figs 122, 131, 133, 140); face without subantennal sulci (Figs 124, 136); propodeum with two short submedian carinae arising on side of petiole and usually also with a median longitudinal carina (Figs 126, 142, 143).

**Description. FEMALE.** Medium to large specimens, 768–2076 µm in length. **Colour.** Body generally dark yellow to brown, usually with fore wing patterned with brown areas. **Head.** Head thick (Fig. 137), about 1.3–1.8× as wide as long and 1.1–1.3× as wide as high; in lateral view with evenly convex anterior surface (Fig. 138). Face about 0.8× as wide as high; subantennal sulci absent (Figs 124, 136); preorbital sulcus straight, appressed against eye to a little beyond lower level of torulus, then separating from eye and continuing to dorsolateral corner of mouth (Figs 136, 138). Toruli abutting transverse trabecula (Fig. 124). Eye in lateral view 0.86× as long as high to as long as high, well separated from back of head (Fig. 138). Malar space about 0.4–0.6× eye height; malar sulcus almost straight to distinctly curved and extending from ventral margin of eye to anterolateral corner of mouth (Figs 121, 138). Gena in lateral view narrow dorsally, wide ventrally and merging smoothly into occiput (Figs 138, 139). Vertex in lateral view oblique, forming right angle or obtuse angle (Fig. 138) with face (separated by transverse trabecula), posteriorly separated from occiput by transverse sulcus behind ocelli (Fig. 137). Ocelli with LOL about 0.5× POL and OOL about 0.55–0.75× POL, with 2 setae between lateral ocelli (Figs 136, 137). Occiput entire (Fig. 139). Labrum with 4 (possibly 5) setae. Mandible with 3 teeth. **Antenna.** Scape at least 6.0× as long as wide, with radicle distinct, narrow, about 0.36–0.47× scape length; pedicel about 0.19–0.26× scape length, about as short as but wider than fl<sub>1</sub>; funicle 7-segmented and fl<sub>7</sub> wider than long and distinctly shorter than fl<sub>6</sub> (Figs 121, 122, 131, 133), fl<sub>1</sub> and fl<sub>7</sub> without mps, fl<sub>2</sub>–fl<sub>8</sub> each with 2 mps; clava about 0.37× funicle length, with 9 mps. **Mesosoma.** About 1.7–2.1× as long as wide, 1.8–1.9× as long as high, and 0.8–1.0× as wide as high. Pronotum in dorsal view short medially but visible, longitudinally divided medially, the lobes closely abutting (even slightly overlapping) (Figs 126, 139, 142), with dorsal area merging smoothly into lateral panel, the lateral panel more or less strongly concave dorsal to most of propleura and base of procoxa (Fig. 121). Pronotal spiracle small, about same size as propodeal spiracle (Fig. 144). Propleura normal. Prosternum rhomboidal, divided posteriorly by longitudinal sulcus extending at least half its length. Mesoscutum in dorsal view with fairly fine (clearly visible in micrographs), straight to anteriorly curved, diverging notauli (Figs 126, 142, 144). Transscutal articulation almost straight. Scutellum slightly longer than wide. Axilla normal. Prepectus fairly wide. Mesopleuron spindle-shaped and truncate at both ends, with wide, shallow femoral depression and apparently no line separating mesepimeron from mesepisternum (Figs 121, 144). Metanotum with dorsellum rectangular, its posterior margin distinctly convex (Figs 126, 142, 143). Metapleuron triangular, separated from propodeum by wide, curved sulcus becoming narrower anteriorly (Figs 143, 144). Propodeum in lateral view (Figs 121, 143, 144) sloping fairly strongly, in almost same plane as dorsellum; in dorsal view with three posterior carinae—a thin, short to long median carina,

and a short, diverging submedian carina level with lateral margin of petiole about midway between median carina and junction with metapleuron—and anterior margin almost always with a distinct transverse sulcus abutting dorsellum (mostly between its lateral margins) usually containing several short longitudinal carinae (Figs 126, 142–144). Propodeal spiracle small, separated by less than its diameter from metanotum. **Wings.** Fore wing at most 3.9× as long as wide, and covered with microtrichia only to distinctly beyond apex of stigmal vein (Figs 121, 127, 132, 135). Venation about 0.4× wing length. Submarginal vein with the usual two basal setae (1 macrochaeta and 1 hypochaeta) and usually a hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigma vein) distinctly shorter than submarginal vein, with 1 hypochaeta about midway between proximal and distal macrochaeta, and about 1 or 2 shorter setae between the macrochaetae. Stigmal vein with apex oblique. Hind wing normal. Venation about 0.4× wing length. **Metasoma.** Petiole wider than long (Fig. 142) to about 3.0× as long as wide (Fig. 121). Gaster about 1.1–5.0× as long as high. Terga without membrane visible between them. Ovipositor sheath as long as gaster, longer than metatibia and at most slightly exerted (Fig. 145), with 1 subapical seta.

**MALE.** Body length 845–1870. **Colour.** Body generally darker than in female.

**Antenna.** Scape 3.0–3.1× as long as wide, with radicle distinct, 0.14–0.34× as long as scape; pedicel small, 0.3–0.4× length of fl<sub>1</sub>; flagellomeres each with about 10 mps. **Metasoma.** Genitalia encapsulated in a sac-like phallobase (see genera other than *Gonatocerus* in Viggiani 1989) or at least with aedeagus not attached to apical sternum of gaster by apodemes (Figs 129, 130). [In this respect, *Heptagonatocerus* spp. differ from other genera of Gonatocerini.]

**Etymology.** From Greek “hepta” meaning seven, and “*Gonatocerus*” meaning elbowed antenna. The name refers to the 7-segmented funicle in the female antenna. The gender is masculine.

**Distribution.** *Heptagonatocerus* species occur in the Oriental and Afrotropical (Madagascar, South Africa) regions.

**Hosts and habitat.** Hosts are unknown. Specimens have been collected mainly in forests.

**Included species:**

*Heptagonatocerus madagascarensis* Huber; holotype ♀ in CAS. **TL:** Madagascar, Antananarivo, Ambohitantely Forest Reserve.

*Heptagonatocerus magnificus* Huber; holotype ♀ in QSBG. **TL:** Thailand, Chanthaburi, Khao Khitchakut Nat. Park, entrance of youth camp.

*Heptagonatocerus parvus* Huber; holotype ♀ in QSBG. **TL:** Thailand, Chaiyaphum Tat Tone Nat. Park, Phu Hang Sing.

*Heptagonatocerus pulchellus* Huber; holotype ♀ in QSBG. **TL:** “Thailand, Nakhon Si Thammarat, Namtok Yong Nat. Park, TV aerial, 966m.

**Key to species of *Heptagonatocerus*. Females**

- 1 Antenna with fl<sub>3</sub> except base and fl<sub>4</sub> white, contrasting distinctly with remaining, dark funicle segments (Fig. 133); body length at most about 930 µm . . . . . *H. parvus* Huber, sp. n.
- Antenna with fl<sub>3</sub> and fl<sub>4</sub> brown, same colour as remaining funicle segments (Figs 121, 131); body length at least about 1300 µm . . . . . 2
- 2(1) Fore wing with the two dark areas beyond venation separated entirely by clear area (Fig. 121) . . . . . *H. pulchellus* Huber, sp. n.
- Fore wing with the two dark areas beyond venation joined by a longitudinal median brown streak (Figs 127, 132) . . . . . 3
- 3(2) Body length at least about 2100 µm; flagellomeres wide (Fig. 131), fl<sub>1</sub>–fl<sub>4</sub> with length/width less than about 1.7 . . . . . *H. magnificus* Huber, sp. n.
- Body length at most about 1450 µm; flagellomeres narrow (Fig. 122), fl<sub>1</sub>–fl<sub>4</sub> with length/width greater than about 2.5 . . . . . *H. madagascarensis* Huber, sp. n.

***Heptagonatocerus madagascarensis* Huber, sp. n.**

(Figs 122–130, 136–145)

**Type material.** Holotype ♀ (CAS) on slide (Fig. 125) labelled: 1. “Madagascar Prov. D’Antananarivo [sic] Réserve Spéciale d’Ambohitantely Forêt d’Ambohitantely 209m 72° NE d’Ankazobe, 1410m, 17–22.iv.2001, 18°13’31”S

47°17'13"E, Fisher, Griswold *et al.* California Academy of Sciences Montane rainforest, sifted litter BLF3694, CAS Lot #006022". 2. "Heptagonatocerus madagascarensis Huber Holotype ♀ dorsal".

**Paratypes.** 4♀, 17♂. **MADAGASCAR.** **Antsiranana.** Ampasindava, Forêt d'Ambilanivy, 3.9 km 181° S Ambaliha, 13°47'55"S 46°09'42"E, 800m, 4–9.iv.2001, Fisher, Griswold *et al.*, rainforest, MT, #007134 (1♂, CAS). **Diego-Suarez.** Montagne d'Ambre National Park, 12°30'52"S 49°10'53"E, 960m, 19.iii–5.iv, 5–21.iv.2001, R. Harin'Hala, MT, #007146, #007147 (1♀, 7♂, CAS, CNC, UCR). **Fianarantsoa.** Ranomafana, JIRAMA water works, 21°14.91'S 47°27.13'E, 690m, 2–10.i.2002, R. Harin'Hala, MT (1♂, CAS); Ranomafana National Park, 21°15.99'S 47°25.21'E, 1020m, 2–10.i, 12–19.ii.2002, R. Harin'Hala, MT, #009568, #009571 (1♀, 1♂, CAS), same Park but 21°15.05'S 47°24.43'E, 1030m, 16.x–8.xi.2001, 14–21.i.2002, 15–27.iv.2003, MT in mixed tropical rainforest, #009559, #09561, #011186, #009570 (1♀, 5♂, CAS), same Park but Vohiparara, 1110m, 21°13.57'S 47°22.19'E, 15–21.xii.2001, MT in high altitude rainforest, #09554 (1♂, CAS). **Toamasina.** Botanic garden near entrance to Andasibe-Mantadia National Park, 18°55.58'S 48°24.47'E, 1025m, 8–16.x, 1–5.ix.2001, R. Harin'Hala, MT in tropical forest, #007164, #09550 (1♀, 1♂, CAS).

**Diagnosis.** Distinguished from the other three species of *Heptagonatocerus* by the funicle uniformly brown and basal segments narrow (Fig. 122), and the fore wing with the brown spot just beyond apex of venation crossed by a narrow, darker, slightly curved longitudinal line that extends to the apical brown area (Fig. 127).

**Description.** **FEMALE.** Body length 1306–1434 (n=3). **Colour.** Scape, pedicel, legs except sometimes metatibia, pro- and mesothorax, and gaster ventrally and usually laterally yellow; flagellum, head, scutellum (especially frenum), and at least  $gt_4$  and  $gt_5$  dorsally dark brown. Fore wing with brown spot just beyond apex of venation crossed by a narrow, darker, slightly curved longitudinal line that extends to the apical brown area (Fig. 127). The extent of dark brown on the body varies considerably: one female has the entire meso- and metapleuron, and propodeum dark brown; another has less dark brown on the mesosoma (the propodeum is mostly yellow) (Fig. 126) but almost the entire gaster is dark brown. **Head.** Head (Figs 124, 136–139) width 340 (n=1). **Antenna.** Funicle segments  $fl_2$ – $fl_6$  each with 2 mps,  $fl_1$  and  $fl_7$  without mps (Fig. 122), each segment with normal setae, more dense on apical segments (Figs 140, 141). Antennal measurements (n=1 or 2), length/width (ratios of flagellar segments): scape 382–420/43–51, pedicel 79/45–46,  $fl_1$  75–83/30 (2.52–2.74),  $fl_2$  128–132/32–33 (3.90–4.06),  $fl_3$  124/35 (3.51),  $fl_4$  125–127/40 (3.15),  $fl_5$  107–108/49 (2.21),  $fl_6$  100/68–73 (1.37–1.47),  $fl_7$  42/64–67 (0.63–0.68), clava 263–267/94–98 (2.72–2.81). **Mesosoma.** Propodeum with median carina not extending to dorsellum (Fig. 143), sometimes not longer than sublateral carina (Fig. 126). **Wings.** Fore wing length (n=2) 1395–1598, width 395–478, length/width 3.34–3.53, longest marginal setae 106–131. Hind wing length 1154–1195, width 169–189, longest marginal setae 138–149. **Metasoma.** Ovipositor sheath length (n=2) 682–699, distinctly longer than metatibia length (545–550) and slightly exerted beyond apex of gaster.

**MALE.** Body length 1024–1459 (n=10). **Colour.** Body dark brown except scape, pedicel, pronotum, notauli, scutellum laterally and legs except sometimes metatibia yellow. **Antenna.** Measurements (n=1): scape length/width 3.08, pedicel length/width 1.35, flagellar segment length:  $fl_1$  146,  $fl_2$  156,  $fl_3$  168,  $fl_4$  163,  $fl_5$  167,  $fl_6$  164,  $fl_7$  164,  $fl_8$  152,  $fl_9$  153,  $fl_{10}$  144,  $fl_{11}$  140; total flagellar length 1720;  $fl_6$  length/width 3.29, with about 10 mps (Fig. 123). **Metasoma.** Gaster as in Figs 128 and 130. Genitalia as in generic description (Figs 129, 130).

**Etymology.** The species is an apposition named after the country where all the specimens were collected.

### *Heptagonatocerus magnificus* Huber, sp. n.

(Figs 131, 132)

**Type material.** Holotype ♀ (QSBG) on card, labelled as follows: 1. "Thailand, Chanthaburi, Khao Khitchakut Nat. Park entrance/youth camp 12°50.49'N 102°7.22'E, 52m 4–5.xi.2008, pan trap, Suthida & Charoenchai, #3985". 2. "Holotype *Heptagonatocerus magnificus* Huber ♀".

**Paratypes.** 2♀, 4♂. **MALAYSIA.** **West Malaysia,** Genting Tea Estate, vii–viii.1985, 2000', W. Budenberg (1♂, CNC). **THAILAND.** **Chanthaburi.** Khao Khitchakut Nat. Park, 200m from sala/Klong Chang Sae waterfall to Khao Prabaht, 12°49.28'N 102°9.29'E, 285m, 20–27.xi.2008, Suthida and Charoenchai, #3975, Malaise trap (1♀, CNC). **Petchaburi.** Kaeng Krachan Nat. Park, Pa La-U/Huai Palao forest unit 3, 12°32.149'N 99°28.265'E, 2–3.i and 2–3.viii.2008, Akaradate & Thongbai, PT, # 4560, #4506 (1♀, 1♂, QSBG), same Park but Pa La-U / waterfall/*Ficus* tree, 12°32.154'N 99°28.098'E, 19–26.ix.2008, Akaradate & Thongbai, Malaise trap, #4516 (1♂,

QSBG). **Surat Thani.** Khao Sok Nat. Park, headquarters, 8°54.896'N 98°31.81'E, 155m, 16–23.vi.2009, Pongphan, #4929 (1 ♂, CNC).

**Diagnosis.** Distinguished from the other species of *Heptagonatocerus* by the fore wing with the two dark areas beyond venation joined by a longitudinal median brown streak (Fig. 132) and funicle segments wide, with fl<sub>1</sub>–fl<sub>4</sub> with length/width less than about 1.7 (Fig. 131).

**Description. FEMALE.** Body length 2150–2076 (n=2). **Colour.** Head, mesosoma and petiole light brown or dark yellow; flagellum black; scape brown except white apically and dorsoapically, and pedicel yellowish; gaster light brown but gt<sub>1</sub>–gt<sub>5</sub> darker brown dorsally and laterally; legs mostly light brown but metatibia except base dark brown; procoxa, metacoxa apically, and metatibia basally white. Fore wing behind parastigma with brown area fading apically, and beyond apex of venation with two brown medially and subapically, separated by white areas except for a narrow longitudinal brown band joining the brown areas submedially (Fig. 132); hind wing clear, with faint brown suffusion medially beyond venation. **Head.** Head width 484 (n=1). Face submedially above clypeus with group of about 8 long setae. **Antenna.** Funicle segments fl<sub>2</sub>–fl<sub>6</sub> each with 2 mps, fl<sub>1</sub> and fl<sub>7</sub> without mps (Fig. 131), each segment with dense, short setae, thick dorsally and ventrally. Antennal measurements (n=1), length/width (ratios of flagellar segments): scape 701/84, pedicel 86/62, fl<sub>1</sub> 144/83 (1.73), fl<sub>2</sub> 158/105 (1.50), fl<sub>3</sub> 154/114 (1.34), fl<sub>4</sub> 158/113 (1.40), fl<sub>5</sub> 146/112 (1.31), fl<sub>6</sub> 130/116 (1.12), fl<sub>7</sub> 61/98 (0.62), clava 453/138. **Mesosoma.** Propodeum with median carina short, not longer than sublateral carinae. **Wings.** Fore wing length (n=1) 1871, width 456, length/width 4.10, longest marginal setae 116. Hind wing length 1588, width 76, longest marginal setae 130. **Metasoma.** Ovipositor sheath length (n=1) 866, longer than metatibia length (738) and barely exerted beyond apex of gaster.

**MALE.** Body length 1766–1971 (n=3). **Colour.** Flagellum, mesosoma except pronotum, petiole, and gaster dorsally dark brown; scape, pedicel, face, gena below eye, pronotum and gaster laterally and ventrally lighter brown; vertex and occiput with narrow yellow lines around each ocellus, along dorsal and posterior orbits, from lateral ocelli to foramen magnum, and from mid ocellus to transverse trabecula apices; legs dark yellow except meso- and metacoxa, and metatibia dark brown. **Antenna.** Measurements (n=1): scape length (length/width) 221 (3.03), pedicel length (length/width) 72 (1.25), flagellar segment length: fl<sub>1</sub> 242, fl<sub>2</sub> 274, fl<sub>3</sub> 278, fl<sub>4</sub> 293, fl<sub>5</sub> 301, fl<sub>6</sub> 275, fl<sub>7</sub> 263, fl<sub>8</sub> 249, fl<sub>9</sub> 268, fl<sub>10</sub> 274, fl<sub>11</sub> 272; total flagellar length 2989; flagellar segments progressively widening from fl<sub>1</sub>–fl<sub>4</sub> then narrowing from fl<sub>9</sub>–fl<sub>11</sub>, fl<sub>5</sub>–fl<sub>8</sub> with most mps and strongly notched ventroapically; fl<sub>6</sub> length/width 2.49, with about 14 mps. **Metasoma.** Genitalia with peculiar circular apodemes arranged vertically at anterior apex of aedeagus.

**Etymology.** The species name is a Latin adjective meaning magnificent.

### *Heptagonatocerus parvus* Huber, sp. n.

(Figs 133–135)

**Type material.** Holotype ♀ (QSBG) on slide (Fig. 134) labelled: 1. “Thailand: Chaiyaphum Tat Tone Nat. Park, Phu hang sing, 15°58.723'N 102°02.231'E 5–12.vii.2006, Malaise trap T. Jaruphan & O. Budsawong”. 2. “Heptagonatocerus parvus Huber ♀ dorsal Holotype”.

**Paratypes.** 15 ♀, 1 ♂. **THAILAND. Chaiyaphum.** Tat Tone National Park, Chaiyapoom forest fire station, 16°00.809'N 102°01.335'E, 195m, 12–19.xii.2006, T. Jaruphan, O. Budsawong, #1370 (1 ♀, QSBG). **Nakhon Nayok.** Khao Yai National Park, Lam Takong viewpoint, 14°25.76'N 101°23.53'E, 732m, 6–7.x.2006, W. Sookkho, #734 (1 ♀, CNC). **Petchabun.** Nam Nao National Park, 16°44.986'N 101°27.874'E, 711m, 31.vii–7.viii.2006, N. Hongyothi & L. Janteab, MT, #422 (1 ♀, QSBG). **Sakon Nakhon.** Phu Phan National Park, 17°9.824'N 103°54.511'E, 199m, 19–25.x.2006, S. Tongboonchai, dry dipterocarp forest, #706, #709 (6 ♀, CNC, QSBG), Huay Nam Pung Dam, 16°54.718'N 103°54.294'E, 289m, S. Tongboonchai, forest, #1101 (1 ♀, QSBG). **Surat Thani.** Khao Sok National Park, 8°54.555'N 98°30.522'E, 122m, 13–20.i.2009, Pongphan, MT, #3914 (1 ♂, CNC). **Ubon Ratchathani.** Pha Taem National Park, Huay Pok, 15°37.321'N 105°36.982'E, 419m, 6–13 and 20–27.x.2006, P. Tonsu, Malaise trap, # 721, #727 (5 ♀, CNC).

**Diagnosis.** Distinguished from the other three species of *Heptagonatocerus* by its small body size, fl<sub>3</sub> (except base) and fl<sub>4</sub> white, contrasting strongly with the remaining, dark brown funicle segments (Fig. 133), and fore wing with two transverse brown bands separated by a clear area (Fig. 135).

**Description. FEMALE.** Body length 768–922 (n=10). **Colour.** Head, scape except radicle, mesosoma and legs mainly dark yellow; radicle light yellow, pedicel brown, flagellum dark brown except fl<sub>3</sub> other than base and fl<sub>4</sub> white; pronotum, narrow longitudinal line along notaulus, scutellum laterally and along transscutal articulation between notauli light yellow; mesosoma dark yellow with brown transverse band on gt<sub>4</sub> and gt<sub>5</sub> and darker spot on spiracle. Fore wing with transverse brown band beyond venation and lighter brown suffusion in apical two fifths (Fig. 135). **Head.** Width 232 (n=1). **Antenna.** Funicle segments fl<sub>2</sub>–fl<sub>6</sub> each with 2 mps, fl<sub>1</sub> and fl<sub>7</sub> without mps, each segment with normal setae, more dense on apical segments (Fig. 133). Antennal measurements (n=2), length/width (ratios of flagellar segments): scape 214–251/34–40, pedicel 56–59/30–38, fl<sub>1</sub> 45–53/24–27 (1.88–2.20), fl<sub>2</sub> 73–90/26–28 (2.80–3.39), fl<sub>3</sub> 69–84/25–27 (2.54–3.39), fl<sub>4</sub> 66–81/26–28 (2.32–3.08), fl<sub>5</sub> 28–64/31–34 (1.73–2.06), fl<sub>6</sub> 55–71/39–41 (1.37–1.82), fl<sub>7</sub> 30–32/40–48 (0.66–0.74), clava 149–163/60–68 (2.40–2.72). **Mesosoma.** Propodeum apparently without median carina. **Wings.** Fore wing length (n=3) 752–872, width 204–235, length/width 3.69–3.89, longest marginal seta 87–93. Hind wing (n=2) length 579–694, width 20–23, longest marginal setae 82–90. **Metasoma.** Ovipositor sheath length (n=2) 516–594, distinctly longer than metatibia length (278–363) and distinctly exerted beyond apex of gaster.

**MALE.** Body length 1100 (n=1, card mount). **Colour.** Body dark yellow except flagellum dark brown contrasting strongly with yellow scape and pedicel; gaster brown, gt<sub>4</sub> and gt<sub>5</sub> darker than in female. **Antenna.** Total flagellar length 1495. **Metasoma.** Genitalia not examined (slide mount of unique male not prepared).

**Etymology.** The species name is a Latin adjective meaning small, referring to the very small size of this species compared to others in the genus.

### ***Heptagonatocerus pulchellus* Huber, sp. n.**

(Fig. 121)

**Type material.** Holotype ♀ (QSBG) on card, labelled as follows: 1. “Thailand Nakhon Si Thammarat, Namtok Yong Nat. Park, TV aerial, 966m 8°14.262'N 99°48.289'E, MT, 21–28.vii.2008, Paiboon, #3108”. 2. “Holotype ♀ *Heptagonatocerus pulchellus* Huber”.

**Paratypes.** 8 ♀. **THAILAND. Lampang.** Chae Son Nat. Park, Doi Laan/helipad, 1528m, 18°51.363'N 99°22.231'E, 8–14.iii.2008, MT, B. Kwannui & A. Sukpeng, #5402 (1 ♀, QSBG). Loei. Phu Ruea Nat. Park, 17°30.740'N 101°20.650'E, 1353m, 12–19.ix.2006, N. Jaroenchai, Malaise trap, #828 (1 ♀, CNC). **Nakhon Si Thammarat.** Same data as holotype (1 ♀, CNC), same data as holotype but 25.viii–1.ix.2008, #3533 (1 ♀, CNC), same data as holotype but 15–22.x.2008, #4226 (2 ♀, CNC, QSBG), same data as holotype but 952m, 13–20.iv.2009, #4803 (1 ♀, QSBG). **Sakon Nakhon.** Phu Phan Nat. Park, behind office 17°03.521'N 103°58.450'E, 14.vii.2006, yellow pan trap, W. Kongnara (1 ♀, QSBG).

**Diagnosis.** Distinguished from the other three species of *Heptagonatocerus* by the fore wing with the two dark areas beyond venation separated entirely by clear area, the uniformly dark brown flagellum (Fig. 121), and propodeum with median carina extending to dorsellum.

**Description. FEMALE.** Body length 1740–2022 (n=7). **Colour.** Body uniform dark yellow, except flagellum almost black (Fig. 121). Fore wing behind parastigma with brown area fading apically, and beyond apex of venation with three entirely separated brown areas: behind base of parastigma, medially and apically (Fig. 121); hind wing clear, with faint brown suffusion medially beyond venation. **Head.** Width 480 (n=1). **Antenna.** Funicle segments fl<sub>1</sub>–fl<sub>6</sub> each with 2 mps, fl<sub>7</sub> without mps, all with short setae, thick dorsally and ventrally, and more densely spaced on apical segments. Antennal measurements (n=1), length/width (ratios of flagellar segments): scape 633/84, pedicel 83/57, fl<sub>1</sub> 158/70 (2.26), fl<sub>2</sub> 123/77 (1.60), fl<sub>3</sub> 130/77 (1.69), fl<sub>4</sub> 129/78 (1.65), fl<sub>5</sub> 117/73 (1.60), fl<sub>6</sub> 111/81 (1.37), fl<sub>7</sub> 52/83 (0.63), clava 410/138. **Mesosoma.** Propodeum with median carina extending to dorsellum. **Wings.** Fore wing length (n=1) 1870, width 512, length/width 3.65, longest marginal setae 118. Hind wing length 1459, width 77, longest marginal setae 125. **Metasoma.** Ovipositor sheath length (n=1) ~ 426, shorter than metatibia length (654) and barely exerted beyond apex of gaster.

**MALE.** Unknown.

**Etymology.** The species name is a Latin adjective meaning pretty, referring to the nicely patterned fore wing.

## ***Krateriske* Huber, gen. n.**

(Figs 146–174)

**Type species.** *Krateriske guianensis* Huber, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Krateriske* are distinguished by the following combination of features: face (Fig. 163) with subantennal sulci meeting above mouth margin and continuing to mouth as short, median sulci; fore wing (Figs 157–159) with 2 or 3 hypochaetae on parastigma midway between proximal and distal macrochaetae; propodeum (Figs 159, 169, 171, 172) with median oval, crater-like elevation.

**Description. FEMALE.** Large specimens, 2125–2500  $\mu\text{m}$  in length. **Colour.** Body generally light brown except scape and clava dark; wings mostly with distinct brown suffusion. **Head.** Head (Figs 146, 164, 165) thick, about 1.6–1.8 $\times$  as wide as long and about 1.1–1.2 $\times$  as wide as high; in lateral view with strongly and evenly rounded anterior surface. Face (Figs 147, 148, 163, 167) almost 0.7 $\times$  as wide as high; subantennal sulci present, strongly converging ventrally to meet just above mouth margin and continuing as short median sulcus to mouth; preorbital sulcus appressed against eye almost to its ventral margin, then strongly curved inward to dorsolateral corner of mouth. Toruli separated by their own width from transverse trabecula. Eye in lateral view almost as long as high, extending to back of head (Figs 164–167). Malar space about 0.2 $\times$  eye height; malar sulcus shallow, extending ventroanteriorly from posterior angle of eye almost to mouth and posterodorsally along posterior eye margin to level of foramen (Figs 165–168). Gena in lateral view absent dorsally, wide ventrally and separated from occiput by blunt angle. Vertex in lateral view oblique, merging smoothly into face (separated by transverse trabecula), posteriorly merging smoothly into occiput. Ocelli with LOL about 0.3–0.7 $\times$  POL and OOL 0.5–0.6 $\times$  POL, with two setae between lateral ocelli. Occiput entire. Labrum with about 8 setae. Mandible with 3 teeth (Fig. 168). **Antenna.** Scape about 7 $\times$  as long as wide, with radicle distinct, narrow, about 0.3 $\times$  scape length; pedicel about 0.11 $\times$  scape length, as short and narrow as  $fl_1$ ; funicle 8-segmented,  $fl_1$  without mps,  $fl_2$ – $fl_8$  each with only 1 mps; clava almost 0.8 $\times$  funicle length, with numerous (about 30) short, oblique mps (Figs 146, 151, 152). **Mesosoma.** About 1.9 $\times$  as long as wide, 1.8 $\times$  as long as high, and 0.8–0.9 $\times$  as wide as high. Pronotum (Figs 153, 169) in dorsal view short but visible, longitudinally divided, the lobes abutting medially, with dorsal surface merging smoothly into lateral surface and lateral surface concave in posterior 0.6 (between posterior half of propleura and spiracle). Pronotal spiracle larger than propodeal spiracle, but its opening small (Fig. 170). Propleura normal. Prosternum rhomboidal, posteriorly divided by longitudinal suture extending at least half its length, but in one species apparently not divided at all. Mesoscutum (Figs 153, 169) in dorsal view with rather wide but shallow, barely diverging notauli. Transscutal suture straight. Scutellum slightly longer than wide. Axilla normal. Prepectus narrow and strap-like, slightly wider medially than apically. Mesopleuron spindle-shaped and truncate at both ends, with sulcus separating mesepimeron from mesepisternum (Figs 146, 170). Metanotum with rectangular dorsellum, its posterior margin distinctly convex (Figs 153, 169, 171, 172). Metapleuron triangular, separated from propodeum by curved carina becoming thicker anteriorly (Fig. 170). Propodeum in lateral view (Fig. 170) sloping fairly strongly, in different plane from dorsellum; in dorsal view (Figs 160, 169, 171, 172) with posteromedian crater-like oval area bounded by thick, flat carinae with several short submedian carinae and a long, median carina extending anteriorly from it. Propodeal spiracle small, separated by less than its diameter from metanotum. **Wings.** Fore wing at least 4.0 $\times$  as long as wide, and densely and uniformly covered with microtrichia to base of parastigma (Figs 157–159). Venation about 0.4 $\times$  wing length. Submarginal vein with the usual two basal setae (1 macrochaeta and 1 hypochaeta), and a hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigmal vein) slightly longer than submarginal vein, with 2 or 3 hypochaetae midway between proximal and distal macrochaetae, and more than 10 shorter setae between the macrochaetae. Stigmal vein with apex oblique. Hind wing slightly wider towards apex than at level of hamuli. Venation about 0.45 $\times$  wing length. **Metasoma.** Petiole short, slightly longer than wide (Figs 153, 154, 171). Gaster about 1.5 $\times$  as long as high. Terga narrow and widely separated by white membrane between them (Figs 146, 154, 160, 162). Ovipositor sheath shorter than gaster, shorter than metatibia and not exerted beyond apex of gaster (Figs 146, 161, 162), with 1 subapical seta.

**MALE.** Body length 2200–2460. **Colour.** Body generally darker than in female. **Antenna.** Scape less than 2 $\times$  as long as wide, with radicle short and fused with scape; pedicel narrower and much shorter than  $fl_1$ ; flagellomeres each with numerous (30+) mps in three irregular whorls (Fig. 149). **Metasoma.** Genitalia with wide, flat scoop-like lateral projections (volsellae?) at base of curved aedeagal apodemes that do not extend posteriorly as far as apex of apodeme of genital sternite (Figs 155, 156).

**Etymology.** From Greek “krater” meaning bowl or basin, and “-iske,” a suffix meaning little. The name refers to the small, crater-like elevation on the propodeum. The gender is feminine.

**Distribution.** *Krateriske* species occur in northern South America.

**Hosts and habitat.** Hosts are unknown. Specimens have been collected in forests.

**Included species:**

*Krateriske ecuadorensis* Huber; holotype ♀ in CNC. **TL:** Ecuador, Napo, Yasuni Biological Research Station.

*Krateriske guianensis* Huber; holotype ♀ in CNC. **TL:** French Guiana, Saül, Mt. Fumée.

*Krateriske peruensis* Huber; holotype ♀ in CNC. **TL:** Peru, Huanuco. Rio Lullapichis.

### Key to species of *Krateriske*. Females

- 1 Fore wing with median longitudinal light band bordered anteriorly and posteriorly by darker areas (Figs 146, 154) . . . . . *K. guianensis* Huber, sp. n.
- Fore wing with median transverse band bordered proximally and distally by darker areas (Figs 153, 155) . . . . . 2
- 2(1) Funicle with fl<sub>2</sub> and fl<sub>3</sub> brown; fore wing with white transverse median and apical bands narrower (Fig. 153); hind wing beyond venation wider and with a narrower white submedian band (Fig. 153) . . . . . *K. ecuadorensis* Huber, sp. n.
- Funicle with fl<sub>2</sub> and fl<sub>3</sub> white or sometimes fl<sub>2</sub> with slight brown tinge; fore wing with white transverse median and apical bands wider (Fig. 155); hind wing beyond venation narrower and with a wider white submedian band (Fig. 155) . . . . . *K. peruensis* Huber, sp. n.

### *Krateriske guianensis* Huber, sp. n.

(Figs 146, 147, 149, 151, 154, 156–174)

**Type material.** Holotype ♀ (CNC) on card, labelled: 1. “French Guiana: Saül 7 km N. & 3 km SE. Les Eaux Claires, Mt. Fumée 490m, 1–8.vi.1997 J. Ashe, R. Brooks, FIT”. 2. “Holotype *Krateriske guianensis* Huber ♀.”

**Paratypes.** 10 ♀ and 9 ♂. **FRENCH GUIANA.** 33.5 km S. Cayenne & 8.4 km NW. hwy N2 on hwy D5, 30m, 29.v–9.vi.1997, J. Ashe, R. Brooks (1 ♂, CNC); 7 km S. Les Eaux Claires, Saül, 170m, 30.v–4.vi.1997, J. Ashe, R. Brooks, FIT (1 ♂, CNC); 41.5 km S. Matoury, 4°37.37'N 52°22.59'W, 50m, 29.v–9.vi.1997, J. Ashe, R. Brooks, FIT (2 ♀, 1 ♂, CNC); Montagne des Chevaux 4°43' 0.01"N 52°25' 0.12"W, 11.xii.2011, S.E.A.G. via Y. Braet (1 ♀, CNC); Patawa, Kaw Mountains, 4°33.56' N 52°12.43' W, viii and ix.2007, J. Cerda MT (1 ♀, 1 ♂, MNHN), montagne de Kaw, relais Patawa, 4°32'N 52°10'W, 190m, iii.2003, J.A. Cerda, MT (2 ♂, CNC, UCRC); 8.4 km SSE Roura, 4°40.69' N 52°17.47' W, 200m, 22–24, and 25–29.v.1997, J. Ashe, R. Brooks, MT (1 ♀, 1 ♂, CNC); 27.4 km SSE Roura, 4°34.33' N 52°13.41' W, 280m, 25–29.v.1997, J. Ashe, R. Brooks, MT (2 ♀, CNC, UCRC); 7 km N. Saül & 1 km N. Les Eaux Claires, rue de Belizon tract, 280m, 4–8.vi.1997, J. Ashe, R. Brooks, FIT (2 ♀, CNC); same data as holotype (1 ♀, 1 ♂, CNC), same data as holotype but 300m, 4–8.vi (1 ♂, CNC).

**Diagnosis.** *Krateriske guianensis* is distinguished from the other two *Krateriske* species by the fore wing with a light longitudinal band between a darker anterior and posterior areas (Figs 146, 154).

**Description. FEMALE.** Body length 2125–2300 (n=8). **Colour.** Mesosoma, petiole, legs and antenna except clava brownish yellow, sometimes with pronotum, lateral lobe of mesoscutum, and anterior scutellum lighter; head light brown, clava and pretarsus dark brown, gaster with terga dorsally except gt<sub>6</sub> each with a narrow brown band slightly wider laterally and sometimes also medially, the bands well separated from each other by white intersegmental membrane (Figs 156, 158), gt<sub>6</sub> with band broken into two sublateral brown spots. Fore wing (Fig. 154) with a light longitudinal band between darker anterior and posterior areas; hind wing darker in apical half beyond venation. **Head.** Head (Fig. 147) width 662–683 (n=2). **Antenna.** Each funicle segment with 2 mps except fl<sub>1</sub> without mps, and clava with about 35 mps (Fig. 151). Antennal measurements (n=2), length/width (ratios of funicle segments): scape 722–744/108–115, pedicel 105–106/62–64, fl<sub>1</sub> 106–110/50–54 (2.04–2.11), fl<sub>2</sub> 118–119/53–55 (2.13–2.66), fl<sub>3</sub> 116–120/53–57 (2.04–2.27), fl<sub>4</sub> 116–117/59–64 (1.81–1.97), fl<sub>5</sub> 106–110/58–67 (1.57–1.90), fl<sub>6</sub> 96–99/66 (1.46–1.51), fl<sub>7</sub> 86–91/66–67 (1.28–1.39), fl<sub>8</sub> 77–80/67–70 (1.09–1.19), clava 633–661/106. **Mesosoma.** Propodeum with median oval slightly wider dorsally than ventrally and blunt, with carinae extending outwards from oval quite long (Figs 159, 169–172). **Wings.** Fore wing length (n=2) 2522–2550, width 610–638, length/width, 4.00–4.14, longest marginal setae 88–90. Hind wing length 2050–2112, width 115–132, longest

marginal setae 114–116. **Metasoma.** Ovipositor sheath length 595 (n=1), distinctly shorter than metatibia length (~860).

**MALE.** Body length 2225–2500 (n=6). **Colour.** Gaster (Fig. 160) with wider brown bands and larger spots on  $gt_6$ , with relatively less white intersegmental membrane visible than in female; flagellum dark brown. **Antenna.** Measurements (n=1): scape length/width 171/86, pedicel length/width 78–75, flagellar segment length:  $fl_1$  276,  $fl_2$  335,  $fl_3$  328,  $fl_4$  338,  $fl_5$  342,  $fl_6$  323,  $fl_7$  290,  $fl_8$  263,  $fl_9$  267,  $fl_{10}$  281,  $fl_{11}$  306; total flagellar length 3351;  $fl_6$  length/width 3.39, with about 16 mps in each of 3 irregular whorls (Fig. 149). **Metasoma.** Genitalia as in generic description (Figs 161, 162).

**Etymology.** The species is an adjective named after the country where all the specimens were collected.

### ***Krateriske ecuadorensis* Huber, sp. n.**

(Figs 150, 153)

**Type material.** Holotype ♀ (CNC) on card labelled: 1. “Ecuador: Napo, Yasuni Biol. Res. Station, 220m, 0.67°S 76.39°W, PT, 18–26.v.1996, P. Hibbs”. 2. “Holotype *Krateriske ecuadorensis* Huber ♀”.

**Paratypes.** 2 ♀ and 1 ♂ on points or cards, 1 pair of wings and one ♀ antenna on slide. **ECUADOR. Napo.** Same data as holotype (1 ♀, CNC); 21 km E. Puerto Napo, Jatun Sacha Biological Station, 400m, 15.vii.1994, Levy & Génier, FIT, virgin rain forest (1 ♀, CNC); Lumbaqui, 10.iii.1983, L. Huggert (1 ♂, CNC).

**Diagnosis.** *Krateriske ecuadorensis* differs from *K. guianensis* by the fore wing (Fig. 153) with a light transverse median band separating darker proximal and apical areas. It differs from *K. peruensis* by the fore wing with narrower transverse median and apical white bands, the hind wing wider just beyond venation, the female antenna with  $fl_3$  brown (Fig. 150), and propodeum with median raised oval wider.

**Description. FEMALE.** Body length 2355–2430 (n=3). **Colour.** Head, radicle except narrowly near apex, mesosoma, petiole, and legs brownish yellow, with face dorsally, coxae and trochanters lighter yellow; radicle narrowly near apex,  $fl_1$ – $fl_3$  ( $fl_3$  becoming lighter apically), and pretarsus dark brown,  $fl_4$ – $fl_8$  white; gaster with terga dorsally except  $gt_6$  each with a narrow brown band separated from each other by white intersegmental membrane,  $gt_6$  with band broken into two sublateral brown spots. Fore wing (Fig. 153) with a light transverse median band and apical spot between darker areas; hind wing slightly darker basally and apically and lighter medially beyond venation. **Head.** Head width 630–640 (n=3, card mounts). **Antenna.** Each funicle segment with 2 mps, except 1 (possibly 2) on  $fl_1$ . Antennal measurements (n=1) length/width (ratios of funicle segments): scape 793/110, pedicel 107/64,  $fl_1$  133/60 (2.21),  $fl_2$  158/59 (2.66),  $fl_3$  161/60 (2.68),  $fl_4$  147/61 (2.42),  $fl_5$  126/69 (1.83), remaining segments missing. **Mesosoma.** Propodeum with median oval slightly wider dorsally than ventrally and blunt, with a few short carinae extending outwards from oval. **Wings.** Fore wing length (n=1) 2642, width 630, length/width 4.19, longest marginal setae 85. Hind wing length 2075, width 134, longest marginal setae 145. **Metasoma.** Ovipositor sheath length 538, distinctly shorter than metatibial length (998) (point mounted specimen).

**MALE.** Body length 2150 (n=1). **Colour.** Head, mesosoma and antenna (except apical two flagellomeres white) dark brown with H-shaped yellowish sublateral streak on mesoscutum and scutellum (specimen may be slightly teneral) and sublateral streak on mesosternum between pro- and mesocoxae; fore wing with wider light transverse band than in female and apex not distinctly lighter. **Antenna.** Dark brown, pedicel brown, apical two flagellar segments yellow. Measurements (n=1, card mount): scape length/width 218/89, pedicel length/width 59/79, flagellar segment length:  $fl_1$  366,  $fl_2$  366,  $fl_3$  376,  $fl_4$  376,  $fl_5$  376,  $fl_6$  347,  $fl_7$  347,  $fl_8$  257,  $fl_9$  307,  $fl_{10}$  287,  $fl_{11}$  367; total flagellar length 3775;  $fl_6$  length/width 4.4, with about 16 mps. **Metasoma.** Genitalia not examined (slide of unique male not prepared).

**Etymology.** The species is an adjective named after the country where all the specimens were collected.

### ***Krateriske peruensis* Huber, sp. n.**

(Figs 148, 152, 155)

**Type material.** Holotype ♀ (CNC) on card labelled: 1. “Peru, Huanuco. Rio Llullapichis, 9°37'S 74°56'W, 260m, 1.xi.1981, M.V. Tshirnaus, YPT, primary forest”. 2. “Holotype *Krateriske peruensis* Huber ♀”.



**Paratypes.** 7 ♀, 2 ♂. **PERU. Huanuco.** Same data as holotype (7 ♀, 2 ♂, CNC).

**Diagnosis.** *Krateriske peruensis* differs from *K. guianensis* by the fore wing with transverse white bands (Fig. 155) and from *K. ecuadorensis* by the fore and hind wing white bands wider, the hind wing narrower just beyond the venation, fl<sub>3</sub> white (Fig. 152), and propodeum with median raised oval narrower.

**Description. FEMALE.** Body length 2100–2300 (n=4). **Colour.** Radicle, head, mesosoma, a longitudinal band on gt<sub>1</sub>, transverse bands on gt<sub>2</sub>–gt<sub>6</sub> (broken medially on gt<sub>6</sub>), and legs dark yellow; clava dark brown, scape, pedicel, fl<sub>1</sub> and fl<sub>2</sub> brown; fl<sub>3</sub> light brown, fl<sub>4</sub>–fl<sub>8</sub> white. Fore wing (Fig. 155) with a light apical spot, and light transverse median band between darker areas; hind wing slightly darker basally and apically and lighter medially beyond venation. **Head.** Head (Fig. 148) width 649–696 (n=2). **Antenna.** Each funicle segment with 2 mps (Fig. 152). Antennal measurements (n=3) length/width (ratios of funicle segments): scape 774–837/114–122, pedicel 108–115/66–69, fl<sub>1</sub> 112–129/48–59 (2.24–2.33), fl<sub>2</sub> 127–150/54–62 (2.37–2.44), fl<sub>3</sub> 141–154/53–64 (2.21–2.67), fl<sub>4</sub> 134–163/62–70 (2.18–2.46), fl<sub>5</sub> 120–129/64–76 (1.66–1.88), fl<sub>6</sub> 118–127/71–78 (1.62–1.73), fl<sub>7</sub> 107–112/69–74 (1.49–1.71), fl<sub>8</sub> 84–102/70–74 (1.19–1.39), clava 713–757/121–140. **Mesosoma.** Propodeum with median oval slightly narrower dorsally than ventrally and slightly pointed, with carinae extending outwards from oval very short or absent. **Wings.** Fore wing length 2676–2836 (n=3) width 634–665, length/width 4.14–4.47, longest marginal setae 98–109. Hind wing length 2013–2217, width 142 (n=1), longest marginal setae 122–143. **Metasoma.** Ovipositor sheath length 662–709 (n=2), distinctly shorter than metatibial length (937–982).

**MALE.** Body length 2400–2500 (n=2). **Colour.** Mesosoma brown, otherwise as in female but flagellum dark brown except apical 2 or 3 segments yellowish white. **Antenna.** Measurements (n=1, card mount): scape length/width 170/79, pedicel length/width 79/69, flagellar segment length: fl<sub>1</sub> 320, fl<sub>2</sub> 371, fl<sub>3</sub> 358, fl<sub>4</sub> 345, fl<sub>5</sub> 345, fl<sub>6</sub> 316, fl<sub>7</sub> 307, fl<sub>8</sub> 256, fl<sub>9</sub> 282, fl<sub>10</sub> 269, fl<sub>11</sub> 307; total flagellar length 3476; fl<sub>6</sub> length/width 4.0, with about 14 mps in each of 3 irregular whorls. **Metasoma.** Genitalia not examined (slides of males not prepared).

**Etymology.** The species is an adjective named after the country where all the specimens were collected.

### *Lymaenon* Walker, stat. rev. (= *litoralis* group, of authors)

(Figs 7, 8, 175–190)

*Lymaenon* Walker, 1846: 49. **Type species:** *Lymaenon acuminatus* Walker, by subsequent designation by Gahan & Fagan, 1923: 82. Synonymy under *Gonatocerus* by Foerster, 1856: 118. Treated as the *litoralis* group of species by various authors from 1988–2013 and as a subgenus of *Gonatocerus* by Triapitsyn *et al.*, 2010: 41, and Triapitsyn, 2013a: 39 and 2013b: 216.

*Rachistus* Foerster, 1847: 203. **Type species:** *Ooctonus litoralis* Haliday, by subsequent designation by Gahan and Fagan, 1923: 128. Synonymy under *Gonatocerus* by Foerster 1856: 120. Synonymy under *Gonatocerus (Lymaenon)* by Triapitsyn *et al.*, 2010: 41.

*Oophilus* Enoch, 1909: 458. **Type species:** *O. longicauda* Enoch, by monotypy. Synonymy under *Gonatocerus* by Girault, 1911 [96]: 276. Synonymy under *Gonatocerus (Lymaenon)* by Triapitsyn *et al.*, 2010: 41.

*Agonatocerus* Girault, 1913 [149]: 276. **Type species:** *A. humboldti*, by original designation. Synonymy under *Gonatocerus* by Girault, 1915 [228]: 159. Synonymy under *Gonatocerus (Lymaenon)* by Triapitsyn *et al.*, 2010: 41.

*Gonatoceroidea* Girault, 1913 [155]: 255 (as subgenus of *Gonatocerus*); Girault, 1913 [165]: 109 (given generic status). **Type species:** *G. australica* Girault, by original designation. Synonymy under *Gonatocerus* by Girault, 1915 [228]: 159. Synonymy under *Gonatocerus (Lymaenon)* by Triapitsyn *et al.*, 2010: 41.

*Decarthrius* Debauche, 1949: 21. **Type species:** *Decarthrius straeleni* Debauche, by original designation. Synonymy under *Gahanopsis* by Annecke & Doutt, 1961: 13. Synonymy under *Gonatocerus (Lymaenon)* by Triapitsyn *et al.*, 2010: 41.

**Diagnosis.** Within *Gonatocerini*, the species of *Lymaenon* are distinguished by the following combination of features: vertex almost always with 3 (Fig. 180) or 4 setae in ocellar triangle; pronotum longitudinally divided medially, the lobes widely separated by a distinct, median area (Fig. 188); dorsellum strap-like, the anterior and posterior margins parallel (Fig. 185); propodeum usually with two usually well separated and slightly converging submedian lines almost always extending length of propodeum (Fig. 185).

**Description. FEMALE.** Face with subantennal sulci present, weakly converging, the distance between them at mouth margin the same or more (occasionally less) than their distance from the preorbital sulci (Fig. 179). Vertex with 3 (Fig. 180) or 4 setae in ocellar triangle, rarely with 2 setae. Occiput almost always entire (Fig. 182), rarely with a partial sulcus along eye orbit separating gena from occiput. Mandible with 3 normal teeth (Figs 183, 184).

Funicle 8-segmented, rarely 7-segmented (Fig. 175), the basal four usually shorter than apical four (or three), and rarely with mps whereas apical four segments have mps on at least one segment. Pronotum longitudinally divided medially, the lobes widely separated by a distinct, median area (Fig. 188), this area membranous or, less commonly, well sclerotized (but separated by carinae from lateral areas). Pronotal spiracle almost always larger than propodeal spiracle (Fig. 186). Dorsellum at least 4× as wide as long, strap-like, the anterior and posterior margins parallel (Figs 7, 185, 186). Propodeum usually with two usually well separated and slightly converging submedian lines almost always extending length of propodeum, the area between them often with minute spicules (Figs 7, 185), rarely the submedian lines short, raised as carinae and without spicules between them. Fore wing with microtrichia usually present behind venation to base of parastigma (Figs 175, 177), sometimes bare behind venation except for subcubital line (Fig. 176), rarely completely bare behind venation. Stigma almost always truncate apically (Figs 175–178), sometimes slightly oblique.

**MALE.** Radicle short, separated from scape by a line or sulcus, at most about 0.3× as long as scape. Scape fairly short, at most about 3.0× as long as pedicel. Genitalia with aedeagal apodemes shorter than to almost as long as apodeme of genital sternum, rarely extending anteriorly slightly past its apex (see examples in Triapitsyn 2010), and with well developed volsellae.

**Discussion.** With over 160 nominal species, *Lymaenon* is the most speciose genus in Gonatocerini. The species vary widely in size from small to very large specimens, with body length 435–3200 µm. Body colour can be almost entirely black to almost entirely yellow, often patterned in various ways with brown, yellow or black. Many species have the same colour and pattern as several *Gonatocerus* species, in which the mesosoma is predominantly yellow but with brown spots or areas on the mid- and side lobes of the mesoscutum, medially on the anterior scutellum, and on the axilla (Fig. 7). In the Holarctic region the mesosoma is usually uniformly coloured dark brown or black; in tropical areas yellow is the predominant body colour. Superficially, different *Lymaenon* species can resemble those of several other genera but the strap-like dorsellum and propodeal structure remains constant and the genus is quite homogeneous structurally so subdividing it into meaningful species groups appears futile. The greatest diversity in body form and colour is found in Australia. The least diversity occurs in the Nearctic, Neotropical and Palaearctic regions. The Afrotropical and Oriental regions have an intermediate amount of diversity. Most species have eight funicle segments. A few African species have only seven funicle segments (Fig. 175), as in some *Gahanopsis*. Fl<sub>1</sub>–fl<sub>4</sub> vary in length, from all being almost anelliform to distinctly longer than wide, but in almost all cases fl<sub>1</sub>–fl<sub>4</sub> are each no longer than and almost always shorter than fl<sub>5</sub> or fl<sub>6</sub>. In a few species the head is very thin, as in *Zeyanus*. The back of head usually lack sulci but the occiput of some species has a curved transverse sulcus extending from the malar sulcus behind each eye to the foramen, somewhat as in some species of *Cosmocomoidea* or *Gastrogonatocerus*. The wings are usually unmarked but many Australian and a few Afrotropical species have patterned wings, usually as 1–3 bands extending across the wing (Fig. 178) but sometimes with an apical spot or longitudinal streak. A few *Lymaenon* species have one or two white flagellomeres (Fig. 176) as in some *Cosmocomoidea* and *Cosmocomopsis* species. Fore wing microtrichia usually extend over the entire wing surface to the base of the parastigma but quite often only the subcubital line of microtrichia extends to the base and the area behind the venation is bare; exceptionally, the entire area behind the venation is bare, as in many *Cosmocomoidea* species. The gastral petiole is usually short, ring-like (Figs 89, 190) but sometimes (several species in Madagascar) it is as long as the metacoxa, as in some *Cosmocomoidea* and *Cosmocomopsis* species. Most *Lymaenon* species do not have the ovipositor sheaths extending much beyond the gaster apex (Fig. 190) but a few species have them extending well beyond (Fig. 177). Some species, especially from Australia but also from other regions, have a long gaster with the ovipositor extending anteriorly to varying degrees under the mesosoma and head (Fig. 178), as in many *Gahanopsis* and *Gastrogonatocerus* species. The ovipositor sheaths have the usual pair of subapical setae but one species (one specimen seen) has 5 pairs, somewhat as in *Zeyanus* species.

**Hosts and habitat.** Fewer than 20 nominal species have a host recorded, sometimes only to family. The few reliable host records indicate that species of *Lymaenon* parasitize Cicadellidae and sometimes Membracidae and are not host specific. Viggiani (2013) listed the four known hosts of one species, *L. litoralis* (Haliday): *Cicadula sexnotata* (Fallén), *Acocephalus* sp., *Neoaliturus (Circulifer) tenellus* (Baker), and *Zyginidia sohrab* Zachvatkin. Species of *Lymaenon* are particularly well represented in semi-arid to arid regions such as open woodlands, deserts and, occasionally, tundra. Relatively fewer species are found in forests, especially tropical rainforests.

**Included species:**

*Lymaenon acuminatus* Walker, **comb. rev.** from *Gonatocerus*. *Lymaenon acuminatus* Walker, 1846: 49; lectotype

- ♀ in MVMA. Dalla Torre, 1898: 429 (transferred to *Gonatocerus*). **TL:** England, no locality given.
- Lymaenon longicauda* (Enock). *Oophilus longicauda* Enock, 1909: 458; lectotype ♀ in BMNH (examined).  
Debauche, 1948: 88 (transferred to *Lymaenon*). **TL:** England, Surrey, Richmond Park. Synonymy under *G. acuminatus* by Graham, 1972: 132.
- Lymaenon africanus* (Soyka). *Gonatocerus africanus* Soyka, 1950: 126; holotype ♀ in PPDD (lost); 1 paratype ♀ in NHMV (examined). Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Egypt, Dakhla Oasis.
- Lymaenon angustiventris* (Girault & Dodd), **comb. n.** from *Gonatocerus*. *Gonatocerus angustiventris* Girault & Dodd in Girault, 1915 [228]: 158; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Kuranda.
- Lymaenon aureinotum* (Dodd), **comb. n.** from *Gonatocerus*. *Ooctonus aureinotum* Dodd, 1917: 351; holotype ♀ in QMBA. Lin *et al.*, 2007: 34 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Yungaburra.
- Lymaenon aureus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus aureus* Girault, 1911 [96]: 263; neotype ♀ in USNM, designated by Triapitsyn, 2013a: 48. **TL:** USA, Illinois, Urbana.
- Lymaenon aligarhensis* (Shamim & Adam Shafee). *Gonatocerus aligarhensis* Shamim & Adam Shafee, 1984: 623; holotype ♀ in ZDAMU. **TL:** India, Uttar Pradesh, Aligarh. Synonymy under *G. pahlgamensis* by Zeya & Hayat, 1995: 114. Synonymy under *G. aureus* by Triapitsyn, 2013a: 48.
- Lymaenon brunneus tenuipennis* (Girault). *Gonatocerus brunneus tenuipennis* Girault, 1911 [96]: 263; holotype ♀ in INHS (lost). **TL:** USA, Illinois, Centralia, Urbana. Synonymy under *G. aureus* by Triapitsyn, 2013a: 47.
- Lymaenon chrysis* Debauche. *Lymaenon chrysis* Debauche, 1948: 99; holotype ♀ in IRSNB (examined).  
Graham, 1973: 48 (transferred to *Gonatocerus*). **TL:** Belgium, Héverlé. Synonymy under *G. aureus* by Triapitsyn, 2013a: 47.
- Lymaenon fukuokensis* (Sahad). *Gonatocerus fukuokensis* Sahad, in Sahad & Hirashima, 1984: 20; holotype ♀ in KUEC. **TL:** Japan, Kyushu, Fukuoka City, Hakozaki. Synonymy under *G. pahlgamensis* by Zeya & Hayat, 1995: 114. Synonymy under *G. aureus* by Triapitsyn, 2013a: 48.
- Lymaenon gracilentus* (Hellén). *Gonatocerus gracilentus* Hellén, 1974: 11; lectotype ♀ in ZMH. **TL:** Finland, Parikkala. Synonymy under *chrysis* by Matthews, 1986: 227. Synonymy under *G. aureus* by Triapitsyn, 2013a: 48.
- Lymaenon illinoiensis* (Girault). *Gonatocerus illinoiensis* Girault, 1917 [323]: 91; holotype ♀ in USNM (examined). **TL:** USA, Illinois, Randolph Co., Coulterville. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon pahlgamensis* Narayanan, 1961: 25; holotype ♀ in IARI. **TL:** India, Kashmir, no locality given. Synonymy under *G. aureus* by Triapitsyn, 2013a: 48.
- Lymaenon kanheriensis* (Mani & Saraswat). *Gonatocerus kanheriensis* Mani & Saraswat, 1973: 87; holotype ♀ in USNM (examined). **TL:** India, Maharashtra, Bombay. Synonymy under *G. pahlgamensis* by Zeya & Hayat, 1995: 114. Synonymy under *G. aureus* by Triapitsyn, 2013a: 47.
- Lymaenon vopros* Triapitsyn, 2013a: 47. Replacement name for *G. flavus* Soyka, 1950, not *G. flavus* Förster, 1841.
- Lymaenon flavus* (Soyka). *Gonatocerus flavus* Soyka, 1950: 127; holotype ♀ in PPDD (lost); Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Egypt, Giza. Synonymy under *G. aureus* by Triapitsyn, 2013a: 47.
- Lymaenon australensis* (Perkins), **comb. n.** from *Gonatocerus*. *Ooctonus australensis* Perkins, 1905: 195; 1 ♀ and 1 ♂ syntypes in BPBM (examined). Girault, 1915 [228]: 156 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Cairns.
- Lymaenon australicus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus (Gonatoceroidea) australica* Girault, 1913 [155]: 255; holotype ♀ in QMBA (examined). Girault, 1915 [228]: 159 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Ayr.
- Lymaenon ayrensis* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus ayrensis* Girault, 1913 [155]: 257; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Ayr.
- Lymaenon baconi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus baconi* Girault, 1912 [120]: 129; 2 ♂ syntypes in QMBA (examined). **TL:** Australia, Queensland, Mackay, Pioneer River.
- Lymaenon bakrotus* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus bakrotus* Mani & Saraswat, 1973: 80; holotype ♀ in USNM (examined). **TL:** India, Himachal Pradesh, Dalhousie (Upper Bakrota).
- Lymaenon bashai* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus bashai* Zeya in Zeya & Hayat, 1995: 121;

- holotype ♀ in BMNH (examined). **TL:** India, Assam, Silchar, near railway station.
- Lymaenon basilewskyi* Mathot. *Lymaenon basilewskyi* Mathot, 1968: 265; holotype ♀ in MRAC (examined). **TL:** Tanzania, Ngorongoro, Rest Camp [data from type slide: 2400–2500m, 6/19–vi.1957, P. Basilewsky et N. Leleup.]
- Lymaenon bellus* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus bellus* Girault, 1938 [452]: 396; holotype ♀ in QMBA (examined). Lin *et al.*, 2007: 34 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Kingston.
- Lymaenon beshbarmak* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus* (*Lymaenon*) *beshbarmak* Triapitsyn, 2013a: 58; holotype ♀ in UCRC. **TL:** Kyrgyzstan, Dzhahalal-abad, Teke-Uyuk ravine.
- Lymaenon berezovskiyi* (Triapitsyn), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus* (*Lymaenon*) *berezovskiyi* Triapitsyn, 2013a: 56; holotype ♀ in UCRC. **TL:** Turkmenistan, Ahal, Babarurmaz.
- Lymaenon berijamus* (Mani & Saraswat), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus berijamus* Mani & Saraswat, 1973: 82; holotype ♀ in USNM (examined). Triapitsyn, 2013a: 113 [placed in *Gonatocerus* (*Lymaenon*)]. **TL:** India, Tamil Nadu, Anamalai Hills, between Berijam and Munnar.
- Lymaenon bicolor* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus bicolor* Girault, 1913 [147]: 216; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon bicoloriventris* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus bicoloriventris* Zeya in Zeya & Hayat, 1995: 96; holotype ♀ in BMNH (examined). Triapitsyn, 2013a: 60 [placed in *Gonatocerus* (*Lymaenon*)]. **TL:** India, Karnataka, Srirangapatnam.
- Lymaenon bifasciiventris* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus bifasciiventris* Girault, 1917 [328]: 273; 16 ♀ and 1 ♂ syntypes in QMBA (examined). **TL:** Java, no locality given.
- Lymaenon boswelli* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus boswelli* Girault, 1915 [228]: 158; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Cooktown.
- Lymaenon bouceki* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus bouceki* Zeya in Zeya & Hayat, 1995: 105; holotype ♀ in BMNH (examined). **TL:** India: Uttar Pradesh, Aligarh.
- Lymaenon brevifuniculatus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus brevifuniculatus* Subba Rao, 1970: 664; holotype ♀ in BMNH (examined). **TL:** Pakistan, Hyderabad.
- Lymaenon breviterebratus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus breviterebratus* Subba Rao, 1989: 148; holotype ♀ in BMNH (examined). **TL:** India, Karnataka, 25 km W. Mudigere.
- Lymaenon brunoi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus brunoi* Girault, 1912 [120]: 142; 6 ♂ syntypes in QMBA (examined) [this is a mixed series, including two specimens possibly of *Gonatocerus comptei* or *G. hallami*]. **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon brunoi lyelli* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus brunoi lyelli* Girault, 1913 [147]: 218; holotype ♂ in QMBA. **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon bulgaricus* (Donev & Triapitsyn), **comb. n.** from *Gonatocerus*. *Gonatocerus* (*Lymaenon*) *bulgaricus* Donev & Triapitsyn in Triapitsyn *et al.*, 2013: 277; holotype ♀ in PUPB. **TL:** Bulgaria, Blagoevgrad, Sandanski, Rozhen Monastery.
- Lymaenon capensis* Viggiani & Jesu, 1995: 101; holotype ♀ in DEZA. **TL:** Cape Verde Is., San Jorge.
- Lymaenon carlylei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus carlylei* Girault, 1913 [165]: 114; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon centaurus* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus centaurus* Girault, 1920 [352]: 45; holotype ♀ in QMBA. Lin *et al.*, 2007: 35 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Goondi.
- Lymaenon chryseides* Debauche, 1949: 45; holotype ♀ in MRAC. **TL:** Congo, Parc National Albert, Nyasheke, Nyamuragira volcano.
- Lymaenon cingulatus* (Perkins), **comb. n.** from *Gonatocerus*. *Gonatocerus cingulatus* Perkins, 1905: 196; 1 ♀ syntype in BPBM (examined). **TL:** Australia, Queensland, Brisbane.
- Lymaenon circumvagus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus circumvagus* Girault, 1915 [228]: 159; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Kuranda.
- Lymaenon citriscapus* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus citriscapus* Girault, 1930 [433]: 5; 3 ♀ syntypes in QMBA (examined). Lin *et al.*, 2007: 35 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Mt. Coot'ha.
- Lymaenon coimbatorensis* (Zeya, Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus coimbatorensis* Zeya Manickavasagam & Rameshkumar, 2012: 6; holotype ♀ in ZDAMU. **TL:** India, Tamil

Nadu, Coimbatore.

- Lymaenon contortivena* Debauche, 1949: 30; holotype ♀ in MRHNB (examined). **TL:** Congo, Kivu, Rutshuru.
- Lymaenon cubensis* (Dozier), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus cubensis* Dozier, 1932: 83; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 46 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Cuba, near Havana.
- Lymaenon cunctator* Mathot, **comb. rev.** from *Gonatocerus (Lymaenon)*. *Lymaenon cunctator* Mathot, 1969: 7; holotype ♀ in IRSNB. Matthews, 1986: 223 (implied transfer to *Gonatocerus*); Triapitsyn, 2013a: 62 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Belgium, Tervuren, étang [pond] du Merisier. Synonymy under *litoralis* by Matthews, 1986: 223. Reinstated as valid species by Triapitsyn, 2013a: 62.
- Lymaenon dakhlae* (Soyka), **comb. n.** from *Gonatocerus*. *Gonatocerus dakhlae* Soyka, 1950: 126; holotype ♀ in PPDD (lost). Heqvist, 1960: 430 (transferred to *Lymaenon*). Triapitsyn, 2013a: 169 (treated as a *nomen dubium* in *Gonatocerus*). **TL:** Egypt, Dakhla Oasis.
- Lymaenon darwini* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus darwini* Girault, 1912 [120]: 130; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Mackay, Pioneer River.
- Lymaenon davinci* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus davinci* Girault, 1912 [120]: 135; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, near Nelson [= Gordonvale].
- Lymaenon debauchei* Mathot, 1968: 268; holotype ♀ in MRAC (examined). **TL:** Congo, N. Lac Kivu, Rwankwi. [data from holotype slide are xii.1951. J.V. Leroy.]
- Lymaenon delhiensis* Narayanan & Subba Rao, **comb. rev.** from *Gonatocerus*. *Lymaenon delhiensis* Narayanan & Subba Rao, 1961: 659; holotype ♀ in IARI. Zeya & Hayat, 1995: 118 (transferred to *Gonatocerus*). **TL:** India, Delhi.
- Lymaenon noyesi* (Subba Rao). *Gonatocerus noyesi* Subba Rao, 1989: 149; holotype ♀ in BMNH (examined). **TL:** India, Tamil Nadu, Coimbatore. Synonymy under *delhiensis* by Zeya & Hayat, 1995: 118.
- Lymaenon relictus* (Mani & Saraswat). *Gonatocerus relictus* Mani & Saraswat, 1973: 90; holotype ♀ in USNM (examined). **TL:** India, Tamil Nadu, Anamalai Hills, Berijam. Synonymy under *G. delhiensis* by Zeya & Hayat, 1995: 118.
- Lymaenon virgatus* (Subba Rao). *Gonatocerus virgatus* Subba Rao, 1989: 150; holotype ♀ in BMNH (examined). **TL:** India, Karnataka, Mudigere. Synonymy under *G. delhiensis* by Zeya & Hayat, 1995: 118.
- Lymaenon devitatakus* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus devitatakus* Mani & Saraswat, 1973: 86; holotype ♀ in USNM (examined). **TL:** India, Tamil Nadu, Devikulam.
- Lymaenon dies* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus dies* Girault, 1913 [165]: 50; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Capeville.
- Lymaenon dodo* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus dodo* Girault, 1920 [353]: 99; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Brisbane.
- Lymaenon elizabethae* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus elizabethae* Girault, 1925 [387]: 2; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, The Caves.
- Lymaenon ella* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus ella* Girault, 1931 [435]: 4; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon farmani* (Zeya & Anwar), **comb. n.** from *Gonatocerus*. *Gonatocerus farmani* Zeya & Anwar, 2013: 121; holotype ♀ in ZDAMU. **TL:** India, Meghalaya, Shillong, Ladmawplong.
- Lymaenon fasciiventris* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus fasciiventris* Girault, 1913 [147]: 217; holotype ♂ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon flavipes* (Girault & Dodd), **comb. n.** from *Gonatocerus*. *Ooctonus flavipes* Girault & Dodd in Girault, 1915 [228]: 154; holotype ♂ in QMBA. Lin *et al.*, 2007: 35 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Kuranda.
- Lymaenon flaviventris* (Dozier), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus flaviventris* Dozier, 1932: 82; holotype ♀ in USNM (examined). Triapitsyn *et al.*, 2010: 47 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Haiti, Sarthe.
- Lymaenon flosculus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus flosculus* Girault, 1915 [228]: 160; holotype ♀ in QMBA (examined). **TL:** Australia, New South Wales, Tweed Heads, Tweed River.
- Lymaenon fulgor* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus fulgor* Girault, 1913 [155]: 259; holotype ♂ in QMBA (lost). **TL:** Australia, Queensland, Ayr.

- Lymaenon gigas* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus gigas* Girault, 1915 [228]: 154; holotype ♀ in QMBA (examined). Lin *et al.*, 2007: 35 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Kuranda.
- Lymaenon goethei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus goethei* Girault, 1912 [120]: 139; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon gregi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus gregi* Girault, 1915 [228]: 159; holotype ♂ in QMBA (examined). **TL:** Australia, NSW, Murwillumbah.
- Lymaenon grotiusi* (Girault), **comb. n.** from *Gonatocerus*. *Cosmocomoidea grotiusi* Girault, 1913 [165]: 108; holotype ♀ in QMBA (examined). Girault, 1913 [165]: 110 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon hackeri* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus hackeri* Girault, 1938 [452]: 394; 3 ♀ syntypes in QMBA (examined) [possibly a mixed series]. **TL:** Australia, Queensland, Brisbane, Clayfield.
- Lymaenon haeckeli* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus haeckeli* Girault, 1912 [120]: 131; 1 ♀ and 1 ♂ syntypes in QMBA (examined). **TL:** Australia, Queensland, Port Douglas, Double Island.
- Lymaenon heinei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus heinei* Girault, 1938 [452]: 394; holotype ♀ in QMBA (lost). **TL:** Australia, Queensland, no locality given.
- Lymaenon helmholtzii* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus helmholtzii* Girault, 1912 [120]: 142; 3 ♀ syntypes in QMBA (examined). **TL:** Australia, Queensland, Mackay.
- Lymaenon helmholtzii christi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus helmholtzii christi* Girault, 1938 [452]: 393; 3 ♀ syntypes in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon hoplitis* Debauche, 1949: 35; holotype ♀ in MRAC. **TL:** Congo, Parc National Albert, towards Rweru, Mikeno volcano.
- Lymaenon humboldti* (Girault), **comb. n.** from *Gonatocerus*. *Agonatocerus humboldti* Girault, 1913 [149]: 276; holotype ♀ in QMBA (examined). Girault, 1915 [228]: 159 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon huxleyi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus huxleyi* Girault, 1912 [120]: 134; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Roma.
- Lymaenon huyghensi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus huyghensi* Girault, 1912 [120]: 143; holotype ♀ in QMBA. **TL:** Australia, Queensland, Kuranda.
- Lymaenon huyghensi gratia* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus huyghensi gratia* Girault, 1938 [452]: 393; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon ignipes* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus ignipes* Girault, 1930 [433]: 5; holotype ♀ in QMBA (examined). Lin *et al.*, 2007: 35 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Amamoor.
- Lymaenon indigenus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus indigenus* (Girault, 1938 [452]: 394; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, no locality given.
- Lymaenon indigenus faradayi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus indigenus faradayi* Girault, 1938 [452]: 394; ?holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly. See Dahms, 1984: 717 for discussion about the type.
- Lymaenon io* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus io* Girault, 1915 [245]: 360 and 1938 [452]: 393; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Capeville.
- Lymaenon ionella* (Özdikmen), **comb. n.** from *Gonatocerus*. *Gonatocerus ionella* Özdikmen, 2011: 840.  
Unnecessary replacement name for *G. io* Girault, 1938, not *G. io* Girault, 1915. A replacement name is not needed because the 1938 species description (based on a specimen in alcohol) is evidently based on the same specimen (remounted from alcohol) as the 1915 description (see Dahms 1984: 727). Although the descriptions differ they are not incompatible and I am certain they refer to the same specimen. Therefore, *G. io* Girault, 1938, is simply a redescription of *G. io*, Girault, 1915 (not a new species description, as Girault claimed) and not a junior primary homonym (as treated by Özdikmen).
- Lymaenon iona* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus iona* Girault, 1930 [433]: 5; holotype ♀ in QMBA. Lin *et al.*, 2007: 36 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Brookfield.
- Lymaenon johnstonia* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus johnstonia* Girault, 1917 [303a]: 13; holotype ♀ in ZMHB. **TL:** German East Africa [= Tanzania], no locality given.
- Lymaenon kabashae* Debauche, 1949: 40; holotype ♀ in MRAC. **TL:** Congo, Parc National Albert, Kanyabayongo (Kabasha).

- Lymaenon kalika* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) kalika* Triapitsyn, 2013a: 64; holotype ♀ in ZMUC. **TL:** Denmark, Magleby Strand Amager. See Triapitsyn, 2013a: 64 for discussion of locality.
- Lymaenon karakum* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) karakum* Triapitsyn, 2013a: 65; holotype ♀ in UCRC. **TL:** Italy, Lazio, Roma, Castelporziano Presidential Estate.
- Lymaenon karlik* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) karlik* Triapitsyn, 2013a: 67; holotype ♀ in UCRC. **TL:** China, Beijing, Mentougou, Xiaolongmen station.
- Lymaenon katraps* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) katraps* Triapitsyn, 2013a: 69; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon kazak* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) kazak* Triapitsyn, 2013a: 71; holotype ♀ in ZIN. **TL:** Russia, Krasnodarskiy kray, Krasnodar, All-Russian Research Institute of Biological Plant Protection.
- Lymaenon kivuanus* Debauche, 1949: 43; holotype ♀ in MRAC. **TL:** Congo, Kivu, Rutshuru.
- Lymaenon kochi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus kochi* Girault, 1936 [446]: 1; holotype ♀ in QMBA (examined). **TL:** Australia, Victoria, Canterbury.
- Lymaenon komarik* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) komarik* Triapitsyn, 2013a: 75; holotype ♀ in UCRC. **TL:** France, Gironde, Saint Colombe.
- Lymaenon krasavchik* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) krasavchik* Triapitsyn, 2013a: 76; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon kulik* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) kulik* Triapitsyn, 2013a: 77; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon kum* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) kum* Triapitsyn, 2013a: 79; holotype ♀ in CAS. **TL:** Russia, Sakhalinskaya oblast', Sakhalin Island, near Anna River mouth.
- Lymaenon kusaka* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) kusaka* Triapitsyn, 2013a: 81; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon lamarecki* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus lamarecki* Girault, 1912 [120]: 138; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Cookstown.
- Lymaenon litoralis* (Haliday), **comb. n.** from *Gonatocerus (Lymaenon)*. *Ooctonus litoralis* Haliday, 1833: 344; lectotype ♀ in OUMNH. Walker, 1846: 51 (transferred to *Lymaenon*); Foerster, 1847: 204 (transferred to *Rachistus*); Dalla Torre, 1898: 429 (transferred to *Gonatocerus*); Debauche 1948: 89 (transferred back to *Lymaenon*); Matthews 1986: 223 (transferred back to *Gonatocerus*); Triapitsyn *et al.*, 2010: 48 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Ireland, Co. Down, near Holywood.
- Lymaenon americanus* (Brues). *Gonatocerus americanus* Brues, 1907: 104; holotype ♀ in MCPM (examined). Triapitsyn, 2013a: 82 [placed in *Gonatocerus (Lymaenon)*]. **TL:** USA, Wisconsin, Milwaukee. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon anthonomi* (Girault). *Gonatocerus anthonomi* Girault, 1905 [16]: 288; lectotype ♀ in USNM (examined). Triapitsyn, 2013a: 82 [placed in *Gonatocerus (Lymaenon)*]. **TL:** USA, Georgia, Fort Valley. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon arduennae* Mathot. *Lymaenon arduennae* Mathot, 1969: 5; holotype ♀ in IRSNB. **TL:** Belgium, Nafraiture, Ry de Grahais. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon brunneus* (Girault). *Gonatocerus brunneus* Girault, 1911 [96]: 261; lectotype ♀ in USNM (examined). Triapitsyn, 2013a: 83 [placed in *Gonatocerus (Lymaenon)*]. **TL:** USA, Indiana, no locality given. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon effusi* Bakkendorf. *Lymaenon effusi* Bakkendorf, 1934: 23; lectotype ♀ in ZMUC (lost). Bakkendorf did not designate a holotype or state the number of specimens he examined so the holotype designation by Matthews (1986: 223) is a lectotype according to ICZN 74.6. Triapitsyn, 2013a: 83 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Denmark, Dyrehaven. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon exiguus* Förster. *Gonatocerus exiguus* Förster 1861, 43; lectotype ♂ in NHMW (examined). **TL:** Switzerland, Graubunden, Roseg. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 82.
- Lymaenon fuscus* (Förster). *Alaptus fuscus* Förster, 1861: 43; lectotype ♀ in NHMW. **TL:** Switzerland, Graubunden, Roseg-Tal [valley]. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 82.

- Lymaenon maevius* (Girault). *Gonatocerus maevius* Girault, 1911 [96]: 272; holotype ♀ in INHS (lost). **TL:** USA, Illinois, Normal. Synonymy under *brunneus* by Girault, 1929 [428]: 26. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon paludis* Debauche. *Lymaenon paludis* Debauche, 1948: 91; holotype ♀ in IRSNB. Graham, 1973: 47 (transferred to *Gonatocerus*). **TL:** Belgium, Héverlé. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon priesneri* (Soyka). *Gonatocerus priesneri* Soyka, 1950: 128; holotype ♀ in PPDD (lost) [1 ♀ and 1 ♂ paratypes in NHMV (examined)]. Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Egypt, Gebel Elba, Wadi Aideb. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon pulchellus* (Hellén). *Gonatocerus pulchellus* Hellén, 1974: 11; holotype ♀ in ZMH. **TL:** Finland, Hauho. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon radiculatus* (Ahlberg). *Gonatocerus radiculatus* Ahlberg, 1925: 85; 3 ♀ syntypes in ?NHRS. **TL:** Sweden, Spånga. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon rhacodes* Debauche. *Lymaenon rhacodes* Debauche, 1948: 97; holotype ♀ in IRSNB (examined). **TL:** Belgium, Héverlé. Synonymy under *G. litoralis* by Matthews, 1986: 223.
- Lymaenon texanus* (Girault). *Gonatocerus texanus* Girault, 1911 [96]: 270; lectotype ♀ in USNM (examined). **TL:** USA, Texas, College Station. Synonymy under *G. anthonomi* by Girault, 1929 [428]: 26. Synonymy under *G. litoralis* by Triapitsyn, 2013a: 83.
- Lymaenon lomonosoffi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus lomonosoffi* Girault, 1913 [158]: 79; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Kuranda.
- Lymaenon longiclava* Viggiani & Jesu, 1995: 104; holotype ♀ in DEZA. **TL:** Cape Verde Islands, São Jorge.
- Lymaenon longior* (Soyka), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus longior* Soyka 1946: 38; holotype ♀ in NHMW (examined). Triapitsyn, 2013a: 99 (placed in *Gonatocerus* (*Lymaenon*)). **TL:** Austria, Hundsheim [incorrectly stated as Holland, Valkenburg, in Matthews, 1986: 224].
- Lymaenon conicus* Mathot, 1969: 3; holotype ♀ in IRSNB. **TL:** Belgium, Tervuren. Synonymy under *G. longior* by Triapitsyn, 2013a: 99.
- Lymaenon macauleyi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus macauleyi* (Girault, 1920 [353]: 99; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Watsonville.
- Lymaenon maculatus* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus maculatus* (Zeya) in Zeya & Hayat, 1995: 117; holotype ♀ in BMNH (examined). **TL:** India, Uttar Pradesh, Aligarh.
- Lymaenon malanadensis* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus malanadensis* Subba Rao, 1989: 153; holotype ♀ in BMNH (examined). **TL:** India, Karnataka, Mudigere.
- Lymaenon manaliensis* (Zeya & Anwar), **comb. n.** from *Gonatocerus*. *Gonatocerus manaliensis* Zeya & Anwar, 2013: 119; holotype ♀ in ZDAMU. **TL:** India, Himachal Pradesh, Manali.
- Lymaenon mazzinini* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus mazzinini* Girault, 1913 [165]: 114; holotype ♀ in QMBA (examined). **TL:** Australia: Queensland, Cairns, opposite Double Island.
- Lymaenon mediterraneus* (Donev & Triapitsyn), **comb. n.** from *Gonatocerus*. *Gonatocerus* (*Lymaenon*) *mediterraneus* Donev & Triapitsyn in Triapitsyn *et al.*, 2013: 281; holotype ♀ in PUPB. **TL:** Greece, Crete, Heraklion.
- Lymaenon merces* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus merces* Girault, 1913 [165]: 113; holotype ♀ in QMBA (examined). **TL:** Australia: Queensland, Nelson [= Gordonvale].
- Lymaenon metchnikoffi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus metchnikoffi* Girault, 1912 [120]: 132; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale], Mulgrave River.
- Lymaenon mirissimus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus mirissimus* Girault, 1913 [165]: 112; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon mirus* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus mirus* Girault, 1938 [452]: 396; holotype ♀ in QMBA (examined). Lin *et al.*, 2007: 36 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Kuranda.
- Lymaenon mitjaevi* (Triapitsyn & Rakitov), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus* (*Lymaenon*) *mitjaevi* Triapitsyn & Rakitov in Rakitov & Triapitsyn, 2013: 545; holotype ♀ in UCRC. **TL:** Uzbekistan, Bukhara, Kagan, Ecocenter “Dzheyran”.
- Lymaenon molindianus* Debauche, 1949: 38; holotype ♀ in MRAC. **TL:** Congo, Parc National Albert, Molindi River, between Kirumba and Lake Kibuga.



- Lymaenon mosesi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus mosesi* Girault, 1938 [452]: 395; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon munnarus* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus munnarus* Mani & Saraswat, 1973: 89; holotype ♀ in USNM (examined). **TL:** India, Tamil Nadu, Anamalai Hills, Munnar.
- Lymaenon musa* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus musa* Girault, 1938 [452]: 392; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Brisbane, Mt. Cootha.
- Lymaenon musa bayardi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus musa bayardi* Girault, 1938 [452]: 393; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon narayani* Subba Rao & Kaur, **comb. rev.** from *Gonatocerus*. *Lymaenon narayani* Subba Rao & Kaur, 1959: 227; holotype ♀ in IARI. Subba Rao & Hayat, 1983: 136 (transferred to *Gonatocerus*). **TL:** India, Delhi.
- Lymaenon nassaui* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nassaui* Girault, 1938 [452]: 395; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Kingston.
- Lymaenon ngandoi* Debauche, 1949: 47; holotype ♀ in MRAC. **TL:** Rwanda, Lake Ngando, base of Karisimbi volcano.
- Lymaenon nigricornis* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nigricornis* Girault, 1917 [303a]: 13; holotype ♀ in ZMHB. **TL:** German East Africa [= Tanzania], no locality given.
- Lymaenon nigricorpus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nigricorpus* Girault, 1917 [303a]: 14; holotype ♀ in ZMHB (lost). **TL:** German East Africa [= Tanzania], no locality given.
- Lymaenon nigratarsis* (Ashmead), **comb. n.** from *Gonatocerus*. *Gonatocerus nigratarsis* Ashmead, 1887: 192; holotype ♀ in USNM (examined). **TL:** USA, Florida, Jacksonville.
- Lymaenon nonsulcatus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nonsulcatus* Girault, 1915 [228]: 157; holotype ♂ in QMBA (examined). **TL:** Australia, Queensland, Cloncurry.
- Lymaenon notabilis* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus notabilis* Girault, 1938 [452]: 394; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Indooroopilly.
- Lymaenon novickyi* (Soyka), **comb. n.** from *Gonatocerus* (*Lymaenon*). *Gonatocerus novickyi* Soyka, 1946: 38; holotype ♀ in NHMW (examined). [A “co-type” in USNM (examined) belongs to *Gonatocerus*]. Triapitsyn, 2013a: 99 [placed in *Gonatocerus* (*Lymaenon*)]. **TL:** Austria, Ziklake near St. Andrä, Neusiedler See.
- Lymaenon fossarum* Hincks. *Lymaenon fossarum* Hincks, 1952: 64; holotype ♀ in MMUE. Bouček & Graham, 1978a: 109 (transferred to *Gonatocerus*). **TL:** England, Humberside, Spurn, Walker Butts Bank Dyke.
- Synonymy under *G. novickyi* by Matthews, 1986: 227.
- Lymaenon nox* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nox* Girault, 1913 [155]: 258; holotype ♀ in QMBA (lost). **TL:** Australia, Queensland, Ayr.
- Lymaenon nuntius* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus nuntius* Girault, 1920 [353]: 99; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Watsonville.
- Lymaenon nyashekensis* Debauche, 1949: 33; holotype ♀ in MRAC. **TL:** Congo, Parc National Albert, Nyasheke, Nyamuragira volcano.
- Lymaenon orientalis* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus orientalis* Girault 1917 [303a]: 13; holotype ♀ in ZMHB. **TL:** German East Africa [= Tanzania], no locality given.
- Lymaenon ornatus* (Gahan, 1918), **comb. n.** from *Gonatocerus*. *Gonatocerus ornatus* Gahan, 1918: 23; holotype ♀ in USNM (examined). **TL:** USA, Arizona, Tempe.
- Lymaenon pachyscapa* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus pachyscapa* Girault, 1915 [245]: 359; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Capeville (Pentland).
- Lymaenon partifuscipennis* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus partifuscipennis* Girault, 1916 [265]: 102; holotype ♀ in USNM (examined). **TL:** USA, Maryland, Glendale.
- Lymaenon pater* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus pater* Girault, 1920 [353]: 99; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Watsonville.
- Lymaenon perdix* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus perdix* Girault, 1938 [452]: 392; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Dayboro.
- Lymaenon poincarei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus poincarei* Girault, 1913 [165]: 113; holotype ♀ in QMBA (destroyed). **TL:** Australia, Queensland, Harvey’s Creek.
- Lymaenon pratensis* Ogloblin, 1936: 48, **comb. rev.** from *Gonatocerus* (*Lymaenon*). *Lymaenon pratensis* Ogloblin, 1936: 48; lectotype ♀ in MLPA. De Santis, 1967: 10, 105 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010:

- 53 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Argentina: Misiones, Loreto.
- Lymaenon prometheus* (Girault), **comb. n.** from *Gonatocerus*. *Ooctonus prometheus* Girault, 1915 [228]: 155; holotype ♀ in QMBA (examined). Lin *et al.*, 2007: 36 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Kuranda.
- Lymaenon prongandoi* Viggiani & Jesu, 1995: 102; holotype ♀ in DEZA. **TL:** Cape Verde Is., São Jorge.
- Lymaenon protamiramus* Viggiani & Jesu, 1995: 106; holotype ♀ in DEZA. **TL:** Cape Verde Is., São Jorge.
- Lymaenon pygmaeus* (Girault), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus pygmaeus* Girault, 1911 [96]: 269; lectotype ♀ in USNM (examined). Triapitsyn, 2013a: 68 [placed in *Gonatocerus (Lymaenon)*]; Triapitsyn, 2013b: 220 (lectotype designation). **TL:** USA, Mississippi, no locality given.
- Lymaenon ramakrishnai* Subba Rao & Kaur, **comb. rev.** from *Gonatocerus*. *Lymaenon ramakrishnai* Subba Rao & Kaur, 1959: 232; holotype ♀ in IARI. Subba Rao & Hayat, 1983: 136 (transferred to *Gonatocerus*). **TL:** India, Delhi.
- Lymaenon ramamurthyi* (Zeya & Anwar), **comb. n.** from *Gonatocerus*. *Gonatocerus ramamurthyi* Zeya and Anwar, 2013: 120; holotype ♀ in ZDAMU. **TL:** India, Uttarakhand, Roorkee, Chhittarwala.
- Lymaenon renani* (Girault), **comb. n.** from *Gonatocerus*. *Cosmocomoidea renani* Girault, 1913 [160]: 327; holotype ♀ in QMBA (examined). Girault, 1913 [165]: 110 (transferred to *Gonatocerus*). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon rohinavotrae* Risbec, 1952: 438; holotype ♀ in MHNP (examined). **TL:** Madagascar, La Mandraka.
- Lymaenon romae* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus romae* Girault, 1928 [421]: 3; holotype ♀ in QMBA. **TL:** Australia, Queensland, Roma.
- Lymaenon romae boiardini* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus romae boiardini* Girault, 1938 [452]: 392; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Gatton.
- Lymaenon saintpierrei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus saintpierrei* Girault 1913 [173]: 112; holotype ♂ in QMBA. **TL:** Australia, Queensland, Kuranda.
- Lymaenon langlandi* Girault, 1938 [452]: 395. Unnecessary replacement name for *Lymaenon saintpierrei* (Girault, 1913), not *Boudiennyia saintpierrei* (Girault, 1913), as explained in Lin *et al.*, 2007: 36.
- Lymaenon saulfrommeri* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) saulfrommeri* Triapitsyn, 2013a: 107; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Kray, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon shakespearei* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus shakespearei* Girault, 1915 [228]: 158; 2 ♀ syntypes in QMBA (examined). **TL:** Australia, Northern Territory, Port Darwin; Queensland, Cloncurry.
- Lymaenon silhouettae* (Masi). *Gonatocerus silhouettae* Masi, 1917: 228; holotype ♀ in BMNH (examined). Heqvist, 1960: 430 (transferred to *Lymaenon*). **TL:** Seychelles Is., Silhouette I., Mare aux Cochons.
- Lymaenon spectabilis* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus spectabilis* Zeya, in Zeya & Hayat, 1995: 110; holotype ♀ in BMNH (examined). **TL:** India, Uttar Pradesh, Aligarh.
- Lymaenon spinozae* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus spinozae* Girault, 1912 [120]: 140; holotype ♀ in QMBA. **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon straeleni* (Debauche), **comb. n.** from *Gonatocerus (Lymaenon)*. *Decarthrius straeleni* Debauche, 1949: 23; holotype ♀ in MRAC (examined). Annecke & Doult, 1961: 13 (transferred to *Gahanopsis* and synonymy under *G. deficiens*); Triapitsyn *et al.*, 2010: 42 [transferred to *Gonatocerus (Lymaenon)*; implied removal from synonymy under *G. deficiens*]. **TL:** Congo: Parc National Albert, Nyasheke, Nyamuragira volcano, 1820m.
- Lymaenon sulcatus* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus sulcatus* Girault, 1915 [228]: 157; holotype ♂ in QMBA (examined). **TL:** Australia, Queensland, Cloncurry.
- Lymaenon sundus* (Zeya & Anwar), **comb. n.** from *Gonatocerus*. *Gonatocerus sundus* Zeya & Anwar, 2013: 117; holotype ♀ in ZDAMU. **TL:** India, West Bengal, Darjeeling, Gorabari.
- Lymaenon svat* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) svat* Triapitsyn, 2013a: 107; holotype ♀ in UCRC. **TL:** China, Beijing, Mentougou District, Xiaolongmen Station.
- Lymaenon tamilanus* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus tamilanus* Mani & Saraswat, 1973: 93; holotype ♀ in USNM (examined). **TL:** India, Vanadur forest.
- Lymaenon tamiranus* Debauche, 1949: 50; holotype ♀ in MRAC. **TL:** Rwanda, Mount Tamira, near Lake Ngando.
- Lymaenon taringae* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus taringae* Girault, 1938 [452]: 394;

- holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Taringa.
- Lymaenon terrigena* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus terrigena* Girault, 1938 [452]: 392; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Dayboro.
- Lymaenon thyrides* Debauche, **comb. rev.** from *Gonatocerus (Lymaenon)*. *Lymaenon thyrides* Debauche, 1948: 101; holotype ♀ in IRSNB (examined). Matthews, 1986: 223 (implied transfer to *Gonatocerus*). Triapitsyn, 2013a: 109 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Belgium, Forêt de Loverval.
- Lymaenon tolstooi* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus tolstooi* Girault, 1913 [158]: 78; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon triapitsyni* (Zeya, Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus triapitsyni* Zeya, Manickavasagam & Rameshkumar, 2012: 6; holotype ♀ in ZDAMU. **TL:** India, Uttar Pradesh [no locality given].
- Lymaenon tricolor* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus tricolor* Girault, 1913 [165]: 112; holotype ♂ in QMBA (examined, only one fore wing remaining). **TL:** Australia, Queensland, Nelson [= Gordonvale].
- Lymaenon ucri* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) ucri* Triapitsyn, 2013a: 113; holotype ♀ in ZIN. **TL:** Russia, Primorskiy Krai, Ussuriyskiy rayon, Gornotayozhnoye.
- Lymaenon vanharteni* (Jesu & Viggiani), **comb. n.** from *Gonatocerus*. *Gonatocerus vanharteni* Jesu & Viggiani, 2004: 79; holotype ♀ in ?DEZA (type depository not given); Triapitsyn, 2013a: 5 (species name in original description unavailable). **TL:** Yemen, Lahj.
- Lymaenon venustus* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus venustus* Zeya in Zeya & Hayat, 1995: 123; holotype ♀ in BMNH (examined). **TL:** India, Bihar, Davision, Gaya.
- Lymaenon vidanoi* Viggiani & Jesu, **comb. rev.** from *Gonatocerus (Lymaenon)*. *Lymaenon vidanoi* Viggiani & Jesu, 1987: 29; holotype ♀ in DEZA. Triapitsyn, 2013a: 115 [placed in *Gonatocerus (Lymaenon)*]. **TL:** Italy, Torino, Susa.
- Lymaenon vladimiri* (Triapitsyn), **comb. n.** from *Gonatocerus (Lymaenon)*. *Gonatocerus (Lymaenon) vladimiri* Triapitsyn, 2013b: 220; holotype ♀ (USNM). **TL:** USA, New York, Ontario Co., Geneva, Cornell University New York State Agricultural Experiment Station.
- Lymaenon wittei* Debauche, 1949: 52; holotype ♀ in MRAC. **TL:** Rwanda, Ruhengeri, Kiri springs.
- Lymaenon yerongae* (Girault), **comb. n.** from *Gonatocerus*. *Gonatocerus yerongae* Girault, 1938 [452]: 394; holotype ♀ in QMBA (examined). **TL:** Australia, Queensland, Brisbane, Teronga [Yeronga].

### ***Octomicromeris* Huber, gen. n.**

(Figs 191–220)

**Type species.** *Octomicromeris compacta* Huber, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Octomicromeris* are distinguished by the following combination of features: propodeum with a sublateral carina between submedian carina and metapleural sulcus; female antenna with funicle short, the segments at most not much longer than wide, with mps apparently only on fl<sub>1</sub> and fl<sub>2</sub>; parastigma short, at most half as long as submarginal vein, and with almost truncate apex; ovipositor sheaths at most as long as metatibia.

**Description. FEMALE.** Medium to large, compact specimens, 770–1410 µm in length. **Colour.** Almost entirely dark yellow to almost entirely brown. Fore wings uniformly hyaline. **Head.** Head (Figs 191, 199, 205–208) 1.46–1.94× as wide as long and 1.24–1.46× as wide as high; in lateral view with anterior surface convex below torulus, then strongly receding to mouth. Face about 0.86–1.3× as wide as high; subantennal sulci present, slightly converging ventrally, the distance between them at mouth margin about the same as their distance from preorbital sulci; preorbital sulcus almost straight, appressed against eye at level of torulus, then separated from eye and continuing to mouth margin, and meeting malar sulcus just lateral to mediolateral angle of mouth (Fig. 205). Toruli touching or almost touching transverse trabecula. Eye in lateral view slightly longer to slightly shorter than high, dorsally extending to back of head or almost so, then diverging sharply from back of head. Malar space about 0.5× eye height; malar sulcus present, straight or very slightly curved and extending from ventral angle of eye to mouth. Gena in lateral view narrow or absent dorsally, wide ventrally and merging smoothly into occiput. Vertex in lateral view usually strongly oblique and forming an obtuse angle with face but sometimes almost horizontal, at almost right angle to face (separated by transverse trabecula), posteriorly separated from occiput by ill-defined angle and

transverse sulcus behind and between ocelli. Ocelli with LOL about 0.3–0.5× POL, and OOL about 0.5× POL. Occiput entire. Labrum with about 6 setae. Mandible with 3 normal teeth (Fig. 209). **Antenna.** Scape about 5.0× as long as wide, with radicle distinct, narrow, about 0.29–0.34× scape length; pedicel about 0.19–0.22× scape length, distinctly longer than fl<sub>1</sub>; funicle 8-segmented, all the segments at most not much longer than wide, often shorter than wide (particularly fl<sub>8</sub>); fl<sub>5</sub> and fl<sub>7</sub> only with 2 mps; clava at least 0.75× funicle length, with 7 mps. **Mesosoma.** About 1.2–1.8× as long as wide, 1.3–1.4× as long as high, and 0.9–1.1× wide as high. Pronotum in dorsal view very short, just visible medially, longitudinally divided by a short, fine longitudinal suture, the lobes closely abutting medially, in lateral view with anterior surface separate from lateral surface by a fine line, and with median surface almost vertical. Pronotal spiracle small, about same size as propodeal spiracle. Propleura normal. Prosternum triangular, divided posteriorly by longitudinal suture extending less than half its length. Mesoscutum in dorsal view with fine (barely visible in micrographs), almost straight to slightly curved and diverging notauli. Transscutal articulation almost straight. Scutellum about as wide as long. Axilla normal. Prepectus extremely narrow, thread-like. Mesopleuron oval and truncate at both ends, with fine line separating mesepimeron from mesepisternum. Metanotum with dorsellum rectangular, its posterior margin evenly convex. Metapleuron triangular, separated from propodeum by thin, slightly curved sulcus or carina. Propodeum in lateral view sloping strongly, in almost same plane as dorsellum or at an obtuse angle; in dorsal view with four carinae—slightly curved and dorsally converging submedian carinae and almost straight, strongly diverging sublateral carinae (originating at lateral margin of petiole) nearer to submedian carina than to junction with metanotum. Propodeal spiracle small, separated by about its diameter from metanotum. **Wings.** Fore wing at most about 3.0× as long as wide and covered with microtrichia to base of parastigma, though not always evenly behind venation. Venation almost 0.4× wing length. Submarginal vein with the usual basal setae (1 macrochaeta and 1 hypochaeta) and a fairly short hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigmal vein) about 0.5× length of submarginal vein, with 1 hypochaeta about midway between proximal and distal macrochaeta, and about 1 or 2 shorter setae between the macrochaetae. Stigmal vein with apex slightly oblique (somewhat truncate). Hind wing normal. Venation about 0.4× wing length. **Metasoma.** Petiole short, wider than long. Gaster about 1.0–2.2× as long as high. Terga often with narrow, white membrane visible between them. Ovipositor sheaths much shorter than gaster and shorter than metatibia to almost as long as gaster and longer than metatibia, and at most very slightly exerted, with 1 subapical seta.

**MALE.** Body length 998–1152. **Colour.** Body in yellow species where male can be associated, the dark colour generally more extensive than in female. **Antenna.** Scape about 3.1× as long as wide, with radicle not very distinct, about 0.32× scape length; pedicel about 0.47× scape length and shorter than fl<sub>1</sub>; flagellomeres about 2.3× as long as wide, each with about 8 mps. **Metasoma.** Petiole up to 1.3× as long as wide. Genitalia with short aedeagal apodemes and apodeme of genitalia sternite absent (Figs 197, 198).

**Discussion.** Only 19 specimens of *Octomicromeris* were seen. Two species are described below. There appear to be two additional species. They are not described here because more material is needed to differentiate them properly.

**Etymology.** From Greek “okto” meaning eight, “mikro-” meaning small, and “meris” meaning part. The name refers to the eight small funicle segments in the female antenna and, incidentally, to the very short parastigma + stigmal vein, and short ovipositor sheaths. The gender is feminine.

**Distribution.** *Octomicromeris* species occur only in Madagascar.

**Hosts and habitat.** Hosts are unknown. Specimens have been collected in forests.

**Included species:**

*Octomicromeris brevis* Huber; holotype ♀ in CAS. **TL:** Madagascar, Fianarantsoa, Ranomafana National Park, Vatharanana River, 1100 m.

*Octomicromeris compacta* Huber; holotype ♀ in CAS. **TL:** Madagascar, Antsiranana, Ampasindava, Forêt d’Ambilanivy.

### Key to species of *Octomicromeris*. Females

- 1 Mesosoma yellow except for mostly brown frenum (Fig. 202), strongly contrasting with brown head ..... *O. compacta* Huber, sp. n.

- Mesosoma entirely brown or almost so (Fig. 195), same colour as head . . . . . *O. brevis*  
Huber, sp. n.

***Octomicromeris brevis* Huber, sp. n.**

(Figs 192–198)

**Type material.** Holotype ♀ (CAS), on slide (Fig. 193) labelled: 1. “Madagascar: Prov. Fianarantsoa Parc National de Ranomafana Vatharanana River 1100 m, 21°17.24'S 47°26'00"E 27–21.iii.2003, Fisher, Griswold *et al.* YPT in montane rainforest BLF8399 CAS Lot # 011175". 2. “Octomicromeris brevis Huber ♀ Holotype”.

**Paratypes.** 1 ♀, 3 ♂. **MADAGASCAR. Fianarantsoa.** Ranomafana National Park, Vohiparara, 1130 m, 21°15.05'S 47°24'43"E, 14–21.i.2002 and 20.iii–3.iv.2003, R. Harin'Hala, mixed tropical rainforest, MT, #09561, #011186, #011360 (1 ♀, 2 ♂, CAS). **Diego Suarez.** Montagne d'Ambre National Park, 960 m, 12°30'52"S 49°10'53"E, 19.iii–5.iv.2001, R. Harin'Hala, MT, #007146, (1 ♂, CAS).

**Diagnosis.** The entirely brown mesosoma distinguishes *O. brevis* from *O. compacta* females (male is unknown), which has the mesosoma yellow except for a brown spot covering almost the entire frenum.

**Description. FEMALE.** Body length 794 (n=1). **Colour.** Head, antenna except scape, pedicel and fl<sub>1</sub>, mesosoma, procoxa, and apical half of gaster brown; scape, pedicel mostly, fl<sub>1</sub>, petiole and legs except procoxa yellow. Wings with a brown suffusion over most of surface, somewhat less pronounced towards apex. **Head.** Head width 306 (n=1). **Antenna.** Funicle segments fl<sub>5</sub> and fl<sub>7</sub> with 2 mps (Fig. 192). Antennal measurements (holotype), length/width (ratios of funicle segments): scape 309/63, pedicel 69/45, fl<sub>1</sub> 37/28 (1.32), fl<sub>2</sub> 26/28 (0.93), fl<sub>3</sub> 30/39 (0.77), fl<sub>4</sub> 26/28 (0.93), fl<sub>5</sub> 40/30 (1.33), fl<sub>6</sub> 28/31 (0.90), fl<sub>7</sub> 35/35 (1.0), fl<sub>8</sub> 29/46 (0.63), clava 258/68. **Mesosoma.** Propodeum with submedian carinae not quite extending to dorsellum and slightly converging dorsally; sublateral carinae as long as submedian carinae (Fig. 195). **Wings.** Fore wing (Fig. 194) length (holotype) 1230, width 437, length/width 2.82, longest marginal setae 92. Hind wing length 946, width 52, longest marginal setae 118. **Metasoma.** Ovipositor sheath length (holotype) 273, distinctly shorter than metatibia length (374) and not exerted beyond apex of gaster (Fig. 196).

**MALE. Colour.** Body darker brown than in female, with scape, pedicel, legs except brown metatibia, petiole and base and underside of gaster yellowish. Body length 819–1024 (n=2). **Antenna.** Measurements (n=1): scape length/width 118/37, pedicel length/width 55/39, flagellar segments length: fl<sub>1</sub> 70, fl<sub>2</sub> 80, fl<sub>3</sub> 89, fl<sub>4</sub> 99, fl<sub>5</sub> 93, fl<sub>6</sub> 91, fl<sub>7</sub> 94, fl<sub>8</sub> 92, fl<sub>9</sub> 95, fl<sub>10</sub> 94, fl<sub>11</sub> 96; total flagellar length 984; fl<sub>6</sub> length/width 2.33, with 9 mps. **Genitalia.** As in generic description (Figs 197, 198).

**Etymology.** The species name is a Latin adjective meaning short, referring to the short ovipositor sheaths.

***Octomicromeris compacta* Huber, sp. n.**

(Figs 199–204)

**Type material.** Holotype ♀ (CAS), on slide (Fig. 200) labelled: 1. “Madagascar: Prov. d’Antsiranana, Ampasindava, Forêt d’Ambilanivy, 3.9 km 41° S Ambaliha 13°47'55"S 46°09'42"E, 800m, 4–9.iv.2001, Fisher, Griswold *et al.*, CAS MT, rainforest CAS Lot # 007134". 2. “Octomicromeris compacta Huber ♀ Holotype”.

**Paratypes.** 6 ♀. **MADAGASCAR. Antananarivo.** 3 km 41° NE Andranomay, 11.5 km 147° SSE Anjozorobe, 18°28'34"S 47°57'36"E, 1300m, 5–13.xii.2000, Fisher, Griswold *et al.*, montane rainforest, MT, #005502, #066042 (2 ♀, CAS). **Diego-Suarez.** Montagne d'Ambre National Park, 12°30'52"S 49°10'53"E, 960m, 19.iii–5.iv.2001, R. Harin'Hala, MT, #007146 (1 ♀, CAS). **Toliara.** 29.2 km 343° NNW Mahaboboka, Forêt Classé d'Analavelona, 22°40'30"S 44°11'24"E, 1100m, 18–22.ii.2003, Fisher, Griswold, montane rainforest, YPT, #011349 (3 ♀, CAS, CNC).

**Diagnosis.** The brown head contrasting with the yellow mesosoma (except for a round brown spot covering the frenum) distinguishes females of *O. compacta* (male is unknown) from *O. brevis* (both head and mesosoma entirely brown).

**Description. FEMALE.** Body length 1024–1255 (n=5). **Colour.** Head, antenna except most of scape, frenum, part of gaster (gt<sub>4</sub>–gt<sub>5</sub> and less so gt<sub>3</sub>) and, usually, metatibia brown; scape at extreme apex, mesosoma except frenum, most of gaster and legs, usually except metatibia, yellow. **Head.** Head (Fig. 199) width 354–379 (n=2).

**Antenna.** Funicle segments fl<sub>5</sub> and fl<sub>7</sub> with 2 mps (Fig. 199). Antennal measurements (holotype), length/width (ratios of funicle segments): scape 352–371/71–72, pedicel 71–75/44, fl<sub>1</sub> 41–49/31 (1.34–1.58), fl<sub>2</sub> 33–38/29–32 (1.12–1.22), fl<sub>3</sub> 40–41/29–30 (1.32–1.43), fl<sub>4</sub> 38–40/30–32 (1.19–1.33), fl<sub>5</sub> 52–53/34–36 (1.48–1.50), fl<sub>6</sub> 36–38/34–37 (0.98–1.10), fl<sub>7</sub> 39–44/41–43 (0.91–1.07), fl<sub>8</sub> 37/53–58 (0.65–0.70), clava 246–254. **Mesosoma.** Propodeum with submedian carinae not quite extending to dorsellum and almost parallel; sublateral carinae as long as submedian carinae (Fig. 202). **Wings.** Fore wing (Fig. 202) length (n=2) 1185–1224, width 412–416, length/width 2.87–2.97, longest marginal setae 78–89. Hind wing length 936–994, width 56–60, longest marginal setae 112–118. **Metasoma.** Ovipositor sheath length (n=2) 349–423, slightly shorter to slightly longer than metatibia length (~355–370) and slightly exerted beyond apex of gaster (Figs 203, 204).

**MALE.** Unknown.

**Etymology.** The species name is a Latin adjective meaning compact.

### ***Progonatocerus* Huber, gen. n.**

(Figs 221–247)

**Type species.** *Progonatocerus albiclava*, **sp. n.**, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Progonatocerus* are distinguished by the following combination of features: pronotum entire (Figs 239, 241, 242); scutellum with two short longitudinal subcuticular lines lateral 50 to the campaniform sensilla, visible in cleared slide mounts (Fig. 227). Males have an unusually long flagellum (Fig. 235).

**Description. FEMALE.** Moderately sized specimens, 973–1306 µm in length. **Colour.** Body yellow with various amounts of brown on gaster, and antenna except clava dark brown; clava usually white or cream-coloured (Figs 221, 226, 234).

**Head.** Head (Figs 222, 228), about 1.52–1.73× as wide as long and about 0.83× as wide as high; in lateral view with anterior surface quite strongly convex ventral to torulus (Fig. 240). Face as wide as high (Fig. 222); subantennal sulci present, slightly converging, the distance between them at mouth margin less than their distance from preorbital sulci; preorbital sulcus closely following inner orbit almost to lower margin of eye then curving slightly inward to dorsolateral corner of mouth. Toruli almost touching transverse trabecula. Eye in lateral view slightly higher than long, dorsally extending to back of head (Figs 239, 240). Malar space about 0.3× eye height; malar sulcus almost straight, extending from posteroventral angle of eye to mouth margin about midway between mandibular condyles. Vertex in lateral view oblique, forming obtuse angle with face (separated by transverse trabecula), posteriorly acutely angled at junction with occiput (Figs 240, 241), with a sulcus extending behind lateral ocelli from eye to eye. Ocelli with LOL about 0.5× POL and OOL about 0.6× POL, with 2 setae between lateral ocelli. Occiput entire. Labrum with 3 setae. Mandible with 3 normal teeth (Fig. 222). **Antenna.** Scape about 4.3× as long as wide (Figs 226, 234) with radicle distinct, narrow 0.4–0.5× remainder of scape length; pedicel about 0.20–0.25× scape length, longer and wider than fl<sub>1</sub>; funicle 8-segmented, each segment at most with 2 mps; clava about 0.5× funicle length, apparently with 8 mps (Figs 239, 242). **Mesosoma.** About 1.7–1.8× as long as wide, 1.5–1.7× as long as high, and 0.9–1.0× as wide as high (Figs 227, 228, 242, 243). Pronotum (Figs 238, 239, 242) entire, in dorsal view short and almost vertical but still slightly visible, merging smoothly with lateral panel. Pronotal spiracle about same size as propodeal spiracle (Fig. 243). Propleura normal. Prosternum rhomboidal, divided posteriorly by longitudinal sulcus extending at least half its length. Mesonotum in dorsal view with fairly wide but shallow, fairly straight and slightly diverging notauli. Transscutal articulation straight. Scutellum longer than wide, anteriorly with two short longitudinal subcuticular lines extending from scutoscutellar suture just medial to posterior apex of notauli and lateral to scutellar campaniform sensilla towards anterior margin of frenum (Fig. 227). Axilla normal. Prepectus narrow, slightly wider medially and ventrally than dorsally. Mesopleuron spindle-shaped and truncate at both ends with fine sulcus separating mesepisternum from mesepimeron. Metanotum with triangular dorsellum, its posterior margin quite strongly convex. Metapleuron triangular, separated from propodeum by complete but fine line. Propodeal spiracle small, separated by about its diameter from metanotum. **Wings.** Fore wing 3.7–4.0× as long as wide, with microtrichia fairly dense and uniform over entire surface to base of parastigma except absent narrowly anterior to retinaculum (Figs 225, 233). Venation almost 0.4× wing length.

Submarginal vein with the usual two basal setae (a dorsal macrochaeta and a ventral hypochaeta) and a hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigmal vein) about  $0.9\times$  length of submarginal vein, with hypochaeta closer to distal than proximal macrochaeta and 2–5 setae between the macrochaetae. Stigmal vein with apex truncate. Hind wing normal. Venation  $4.3\times$  wing length. **Metasoma.** Petiole short, wider than long (Figs 227, 229, 245). Gaster about  $1.4\text{--}1.5\times$  as long as high. Terga with white membrane at most narrowly visible between them. Cerci abutting each other dorsally. Ovipositor sheaths (Figs 230, 231) about as long as to shorter than gaster, equal to or longer than metatibia, and slightly exerted beyond gaster apex, with 1 subapical seta.

**MALE. Colour.** Body yellow with flagellum, trabeculae and gaster medially dark brown. **Antenna.** Scape (including radicle) short, about  $2.8\times$  as long as wide, with radicle about  $0.25\times$  scape length; pedicel about  $0.46\times$  scape length; flagellum unusually long, flagellomeres each with about 8 mps. **Metasoma.** Genitalia with aedeagal apodemes about as long as aedeagus and apodeme of genital sternum absent (Fig. 237).

**Discussion.** *Progonatocerus* is similar in some ways both to *Gonatocerus* and to *Lymaenon*. *Progonatocerus* has three features resembling *Lymaenon* species—the stigmal vein apex is almost truncate (Figs 221, 225, 233),  $fl_1$  is not obliquely truncate dorsoapically, and  $fl_2$ ,  $fl_3$  and  $fl_4$  are not longer than the subsequent flagellomeres (Figs 226, 234). *Progonatocerus* also has three features resembling *Gonatocerus* species—a rhomboidal dorsellum (Figs 221, 227, 242), pronotal spiracle about the same size as propodeal spiracle (Fig. 243), and two setae in the ocellar triangle (Figs 222, 223, 239).

**Etymology.** From Latin “pro” meaning before (in the sense of earlier) and *Gonatocerus*. The name refers to its supposed earlier ancestry from which *Gonatocerus* and *Lymaenon* may have arisen. The gender is masculine.

**Distribution.** *Progonatocerus* species occur in the Oriental region. About 25 specimens representing perhaps three species were examined from Indonesia (Sumatra), Malaysia, Thailand, Vietnam. Two species are described here.

**Hosts and habitat.** Hosts are unknown. Specimens have been collected in forests.

**Included species:**

*Progonatocerus albiclava* Huber; holotype ♀ in CNC (examined). **TL:** Malaysia, Sabah, Danum Valley.

*Progonatocerus brunneiclava* Huber; holotype ♀ in QSBG (examined). **TL:** Thailand, Nakhon Nayok Khao Yai Nat. Park, entrance to Hnong Pak Chee Trail.

**Key to species of *Progonatocerus*. Females**

- 1 Clava yellowish white;  $fl_4$  with 2 mps (Fig. 226); ovipositor sheath at least  $530\ \mu\text{m}$  long, separated from base of gaster (at junction with petiole) by about  $0.15\times$  its own length; fore wing usually slightly wider, at least  $4.0\times$  as long as wide . . . . . *P. albiclava* Huber, sp. n.
- Clava brown (rarely with apex almost white—possibly teneral specimens);  $fl_4$  without mps (Fig. 234); ovipositor sheath at most  $430\ \mu\text{m}$  long, separated from base of gaster (at junction with petiole) by about  $0.4\times$  its own length; fore wing usually slightly narrower, at most  $4.0\times$  as long as wide . . . . . *P. brunneiclava* Huber, sp. n.

***Progonatocerus albiclava* Huber, sp. n.**

(Figs 221–231, 238–247)

**Type material.** Holotype ♀ (CNC), on slide (Fig. 224) labelled: 1. “Malaysia: Sabah, Danum Valley, 18.vii.86–18.i.1987, M. Still” 2. “Holotype *Progonatocerus albiclava* Huber ♀”.

**Paratypes.** 14 ♀, 1 ♂. **MALAYSIA. Sabah.** Same data as holotype (14 ♀, 1 ♂, CNC, UCRC, BMNH).

**Diagnosis.** Clava pale yellow,  $fl_4$  with 2 mps,  $gt_3\text{--}gt_6$  with well-defined oval brown spot separated by almost white line from brown lateral area (Fig. 221); ovipositor sheaths at least  $1.1\times$  as long as metatibia and originating at about  $0.15\times$  its length from apex of petiole.

**Description. FEMALE.** Body length 1024–1152 (n=10). **Colour.** Head except trabeculae, scape except radicle, pedicel ventrally, mesosoma, and legs except pretarsi dark yellow; pedicel dorsally, flagellum except sometimes  $fl_1$ , trabeculae, pretarsi, and  $gt_3\text{--}gt_6$  dorsomedially and laterally dark brown (gaster dorsally with well-defined oval brown spot); radicle, and gaster ventrally, basally and dorsolaterally from  $gt_3$  to posterior apex pale

yellow to almost white. **Head.** Head (Figs 221, 222, 238) width 368 (n=1). **Antenna.** Funicle segments fl<sub>4</sub>–fl<sub>8</sub> each with 2 mps (Fig. 226). Antennal measurements (n=3) length/width (ratios of funicle segments): scape 414–436/48–58, pedicel 74–87/44–46, fl<sub>1</sub> ~50–63/33–38 (~1.33–1.80), fl<sub>2</sub> 59–68/33–36 (1.63–2.22), fl<sub>3</sub> 70–80/32–36 (2.02–2.21), fl<sub>4</sub> 82–85/36–38 (2.23–2.31), fl<sub>5</sub> 85–90/34–39 (2.23–2.48), fl<sub>6</sub> 84–86/33–42 (1.99–2.61), fl<sub>7</sub> 86–90/40–47 (2.04–2.17), fl<sub>8</sub> 85–90/45–52 (1.66–1.97), clava 322–334/79–88. **Mesosoma.** As in generic description (Figs 227, 228, 242, 243). **Wings.** Fore wing (Fig. 225) length (n=3 1359–1380), width 327–329, length/width 4.01–4.22, longest marginal setae 95–106. Hind wing length 1061–1088, width 33–36, longest marginal setae 124–135. **Metasoma.** Ovipositor sheath length 534–548 (n=3) distinctly longer than metatibia length (462–484) and slightly exerted beyond apex of gaster (Figs 229–231), with 1 apical seta.

**MALE. Colour.** Body as in female except flagellum and gaster from gt<sub>3</sub> to apex brown. Body length 1175 (n=1). **Antenna.** Measurements (n=1, card mount): scape length/width 150/50, pedicel length/width 60/45, flagellar segments length: fl<sub>1</sub> 140, fl<sub>2</sub> 180, fl<sub>3</sub> 180, fl<sub>4</sub> 180, fl<sub>5</sub> 180, fl<sub>6</sub> 180, fl<sub>7</sub> 160, fl<sub>8</sub> 160, fl<sub>9</sub> 160, fl<sub>10</sub> 160, fl<sub>11</sub> 160; total flagellar length 1840; fl<sub>6</sub> length/width 4.5, with about 8 mps. **Metasoma.** Genitalia not examined (slide of unique male not prepared).

**Etymology.** The species name is a Latin adjective for white, referring to the colour of the clava.

***Progonatocerus brunneiclava* Huber, sp. n.**  
(Figs 232–237)

**Type material.** Holotype ♀ (QSBG), on slide (Fig. 232) labelled: 1. “Thailand: Nakhon Nayok Khao Yai Nat. Park, entrance to Hnong Pak Chee Trail 14°27.115'N 101°21.951'E 733m, 7–8.v.2007, YPT Pong Sandao, #2258” 2. “*Progonatocerus brunneiclava* Huber ♀ Holotype”.

**Paratypes.** 10 ♀, 9 ♂. **THA'-. Nakhon Nayok.** Same data as holotype but #2258 (1 ♀, CNC); same data as holotype but 11–12.v.2007, #2262 (4 ♀, 2 ♂, QSBG, CNC); same data as holotype but 5–12.v.2007, Wirat Sukho, MT, #2264 (3 ♂, QSBG); Khao Yai Nat. Park, 750m, 14°24.515'N 101°22.432'E, 26.ii–5.iii.2007, Wirat Sukhot, #2252 (2 ♀, QSBG); Khao Yai Nat. Park, near Hnong Pak Chee Trail, 699m, 14°27.119'N 101°21.482'E, 19–26.v.2007, W. Sukho, evergreen forest, MT, #2271 (1 ♀, 1 ♂, CNC); Khao Yai Nat. Park, near Training Centre 2, 750m, 14°24.515'N 101°22.432'E, 5–12.ii.2007, Pong Sandao, MT (1 ♀, UCRC). **Nakhon Ratchasima.** Khao Yai Nat. Park, Pong Nong Ma Khee, 14°28.285'N 101°22.57'E, 751m, 12–19.iv.2007, Wirat Sukho, MT, #2225 (1 ♀, QSBG); Khao Yai Nat. Park, elephant trail near fire protection office, 14°28.285'N 101°22.57'E, 19–26.vi.2007, Wirat Sukho, MT, #2228 (1 ♂, QSBG). **Phitsanulok.** Thung Salaeng Lung Nat. Park, staff house, Gang Sopa waterfall, 16°52.677'N 100°49.257'E, 486m, 21–28.x.2006, Pongpitak Pranee, #764, MT (1 ♂, CNC); Thung Salaeng Lung Nat. Park, Gang Sopa waterfall, 16°52.464'N 100°49.665'E, 501m, 4–12.xi.2006, P. Pranee, mixed deciduous forest, #772, MT (1 ♂, CNC).

**Diagnosis.** Clava brown, sometimes yellowish white apically, tending to brown basally (Fig. 234), occasionally almost entirely white; fl<sub>4</sub> without mps; fore wing at most 4.0× as long as wide; ovipositor sheaths equal to length of metatibia and originating at about 0.4× its length from apex of petiole.

**Description. FEMALE.** Body length 819–1050 (n=5). **Colour.** Body yellow except funicle, clava (usually), gaster from about gt<sub>4</sub>–gt<sub>6</sub> dorsomedially, and gt<sub>3</sub>–gt<sub>6</sub> laterally brown; clava occasionally only partly brown at base, rarely almost entirely white. **Head.** Head width 334–349 (n=3). **Antenna.** Funicle segments fl<sub>5</sub>–fl<sub>8</sub> with 2 mps (Fig. 234). Antennal measurements (n=3), length/width (ratios of funicle segments): scape 362–374/54–60, pedicel 80–82/42, fl<sub>1</sub> 53–54/29–32 (1.71–1.86), fl<sub>2</sub> 58–60/28–29 (2.04–2.19), fl<sub>3</sub> 63–68/28–30 (2.14–2.34), fl<sub>4</sub> 60–66/29–30 (2.07–2.28), fl<sub>5</sub> 77–78/34–36 (2.15–2.26), fl<sub>6</sub> 72–77/37–39 (1.90–2.01), fl<sub>7</sub> 71–78/41–42 (1.06–1.79), fl<sub>8</sub> 84–90/50–51 (1.66–1.76), clava 275–303/68–76. **Mesosoma.** As in generic description. **Wings.** Fore wing (Fig. 233) length (n=3) 1210–1253, width 300–343, length/width 3.68–4.03, longest marginal setae 94–98. Hind wing length 933–978, width 28–32, longest marginal setae 104–124. **Metasoma.** Ovipositor sheaths length 405–429 (n=3) equal to or slightly longer than metatibia length (387–407) and slightly exerted beyond apex of gaster.

**MALE.** Body length 819–998 (n=5). **Colour.** Body as in female except flagellum (Fig. 235) and more of gaster brown. **Antenna.** Measurements (n=2): scape length/width 120–122/41–44, pedicel length/width 55–62/37–46, flagellar segments length: fl<sub>1</sub> 126–129, fl<sub>2</sub> 160–163, fl<sub>3</sub> 158–172, fl<sub>4</sub> 156–175, fl<sub>5</sub> 157–174, fl<sub>6</sub> 152–176, fl<sub>7</sub> 150–



166, fl<sub>8</sub> 149–165, fl<sub>9</sub> 152–179, fl<sub>10</sub> 151–179, fl<sub>11</sub> 157–177; total flagellar length 1669–1854; fl<sub>6</sub> length/width 3.92–4.58, with about 8 mps. **Metasoma.** Gaster as in Fig. 236. Genitalia as in generic description (Fig. 237)

**Etymology.** The species name is Latin adjective for brown, referring to the usual colour of the clava.

### ***Tanyxiphium* Huber, gen. n.**

(Figs 248–288)

**Type species.** *Tanyxiphium seychellense* Huber, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Tanyxiphium* are distinguished by the following combination of features: female mandible small, shorter than maxilla, with 3 minute teeth (Figs 258, 264, 273, 276, 281); pronotum entire (Figs 262, 269, 271, 285); dorsellum rhomboidal (Figs 252, 262, 269); ovipositor sheaths in Old World species enormously long (Fig. 248) but in New World species ovipositor sheaths usually much shorter (Figs 253, 254), slightly to moderately extending beyond apex of gaster. Males have a distinct ‘neck’, pronotum entire but with seemingly widely separated lateral lobes (due to different colour of median area) (Figs 272, 275, 284), a wide head, and mandibles of normal size (crossing each other when closed), with 3 normal teeth (Figs 255, 280, 282).

**Description (based mainly on Old World species). FEMALE.** Medium to large, slender specimens, 770–1230 µm in length. **Colour.** Almost entirely dark yellow (except brown flagellum) to almost entirely brown. Fore wings fairly hyaline, often with a faint brown suffusion especially behind and well beyond venation. **Head.** Head (Figs 249, 258, 264, 265, 271, 273) about 2.08–2.55× as wide as long and 1.17–1.28× as wide as high; in lateral view with anterior surface distinctly angular, above torulus almost flat and vertical and below torulus almost flat and strongly receding to mouth. Face (Fig. 263) about 0.8–0.9× as wide as high, widest at level of antennifer, slightly converging above and below; subantennal sulci present and converging ventrally, the distance between them at mouth margin less than half their distance to preorbital sulci; preorbital sulcus fine, appressed against eye at level of torulus, then apparently curving medially around ventral margin of torulus and meeting dorsal apex of subantennal sulcus. Toruli at least half their length from transverse trabecula. Eye in lateral view higher (about 1.2–1.4×) than long, much of its posterior margin extending to back of head or almost so, then at about one third eye height diverging slightly away from back of head. Malar space 0.4–0.6× eye height; malar sulcus very fine, slightly curved, extending from anteroventral margin of eye to posterolateral angle of mouth. Gena in lateral view narrow or absent behind dorsal two-thirds of eye, narrow ventrally, merging into occiput by rounded angle. Vertex in lateral view strongly oblique and forming a very obtuse angle with face (Fig. 275) but sometimes almost in same plane as face, posteriorly separated from occiput by fairly sharp angle and a transverse sulcus behind and between ocelli (Fig. 271). Ocelli with LOL about 0.35–0.45× POL and OOL about 0.3–0.4× POL, the lateral ocelli oblique, facing posteriorly and on line with occipital junction, with 4 setae between them. Occiput entire. Mouth opening small, its width about equal to malar space. Labrum with 2 or 3 setae medially and 1 laterally. Mandibles small, at most as long as maxillae barely meeting medially when closed, with 2 or 3 minute teeth (Figs 249, 258, 264, 276). **Antenna.** Scape about 5.7–6.0× as long as wide, with radicle distinct, narrow, about 0.28× scape length; pedicel about 0.29× scape length, distinctly longer than fl<sub>1</sub>; funicle 8-segmented, the segments all longer than wide; clava (Figs 248, 249, 260, 266), at most about 0.45× funicle length, with 8 mps. **Mesosoma.** About 1.3–1.5× as long as wide, 1.6–1.7× as long as high, and 1.0–1.2× wide as high. Pronotum in dorsal view very short, usually just visible medially (Figs 252, 262, 269), occasionally a little longer and easily visible, apparently entire but with a median area bordered laterally by a paler area so lateral lobes apparently widely separated (somewhat resembling *Lymaenon*); in lateral view with median surface separated from vertical lateral surface by sharply rounded angle. Pronotal spiracle in wide shallow depression (somewhat resembling *Lymaenon*), slightly larger than propodeal spiracle (Fig. 269). Propleura normal. Prosternum triangular, divided posteriorly by longitudinal sulcus extending for various lengths. Mesoscutum in dorsal view with fairly wide but shallow (not or barely visible in micrographs), almost straight, slightly diverging notauli. Transscutal articulation almost straight. Scutellum slightly longer than wide. Axilla normal. Prepectus narrowly triangular, widest near dorsal apex. Mesopleuron spindle shaped and truncate at both ends, with very shallow femoral depression and with fine, barely visible line separating narrower mesepimeron from wider mesepisternum. Metanotum with triangular dorsellum, its posterior margin distinctly convex (Figs 252, 262, 269). Metapleuron triangular, separated from propodeum by thin, slightly curved line.

Propodeum in lateral view sloping slightly, in almost same plane as dorsellum or at an obtuse angle, in dorsal view smooth, without carinae and anteriorly abutting metanotum. Propodeal spiracle small, separated by at most its own diameter from metanotum. **Wings.** Fore wing 3.0–4.2× as long as wide, without microtrichia to distinctly beyond apex of venation except for cubital line of microtrichia extending to almost to base of parastigma and up to 3 scattered microtrichia between it and apex of venation (Figs 251, 261, 268). Venation almost 0.4× wing length. Submarginal vein with the usual basal setae (1 macrochaeta and 1 hypochaeta) and a hypochaeta near base of parastigma. Remaining venation (parastigma + stigmal vein) about 0.5× length of submarginal vein, with hypochaeta closer to distal than to proximal macrochaeta, and 1 or 2 shorter setae between the macrochaetae. Stigmal vein with apex slightly oblique (somewhat truncate). Hind wing normal. Venation about 0.4× wing length. **Metasoma.** Petiole short, wider than long (Figs 262, 269, 270). Gaster about 2.1–3.5× as long as high. Terga without or scarcely with membrane visible between them (Figs 248, 253, 254, 263, 270). Ovipositor sheaths short and exerted only slightly beyond gaster apex to more than 2.0× gaster length and usually well over entire body length, with its exerted portion often curved dorsally and with 1 subapical seta (Figs 248, 253, 254).

**MALE.** Body length 790–1100. **Colour.** In yellow species where male can be correctly associated with conspecific female, colour more uniform than in female, except pronotum either with narrow longitudinal white submedian bands separated by brown median area or entire median area white. **Antenna.** Flagellomeres about 2.5–3.2× as long as wide, at most with 5 mps, the basal segments each with fewer mps (Fig. 256); scape about 5.3–5.8× as long as wide, with radicle about 0.3–0.4× scape length and not very clearly separated; pedicel about 0.4× scape length and shorter than  $fl_1$ . **Head.** Head about 3.3× as wide as long. Mandibles normal, overlapping when closed, with 3 normal teeth (Figs 255, 280, 282). **Mesosoma.** Pronotum long and more gradually tapering anteriorly than in female, the head appearing well separated from mesosoma (Fig. 272) and the propleura appearing widely separated anteriorly. **Metasoma.** Genitalia with aedeagal apodemes fused at junction with base of aedeagus and not extending anteriorly past apex of apodeme of genital sternum (Fig. 257).

**Discussion.** *Tanyxiphium* is most similar to *Gonatocerus* but differs as follows: head (especially mandibles) sexually dimorphic, ocellar triangle with 4 setae between the lateral ocelli (Fig. 272), and pronotum entire. Females of the various species are distinguished from one another mainly on different ovipositor sheath lengths. Features to associate males correctly with the corresponding females and to identify the males to species are not clear, though body colour may be useful. Males can be associated by collecting them repeatedly in the same collecting events as the corresponding females. The males of only two of the five species are known and correctly associated with the corresponding females.

**Etymology.** From Greek “tany-” meaning long, and “xiphos” (diminutive “xiphion”) meaning sword, referring to the long, greatly exerted ovipositor and sheaths in most species. The gender is neuter.

**Distribution.** *Tanyxiphium* species occur in the Oriental, Afrotropical, and Neotropical regions. Numerous specimens representing several species were seen, representing both Old World and Neotropical species. Only three are described here. Three specimens collected at 2070 m in Nepal were seen; this is the highest elevation recorded for specimens of the genus. In the Old World the eastern-most specimens came from Malaysia (Sabah) and the western-most from Ivory Coast. In the New World the genus occurs from Costa Rica south to Argentina.

**Hosts and habitat.** Hosts are unknown. Specimens have been collected in forests; one species on a small island may be in a dry, more open habitat.

**Included species:**

*Tanyxiphium breviovipositor* Huber; holotype ♀ in IAVH. **TL:** Colombia, Vichada, Parque Nacional Natural Tuparro.

*Tanyxiphium harriet* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus harriet* Zeya, 2015: 87; holotype ♀ in NBAII. **TL:** India, Kerala, South Andaman, Mt. Harriet.

*Tanyxiphium longissimum* Huber; holotype ♀ in QSBG. **TL:** Thailand: Petchabun Khao Kho National Park.

*Tanyxiphium perforator* (Ogloblin); **comb. n.** from *Gonatocerus*. *Lymaenon perforator* Ogloblin 1953: 4; holotype ♀ in MLPA (examined). De Santis, 1967: 10, 105 (transferred to *Gonatocerus*); Triapitsyn *et al.*, 2010: 34 [questionable placement in *Gonatocerus* (*Gonatocerus*)]. **TL:** Argentina, Misiones, San Ignacio district, Rio Yabebirí.

*Tanyxiphium seychellense* Huber; holotype ♀ in BMNH. **TL:** Seychelles, Cousin Island.

## Key to species of *Tanyxiphium*. Females

- 1 Ovipositor sheaths not or barely exerted beyond apex of gaster (Figs 253, 254), at most 1.3× as long as metatibia ..... *T. breviovipositor* Huber, sp. n.  
– Ovipositor sheaths greatly exerted beyond apex of gaster, at least 3.0× as long as metatibia (Fig. 248) ..... 2  
2(1) Fl<sub>5</sub> with 2 mps (Fig. 260) ..... 3  
– Fl<sub>5</sub> without mps ..... 4  
3(2) Head dark yellow to light brown, mesosoma yellow ..... *T. longissimum* Huber, sp. n.  
– Head dark brown, mesosoma brown ..... *T. harriet* Zeya  
4(3) Mesosoma uniformly brown ..... *T. perforator* (Ogloblin)  
– Mesosoma bicoloured, with prothorax and mesothorax brown but metathorax and propodeum almost yellow (Fig. 269) ..... *T. seychellense* Huber, sp. n.

### *Tanyxiphium breviovipositor* Huber, sp. n.

(Figs 249–257, 272, 275)

**Type material.** Holotype ♀ (IAVH), on slide (Fig. 250) labelled: 1. “Colombia: Vichada, PNN Tuparro, Centro Administrativo, 5°21'N 67°51'W 100m, 8–28.viii.2000, W. Villalba, MT (M.514)”. 2. “*Tanyxiphium breviovipositor* Huber Holotype ♀ dorsal”.

**Paratypes.** 28 ♀, 1 ♂. **COLOMBIA. Vichada.** Same data as holotype (15 ♀, 1 ♂, CNC, IAVH, UCRC); Same data as holotype but 29.vi–15.vii, M.273 (2 ♀, IAVH), Cerro Tomás, 140m, 29.vi–15.vii, M. 269 (2 ♀, IAVH) and 22.v–3.vi.2001, M1789, I. Gil (2 ♀, CNC), Rio Tomo, 250m [sic], 1–12.v.2001, MT, M 1797 (1 ♀, IAVH). **Amazonas.** PNN Amacayacu, Matamata, 3°23'S 70°06'W, 150m, 12–19.vii.2000, A. Parente, MT, M.688 (2 ♀, IAVH), 30.x–11.xi.2000 (2 ♀, IAVH, UCRC), and 31.vii–7.viii.2000, M686 (1 ♀, IVAH), San Martin, 12–16.vi.2000, B. Amado, MT M697 (1 ♀, IAVH).

**Diagnosis.** *Tanyxiphium breviovipositor* differs from the three other described *Tanyxiphium* species by the short ovipositor sheaths that are only slightly exerted beyond the gaster apex. The other described species have much longer, distinctly exerted ovipositor sheaths.

**Description. FEMALE.** Body length 691–819 (n=10). **Colour.** Antenna except scape and pedicel laterally and ventrally, head and mesosoma except (usually) a streak along outside of notauli and inside of axilla and axillula, and ovipositor plates brown. Metasoma lighter, mottled with brown dorsally as follows: gt<sub>2</sub>–gt<sub>6</sub> laterally and medially (lighter brown), these areas usually (not on gt<sub>5</sub> and gt<sub>6</sub>) separated by lighter (white) areas sublaterally along anterior margin. Scape and pedicel except dorsally, legs except femora, and sublateral streak on mesosoma yellowish or at least lighter in colour. **Head.** Head width 282–305 (n=2). **Antenna.** Funicle segments fl<sub>7</sub> and fl<sub>8</sub> each with 2 mps (Fig. 249). Length/width measurements (n=3, but 2 for scape and pedicel): scape 197–216/31–34, pedicel 60–63/32–33, fl<sub>1</sub> 30–35/17–18, fl<sub>2</sub> 32–33/13–19, fl<sub>3</sub> 36–38/15–18, fl<sub>4</sub> 34–36/15–18, fl<sub>5</sub> 38–44/16–18, fl<sub>6</sub> 38–41/18–20, fl<sub>7</sub> 48–55/22–23, fl<sub>8</sub> 51–56/28–30, clava 168–194–42–47. **Mesosoma.** As in generic description (Fig. 252). **Wings.** Fore wing (Fig. 251) length (n=3) 755–808, width 210–235, length/width 3.44–3.60, longest marginal setae 83–90. Hind wing length (n=3) 614–702, width 19–21, longest marginal setae 88–92. **Metasoma.** Gaster (Fig. 253) at most 2.5× as long as wide. Ovipositor sheath (Fig. 254) length (n=3) 339–451, 1.21–1.25× metatibia length (279, n=2), not or only slightly exerted beyond apex of gaster.

**MALE.** Body length ~ 824 (n=1, from slide mount, dissected). **Colour.** Body except for longitudinal white submedian bands on pronotum more uniformly brown than in female. **Antenna.** Measurements (n=1) (Fig. 256): scape ~ 135, pedicel 56, fl<sub>1</sub> 50, fl<sub>2</sub> 53, fl<sub>3</sub> 62, fl<sub>4</sub> 60, fl<sub>5</sub> 64, fl<sub>6</sub> 66, fl<sub>7</sub> 66, fl<sub>8</sub> 70, fl<sub>9</sub> 70, fl<sub>10</sub> 68, fl<sub>11</sub> ~ 81; total flagellar length ~ 710; fl<sub>6</sub> length/width 3.23, with about 7 mps. **Metasoma.** Genitalia as in generic description (Fig. 257).

**Etymology.** From *brevis*, Latin for short, and ovipositor, referring to the relatively short ovipositor of this species.

### *Tanyxiphium longissimum* Huber, sp. n.

(Figs 258–263, 285, 287, 288)

**Type material.** Holotype ♀ (QSBG), on slide (Fig. 259) labelled: 1. “Thailand: Petchabun Khao Kho Nat. Park,

office 16°39.479'N 101°08.105'E 12–19.vii.2006, MT, S. Chatchumnan & S. Singtong". 2. "Holotype *Tanyxiphium longissimum* Huber Holotype ♀ dorsal".

**Paratypes.** 8 ♀. **THAILAND. Chiang Mai.** Doi Inthanon Nat. Park, 18°31.559'N 98°29.941'E, 1700m, 9–16.viii.2006, MT, checkpoint 2, Y. Areeluck (1 ♀, CNC). **Petchabun.** Same data as holotype (3 ♀, QSBG, CNC); same data as holotype but 19–26.vii [16°39.550'N] and 26.vii-2.viii (3 ♀, QSBG, CNC); Khao Kho Nat. Park, 16°39.257'N 101°07.945'E, 186m, 5–12.ix.2006, MT, S. Chatchumnan & S. Singtong, mixed deciduous forest (1 ♀, QSBG).

**Diagnosis.** *Tanyxiphium longissimum* differs from *T. seychellense* by the uniform colour of the mesosoma, fl<sub>5</sub> with 2 mps and fl<sub>6</sub> usually with 1 mps, the narrower wings, the relatively longer and narrower gaster, and the longer ovipositor sheaths. It differs from *T. breviovipositor* and *T. perforator* (Ogloblin) by the much longer ovipositor sheaths.

**Description. FEMALE.** Body length 970–1050 (n=6). **Colour.** Body yellow, with vertex posteriorly and upper half of occiput brown, scape except radicle and pedicel light brown, flagellum and ovipositor sheaths dark brown, apical half of metatibia and all tarsi brown.

**Head.** Head width 311–327 (n=3). **Antenna.** Funicle segments fl<sub>3</sub>, fl<sub>7</sub> and fl<sub>8</sub> each with 2 mps, fl<sub>6</sub> usually with 1 mps, occasionally 0 or 2 mps on one or both antenna. Length/width measurements (n=3): scape 237–253/39–43, pedicel 72–78/36–38, fl<sub>1</sub> 56–62/22–23, fl<sub>2</sub> 41–56/21, fl<sub>3</sub> 53–62/21–22, fl<sub>4</sub> 50–61/21–23, fl<sub>5</sub> 73–82/24–29, fl<sub>6</sub> 68–72/24–26, fl<sub>7</sub> 74–82/28–32, fl<sub>8</sub> 70–77/35–70, clava 203–217/56–65. **Mesosoma.** As in generic description (Fig. 262). **Wings.** Fore wing length (n=3) 1083–1169, width 266–288, length/width 4.06–4.13, longest marginal setae 85–94. Hind wing length (n=3) 866–941, width, 26–27, longest marginal setae 103–112. **Metasoma.** Gaster about 2.5× as long as wide. Ovipositor sheath length 2126–2414, 4.66–4.80× metatibia length (452–518), with exerted part at least 1.5× as long as entire body length.

**MALE.** Unknown.

**Etymology.** From *longus*, Latin for long, and *-issimus*, adjectival superlative, referring to the very long ovipositor sheaths.

### *Tanyxiphium seychellense* Huber, sp. n.

(Figs 264–270, 274, 277–282)

**Type material.** Holotype ♀ (BMNH), on slide (Fig. 267) labelled: 1. "Seychelles: Cousin I. 24.vi.1999, M.J. Hill, Malaise trap, plot 24, birdlife GEF" 2. "*Tanyxiphium seychellense* Huber Holotype ♀ dorsal"

**Paratypes.** 32 ♀, 19 ♂. **MADAGASCAR. Fianarantsoa.** Ranomafana National Park, 1020m, 21°15.99'S 47°25.21'E, 23–28.iv.2002, R. Halin'Hala, MT (1 ♀, CAS), 1030m, 21°15.05'S 47°24.43'E, 15–21.xii.2001, R. Halin'Hala, MT (1 ♀, CAS). **SEYCHELLES:** same data as holotype (2 ♀, 1 ♂, BMNH, CNC); same data as holotype except some labels with M.J. Hill as the collector, and dates and plot numbers as follows: 10.iii, 18.vi, 21.vi, 5.xii, 8.xii; plots H5, H9, P5, 10, 12, 33, 41 (19 ♀, 15 ♂, BMNH, CNC, UCRC); Conception I., 20.ix, plot 10 (3 ♀, 1 ♂); Denis I., 8 and 11.x.1999, M.J. Hill, plots F4, B11 (2 ♀); Felicite I., 14.xi.1999, M. J. Hill, plot 6 (1 ♀); Grand Soeur I., 22.vii.1999, M.J. Hill, plot 8 (1 ♀); Marianne I., 10.iii.2000, M.J. Hill, plot E 4/1 (1 ♀); North I. 23.viii.1999, M. Hill, plot 1 (1 ♀, 2 ♂, CNC).

**Diagnosis.** *Tanyxiphium seychellense* females differ from those of *T. longissimum* by the yellow colour of metathorax and propodeum contrasting distinctly with the dark colour of the pro- and mesothorax (Fig. 269), fl<sub>5</sub> and fl<sub>6</sub> without mps (exceptionally one on fl<sub>5</sub>) (Fig. 266), and ovipositor sheaths at most slightly longer than entire body length.

**Description. FEMALE.** Body length 922–1100 (n=10). **Colour.** Head except mouthparts, antenna except scape–fl<sub>1</sub>, and pro- and mesothorax dark brown, gaster brown, sometimes lighter anteriorly and posteriorly; mouthparts, scape–fl<sub>1</sub>, metathorax and propodeum, and legs yellow (Fig. 269). The dark brown parts may be lighter brown to almost yellow in some specimens. **Head.** Head (Figs 264, 265, 277, 279) width 355–385 (n=2), with mandibles small, barely meeting medially (Figs 264, 281). **Antenna.** Funicle segments fl<sub>1</sub> and fl<sub>8</sub> each with 2 mps (Fig. 266), fl<sub>5</sub> exceptionally with 1 mps on one antenna. Length/width measurements (n=4): scape 206–273/36–50, pedicel 68–80/36–42, fl<sub>1</sub> 48–56/22–25, fl<sub>2</sub> 38–53/22–23, fl<sub>3</sub> 48–59/20–23, fl<sub>4</sub> 45–56/22–24, fl<sub>5</sub> 65–76/24–25, fl<sub>6</sub> 52–

66/23–27, fl<sub>7</sub> 62–78/26–32, fl<sub>8</sub> 60–77/29–44, clava 171–230/53–66. **Mesosoma.** As in generic description (Fig. 269). **Wings.** Fore wing (Fig. 268) length (n=4) 998–1110, width 259–323, length/width 3.43–3.85, longest marginal setae 79–89. Hind wing (n=4) length 776–892, width 27–35, longest marginal setae 92–114. **Metasoma.** Gaster (Fig. 270) at most about 2.0× as long as wide. Ovipositor sheath length 1373–1564 (n=4), 3.15–3.60× metatibia length (386–462), with exerted part shorter (0.75×) to slightly longer than entire body length.

**MALE.** Body length 947–1126 (n=5). **Colour.** Body generally uniform, usually light brown to yellow, occasionally dark brown, except for longitudinal white median band on pronotum. **Head.** Head (Figs 274, 278, 280) with mandibles normal, crossing medially (Fig. 282). **Antenna.** Measurements (n=3): scape 154–169, pedicel 61–62, fl<sub>1</sub> 48–58, fl<sub>2</sub> 53–72, fl<sub>3</sub> 61–72, fl<sub>4</sub> 63–77, fl<sub>5</sub> 64–77, fl<sub>6</sub> 61–77, fl<sub>7</sub> 62–75, fl<sub>8</sub> 68–76, fl<sub>9</sub> 74–79, fl<sub>10</sub> 74–82, fl<sub>11</sub> 84–96; total flagellar length 712–841; fl<sub>6</sub> length/width 2.53–2.83, with 4 or 5 mps. **Metasoma.** Genitalia as in generic description.

**Etymology.** Named after the the Seychelles Islands, the country in which most specimens were collected.

### ***Yoshimotoana* Huber, gen. n. (= *masneri* species group, of authors)**

(Figs 289–317)

**Type species.** *Yoshimotoana masneri* (Yoshimoto), by present designation.

**Diagnosis.** Within Gonatocerini, the single species of *Yoshimotoana* is distinguished by the following combination of features: pronotum entire, as long as mesonotum (Figs 293, 303, 304, 307); propodeum deeply pitted over most of its surface; petiole about twice as long as metacoxa, almost as long as gaster (Figs 309–313); gt<sub>1</sub> the longest tergum, its posterior margin distinctly notched medially (Figs 309, 310).

**Description. FEMALE.** Large specimens, 1765–2100 µm in length. **Colour.** Body yellow except trabeculae, flagellum and metatibia brown (Fig. 289). **Head.** Head (Figs 290, 297–301) about 1.8× as wide as long and about 1.5× as wide as high; in lateral view with anterior surface flat above torulus, to slightly convex and sloping to mouth opening below torulus. Face about 1.2× as wide as high; subantennal sulci strongly converging, the distance between them at mouth margin less than half distance to preorbital sulcus; preorbital sulci curving slightly outward to below ventral margin of eye then curving sharply inward towards clypeus just above anterior margin of mouth. Toruli slightly more than their width from transverse trabecula. Eye in lateral view as high as long, its dorsal part well separated from back of head. Malar space about 0.5× eye height; malar sulcus absent. Gena in lateral view at level of dorsal part of eye quite wide, about half as wide as area at level of ventral part of eye. Vertex in lateral view horizontal, at right angle to face, posteriorly almost at right angle with occiput, with a fine line behind lateral ocelli separating vertex from occiput. Ocelli with LOL 0.5× POL or a little less and OOL about 0.8× POL, with two setae between lateral ocelli. Occiput entire. Labrum with 5 setae. Mandible with 3 normal teeth (Fig. 302). **Antenna.** Scape about 4.2× as long as wide, (Fig. 291) with radicle distinct, about 0.3× scape length; pedicel 0.3× scape length and at most about 0.5× as long as and slightly wider than fl<sub>1</sub>; funicle 8-segmented, fl<sub>1</sub>–fl<sub>8</sub> at most with 2 mps; clava with 8 mps (Fig. 291). **Mesosoma.** About 2.0× as long as wide, 2.0–2.1× as long as high, and 1.1× as wide as high (Figs 293, 303, 304). Pronotum in dorsal view long and entire (Figs 303, 307), with dorsal surface separated from lateral surface by a rounded edge, and lateral surface concave in posterior 0.4 (from posterior part of propleura to below spiracle). Pronotal spiracle larger than propodeal spiracle (Fig. 204). Propleura abutting along most of their median length (Figs 305, 306). Prosternum rhomboidal, divided by longitudinal sulcus extending almost its entire length (Figs 305, 306). Mesonotum in dorsal view with narrow, fairly deep notauli (Fig. 303). Transscutal articulation straight. Scutellum slightly wider than long. Axilla normal. Prepectus wide and rectangular (Fig. 304). Mesopleuron spindle-shaped and truncate at both ends, without visible sulcus separating mesepisternum from mesepimeron. Metanotum with dorsellum somewhat triangular, its posterior margin rounded. Metapleuron large and oval, separated from propodeum by strongly curved line of abutting pits. Propodeum in lateral view slightly convex and weakly sloping, dorsally almost in same plane as dorsellum, in dorsal view with two straight, parallel submedian carinae and smooth between carinae except for row of deep pits laterally along each carina, the remainder of propodeum almost entirely covered with longitudinal rows of deep pits (Figs 304, 308). Propodeal spiracle small, separated by about its diameter from metanotum. **Wings.** Fore wing (Fig. 292) about 3.8× as long as wide, with microtrichia fairly dense and uniform distally, absent proximally behind and just beyond venation except for a few microtrichia behind stigmal vein and apex of parastigma. Venation 0.4× wing

length. Submarginal vein with a dorsal macrochaeta and a short and inconspicuous ventral hypochaeta basally, and the apical hypochaetae absent. Remaining venation (parastigma + stigmal vein) with hypochaeta closer to distal than proximal macrochaeta and with 4 or 5 setae between the macrochaeta. Stigmal vein with apex oblique. Hind wing normal (Fig. 292). Venation about 0.50× wing length. **Metasoma.** Petiole much longer than wide, almost as long as gaster (Figs 311–313). Gaster 1.6–2.0× as long as high,  $gt_1$ – $gt_3$  with posterior margins crenulate. Terga with white membrane at most narrowly visible between them (Fig. 289). Ovipositor sheaths not exerted beyond gaster apex, with 1 subapical seta.

**MALE. Colour.** As in female. **Antenna.** Scape short, with radicle not distinguishable (Fig. 295); pedicel about 0.41× scape length; flagellomeres each with about 12 mps (fewer on apical flagellomeres). **Metasoma.** Gaster somewhat cylindrical (Fig. 296). Genitalia with aedeagal apodemes narrowly V-shaped, not extending anteriorly as far as apex of apodeme of genital sternum.

**Discussion.** Yoshimoto (1990) described the features of his *masneri* species group based on one included species. Zeya and Hayat (1995) distinguished this species group from other species groups in a key. Triapitsyn *et al.* (2010) described a second species and treated both as the *masneri* subgroup of species, placing it within the *ater* group of *Gonatocerus* (*Cosmocomoidea*). Their species is synonymized below on the basis of the funicle segment colour being slightly variable, from uniformly dark brown to lighter brown with  $fl_6$  and sometimes  $fl_3$  and  $fl_7$  whitish. A slide mounted female antenna from a topotypical specimen from El Rio (La Vega), for some reason not listed by Yoshimoto (1990) as a paratype, has one funicle segment whitish whereas the holotype has the entire funicle dark brown.

**Etymology.** Yoshimoto + “-ana”, a Latin adjectival suffix that means belonging or pertaining to. The generic name is feminine. The genus is named after Carl Yoshimoto, my predecessor in the Canadian Forest Service, who recognized how distinct the species was and placed it in a new species group of *Gonatocerus*, the *masneri* group (Yoshimoto 1990).

**Distribution.** The single species in *Yoshimotoana* occurs in the Dominican Republic.

**Hosts and habitat.** Hosts are unknown. The habitat is various types of forest from dry montane to wet coastal.

**Included species:**

*Yoshimotoana masneri* (Yoshimoto), **comb. n.** from *Gonatocerus*. *Gonatocerus masneri* Yoshimoto, 1990: 88; holotype ♀ in CNC (examined). **TL:** Dominican Republic: La Vega, El Rio.

*Yoshimotoana hispaniola* Triapitsyn and Huber. *Gonatocerus* (*Cosmocomoidea*) *hispaniolus* Triapitsyn & Huber, in Triapitsyn *et al.*, 2010: 164; holotype ♀ in CNC (examined). **TL:** Dominican Republic, Pedernales, Sierra de Bahoruco, Alcoa Road, km 25. **Syn. n.**

### ***Zeyanus* Huber, gen. n. (= *asulcifrons* species group, of authors)**

(Figs 318–340)

**Type species.** *Gonatocerus asulcifrons* Zeya, by present designation.

**Diagnosis.** Within Gonatocerini, the species of *Zeyanus* are distinguished by the following combination of features: head thin (Figs 330, 331, 333), at least 2.5 as wide as long; face without subantennal sulci (Figs 319, 329); occiput divided by transverse, oblique sulcus extending above foramen magnum from eye to eye (Figs 320, 332); pronotum longitudinally divided, the lobes abutting medially (Fig. 337); mesonotal spiracle much larger than propodeal spiracle, but with small opening; dorsellum triangular (Figs 336, 337); propodeum with straight, submedian carinae more or less converging anterodorsally (Figs 336, 337); ovipositor sheaths distinctly exerted and usually upturned, with numerous (rarely as few as 3) setae along the exerted length of each sheath (Figs 318, 323, 335, 339).

**Description. FEMALE.** Large specimens, 1280–1895 µm in length. **Colour.** Body yellow with various amounts of brown or, occasionally, black. **Head.** Head thin (Figs 318, 331, 333), about 2.25–2.72× as wide as long and about 1.2–1.5× as wide as high; in lateral view with anterior surface almost flat to slightly convex mainly below lower eye margin. Face about as wide as high; subantennal sulci absent (Fig. 319, 329) but with distinct, triangular depression below each torulus; preorbital sulci curving slightly inward ventral to toruli then almost straight to dorsolateral corners of mouth. Toruli at most half their width from transverse trabecula. Vertex in lateral view (Fig. 331) almost vertical and in same plane as face, posteriorly usually acutely angled at junction with occiput, with a distinct carina extending from eye margin to each lateral ocellus but not between them (Fig. 330).

Ocelli with LOL less than  $0.5\times$  POL and OOL  $0.5\text{--}1.0\times$  POL, with two setae between lateral ocelli. Eye in lateral view about  $1.5\times$  as high as long, its dorsal part extending to back of head. Malar space about  $0.5\times$  eye height; malar sulcus present, almost straight, extending from ventral or anteroventral angle of eye to about posterior angle of mouth. Gena in lateral view very narrow or absent above level of occipital sulcus, and below occipital sulcus as wide as area in front of malar sulcus (Fig. 331). Occiput divided by distinct, transverse sulcus extending from eye to eye above foramen magnum (Figs 330, 332). Labrum with 3 or 5 setae. Mandible with 3 normal teeth (Fig. 334). **Antenna.** Scape at most about  $4.3\times$  as long as wide, (Fig. 321) with radicle distinct, narrow, about  $0.3\text{--}0.4\times$  scape length; pedicel  $0.15\text{--}0.25\times$  entire scape length, and at most about  $0.8\times$  as long and about as wide as fl<sub>1</sub>; funicle 8-segmented, fl<sub>1</sub>–fl<sub>8</sub> with one or sometimes two slightly overlapping whorls of 2 or 4 mps; clava with at least 15 mps, scattered or in up to three whorls. **Mesosoma.** About  $1.5\text{--}1.9\times$  as long as wide,  $1.5\text{--}2.0\times$  as long as high, and  $1.0\text{--}1.3\times$  as wide as high. Pronotum (Figs 325, 330, 337) short but visible in dorsal view, longitudinally divided into two abutting lobes, with dorsal surface separated from lateral surface by a distinct edge, and lateral surface concave in posterior 0.7 (between posterior half of propleura and spiracle). Pronotal spiracle distinctly larger than propodeal spiracle (Fig. 338). Propleura normal, in dorsal view sometimes slightly protuberant lateral to pronotum. Prosternum rhomboidal, divided posteriorly by longitudinal sulcus extending almost its entire length. Mesonotum in dorsal view with fairly wide but shallow notauli. Transscutal articulation straight. Scutellum slightly wider than long. Axilla normal. Prepectus fairly wide and triangular. Mesopleuron spindle-shaped and truncate at both ends, with fine sulcus separating mesepisternum from mesepimeron. Metanotum with dorsellum rectangular/triangular, its posterior margin rounded. Metapleuron triangular, separated posteriorly from propodeum by a short, indistinct, fairly straight carina. Propodeum in lateral view weakly sloping, almost in same plane as dorsellum; in dorsal view, with two thin, straight, dorsally converging submedian carinae. Propodeal spiracle small, separated by less than its diameter from metanotum. **Wings.** Fore wing (Fig. 322) at most about  $3.0\times$  as long as wide, with microtrichia fairly dense and uniform distally, sparser proximally, and almost absent from slightly distal to apex of venation to wing base except for a few microtrichia behind venation (usually about 4 behind stigmal vein, rarely up to about 10 along parastigma almost to its base). Venation a little over  $0.3\times$  wing length. Submarginal vein with the usual two basal setae (a dorsal macrochaeta and a ventral hypochaeta) and a hypochaeta apically, next to proximal macrochaeta of parastigma. Remaining venation (parastigma + stigmal vein) with hypochaeta closer to distal than proximal macrochaeta and with 2–5 setae between the macrochaetae, usually in apical half. Stigmal vein with apex oblique. Hind wing normal. Venation about  $0.45\times$  wing length. **Metasoma.** Petiole short, usually much wider than long and scarcely visible (Figs 323, 325). Gaster  $1.7\text{--}2.0\times$  as long as high. Terga with white membrane at most narrowly visible between them. Ovipositor sheath exerted beyond gaster apex by about  $0.5\text{--}0.8\times$  gaster length, usually distinctly upcurved but sometimes straight, with numerous setae along most of its exerted length (Figs 318, 323, 335, 339), exceptionally with as few as 3 setae.

**MALE. Colour.** As in female. **Antenna.** Scape short (Fig. 324), with radicle  $0.2\text{--}0.4\times$  scape length, not clearly separated from it; pedicel about  $0.35\times$  scape length; flagellomeres each with about 20 mps (Figs 327, 328). **Metasoma.** Gaster slightly compressed. Genitalia extremely long, about  $0.7\times$  length of gaster, with aedeagal apodemes almost parallel for their entire length and extending posteriorly as far as apex of apodeme of genital sternum (Fig. 326).

**Etymology.** *Zeya* + “-anus”, a Latin suffix that means belonging to or pertaining to. The gender is masculine. The genus is named after Shahid Bin Zeya, who first recognized the unique features of the included species and placed them in a new species group of *Gonatocerus*, the *asulcifrons* group (Zeya and Hayat, 1995).

**Distribution.** *Zeyanus* species occur in the Oriental and Afrotropical regions.

**Hosts and habitat.** Hosts are unknown but one species was reared from an undetermined leaf gall (Gupta and Poorani 2008). Specimens (BMNH, CNC, UCRC, UCDC, USNM), representing several species were examined from forests in Guinea, Kenya, and Uganda (Afrotropical), South Korea and southern Japan (Palaeartic), and several countries from India to Indonesia (Oriental).

**Included species:**

*Zeyanus asulcifrons* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus asulcifrons* Zeya, in Zeya & Hayat, 1995: 60; holotype ♀ in BMNH (examined). **TL:** India, Assam, Halflong.

*Zeyanus bialbifuniculatus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus bialbifuniculatus* Subba Rao, 1989: 146; holotype ♀ in BMNH (examined). **TL:** India, Tamil Nadu, 3 km E. Manjler Dam.

- Zeyanus similis* (Gupta & Poorani). *Gonatocerus similis* Gupta & Poorani, 2008: 59; holotype ♀ in IARI. **TL:** India, Karnataka, Yana forests. **Syn. n.**
- Zeyanus devikulamus* (Mani & Saraswat), **comb. n.** from *Gonatocerus*. *Gonatocerus devikulamus* Mani & Saraswat, 1973: 84; holotype ♀ in USNM (examined). **TL:** India, Tamil Nadu, Anamalai Hills, Devikulam.
- Zeyanus fulvipodus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus fulvipodus* Subba Rao 1989: 146; holotype ♀ in BMNH (examined). **TL:** India, Kerala, 24 km S. Palghat, Nelliampathy.
- Zeyanus jaintiacus* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus jaintiacus* Zeya, 2014: 95; holotype ♀ in ZDAMU. **TL:** India, Meghalaya, Ri Bhoi, Um Sam Lem.
- Zeyanus longiterebratus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus longiterebratus* Subba Rao, 1989: 145; holotype ♀ in BMNH (examined). **TL:** India, Kerala, Periyar Animal Sanctuary.
- Zeyanus rileyi* (Zeya), **comb. n.** from *Gonatocerus*. *Gonatocerus rileyi* Zeya, 2014: 94; holotype ♀ in ZDAMU. **TL:** India, Kerala, Malappuram.
- Zeyanus sergueii* (Manickavasagam & Rameshkumar), **comb. n.** from *Gonatocerus*. *Gonatocerus sergueii* Manickavasagam & Rameshkumar, 2013a: 87; holotype ♀ in EDAU. **TL:** India, Karnataka, Bengaluru, IWST campus.
- Zeyanus unicolouratus* (Subba Rao), **comb. n.** from *Gonatocerus*. *Gonatocerus unicolouratus* Subba Rao, 1989: 144; holotype ♀ in BMNH (examined). **TL:** India, New Delhi.

### Geographic distribution of the genera of Gonatocerini

Biogeographic boundaries among the regions are not clearly defined and vary depending on the taxon under study and the author of a particular study. For convenience, the Western Hemisphere is divided into the area north of the Mexico-USA border—the Nearctic region, and south of that border—the Neotropical region. In fact, the Nearctic region extends biogeographically south between the eastern and western cordilleras of Mexico almost to the Isthmus of Tehuantepec whereas the Neotropical region extends biogeographically north to different extents along both coasts of Mexico, and also includes southern Florida.

**Australian region.** Two genera. By far the most common, speciose and diverse is *Lymaenon*. *Gonatocerus* is widespread but seems to be represented by few species. One species of *Cosmocomoidea* was deliberately introduced into French Polynesia for biological control against the glassy winged sharpshooter, *Homalodisca vitripennis* (Cicadellidae).

**Afrotropical region.** Six genera. By far the most widespread, common, and speciose is *Lymaenon*. *Gonatocerus* is widespread and the next most common genus. *Zeyanus* is represented by at least two species. *Heptagonatocerus* occur in southeastern South Africa and Madagascar, *Octomicromeris* occurs only in Madagascar, and *Tanyxiphium* occurs in the Seychelles and Madagascar.

**Oriental region.** Six genera. The most common and widespread is *Lymaenon*, followed by *Gonatocerus*. *Cosmocomoidea*, *Zeyanus*, *Heptagonatocerus* and *Tanyxiphium* are widespread but relatively uncommon or rare.

**Palaeartic region.** Four genera. *Lymaenon*, *Gonatocerus*, and *Cosmocomoidea* are widespread and common. *Zeyanus* is rare, collected so far only in the Far East (Japan, Korea).

**Nearctic region (north of Mexico).** Four genera. The most common and widespread is *Lymaenon*, the only genus extending to the far north where at least one species has been collected in tundra habitats. *Gonatocerus* and *Cosmocomoidea* are widespread but most diverse in the southeast. *Gastrogonatocerus* is mainly southern.

**Neotropical region (south of USA).** Eight genera. By far the most common and speciose, (especially in forested areas) is *Cosmocomoidea*. *Gahanopsis*, *Gastrogonatocerus*, *Gonatocerus*, *Lymaenon*, and *Tanyxiphium* are widespread but relatively uncommon and not very speciose. *Lymaenon*, at least, occurs mainly in more open, drier habitats. *Yoshimotoana* is restricted to Hispaniola and *Krateriske* to rainforests in northern South America.

### Generic relationships

A detailed character matrix and phylogenetic analysis for the included genera of Gonatocerini, with or without taking into account other genera of Mymaridae, is needed but is beyond the scope and purpose of this paper.



However, an intuitive phylogeny of genera within Gonatocerini is proposed (Fig. 341) as a working hypothesis of relationships. The branch numbers are treated below. The polarity of most character states is uncertain or unknown but most are homoplasious because they occur at least once elsewhere, within Mymaridae at least. The polarities are inferred mostly by comparison with genera within Mymaridae. The genera are distinct and can be defined on various features that may be good synapomorphies for the included species. In contrast, finding useful features that define groups of genera within Gonatocerini is difficult. Mymaridae is treated as the earliest lineage within Chalcidoidea and the family is clearly monophyletic (Heraty *et al.*, 2013). One can use Rotoitidae as an out group for comparison of character states, as mentioned under Tribe Gonatocerini (above) because it is the next most basal lineage to Mymaridae within Chalcidoidea (Heraty *et al.*, 2013). Beyond that it is difficult to determine what the next best out group should be. The sister taxon to Chalcidoidea is uncertain and the various alternatives are all very different from Chalcidoidea, making it difficult to compare features. Therefore, coding characters based on outgroup analysis is not attempted.

1a. Mymaridae other than Gonatocerini are defined by one likely synapomorphy—the lack of a malar sulcus, though some included genera do not have this feature and, if synapomorphic, it is homoplasious.

1b. Gonatocerini has three putative apomorphies (likely homoplasies): proximal macrochaeta about mid-way between proximal and distal macrochaetae, parastigma usually slanting away proximally from anterior margin of fore wing, and genitalia usually not encapsulated, but instead is attached directly to  $gs_7$ .

2a. This clade, consisting only of *Archigonatocerus*, is inferred as the basal lineage of Gonatocerini, based on absence of the putative apomorphic states occurring in the remaining genera (Clade 2b). The relatively long venation, fore wing with an oblique fold/hair line extending obliquely across the wing, and parastigma hypochaeta distinctly closer to the proximal than the distal macrochaeta (in the one species, *A. balticus*, where the hypochaeta is visible) are useful defining features for *Archigonatocerus* but they are plesiomorphic.

3b. The remaining members of Gonatocerini other than *Heptagonatocerus* and *Zeyanus* are hypothesized as a monophyletic clade based on three putative synapomorphies: presence of subantennal sulci, male genitalia not encapsulated, and presence of one seta subapically on each ovipositor sheath (one specimen with 5 setae towards the apex of the exerted part of each ovipositor sheath was found in a specimen of *Lymaenon* from Australia).

3a. Members of *Heptagonatocerus* and *Zeyanus* lack subantennal sulci, hypothesized as a plesiomorphy. The two genera are otherwise very different. In *Heptagonatocerus* the male genitalia are encapsulated (a plesiomorphy) and the ovipositor has only one pair of subapical setae (an apomorphy, as in clade 3b). In *Zeyanus* each ovipositor sheath is setose along its entire exerted length (a plesiomorphy) and the male genitalia are not encapsulated (an apomorphy, as in clade 3b). *Heptagonatocerus* females have a 7-segmented funicle (an apomorphy) whereas in *Zeyanus* they are 8-segmented (a plesiomorphy, as in most other Gonatocerini). Because there is no evidence that the two genera comprise a monophyletic clade this separation from Clade 3a is indicated by a dashed line.

4b. This clade is defined by single putative synapomorphy, dorsellum with anterior and posterior margins either parallel, or slightly sinuate with a slight median projection.

4a. This group of genera all have a triangular or rhomboidal dorsellum, a feature shared with more basal genera and thus presumably plesiomorphic. The group is therefore not supported as a monophyletic clade by any synapomorphy so its separation from Clade 4b is indicated by a dashed line. The group consist of eight genera divided into two subgroups. Clade 4ab includes genera in which the propodeal carinae are absent—a possible synapomorphy for this clade, though independent loss of carinae in otherwise unrelated genera is also a possibility. Group 4aa includes a variety of genera that all have the propodeum with some sort of longitudinal carinae. Because there is no evidence that the five genera comprise a monophyletic clade their separation from Clade 4ab is indicated by a dashed line.

5b. This clade is defined by two synapomorphies: the dorsellum strap-like or almost so and the pronotum with the lobes not abutting, either widely separated in *Lymaenon* or narrowly separated by a median more or less sclerotized area in *Cosmocomopsis*.

5a. This clade is defined by the posterior margin of dorsellum slightly sinuate, with a slight median projection (an apomorphy, perhaps the middle of a transformation series from rhomboidal to strap-like dorsellum) and the propodeum divided medially by a longitudinal sulcus.

## Unavailable names

- Gonatocerus bifasciatus* Viggiani 2005: 65. *Nomen nudum*. [Evidently a mistake for *Cosmocomoidea fasciatus* Girault].
- Lymaenon flavocinctus* Walker, 1846: 51. *Nomen nudum*. Dalla Torre, 1898: 429 (catalogue); Debauche, 1948: 80 (list); Bouček & Graham, 1978a: 109 (check list); Triapitsyn, 2013: 171 (discussion).
- Gonatocerus grayi* Manickavasagam & Rameshkumar 2013b: 564. *Nomen nudum*. [Evidently a *lapsus* for *Cosmocomoidea garyi*].
- Gonatocerus jassidae* Risbec, 1956b: 821. *Nomen nudum*. [Evidently a mistake for *Gonatocerus africanus* Risbec].
- Gonatocerus mirivorus* Kurjumov, 1912: 14. *Nomen nudum*. Nikol'skaya 1952: 538 [Russian original], 554 [English translation] (list); Triapitsyn, 2013a: 171 (discussion).
- Gonatocerus websteri* in Girault, 1911 [96]: 324. *Nomen nudum*.
- Gonatocerus welateri* Nason, 1906: 8. *Nomen nudum*. De Santis 1979: 365 (catalogue). [Evidently a *lapsus* for *websteri*. See Girault 1911 [96]: 324.]

## Species removed from *Gonatocerini*

*Gonatocerus minimus* Förster, 1841: 45; holotype in NHMW (lost). *Nomen dubium*. Triapitsyn 2013a: 170 (literature references). This species does not belong in *Gonatocerini*. Förster gave a measurement of one-ninth “linea” (1 linie or linea = 2.191 mm [German] or slightly more [French] or less [English] depending on which area of Europe the term was used in the 1800s). This makes *minimus* at most only 0.25 mm long, which is far too small for a species of *Gonatocerus* or almost any other species of Mymaridae. Debauche (1948: 80) did not treat the species because he thought Förster had not mentioned it subsequent to his original description. In fact, Förster (1847: 229) had mentioned the species again and stated the need for a new generic placement for it, and that he would save that for later. He never described a new genus for it or placed the species in another genus.

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**APPENDIX 1.** Alphabetical list of nominal species of Gonatocerini with current placement and status. *Nomina nuda* are not listed.

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*abbreviata* Ogloblin, 1953. See under *Cosmocomoidea*.  
*acanophorae* Ogloblin, 1938. See under *Gahanopsis*.  
*acuminatus* Walker, 1846. See under *Lymaenon*.  
*aegyptiacus* Soyka, 1950. See under *Gonatocerus*.  
*aequatorianus* Ogloblin, 1959. See under *Gonatocerus*.  
*aethalionis* Ogloblin, 1938. See under *Gahanopsis*.  
*africanus* Risbec, 1956. See under *Gonatocerus risbeci*.  
*africanus* Soyka, 1950. See under *Lymaenon*.  
*alami* Shamim & Adam Shafee, 1984. See under *Gonatocerus tarae*. **Synonym.**  
*alberti* Debauche, 1949. See under *Lymaenon*.  
*albiclava* Huber, 2015 (this paper). See under *Progonatocerus*.  
*alecto* Debauche, 1948. See under *Gonatocerus fuscicornis*. **Synonym.**  
*aligarhensis* Shamim & Adam Shafee, 1984. See under *Lymaenon aureus*. **Synonym.**  
*americanus* Brues, 1907. See under *Lymaenon litoralis*. **Synonym.**  
*angustiventris* Girault & Dodd, 1915. See under *Lymaenon*.  
*annulicornis* Ogloblin, 1936. See under *Cosmocomoidea*.  
*anomocerus* Crawford, 1913. See under *Gastrogonatocerus*.  
*anthonomi* Girault, 1905. See under *Lymaenon litoralis*. **Synonym.**  
*antillensis* Dozier, 1937. See under *Gonatocerus*.  
*appendiculatus* Ogloblin, 1939. See under *Gonatocerus*.  
*arduennae* Mathot, 1969. See under *Lymaenon litoralis*. **Synonym.**  
*arkadak* Triapitsyn, 2010. See under *Gahanopsis*.  
*ashmeadi* Girault, 1915. See under *Cosmocomoidea*.  
*asulcifrons* Zeya, 1995. See under *Zeyanus*.  
*atra* Förster, 1841. See under *Cosmocomoidea*.  
*atriclava* Girault, 1917. See under *Cosmocomoidea*.  
*aureinotum* Dodd, 1917. See under *Lymaenon*.  
*aureus* Girault, 1911. See under *Lymaenon*.  
*australensis* Perkins, 1905. See under *Lymaenon*.  
*australicus* Girault, 1913. See under *Lymaenon*.  
*ayrensis* Girault, 1913. See under *Lymaenon*.  
*baconi* Girault, 1912. See under *Lymaenon*.  
*bakrotus* Mani & Saraswat, 1973. See under *Lymaenon*.  
*balticus* Huber, 2015 (this paper). See under *Archigonatocerus*.  
*barbos* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*bashai* Zeya, 1995. See under *Lymaenon*.  
*basilewskyi* Mathot, 1968. See under *Lymaenon*.  
*bayardi* Girault, 1938. See under *Lymaenon musa*. **Subspecies.**  
*bellus* Girault, 1938. See under *Lymaenon*.  
*berezovskiyi* Triapitsyn, 2013. See under *Lymaenon*.  
*berijamus* Mani & Saraswat, 1973. See under *Lymaenon*.  
*beshbarmak* Triapitsyn, 2013. See under *Lymaenon*.  
*bialbifuniculatus* Subba Rao, 1989. See under *Zeyanus*.  
*bicolor* Girault, 1913. See under *Lymaenon*.  
*bicoloriventris* Zeya, 1995. See under *Lymaenon*.  
*bifasciatiiventris* Girault, 1917. See under *Lymaenon*.  
*blefufuscu* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*blesticus* Ogloblin, 1957. See under *Cosmocomoidea*.  
*boiardini* Girault, 1938. See under *Lymaenon romae*. **Subspecies.**  
*bonaerensis* Ogloblin, 1939. See under *Gonatocerus*.  
*bonariensis* Brèthes, 1922. See under *Cosmocomoidea*.  
*boswelli* Girault, 1915. See under *Lymaenon*.  
*bouceki* Zeya 1995. See under *Lymaenon*.  
*brachyura* Ogloblin, 1938. See under *Cosmocomoidea*.  
*brevifuniculatus* Subba Rao, 1970. See under *Lymaenon*.  
*breviovipositor* Huber, 2015 (this paper). See under *Tanyxiphium*.  
*brevis* Huber, 2015 (this paper). See under *Octomicromeris*.  
*breviterebratus* Subba Rao, 1989. See under *Lymaenon*.

*britteni* Hincks, 1960. See under *Gonatocerus longicornis*. **Synonym.**  
*brunneiclava* Huber, 2015 (this paper). See under *Progonatocerus*.  
*brunneus* Girault, 1911. See under *Lymaenon litoralis*. **Synonym.**  
*brunoi* Girault, 1912. See under *Lymaenon*.  
*bucculenta* Huber, 1988. See under *Cosmocomoidea*.  
*bukashka* Triapitsyn, 2013. See under *Gonatocerus*.  
*bulgaricus* Donev & Triapitsyn, 2013. See under *Lymaenon*.  
*californicus* Girault, 1911. See under *Gonatocerus*.  
*camerounensis* Özdikmen, 2011. See under *Gonatocerus risbeci*. **Unnecessary replacement name.**  
*capensis* Viggiani & Jesu, 1995. See under *Lymaenon*.  
*capitata* Gahan, 1932. See under *Cosmocomoidea*.  
*carahuensis* Ogloblin, 1957. See under *Cosmocomoidea*.  
*carlylei* Girault, 1913. See under *Lymaenon*.  
*caudata* Ogloblin, 1935. See under *Cosmocomoidea*.  
*centaurus* Girault, 1920. See under *Lymaenon*.  
*christi* Girault, 1938. See under *Lymaenon helmholtzii*. **Subspecies.**  
*chryseides* Debauche, 1949. See under *Lymaenon*.  
*chrysis* Debauche, 1948. See under *Lymaenon aureus*. **Synonym.**  
*chusqueicola* Ogloblin, 1957. See under *Cosmocomoidea*.  
*cicadellae* Nikol'skaya, 1951. See under *Gonatocerus longicornis*. **Synonym.**  
*cincticipitis* Sahad, 1982. See under *Gonatocerus*.  
*cingulatus* Perkins, 1905. See under *Lymaenon*.  
*circumvagus* Girault, 1915. See under *Lymaenon*.  
*citricapus* Girault, 1930. See under *Lymaenon*.  
*coimbatorensis* Zeya, Manickavasagam & Rameshkumar, 2012. See under *Lymaenon*.  
*compacta* Huber, 2015 (this paper). See under *Octomicromeris*.  
*comptei* Girault, 1912. See under *Gonatocerus*.  
*concinna* Ogloblin, 1936. See under *Cosmocomoidea*.  
*conicus* Mathot, 1969. See under *Lymaenon longior*. **Synonym.**  
*contortivena* Debauche, 1949. See under *Lymaenon*.  
*coxalis* Ogloblin, 1959. See under *Cosmocomoidea*.  
*crassicornis* Viggiani, 1969. See under *Cosmocomoidea*.  
*crassipes* Debauche, 1948. See under *Gonatocerus longicornis*. **Synonym.**  
*cubensis* Dozier, 1932. See under *Lymaenon*.  
*cunctator* Mathot, 1969. See under *Lymaenon*.  
*cuscus* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*dakhlae* Soyka, 1950. See under *Lymaenon*.  
*darwini* Girault, 1912. See under *Lymaenon*.  
*davinci* Girault, 1912. See under *Lymaenon*.  
*debauchei* Mathot, 1968. See under *Lymaenon*.  
*deficiens* Ogloblin, 1946. See under *Gahanopsis*.  
*delhiensis* Narayanan & Subba Rao, 1961. See under *Lymaenon*.  
*deleoni* Triapitsyn, Logarzo & Virla, 2008. See under *Cosmocomoidea*.  
*devikulamus* Mani & Saraswat, 1973. See under *Zeyanus*.  
*devitatakus* Mani & Saraswat, 1973. See under *Lymaenon*.  
*dies* Girault, 1913. See under *Lymaenon*.  
*dimorphus* Ogloblin, 1938. See under *Gastrogonatocerus margiscutum*. **Synonym.**  
*dodo* Girault, 1920. See under *Lymaenon*.  
*dolichocerus* Ashmead, 1887. See under *Cosmocomoidea*.  
*dorsiniger* Ogloblin, 1959. See under *Gastrogonatocerus membraciphagus*. **Synonym.**  
*ecuadorensis* Huber, 2015 (this paper). See under *Krateriske*.  
*edentulus* Zeya, 1995. See under *Gonatocerus*.  
*effusi* Bakkendorf, 1934. See under *Lymaenon litoralis*. **Synonym.**  
*elizabethae* Girault, 1925. See under *Lymaenon*.  
*elizavetae* Triapitsyn, 2013. See under *Cosmocomoidea*.  
*ella* Girault, 1931. See under *Lymaenon*.  
*empoascae* Subba Rao, 1966. See under *Cosmocomoidea ater*. **Synonym.**  
*enicophila* Huber, 1988. See under *Cosmocomoidea bonariensis*. **Synonym.**  
*ermi* Triapitsyn, 2013. See under *Cosmocomoidea*.  
*excisus* Ogloblin, 1936. See under *Gonatocerus*.  
*exiguus* Förster, 1861. See under *Lymaenon litoralis*. **Synonym.**

*eximius* Gahan, 1913. See under *Gonatocerus mexicanus*. **Synonym.**  
*faradayi* Girault, 1938. See under *Lymaenon indigenus*. **Subspecies.**  
*farmani* Zeya & Anwar, 2013. See under *Lymaenon*.  
*fasciata* Girault, 1911. See under *Cosmocomoidea*.  
*fasciiventris* Girault, 1913. See under *Lymaenon*.  
*flagellaris* Ogloblin, 1959. See under *Cosmocomoidea*.  
*flagellata* Huber, 1988. See under *Cosmocomoidea*.  
*flavipes* Girault & Dodd, 1915. See under *Lymaenon*.  
*flaviventris* Dozier, 1932. See under *Lymaenon*.  
*flavus* Förster, 1841. See under *Gonatocerus pictus*. **Synonym.**  
*flavus* Soyka, 1950. See under *Lymaenon vopros* (under *aureus*). **Objective and subjective synonym.**  
*flopsis* Huber, 2015 (this paper). See under *Cosmocomopsis*.  
*floridensis* Huber, 1988. See under *Gonatocerus*.  
*flosculus* Girault, 1915. See under *Lymaenon*.  
*fossarum* Hincks, 1952. See under *Lymaenon novickyi*. **Synonym.**  
*fukuokensis* Sahad, 1984. See under *Lymaenon aureus*. **Synonym.**  
*fulgor* Girault, 1913. See under *Lymaenon*.  
*fulvipodus* Subba Rao, 1989. See under *Zeyanus*.  
*fuscicornis* Walker, 1846. See under *Gonatocerus*.  
*fuscus* Förster, 1861. See under *Lymaenon litoralis*. **Synonym.**  
*garchamp* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*garyi* Manickavasagam & Rameshkumar, 2013. See under *Cosmocomoidea*.  
*gerasim* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*gibsoni* Crawford, 1915. See under *Gonatocerus mexicanus*. **Synonym.**  
*gigas* Girault, 1915. See under *Lymaenon*.  
*goethei* Girault, 1912. See under *Lymaenon*.  
*gracilentus* Hellén, 1974. See under *Lymaenon aureus*. **Synonym.**  
*gracilicornis* Ogloblin, 1936. See under *Cosmocomoidea*.  
*grandis* Ogloblin, 1936. See under *Cosmocomoidea*.  
*granulosus* Ogloblin, 1959. See under *Gonatocerus*.  
*gratia* Girault, 1938. See under *Lymaenon huyghensi*. **Subspecies.**  
*greenwalti* Huber, 2011. See under *Cosmocomoidea*.  
*guianensis* Huber, 2015 (this paper). See under *Krateriske*.  
*gunathilagaraji* Manickavasagam & Rameshkumar, 2013. See under *Cosmocomoidea*.  
*gregi* Girault, 1915. See under *Lymaenon*.  
*grotiusi* Girault, 1913. See under *Lymaenon*.  
*hackeri* Girault, 1938. See under *Lymaenon*.  
*haeckeli* Girault, 1912. See under *Lymaenon*.  
*hallami* Girault, 1920. See under *Gonatocerus*.  
*harriet* Zeya, 2015. See under *Tanyxiphium*.  
*hayati* Zeya & Khan, 2012. See under *Cosmocomoidea*.  
*heinei* Girault, 1938. See under *Lymaenon*.  
*helavai* Yoshimoto, 1990. See under *Cosmocomoidea*.  
*helmholtzii* Girault, 1912. See under *Lymaenon*.  
*henneberti* Meunier, 1905. See under *Gonatocerus*.  
*heraty* Manickavasagam & Rameshkumar, 2013. See under *Cosmocomoidea*.  
*hispaniola* Triapitsyn & Huber, 2010. See under *Yoshimotoana*.  
*h-lutea* Ogloblin, 1938. See under *Cosmocomoidea nigriflagellum*. **Synonym.**  
*hoplitis* Debauche, 1949. See under *Lymaenon*.  
*huberi* Zeya 1995. See under *Gonatocerus*.  
*humboldti* Girault, 1913. See under *Lymaenon*.  
*huxleyi* Girault, 1912. See under *Lymaenon*.  
*huyghensi* Girault, 1912. See under *Lymaenon*.  
*ignipes* Girault, 1930. See under *Lymaenon*.  
*illinoisensis* Girault, 1917. See under *Lymaenon litoralis*. **Synonym.**  
*impar* Huber, 1988. See under *Cosmocomoidea*.  
*inaequalis* Debauche, 1949. See under *Gonatocerus*.  
*inaudita* Ogloblin, 1936. See under *Cosmocomoidea*.  
*incompta* Huber, 1988. See under *Cosmocomoidea*.  
*indica* Subba Rao & Kaur, 1959. See under *Cosmocomoidea ater*. **Synonym.**  
*indigenus* Girault, 1938. See under *Lymaenon*.

*inexpectata* Huber, 1988. See under *Cosmocomoidea*.  
*inflaticapus* Huber, 1988. See under *Cosmocomoidea*.  
*intermedia* Bořoc, 1962. See under *Cosmocomoidea ater*, s.l. **Synonym**.  
*io* Girault, 1915. See under *Lymaenon*.  
*iona* Girault, 1930. See under *Lymaenon*.  
*ionella* Özdikmen, 2011. See under *Lymaenon io*. **Unnecessary replacement name**.  
*ipswichia* Girault, 1922. See under *Gonatocerus*.  
*jaintiacus* Zeya, 2014. See under *Zeyanus*.  
*janzeni* Huber, 2015 (this paper). See under *Gonatocerus*.  
*johnstonia* Girault, 1917. See under *Lymaenon*.  
*juvator* Perkins, 1912. See under *Gastrogonatocerus*.  
*kabashae* Debauche, 1949. See under *Lymaenon*.  
*kalika* Triapitsyn, 2013. See under *Lymaenon*.  
*kanheriensis* Mani & Saraswat, 1973. See under *Lymaenon aureus*. **Synonym**.  
*karakum* Triapitsyn, 2013. See under *Lymaenon*.  
*karkik*, Triapitsyn, 2013. See under *Lymaenon*.  
*kashipurensis* Zeya & Khan, 2012. See under *Cosmocomoidea*.  
*katraps*, Triapitsyn, 2013. See under *Lymaenon*.  
*kazak* Triapitsyn, 2013. See under *Lymaenon*.  
*kikimora* Triapitsyn, 2013. See under *Cosmocomoidea*.  
*kiskis* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*kivuanus* Debauche, 1949. See under *Lymaenon*.  
*kochi* Girault, 1936. See under *Lymaenon*.  
*kodaiana* Mani & Saraswat, 1973. See under *Cosmocomoidea*.  
*koebeli* Perkins, 1912. See under *Gonatocerus*.  
*komarik* Triapitsyn, 2013. See under *Lymaenon*.  
*kootenai* Huber, 2011. See under *Cosmocomoidea*.  
*koziavka* Triapitsyn, 2013. See under *Gonatocerus*.  
*krasavchik* Triapitsyn, 2013. See under *Lymaenon*.  
*kulik* Triapitsyn, 2013. See under *Lymaenon*.  
*kum* Triapitsyn, 2013. See under *Lymaenon*.  
*kusaka* Triapitsyn, 2013. See under *Lymaenon*.  
*lamarcki* Girault, 1912. See under *Lymaenon*.  
*langlandi* Girault, 1938. See under *Lymaenon saintpierrei*. **Unnecessary replacement name**.  
*latipennis* Girault, 1911. See under *Cosmocomoidea*.  
*lissonotus* Huber, 1988. See under *Gonatocerus*.  
*litoralis* Haliday, 1833. See under *Lymaenon*.  
*logarzoi* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*lomonosoffi* Girault, 1913. See under *Lymaenon*.  
*longicauda* Enock, 1909. See under *Lymaenon acuminatus*. **Synonym**.  
*longiclava* Viggiani & Jesu, 1995. See under *Lymaenon*.  
*longicornis* Nees, 1834. See under *Gonatocerus*.  
*longicrus* Kieffer, 1913. See under *Gonatocerus*.  
*longior* Soyka, 1946. See under *Lymaenon*.  
*longissimum* Huber, 2015 (this paper). See under *Tanyxiphium*.  
*longiterebratus* Subba Rao, 1989. See under *Zeyanus*.  
*longivena* Huber, 2015 (this paper). See under *Archigonatocerus*.  
*longiventris* Bořoc, 1963. See under *Gonatocerus longicornis*. **Synonym**.  
*lucida* Dodd, 1919. See under *Cosmocomoidea*.  
*lyelli* Girault, 1913. See under *Lymaenon brunoi*. **Subspecies**.  
*macauleyi* Girault, 1920. See under *Lymaenon*.  
*maculatus* Zeya, 1995. See under *Lymaenon*.  
*maculipennis* Ashmead, 1900. See under *Cosmocomoidea*.  
*madagascarensis* Huber, 2015 (this paper). See under *Heptagonatocerus*.  
*maevius* Girault, 1911. See under *Lymaenon litoralis*. **Synonym**.  
*maga* Girault, 1911. See under *Gonatocerus*.  
*magnificus* Huber, 2015 (this paper). See under *Heptagonatocerus*.  
*malanadensis* Subba Rao, 1989. See under *Lymaenon*.  
*manaliensis* Zeya & Anwar, 2013. See under *Lymaenon*.  
*mandyanus* Zeya & Usman, 2014. See under *Gonatocerus*.  
*margiscutum* Girault, 1914. See under *Gastrogonatocerus*.

*marilandica* Girault, 1917. See under *Cosmocomoidea*.  
*masneri* Yoshimoto, 1990. See under *Yoshimotoana*.  
*maxima* Girault, 1911. See under *Cosmocomoidea latipennis*. **Synonym.**  
*mazzinini* Girault, 1913. See under *Lymaenon*.  
*mediterraneus* Donev & Triapitsyn, 2013. See under *Lymaenon*.  
*megalura* Mathot, 1969. See under *Cosmocomoidea oxygygus*. **Synonym.**  
*meghalayanus* Zeya, 2011. See under *Gonatocerus*. **Replacement name.**  
*membraciphagus* Ogloblin, 1935. See under *Gastrogonatocerus*.  
*merces* Girault, 1913. See under *Lymaenon*.  
*metanotalis* Ogloblin, 1938. See under *Cosmocomoidea*.  
*metchnikoffi* Girault, 1912. See under *Lymaenon*.  
*mexicanus* Perkins, 1912. See under *Gonatocerus*.  
*minimus* Förster, 1841. See under Species removed from *Gonatocerini*.  
*minor* Matthews, 1986. See under *Gonatocerus aegyptiacus*. **Synonym.**  
*mirissimus* Girault, 1913. See under *Lymaenon*.  
*mirus* Girault, 1938. See under *Lymaenon*.  
*mitjaevi* Triapitsyn & Rakitov, 2013. See under *Lymaenon*.  
*miurai* Sahad, 1982. See under *Gonatocerus aegyptiacus*. **Synonym.**  
*molindianus* Debauche, 1949. See under *Lymaenon*.  
*monrosi* Ogloblin, 1959. See under *Gastrogonatocerus margiscutum*. **Synonym.**  
*monticola* Zeya, 1995. See under *Cosmocomoidea*.  
*mopsis* Huber, 2015 (this paper). See under *Cosmocomopsis*.  
*morgani* S. Triapitsyn, 2006. See under *Cosmocomoidea*.  
*morrilli* Howard, 1908. See under *Cosmocomoidea*.  
*mosesi* Girault, 1938. See under *Lymaenon*.  
*mumu* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*munnarus* Mani & Saraswat, 1973. See under *Lymaenon*.  
*musa* Girault, 1938. See under *Lymaenon*.  
*narayani* Subba Rao & Kaur, 1959. See under *Lymaenon*.  
*nassau* Girault, 1938. See under *Lymaenon*.  
*nasuta* Ogloblin, 1939. See under *Cosmocomoidea*.  
*necator* Ogloblin, 1939. See under *Cosmocomoidea bonariensis*. **Synonym.**  
*ngandoi* Debauche, 1949. See under *Lymaenon*.  
*nigriceps* Ogloblin, 1955. See under *Gastrogonatocerus*.  
*nigricornis* Girault, 1917. See under *Lymaenon*.  
*nigricorpus* Girault, 1917. See under *Lymaenon*.  
*nigriflagellum* Girault, 1914. See under *Cosmocomoidea h-lutea*. **Synonym.**  
*nigritarsis* Ashmead, 1887. See under *Lymaenon*.  
*nigrithorax* Ogloblin, 1953. See under *Cosmocomoidea*.  
*nigroides* Narayanan & Subba Rao, 1961. See under *Cosmocomoidea ater*. **Synonym.**  
*nonsulcatus* Girault, 1915. See under *Lymaenon*.  
*notabilis* Girault, 1938. See under *Lymaenon*.  
*novickyi* Soyka, 1946. See under *Lymaenon*.  
*novifasciata* Girault, 1911. See under *Cosmocomoidea*.  
*nox* Girault, 1913. See under *Lymaenon*.  
*noyesi* Subba Rao, 1989. See under *Lymaenon delhiensis*. **Synonym.**  
*nuntius* Girault, 1920. See under *Lymaenon*.  
*nyashekensis* Debauche, 1949. See under *Lymaenon*.  
*ogloblini* De Santis, 1967. See under *Gonatocerus bonaerensis*. **Unnecessary replacement name.**  
*orientalis* Girault, 1917. See under *Lymaenon*.  
*orientalis* Zeya, 1995. See under *Gonatocerus meghalayanus*. **Objective synonym.**  
*ornatus* Gahan, 1918. See under *Lymaenon*.  
*orthopenitus* Guo, Lin & Hu, 2011. See under *Gonatocerus pictus*. **Synonym.**  
*ovicenatus* Leonard & Crosby, 1915. See under *Cosmocomoidea oxygygus*. **Synonym.**  
*oxygygus* Foerster, 1856. See under *Cosmocomoidea*.  
*pachyscapa* Girault, 1915. See under *Lymaenon*.  
*pahlgamensis* Narayanan, 1961. See under *Lymaenon aureus*. **Synonym.**  
*paludis* Debauche, 1948. See under *Lymaenon litoralis*. **Synonym.**  
*pannonica* Soyka, 1946. See under *Cosmocomoidea ater*. **Synonym.**  
*parcepilosa* Ogloblin, 1957. See under *Cosmocomoidea*.  
*partifuscipennis* Girault, 1916. See under *Lymaenon*.

*parvus* Huber, 2015 (this paper). See under *Heptagonatocerus*.  
*pater* Girault, 1920. See under *Lymaenon*.  
*perdix* Girault, 1938. See under *Lymaenon*.  
*perforator* Ogloblin, 1953. See under *Tanyxiphium*.  
*peruensis* Huber, 2015 (this paper). See under *Krateriske*.  
*petrarchi* Girault, 1920. See under *Gonatocerus*.  
*pictosimilis* Soyka, 1946. See under *Gonatocerus fuscicornis*.  
*pictus* Haliday, 1833. See under *Gonatocerus*.  
*piriformis* Ogloblin, 1955. See under *Gastrogonatocerus*.  
*poincarei* Girault, 1913. See under *Lymaenon*.  
*populi* Viggiani, 1969. See under *Cosmocomoidea atra*. **Synonym.**  
*portoricensis* Dozier, 1937. See under *Cosmocomoidea*.  
*pratensis* Ogloblin, 1936. See under *Lymaenon*.  
*priesneri* Soyka, 1950. See under *Lymaenon litoralis*. **Synonym.**  
*prometheus* Girault, 1915. See under *Lymaenon*.  
*prongandoi* Viggiani & Jesu, 1995. See under *Lymaenon*.  
*protamiranus* Viggiani & Jesu, 1995. See under *Lymaenon*.  
*pulchellus* Hellén, 1974. See under *Lymaenon litoralis*. **Synonym.**  
*pulchellus* Huber, 2015 (this paper). See under *Heptagonatocerus*.  
*pusilus* Ogloblin, 1935. See under *Gahanopsis*.  
*pygmaeus* Girault, 1911. See under *Lymaenon*.  
*quadrivittata* Dozier, 1932. See under *Cosmocomoidea*.  
*quirogai* Ogloblin, 1936. See under *Cosmocomoidea*.  
*radiculatus* Ahlberg, 1925. See under *Lymaenon litoralis*. **Synonym.**  
*rakitovi* Triapitsyn, 2010. See under *Cosmocomoidea*.  
*ramakrishnai* Subba Rao & Kaur, 1959. See under *Lymaenon*.  
*ramamurthyi* Zeya & Anwar, 2013. See under *Lymaenon*.  
*rasnitsyni* Huber, 2011. See under *Cosmocomoidea*.  
*relictus* Mani & Saraswat, 1973. See under *Lymaenon delhiensis*. **Synonym.**  
*renani* Girault, 1913. See under *Lymaenon*.  
*rhacodes* Debauche, 1948. See under *Lymaenon litoralis*. **Synonym.**  
*rileyi* Zeya, 2014. See under *Zeyanus*.  
*risbeci* Heqvist, 1960. See under *Gonatocerus africanus* Risbec. **Replacement name.**  
*rivalis* Girault, 1911. See under *Gonatocerus*.  
*rogersi* Matthews, 1986. See under *Cosmocomoidea*.  
*rohinavotrae* Risbec, 1952. See under *Lymaenon*.  
*romae* Girault, 1928. See under *Lymaenon*.  
*rufescens* Ashmead, 1904. See under *Cosmocomoidea*.  
*sahadevani* Subba Rao & Kaur, 1959. See under *Cosmocomoidea*.  
*saintpierrei* Girault, 1913. See under *Lymaenon*.  
*saipanensis* Douth, 1955. See under *Gonatocerus aegyptiacus*. **Synonym.**  
*sarawakensis* Sveum, 1982. See under *Gonatocerus*.  
*saufrommeri* Triapitsyn, 2013. See under *Lymaenon*.  
*schajovskoi* Ogloblin, 1957. See under *Cosmocomoidea*.  
*schmitzi* Debauche, 1948. See under *Cosmocomoidea atra*. **Synonym.**  
*seminigra* Ogloblin, 1959. See under *Cosmocomoidea*.  
*sergueii* Manickavasagam & Rameshkumar, 2013. See under *Zeyanus*.  
*setulosus* Ogloblin, 1959. See under *Gastrogonatocerus membraciphagus*. **Synonym.**  
*sevae* Risbec, 1955. See under *Cosmocomopsis*.  
*seychellense* Huber, 2015 (this paper). See under *Tanyxiphium*.  
*shakespearei* Girault, 1915. See under *Lymaenon*.  
*shamimi* Subba Rao & Hayat, 1986. See under *Gonatocerus*. **Replacement name.**  
*shasthryi* Subba Rao & Kaur, 1959. See under *Gonatocerus longicornis*. **Synonym.**  
*silhouettae* Masi, 1917. See under *Lymaenon*.  
*similis* Gupta & Poorani, 2008. See under *Zeyanus bialbifuniculatus*. **Synonym.**  
*spectabilis* Zeya, 1995. See under *Lymaenon*.  
*spinozae* Girault, 1912. See under *Lymaenon*.  
*spiracularis* Ogloblin, 1935. See under *Gastrogonatocerus*.  
*stenopterus* Ogloblin, 1936. See under *Gonatocerus*.  
*straeleni* Debauche, 1949. See under *Lymaenon*.  
*sulcatus* Girault, 1915. See under *Lymaenon*.

*sulphuripes* Foerster, 1847. See under *Gonatocerus fuscicornis*. **Synonym.**  
*sundus* Zeya & Anwar, 2013. See under *Lymaenon*.  
*svat* Triapitsyn, 2013. See under *Lymaenon*.  
*synaptus* Debauche, 1948. See under *Gonatocerus fuscicornis*. **Synonym.**  
*tamilanus* Mani & Saraswat, 1973. See under *Lymaenon*.  
*tamiranus* Debauche, 1949. See under *Lymaenon*.  
*tarae* Narayanan & Subba Rao, 1961. See under *Gonatocerus aegyptiacus*. **Synonym.**  
*taringae* Girault, 1938. See under *Lymaenon*.  
*tenuipennis* Girault, 1911. See under *Lymaenon brunneus* (under *litoralis*). **Synonym.**  
*terebrator* Foerster, 1847. See under *Gonatocerus longicornis*. **Synonym.**  
*terebrator* Shamim & Adam Shafee, 1984. See under *Gonatocerus shamimi*. **Objective synonym.**  
*terrigena* Girault, 1938. See under *Lymaenon*.  
*texanus* Girault, 1911. See under *Lymaenon litoralis*. **Synonym.**  
*thyrides* Debauche, 1948. See under *Lymaenon*.  
*titillatus* Girault, 1917. See under *Gonatocerus utahensis*. **Synonym.**  
*tolstooi* Girault, 1913. See under *Lymaenon*.  
*tremulae* Bakkendorf, 1934. See under *Cosmocomoidea*.  
*trialbifuniculatus* Subba Rao, 1989. See under *Cosmocomoidea*.  
*triangulifera* Ogloblin, 1959. See under *Cosmocomoidea*.  
*triapitsyni* Zeya, Manickavasagam & Rameshkumar, 2012. See under *Lymaenon*.  
*tricolor* Girault, 1913. See under *Lymaenon*.  
*triguttata* Girault, 1916. See under *Cosmocomoidea*.  
*tuberculifemur* Ogloblin, 1957. See under *Cosmocomoidea*.  
*uat* S. Triapitsyn, 2006. See under *Cosmocomoidea*.  
*ucri* Triapitsyn, 2013. See under *Lymaenon*.  
*udakamanda* Mani & Saraswat, 1973. See under *Cosmocomoidea*.  
*unicolouratus* Subba Rao, 1989. See under *Zeyanus*.  
*urocerus* Ogloblin, 1935. See under *Gonatocerus*.  
*utahensis* Girault, 1917. See under *Gonatocerus californicus*. **Synonym.**  
*utkalensis* Subba Rao, 1989. See under *Gonatocerus*.  
*uttarodeccanus* Mani & Saraswat, 1973. See under *Gonatocerus longicornis*. **Synonym.**  
*valentinae* Ogloblin, 1959. See under *Gastrogonatocerus*.  
*vanharteni* Jesu & Viggiani, 2004. See under *Lymaenon*.  
*variguttus* Gault, 1938. See under *Gonatocerus ipswichia*. **Subspecies.**  
*venustus* Zeya, 1995. See under *Lymaenon*.  
*vidanoi* Viggiani & Jesu, 1987. See under *Lymaenon*.  
*virgatus* Subba Rao, 1989. See under *Lymaenon delhiensis*. **Synonym.**  
*virlai* S. Triapitsyn, Logarzo & de León, 2007. See under *Cosmocomoidea*.  
*vladimiri* Triapitsyn, 2013. See under *Lymaenon*.  
*vopros* Triapitsyn, 2013. See under *Lymaenon flavus* (under *aureus*). **Replacement name.**  
*walkerjonesi* S. Triapitsyn, 2006. See under *Cosmocomoidea*.  
*wittei* Debauche, 1949. See under *Lymaenon*.  
*woohoo* Triapitsyn, 2013. See under *Cosmocomoidea*.  
*yerongae* Girault, 1938. See under *Lymaenon*.  
*zeyai* Özdikmen, 1913. See under *Gonatocerus meghalayanus*. **Unnecessary replacement name.**

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## APPENDIX 2. Abbreviations used in the illustrations.

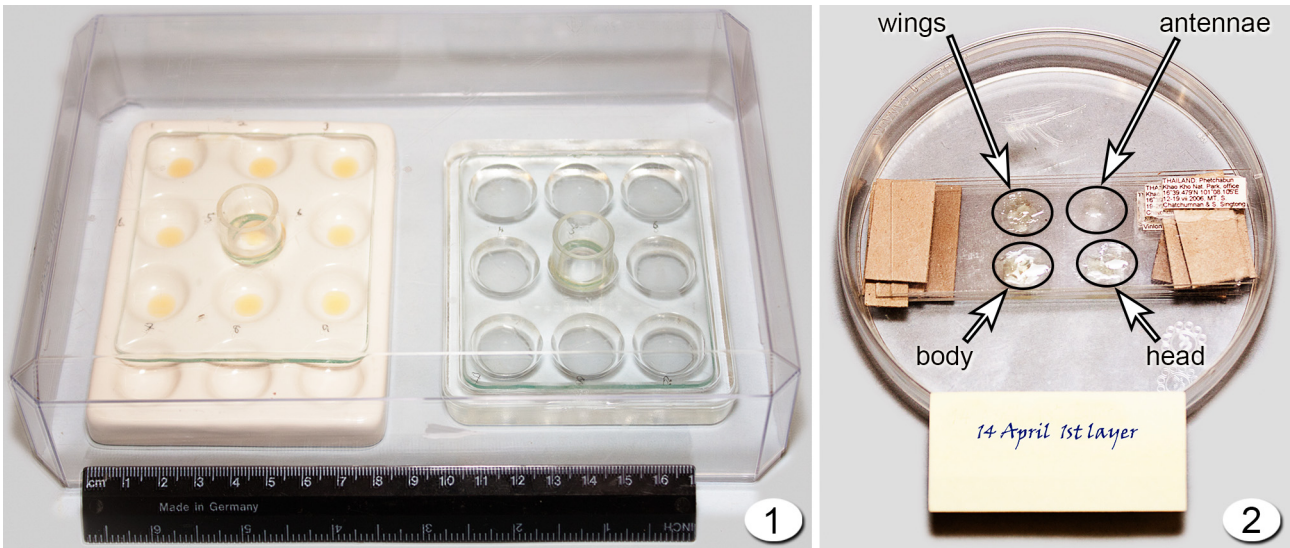
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abm = abductor muscle of mandible  
afe = antennifer  
afo = antennal foramen  
as = anterior scutellum  
ax = axilla  
axs = axillary sclerite  
brf = basal ring of femur (= trochantellus)  
cd = cardo  
clc = calcar  
cs = campaniform sensillum

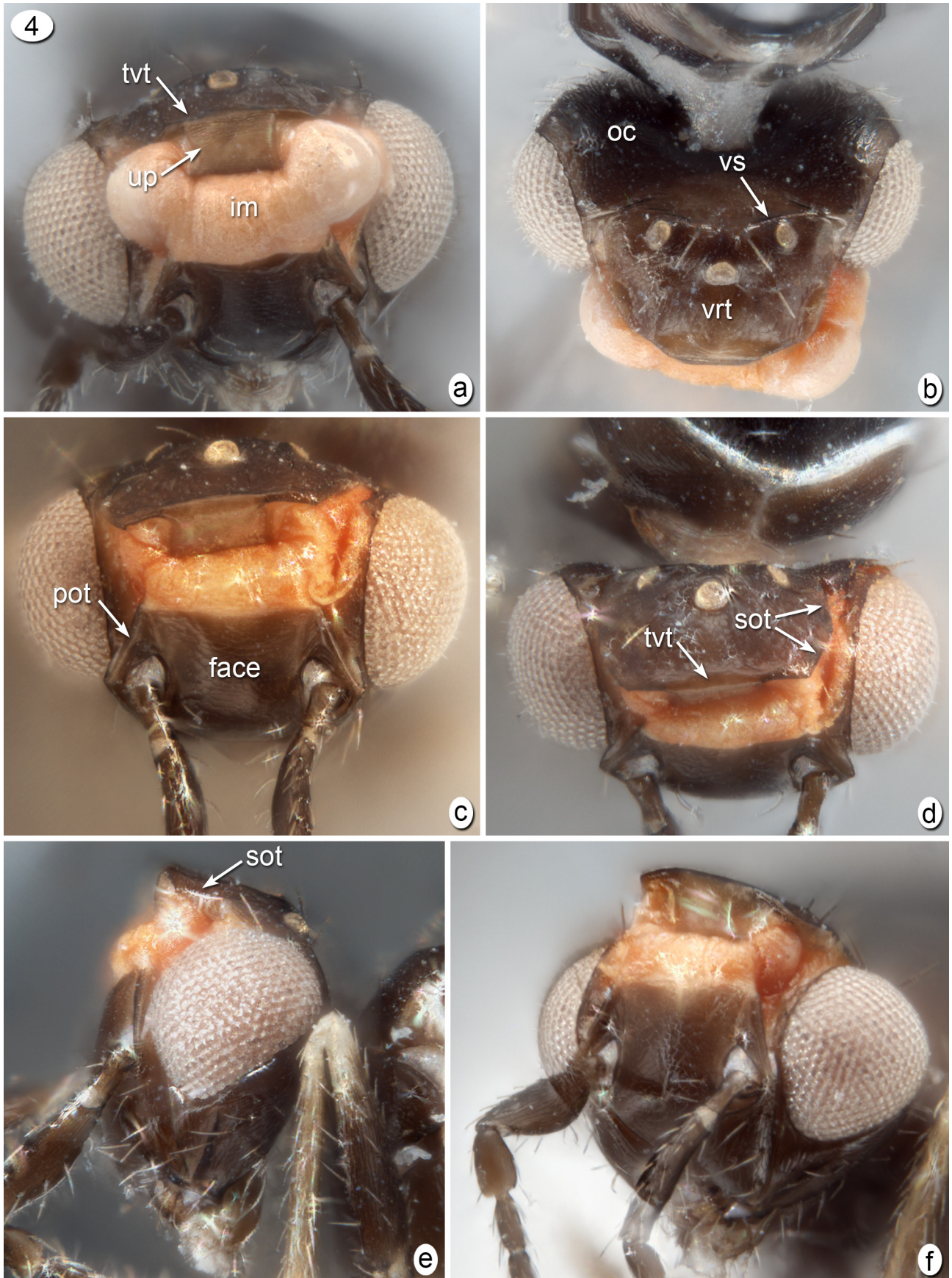


dm = distal macrochaeta  
dor = dorsellum  
eph = epipharynx  
epm<sub>2</sub> = mesepimeron  
eps<sub>2</sub> = mesepisternum  
fr = frenum  
fu<sub>x</sub>p = furcal pit  
gl = glossa  
gs = gastral sternum  
gt = gastral tergum  
hy = hypochaeta  
im = intersegmental membrane  
ivc = inner ventral cluster of radicle setae  
lb = labrum  
lbpl = labial palpus  
llm = lateral panel of mesoscutum  
lpa = lateral panel of axilla  
max = median axillary sclerite  
mlm = median panel of mesoscutum  
mn = manubrium  
mnd = mandible  
mps = multiporous plate sensillum  
mxpl = maxillary palpus  
no<sub>1</sub> = pronotum (or pronotal lobe).  
no<sub>1</sub>l = lateral panel of pronotum  
oc = occiput  
oca = ocular apodeme  
odr = outer dorsal row of radicle setae  
of = occipital foramen  
oop = outer ovipositor plate  
opdel = ocellar pedicel  
opl = optic lobe  
pd = propodeum  
pl<sub>1</sub> = propleuron  
pl<sub>3</sub> = metapleuron  
pm = proximal macrochaeta  
poc = postocciput  
pog = preorbital groove or sulcus  
pot = preorbital trabecula  
pre = prepectus  
prem = prementum  
ptl = petiole  
sag = subantennal groove or sulcus  
sot = supraorbital trabecula  
spr = spiracle  
str = strigil  
tar = tarsomere  
tb = tentorial bridge  
ten = tentorium  
tg = tegula  
tor = torulus (antennal ring)  
tvt = transverse trabecula  
up = unrolled portion of tvt  
utr = unguitactor  
vlv = valvula  
vs = vertexal suture  
vrt = vertex

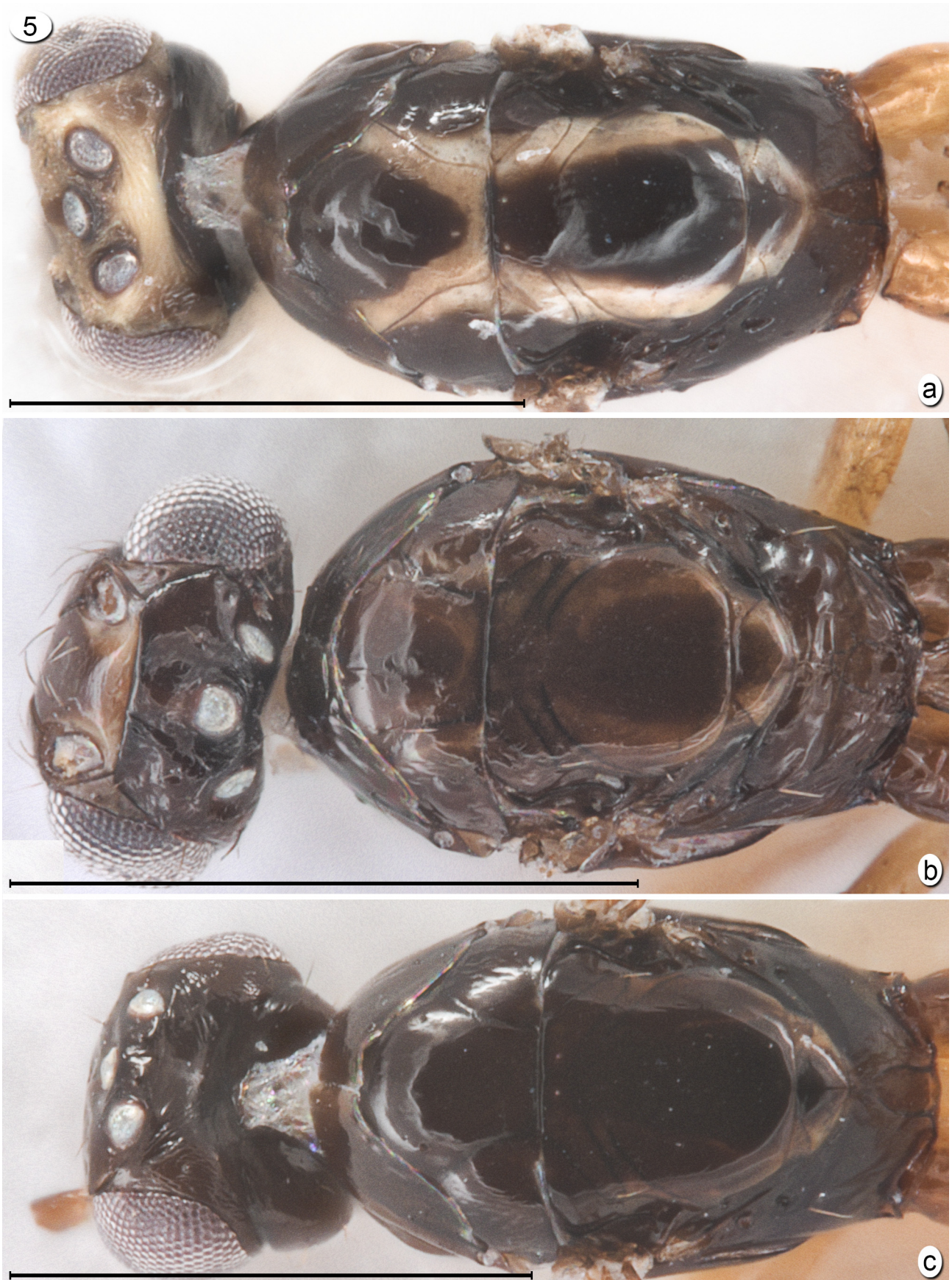
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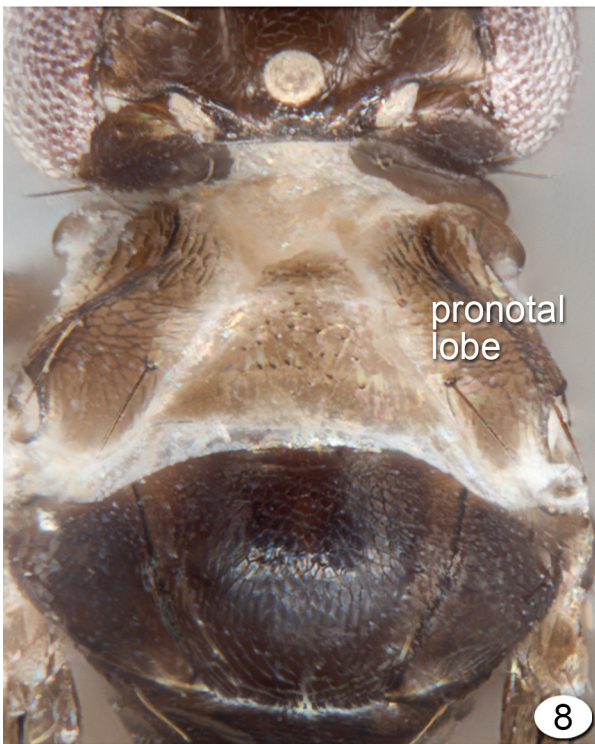
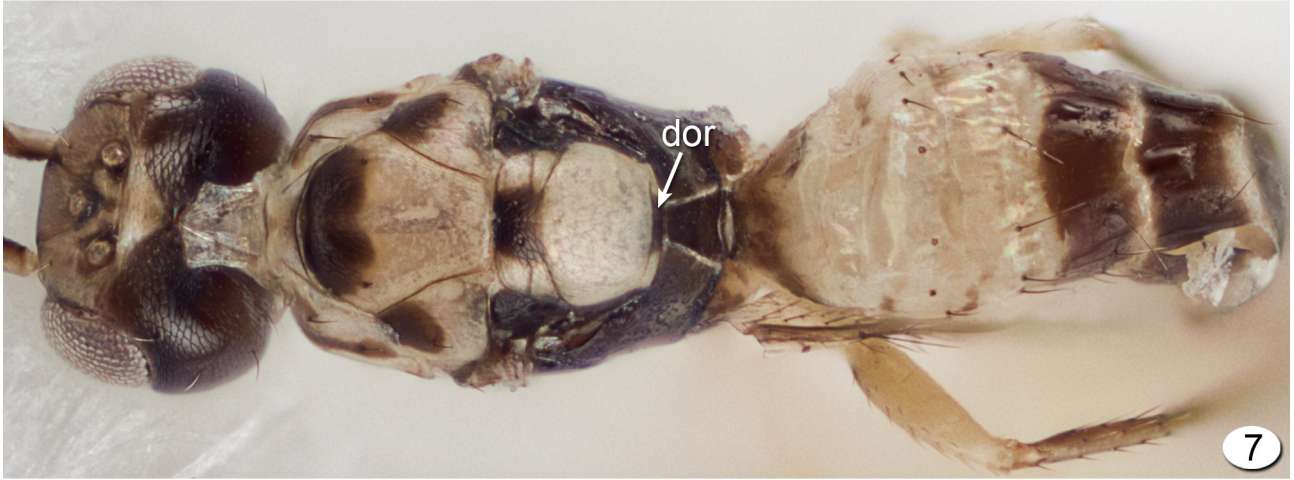
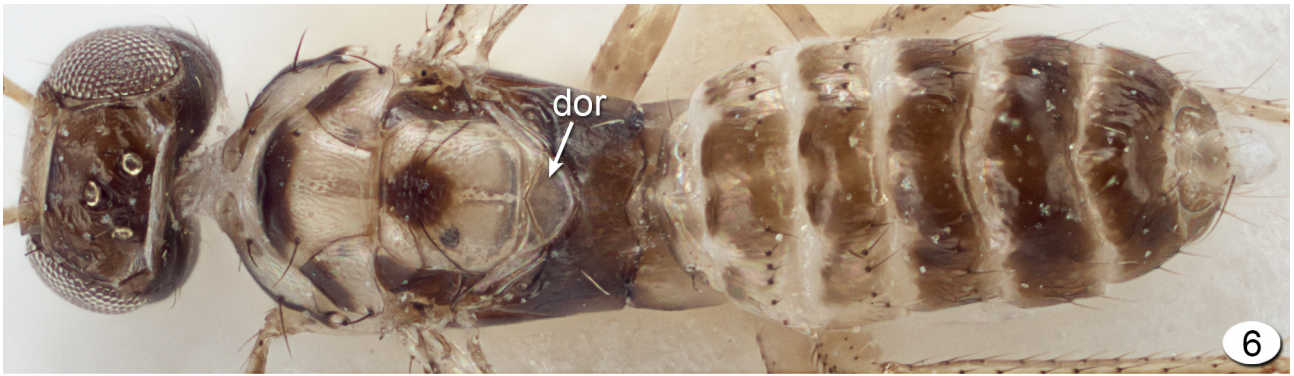
**FIGURES 1–3.** 1, spot plates with clove oil containing wings (left) and 10% KOH for remaining body parts (right); 2, five slides with cardboard spacers stacked in Petri dish for drying in oven; 3, *Cosmocomoidea morrilli*, habitus; USA, Florida, Alachua Co., Gainesville, American Entomological Institute, vi–vii.1987, CNC Hymenoptera Team. Scale bar = 1000  $\mu$ m.



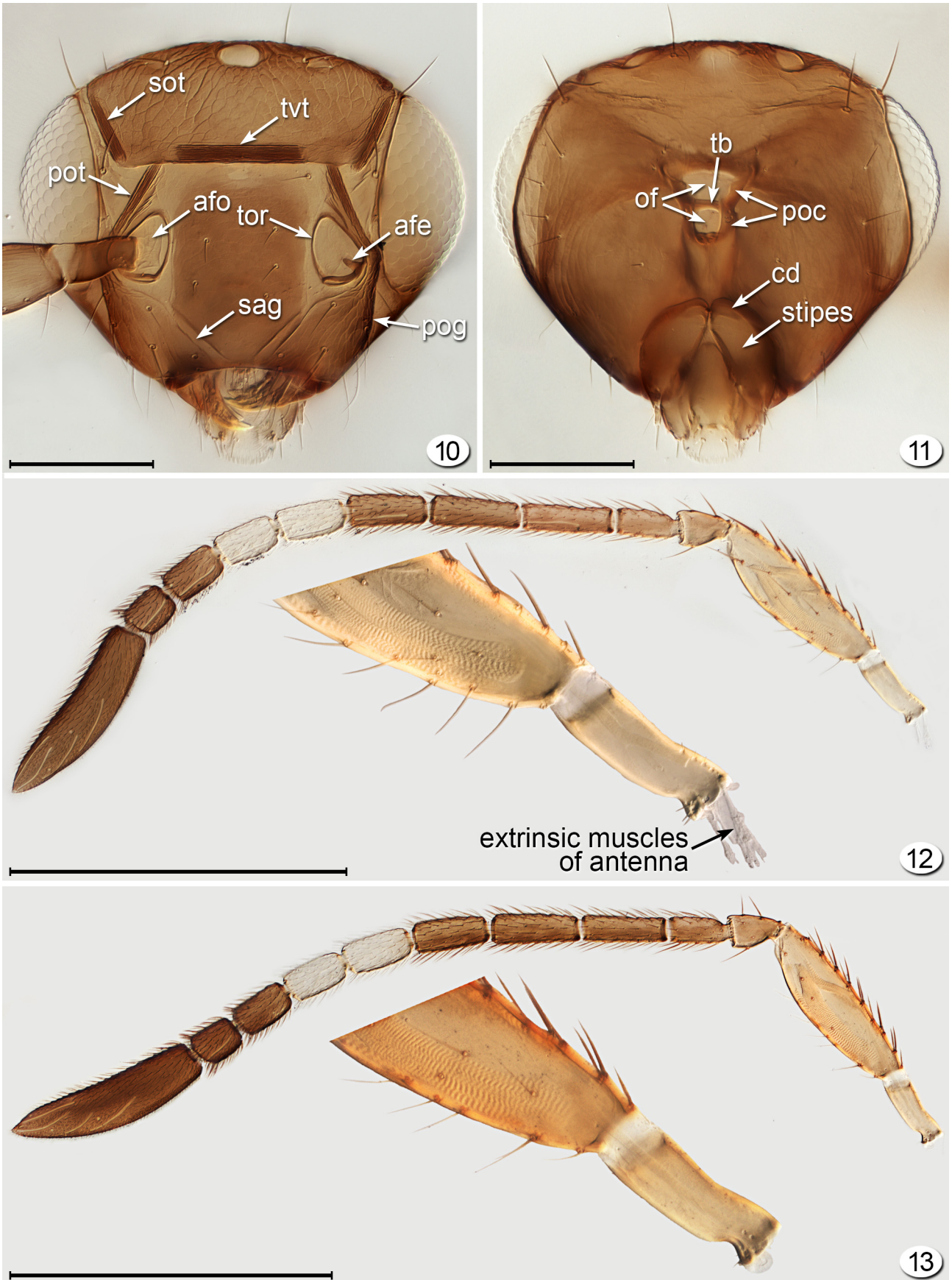
**FIGURE 4.** *Cosmocomoidea dolichocerus*, teneral adult head with vertex separated from face by pink intersegmental membrane, and transverse trabecula unrolled medially: a, anterodorsal; b, posterodorsal; c, anterodorsal; d, dorsal; e, lateral; f, anterolateral. Maximum width of head (across eyes): a and b = 400  $\mu\text{m}$ , c–f = 380  $\mu\text{m}$ .



**FIGURE 5.** *Cosmocomoidea dolichocerus*, head + mesosoma, dorsal (three specimens): a, teneral, the cuticle pale (not yet melanized) on vertex and parts of mesosoma; b, mostly hardened and darkened cuticle; c, fully hardened and darkened cuticle. Scale bar = 500  $\mu$ m.



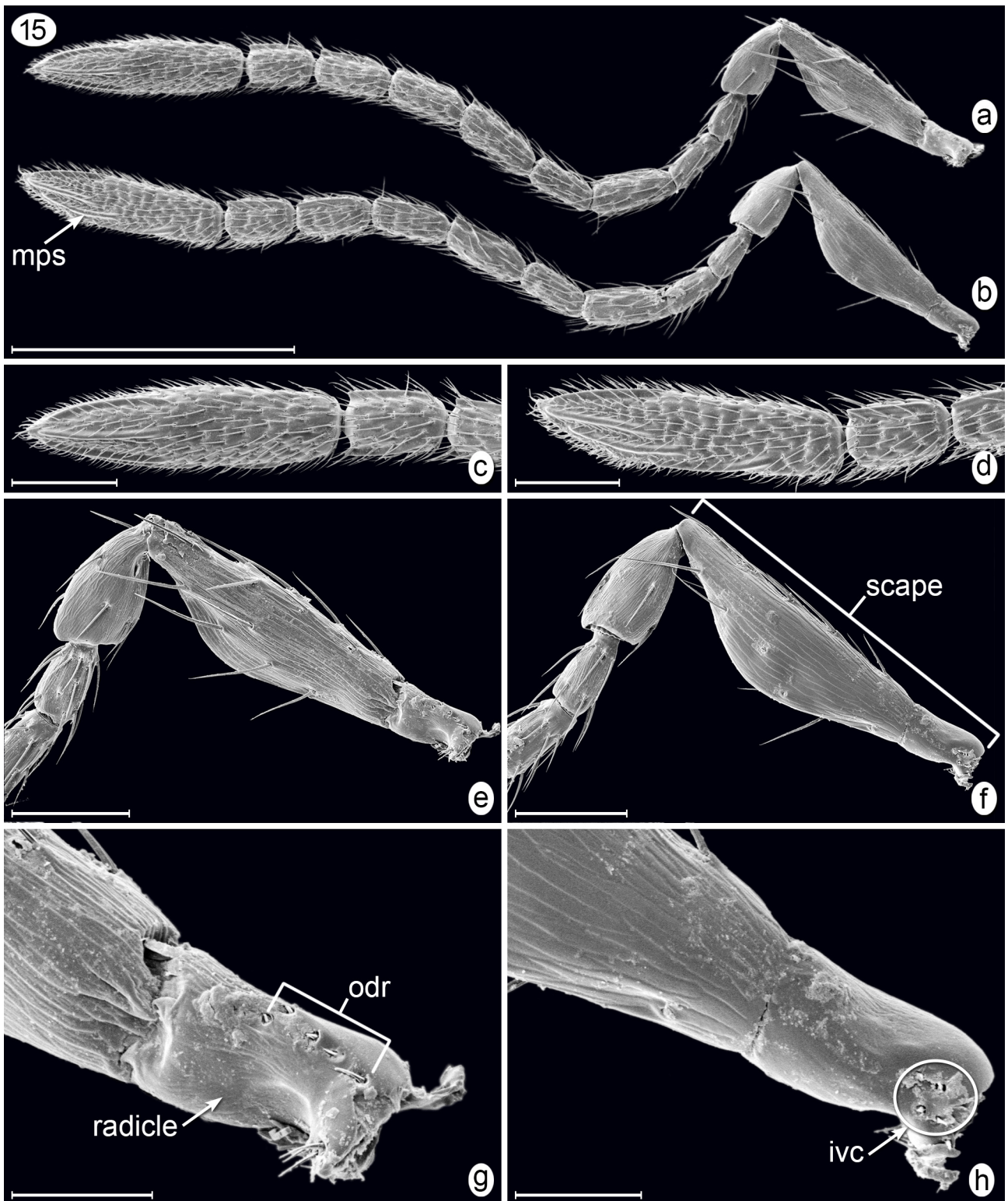
**FIGURES 6–9.** Dorsal views: 6, *Gonatocerus* sp., entire body; 7, *Lymaenon* sp., entire body; 8, *Lymaenon* sp., pronotum, the lateral lobes widely separated medially; 9, *Cosmocomoidea* sp., pronotum, the lateral lobes abutting medially. Maximum diameter across mesoscutum (just anterior to fore wing base): 8 = 300  $\mu$ m, 9 = 330  $\mu$ m.



**FIGURES 10–13.** *Cosmocomoidea* spp.: 10, *Cosmocomoidea* sp., head, anterior; 11, head, posterior; 12, *C. morrilli*, female antenna and (inset) base of left scape (outer view); 13, same as 12, right scape (inner view). Scale bars: 10 and 11 = 100  $\mu$ m, 12 and 13 = 500  $\mu$ m.

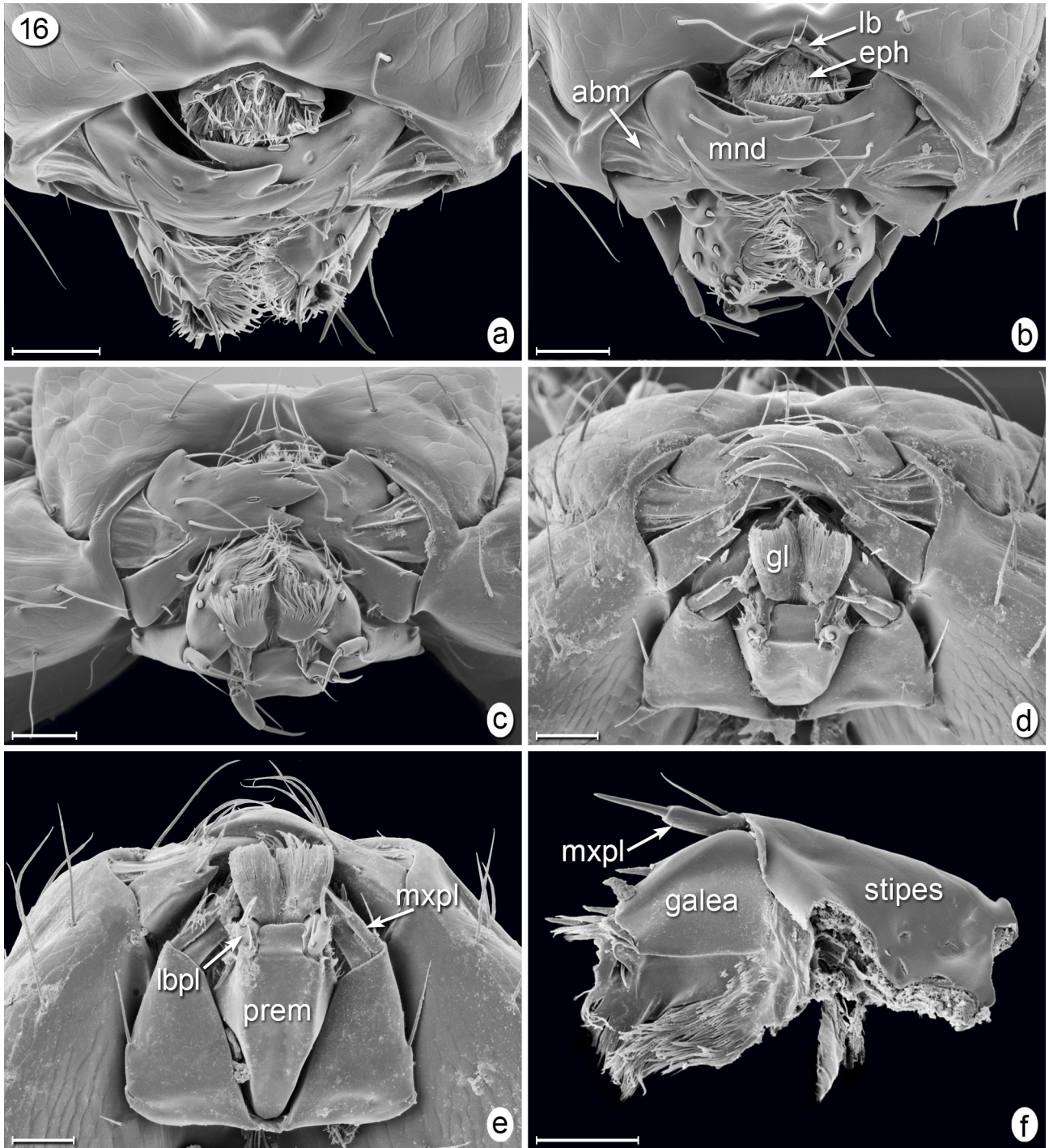


**FIGURE 14.** *Cosmocomoidea morrilli*, head, different sections in transverse plane, slide mounts: a, anterior; b, anteromedian; c, median; d, posteromedian; e, posterior; f, composite. Maximum head diameter = 540  $\mu$ m.

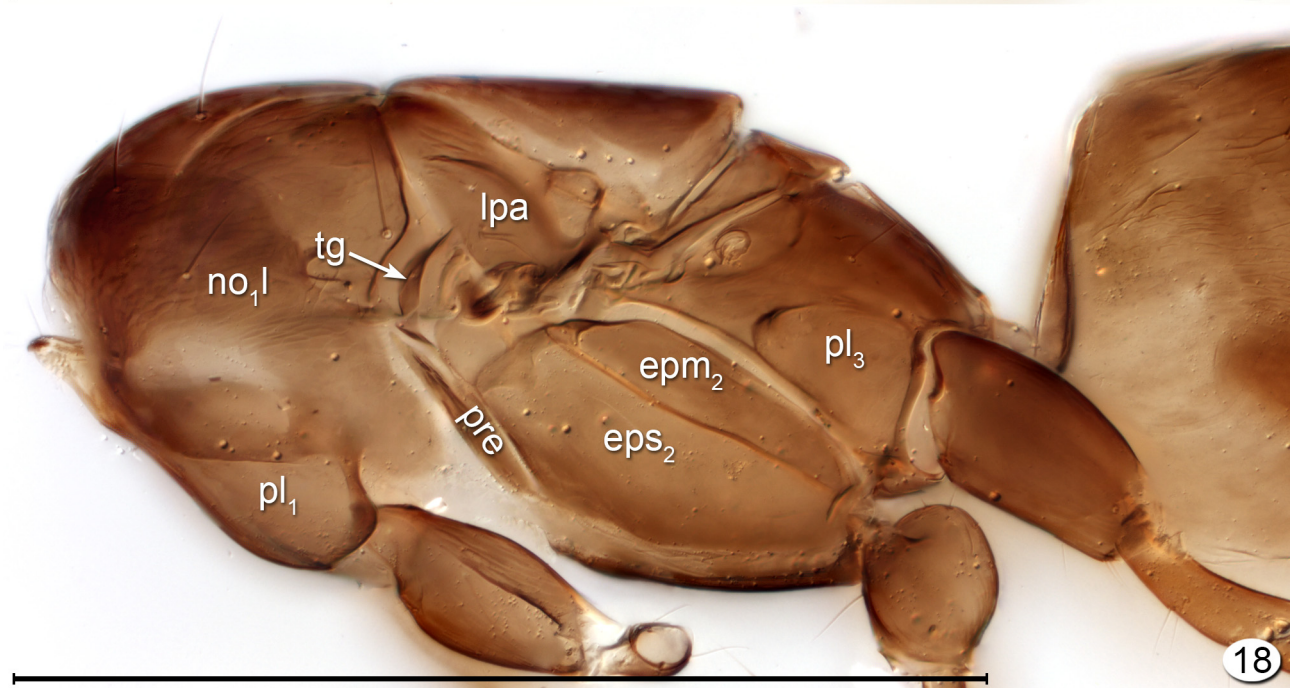
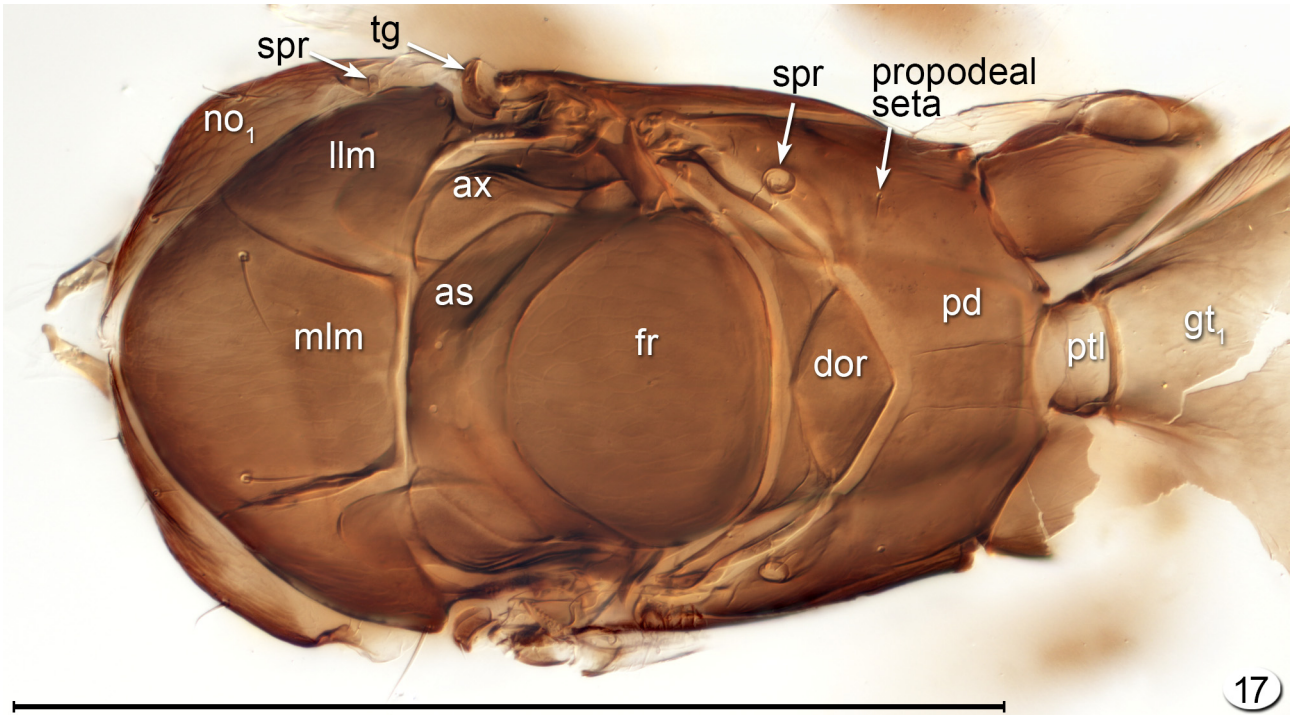


**FIGURE 15.** *Cosmocomoidea latipennis*, female antenna: a, left (outer view); b, right (inner view); c, fl<sub>7</sub>-clava (outer view); d, fl<sub>7</sub>-clava (inner view); e, scape-fl<sub>2</sub> (outer view); f, scape-fl<sub>2</sub> (inner view); g, radicle (outer view); h, radicle (inner view). Scale bars: a and b = 200 μm, c–f, h = 50 μm, g = 20 μm.

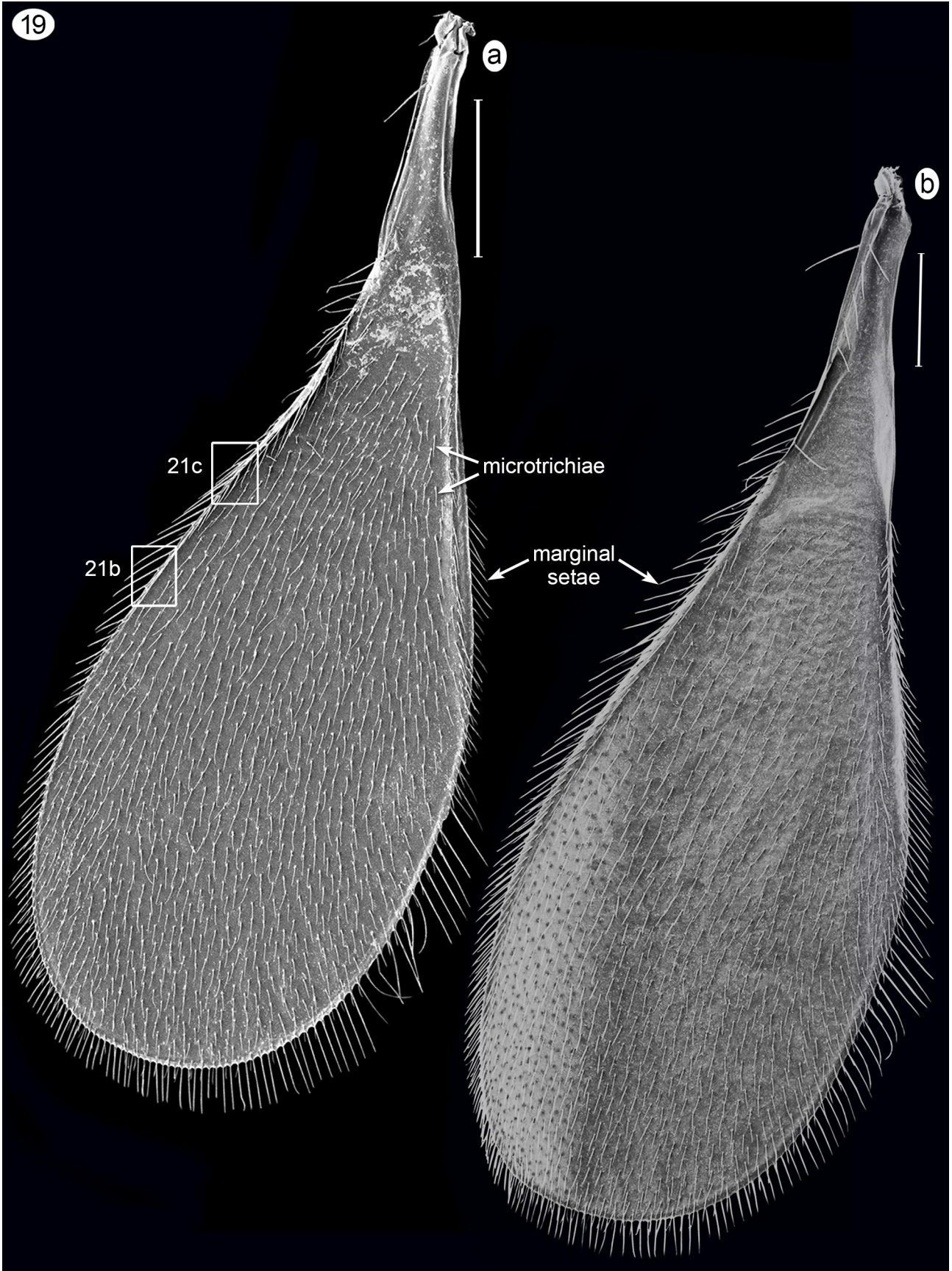




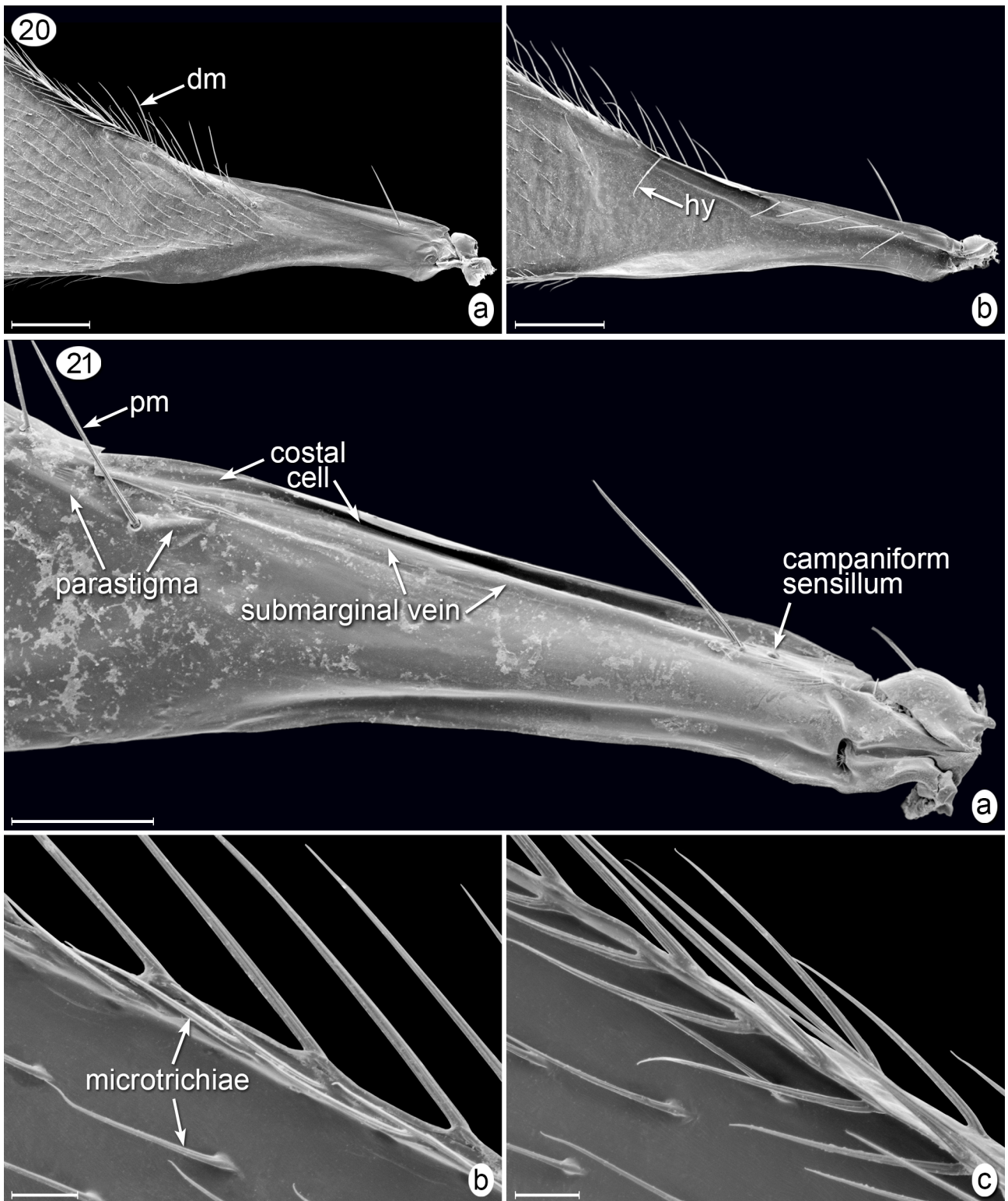
**FIGURE 16.** *Cosmocomoidea latipennis*, mouthparts: a, anterior; b, anteroventral; c, ventral; d, posteroventral; e, posterior; f, right maxilla, posterior. Scale bars = 20  $\mu$ m.



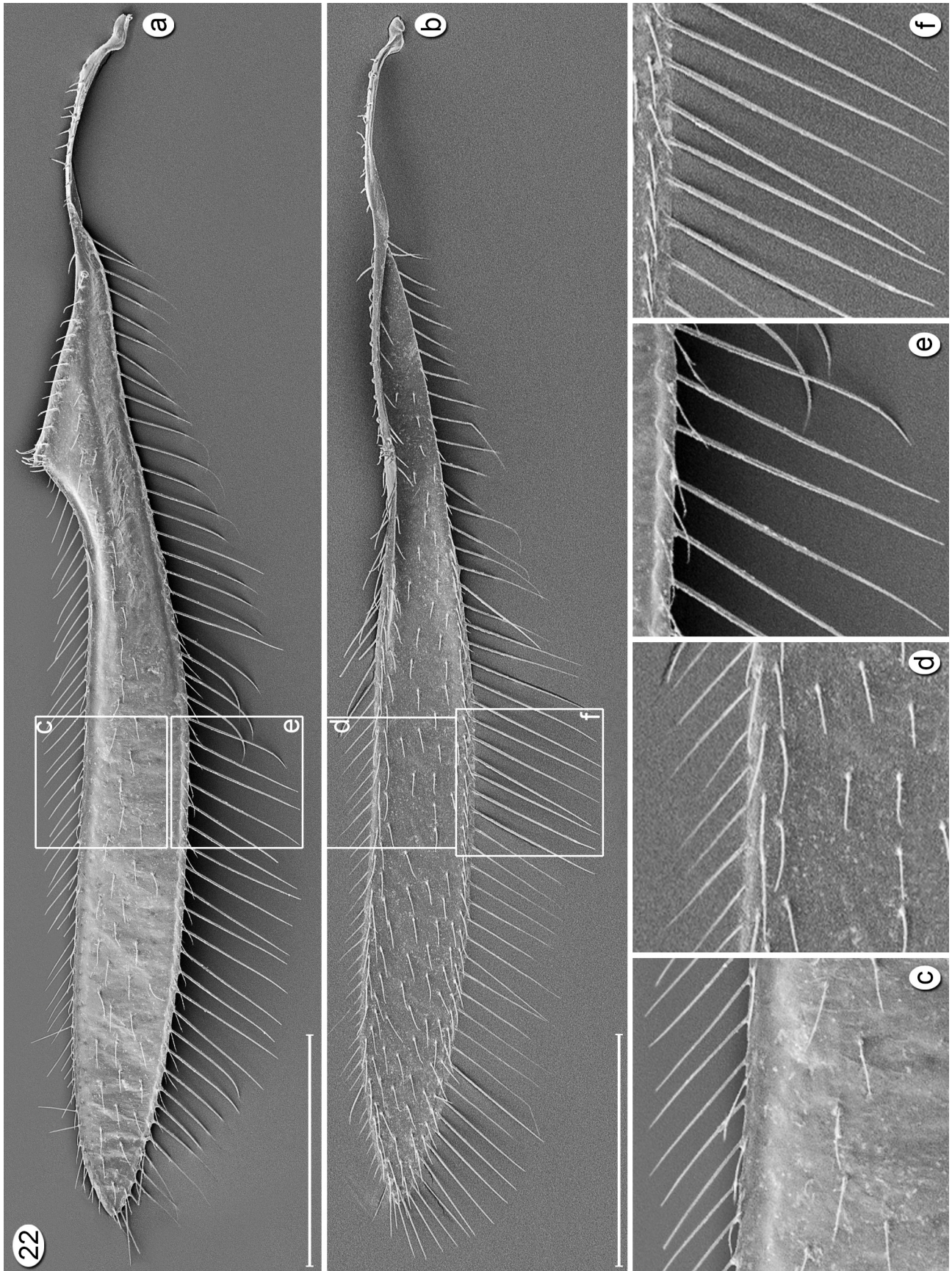
FIGURES 17, 18. *Cosmocomoidea* sp., mesosoma and base of metasoma: 17, dorsal; 18, lateral. Scale bars = 500  $\mu$ m.



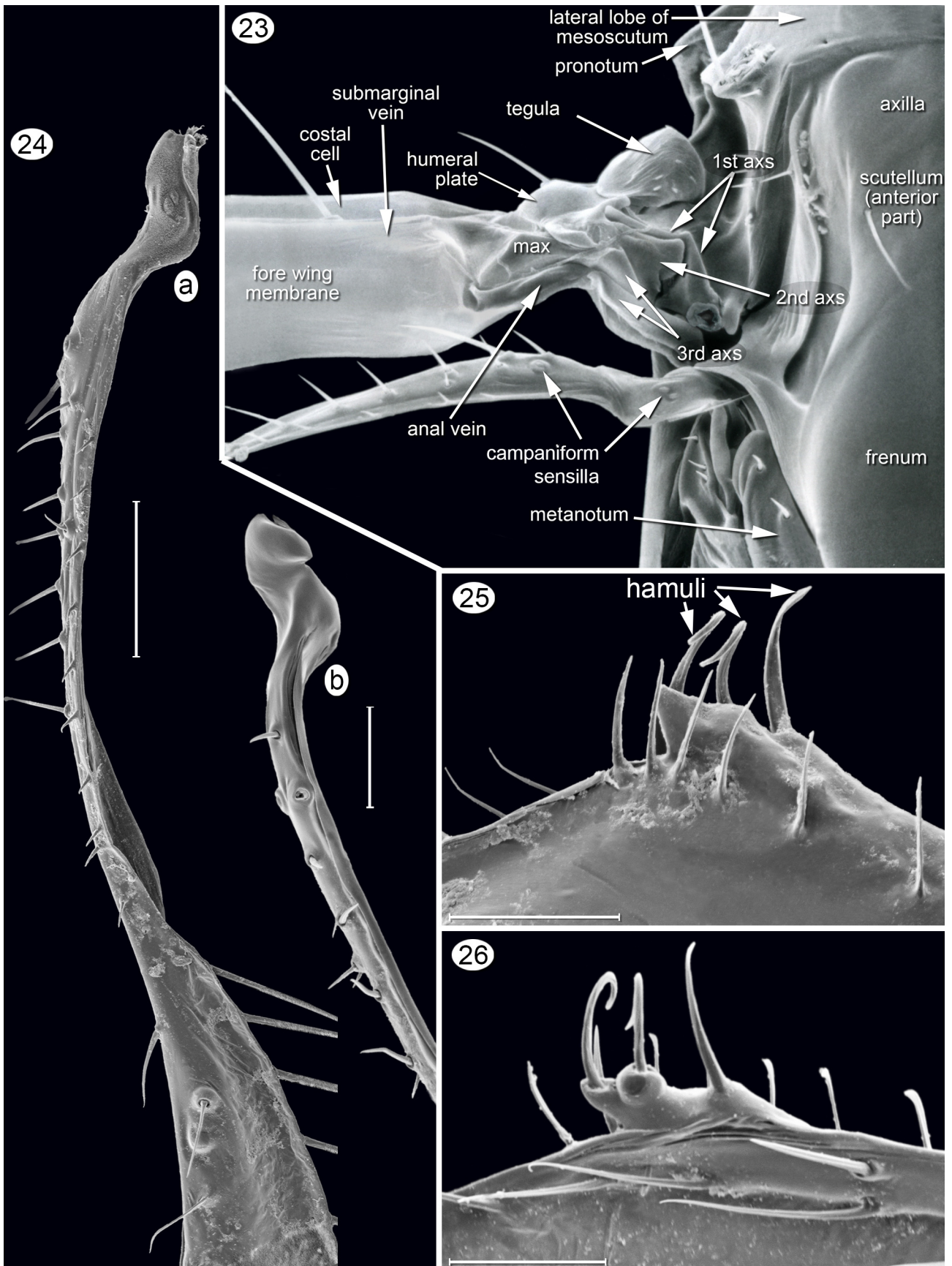
**FIGURE 19.** *Cosmocomoidea latipennis*, fore wing: a, dorsal; b, ventral. Scale bar = 200  $\mu\text{m}$ .



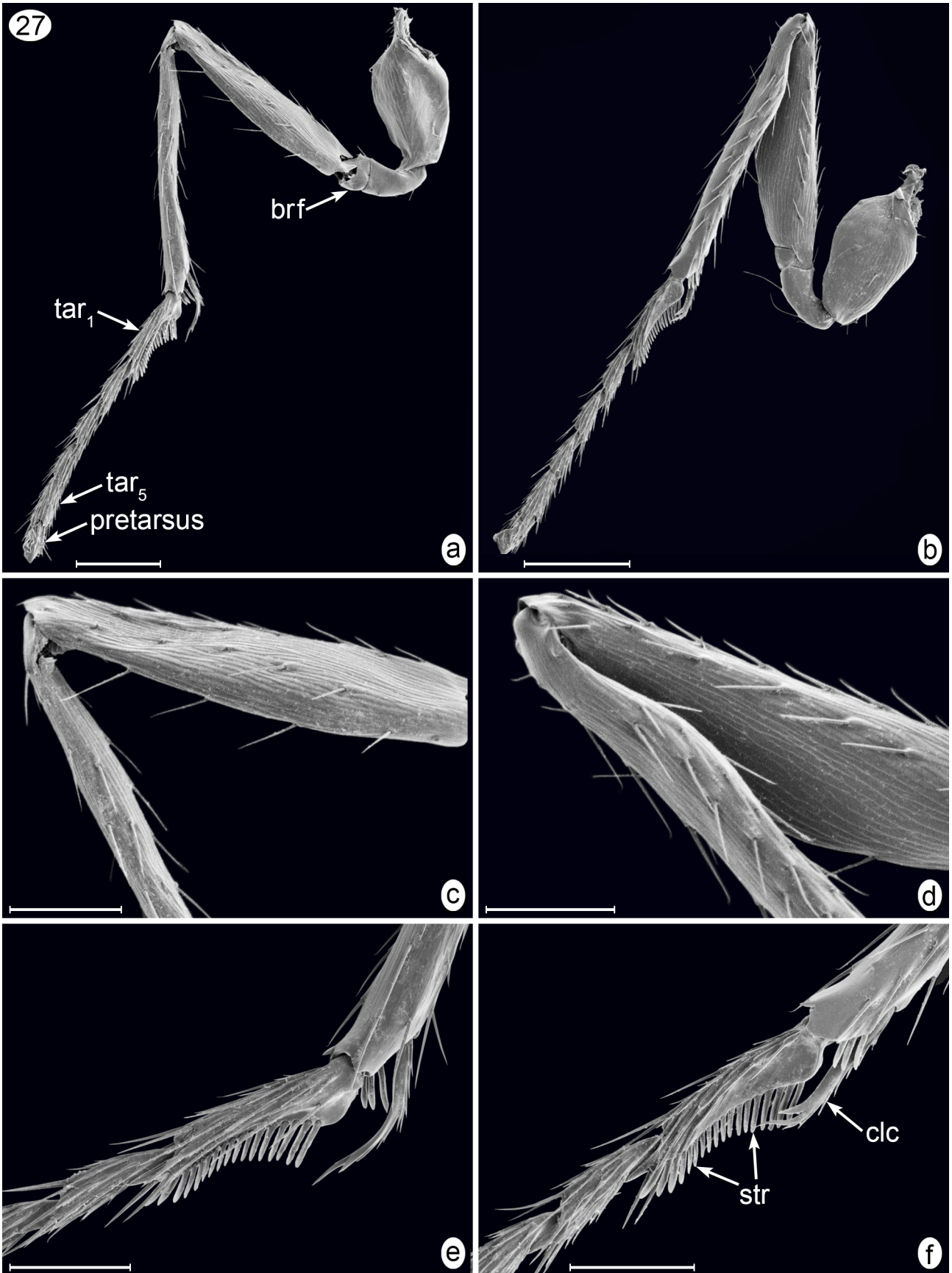
**FIGURES 20, 21.** *Cosmocomoidea* spp.: 20, *C. schajovskoi*, fore wing base. a, dorsal; b, ventral; 21, *C. latipennis*, a, fore wing base; b, membrane surface and margin (inset from 19); c, same as b but margin seen edge on (inset from 19). Scale bars: 20a and b, 21a = 100  $\mu\text{m}$ ; 21b and c = 10  $\mu\text{m}$ .



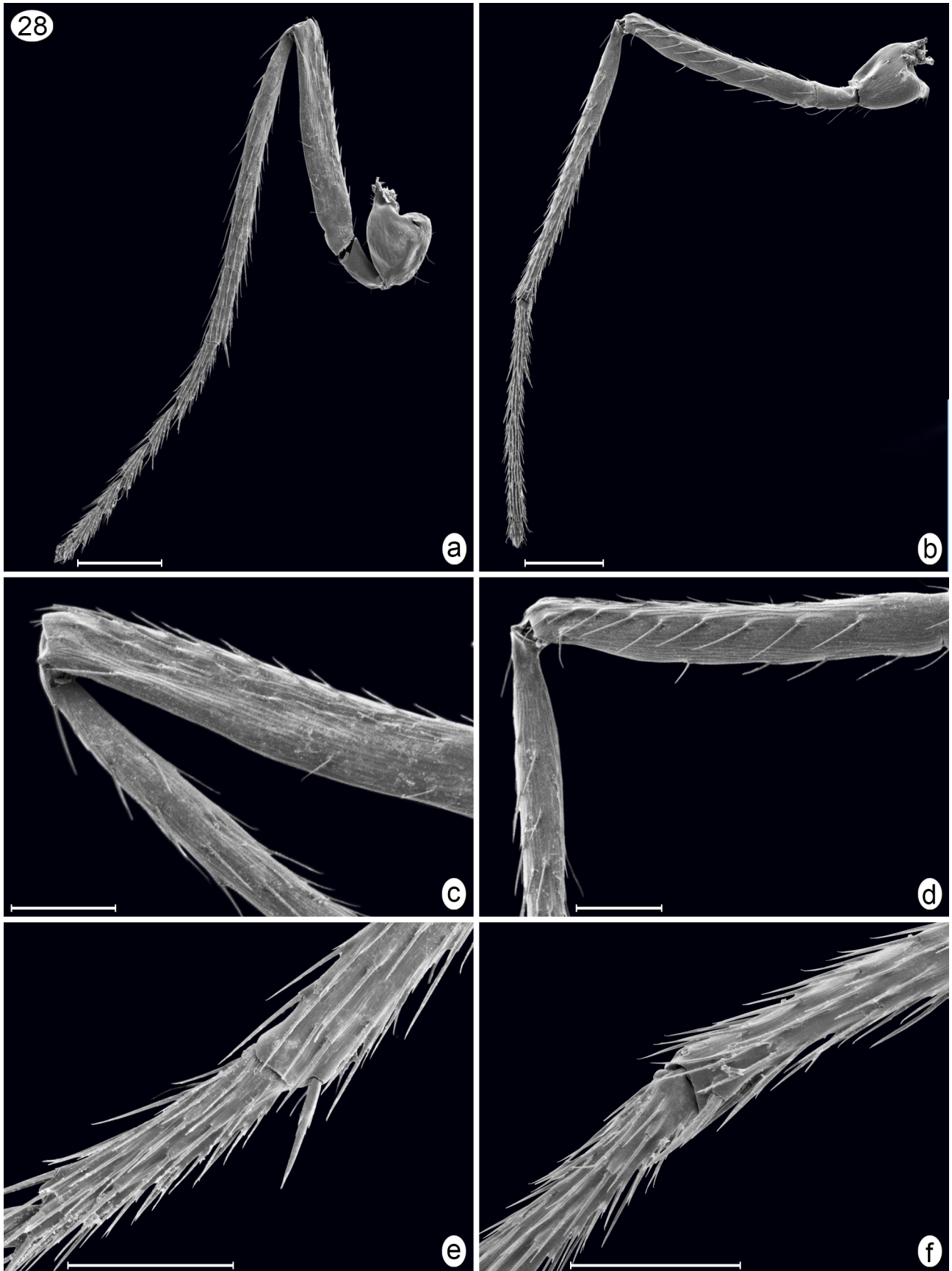
**FIGURE 22.** *Cosmocomoidea latipennis*, hind wing: a, dorsal; b, ventral; c, dorsal, anterior margin (inset from a); d, ventral, anterior margin (inset from b); e, dorsal, posterior margin (inset from a); f, ventral, posterior margin (inset from b). Scale bars: a and b = 200  $\mu$ m.



**FIGURES 23–26.** *Cosmocoidea* spp.: 23, *C. sp.*, base of wings attached to mesosoma; *C. latipennis*: 24, hind wing base; a, enlargement of 22a; b, enlargement of 22b; 25, hamuli, dorsal; 26, hamuli, ventral. Scale bars = 20  $\mu$ m.

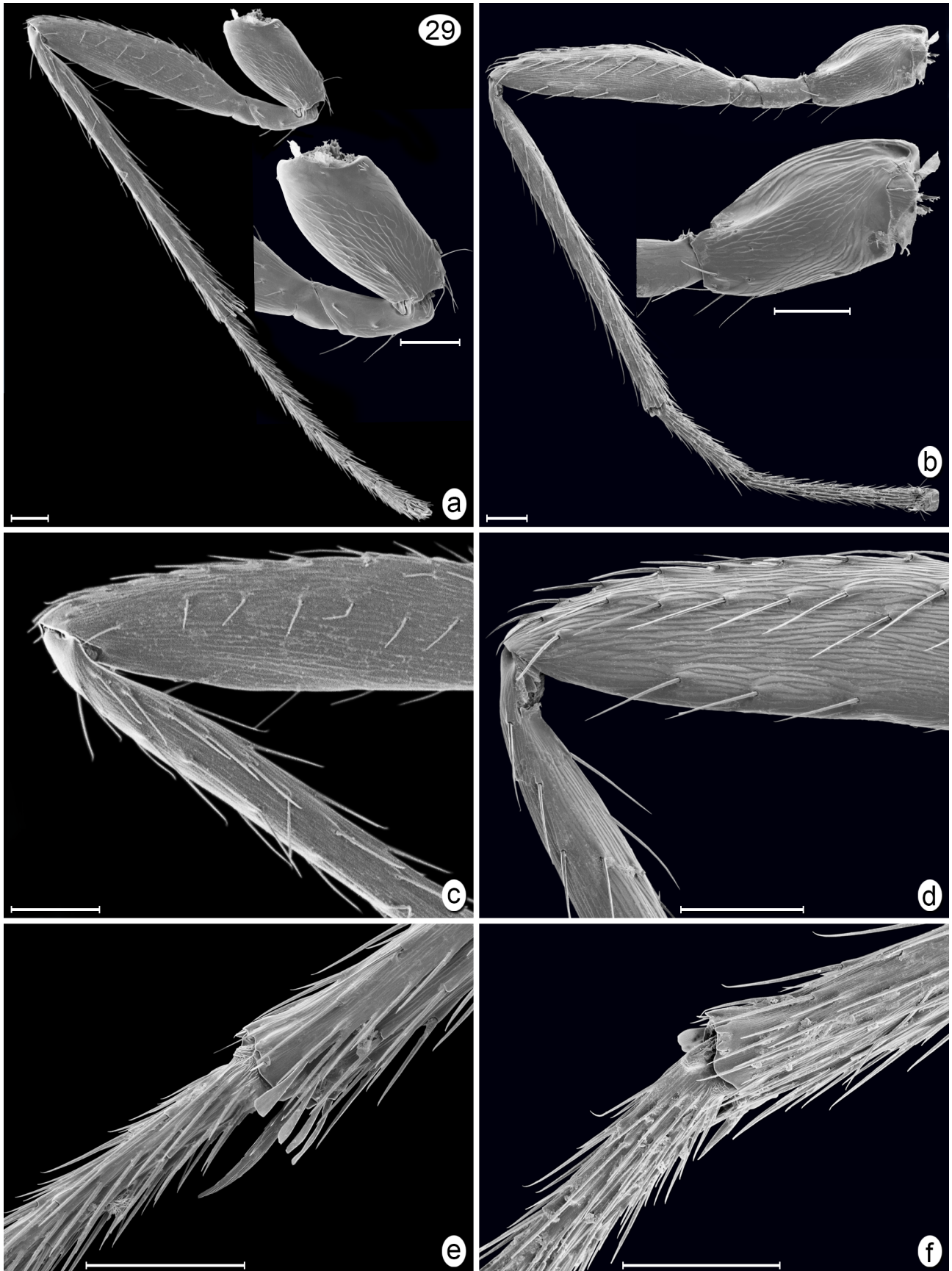


**FIGURE 27.** *Cosmocomoidea latipennis*, fore legs: a, left = posterior view; b, right = anterior view; c, left knee (apex of femur + base of tibia); d, right knee; e, apex of tibia + tarsomere 1 and 2, left; f, same as e, right. Scale bars: a and b = 100  $\mu$ m, c–f = 50  $\mu$ m.

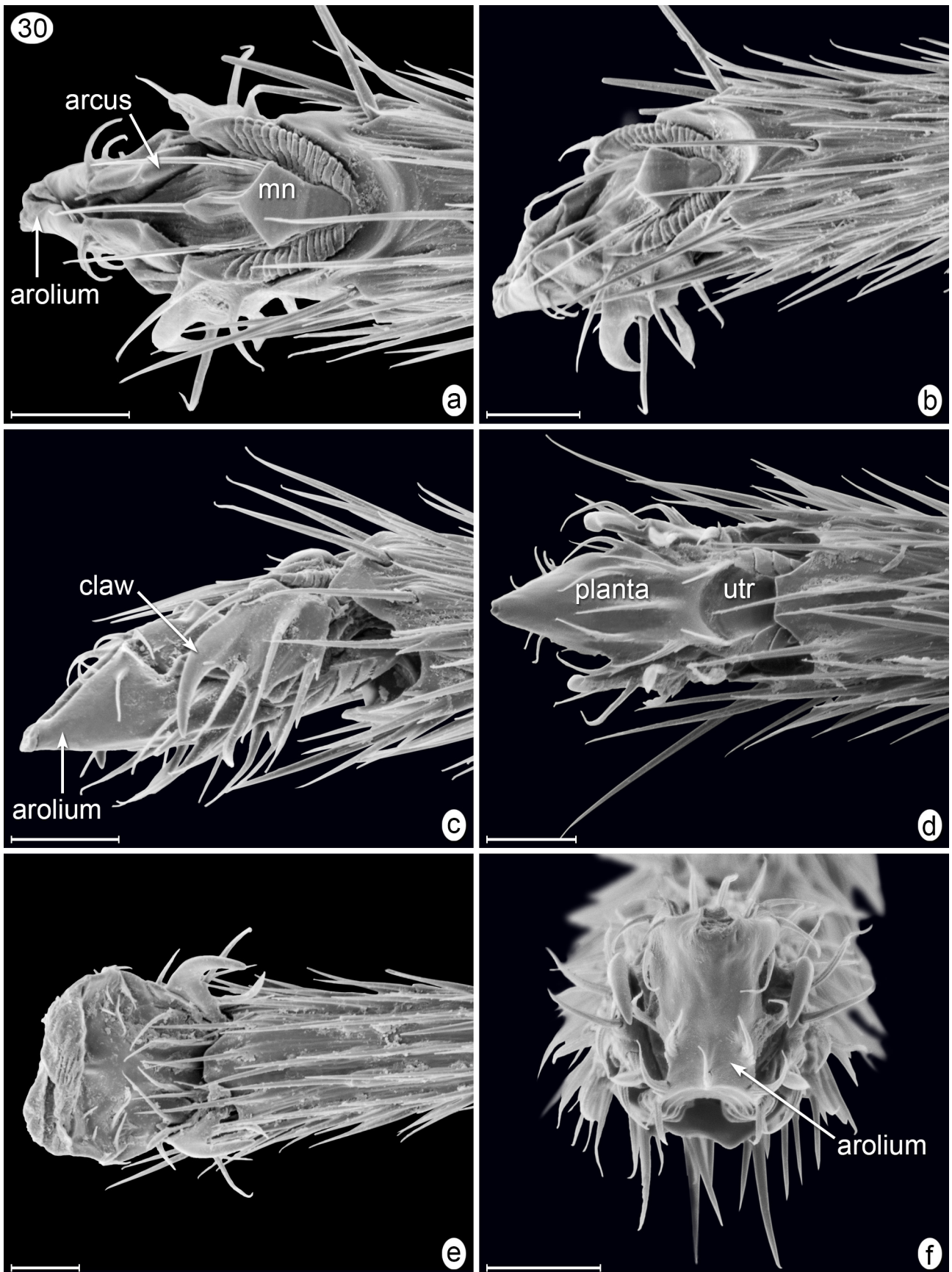


**FIGURE 28.** *Cosmocomoidea latipennis*, middle legs: a, left = posterior view; b, right = anterior view; c, left knee (apex of femur + base of tibia); d, right knee; e, apex of tibia + tarsomere I, left; f, same as e, right. Scale bars: a and b = 100  $\mu\text{m}$ , c–f = 50  $\mu\text{m}$ .

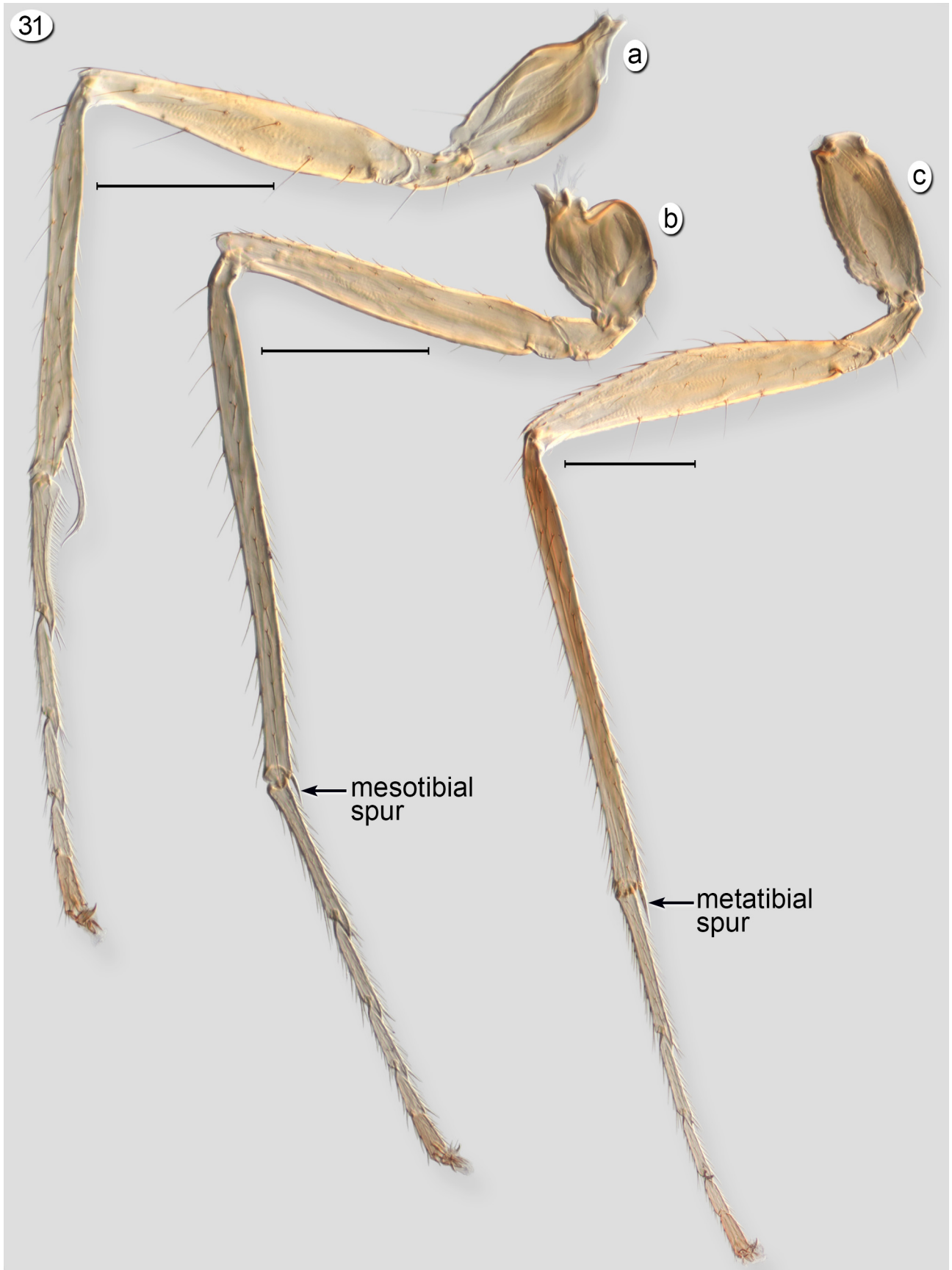




**FIGURE 29.** *Cosmocomoidea latipennis*, hind legs: a, left = posterior view; b, right = anterior view; c, left knee (apex of femur + base of tibia); d, right knee; e, apex of tibia + most of tarsomere 1, left; f, same as e, right. Scale bars = 50  $\mu$ m.



**FIGURE 30.** *Cosmocomoidea latipennis*, pretarsus: a, dorsal; b, laterodorsal; c, lateral; d, ventral; e, ventral with planta and arolium uncurling; f, end on. Scale bars = 10  $\mu$ m.

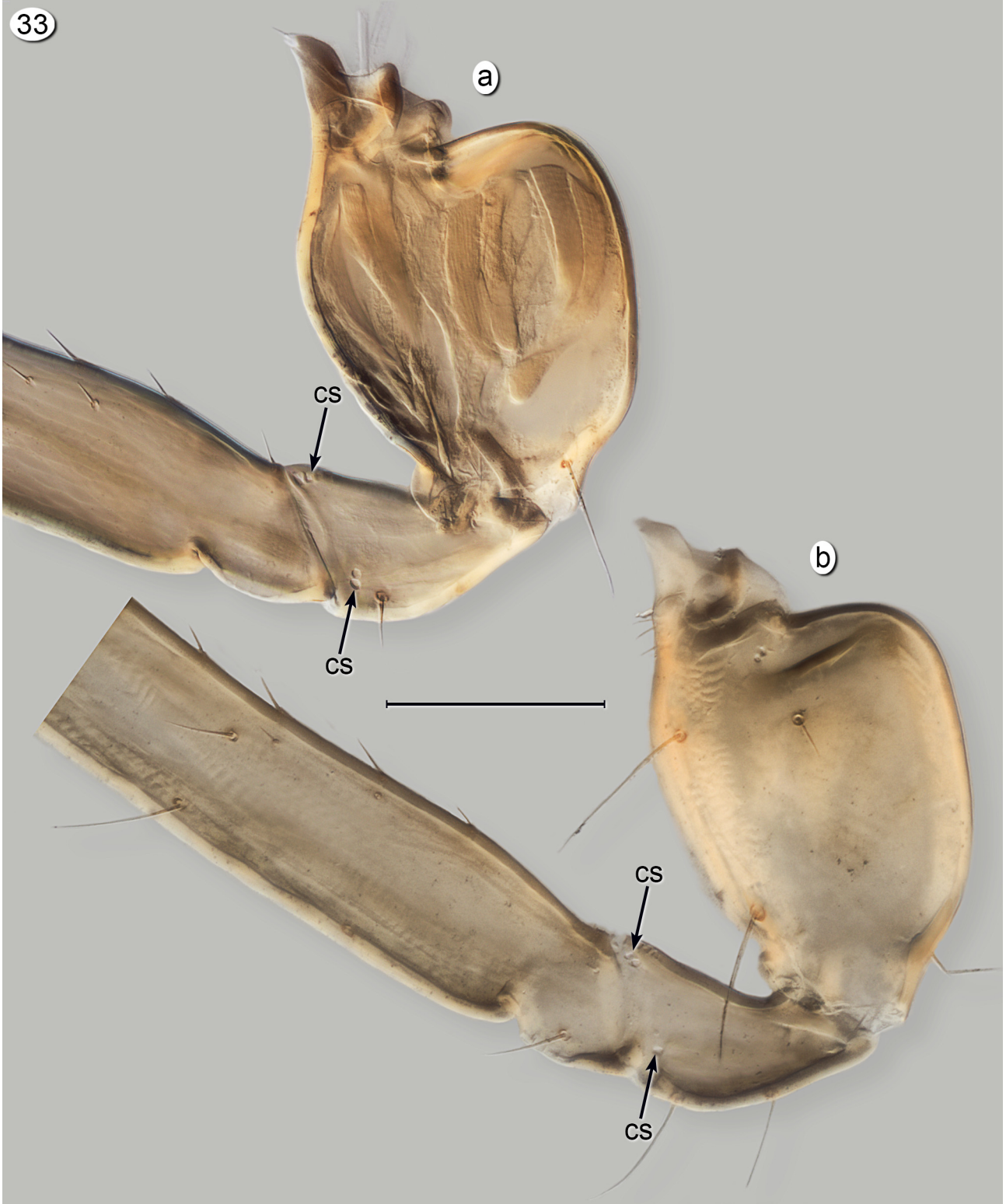


**FIGURE 31.** *Cosmocomoidea morrilli*, left legs (posterior view): a, fore; b, middle; c, hind. Scale bars = 200  $\mu$ m.

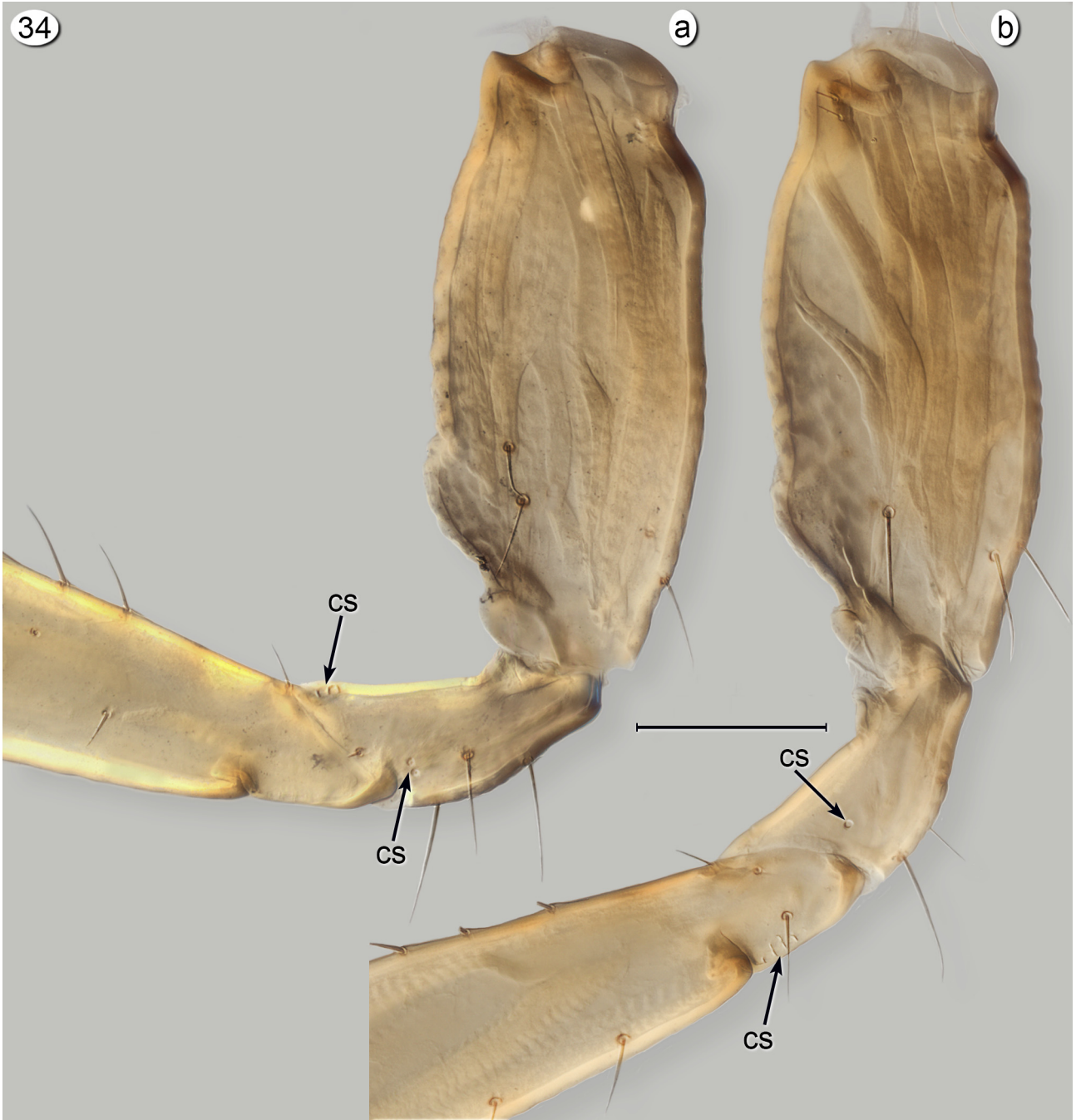


**FIGURE 32.** *Cosmocomoidea morrilli*, fore coxa–base of femur: a, left (posterior); b, right (anterior). Scale bars = 100  $\mu$ m.

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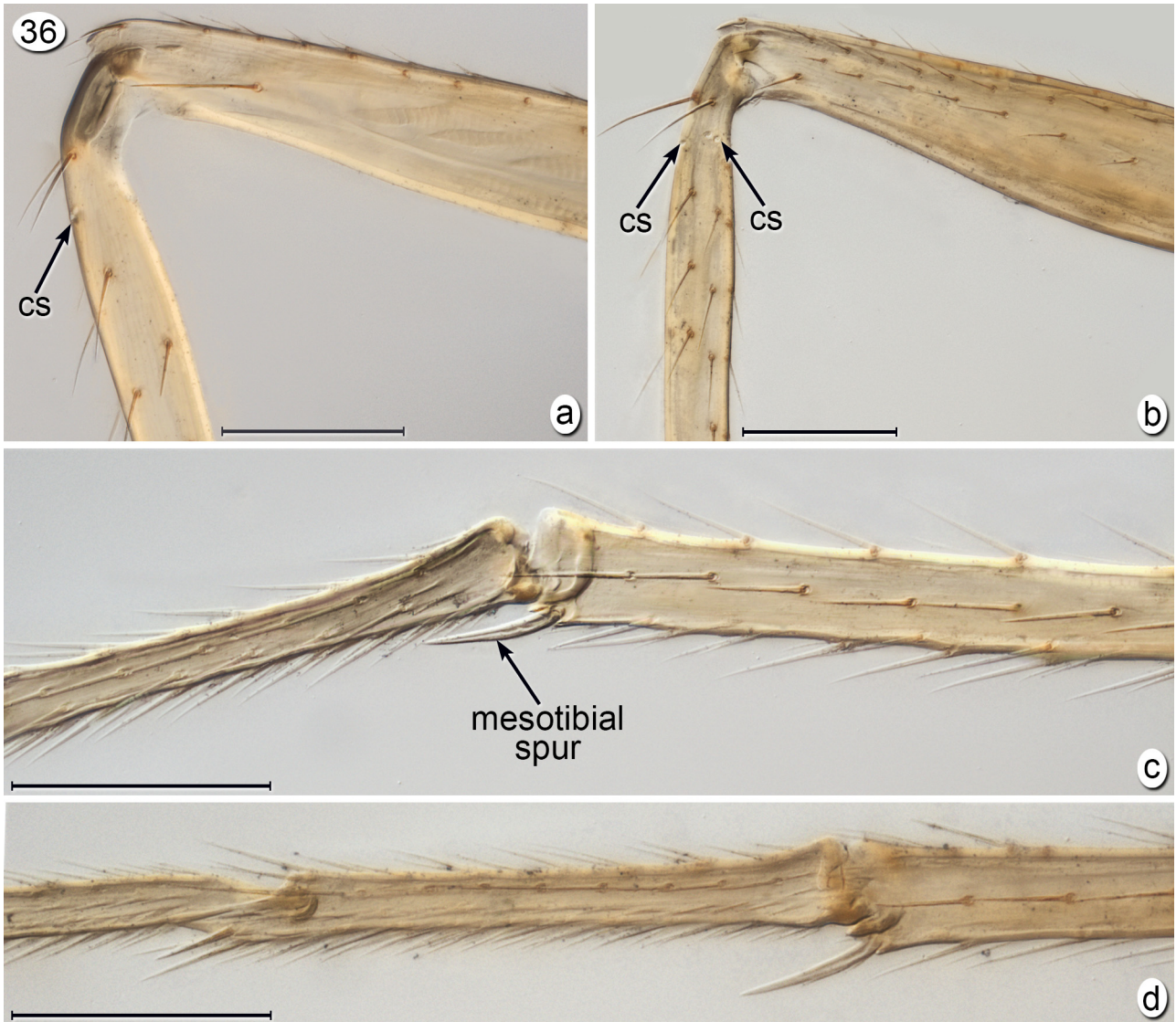
**FIGURE 33.** *Cosmocomoidea morrilli*, middle coxa–base of femur: a, left (posterior); b, right (anterior). Scale bars = 100  $\mu$ m.



**FIGURE 34.** *Cosmocomoidea morrilli*, hind coxa–base of femur: a, left (posterior); b, right (anterior). Scale bars = 100  $\mu$ m.

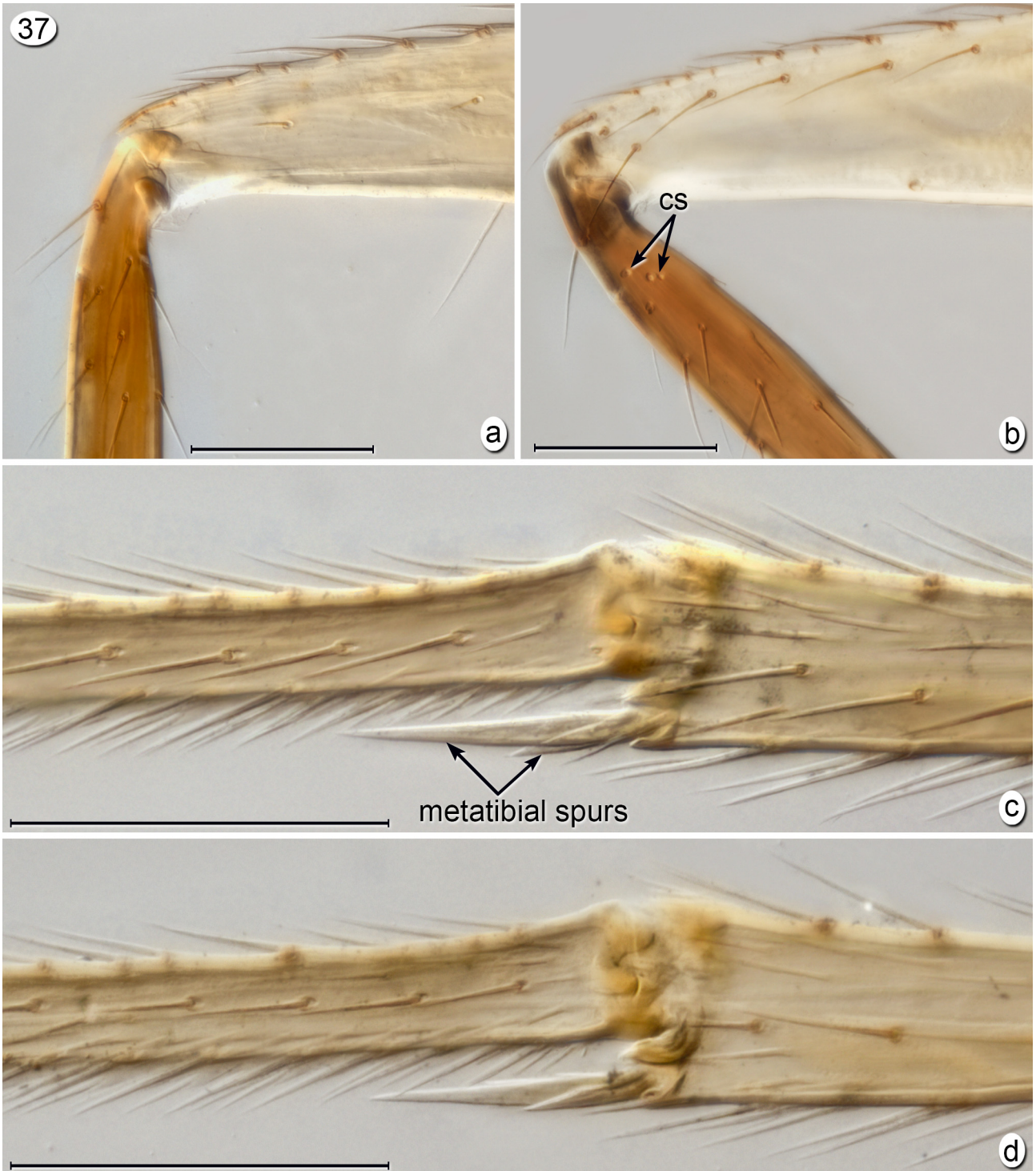


**FIGURE 35.** *Cosmocomoidea morrilli*, fore legs: a, femur apex + tibia base, left (posterior); b, right (anterior); c, tibia apex + tarsomere 1, left; d, right. The antennal cleaner consists of the calcar (moveable tibial spur) and strigil (comb on tarsomere). Scale bars = 100  $\mu$ m.

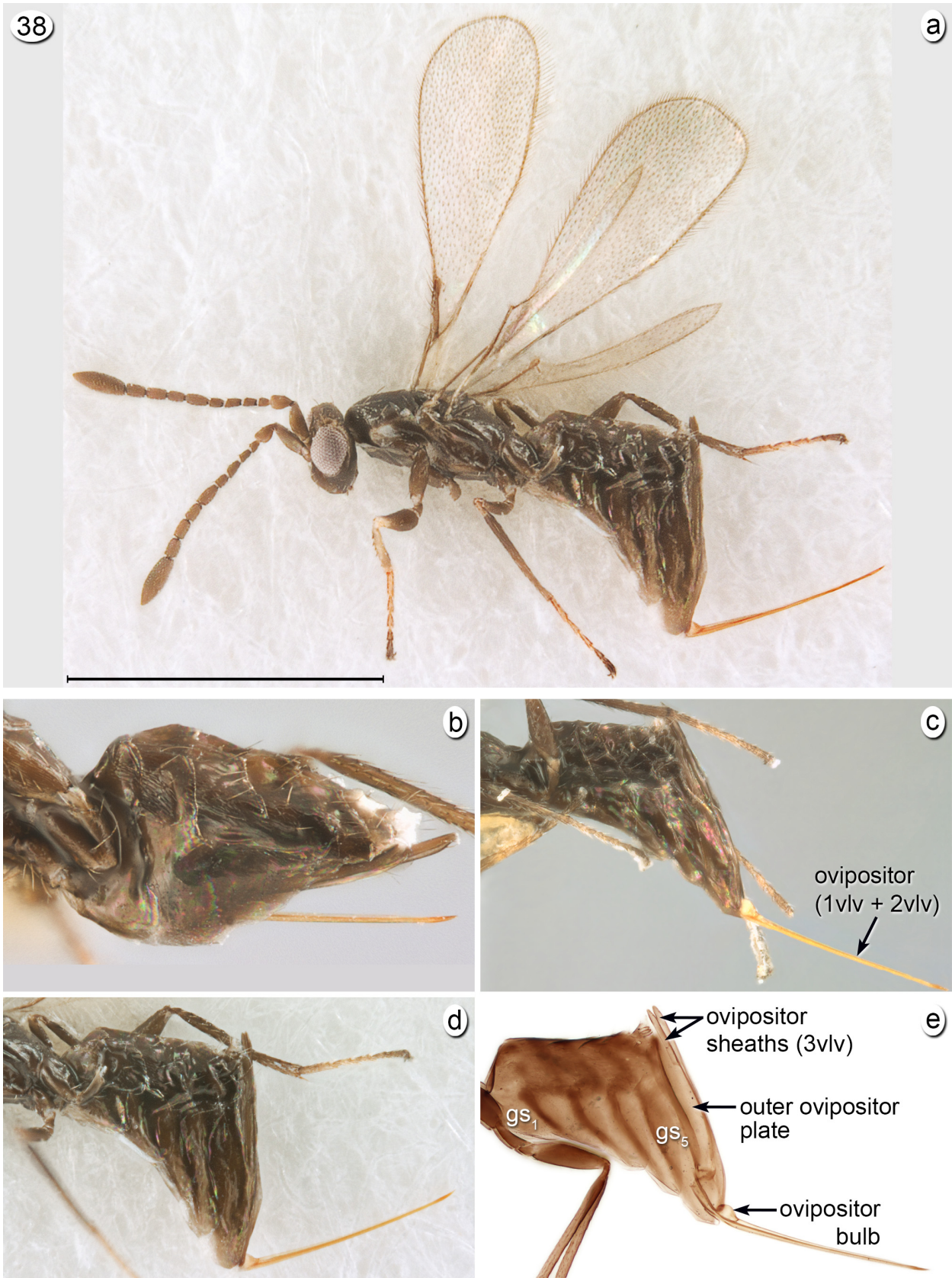


**FIGURE 36.** *Cosmocomoidea morrilli*, middle legs: a, knee (femur apex + tibia base), left (posterior); b, right (anterior); c, tibia apex + tarsomere 1, left; d, right. Scale bars = 100  $\mu$ m.

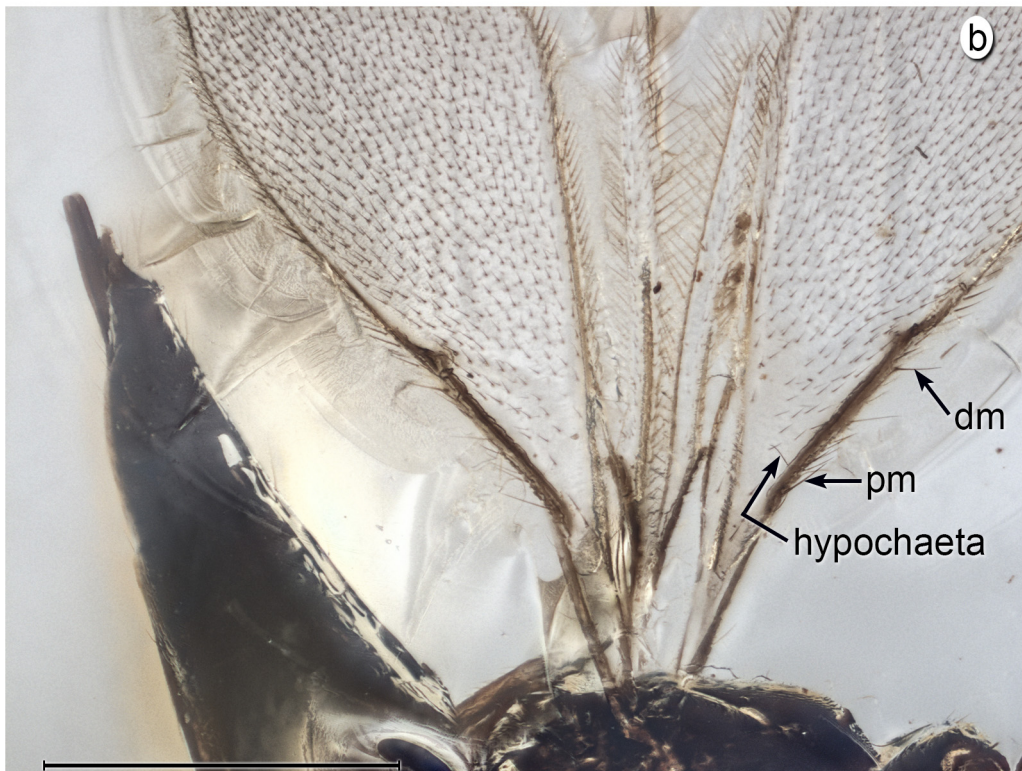




**FIGURE 37.** *Cosmocomoidea morrilli*, hind legs: a, knee (femur apex + tibia base), left (posterior); b, right (anterior); c, tibia apex + tarsomere 1, left; d, right. Scale bars = 100  $\mu$ m.



**FIGURE 38.** *Cosmocomoidea* sp.: a, habitus, with sterna of gaster stretched, ovipositor sheaths vertical and ovipositor unsheathed in preparation for oviposition; b, gaster with ovipositor in resting position; c, gaster with ovipositor almost in line with sheaths, ready for oviposition; d, gaster (duplication of a); e, cleared gaster from c, on slide in Canada balsam. Scale bar = 1000  $\mu$ m (also applies to c–e). Gaster length for b = 490  $\mu$ m.



**FIGURE 39.** *Archigonatocerus balticus*, holotype in amber: a, habitus; b, wings showing venation detail. Scale bars = 500  $\mu$ m.



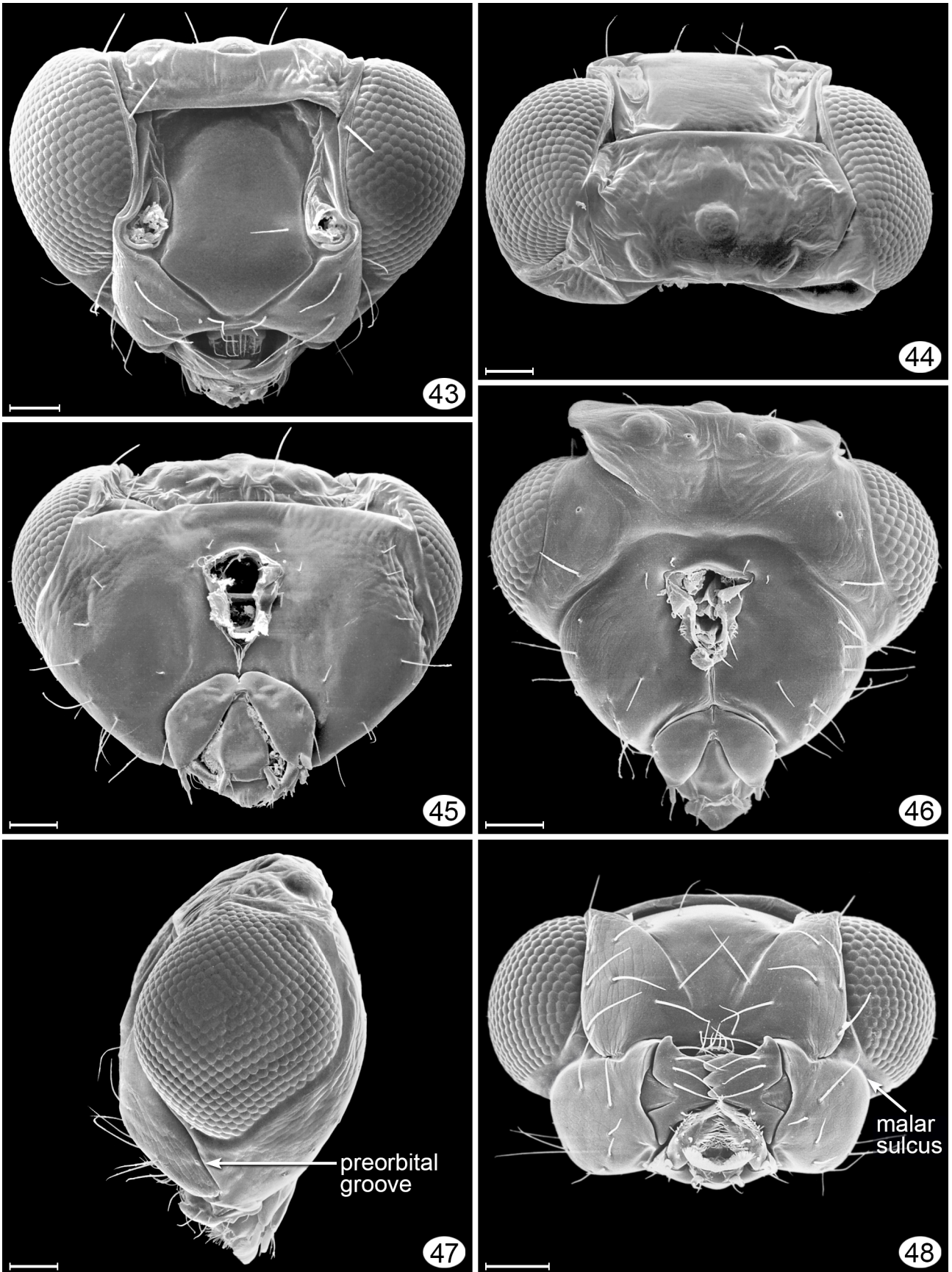
**FIGURE 40.** *Archigonatocerus longivena*, holotype in amber: a, habitus (body enclosed in air bubble); b, right fore wing showing venation detail. Scale bars = 500  $\mu\text{m}$ .



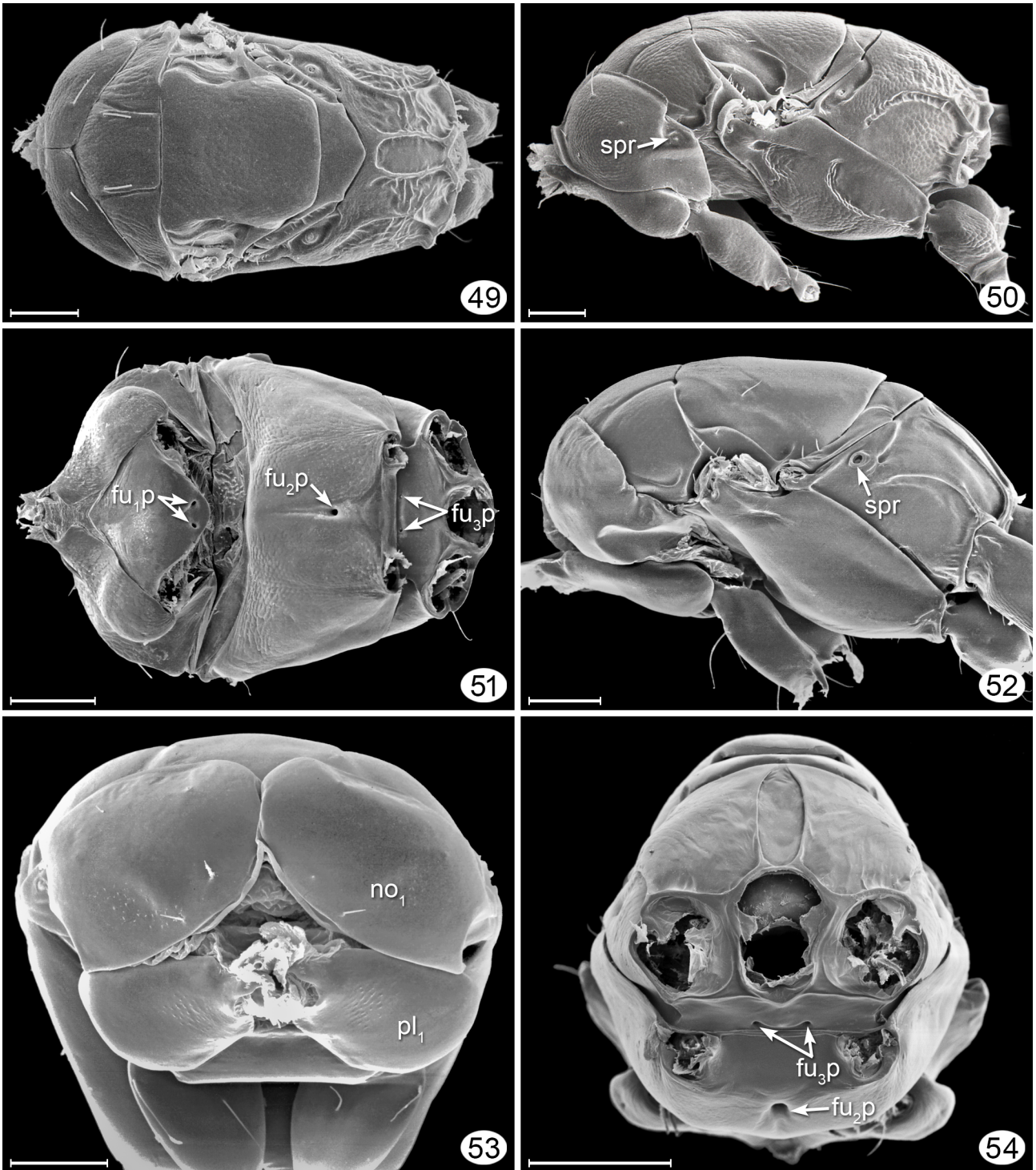
**FIGURE 41.** *Cosmocomoidea bucculentus*, habitus: USA, Arizona, Cochise Co., Chiricahua Mts., Southwestern Research Station, 9.ix.1979, in swimming pool. Scale bar = 1000  $\mu\text{m}$ .



**FIGURE 42.** *Cosmocomoidea schajovskoi*, habitus: Chile, Concepción, Rio Cruces, xii.1993. Scale bar = 500  $\mu$ m.

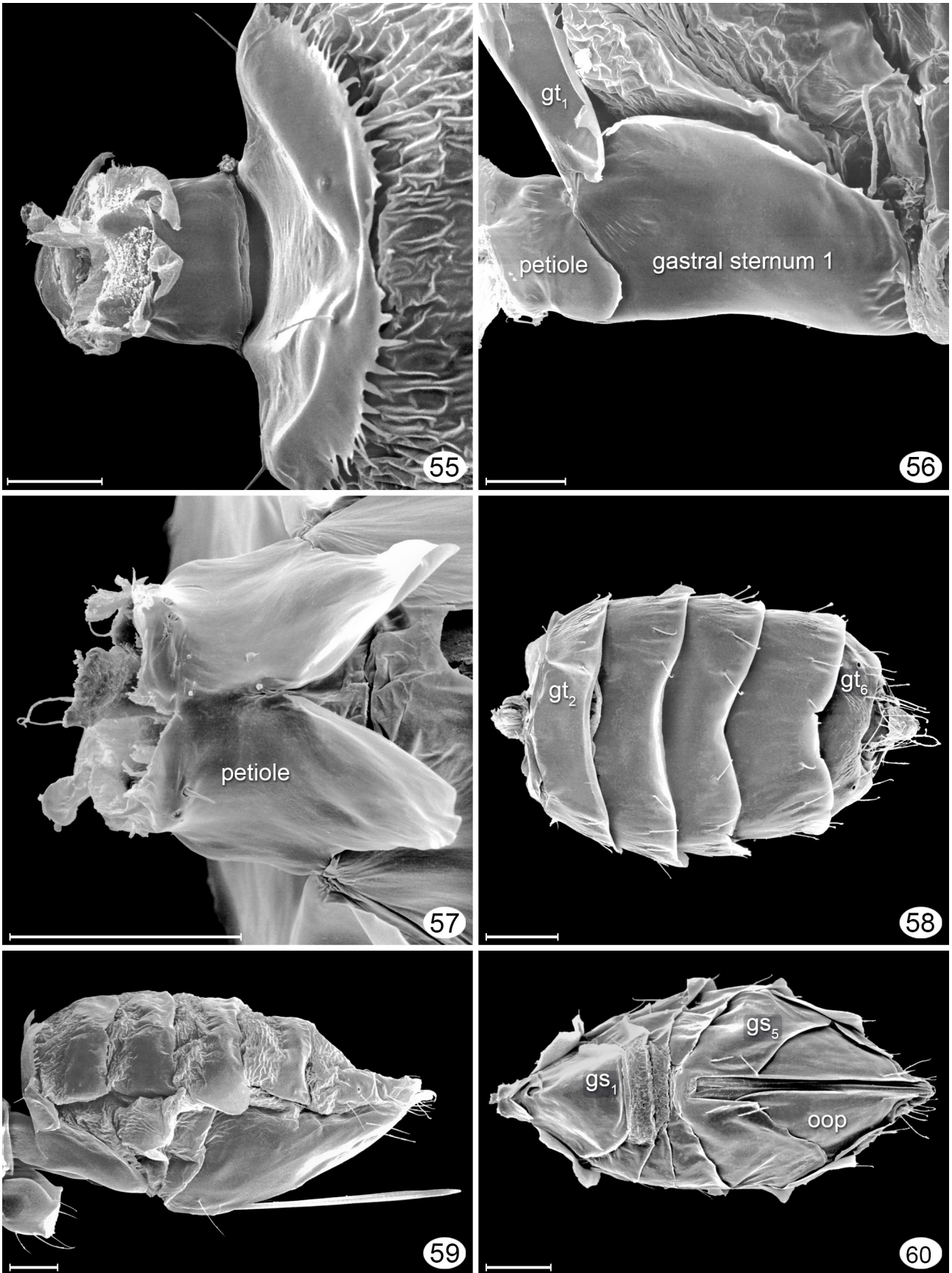


**FIGURES 43–48.** *Cosmocomoidea* spp., head: 43–45, *C.* sp.: 43, anterior; 44, dorsal; 45, posterior; 46, *C. dolichocerus*, posterior; 47, *C.* sp., lateral; 48, *C. dolichocerus*, ventral. Scale bars = 50  $\mu$ m.



**FIGURES 49–54.** *Cosmocomoidea* spp., mesosoma: 49, *C. sp.*, dorsal; 50, *C. morrilli*, lateral; 51–53, *C. sp.*: 51, ventral; 52, lateral; 53, anterior; 54, *C. latipennis*, posterior. Scale bars = 100  $\mu$ m.

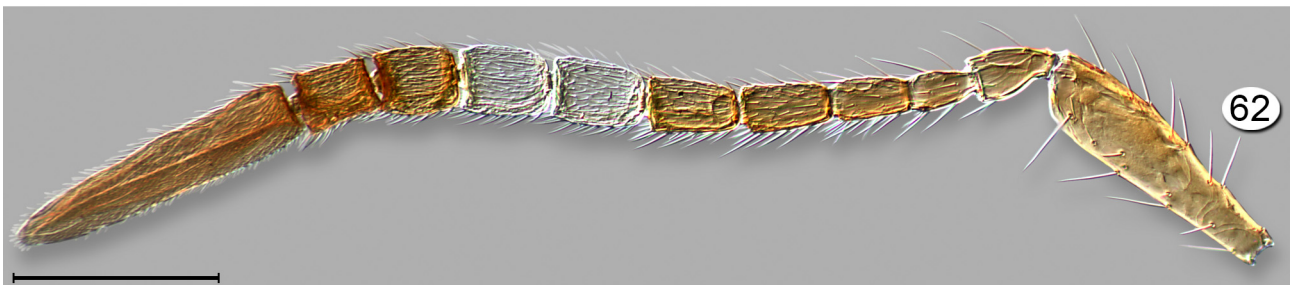




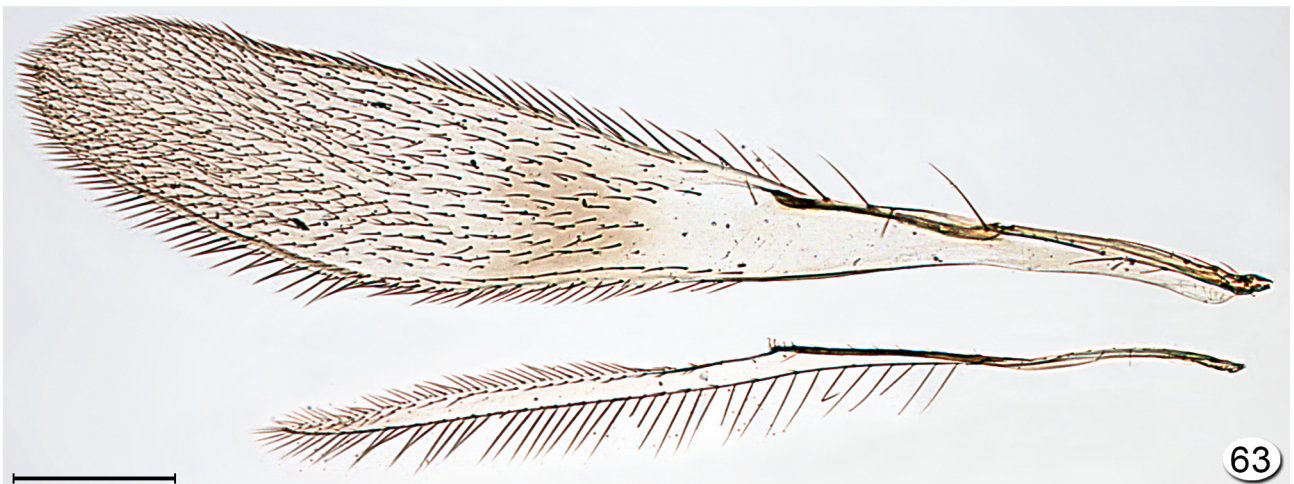
**FIGURES 55–60.** *Cosmocomoidea* sp.: 55, petiole +  $gt_1$ , dorsal; 56, petiole +  $gs_1$ , lateral; 57, petiole, ventral; 58, metasoma, dorsal; 59, metasoma, lateral; metasoma, ventral. Scale bars: 55–57 = 50  $\mu$ m, 58–60 = 100  $\mu$ m.



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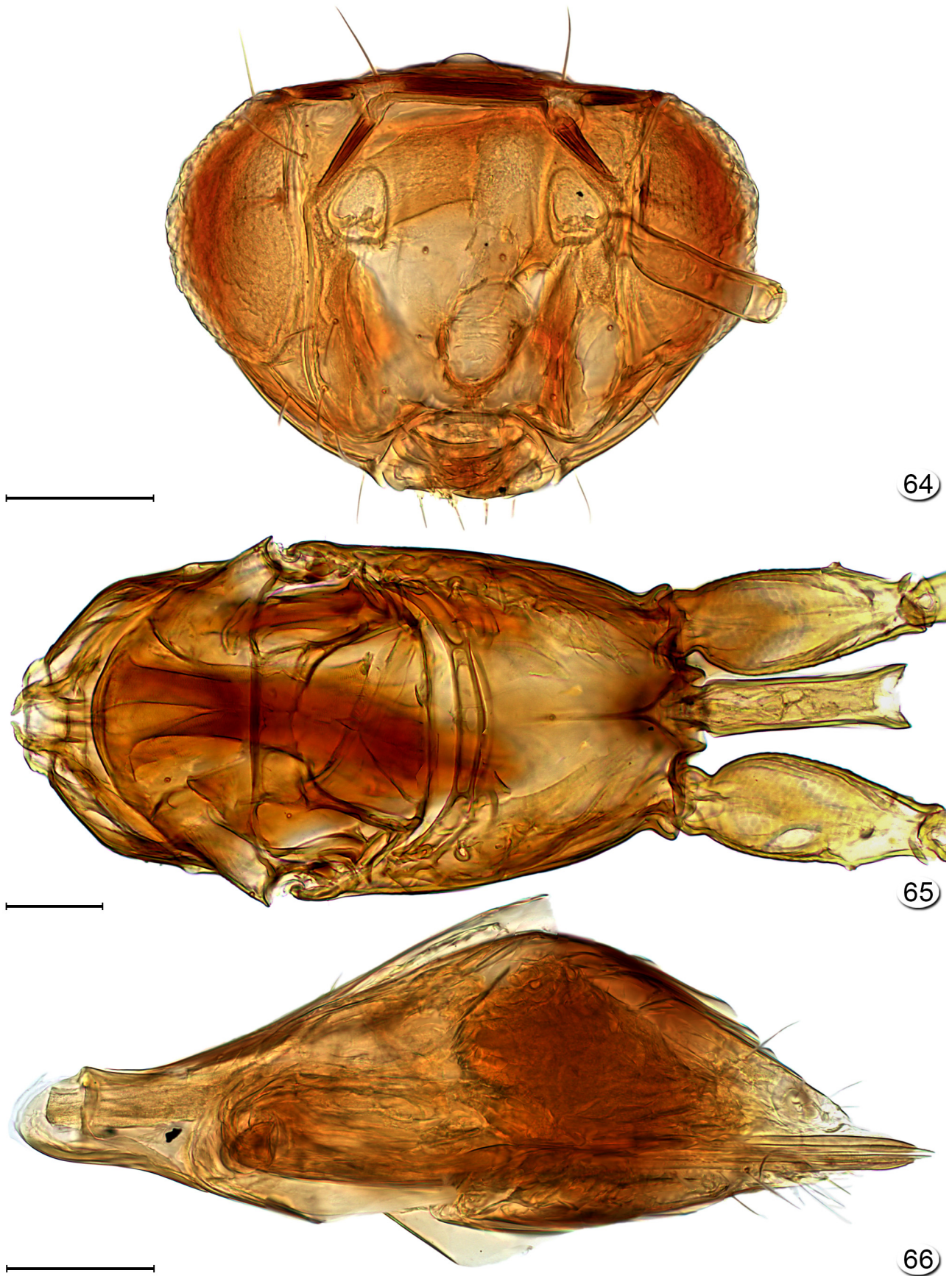


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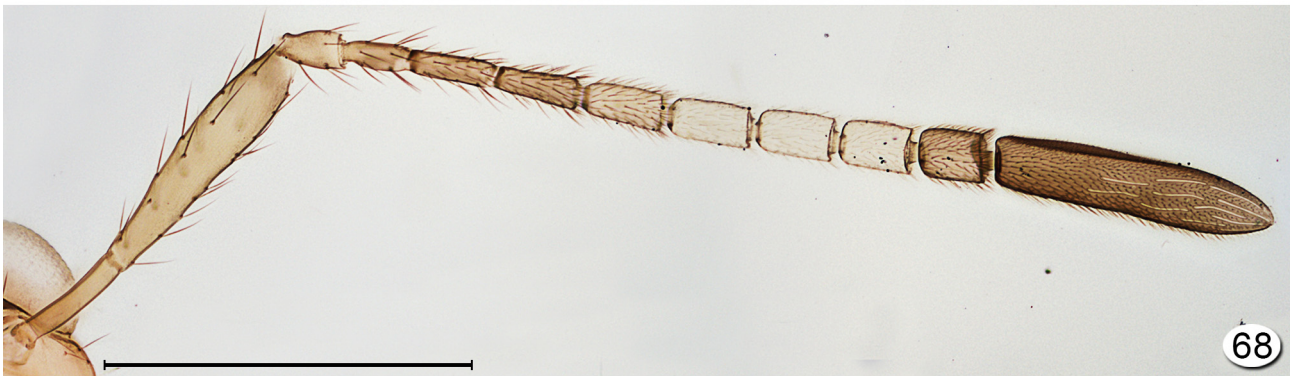
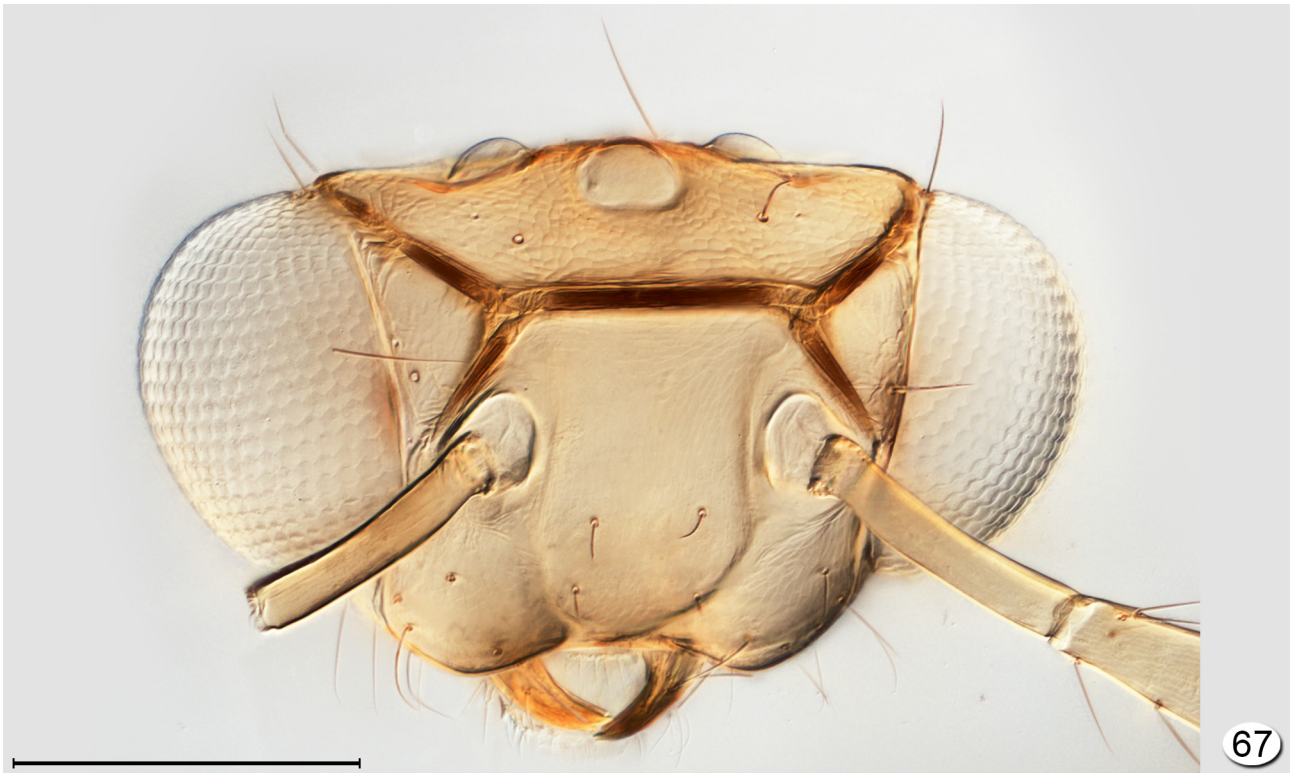


63

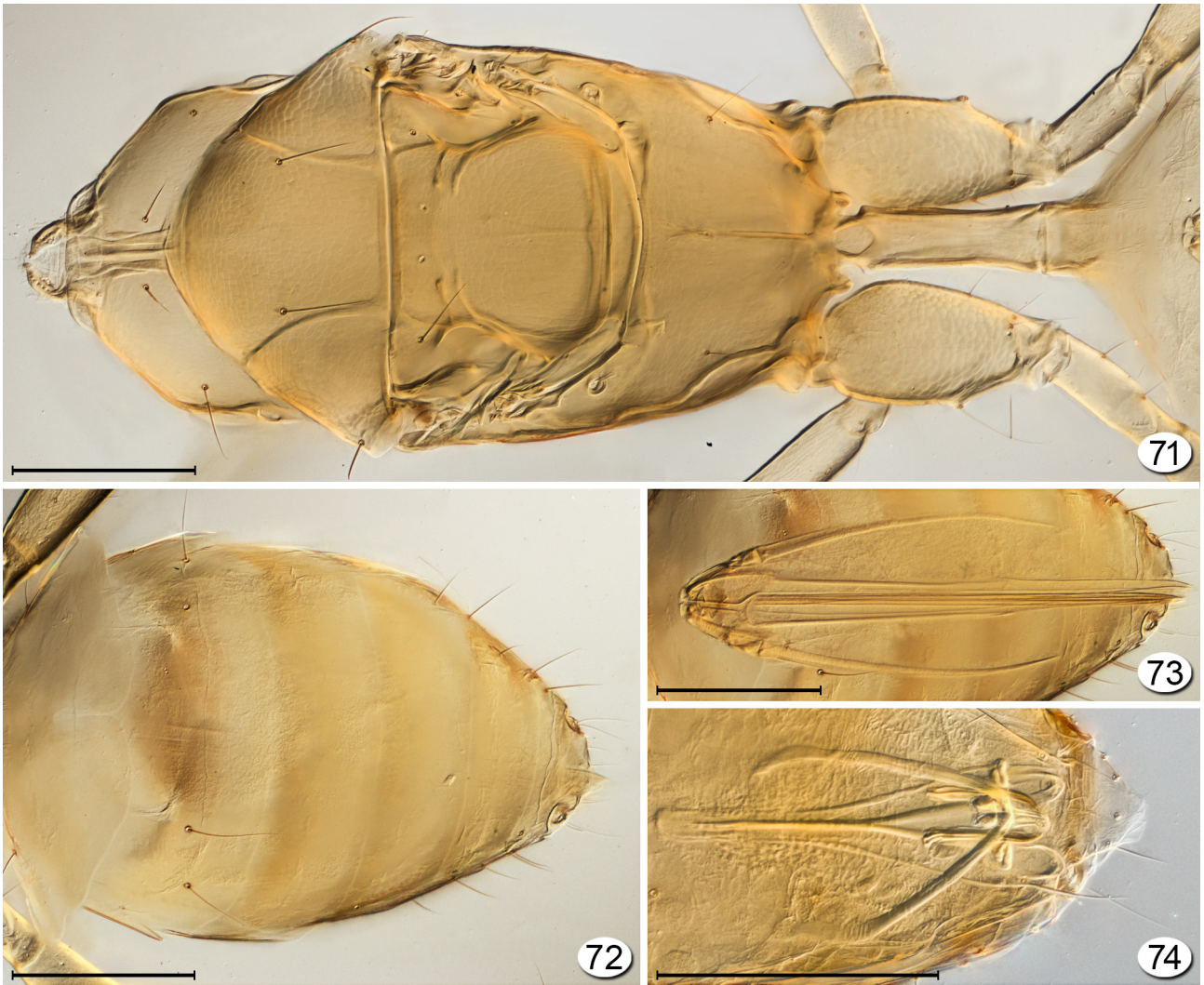
**FIGURE 61–63.** *Cosmocomopsis* spp. : 61, *C. mopsis* holotype, habitus; Madagascar, Antsiranana R.N. 1 de Marojejy, 25.x–3.xi.1996, E.L. Quinter. *Ooctonus sevae*, lectotype. 62, antenna; 63, wings (fore wing not fully expanded). Scale bars: 61 = 1000  $\mu$ m, 62 and 63 = 200  $\mu$ m.



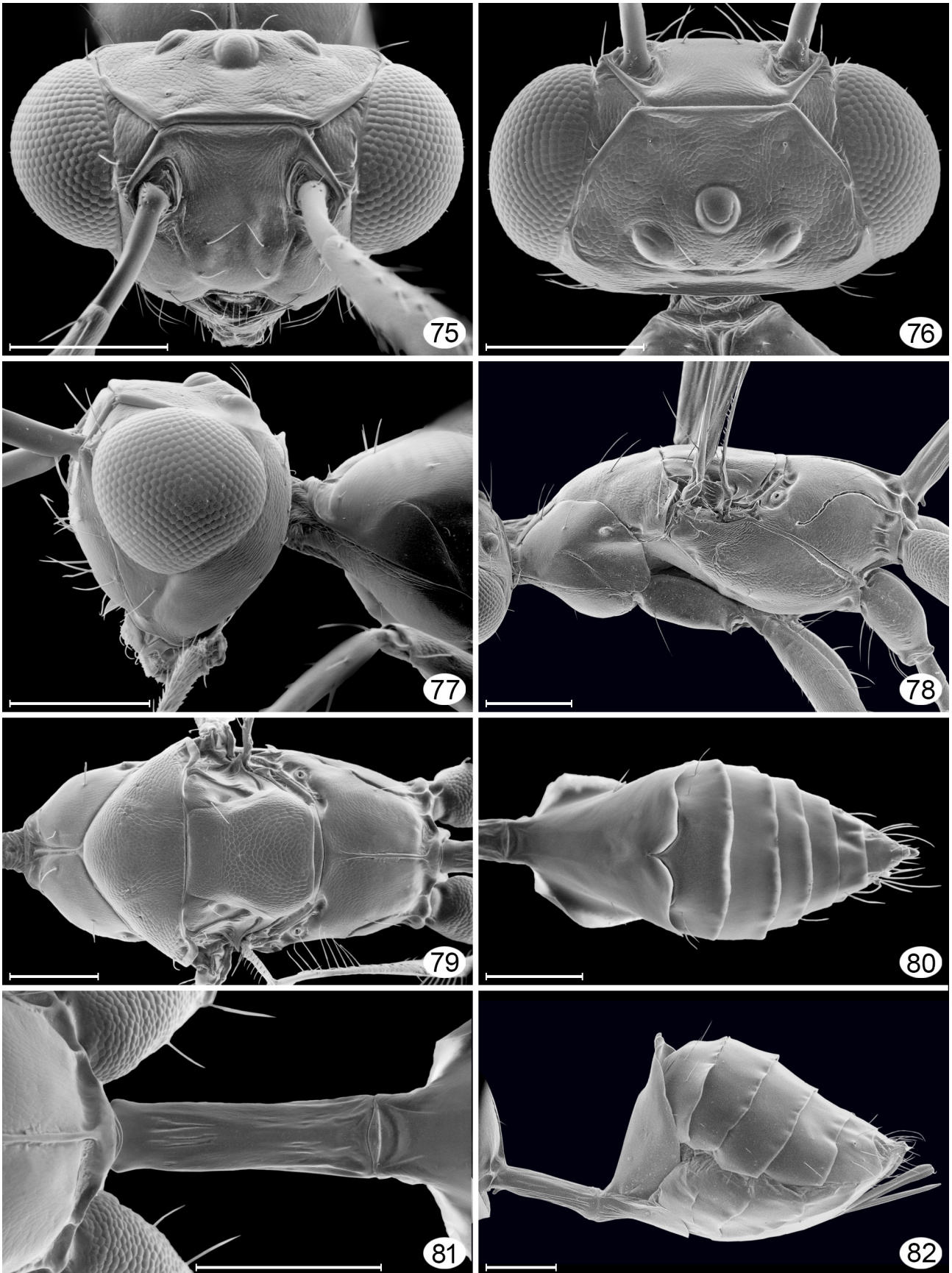
**FIGURES 64–66.** *Ooctonus sevae*, lectotype: 64, head, anterior; 65, mesosoma, dorsal; 66, gaster, dorsal. Scale bars = 100  $\mu$ m.



**FIGURES 67–70.** *Cosmocomopsis flopsis*, holotype: 67, head, anterior; 68, antenna; 69, holotype slide, 70, wings. Scale bars: 67 = 200  $\mu$ m, 68 and 70 = 500  $\mu$ m.



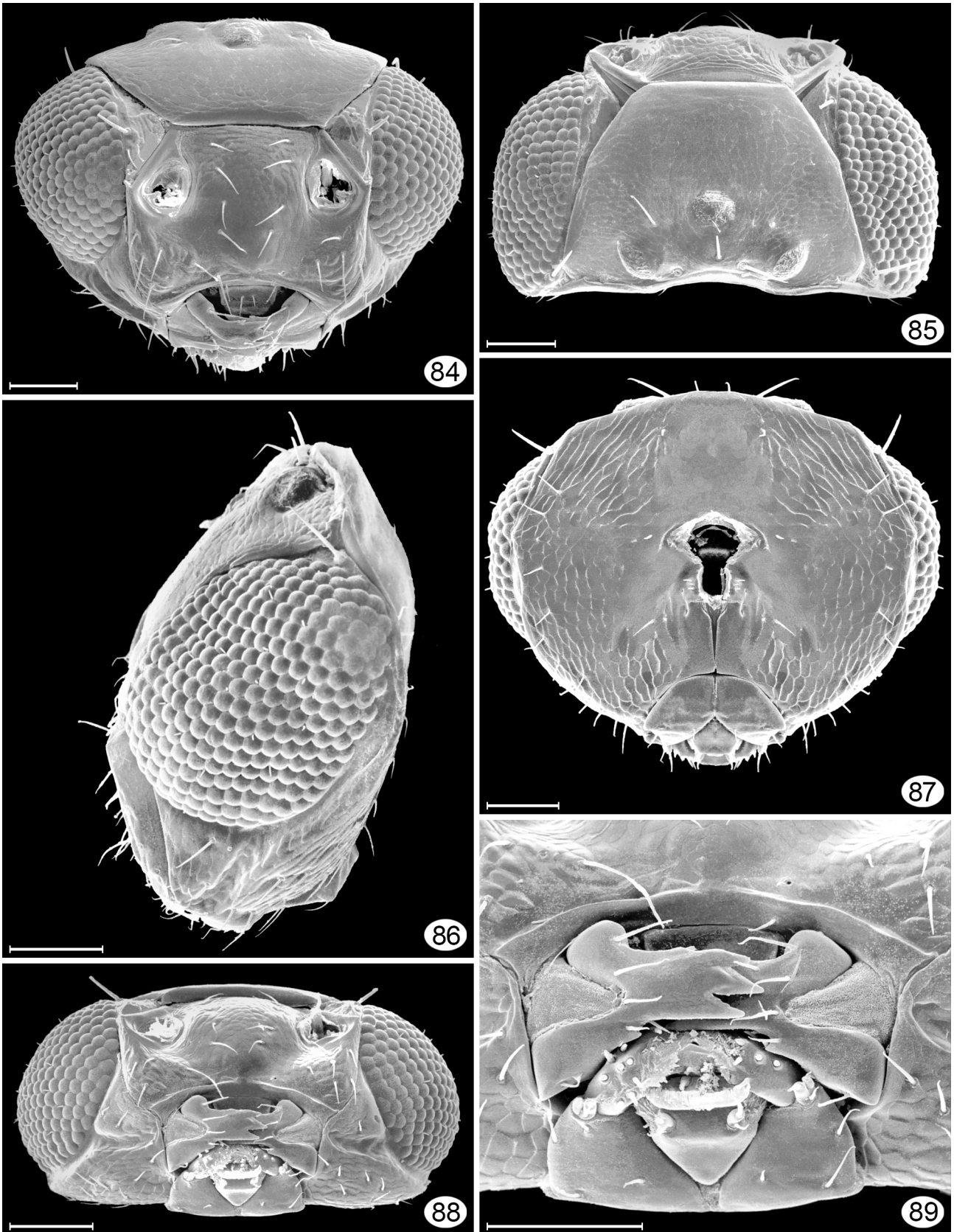
**FIGURES 71–74.** *Cosmocomopsis flopsis*, holotype (except as noted): 71, mesosoma–base of  $gt_1$ , dorsal; 72, gaster, dorsal; 73, genitalia; 74, *C. sevae*, male genitalia, dorsal. Scale bars: 71 and 72 = 200  $\mu\text{m}$ , 73 and 74 = 100  $\mu\text{m}$ .



**FIGURES 75–82.** *Cosmocomopsis sevae*: 75, head, anterior; 76, head, dorsal; 77, head + prothorax, lateral; 78, mesosoma, lateral; 79, mesosoma, dorsal; 80, gaster, dorsal; 81, apex of propodeum + petiole; 82, metasoma, lateral. Scale bars = 200  $\mu$ m.

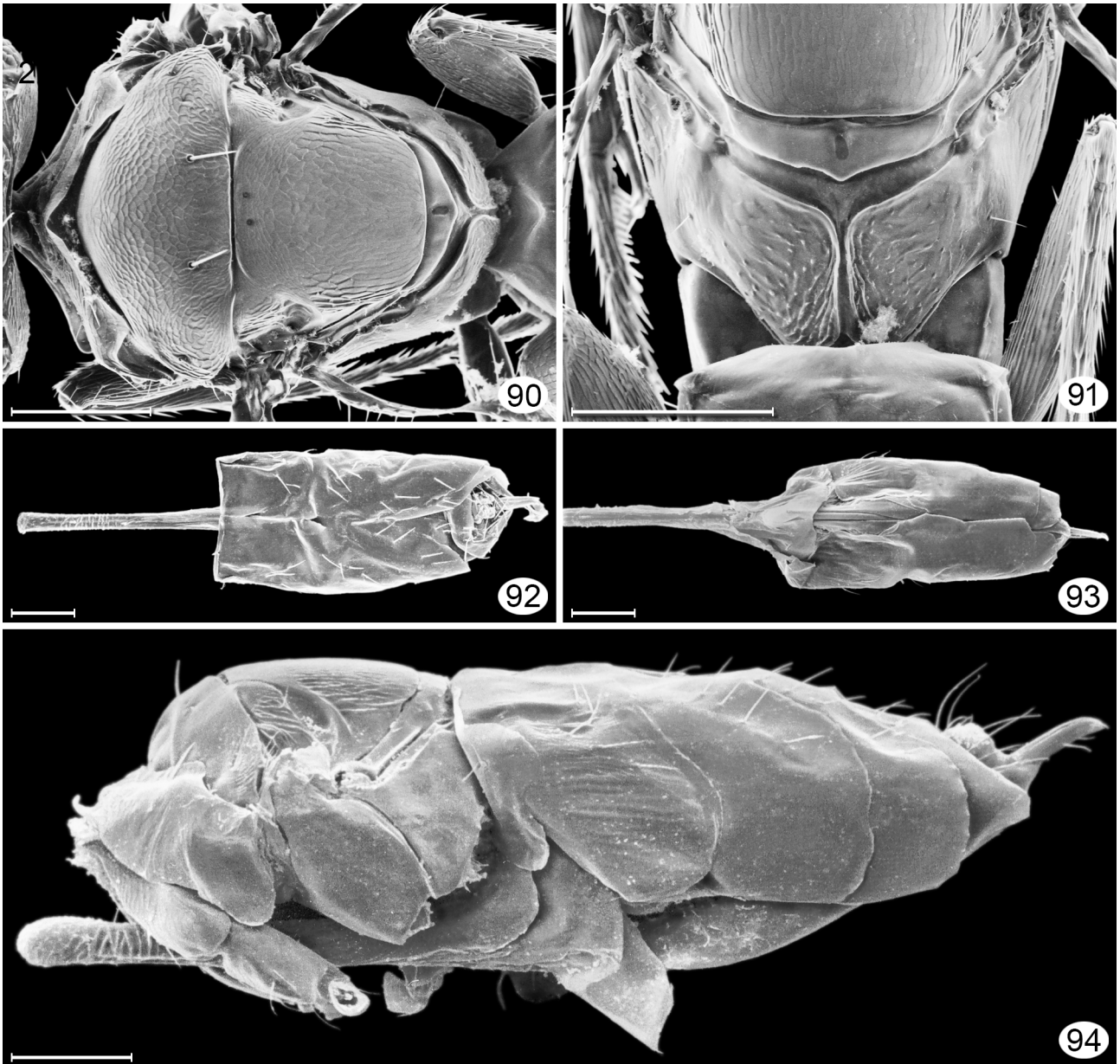


**FIGURES 83.** *Gahanopsis deficiens*, habitus: Costa Rica, Guanacaste, La Pacifica, xii.1985, ex *Acanophora* sp., A. Forsyth. Scale bar = 500  $\mu$ m.



**FIGURES 84–89.** *Gahanopsis deficiens*, head : 84, anterior; 85, dorsal; 86, lateral; 87, posterior; 88, ventral; 89, mouthparts. Scale bars = 50  $\mu$ m.

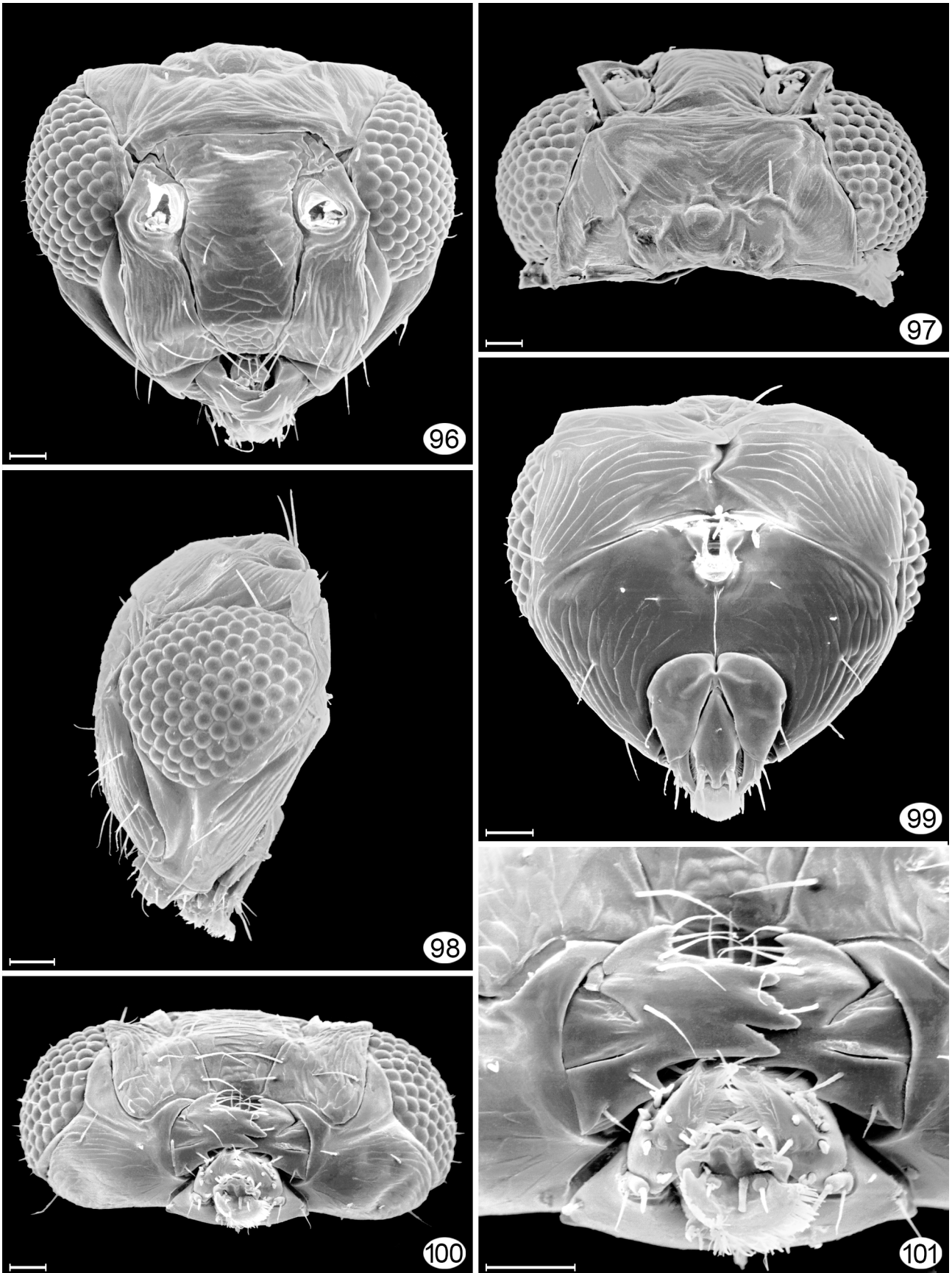




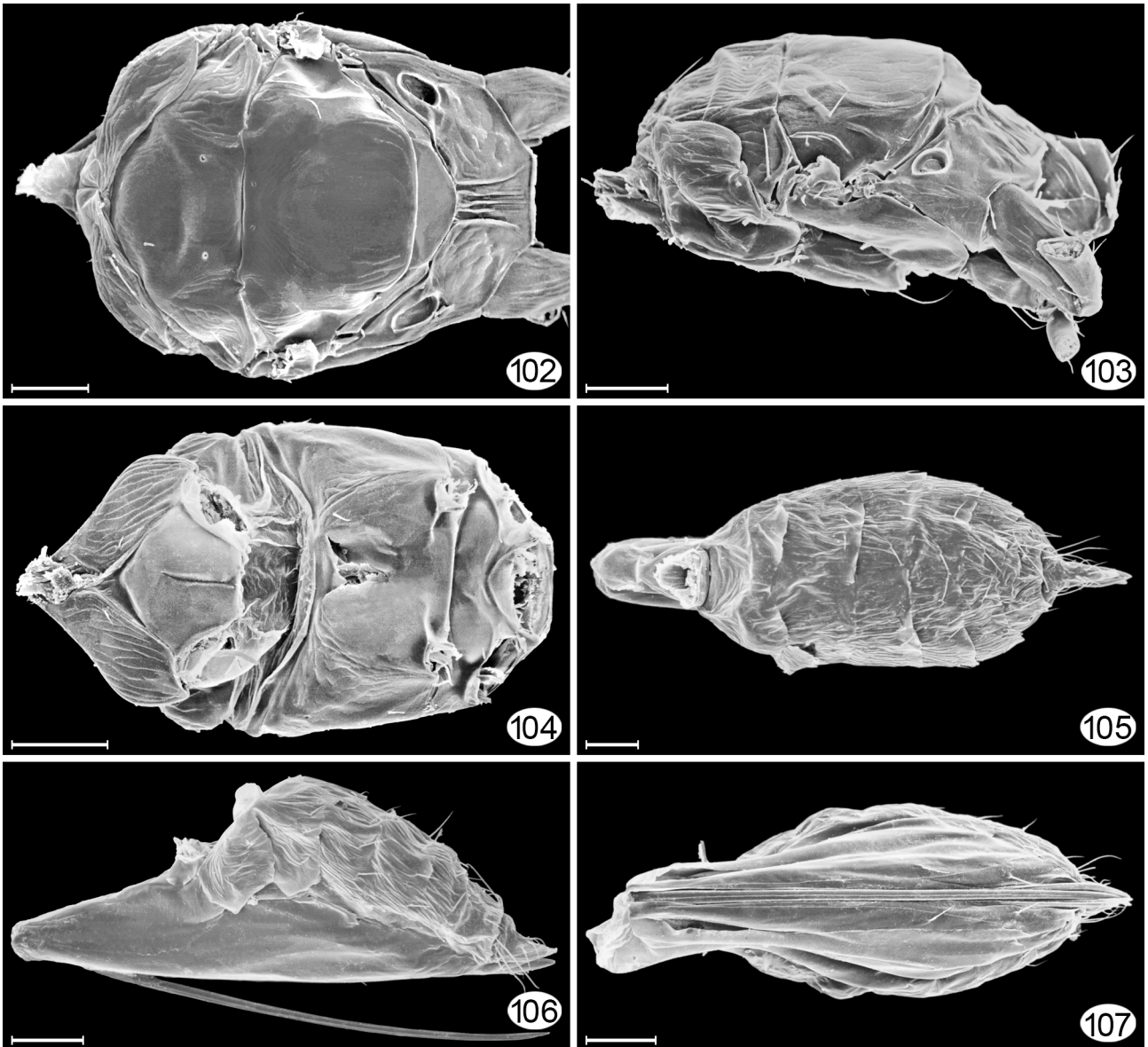
**FIGURES 90–94.** *Gahanopsis* sp.: 90, mesosoma, dorsal; 91, frenalium–base of gaster, posterodorsal; 92, gaster, dorsal; 93, gaster, ventral; 94, mesosoma + metasoma, lateral. Scale bars = 100  $\mu$ m.



**FIGURE 95.** *Gastrogonatocerus* sp., habitus: USA, Texas, Travis Co., Austin, Zilker Park, 8.x.1983, J.B. Woolley. Scale bar = 500  $\mu$ m.



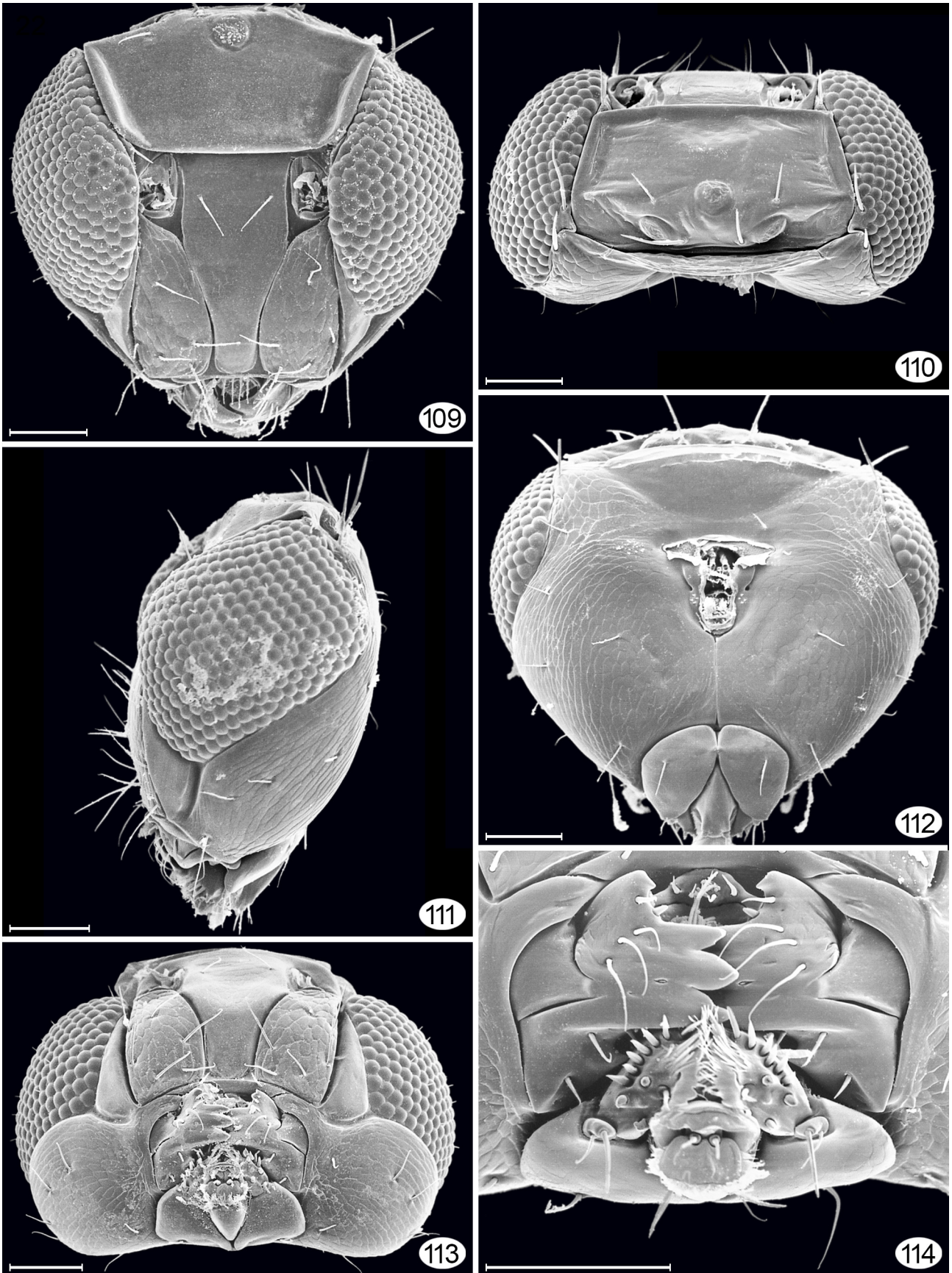
**FIGURES 96–101.** *Gastrogonatocerus* sp., head: 96, anterior; 97, dorsal; 98, lateral; 99, posterior; 100, ventral; 101, mouthparts, ventral. Scale bars = 20  $\mu$ m.



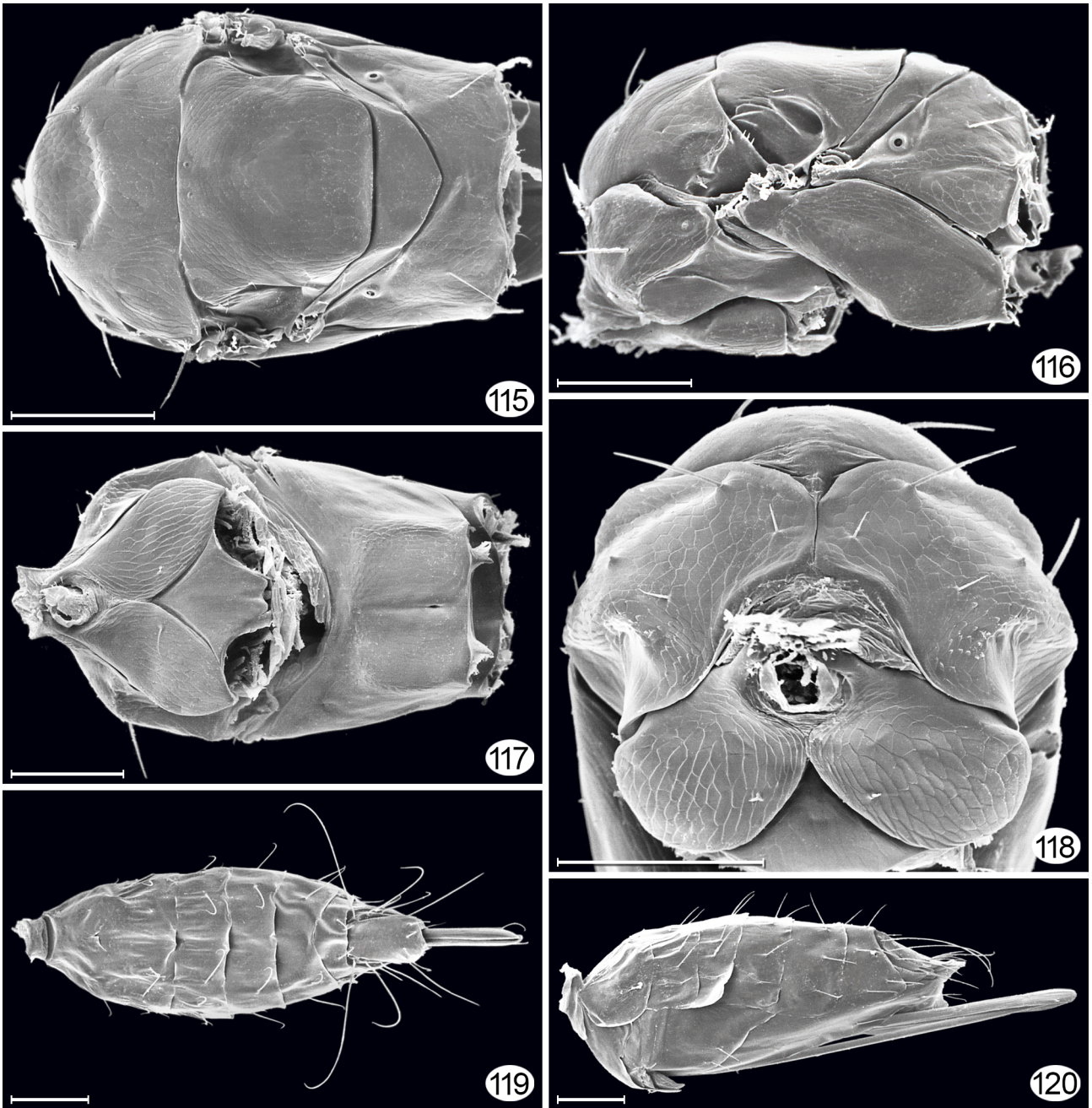
**FIGURES 102–107.** *Gastrogonatocerus* sp.: 102, mesosoma, dorsal; 103, mesosoma, lateral; 104, mesosoma, ventral; 105, metasoma, dorsal; 106, metasoma, lateral; 107, metasoma, ventral. Scale bars = 50  $\mu$ m.



**FIGURE 108.** *Gonatocerus janzeni*, holotype in amber: a, habitus; b, wing showing venation details. Scale bars = 500  $\mu\text{m}$ .



**FIGURES 109–114.** *Gonatocerus rivalis*, head: 109, anterior; 110, dorsal; 111, lateral; 112, posterior; 113, ventral; 114, mouthparts, ventral. Scale bars = 50  $\mu$ m.

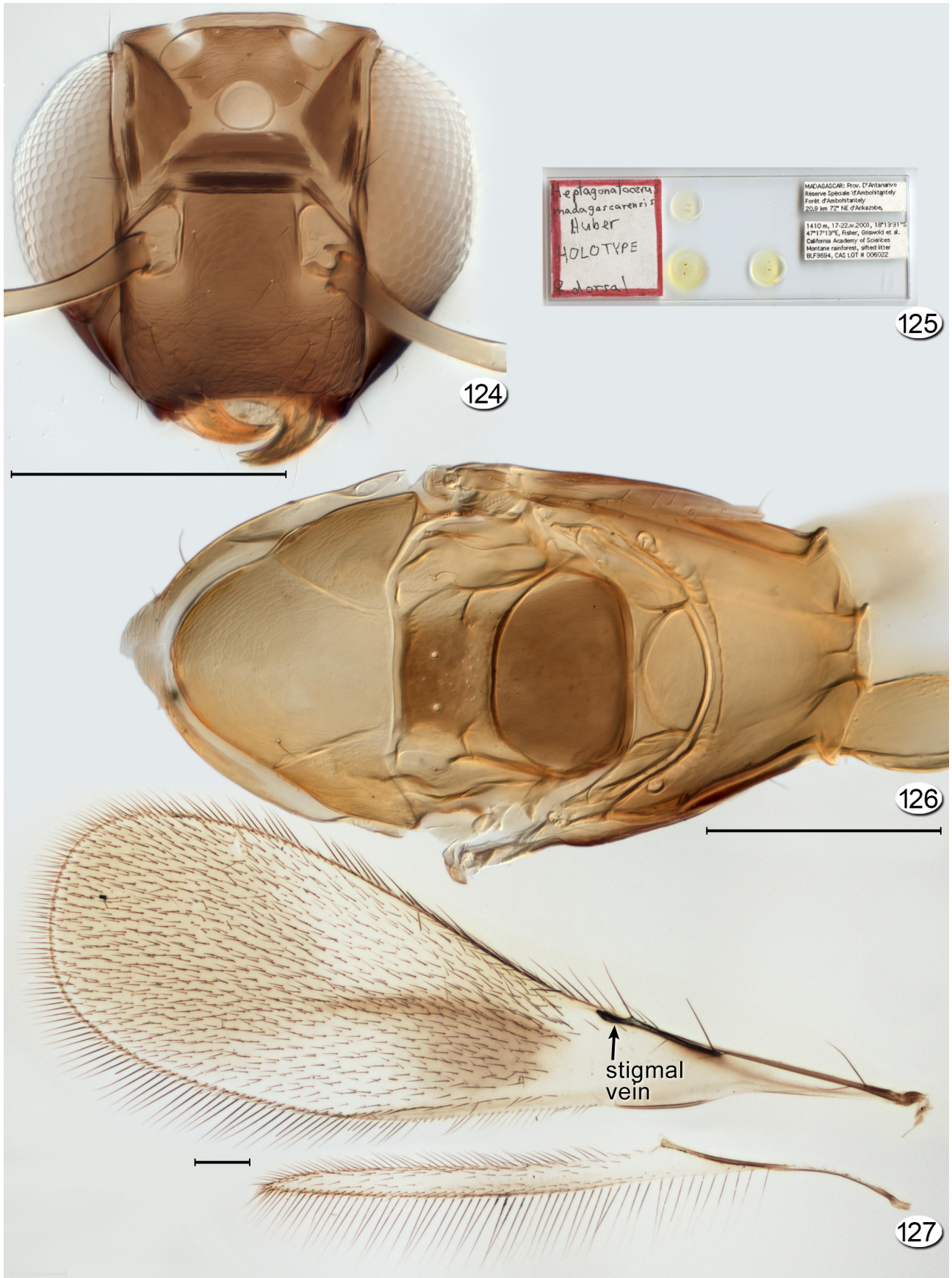


**FIGURES 115–120.** *Gonatocerus rivalis*: 115, mesosoma dorsal; 116, mesosoma lateral; 117, mesosoma ventral; 118, mesosoma anterior; 119, metasoma dorsal; 120, metasoma lateral. Scale bars = 100  $\mu$ m.

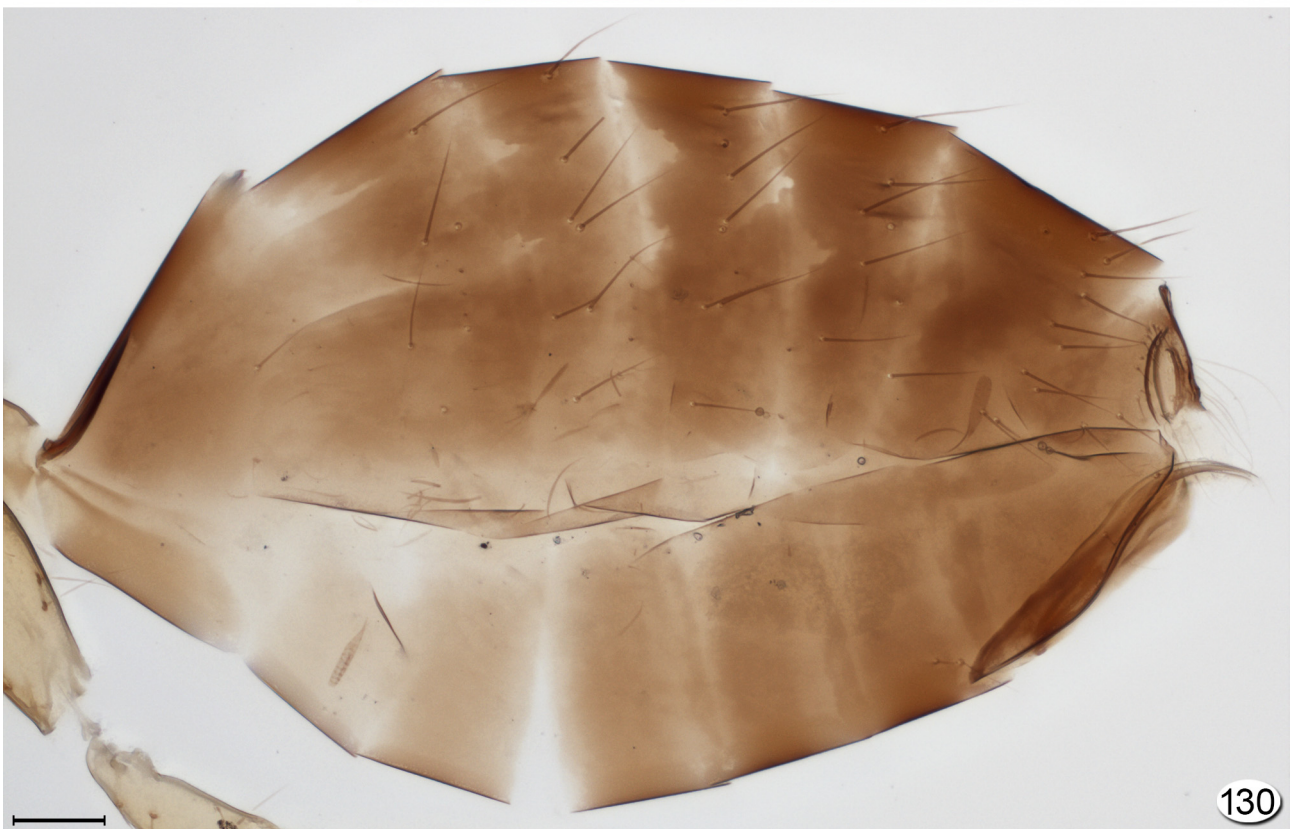
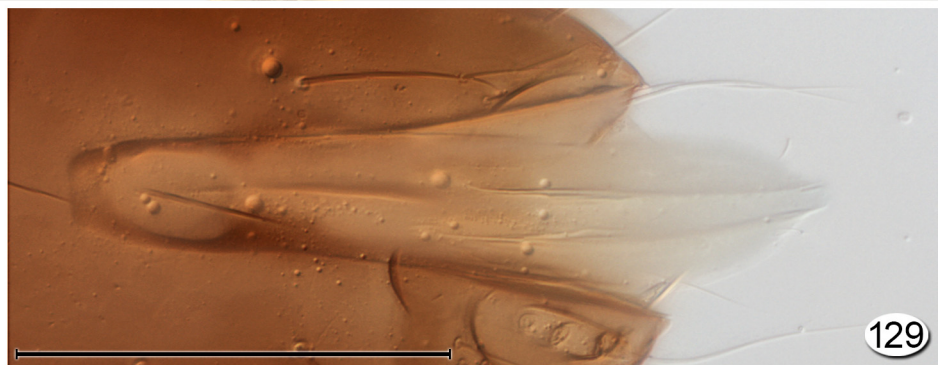


**FIGURES 121–123.** *Heptagonatocerus* spp.: 121, *H. pulchellus*, habitus; Thailand Nakhon Si Thammarat, Namtok Yong Nat. Park, TV aerial, 952m, 8°14.262'N 99°48.289'E, 13–20.iv.2009, Paiboon; 122, 123: *H. madagascarensis*, antenna; 122, female; 123, male. Scale bars = 500  $\mu$ m.

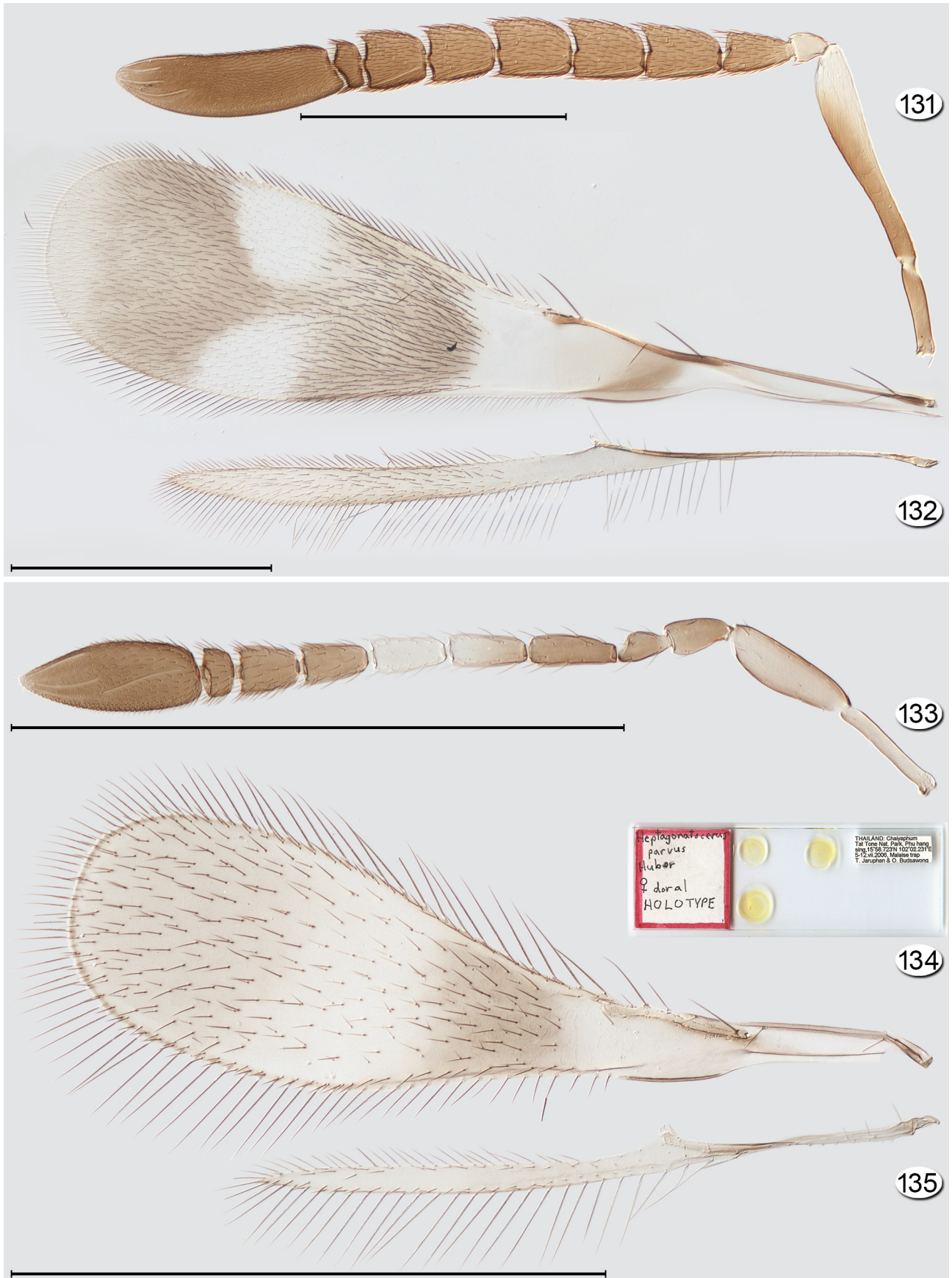




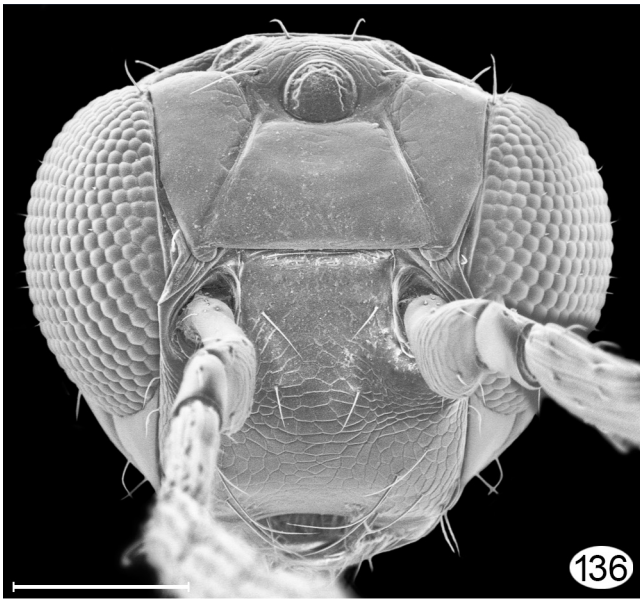
**FIGURES 124–127.** *Heptagonatocerus madagascarensis*, holotype: 124, head, anterior; 125, holotype slide; 126, mesosoma, dorsal; 127, wings. Scale bars = 200  $\mu$ m.



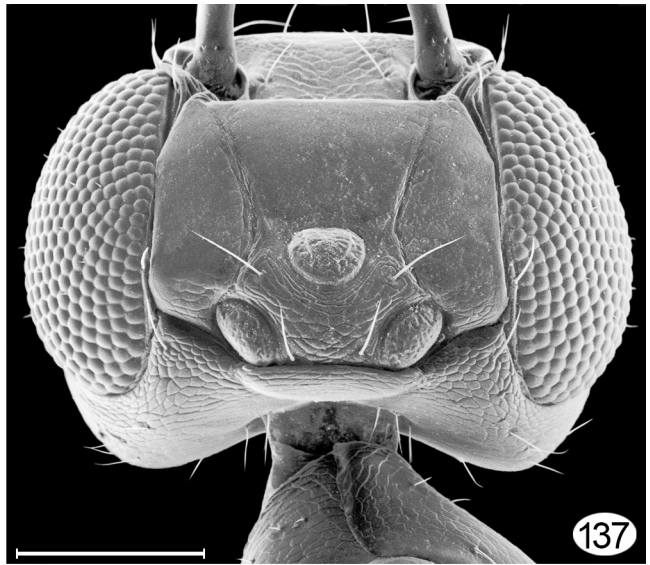
**FIGURES 128–130.** *Heptagonatocerus madagascarensis*, male paratype: 128, metasoma, dorsal; 129, genitalia, dorsal; 130, metasoma, lateral. Scale bars = 100  $\mu\text{m}$ .



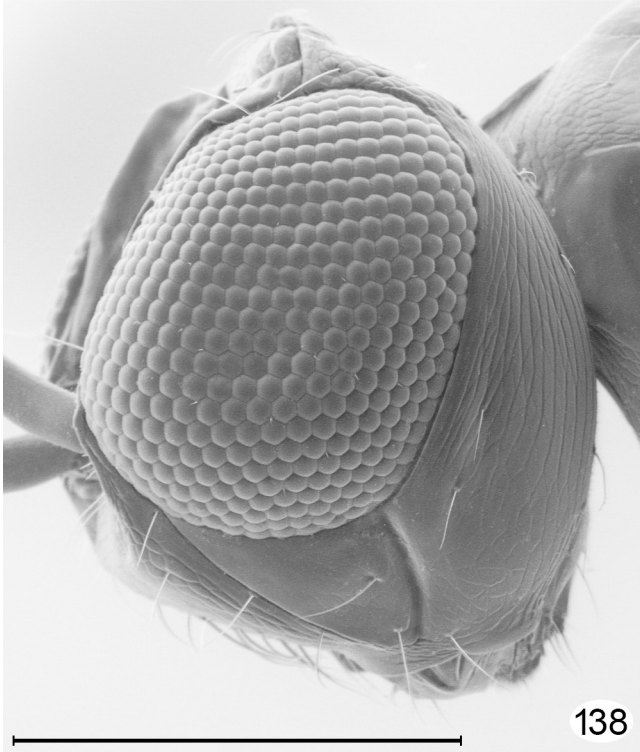
**FIGURES 131–135.** *Heptagonatocerus* spp.: 131, *H. magnificus*, female antenna; 132, *H. magnificus*, wings; 133, *H. parvus*, holotype antenna; 134, holotype slide; 135, *H. parvus*, holotype wings. Scale bars = 500  $\mu$ m.



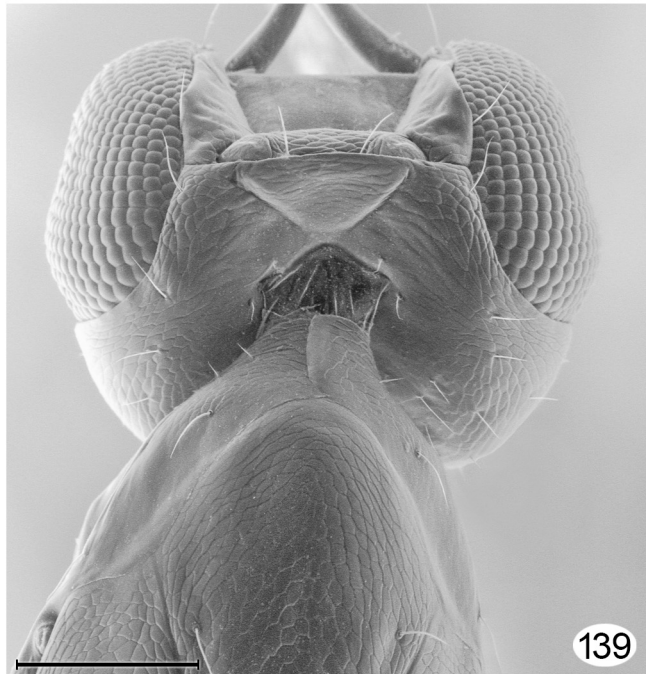
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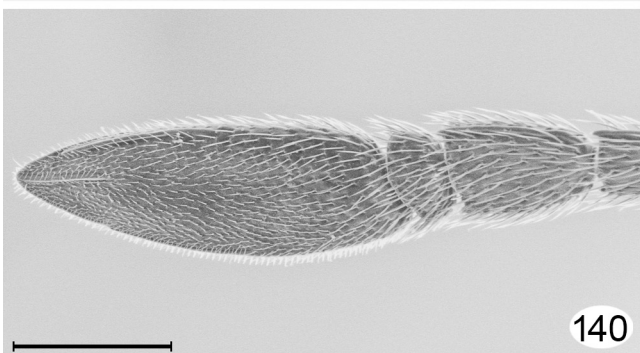
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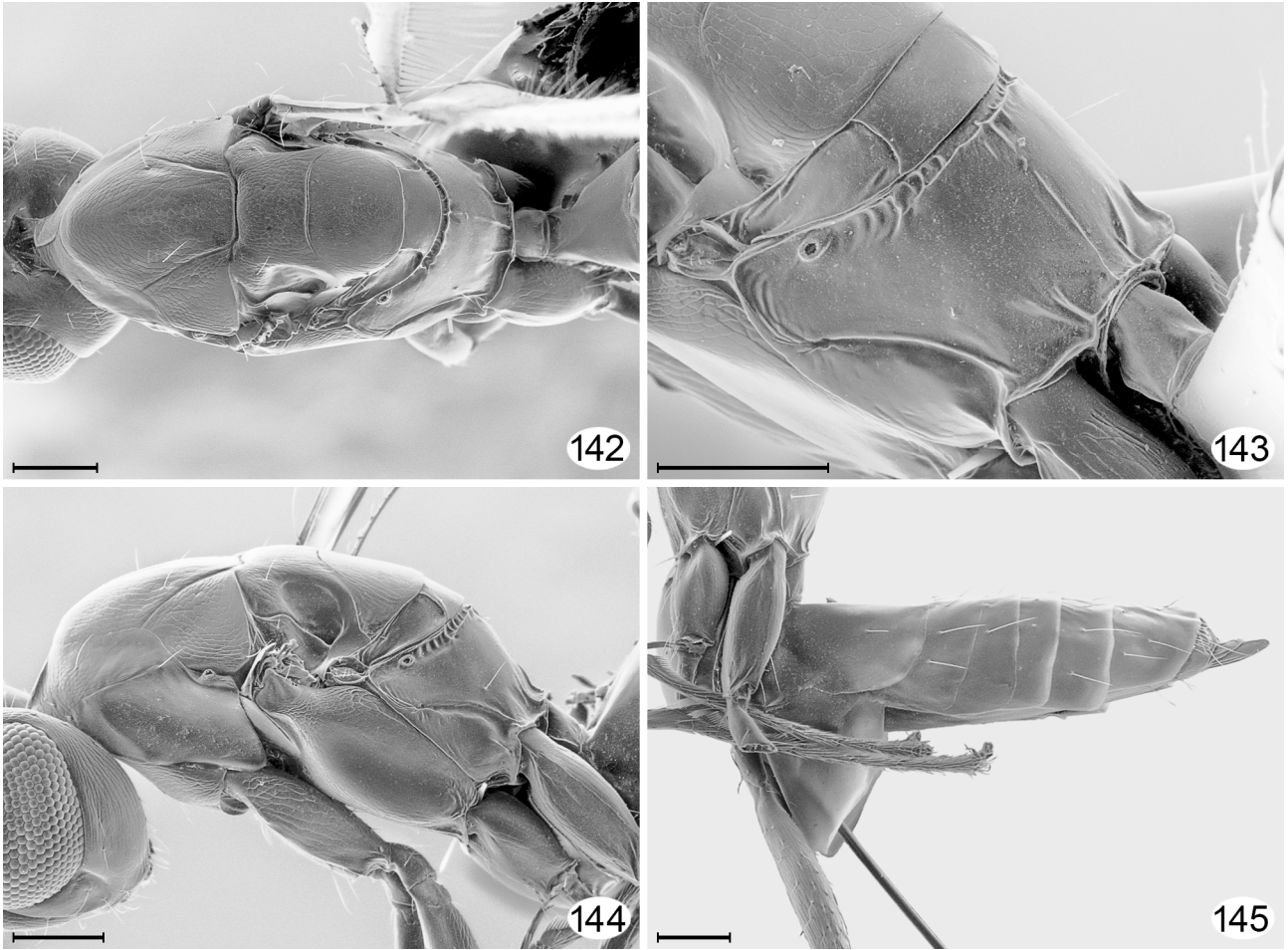


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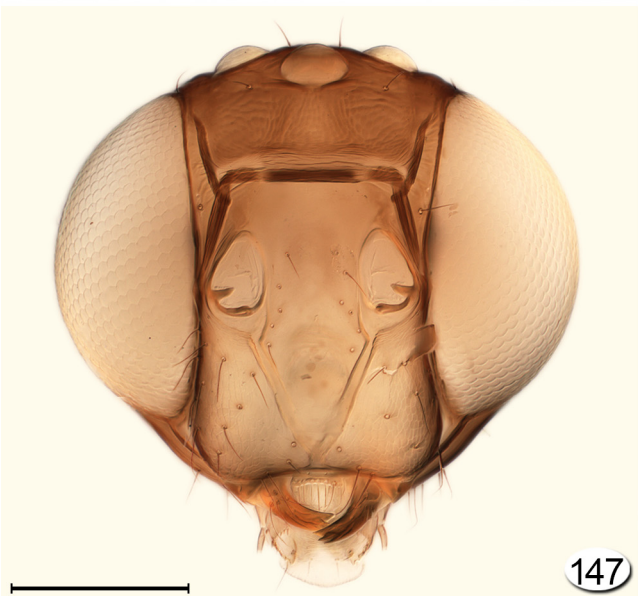
**FIGURES 136–141.** *Heptagonatocerus madagascarensis*: 136, head, anterodorsal, male; 137, head, dorsal, male; 138, head, lateral, male; 139, head, posterodorsal, female; 140, fl<sub>1</sub>-clava, lateral, female; 141, scape-fl<sub>2</sub>, female. Scale bars = 100  $\mu$ m.



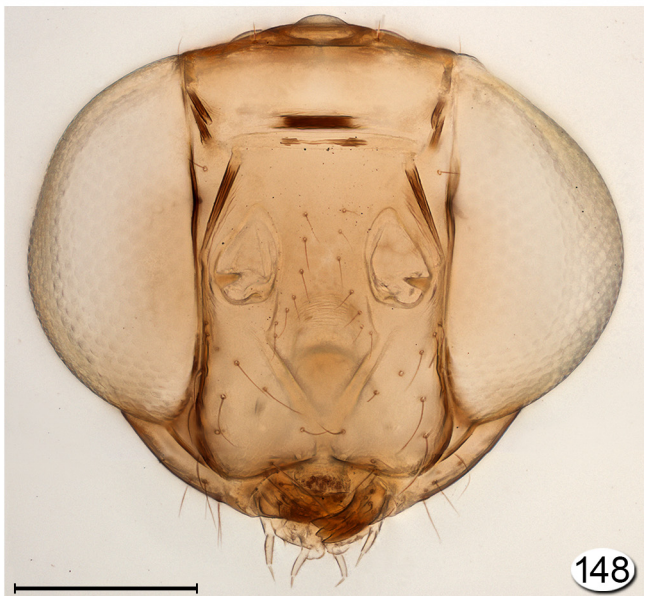
**FIGURES 142–145.** *Heptagonatocerus madagascarensis*, female: 142, mesosoma-gt., dorsal; 143, frenalium-petiole, laterodorsal; 144, mesosoma, lateral; 145, metasoma, lateral. Scale bars = 100  $\mu$ m.



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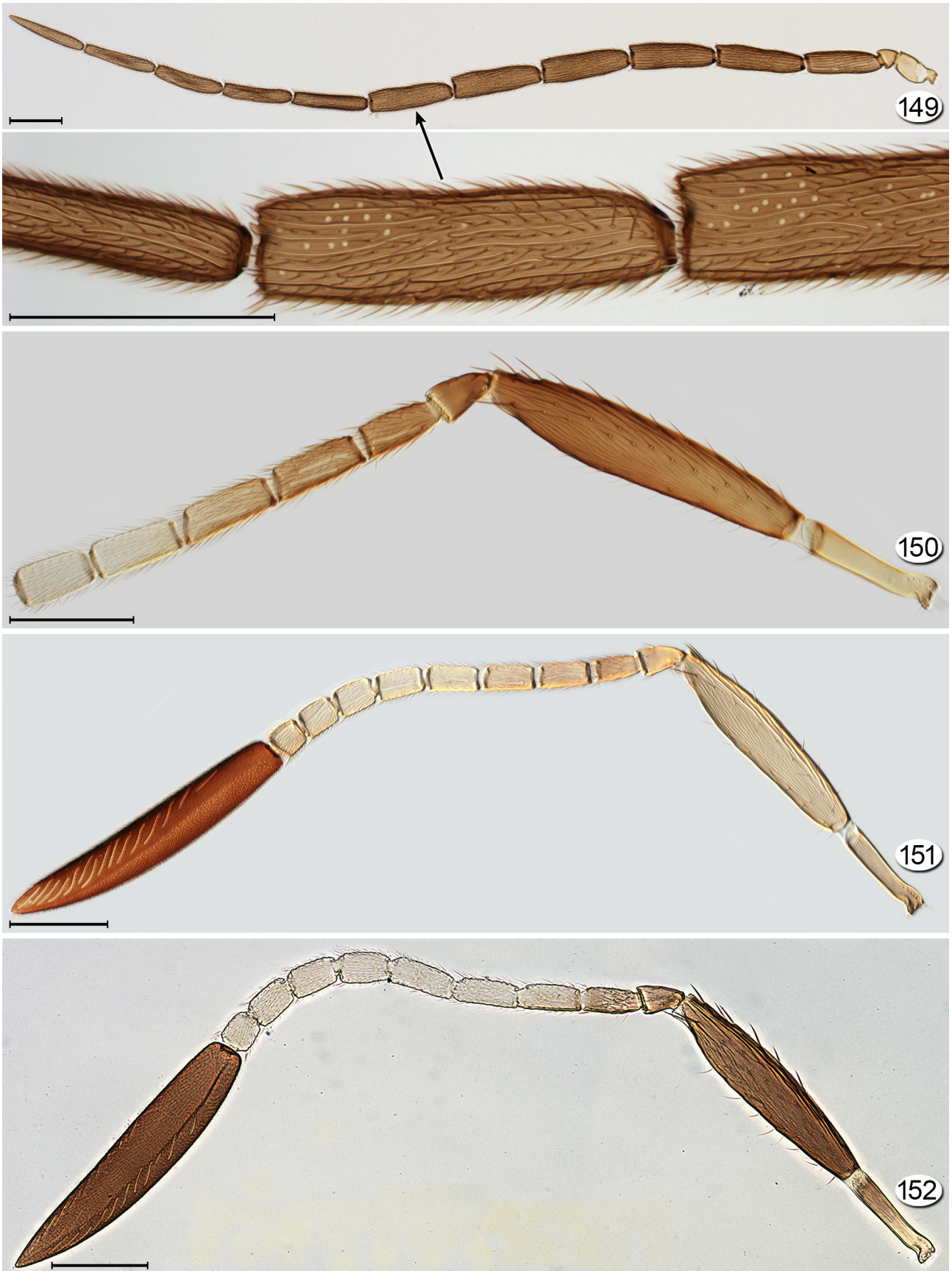


147

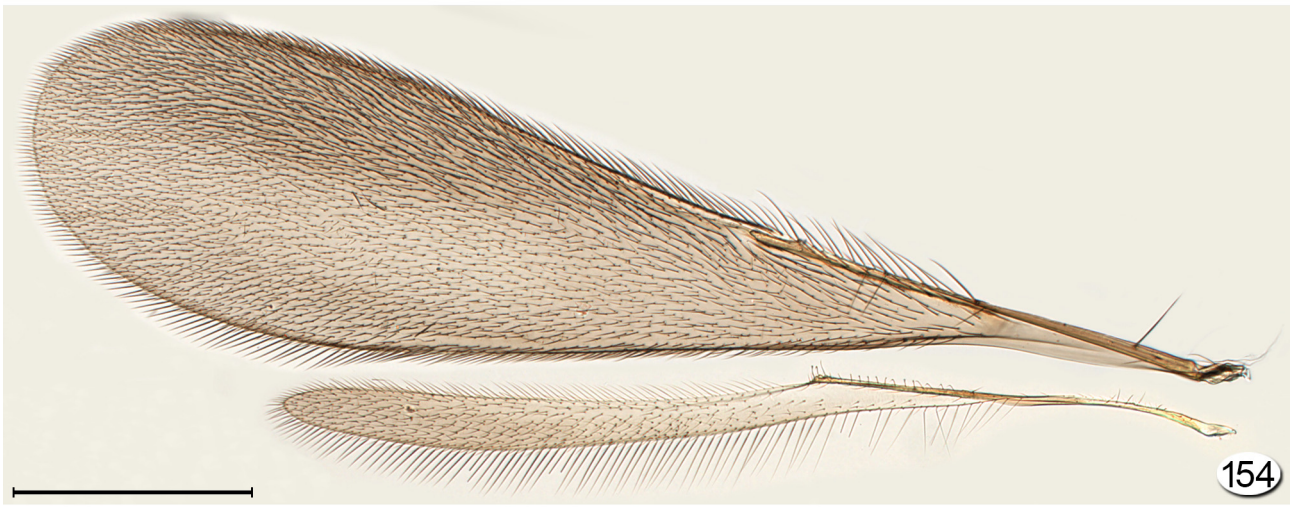
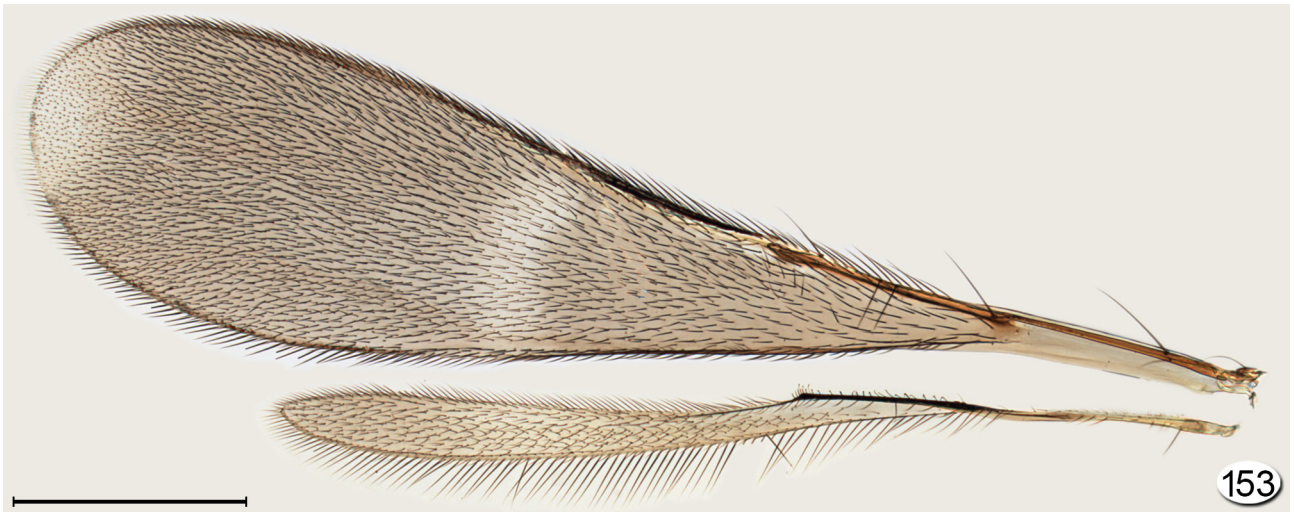


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**FIGURES 146–148.** *Krateriske* spp.: 146, *K. guianensis*, paratype, habitus; French Guiana, 41.5 km S. Matoury, 4°37.37'N 52°22.59'W, 50m, 29.v–9.vi.1997, J. Ashe, R. Brooks; 147, *K. guianensis*, head anterior; 148, *K. peruensis*, head anterior. Scale bars: 146 = 1000  $\mu$ m, 147 and 148 = 200  $\mu$ m.

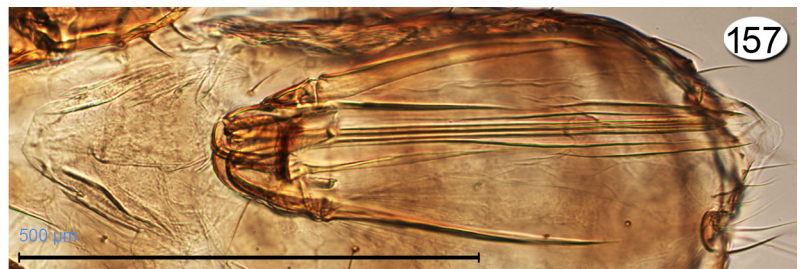


**FIGURES 149–152.** *Krateriske* spp., antenna: 149, *K. guianensis*, male (+ enlargement, showing sensilla); 150, *K. ecuadorensis*, female (fl<sub>6</sub>–fl<sub>11</sub> missing); 151, *K. guianensis*, female; 152, *K. peruensis*, female. Scale bars = 200 µm.

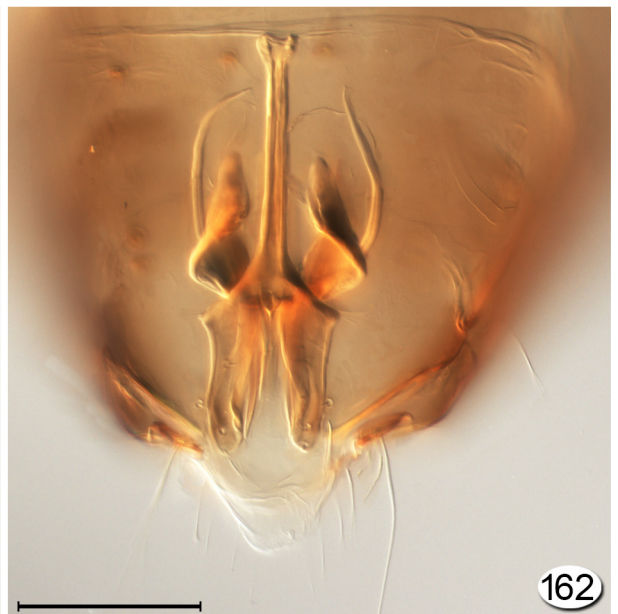
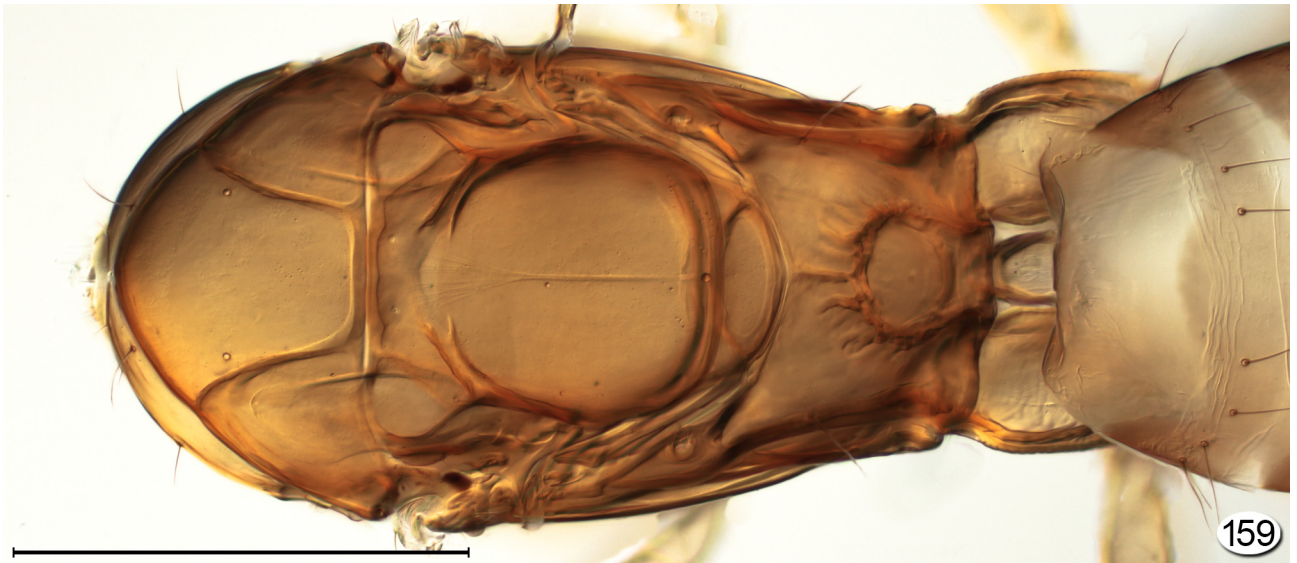


**FIGURES 153–155.** *Krateriske* spp., wings: 153, *K. ecuadorensis*; 154, *K. guianensis*; 155, *K. peruensis*. Scale bars = 500  $\mu\text{m}$ .

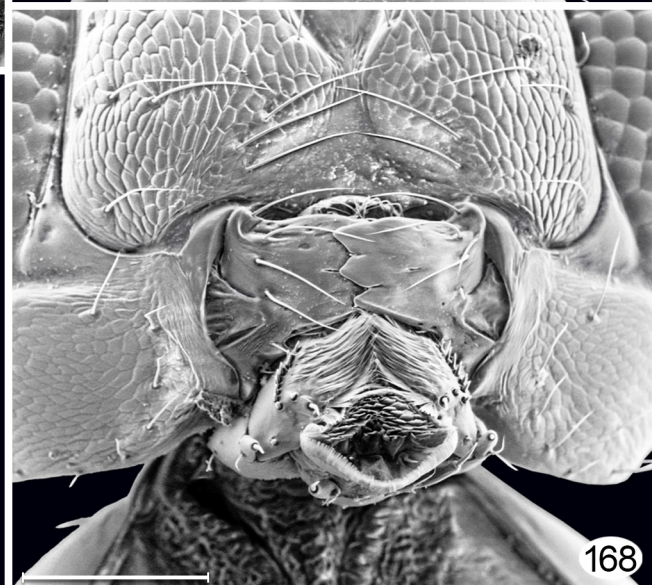
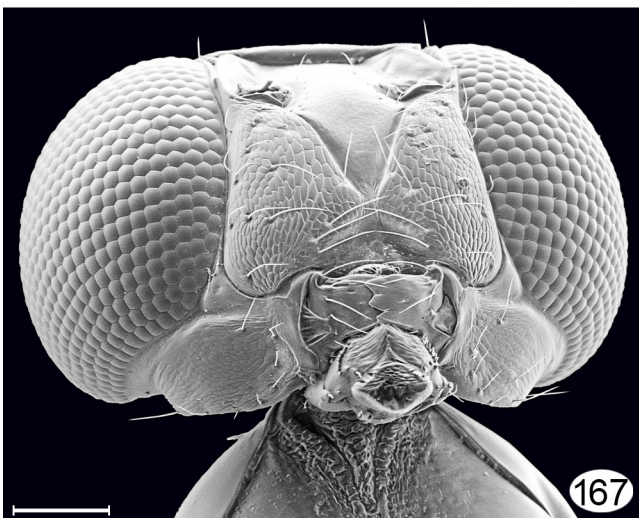
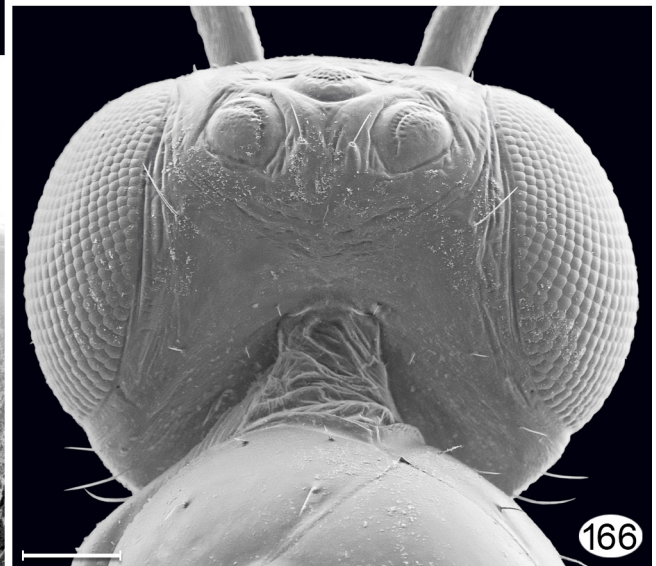
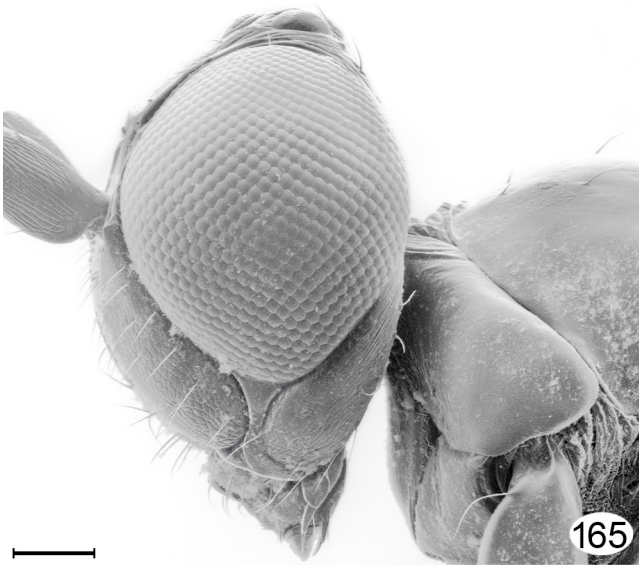
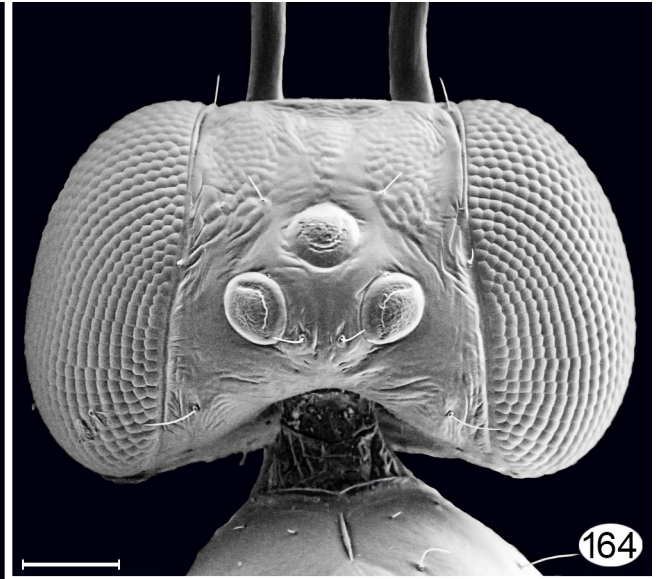
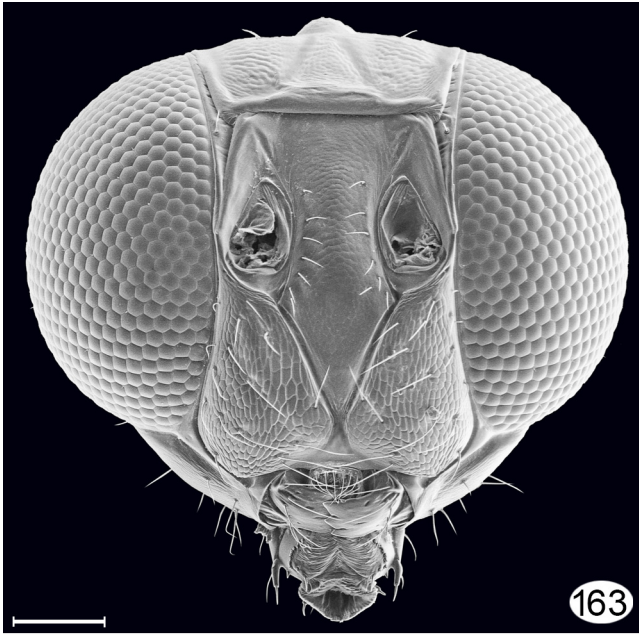




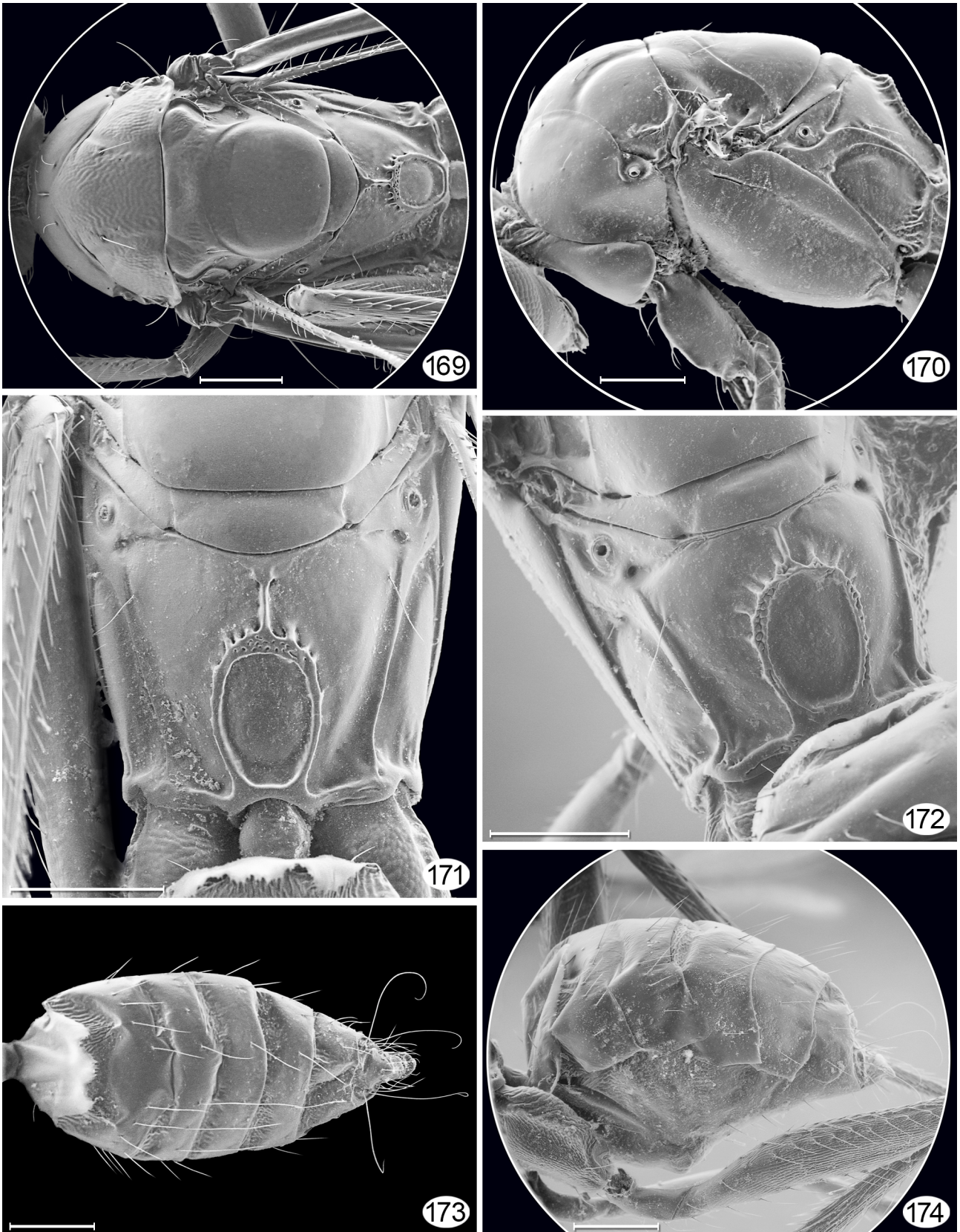
**FIGURES 156–158.** *Krateriske guianensis*, female: 156, propodeum + metasoma, dorsal; 157, genitalia, ventral; 158, metasoma, dorsolateral. Scale bars = 500  $\mu\text{m}$ .



**FIGURES 159–162.** *Krateriske guianensis*, male: 159, mesosoma + base of metasoma, dorsal; 160, metasoma, dorsal; 161, genitalia, dorsal; 162, genitalia, ventral. Scale bars: 159, 160 = 500  $\mu$ m; 161, 162 = 100  $\mu$ m.



**FIGURES 163–168.** *Krateriske guianensis*, head: 163, anterior; 164, dorsal; 165, lateral (+ propleura); 166, dorsoposterior; 167, ventral; 168, mouthparts. Scale bars = 100  $\mu$ m.



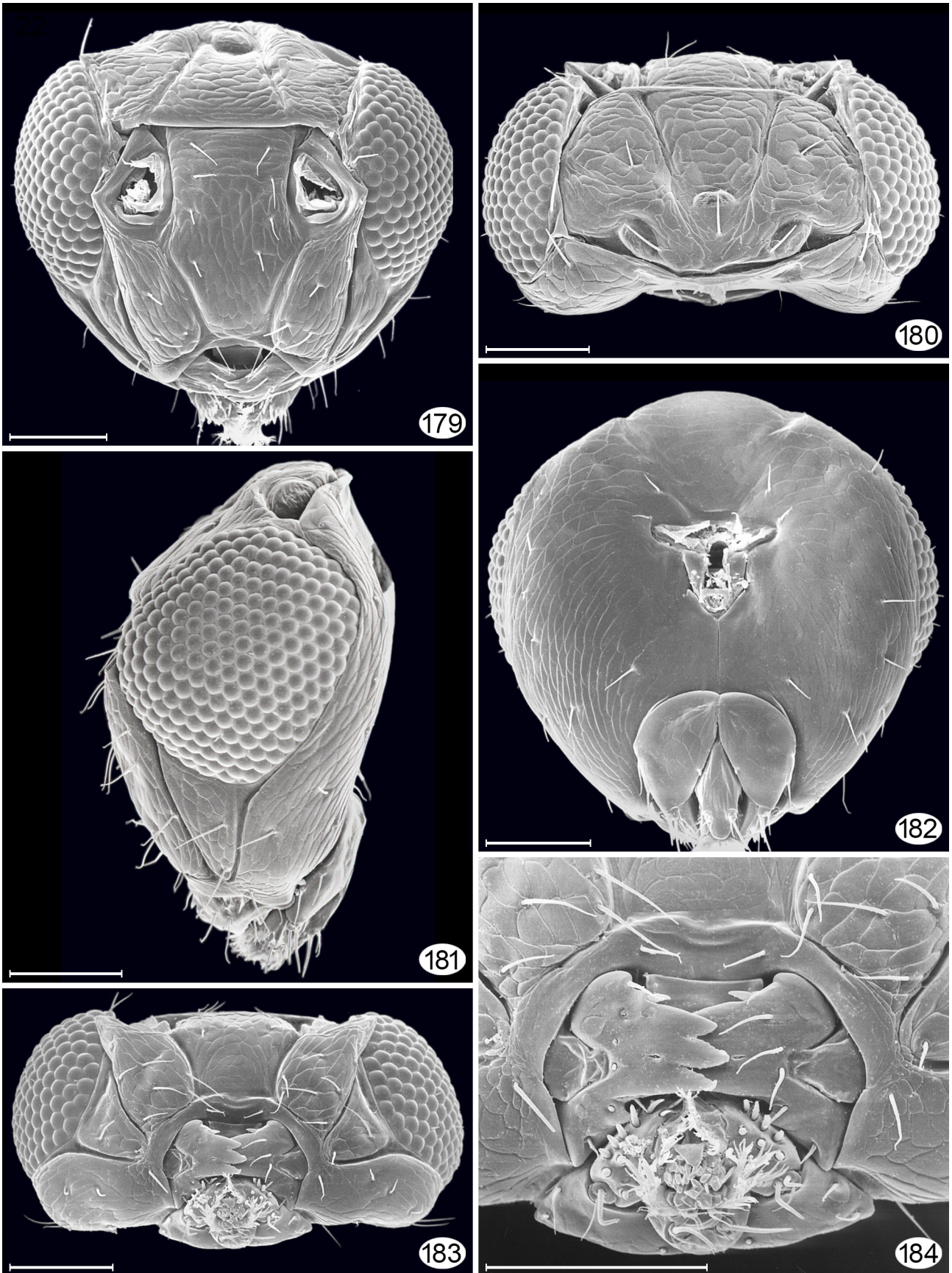
**FIGURES 169–174.** *Krateriske guianensis*: 169, mesosoma, dorsal; 170, mesosoma, lateral; 171, posterior of frenum–anterior of gt<sub>1</sub>, posterodorsal; 172, propodeum, laterodorsal; 173, gaster, dorsal; 174, gaster, lateral. Scale bars = 200  $\mu$ m.



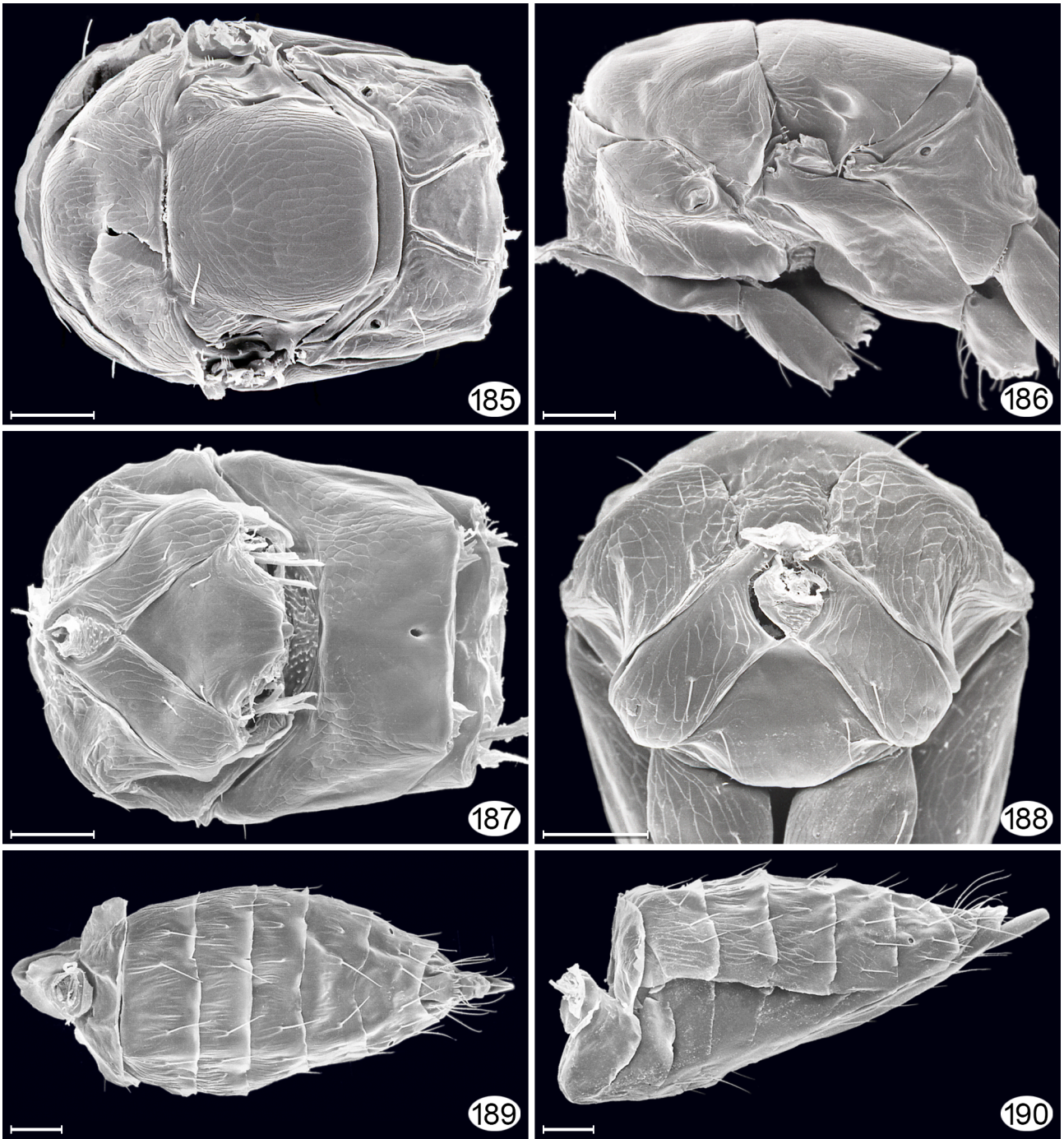
**FIGURES 175, 176.** *Lymaenon* spp., habitus: 175, Central African Republic, Dzanga-Ndoki National Park, 2°21.60'N 16°03.20'E, 350m, 23–24.v.2001, S. van Noort, lowland rainforest (funicle 7-segmented); 176, Malaysia, Sarawak, Gunung Buda, 4°13'N 114°56'E, 5.xi.1996, S.L. Heydon & S. Fung (fl<sub>6</sub> and fl<sub>7</sub> white). Scale bars = 500  $\mu$ m.



**FIGURES 177, 178.** *Lymaenon* spp., habitus: 177, South Africa, West Cape, Kogelberg Nature Reserve, 3416.48'S 19°01.03'E, 16.xi–16.xii.1998, S. van Noort, mesic mountain fynbos (ovipositor sheaths extending posteriorly well beyond gastral apex); 178, Australia, South Australia, 32 km N. Renmark, 263m, 33°53'S 140°43'E, 15.ii–15.iv.2000, D.C. Darling (fore wing banded, ovipositor sheaths exerted anteriorly to head). Scale bars = 500  $\mu$ m.



**FIGURES 179–184.** *Lymaenon* sp., head: 179, anterior; 178, dorsal; 181, lateral; 182, posterior; 183, ventral; 184, mouthparts, ventral. Scale bars = 50  $\mu$ m.

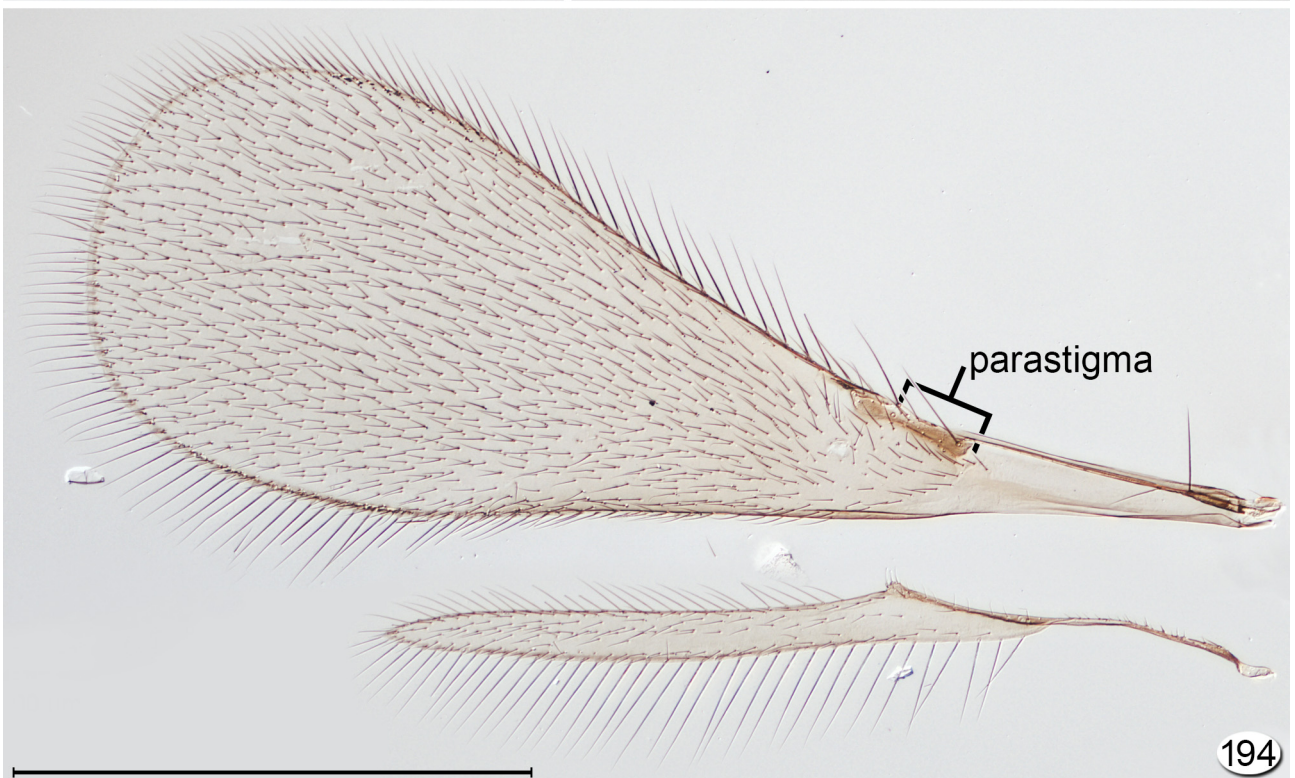
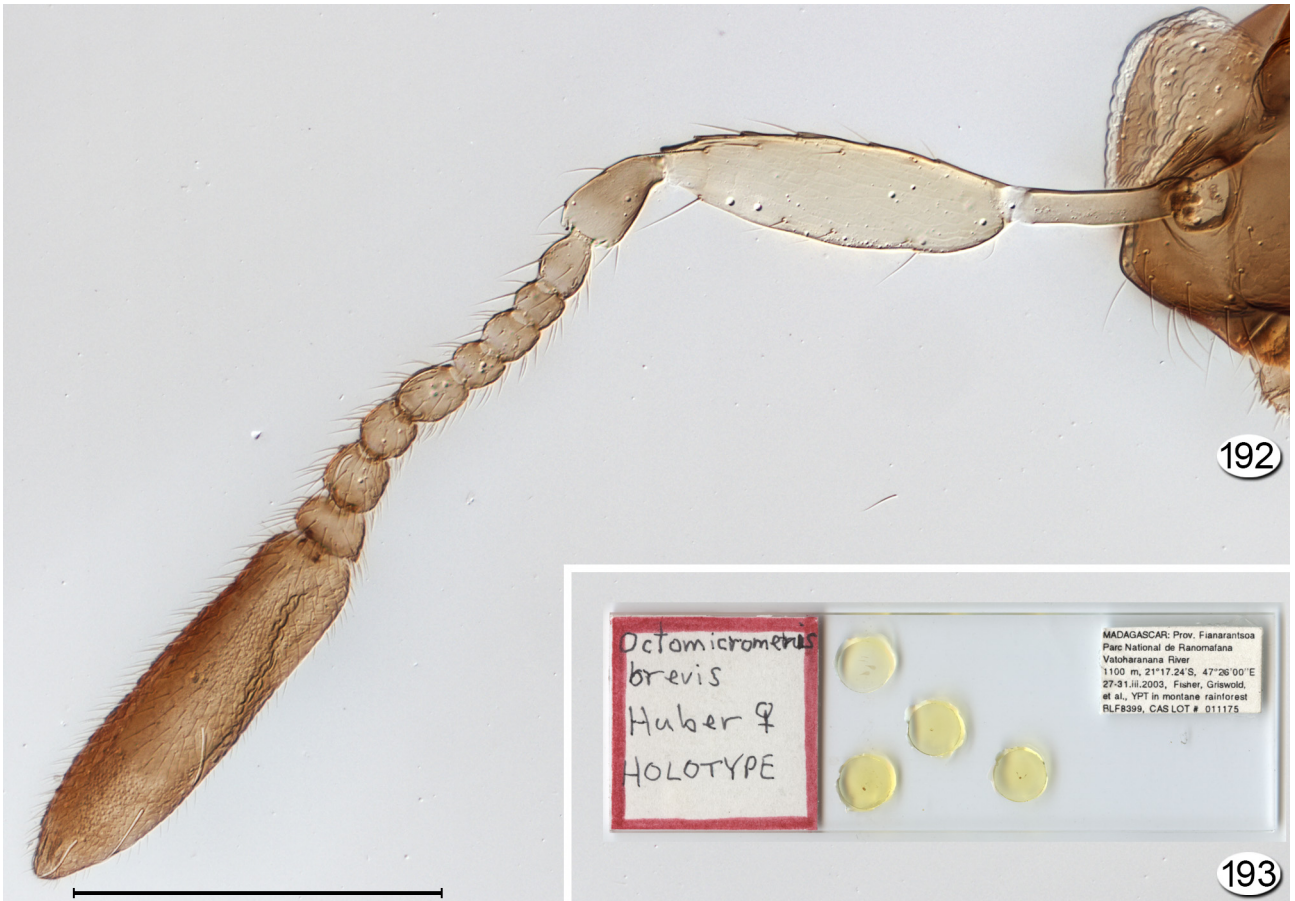


**FIGURES 185–190.** *Lymaenon* sp.: 185, mesosoma dorsal; 186, mesosoma lateral; 187, mesosoma ventral; 188, mesosoma ventroanterior; 189, metasoma dorsal; 190, metasoma lateral. Scale bars = 50  $\mu\text{m}$ .

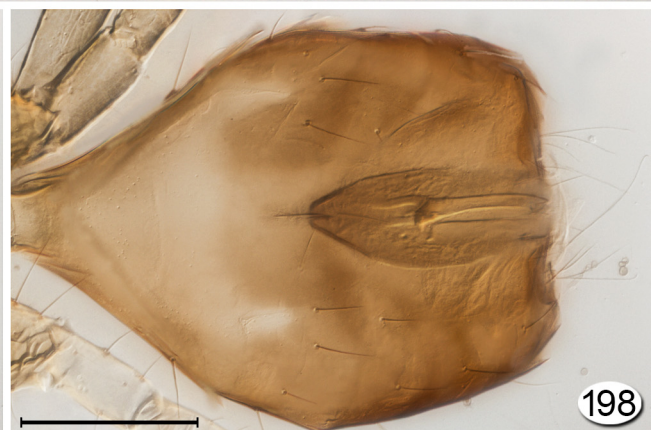
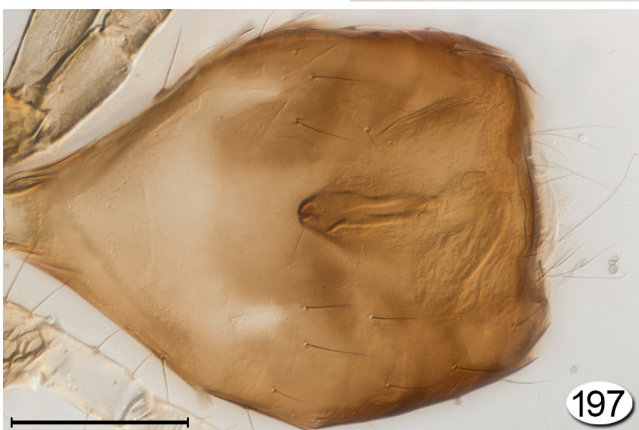




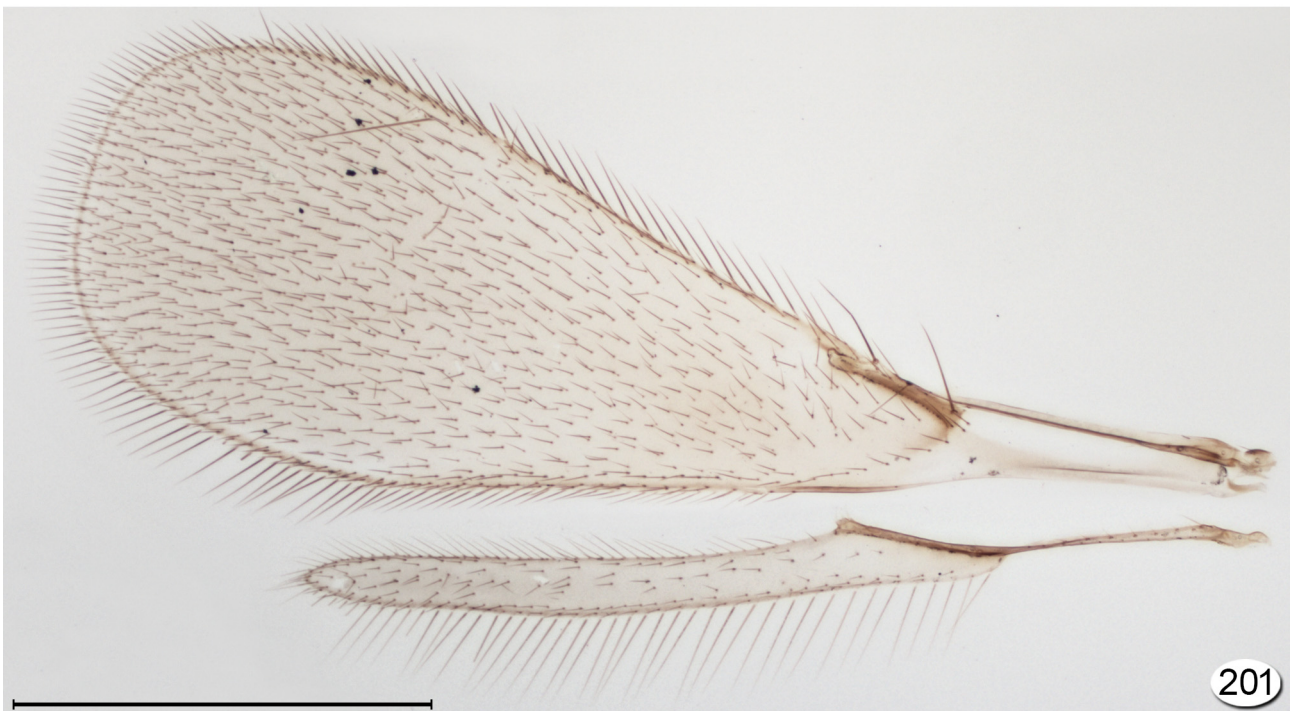
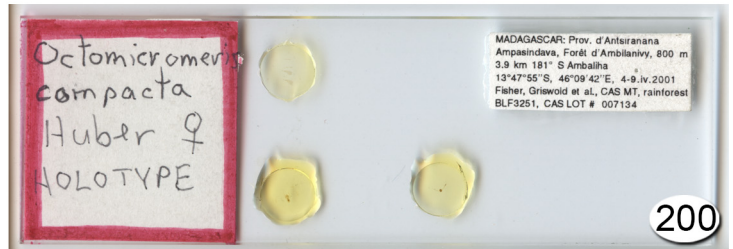
**FIGURE 191.** *Octomicromeris* sp., habitus: Madagascar, Antsiranana, 1625m, along tributary at head of Andranomifotra River, 14°26.4'S 49°44.5'E, 6–12.xi.1996, E.L. Quinter. Scale bar = 500  $\mu$ m.



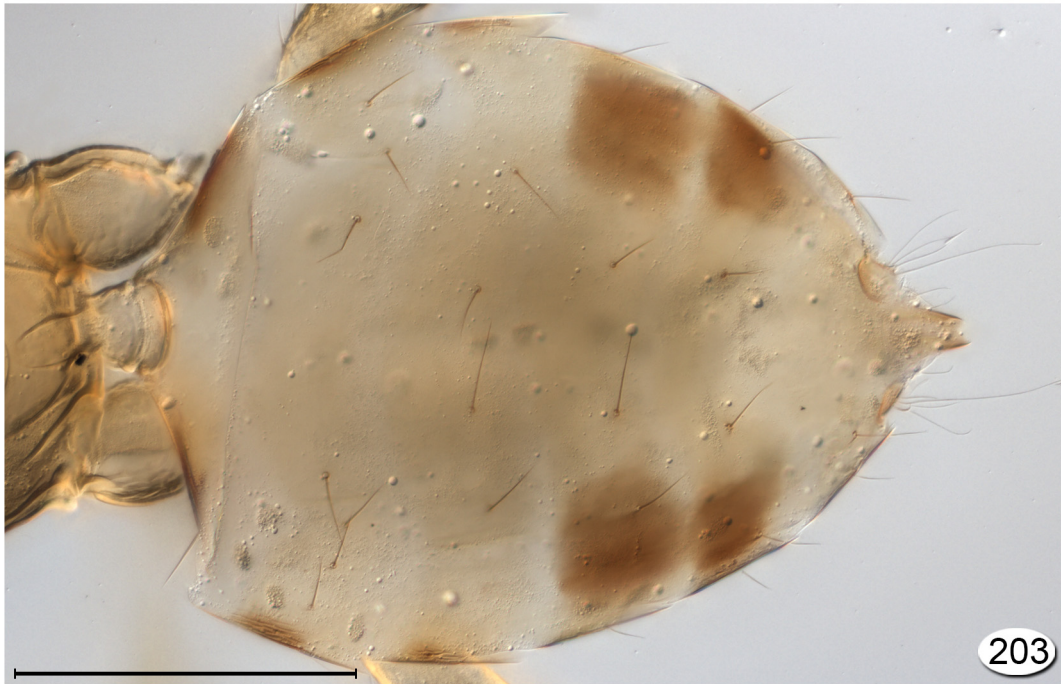
**FIGURES 192–194.** *Octomicromeris brevis*, holotype: 192, antenna; 193, holotype slide; 194, wings. Scale bars: 192 = 200  $\mu\text{m}$ , 194 = 500  $\mu\text{m}$ .



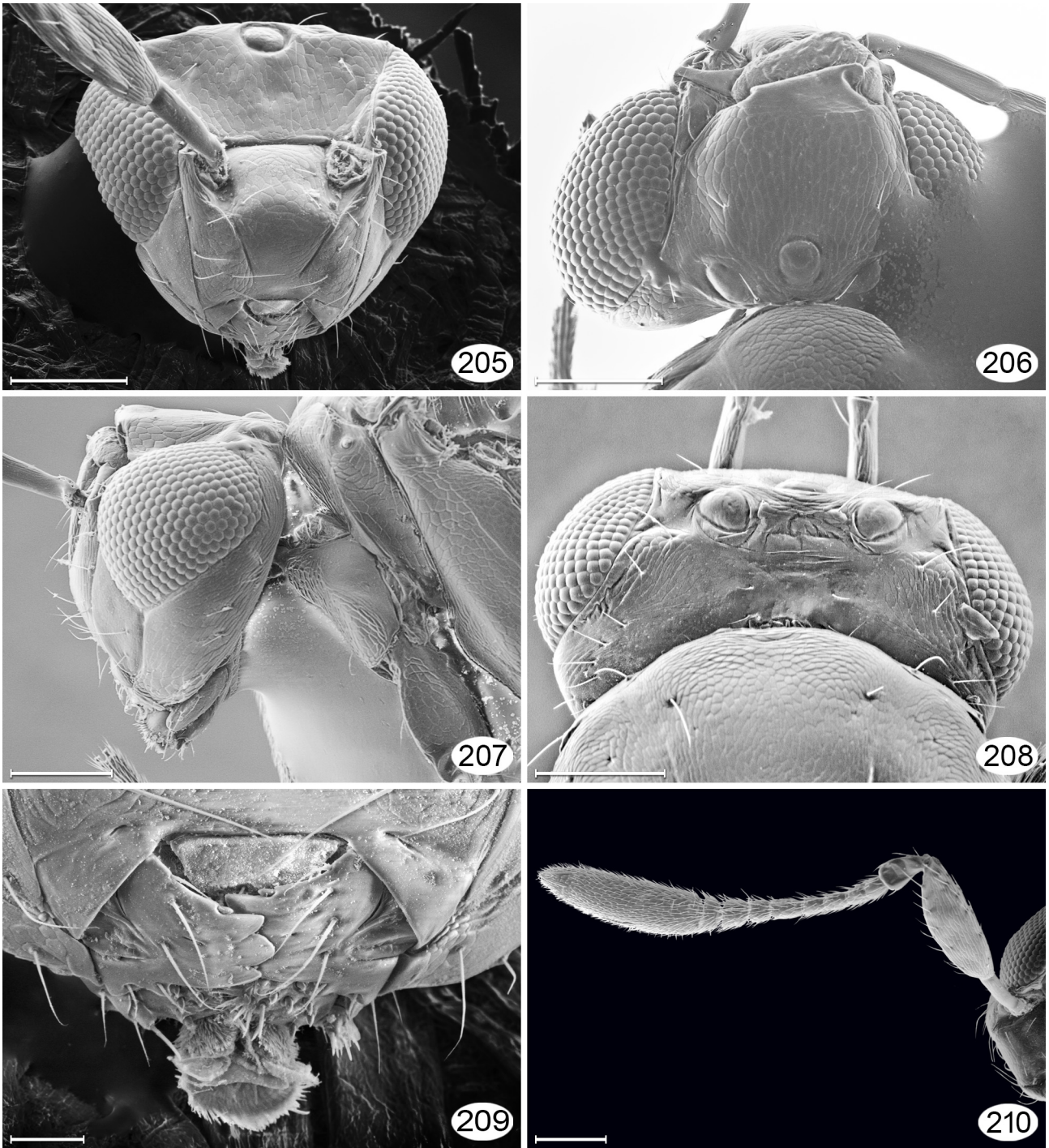
**FIGURES 195–198.** *Octomicromeris brevis*: 195, holotype mesosoma + petiole, dorsal; 196, holotype gaster, lateral; 197, male metasoma showing genitalia, dorsal; 198, male gaster showing genitalia, ventral. Scale bars = 100  $\mu$ m.



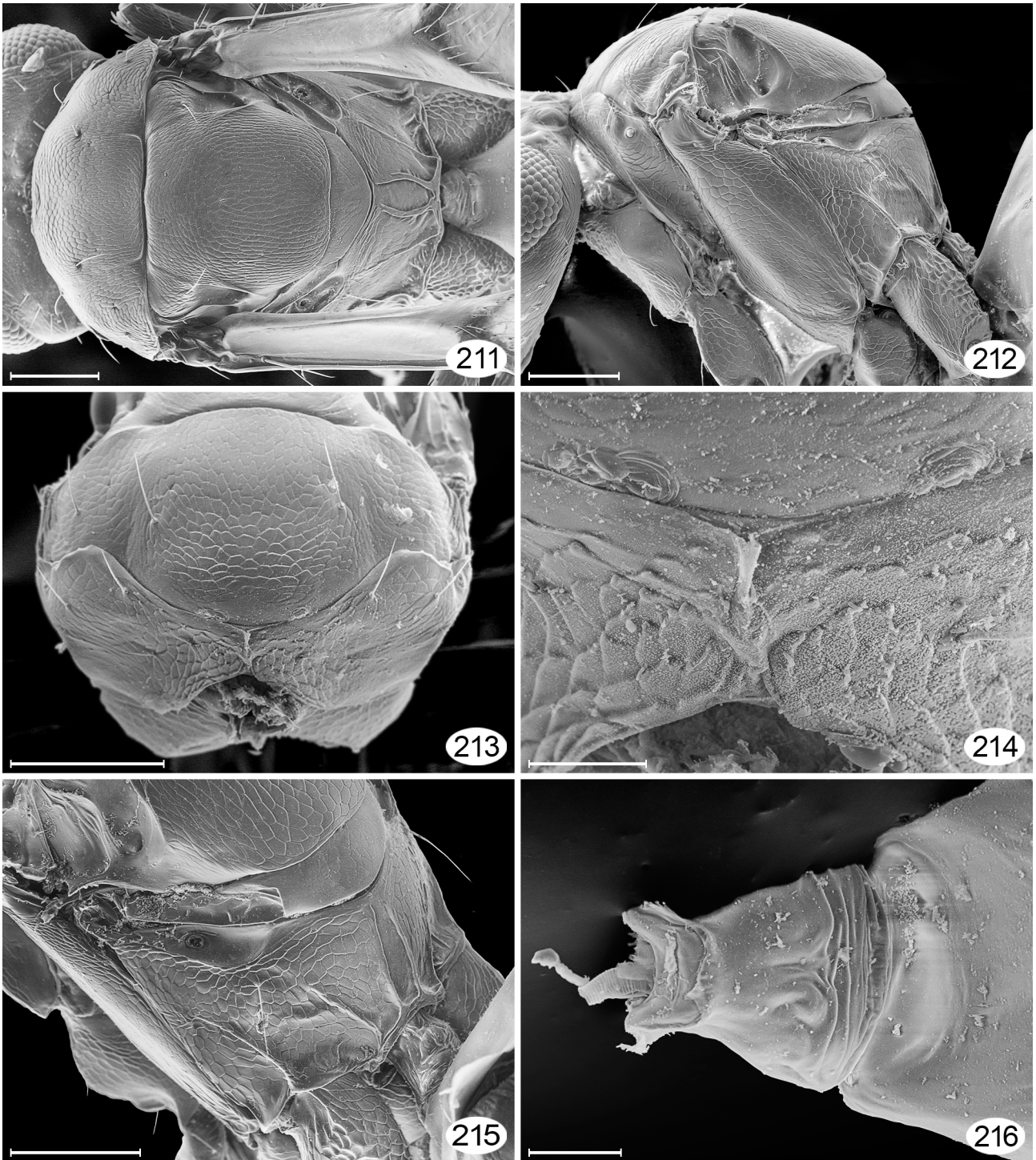
**FIGURES 199–201.** *Octomicromeris compacta*, holotype: 199, antenna + head; 200, holotype slide; 201, wings. Scale bars = 500  $\mu$ m.



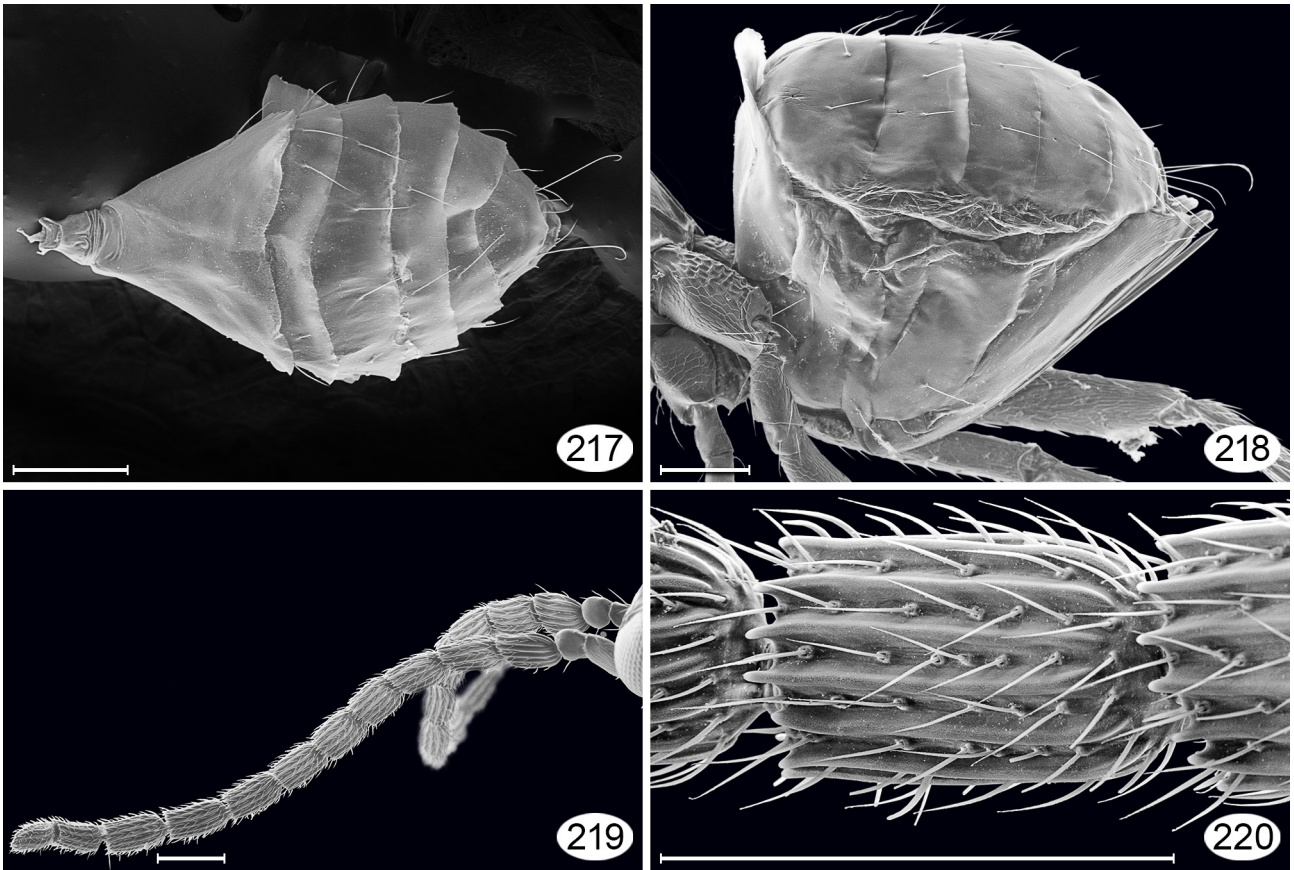
**FIGURES 202–204.** *Octomicromeris compacta*, holotype. 202, mesosoma + petiole, dorsal; 203, metasoma, dorsal; 204, metasoma, ventral. Scale bars = 200  $\mu\text{m}$ .



**FIGURES 205–210.** *Octomicromeris* sp.: 205, head, anterior; 206, head, dorsal; 207, head + prothorax, lateral; 208, head, posterior + anterior part of mesoscutum, dorsal; 209, mouthparts; 210, female antenna. Scale bars: 205–208, 210 = 100  $\mu$ m; 209 = 20  $\mu$ m.



**FIGURES 211–216.** *Octomicromeris pulchellus*, paratype (except as noted): 211, mesosoma + petiole, dorsal; 212, mesosoma + petiole, lateral; 213, *Octomicromeris* sp., mesosoma anterodorsal; 214, *O.* sp., median area of pronotum, anterior; 215, frenum–petiole, oblique posterolateral; 216, petiole + base of gt., anterodorsal. Scale bars: 211–213, 215 = 100  $\mu$ m; 214, 216 = 20  $\mu$ m.

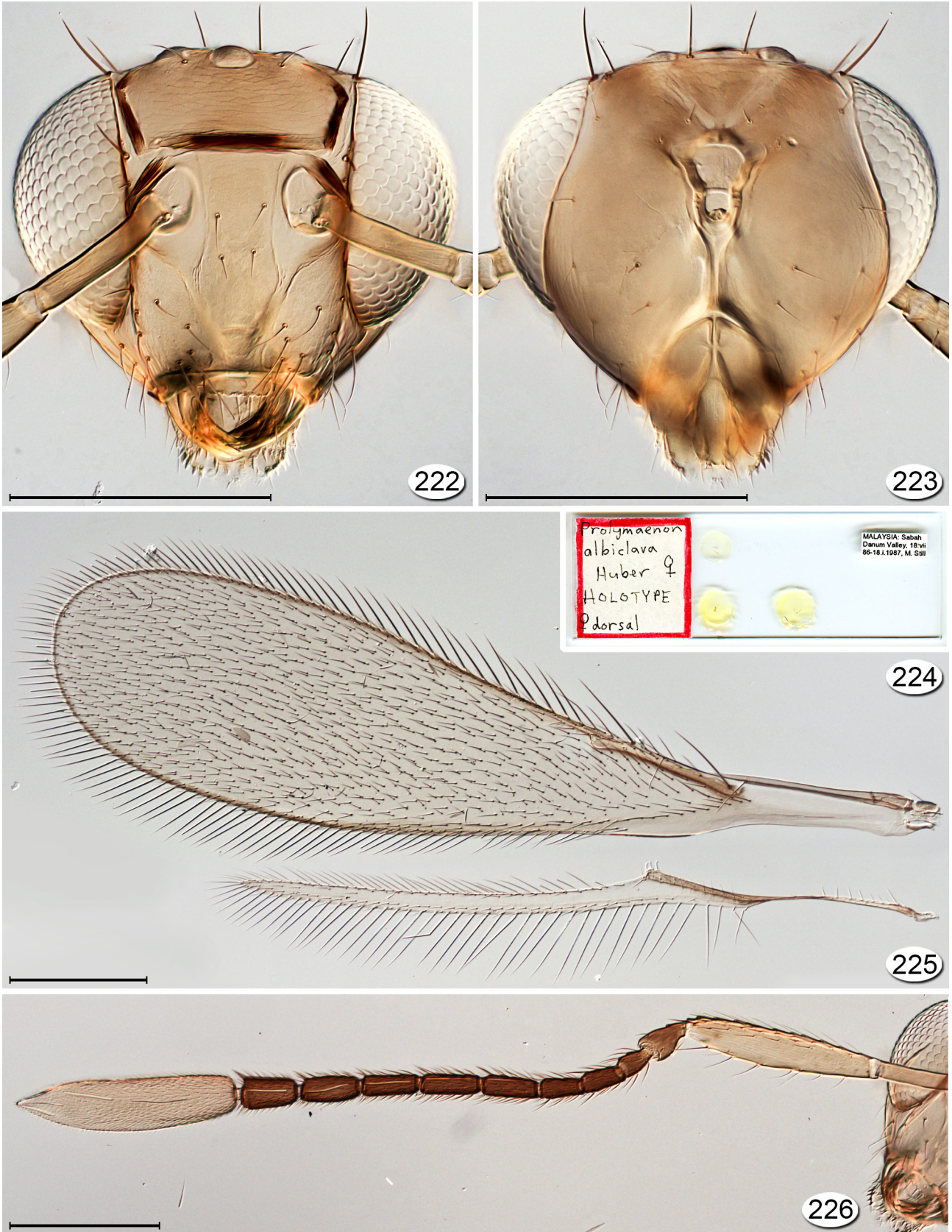


**FIGURES 217–220.** *Octomicromeris pulchellus*, paratype: 217, female gaster, dorsal; 218, female gaster, lateral; 219, male antenna; 220, male fl<sub>6</sub>. Scale bars = 100  $\mu$ m.

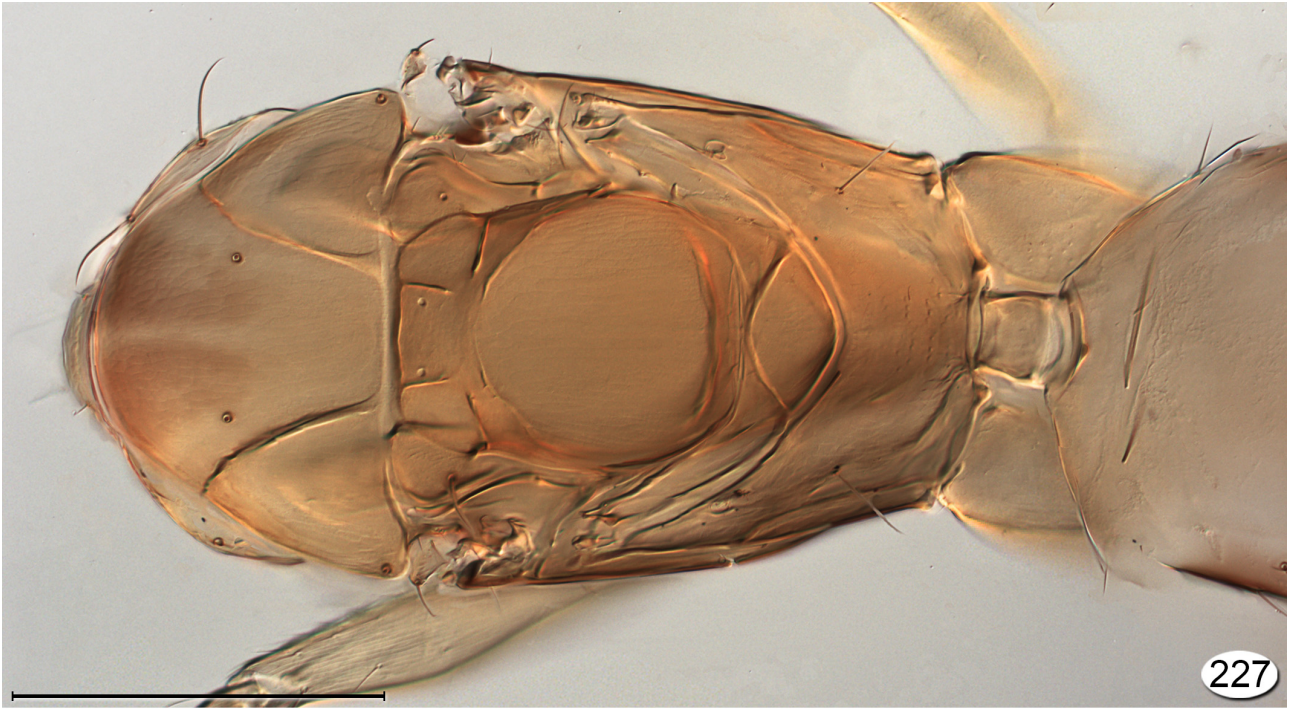




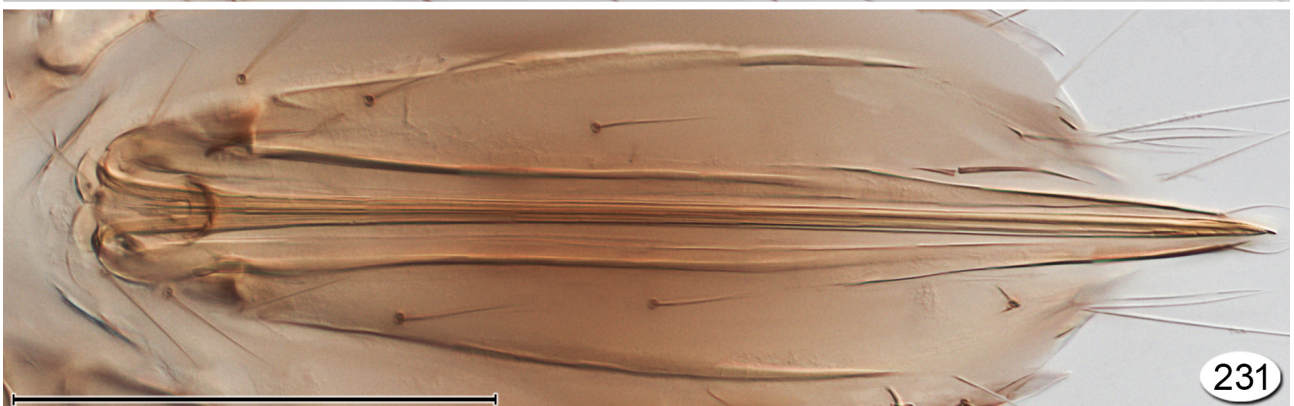
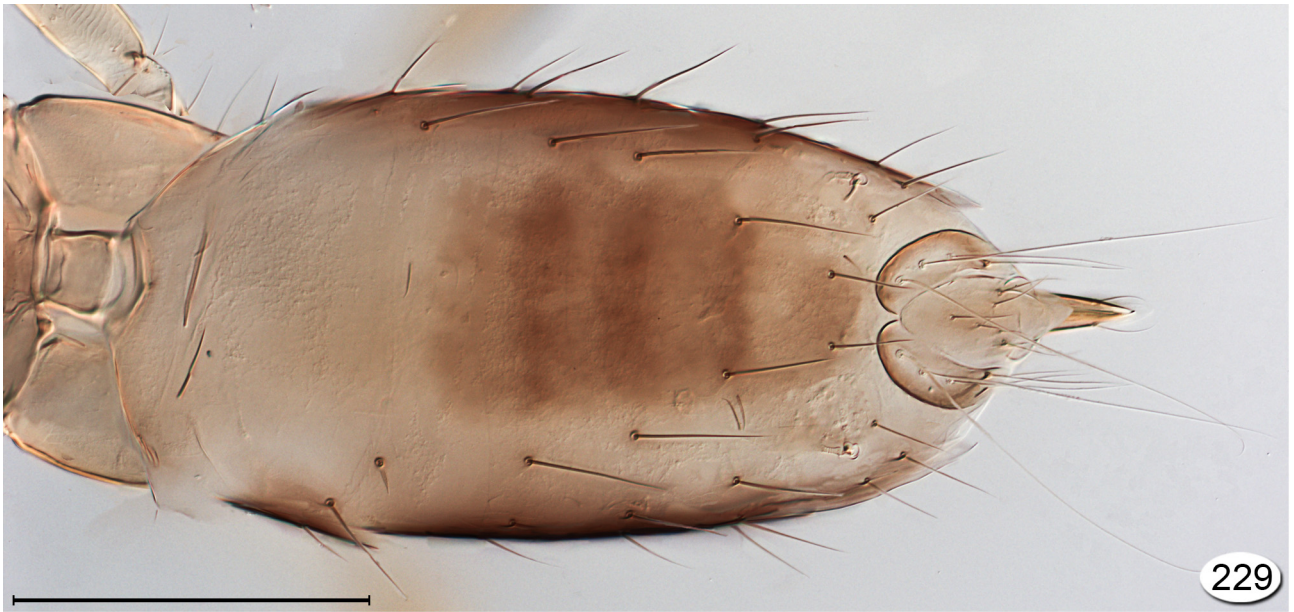
**FIGURE 221.** *Progonatocerus albiclava*, paratype female, habitus: Malaysia: Sabah, Danum Valley, vii.1987, M. Still. Scale bar = 1000  $\mu\text{m}$ .



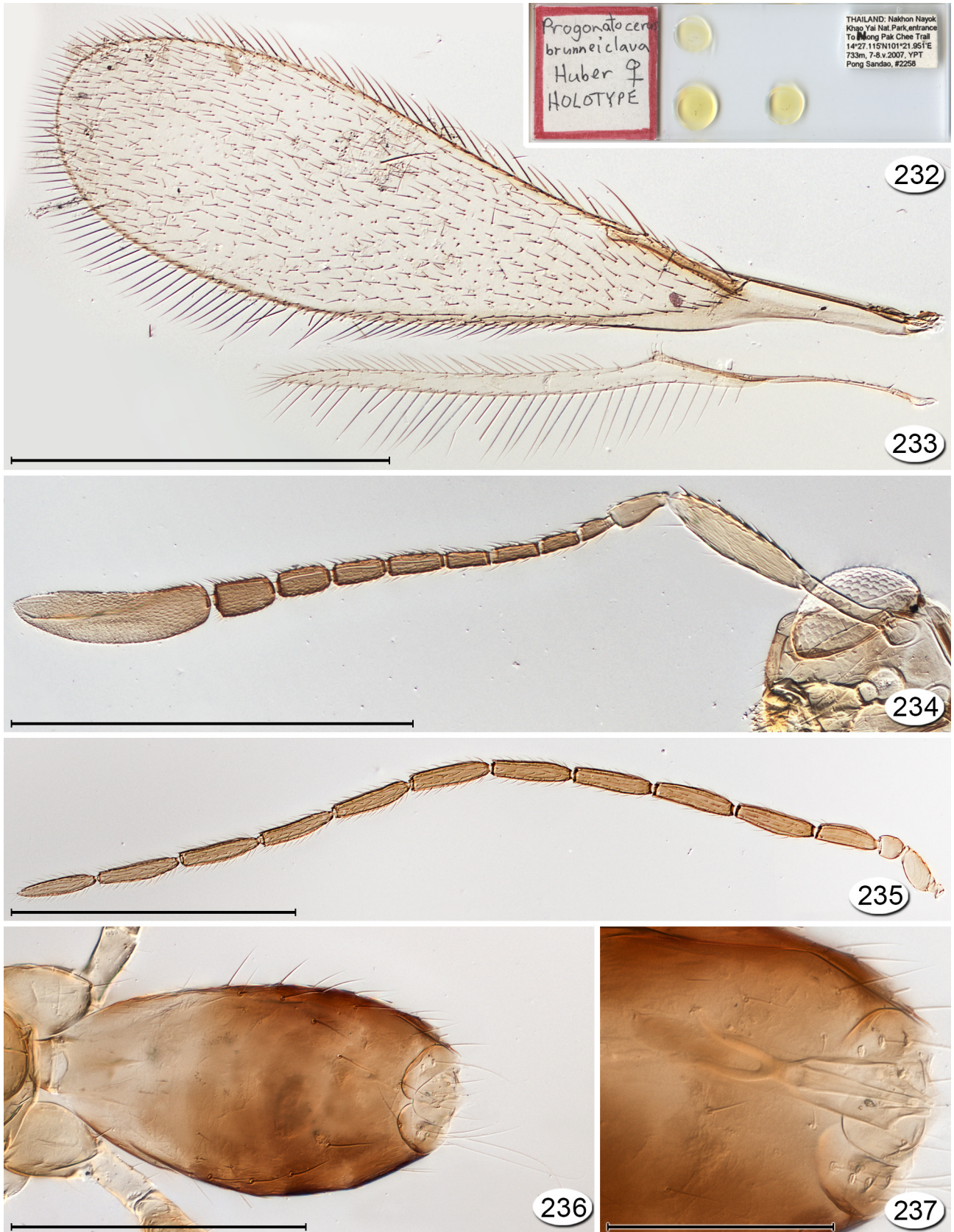
**FIGURES 222–226.** *Progonatocerus albiclava*, holotype: 222, head, anterior; 223, head, posterior; 224, holotype slide; 225, wings; 226, antenna. Scale bars = 200 µm.



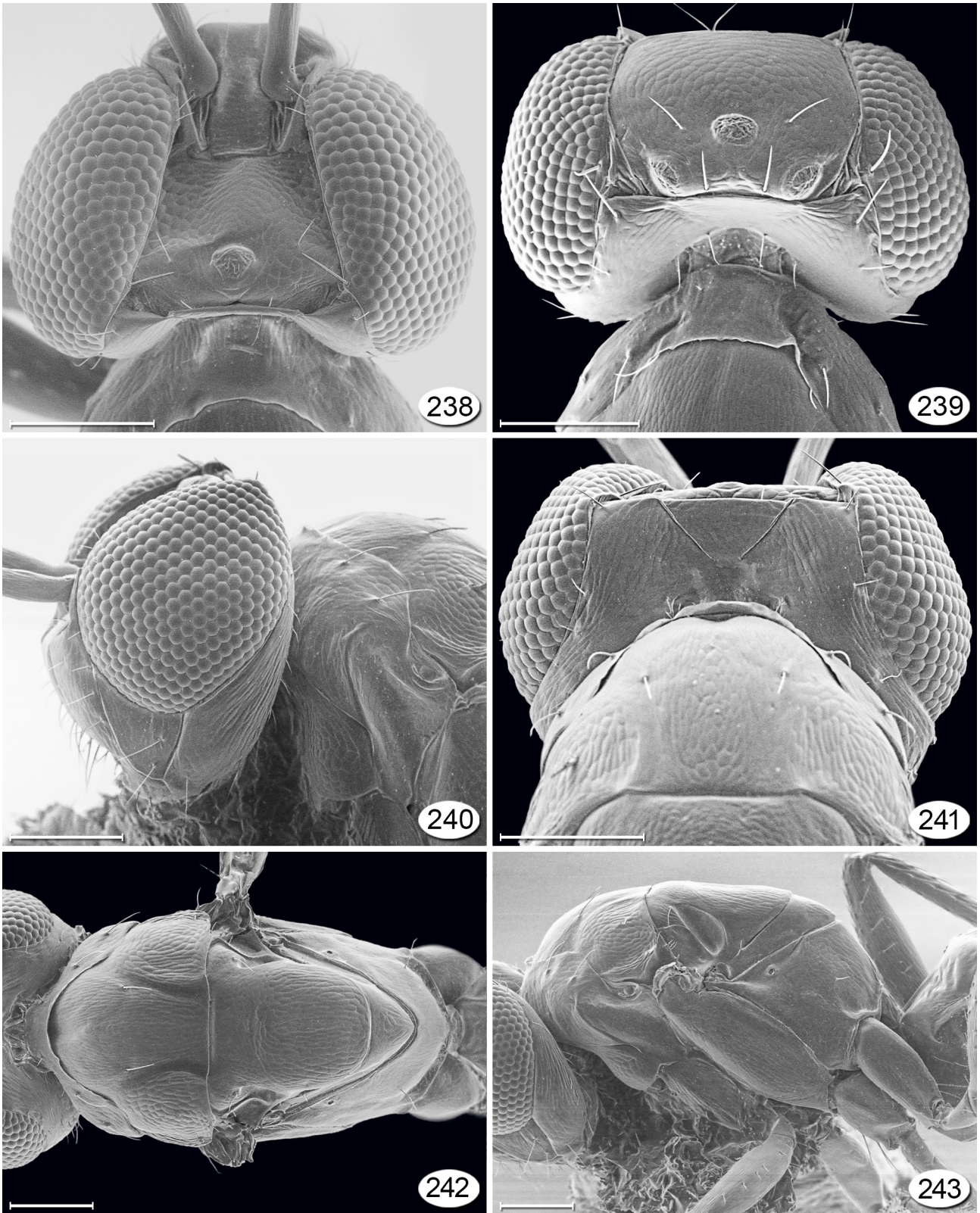
**FIGURES 227, 228.** *Progonatocerus albiclava*: 227, holotype, mesosoma-gt., dorsal; 228, paratype female, head + mesosoma, lateral. Scale bars = 200  $\mu$ m.



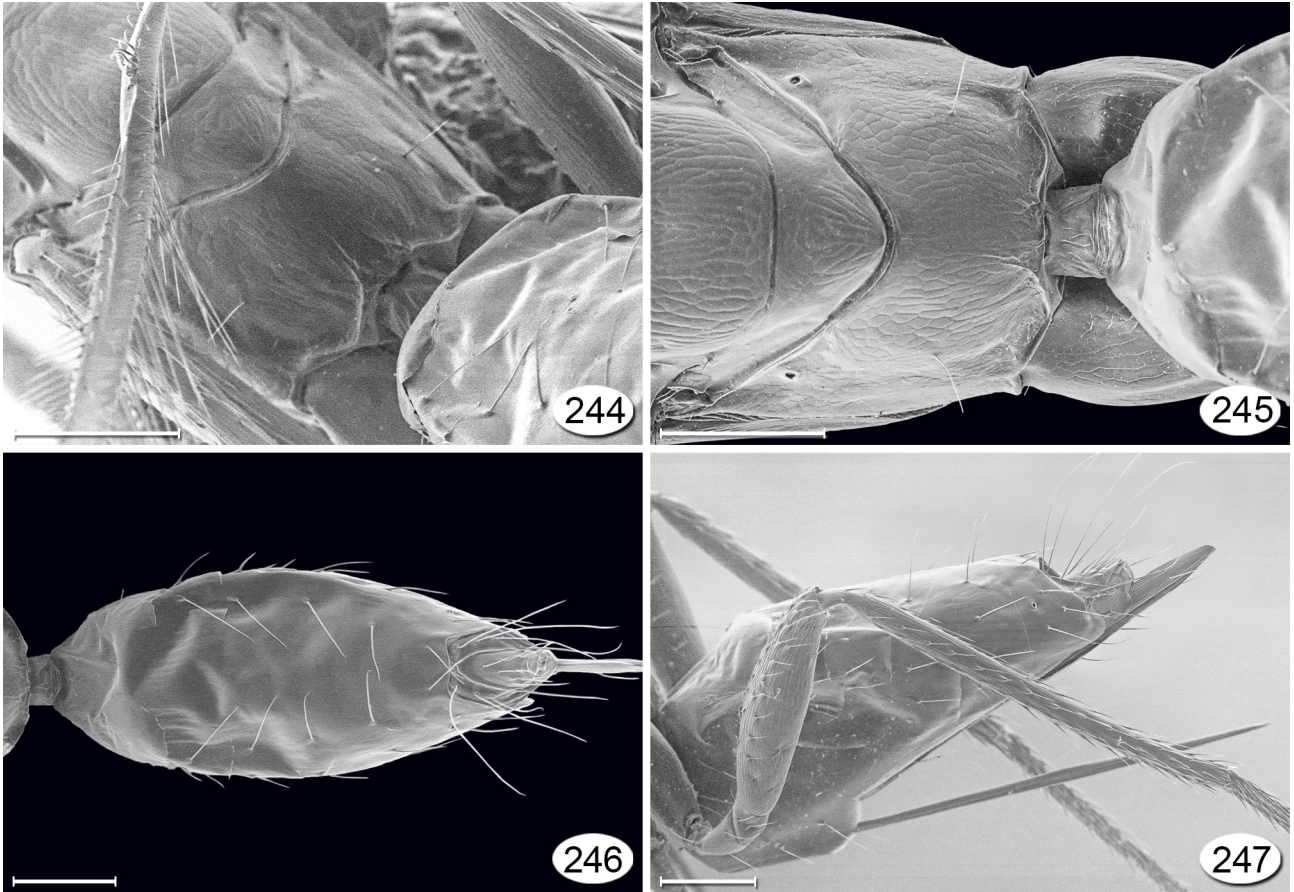
**FIGURES 229–231.** *Progonatocerus albiclava*, holotype: 229, petiole + gaster, dorsal; 230, genitalia, dorsal; 231, genitalia, ventral. Scale bars = 200  $\mu$ m.



**FIGURES 232–237.** *Progonatocerus brunneiclava*: 232, holotype slide; 233, holotype wings; 234, holotype antenna; 235, male antenna; 236, male gaster; 237, male genitalia, dorsal. Scale bars: 233–236 = 500 µm, 237 = 100 µm.



**FIGURES 238–243.** *Progonatocerus albiclava*: 238, head, dorsal (collapsed inward); 239, head + pronotum, dorsal; 240, head + prothorax, lateral; 241, head + mesoscutum, posterodorsal; 242, mesosoma + petiole, dorsal; 243, mesosoma + petiole, lateral. Scale bars = 100  $\mu$ m.

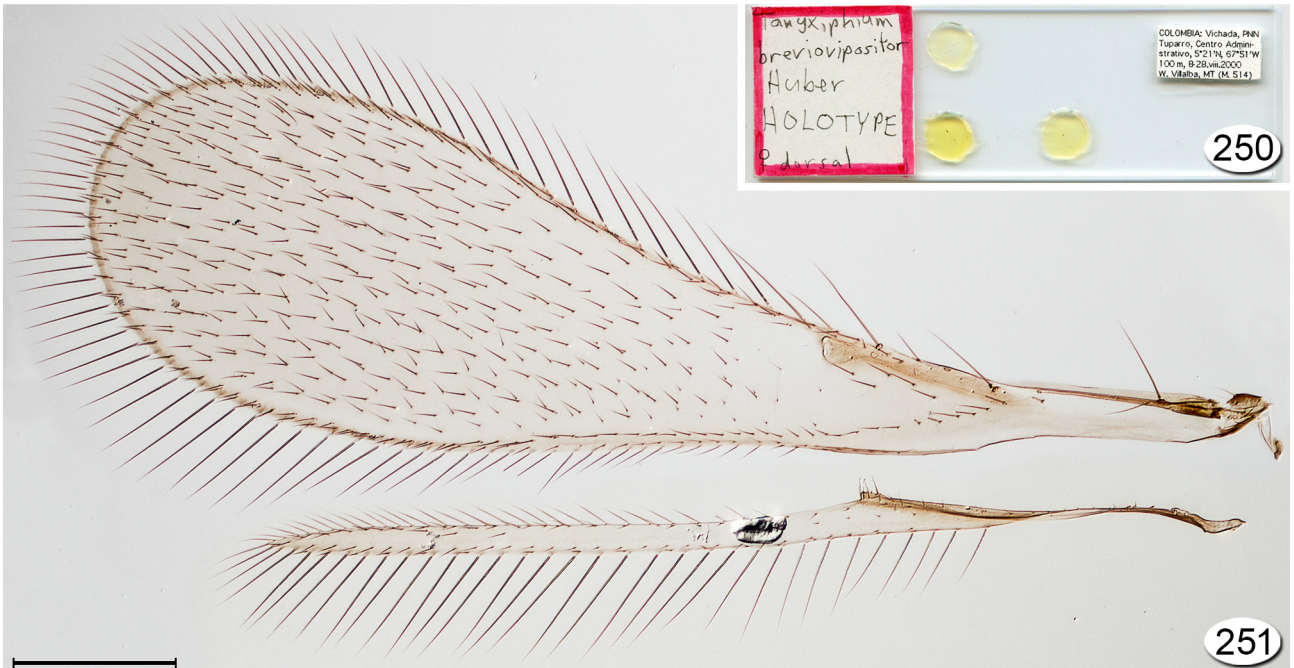


**FIGURES 244–247.** *Progonatocerus albiclava*: 244, frenum-base of gaster, laterodorsal; 245, frenum-base of gaster, dorsal; 246, metasoma, dorsal; 247, metasoma, lateral. Scale bars = 100  $\mu\text{m}$ .



**FIGURE 248.** *Tanyxiphium longissimum*, habitus: Thailand: Petchabun, Khao Kho Nat. Park, office, 16°39.479'N 101°08.105'E, 12–19.vii.2006, S. Chatchumnan & S. Singtong. Scale bar = 1000  $\mu$ m.

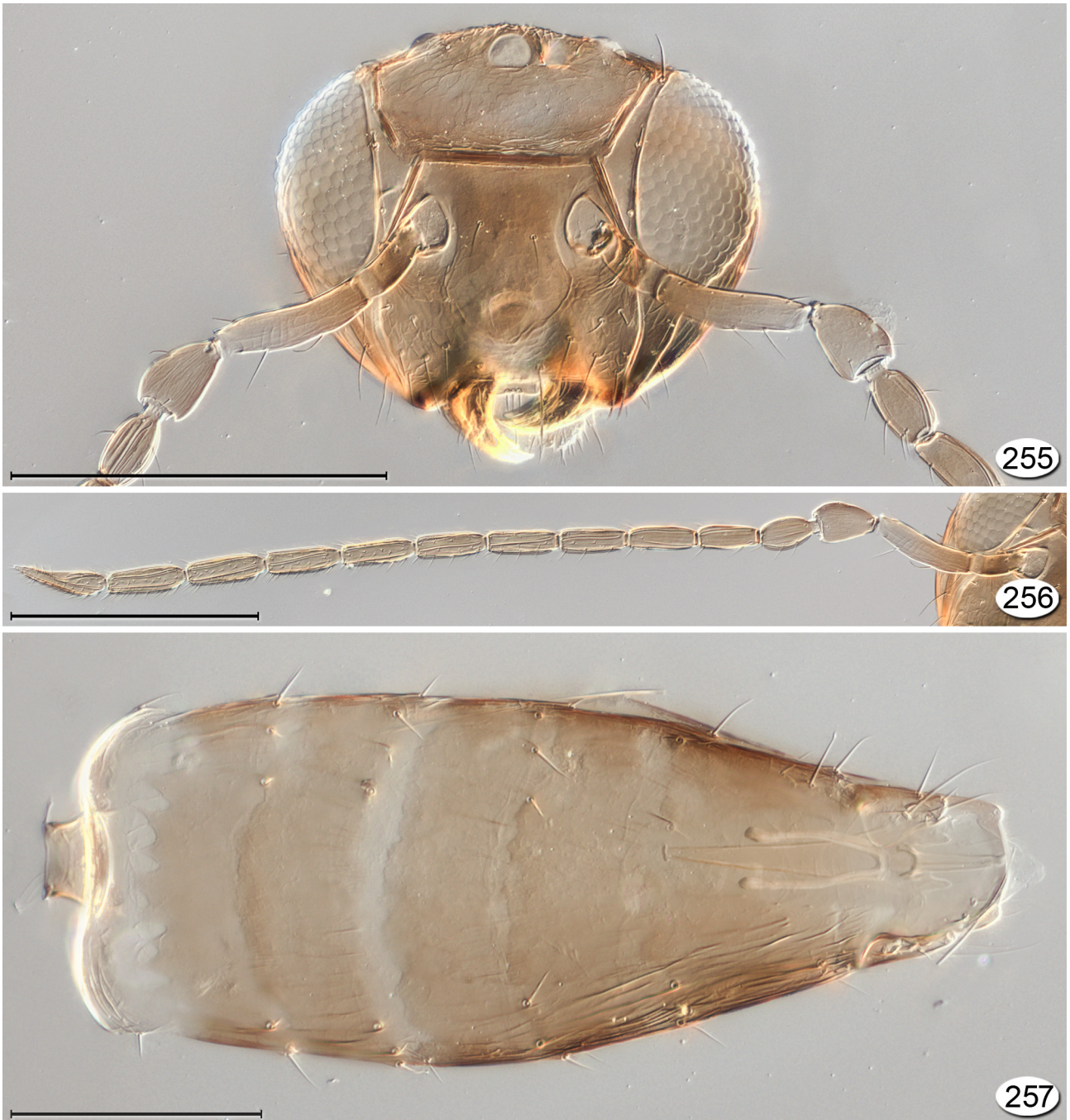




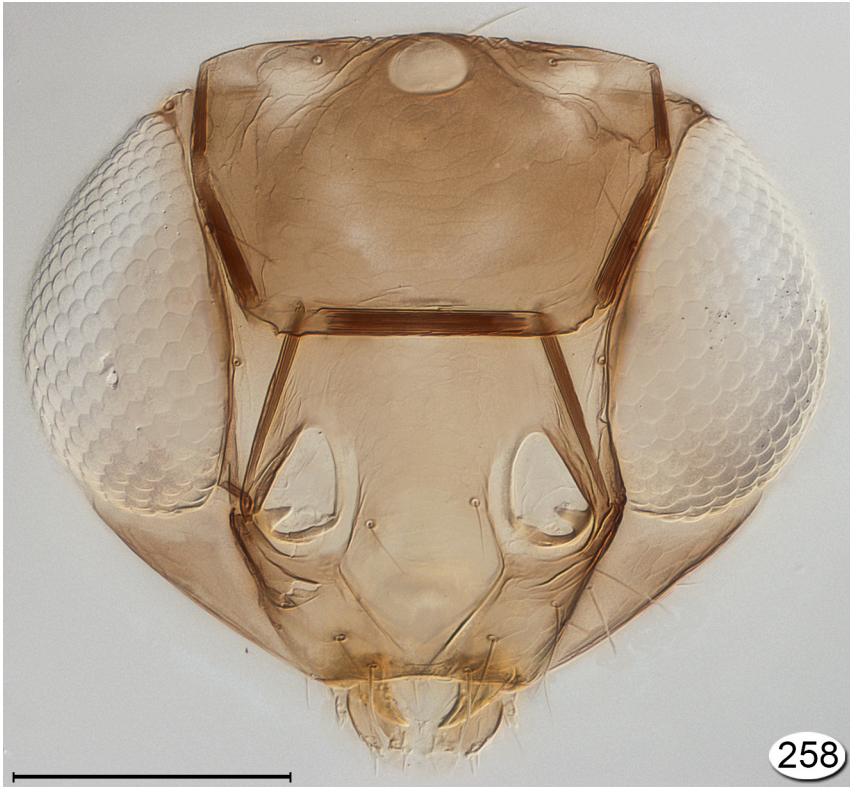
**FIGURES 249–252.** *Tanyxiphium breviovipositor*, holotype: 249, head + antenna; 250, holotype slide; 251, wings; 252, mesosoma, dorsal. Scale bars = 100  $\mu$ m.



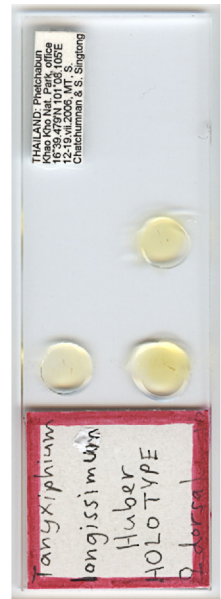
**FIGURES 253, 254.** *Tanyxiphium breviovipositor*, holotype: 253, metasoma, dorsal; 254, ovipositor (as seen through metasoma). Scale bars = 100  $\mu$ m.



**FIGURES 255–257.** *Tanyxiphium breviovipositor*, male paratype: 255, head, anterior; 256, antenna; 257, genitalia (as seen through metasoma). Scale bars = 100  $\mu$ m.



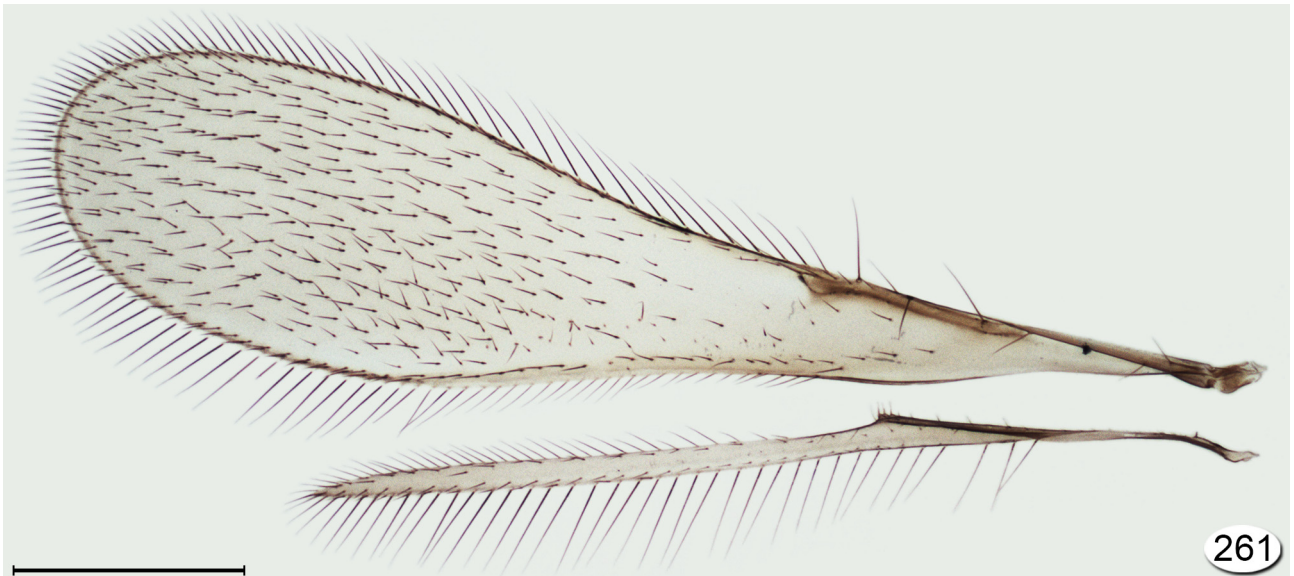
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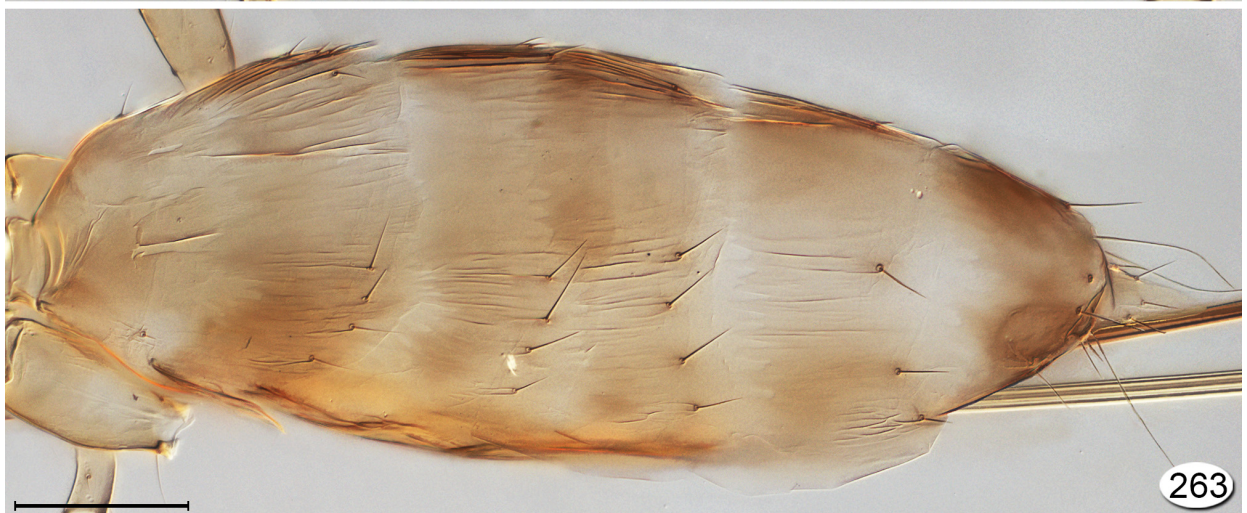
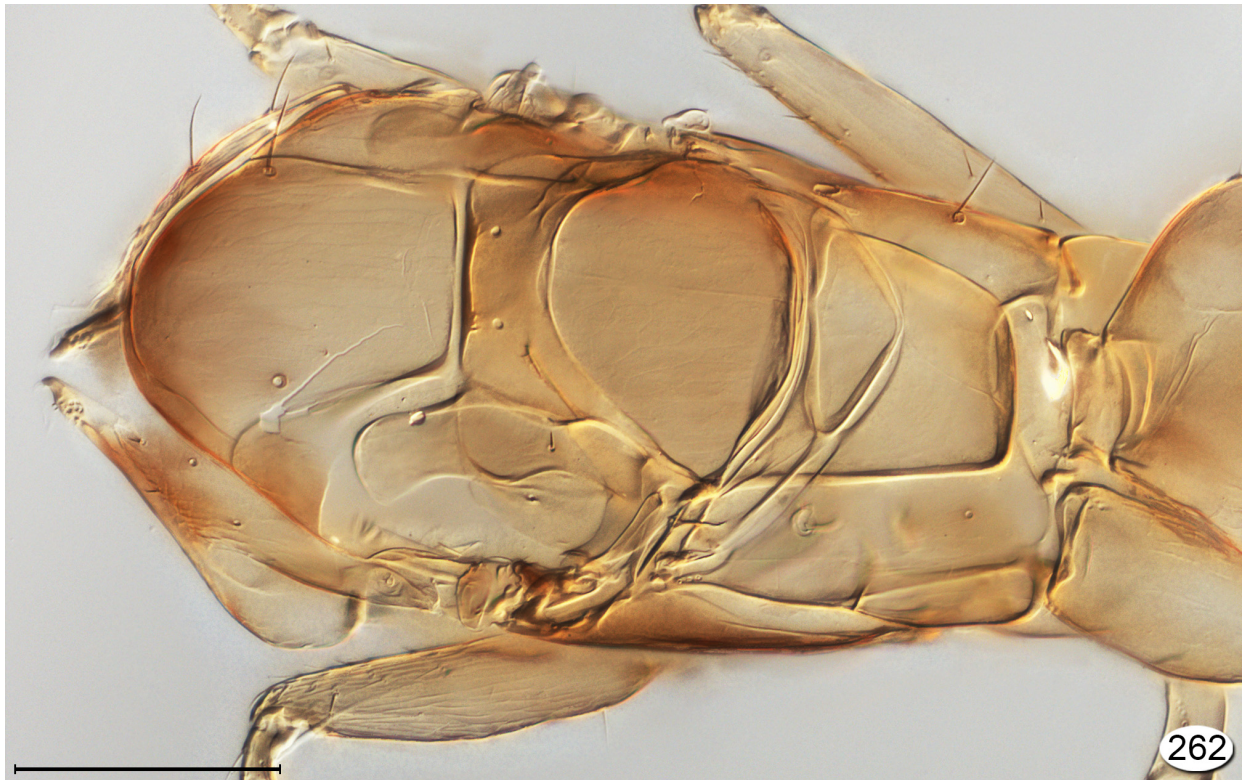


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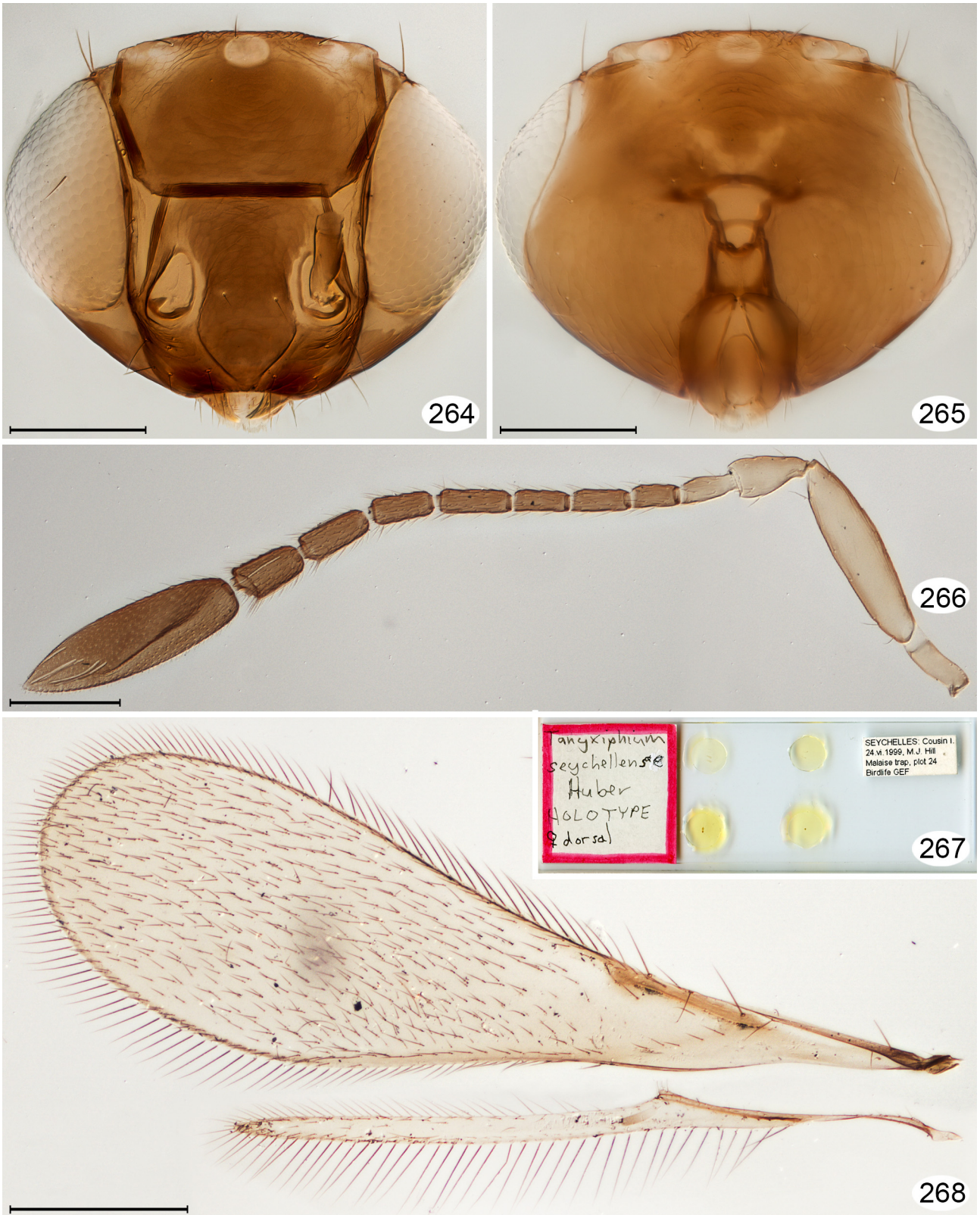


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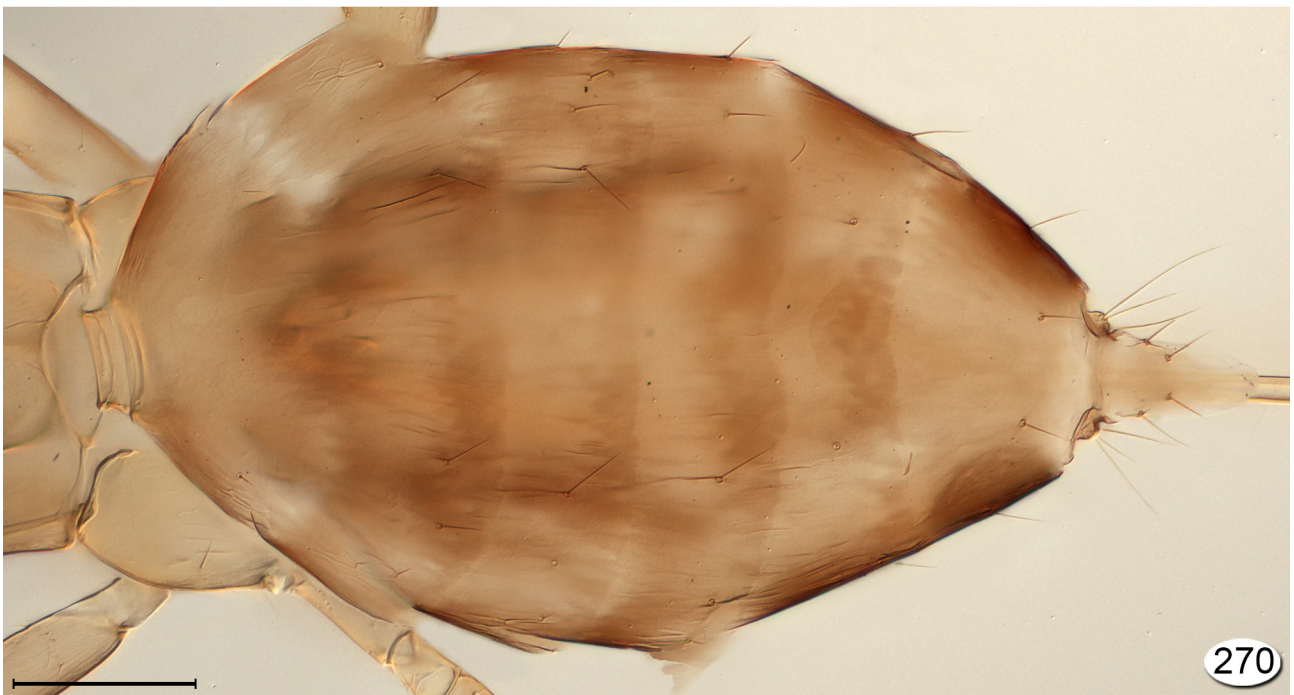
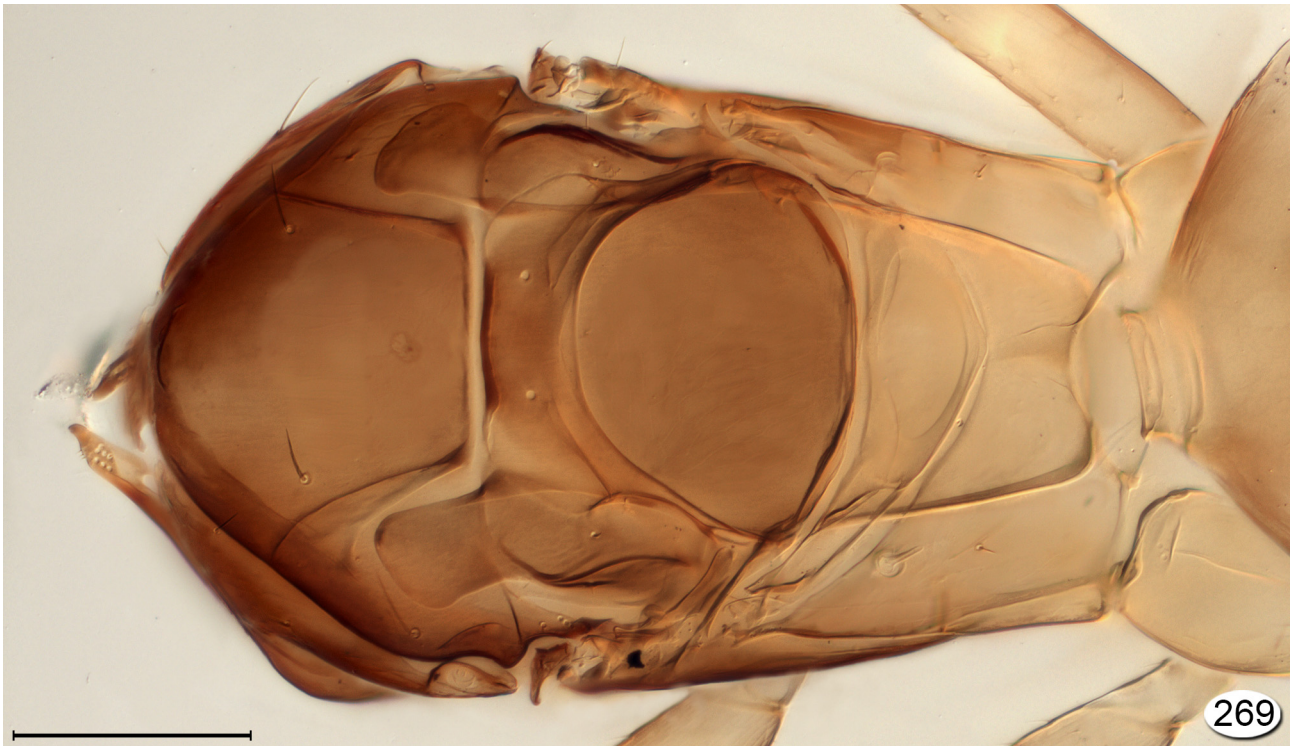
**FIGURES 258–261.** *Tanyxiphium longissimum*, holotype: 258, head, anterior; 259, holotype slide; 260, antenna; 261, wings. Scale bars = 100  $\mu$ m.



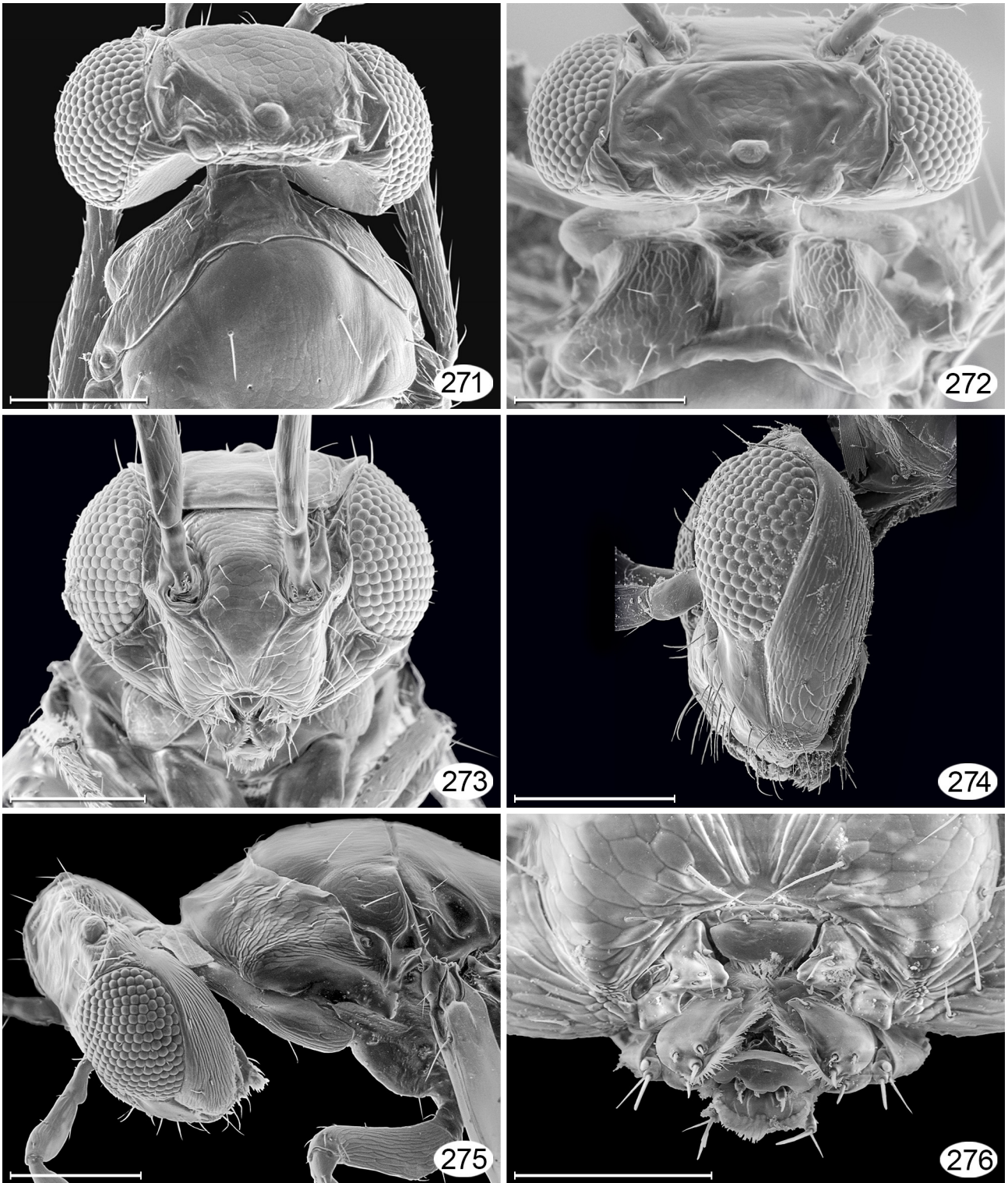
**FIGURES 262, 263.** *Tanyxiphium longissimum*, holotype: 262, mesosoma, dorsal; 263, metasoma (exserted part of ovipositor and sheaths not shown), dorsal. Scale bars = 100  $\mu$ m.



**FIGURES 264–268.** *Tanyxiphium seychellense*, holotype: 264, head, anterior; 265, head, posterior; 266, antenna; 267, holotype slide; 268, wings. Scale bars = 100  $\mu$ m.

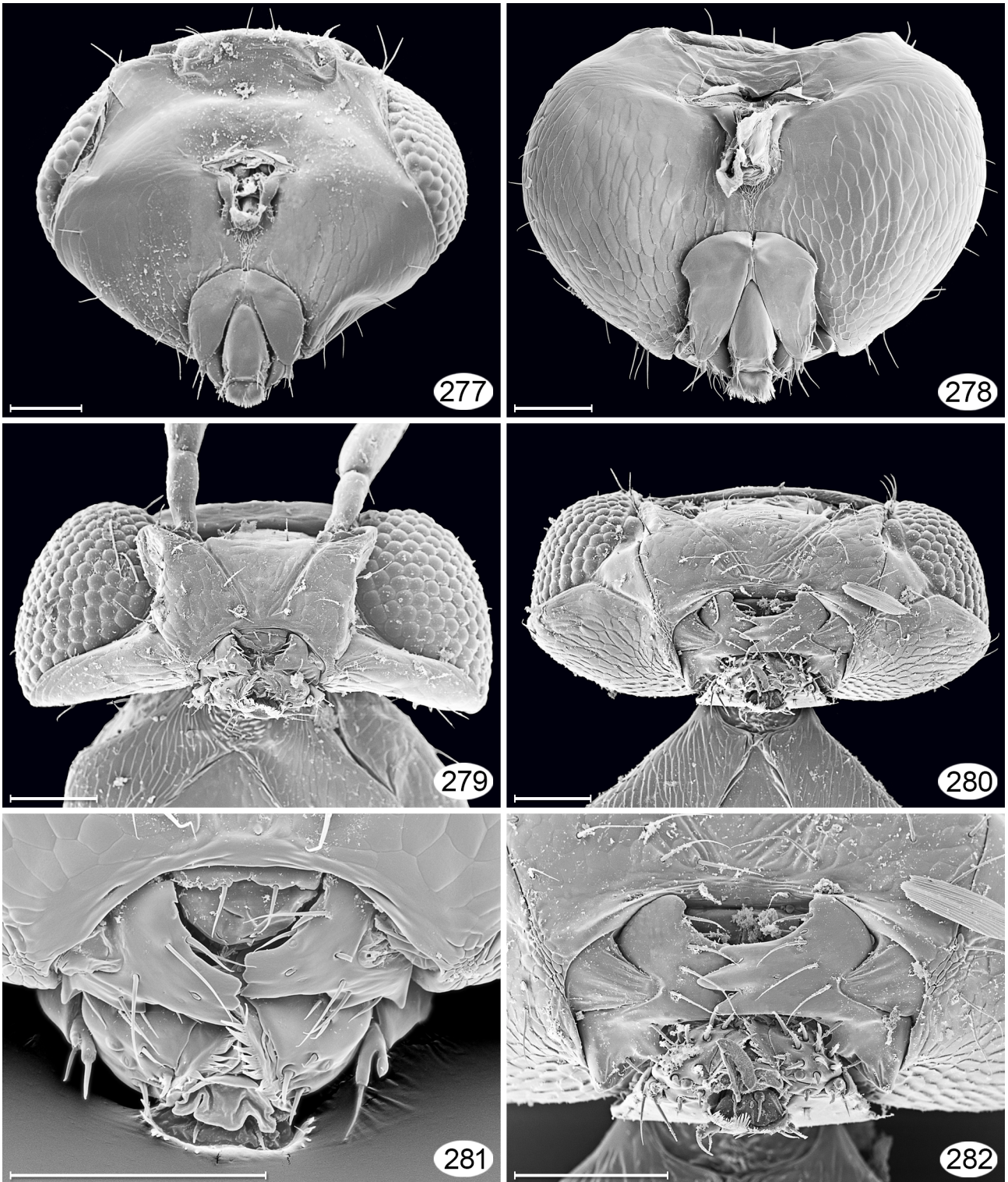


**FIGURES 269, 270.** *Tanyxiphium seychellense*, holotype: 269, mesosoma, dorsal; 270, metasoma (exserted part of ovipositor and sheaths not shown), dorsal. Scale bars = 100  $\mu$ m.

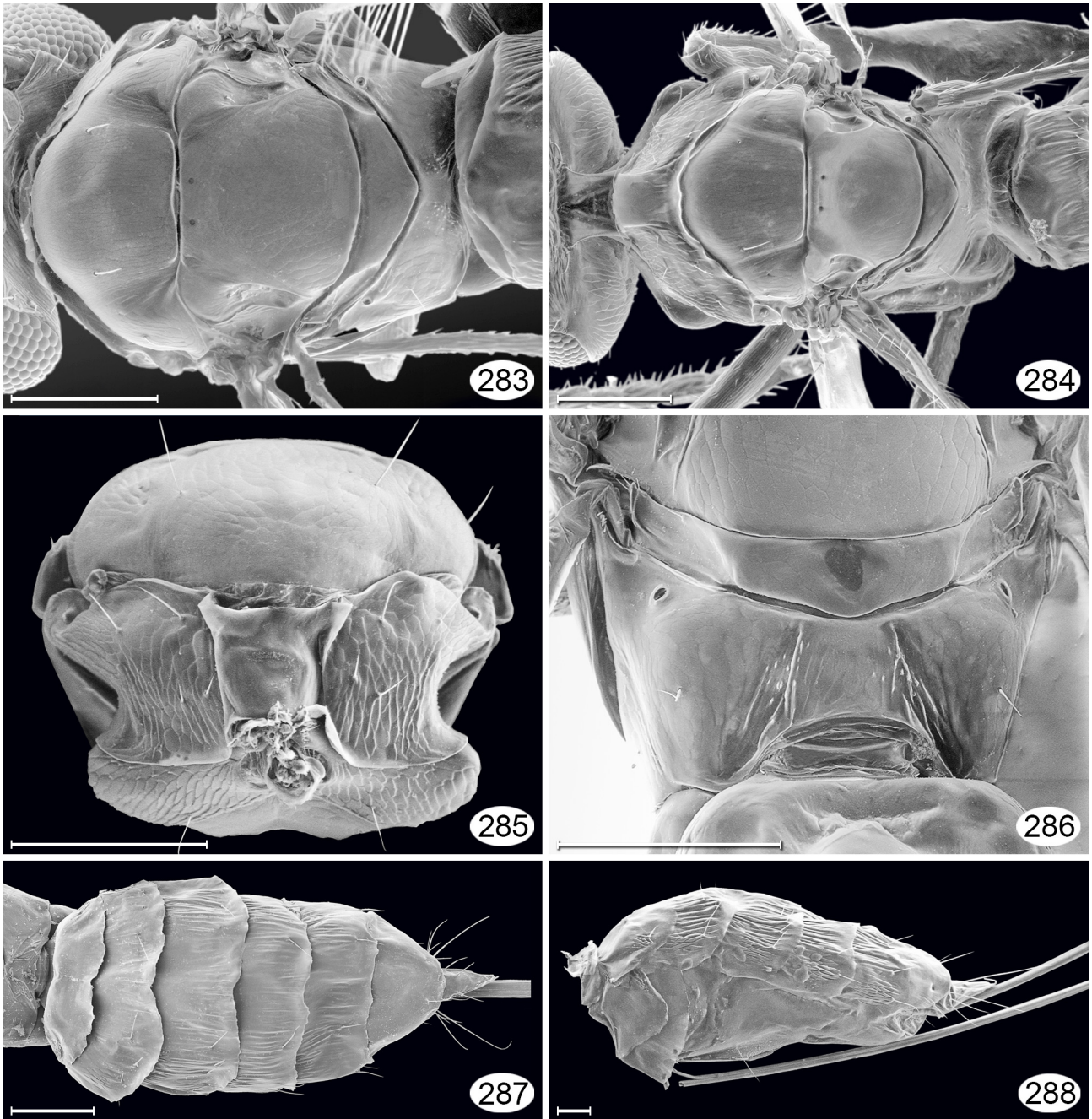


**FIGURES 271–276.** *Tanyxiphium* spp.: 271, *T. ?perforator*, female head–mesoscutum, dorsal; 272, *T. breviovipositor*, male head + pronotum, dorsal; 273, *T. ?perforator*, female head, anterior; 274, *T. seychellense*, male head, lateral; 275, *T. breviovipositor*, male, head–scutellum, lateral; 276, *T. ?perforator*, female mouthparts. Scale bars: 271–275 = 100  $\mu\text{m}$ , 276 = 50  $\mu\text{m}$ .





**FIGURES 277–282.** *Tanyxiphium seychellense*, head: 277, female, posterior; 278, male, posterior; 279, female, ventral; 280, male, ventral; 281, female mouthparts, anterior; 282, male mouthparts, ventroanterior. Scale bars = 50  $\mu$ m.



**FIGURES 283–288.** *Tanyxiphium* spp.: 283, *Tanyxiphium breviovipositor* female, mesosoma dorsal; 284, *T. breviovipositor* male, mesosoma dorsal; 285, *T. longissimum* female, mesosoma anterior; 286, *T. perforator*, female, propodeum dorsal; 287, *T. longissimum* female, metasoma dorsal; 288, *T. longissimum* female, metasoma lateral. Scale bars = 100  $\mu$ m.



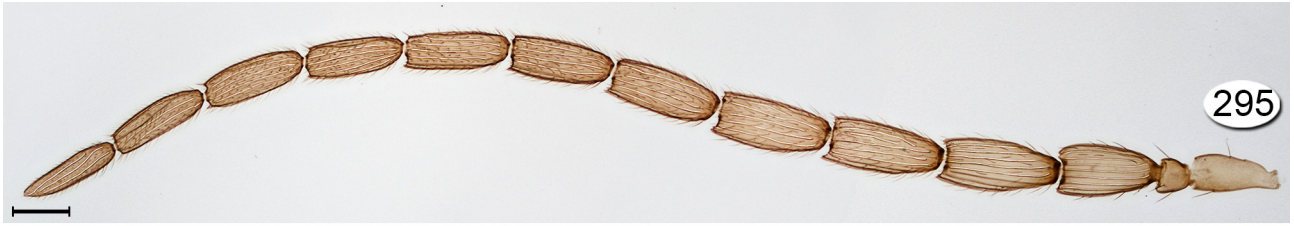
**Figure 289.** *Yoshimotoana masneri*, habitus: Dominican Republic, Puerto Plata, Marapicá, edge of gallery forest near Iberostar Costa Dorada resort, 4–8.iv.2005, A. Smetana & L. Robillard. Scale bar = 1000  $\mu$ m.



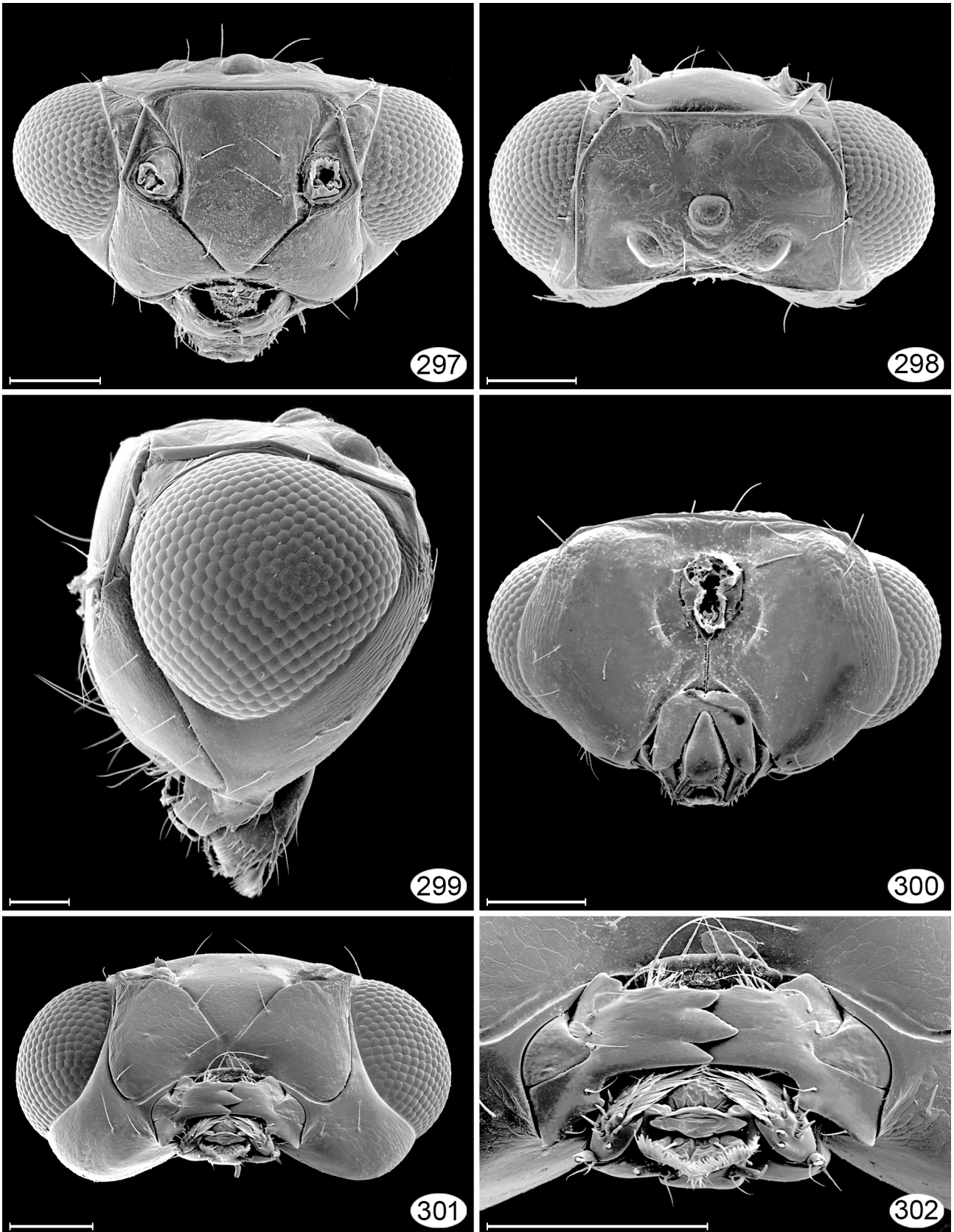
**FIGURES 290–292.** *Yoshimotoana masneri*: 290, head, anterior; 291, antenna; 292, wings. Scale bar = 100  $\mu$ m.



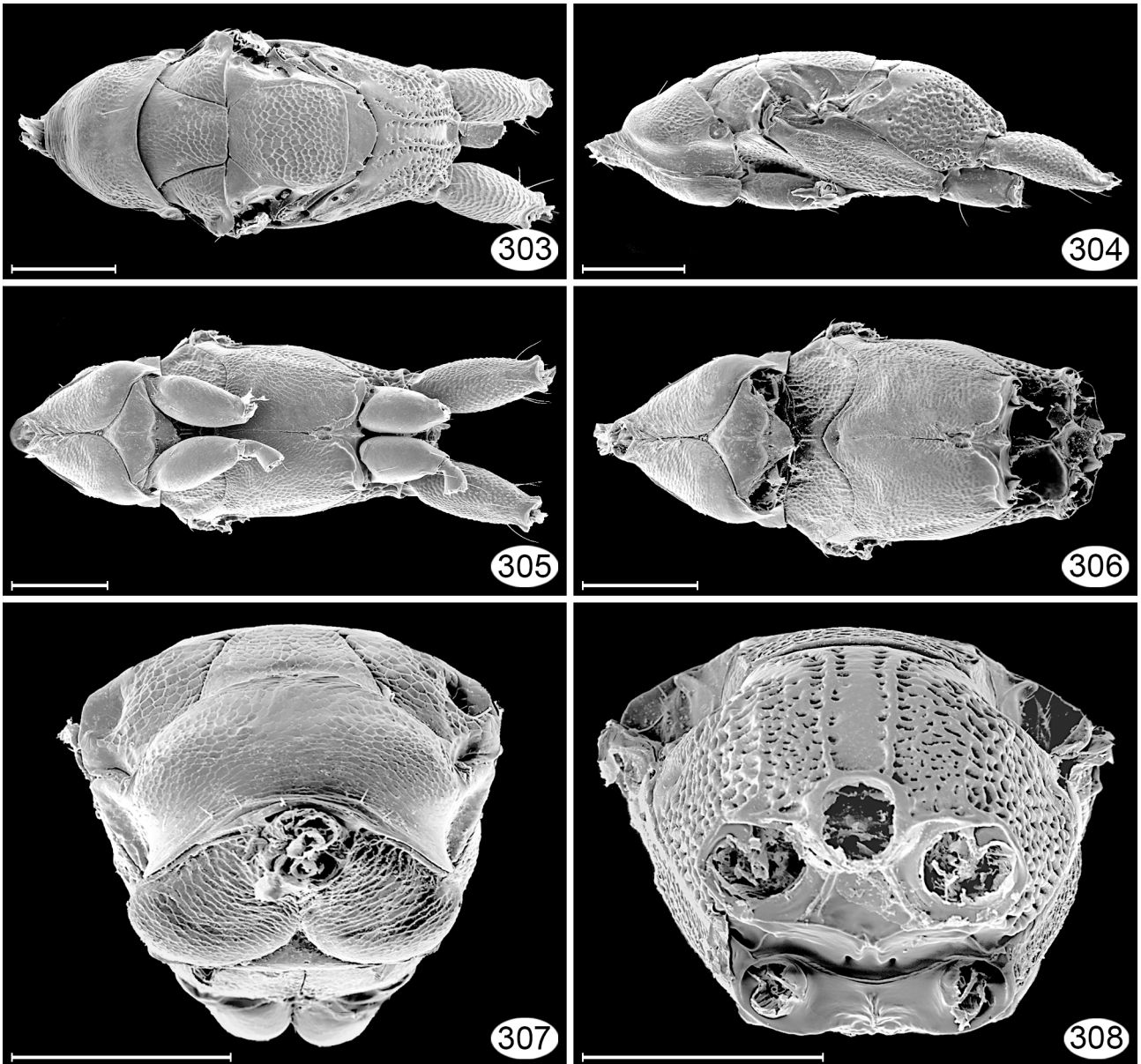
**FIGURES 293, 294.** *Yoshimotoana masneri*: 293, mesosoma, dorsal; 294, metasoma, ventral. Scale bars = 100  $\mu$ m.



**FIGURES 295, 296.** *Yoshimotoana masneri*, male: 295, antenna; 296, gaster, dorsal. Scale bars = 100  $\mu$ m.

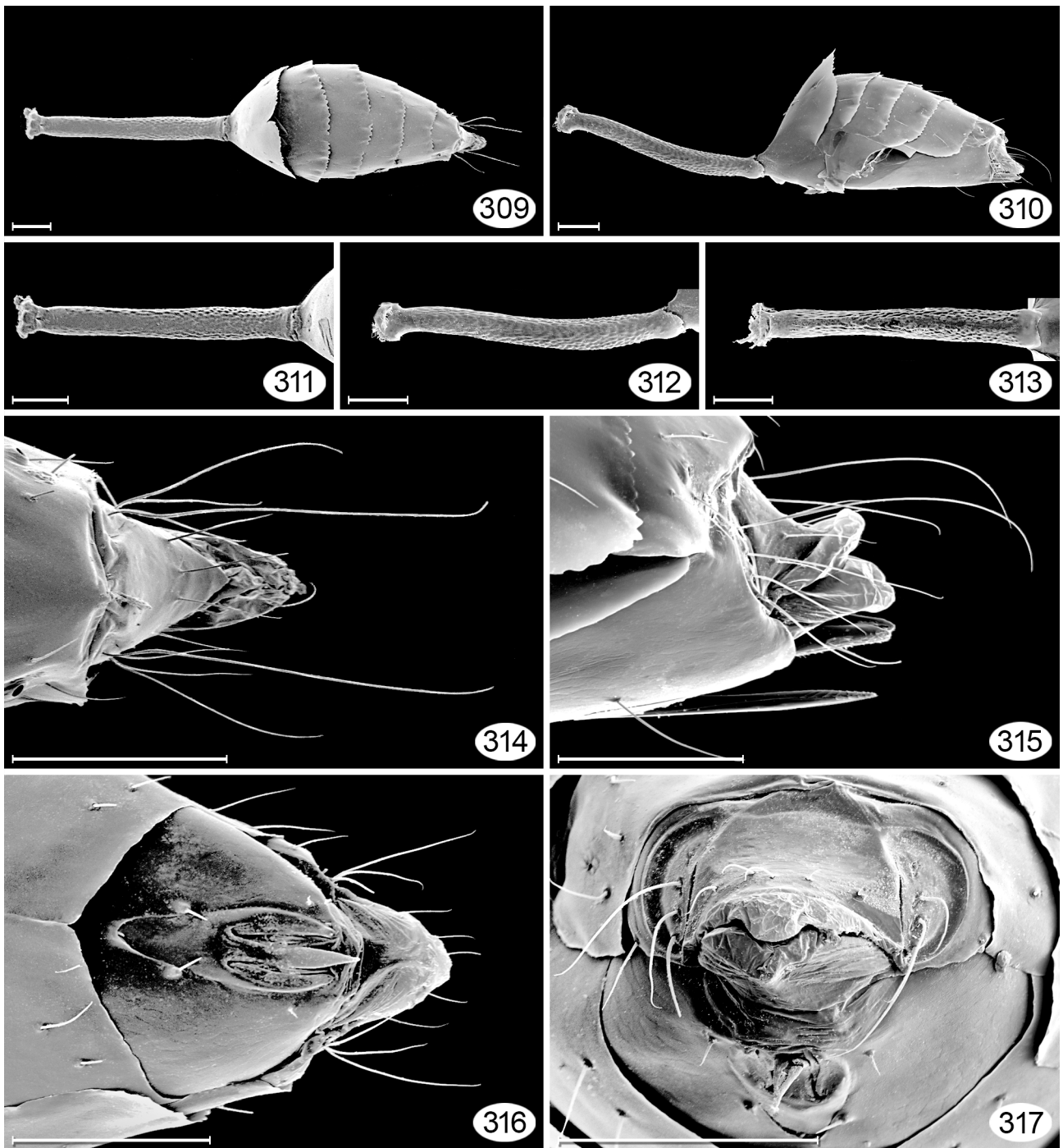


**FIGURES 297–302.** *Yoshimotoana masneri*, head: 297, anterior; 298, dorsal; 299, lateral; 300, posterior; 301, ventral; 302, mouthparts. Scale bars = 100  $\mu$ m.



**FIGURES 303–308.** *Yoshimotoana masneri*, mesosoma: 303, dorsal; 304, lateral; 305, ventral with coxae; 306, ventral without coxae; 307, anterior; 308, posterior. Scale bars = 200  $\mu$ m.

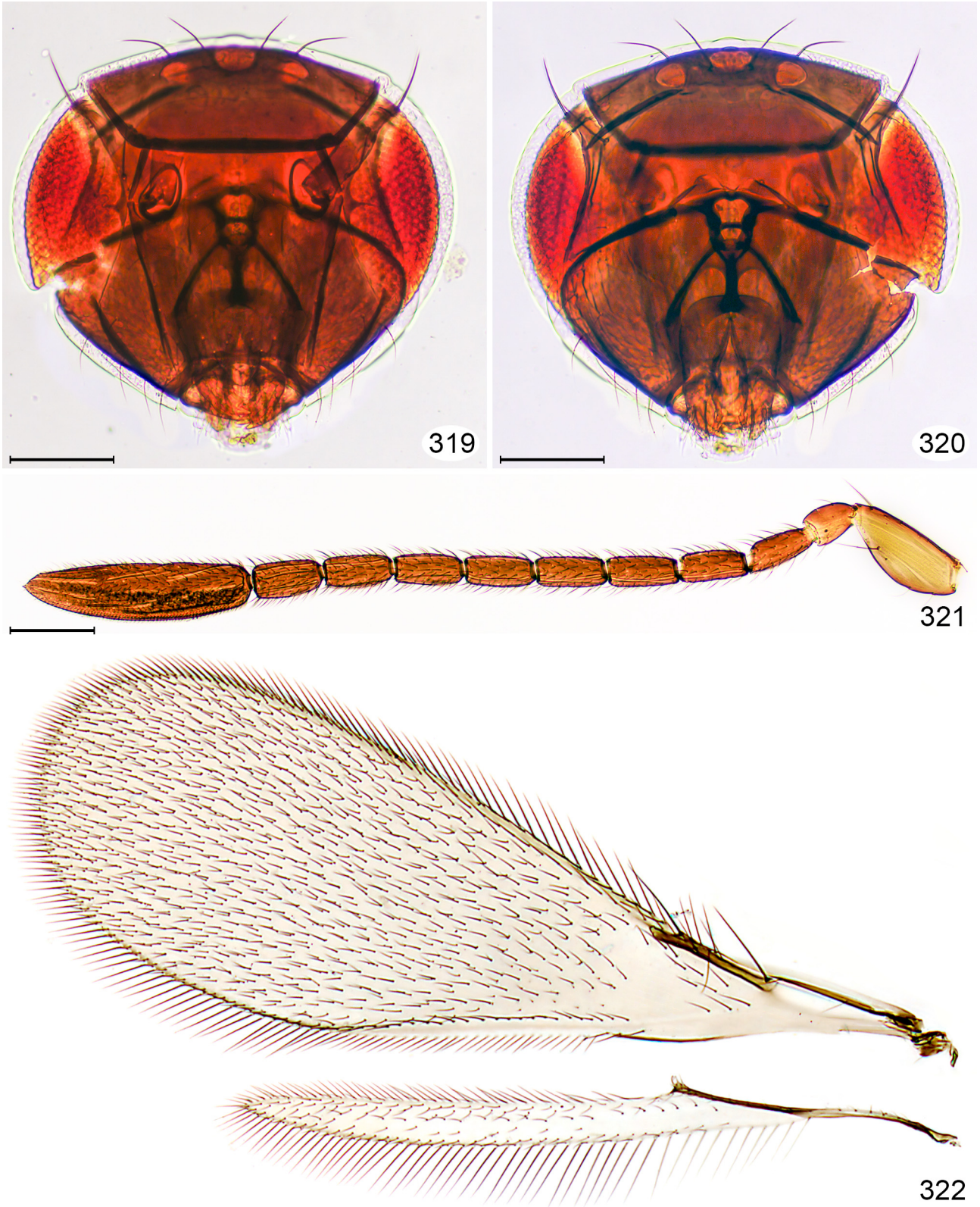




**FIGURES 309–317.** *Yoshimotoana masneri*, female (except as noted), metasoma: 309, dorsal; 310, lateral; 311, petiole, dorsal; 312, petiole, lateral; 313, petiole, ventral; 314, apex of gaster, dorsal; 315, apex of gaster, lateral; 316, male, apex of gaster showing genitalia, ventral; 317, apex of gaster, posterior. Scale bars = 100  $\mu$ m.



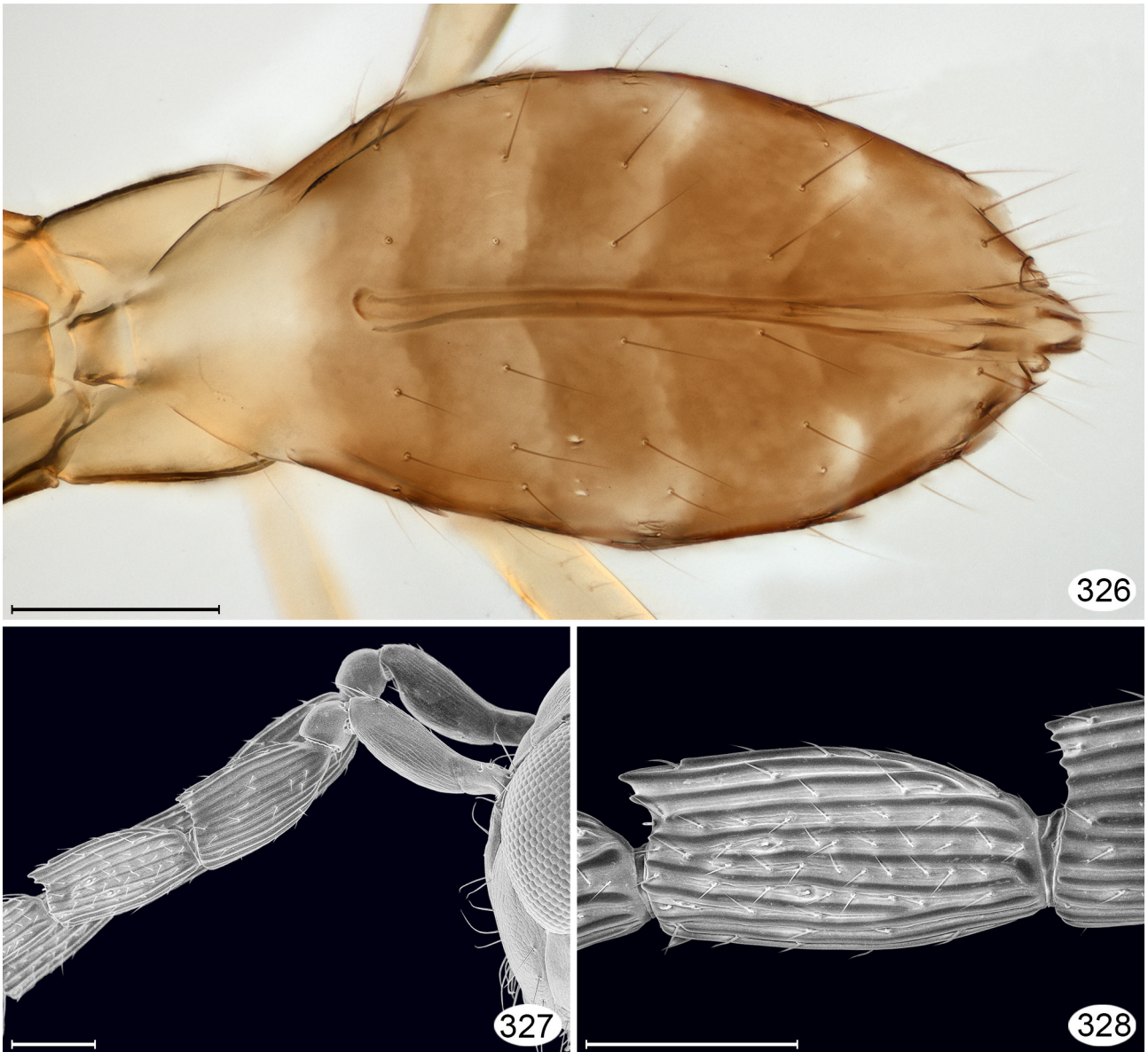
**FIGURE 318.** *Zeyanus* sp., habitus: Thailand, Prachuab Khiri Khan, Khao Sam Roi Yot National Park, education centre, bird watch tower 3, 12°15.299'N 99°56.03'E, 5–6.xii.2008. Scale bar = 1000  $\mu$ m.



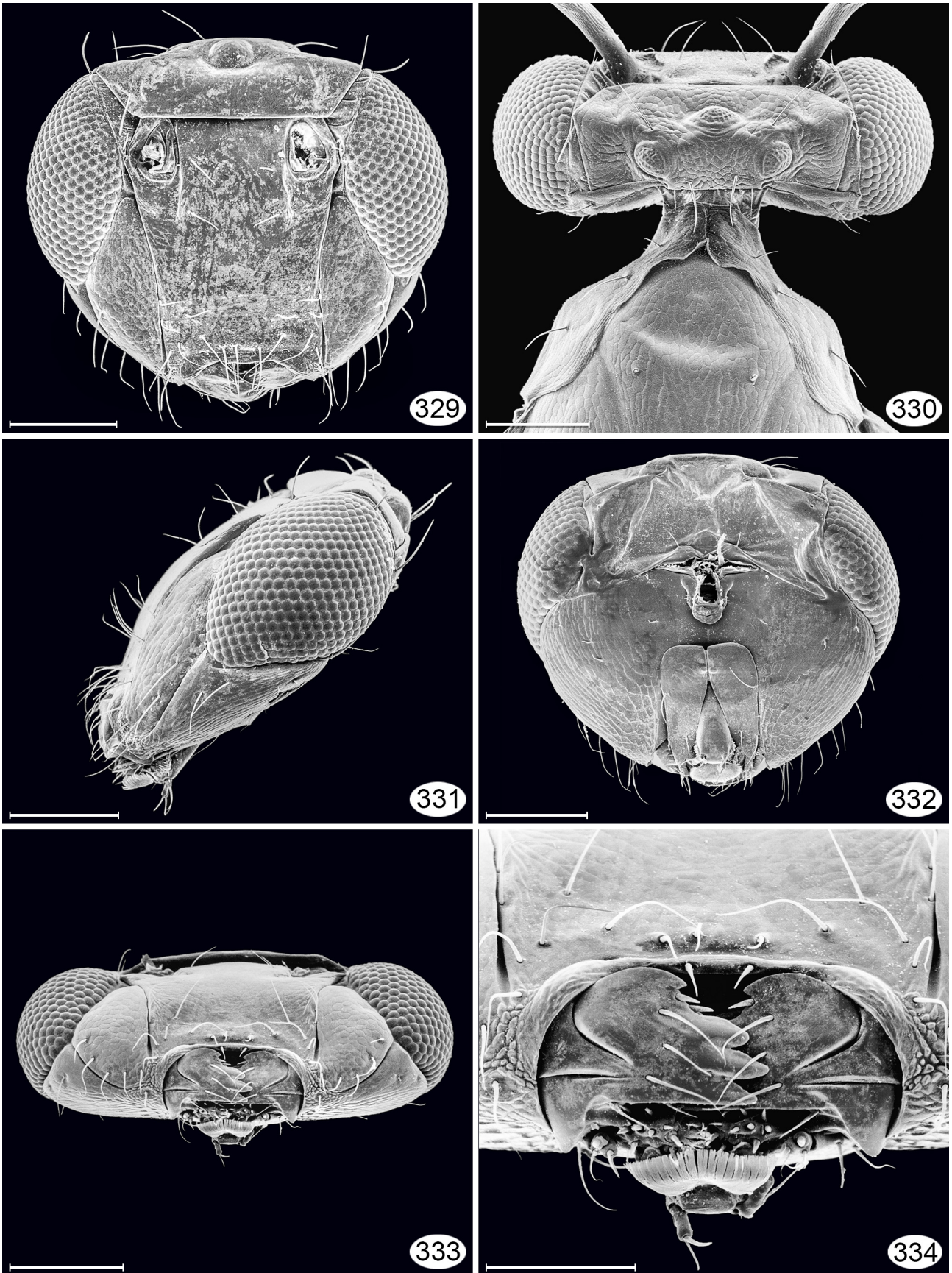
**FIGURES 319–322.** *Zeyanus devikulamus*, holotype: 319, head, anterior; 320, head posterior; 321, antenna; 322, wings. Scale bars = 100  $\mu$ m.



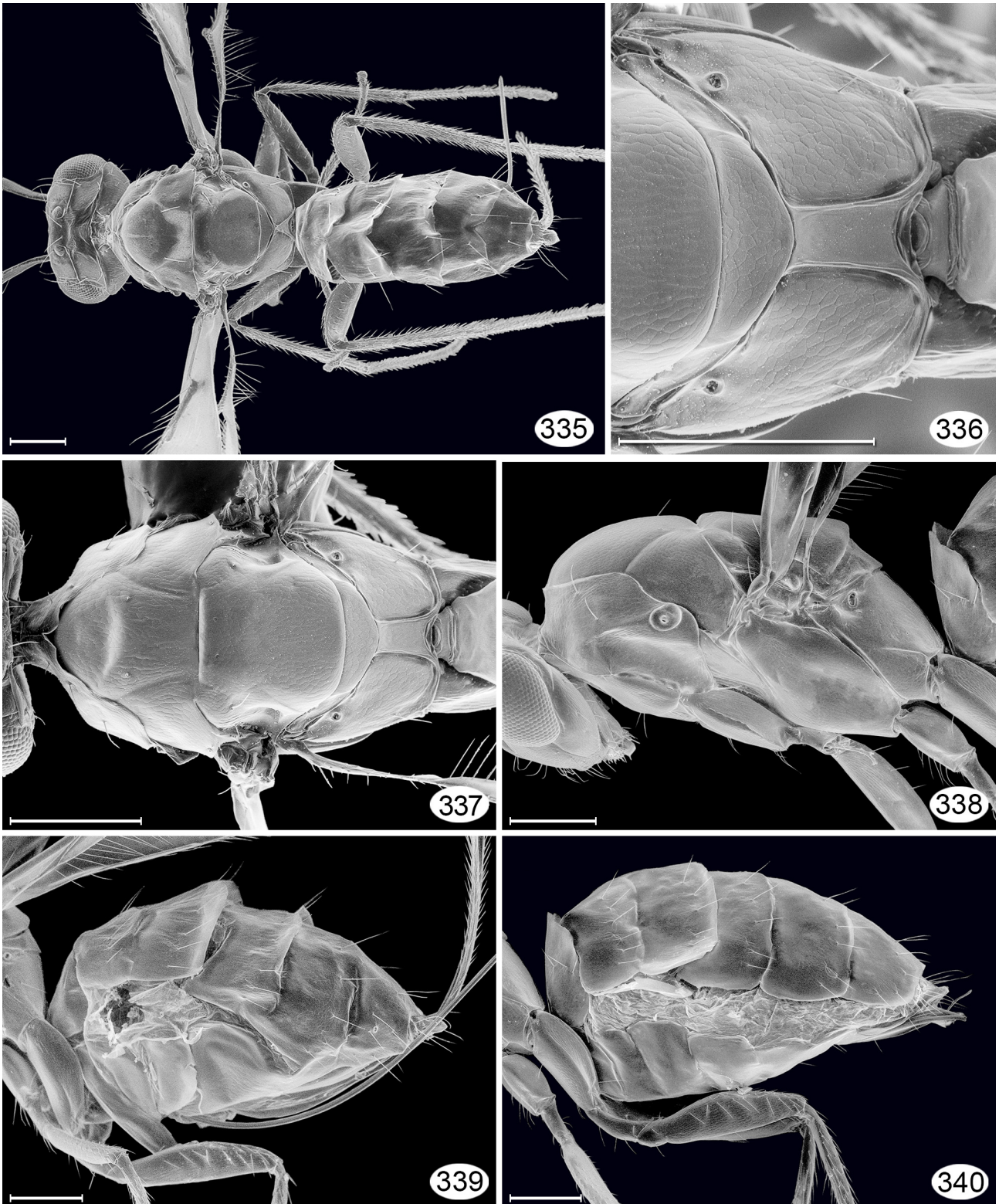
**FIGURES 323–325.** *Zeyanus* spp.: 323, *Z. devikulamus*, holotype gaster, lateral; 324, *Z. sp.*, male antenna; 325, *Z. sp.*, mesosoma, dorsal. Scale bars = 200  $\mu\text{m}$ .



**FIGURES 326–328.** *Zeyanus* sp., male: 326, metasoma, dorsal; 327, antenna, scape–base of fl<sub>3</sub>; 328, fl<sub>2</sub>. Scale bars = 100 μm.



**FIGURES 329–334.** *Zeyamus* sp., head: 329, anterior; 330, dorsal + anterior part of mesosoma; 331, lateral; 332, posterior; 333, ventral; 334, mouthparts. Scale bars: 329–333 = 100  $\mu$ m, 334 = 50  $\mu$ m.



**FIGURES 335–340.** *Zeyanus* sp., female (except as noted): 335, habitus, dorsal; 336, propodeum, dorsal; 337, mesosoma, dorsal; 338, mesosoma, lateral; 339, metasoma, lateral; 340, male metasoma, lateral. Scale bars = 200  $\mu$ m.

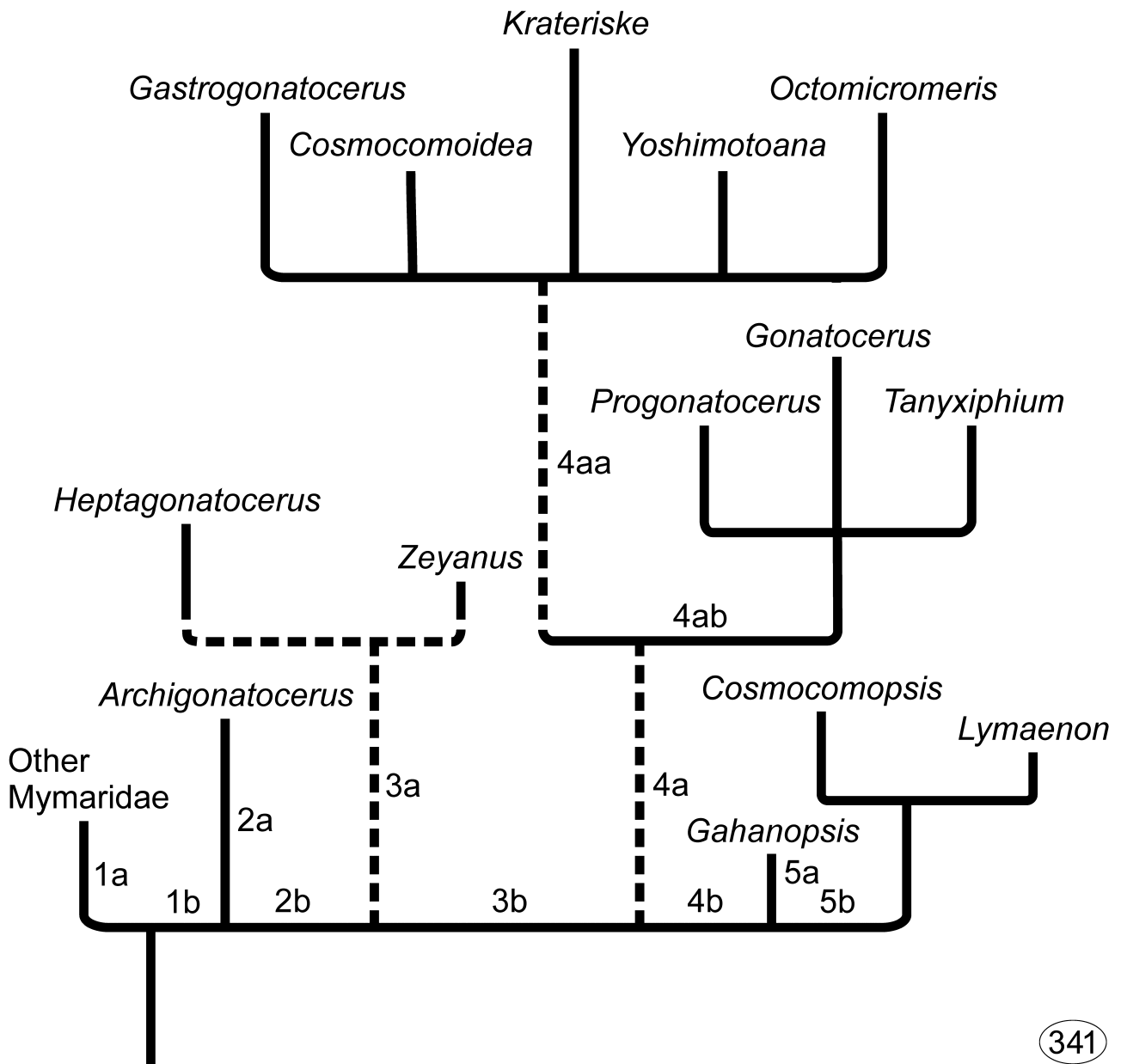


FIGURE 341. Hypothesized relationships among genera of Gnatocerini.