Key to the New World genera of Macrocentrinae (Hymenoptera: Ichneumonoidea: Braconidae) and synopses of the genera

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Abstract

This is an updated overview of the New World (Western Hemisphere) members of Macrocentrinae. It is a revision of the keys by Wharton (1997) and Sharkey et al. (2021a) and contains a synopsis of each genus. The synopses include the following sections: diagnosis, biology, diversity, distribution, publications, and notes. There are four genera reported from the New World.

Wharton, R.A. 1997. Subfamily Macrocentrinae, pp.310-313. In: Wharton, R.A., Marsh, P.M., and Sharkey, M.J. (eds). Manual of the New World Genera of the Family Braconidae (Hymenoptera). Special Publication of the International Society of Hymenopterists, 439 pp.

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Introduction

Macrocentrinae is a moderately diverse subfamily containing four genera in the New World. Most of the described species belong to the genus *Macrocentrus* Curtis. Ahlstrom (2005) revised the species of North America north of Mexico, updating Muesebeck (1932). The latest generic synopsis is by van Achterberg (1993). Shaw and Huddleston (1991) provide a useful summary of the literature, with special reference to biology. New World specimens of Braconidae can be identified to subfamily using the key by Sharkey et al. (2023). Readers using that key will be automatically directed here if they obtain an identification of Macrocentrinae. The present work includes a key to the four New World genera, and a synopsis of each genus. The synopses include the following sections: diagnosis, biology, diversity, distribution, publications, and notes. Images are by Sharkey. General morphological terminology can be found in Sharkey et al. (2023) and in the Hymenoptera Anatomy Ontology Portal (http://portal.hymao.org/projects/32/public/ontology/).

Overview of subfamily

Phylogeny

No phylogenetic analyses at the genus level have been conducted. In a molecular phylogenetic study, Sharanowski et al. (2011) recovered Macrocentrinae as sister to Xiphozelinae and these were found to be sister to the clade Amicrocentrinae + Charmontinae.

Biology

The Macrocentrinae include both solitary and gregarious koinobiont endoparasitoids of lepidopterous larvae (Clausen, 1940; Shaw and Huddleston, 1991). Where known, the gregarious species are polyembryonic. Detailed biological information is available for two species, *M. ancylivorus* Rohwer (Daniel, 1932; Finney et al., 1947) and *M. cingulum* Brischke (as referred to in recent literature van Achterberg, 1993; Farahani et al., 2012) or with authorship incorrectly attributed to Reinhard or as *M. grandii* Goidanich (Parker, 1931; Ding et al., 1989) or as *M. gifuensis* Ashmead (a misidentification) in some of the more important earlier publications. Although only a single individual of *M. ancylivorus* emerges from its host, initial development is polyembryonic (Daniel, 1932). Details of the development of other macrocentrines are largely unknown. It is possible, however, that those species that emerge as solitary parasitoids (at least in *Macrocentrus* and *Hymenochaonia* Dalla Torre) are initially polyembryonic in their development. New World macrocentrines have been reared from 10 families of Lepidoptera (Yu et al, 2016; Sharkey et al. 2021a).

Many of the macrocentrines are pale colored and crepuscular to nocturnal. The species of *Macrocentrus* and *Hymenochaonia* have long ovipositors, often laying their eggs in early instars of hosts concealed in leaf whorls, stems, tubers, or rolled leaves. *Austrozele* Roman and *Dolichozele* Viereck, on the other hand, have short ovipositors, and the available records indicate that they attack exposed caterpillars, e.g., Arctiidae and Noctuidae.

Common genera

Macrocentrus and *Hymenochaonia* are the major New World genera. There are about 190 described species of *Macrocentrus* worldwide, and about one-fourth of these occur in the New World. The remaining 46 species of described macrocentrines are divided amongst seven other genera worldwide. We estimate that there are several

hundred or more undescribed New World species.

Distribution

Cosmopolitan.

Distinguishing features

Macrocentrines can be recognized by the absence of an occipital carina and the presence of small teeth on the hind trochantellus (Fig. 1). With the exception of one known species, *M. incompletus* Muesebeck, all described species have three submarginal cells.

Note. In the generic treatments we give rough estimates of the number of undescribed species that may occur in the New World, e.g., "There are 26 BINs (proxies for species) from Costa Rica on the Barcode of Life Data System (BOLD, Nov. 25, 2024), and we estimate that there may be a hundred or more undescribed species in the New World." To arrive at these very conservative numbers we used estimates of the number of trees in Costa Rica compared to the remainder of the New World. Cazzolla Gatti et al. (2022) estimated there to be 40,123 species of trees in the New World. Nelson Zamora (personal communication), the leading Costa Rican botanist, estimates there to be 2,500 species of trees in Costa Rica, or ~6.2% New World fauna. Over the last ten years Dan Janzen, Winnie Hallwachs and their team have barcoded Malaise trap samples from all over Costa Rica, making it the best sampled country on the Barcode of Live Data System database, though it is far from complete. In the example above, if we were to assume that the 26 BINs represented 6.2% of the New World fauna we would arrive at an estimate of 419 species for the New World. However, we refrain from this detailed estimate and instead make the generalized and conservative estimate of "a hundred or more."

Table 1. List of New World genera and subgenera of Macrocentrinae.

Austrozele Roman, 1910
Dolichozele Viereck, 1911
Hymenochaonia Dalla Torre, 1898
Macrocentrus Curtis, 1833

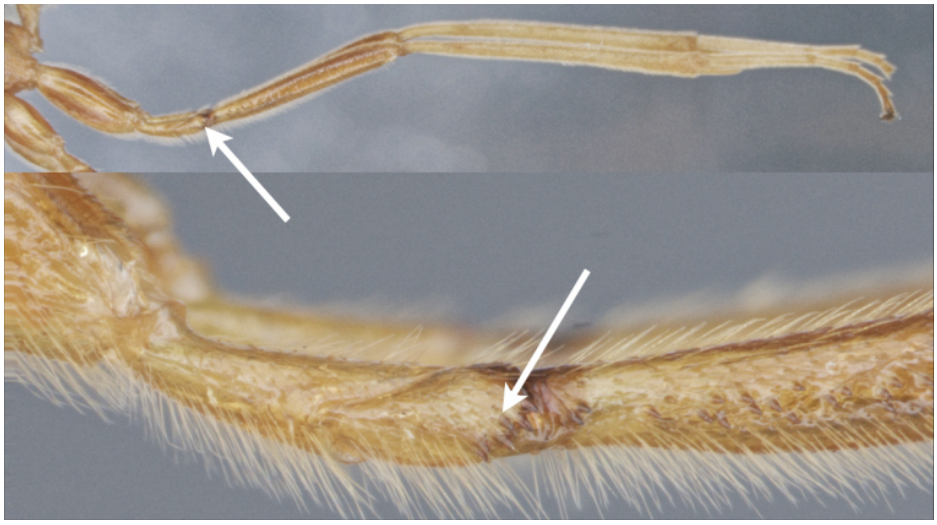


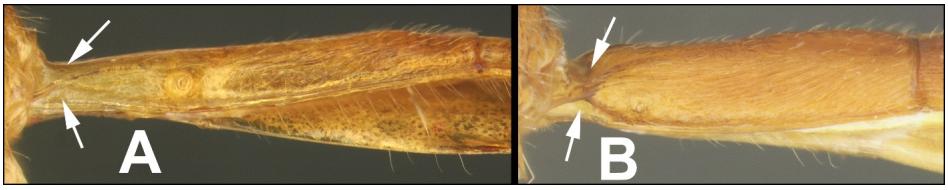
Figure 1. Macrocentrinae are distinguished from other Braconidae in part by the presence of small teeth on the hind trochantellus, indicated by an arrow.

Key to the New World genera of Macrocentrinae

Modified from Sharkey et al. (2021a). Clicking the hyperlinked text in the key below will take the reader to the corresponding couplet or genus synopsis.

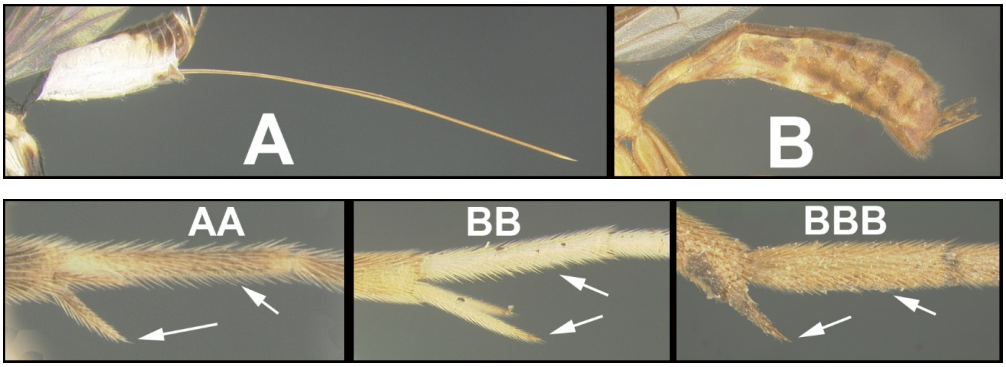
1. **A.** Petiole with laterope shallow or absent; petiole flat or convex basal-medially..... 2

   B. Petiole with laterope deep; petiole nearly always slightly depressed basal-medially 3



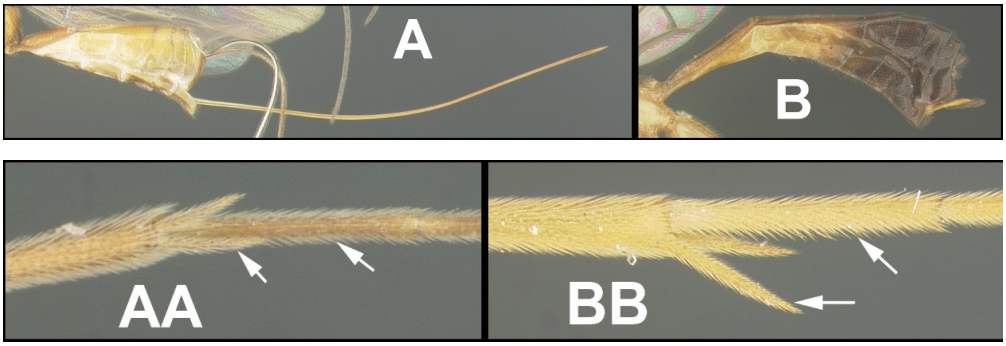
2(1). **A.** Ovipositor long, ovipositor sheath at least as long as metasoma. **AA.** Length of inner (longest) spur of hind tibia 0.4-0.6 times length of hind basitarsus. ..... ***Hymenochaonia***

B. Ovipositor short, ovipositor sheath about equal to apical height of metasoma. **BB.** Length of inner (longest) spur of hind tibia usually (80%) 0.6-0.8 times length of hind basitarsus, if shorter then, **BBB.** Apex of the spur lacking setae. ..... ***Dolichozele***



3(1). **A.** Ovipositor long, ovipositor sheath nearly always at least as long as metasoma. **AA.** Length of inner (longest) spur of hind tibia 0.3-0.5 times length of hind basitarsus. ..... ***Macrocentrus***

B. Ovipositor short, about equal to apical height of metasoma. **BB.** Length of inner (longest) spur of hind tibia 0.5-0.8 times length of hind basitarsus. ..... ***Austrozele***



Generic treatments

Austrozele Roman, 1910

Fig. 2

Diagnosis. Petiole with laterope deep (couplet 2B); ovipositor short, about equal to apical height of metasoma (Fig. 2A).

Biology. Solitary parasitoids of Noctuidae (van Achterberg, 1993) and Geometridae (Sharkey et al., 2021a).

Diversity. There are 22 described species worldwide, two in the Nearctic and four in the Neotropical regions. Presently (Nov. 25, 2024) there are six BINs (proxies for species) from Costa Rica and 12 BINs from Canada on the Barcode of Life Data System (BOLD). There may be close to 100 undescribed species in the New World.

Distribution. Cosmopolitan.

Publications. Ahlstrom (2005) revised the Nearctic species occurring north of Mexico. Sharkey et al. (2021a) described two new species from Costa Rica.

Dolichozele Viereck, 1911

Fig. 3

Diagnosis. Ovipositor much shorter than metasoma (Fig. 3A). Laterope weakly impressed or absent (couplet 1A).

Biology. Solitary parasitoids of Erebidae (Arctiidae in the literature) and Noctuidae (Sharkey et al., 2021a).

Diversity. Nine described species worldwide, with three in the Nearctic and three in the Neotropical regions. There may be several dozen more undescribed in the Neotropics.

Distribution. Nearctic, Neotropical, western Canada (British Columbia) south to Brazil.

Publications. Ahlstrom (2005) revised the Nearctic species occurring north of Mexico. Sharkey et al. (2021a) described two new species from Costa Rica.

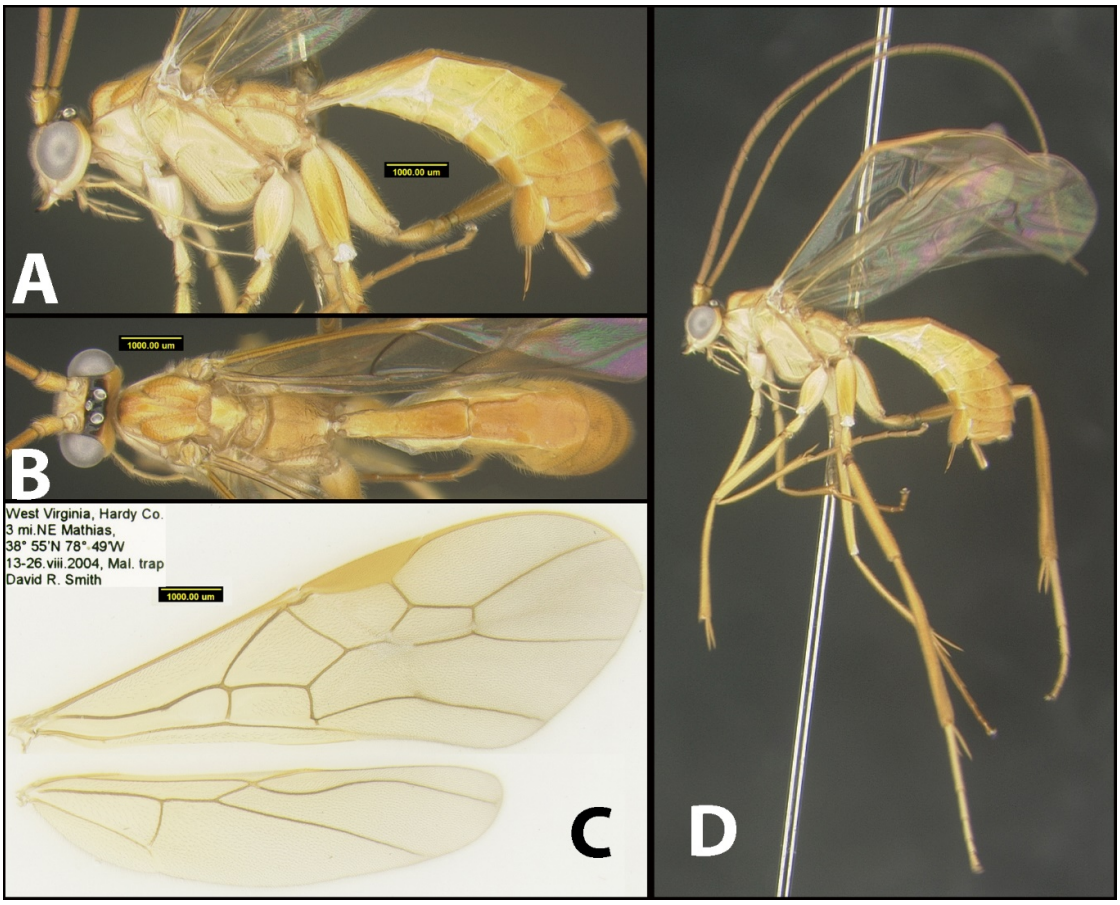


Figure 2. *Austrozele* sp.

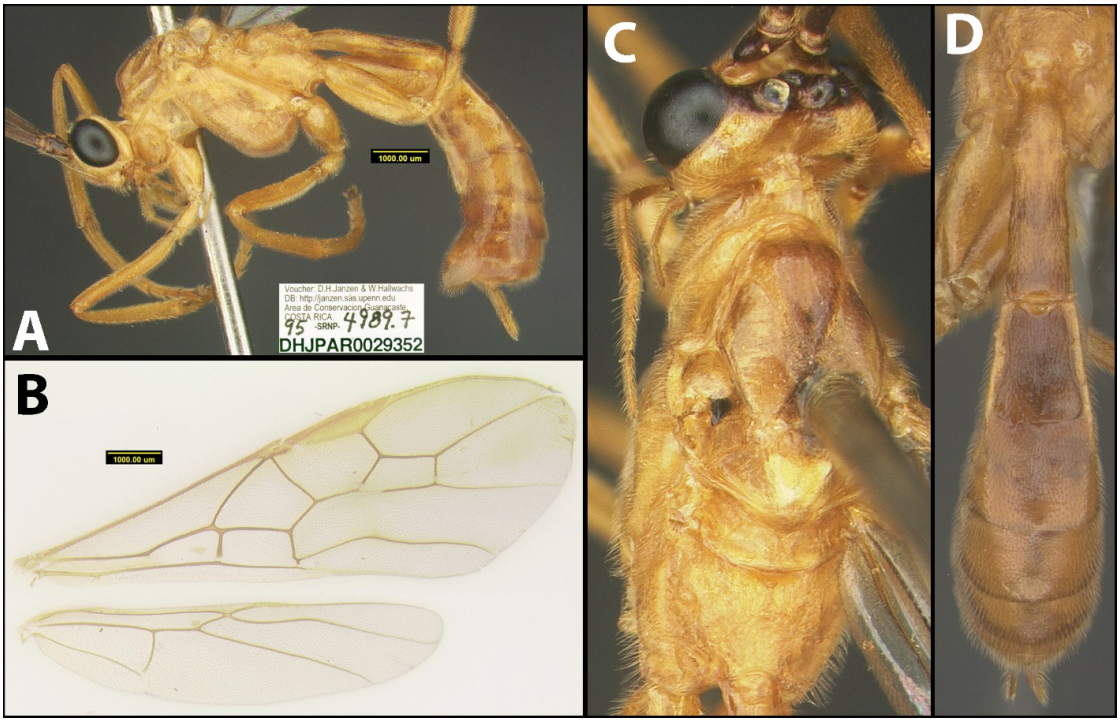


Figure 3. *Dolichozele* sp.

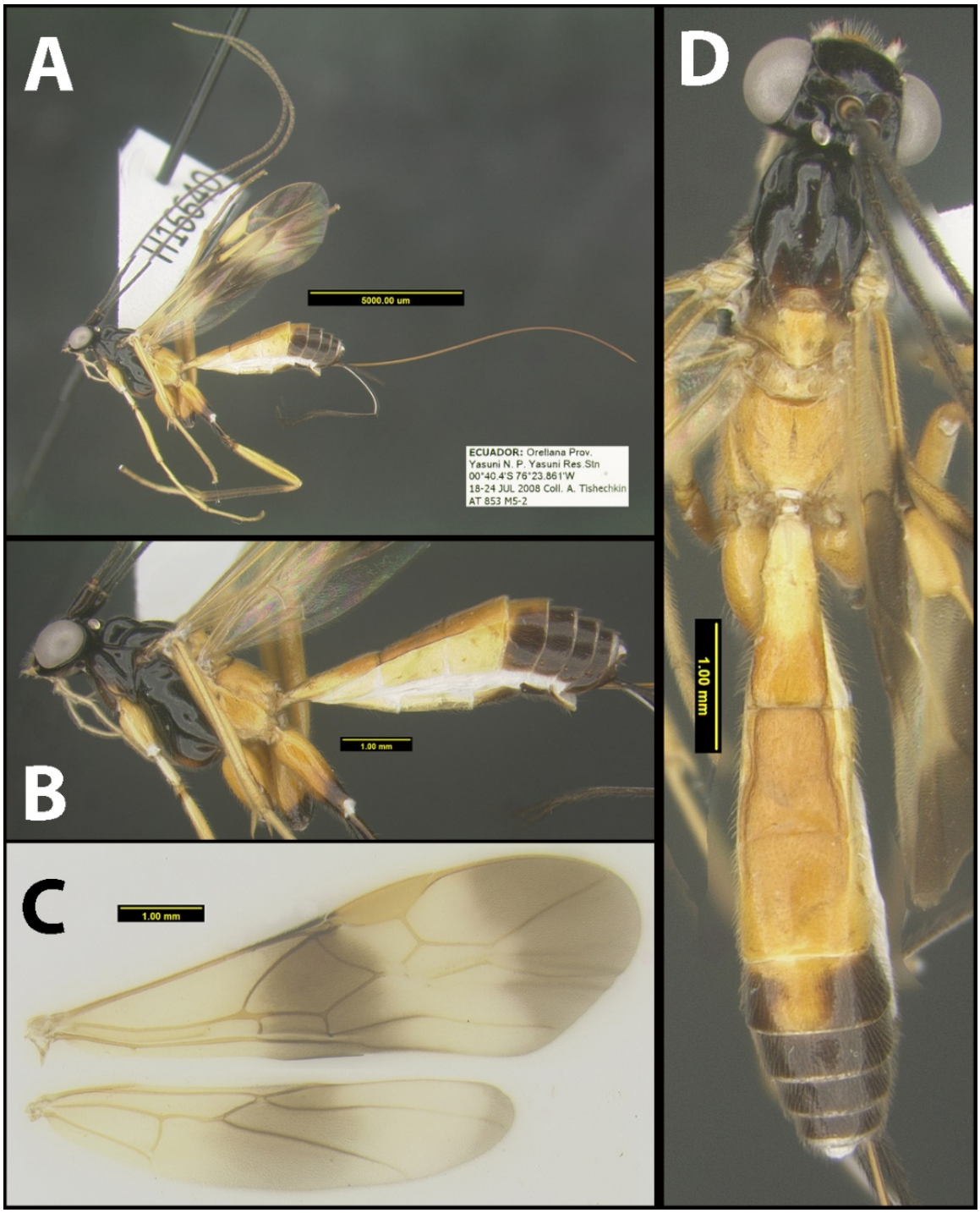


Figure 4. *Hymenochaonia* sp.

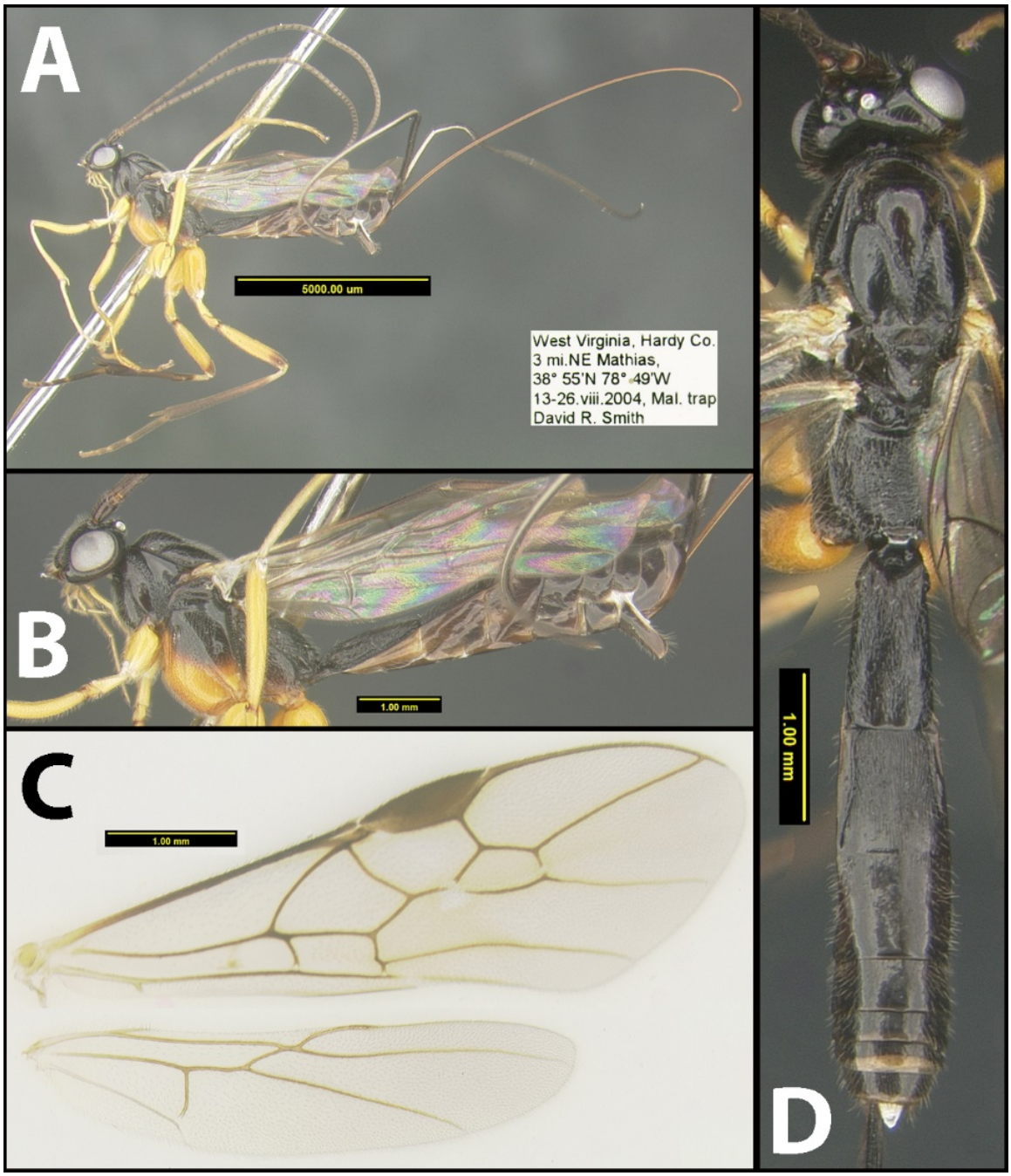


Figure 5. *Macrocentrus* sp.

Hymenochaonia Dalla Torre, 1898

Fig. 4

Diagnosis. Ovipositor as long as or longer than the metasoma, usually at least as long as the body (Fig. 4A). Laterope weakly impressed or absent (couplet 1A).

Biology. Reared primarily from Pyralidae and Tortricidae. Allen (1962) summarized the biology of *H. delicata* (Cresson) (as *Macrocentrus delicatus*). Sharkey et al. (2021a) described species reared from Erebidae (Arctiidae in the literature), Depressariidae, Pyralidae, Crambidae, and Gelechiidae.

Diversity. 23 described species worldwide. There are 26 BINs (proxies for species) from Costa Rica on the Barcode of Life Data System (BOLD, Nov. 25, 2024), and we estimate that there may be a hundred or more undescribed species in the New World.

Distribution. Holarctic, Neotropical (southern Canada to Argentina). Introduced into Europe for biological control of the Oriental fruit moth, *Grapholita molesta* (Busck), but not recovered.

Publications. Ahlstrom (2005) revised the Nearctic species occurring north of Mexico. Sharkey et al. (2021a) described 13 new species from Costa Rica.

Macrocentrus Curtis, 1833

Fig. 5

Diagnosis. Ovipositor as long as or longer than the metasoma, usually at least as long as the body (Fig. 5A). Laterope deeply impressed (couplet 1B). Most of the small specimens (less than 5 mm.) belong to this genus.

Biology. Most of the detailed work has been on polyembryonic species (overview in Shaw and Huddleston, 1991). Tortricidae and Pyralidae are the most frequently recorded hosts, however Sharkey et al. (2021a, b) recorded 16 species with Crambidae as hosts and also two with Depressariidae as hosts.

Diversity. About 210 species described worldwide, with 46 in the Nearctic and 29 in the Neotropical regions. There are 25 BINs (proxies for species) from Costa Rica and 35 BINs from Canada on the Barcode of Life Data System (BOLD, Nov. 25, 2024), and we estimate that there are several hundred undescribed species in the New World.

Distribution. Cosmopolitan.

Publications. Ahlstrom (2005) revised the Nearctic species occurring north of Mexico. Sharkey et al. (2021a, b) described 21 new species from Costa Rica.

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