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A new species of *Torymus* (Hymenoptera: Torymidae) associated with two genera of Bruchinae (Coleoptera: Chrysomelidae) in México

A. Lucía Pérez-Benavides^{1,5}, Fernando Hernández-Baz^{2,*}, Jorge M. González³, and Alejandro Zaldivar Riverón⁴

Abstract

A new parasitoid wasp species, *Torymus moazopi* **sp. nov.** (Hymenoptera: Chalcidoidea: Torymidae), is described from Mexico. This new species was reared from seeds of *Phaseolus vulgaris* L. and *Phaseolus lunatus* L. (both Fabaceae) associated with some Bruchinae (Coleoptera: Chrysomelidae). *Torymus moazopi* **sp. nov.** is morphologically similar to *Torymus atheatus* Grissell (Hymenoptera: Torymidae), but it can be distinguished by its ovipositor length, thorax coloration, and the distinctively wide fore and hind femora in males.

Key Words: taxonomy; biology; new species; parasitoid; Mexico

Resumen

Una nueva especie de avispa parasitoide, *Torymus moazopi* **sp. nov.** (Hymenoptera: Chalcidoidea: Torymidae), se describe para México. Esta nueva especie fue criada a partir de semillas de *Phaseolus vulgaris* L. y *Phaseolus lunatus* L. (ambas Fabaceae) es similar morfológicamente a *Torymus atheatus* Grissell (Hymenoptera: Torymidae), pero se puede distinguir de esta por longitud del ovipositor, coloración del tórax y los fémures anterior y posterior son conspicuamente anchos en los machos.

Palabras Clave: taxonomía; biología; nueva especie; parasitoide; México

The genus *Torymus* Dalman (Hymenoptera: Torymidae) currently contains 393 described species that are distributed worldwide (Noyes 2018), of which 18 have been recorded for Mexico (Cameron 1904; Gahan 1936; Breland 1939; Grissell 1976, 1979; De Santis 1979). The vast majority of *Torymus* species are known to be ectoparasitoids of dipterans or gall former hymenopterans (Moser 1956; Grissell 1976), though few species are seed predators, inquilines, or gall inducers (Grissell 1995; La Salle 2005; Matsuo & Yakawa 2009). Other records of *Torymus* include species that have been reared from eggs of Cicadidae and larvae of Coleoptera, Lepidoptera, and Coccidae (Nikolskaya 1952; Herting 1973; Pérez & Bonet 1985; De Santis 1989; Kazmi & Chauhan 2003).

Even though many species in the genus *Torymus* are Holarctic, the biology, ecology, and especially their phylogeny is far from being fully resolved, because this is one of the largest and most complex genera of its family (Grissell 1995; de Vere & Gijswijt 1998). Huber (1927) divided *Torymus* into 2 groups based on a slightly petiolate versus a sessile stigmal vein. About 50 years later, Gris-

sell (1976) provided additional characters and divided the genus into 5 species groups: *bedeguaris*, *fullawayi*, *advenus*, *varians*, and *tubicula*, based on the presence or absence of frenum on the scutellum, scutum sculpture, hind femur denticulation, and stigmal vein petiolate or sessile.

We recently reared various specimens assigned to *Torymus* from different localities in Mexico (Fig. 1). Based on examination of the morphological features of these specimens and on the available literature, we found that some of them actually represent an undescribed species. Here we describe this new species and provide information about its host records.

Material and Methods

Parasitoid specimens associated to Bruchinae were reared from seeds of *Phaseolus vulgaris* L. and *Phaseolus lunatus* L. All parasitoids that emerged were collected, sacrificed, and mounted on a card-point.

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Fig. 1. Regional distribution of *Torymus moazopi* n. sp. in Mexico.

Torymids were identified following Grissell (1976, 1995). Digital photographs of the diagnostic features present in the new species were taken with a Zeiss® microscope and a digital AxioCam MRc5 camera (Carl Zeiss Microscopy GmbH, Jena, Germany). Table 1 shows the number of examined specimens assigned to the new species together with their localities. Type material is deposited in the Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, México.

Results

Torymus moazopi Pérez-Benavides, sp. nov. (Figs. 2 & 3).

Length 2.3 mm, ovipositor 2.7 mm; thorax color mainly dark metallic blue with coppery luster; frenal groove indicated laterally, hind femur with a distinct denticle; males with distinctively wide fore and hind femora.

FEMALE (Fig. 2): Body metallic blue with a coppery luster in dorsal view (Fig. 2a, d); antennae brown, pedicel dark with metallic blue luster, scape yellow (Fig. 2b, c). Legs metallic blue except yellow femur tips; fore, mid, and hind tibiae yellow, sometimes hind tibia dark brown medially; tarsi pale yellow, except fifth tarsal segments brown (Fig. 2a, f). Tegulae testaceous. Wings hyaline, venation testaceous (Fig. 2g). Length of body + ovipositor: 2.3 + 2.7 mm.

Head in frontal view 1.2× as wide as high, with engraved reticulation (Fig. 2b); eyes separated almost by their own length; distance between eyes 2× frontal width of the eye; temple 0.35× length of the eye; ocellar diameter 0.9× ocular ocellar line. Posterior ocellar line 3.2× ocular ocellar line. Distance between lateral ocellus and occipital carina 1.1× ocular ocellar line. Vertex in dorsal view almost 1.1× as wide

as mesoscutum; mouth, 1.7× malar space. Frons shallowly reticulate to reticulate-imbricate (Fig. 2b); vertex, alutaceous to alutaceous-imbricate; scrobal depression extensively coriaceous to reticulate; lower face with conspicuous white lanceolate setae (Fig. 2b); antenna with toruli distinctly above lower eye line; scape reaching above anterior ocellus; pedicellus plus flagellum about 1.3× breadth of head, flagellum proximally stouter than pedicellus, almost filiform; pedicellus 1.4× as long as broad; anellus 2.5× as broad as long; FI–2 1.1× longer than wide; F3–F7 wider than long; clava 1.5× as long as broad; sensilla dense, in 2 rows (Fig. 2c).

Mesosoma slightly bulged in profile, propodeum declined (Fig. 2a), distinctly visible from above; thoracic dorsum entirely evenly reticulate, midlobe of scutum equal to length of sidelobe; frenal groove not delimited, distinguished by a difference in sculpture; frenal groove absent medially, indicated slightly laterally; lanceolate setae on anterior scutellum, notauli distinct as fine grooves (Fig. 2d). Mesepimeron broad and almost 2× higher than broad; propodeum sloping sharply and overhung by scutellum, with very weakly alutaceous-reticulate sculpture (Fig. 2e); forewing upper surface of costal and admarginal cell bare, speculum open broad, basal vein without setae, triradiating setal rows distinct (Fig. 2g); hind leg with hind coxae stouter, dorsal surface bare in basal half, often with a longitudinal curved carina; hind femur is 3.5× as long as broad and with a distinct denticle beneath (Fig. 2f); hind tibia with 2 apical spurs, the longer spur slightly longer than breadth of tibia and 0.43× as long as first segment of tarsus (Fig. 2f); the shorter spur 0.74× length of second spur.

Metasoma dorsally flattened, terga I and II incised, tergum III with a small incision and tergum IV slightly incised about 1/4 or less visible length of tergum (Fig. 2h); ovipositor 2.3× length of the abdomen (Fig. 2a).

MALE (Fig. 3): Similar to female (Fig. 2a) except antenna with flagellum proximally distinctly stouter than pedicellus (Fig. 3b); pedicellus

Table 1. Sampling sites and biological information associated with *Torymus moazopi* n. sp. (Hymenoptera: Torymidae).

State	Altitude (m)	Latitude (N)	Longitude (W)	Parasitoids associated	Plant hosts	Associated Bruchinae
Oaxaca	17	15.92213889	97.15219444	<i>Eupelmus pulchripes</i> Cameron, 1904 <i>Chryseida bennetti</i> Burks, 1956	<i>Phaseolus lunatus</i> L.	<i>Acanthoscelides obtectus</i> (Say), <i>Acanthoscelides obvelatus</i> Bridwell & Zabrotes spp.
State of Mexico	1,888	18.86066667	99.77794444	<i>Horismenus depressus</i> Gahan, 1930 <i>Eupelmus annulatus</i> Nees, 1834 <i>Eupelmus pulchripes</i> Cameron, 1904 <i>Brasema neococcidis</i> (Peck, 1951) <i>Chryseida bennetti</i> Burks, 1956	<i>Phaseolus vulgaris</i> L.	
State of Mexico	1,817 2,121 1,969	19.05758333 19.02711111 19.03472222	100.0517222 99.99125 100.0421389			
Guerrero	59	16.77461111	99.62219444	<i>Horismenus depressus</i> Gahan, 1930 <i>Eupelmus pulchripes</i> Cameron, 1904 <i>Chryseida bennetti</i> Burks, 1956		
Morelos	1,834	18.95794444	99.50491667	<i>Eurydinoteloidea incerta</i> Ashmead, 1893 <i>Eurydinoteloidea</i> sp. 1		

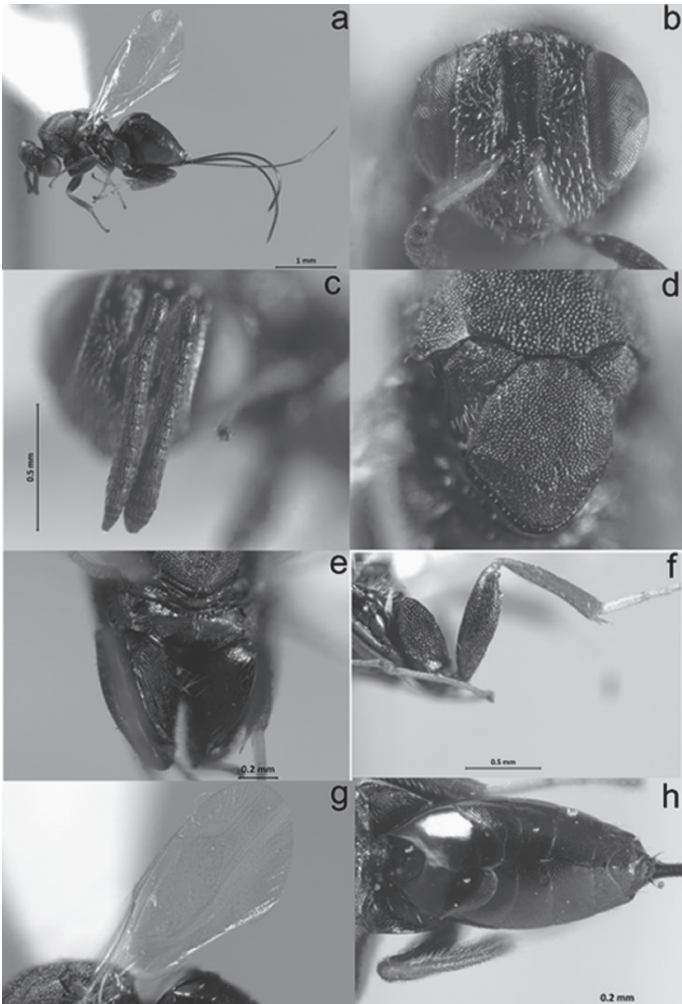


Fig. 2. *Torymus moazopi* sp. nov. (Holotype) (Female): (a) lateral habitus; (b) head, frontal view; (c) antenna, frontal view; (d) scutellum, dorsal view; (e) propodeum, dorsal view (Paratype); (f) leg, hindleg (Paratype); (g) fore wing, lateral view; (h) abdomen, dorsal view (Paratype).

1.12× as long as broad; anellus 2× as broad as long; sensilla dense, in 1 row; fore and hind femur distinctly enlarged.

ETYMOLOGY: The name *moazopi* is a combination of the first letter of each of the localities where the specimens were collected.

REMARKS: *Torymus moazopi* can be placed in the *tubicula* group by the following features: sessile (sometimes subsessile) stigmal vein, wing relatively sparsely setose, hind coxa dorsally glabrous, and frenal groove distinct at least laterally. Within the *tubicula* group, *T. moazopi* is morphologically closer to *T. atheatus* Grissell; however, *T. moazopi*

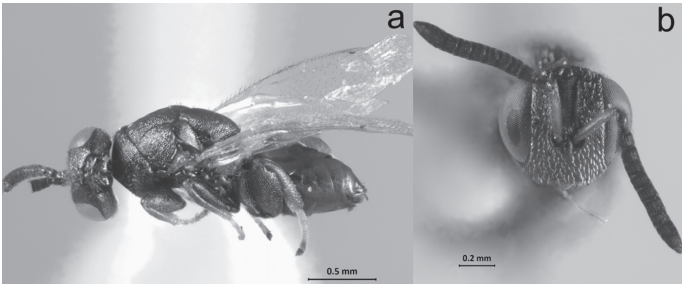


Fig. 3. *Torymus moazopi* sp. nov. (Allotype) (Male): (a) lateral habitus; (b) head, frontal view.

can be distinguished from the latter species by the long ovipositor which is 2.7 mm (1.1 mm in *T. atheatus*), and thorax color which is mainly dark metallic blue with coppery hues (dark metallic green in *T. atheatus*). Also, males of the new species can be distinguished from those of *T. atheatus* by their distinctively wide fore and hind femora.

TYPE MATERIAL

HOLOTYPE – Female, México, Guerrero, México 200, Cuquita Massieu, Tres Palos, Gro., México, 16.774615°N, 99.622191°W; 59 masl, 7 Feb 2015, D. Schneider CNIN 3865, ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L. **ALLOTYPE** – Male, México, Estado de México Toluca, Cd Altamirano 29, Temascaltepec de González, 19.034728°N, 100.042148°W; 1,969 masl, 1 Mar 2014, D. Schneider CNIN 3785 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L. **PARATYPES** – 3 males, México, Morelos, Rio el Zopilote, Santa Mónica, 18.952918°N, 99.504810°W; 1,834 masl, 9 Mar 2014, D. Schneider, CNIN 3806, 3807, 3808 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 3 females, México, Estado de México, Carretera Mex 7, 18.860715°N, 99.777943°W; 1,888 masl, 17 Jan 2014, D. Schneider CNIN 3859, 3860, 3861 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 2 females, México, Estado de México, San Simón de Guerrero, 19.027113°N, 99.991257°W; 2,121 masl, 11 Jan 2015, D. Schneider CNIN 3809, 3810 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 1 female, 1 male, México, Oaxaca, Aguaje del Zapote, San Pedro Mixtepec, 15.922161°N; 97.152206°W; 17 masl, 12 Dec 2016, D. Schneider CNIN 3857, 3858 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 2 males, México, Estado de México Toluca, Cd Altamirano 29, Temascaltepec de González, 19.034728°N, 100.042148°W; 1,969 masl, 1 Mar 2014, D. Schneider CNIN 3794, 3784 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 2 females, México, Estado de México, El Fresno, Temascaltepec de González, 19.057581°N, 100.051709°W; 1,817 masl, 1 Mar 2014, D. Schneider CNIN 3891, 3892 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.; 2 females, 1 male, México, Guerrero, México 200, Cuquita Massieu, Tres Palos, Gro., México, 16.774615°N, 99.622191°W; 59 masl, 7 Feb 2015, D. Schneider CNIN 3866, 3867 ex *Acanthoscelides obtectus* (Say), *Acanthoscelides obvelatus* Bridwell, *Zabrotes* spp. on *Phaseolus vulgaris* L.

BIOLOGY – Among the specimens of *T. moazopi* n. sp., other parasitoids belonging to different taxa emerged. We assume that they also are primary parasitoids of Bruchinae because no other host species emerged from the seeds. All taxa collected from *Phaseolus* at different sampling sites are presented in Table 1.

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