First record in Mexico of Ceromasia auricaudata Townsend (Diptera: Tachinidae) parasitizing Neodiprion omosus Smith (Hymenoptera: Diprionidae)

Álvaro Cañedano-Vildózola¹ *, Jesús R. Sánchez-Pale¹, Omar Franco-Mora¹, and Dulce A. Hernández-Zetina²

The family Diprionidae (Insecta: Hymenoptera), commonly known as sawflies, includes at least 90 described species and is a group of conifer-defoliating insects in the Northern Hemisphere (Smith 1988; Taeger et al. 2010; Smith et al. 2012). Many reports have indicated the presence of sawflies of the genus Neodiprion Rohwer, Zadiprion Rohwer, and Monocerus Dahlbom (Hymenoptera: Diprionidae) in Mexican conifer forests (Smith 1988; Smith et al. 2010, 2012). Defoliation attributed to sawflies leads to reduced growth in terms of diam, height, and root size in affected trees; if attack is severe and prolonged, it can result in tree death, especially among young trees in the sprouting phase (González-Gaona & Sánchez-Martínez 2018). The larvae of *N. omosus* are gregarious, feeding on young needles and the bark of young twigs. As they near pupation, *N. omosus* larvae leave the trees to overwinter underground as pupae. Adults emerge in summer (Cibrián-Tovar et al. 1995; Coria-Avalos et al. 2014). The larvae of *N. omosus* lead to reduced growth in terms of diam, height, and root size in affected trees; if attack is severe and prolonged, it can result in tree death, especially among young trees in the sprouting phase (González-Gaona & Sánchez-Martínez 2018). The larvae were placed in 32.5 × 18.0 × 11.5 cm plastic containers (Rubbermaid®, Atlanta, Georgia, USA) and fed with pine needles from *P. gregii* that were replaced every 5 d. A total of 1,294 puparia were obtained and transferred to a new container with previously disinfected soil with hot water (70 °C for 15 min) as a puation substrate. The soil was moistened with distilled water once per wk to avoid desiccation and premature death of the pupae. The pupation containers were covered with cheesecloth so that parasitoids and sawfly adults could not escape, and were kept in uncontrolled laboratory conditions. Of the 1,294 puparia, 1,047 adult sawflies and 11 Tachinidae specimens emerged, with a single fly emerging from each puparia. It was identified as *C. auricaudata* by D. H. Zetina. The specimens were deposited in the Colección de Insectos del Colegio de Postgraduados, Texcoco, Estado de Mexico, Mexico.

The genus Ceromasia Rondani (Diptera: Tachinidae) is composed of 3 species: *C. auricaudata*, *Ceromasia hybrea* (Walker), and *Ceromasia rubrifrons* (Macquart) (Diptera: Tachinidae), which are recorded from North America, Europe, and Asia (O’Hara et al. 2019). The current distribution of *C. auricaudata* includes Canada and the US (O’Hara et al. 2019). Our findings contribute to knowledge of range expansion of this species toward central Mexico. *Ceromasia auricaudata* is a solitary koinobiont endoparasitoid associated with larvae of the genus *Charistoneura* Lederer (Lepidoptera: Tortricidae) (O’Hara 2005). The literature does not report parasitism of sawflies by members of the genus *Ceromasia*; as such, our findings are also a new host-parasitoid interaction for Mexico, increasing the number of genera of Tachinidae associated with sawflies previously cited by Richter & Kasparyan (2013). Other cases of parasitism of sawfly larvae attributed to Tachinidae in Mexico include *Spathimegenia* (*Vibrissina*) *mexicana* (Aldrich) (Diptera: Tachinidae) parasitizing larvae of *Zadiprion falsus* Smith (Hymenoptera: Diprionidae) in San Luis Potosí (Ordaz-Silva et al. 2014); and *Chetogena* (*Diplothrix*) *n. lophyri* (Townsend) (Diptera: Tachinidae) reported as a parasitoid of

1Facultad de Ciencias Agrícolas, Universidad Autónoma del Estado de Mexico, Campus El Cerrillo, Toluca, Estado de Mexico, C.P. 50200, Mexico; E-mail: acastanedav@uaemex.mx (A. C.-V.), jsanchezp@uaemex.mx (J. R. S.-P.), ofrancom@uaemex.mx (O. F.-M.)

2Instituto Interamericano de Cooperación para la Agricultura (IICA), Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria, Unidad Integral de Diagnóstico, Servicio y Constatación, Carretera Federal Mexico-Pachuca Km. 37.7, Tecámac, Estado de Mexico, C.P. 55740, Mexico; E-mail: zetinaadh@gmail.com (D. A. H.-Z.)

*Corresponding author; E-mail: acastanedav@uaemex.mx
Aguilera-Molina VM, Munguía-Ortega KK, López-Reyes E, Martínez-Aquino A, Ceccarelli FS. 2019. Climate change and forest plagues: assessing current and future impacts of diprionid sawflies on the pine forests of North-Western Mexico. Peer Journal 7: e7220. doi: 10.7717/peerj.7220.

Cibrián-Tovar J, Méndez-Montiel MT, Campos-Bolaños R, Yates III HO, Flores-Lara JE. 1995. Insectos forestales de México. Universidad Autónoma Chapingo, Chapingo, México.

Coppel HC, Maw MG. 1954. Studies on dipterous parasites of the spruce budworm, Choristoneura fumiferana (Clem.) (Lepidoptera: Tortricidae). III. Ceromasia auricaudata Trs. (Diptera: Tachinidae). Canadian Journal of Zoology 32: 144–156.

Coria-Avalos VM, González-Gaona E, Pulido-Herrera A, Muñoz-Flores HJ. 2014. Detección y descripción morfológica de “mosca sierra” en bosques de la comunidad indígena de nuevo San Juan Parangaricutiro, Michoacán, México. Entomología Mexicana 1: 426–430.

González-Gaona E, Sánchez-Martínez G. 2018. Identificación y manejo de moscas sierra de la familia Diprionidae presentes en el centro norte de México. Folleto Técnico. Fondo Sectorial para la Investigación, el Desarrollo e Innovación Tecnológica Forestal (CONACYT-CONAFOR). Pabellón de Arteaga, Aguascalientes, Mexico.

Khalaïm AI, Ruiz-Cancino E, Castañeda-Vildózola Á. 2019. First record of the genus Lamachus Rohwer (Hymenoptera: Diprionidae) defoliator of pines, on the crecimiento e incremento en diámetro of Pinus montezumae Lamb., in the Meseta Tarasca. Tesis de Licenciatura, Departamento de Parasitología Agrícola. Universidad Autónoma Chapingo, Chapingo, México.

O’Hara JE. 2005. A review of the tachinid parasitoids (Diptera: Tachinidae), with keys to adults and puparia. Zootaxa 938: 1–46.

O’Hara JE, Henderson SJ, Wood DM. 2019. Preliminary checklist of the Tachinidae of the world. Version 1.0. http://www.nadsdiptera.org/Tach/World-Tachs/Checklist/Worldchecklist.html (last accessed 19 Dec 2020).

Ordaz-Silva S, Gallegos-Morales G, Sánchez-Peña SR, Flores-Dávila M, Salas-Marina MA, Landeros-Flores J. 2014. First records of Lespezia postico and Vibrissina mexicana (Tachinidae) as parasitoids of Monocotenus sanchezii (Diprionidae). Southwestern Entomologist 39: 511–516.

Richter VA, Kasparyan DR. 2013. Tachinid (Diptera, Tachinidae) Parasitoids of sawflies (Hymenoptera, Symphyta). Entomological Review 93: 630–633.

Ruiz-Cancino E, Khalaïm AI. 2015. Mexican species of the genus Exenterus Hartig (Hymenoptera: Ichneumonidae: Tryphoninae) reared from diprionid hosts. Zootaxa 4048: 140–150.

Smith DR. 1988. A synopsis of the sawflies (Hymenoptera: Symphyta) of America South of the United States: Introduction Xyelidae, Pamphiliidae, Cimbicidae, Diprionidae, Nypyrhidiidae, Siricidae, Orousidae, Cephidae. Systematic Entomology 13: 205–261.

Smith DR, Sánchez-Martínez G, Ojeda-Aguilera A. 2012. A new species of Zadiprion (Hymenoptera: Diprionidae) on Pinus durangensis from Chihuahua, Mexico, and a review of other species of the genus. Proceedings of the Entomological Society of Washington 114: 224–237.

Smith DR, Sánchez-Martínez G, Ordaz-Silva S. 2010. A new Monocotenus (Hymenoptera: Diprionidae) damaging Juniperus Mexicana (Cupressaceae) in San Luis Potosí, México. Proceedings of the Entomological Society of Washington 112: 444–450.

Smith DR, Monjarás-Barrera JI, Aguilar-Hernández JC, Quiñones-Dena H. 2016. New host and distribution records for Zadiprion rohweri (Middleton) (Hymenoptera: Diprionidae), a pinyon pine sawfly. Proceedings of the Entomological Society of Washington 118: 300–301.

Taeger S, Blank SM, Liston AB. 2010. World catalog of Symphyta (Hymenoptera). Zootaxa 2580: 1–1064.

Tao L, Mao-Ling S, Shu-Ping S, You-Qing L. 2016. Parasitoid complex of overwintering cocoons of Neodiprion huizeensis (Hymenoptera: Diprionidae) in Guizhou, China. Revista Colombiana de Entomología 42: 43–47.