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First report of spittlebug species (Hemiptera: Cercopidae) associated with *Pinus* species (Pinaceae) in Mexico

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In Italy and Spain, the spittlebug *Haematoloma dorsatum* (Ahrens) (Hemiptera: Cercopidae) causes severe damage to natural and planted forest trees of the genera *Cedrus* (Pinaceae), *Cupressus* (Cupressaceae), *Juniperus* (Cupressaceae), *Picea* (Pinaceae), and *Pinus* (Pinaceae) (Roversi & Baccetti 1994; Cobos 1995). In America, there are reports of adult males of *Prosapia* species (Hemiptera: Cercopidae) feeding on trees, including *Ilex haberi* (Lundell) W. J. Hahn, *I. cornuta* Lindl. & Paxton, and *I. opaca* Soland. ex Aiton (Aquifoliaceae), and of *Iphirhina quota* (Distant) (Hemiptera: Cercopidae) feeding on *Bourreria costaricensis* (Standl.) A. H. Gentry (Boraginaceae) (Peck 1998). Whereas there are reports of North American aphrophorid spittlebugs (Hemiptera: Aphrophoridae) feeding on natural and planted forest trees as pests (Wilson 1991), there are no reports of pine-feeding Cercopidae in either North or South America.

In 2008, adult spittlebug feeding damage was observed in Mexican forests of *Pinus oaxacana* Mirov. nearby Nicolás Bravo (Puebla State, Mexico) and on *Pinus chiapensis* (Martínez) Andresen in Santa Ana Cuauhtémoc (Cañada region, Oaxaca State, Mexico) (Queyla Beteta Santiago, personal communication). The impacted area and economic damage, however, were not quantified. Subsequently, a new spittlebug outbreak was reported in Mar and Jun 2015 in the municipalities of Tetela de Ocampo, Aquixtla, and Zacatlán de las Manzanas (State of Puebla, Mexico). Approximately 3,000 to 3,500 ha were afflicted. The damage was related to a symptomatology that we called "pine decline" associated with populations of adult spittlebugs resting, feeding, and mating on the foliage of *Pinus* trees. Nymphs were never found on those trees or on herbaceous plants in the understory.

Symptomatology of pine decline begins with drying of pine needle tips (Fig. 1A), descending down to the base of the needles. The foliage becomes yellowish, orange, or brown (Fig. 1B), and then the needles fall. These symptoms are similar to those caused by *H. dorsatum* (Roversi & Baccetti 1994; Cobos 1995). Symptoms occur in the middle of the rainy season when trees take on the characteristic colors; however, trees recover their foliage at the beginning of the next rainy season. This phenomenon was observed 3 times in the last years in the 3 aforementioned municipalities, but after the 3rd time, many of the trees did

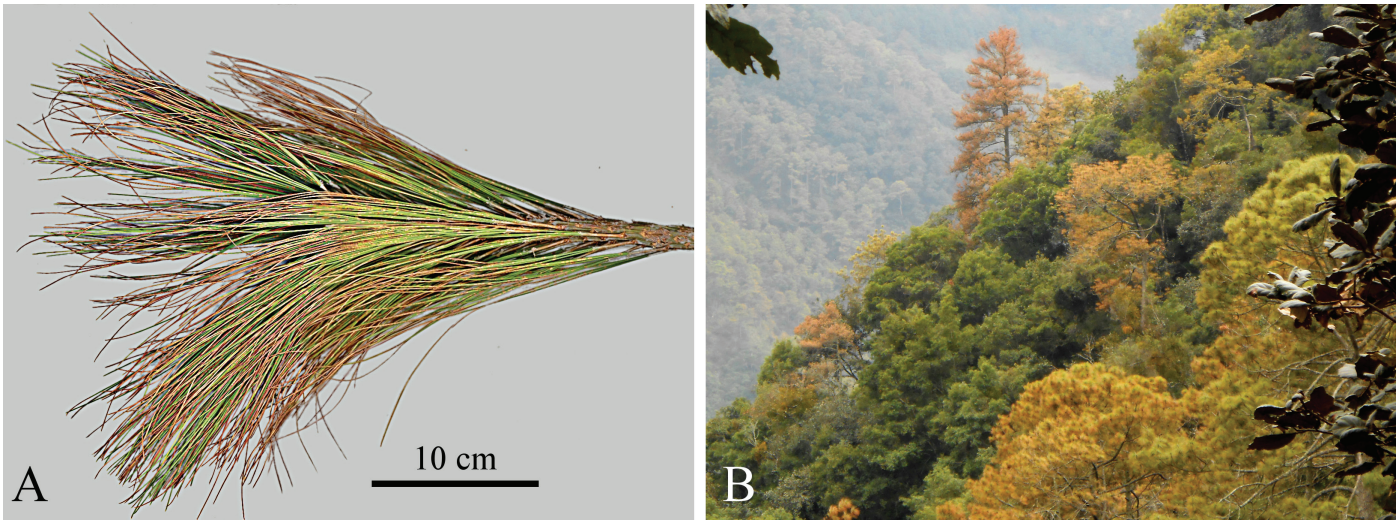


Fig. 1. A) Branch with initial pine decline symptoms. B) Landscape with *Pinus* trees affected by pine decline symptoms.

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not recover and they died. Nevertheless, at Santa Ana, the *P. chiapensis* trees recovered their foliage and none died because spittlebug populations naturally declined. At Nicolás Bravo, the *P. oaxacana* trees recovered, probably due to an outbreak of the entomopathogenic fungus *Metarhizium anisopliae* (Metsch.) Sorokin (Clavicipitaceae).

In Jun through Oct 2015, we collected insects from 3 localities of Puebla State: "Acatlán" (19.85825°N, 97.83385°W) and "Rancho Alegre" (19.84278°N, 97.85611°W), both sites in Tetela de Ocampo, and "Km 68 Carretera Federal Zacatlán-Apizaco" (19.90189°N, 97.95861°W) in Zacatlán de las Manzanas. Adult spittlebugs were found on trees of *Pinus pseudostrobus* Lindl,, *Pinus patula* Schiede ex Schltdl. & Cham., and *Pinus* sp., and 1 adult was feeding on *Rubu*s sp. (Rosaceae). Many insects were observed in a feeding position with forelegs extending out into the air like the Central American species *Mahanarva costaricensis* (Distant) (Hemiptera: Cercopidae) (Carvalho & Webb 2005) on *Heliconia* spp. (Heliconiaceae) (Fig. 2A, B). Mating pairs were also observed, confirming the presence of both males and females. Adults inserted the stylet into various sites on the needles selected for feeding (Fig. 2C). At abandoned feeding sites, the damage persisted, possibly due to the phytotoxic effects of salivary substances (Fig. 2D).

Several authors have described chlorosis in pasture grasses caused by the toxic effects of cercopid saliva (Taliaferro et al 1967; Valério & Nakano 1992). On *Brachiaria decumbens* Stapf (Poaceae), for instance, symptoms of damage due to 1 h of exposure to cercopid feeding was first observed 3 d later, having the greatest expression 23 d later (Valério & Nakano 1992). Cobos (1995) reported that adults of *H. dorsatum* stayed only a short time on *Pinus pinaster* Aiton after damage was observed, when adults had completed their flight period and disappeared under field conditions. This phenomenon could be similar to that found in Puebla and Oaxaca caused by the detected cercopids.

Observation and collecting efforts resulted in the detection of 3 spittlebug species in the cercopid genus *Ocoaxo* on *Pinus* host trees. The first, at Nicolas Bravo in 2008, was identified as *Ocoaxo assimilis* (Walker). Another group of insects collected on *Pinus* trees in the same year, close to the road between Oaxaca City and Pochutla City, was identified as *Ocoaxo varians* (Stål). Insects collected in 2015 did not match either of the aforementioned species based on external morphology and male genitalia. This additional species is now under study and is called *Ocoaxo* near *fowleri* (Lallemand).

Based on specimens deposited in the Colección Nacional de Insectos of the Instituto de Biología, UNAM (CNIN) and the Colección de Insectos del Colegio de Postgraduados–Montecillo (CEAM), the distribution of *Ocoaxo* species in Mexico by state is as follows: *O. varians* in Guerrero, Oaxaca, Puebla, Tlaxcala, and Veracruz; *O. assimilis* in Oaxaca, Puebla, and Veracruz; *Ocoaxo* near *fowleri* in Ciudad de México, Coahulia, Edo. México, Michoacán, Nuevo León, Oaxaca, Puebla,

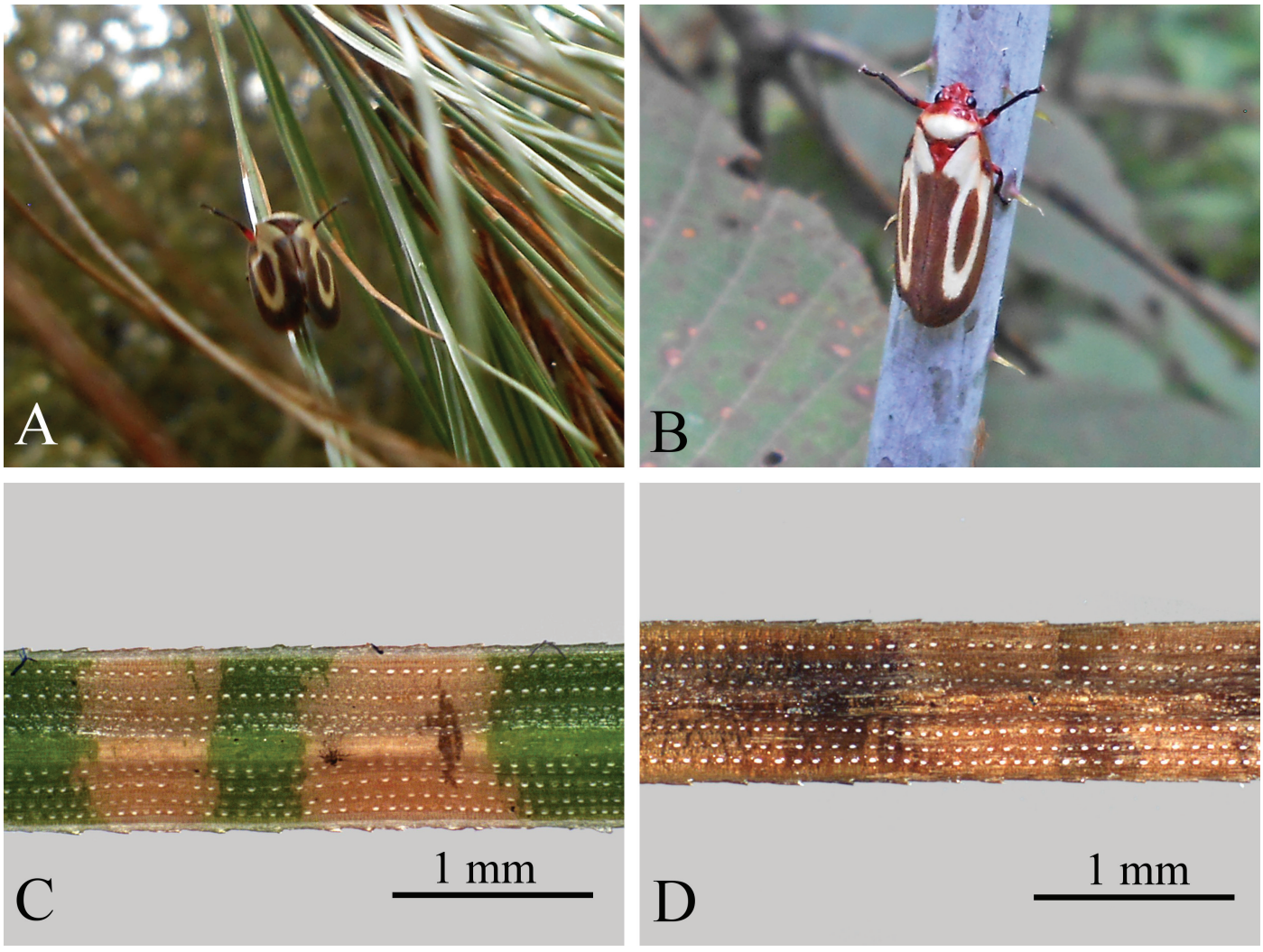


Fig. 2. A) Adult of *Ocoaxo* near *fowleri* feeding on *Pinus pseudostrobus*. B) Adult of *Ocoaxo* near *fowleri* feeding on *Rubus* sp. C) Site and damage caused by *Ocoaxo* near *fowleri* on a needle of *P. pseudostrobus*. D) Final damage caused by *Ocoaxo* near *fowleri* on a needle of *P. pseudostrobus*.

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Querétaro, and San Luis Potosí. All 3 species have been collected in the states of Oaxaca and Puebla, but never at the same time.

It is necessary to establish the true relationship between *Ocoaxo* species and pine decline, as their distributions overlap with pine forests in many states of Mexico. Nast (1950) and Fennah (1968), authors who have worked most on the genus *Ocoaxo*, did not discuss their biology and ecology. In fact, there are no known observations in the literature of *Ocoaxo* host plants. It is clear now that there are some spittlebug species associated with pine forests. However, specific host plants for nymphs are unknown, despite the extensive search for this life stage in 2015 (Jun to Dec 2015). It may be that we did not find the nymphal stage of *Ocoaxo* near *fowleri* because our efforts were focused on pines and the understory plants. We did find nymphs on grasses but these belonged to the species *Prosapia ignifera* Hamilton, *Prosapia teapana* Fennah, and *Prosapia inferens* (Walker) (Hemiptera: Cercopidae), and we did not see adults of *Ocoaxo* near *fowleri* emerging from any spittlemasses.

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Summary

The habitat and adult host plants of 3 *Ocoaxo* species (Hemiptera: Cercopidae) are reported for the first time. In addition, their possible link to a disorder of forest pines we called “pine decline” in Mexico is discussed. The distribution of *Ocoaxo varians* (Stål), *Ocoaxo assimilis* (Walker), and *Ocoaxo* near *fowleri* (Lallemand) is described based on museum collection specimens and field collections performed during 2015.

Key Words: *Ocoaxo assimilis*; *Ocoaxo varians*; *Ocoaxo* near *fowleri*; *Pinus pseudostrobus*; *Pinus patula*; *Pinus chiapensis*; phytotoxemia

Sumario

El hábitat y las plantas hospederas de tres especies de *Ocoaxo* (Hemiptera: Cercopidae) se reportan por primera vez. Además, se discute una posible relación con un trastorno de los bosques de pinos en México, llamado “Declinación de los Pinos.” Se describe la distribución de *Ocoaxo varians* (Stål), *Ocoaxo assimilis* (Walker) y *Ocoaxo* near *fowleri* (Lallemand) con base en ejemplares de museo y colectas de campo realizadas en el año 2015.

Palabras Clave: *Ocoaxo assimilis*; *Ocoaxo varians*; *Ocoaxo* cerca *fowleri*; *Pinus pseudostrobus*; *Pinus patula*; *Pinus chiapensis*; fitotoxemia

References Cited

Carvalho GS, Webb MD [eds.]. 2005. Cercopid Spittlebugs of the New World (Hemiptera: Auchenorrhyncha, Cercopidae). Pensoft Publishers, Sofía and Moscow.

Cobos JM. 1995. Nota sobre la presencia de *Haematoloma dorsatum* (Ahrens) en pinares del Sistema Central. Boletín de Sanidad Vegetal. Plagas 21: 133–137.

Fennah RG. 1968. Revisionary notes on the New World genera of cercopid froghoppers (Homoptera: Cercopoidea). Bulletin of Entomological Research 58: 165–190.

Nast J. 1950 (1949). A revision of the genus *Sphenorhina* Am. & Serv. (Homoptera: Cercopidae) Bulletin Entomologique de la Pologne 19: 114–148.

Peck DC. 1998. Use of alternative food plants exclusively by adult male froghoppers (Homoptera: Cercopidae). Biotropica 30: 639–644.

Roversi PF, Baccetti C. 1994. Ecologia ed etologia di *Haematoloma dorsatum* (Ahrens) (Homoptera: Cercopidae). Redia 77: 133–150.

Taliaferro CM, Byers RA, Burton GW. 1967. Effects of spittlebug injury on root production and sod reserves of Coastal bermudagrass. Agronomy Journal 59: 530–532.

Valério JR, Nakano O. 1992. Sintomatologia dos daños causados pelo adulto da cigarrinha *Zulia entreriana* (Berg, 1879) (Homoptera, Cercopidae) em *Brachiaria decumbens* Stapf. Anais da Sociedade Entomológia do Brasil 21: 95–100.

Wilson LF. 1991. Pine Spittlebug-Its Ecology and Management. United States Department of Agriculture, Forest Service. Agriculture Handbook 695.

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