



Research note

New record and extension of the distribution range of the bark beetle *Dendroctonus rhizophagus* (Curculionidae: Scolytinae)

Nuevo registro y ampliación del área de distribución del descortezador *Dendroctonus rhizophagus* (Curculionidae: Scolytinae)

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Abstract. After several exploratory surveys to the states of Jalisco and Zacatecas in the Sierra Madre Occidental (SMOC), the bark beetle *Dendroctonus rhizophagus* Thomas and Bright, 1970 was recorded in 2 geographic localities of Villa Guerrero, Jalisco. These new records extend the range of distribution of this beetle a further 250 km south along the SMOC from the southernmost site recorded in the state of Durango. These records indicate that this species may be present in almost any area of the SMOC where conditions are suitable for its development.

Key words: geographic distribution, seminal rod, cytochrome oxidase I.

Resumen. Después de varios viajes de exploración a los estados de Jalisco y Zacatecas en la sierra Madre Occidental (SMOC), se registró la presencia del descortezador *Dendroctonus rhizophagus* Thomas y Bright, 1970 en 2 localidades en el Municipio de Villa Guerrero, Jalisco. Estos nuevos registros amplían el área de distribución del descortezador 250 km hacia el sur de la SMOC, a partir del punto más sureño registrado en el estado de Durango. Asimismo, estos registros indican que esta especie puede estar presente en prácticamente cualquier área de la SMOC que reúna las condiciones adecuadas para su desarrollo.

Palabras clave: distribución geográfica, varilla seminal, citocromo oxidasa I.

Species of the genus *Dendroctonus* Erichson, 1836 are biotic agents of the natural renovation of coniferous forests (Pinaceae) since they infest and kill diseased, damaged, stressed, mature, senescent or enfeebled trees. However, they are also representative of insect species that in epidemic conditions are involved in the large-scale deforestation of forest ecosystems (Wood, 1982). The genus comprises 19 species and 1 subspecies, of which 17 occur in North and Central America, and only 2 in Asia and Europe (Wood, 1982; Furniss, 2001; Ruiz et al., 2009). *Dendroctonus rhizophagus* Thomas and Bright, 1970 was described from specimens collected from the roots of pine seedlings near El Salto, Durango, in 1964, but due to its extensive morphological similarities to another species (*D. valens*), its indisputable taxonomic acceptance was not established until several years later (Wood, 1982). Collection records accumulated since then in the principal

entomological collections of North and Central America have confirmed its position as a species endemic to Mexico occurring in pine forests of the Sierra Madre Occidental (SMOC) in the states of Chihuahua, Durango, Sinaloa and Sonora (Cibrián-Tovar et al., 1995; Salinas-Moreno et al., 2004, 2010a, 2010b). However, there are also records for Zacatecas and Guerrero (Atkinson and Equihua-Martínez, 1985; Furniss and Campos-Bolaños 1985; Cibrián-Tovar et al., 1995; Bright and Skidmore, 2002), although no details are provided regarding collection data or specimen location. In regard to the record for Guerrero, Dr. Atkinson (com. pers.) says that in 1982 a group of entomologists found signs characteristic of the damage caused by *D. rhizophagus* in a regeneration area of *Pinus oocarpa* in Chilapa, Guerrero, at 2 040 m elevation. The specimens collected were deposited in the entomological collection of the Colegio de Posgraduados in Montecillos, Chapingo as well as the insect collection at Texas A and M University (College Station). However, the specimens deposited in

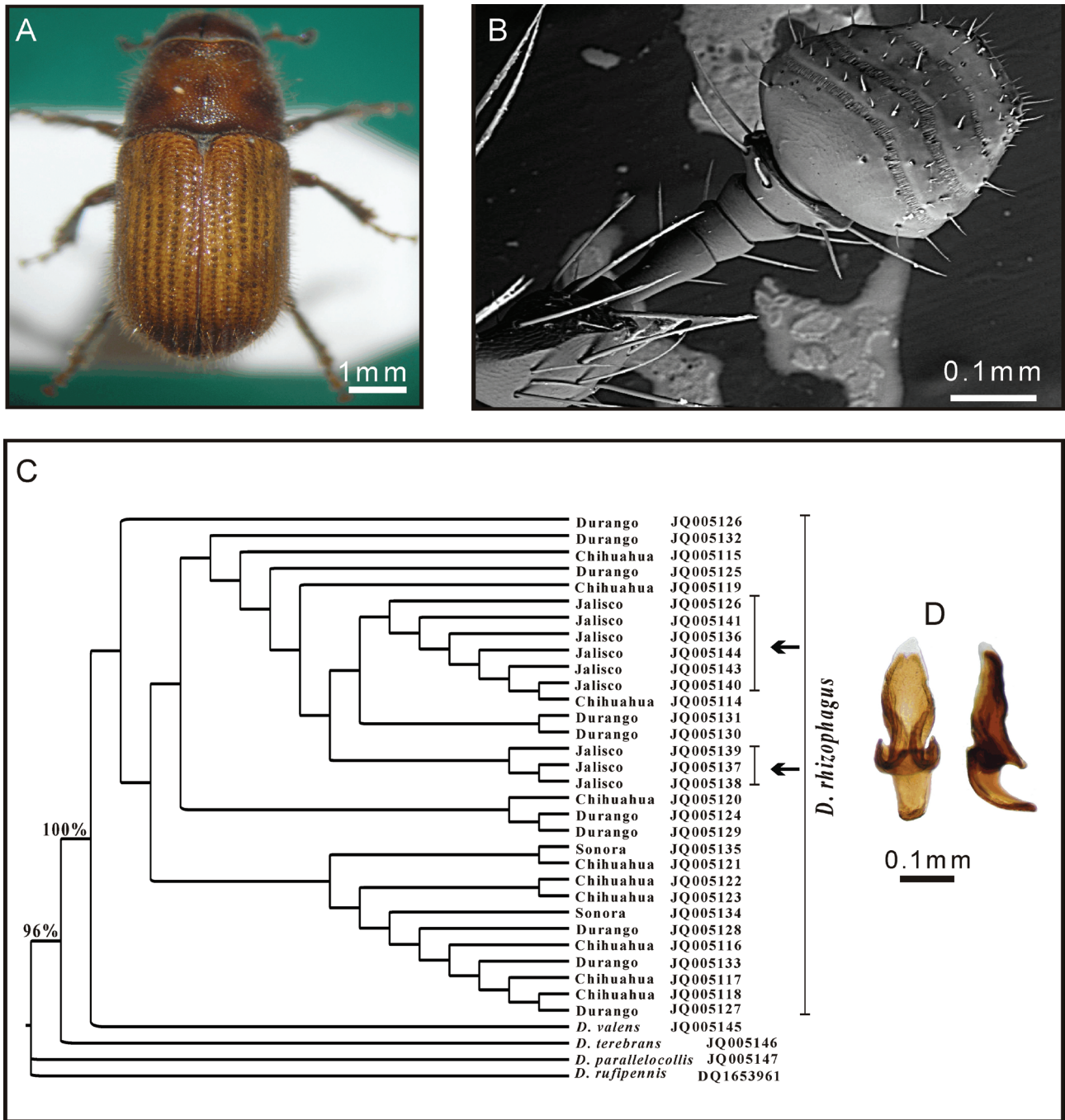


Figure 1. A), male adult of *Dendroctonus rhizophagus*. B), micrograph of the male antenna taken with an environmental microscope, 350X. C), phylogenetic tree of *D. rhizophagus* COI sequences (1 545 bp) and its sister species constructed by neighbor-joining with MEGA v4.1, using the Tamura-Nei model determined with ModelTest v3.7 and a gamma parameter value of 0.73. Bootstrap values based on 1 000 pseudo replicates are indicated at nodes. *D. rufipennis* was used as an external group and the arrows show the position of Jalisco samples. D), the male seminal rod. Gene Bank accession numbers of sequences from JQ005114 to JQ005147.

Mexico have apparently been mislaid, and it has not so far been possible to examine the others.

A recent study of the potential distribution of *D. rhizophagus* based on 669 different collection records reveals that this beetle infects and kills seedlings of 11 pine species in natural regeneration areas as well as commercial plantations (Mendoza et al., 2011). The latter study also shows the existence of favorable biological (potential and actual hosts), climatic (temperature and precipitation) and altitudinal conditions for the growth of this beetle in pine forests throughout the SMOC. In view of this, in May and June 2010 and 2011 several surveys were carried out in the states of Jalisco and Zacatecas with the aim of documenting the occurrence of this species in this geographic area of the SMOC.

The search for this beetle in the state of Zacatecas was unproductive, but in Jalisco it was found colonizing seedlings of *Pinus leiophylla*, *P. herrerae* and *P. lumholtzii*. These localities (22°04'06.6" N, 103°53'50.2" W and 22°08'11.1" N, 103°52'29.1" W) are near and inside of the property El Romerillo, which is 5 km N and 10.5 km W of the town of Villa Guerrero at 2 500-2 650 m elevation. Infested trees showed the signs characteristic produced by the activity of this bark beetle (Thomas and Bright, 1970). Adult specimens were collected by hand from infested trees and taxonomically identified based on the morphological characters typical of this species (robust body, dark reddish-brown body color with elytra lighter than the pronotum and head, and the first segment of the antennal club darker) (Thomas and Bright, 1970; Wood, 1982) (Fig. 1A). Identification was confirmed by the asymmetric shape of the antennal club (Furniss and Campos, 1985) (Fig. 1B), 9 sequences of 1 545 bp derived from mtDNA cytochrome oxidase subunit I (Fig. 1C), the position of the species in a phylogenetic tree constructed with its sister species (Kelley and Farrell, 1998), and examination of the male seminal rod (Thomas and Bright, 1970) (Fig. 1D).

This communication is therefore the first record of *D. rhizophagus* in the state of Jalisco. The nearest locality to these new records is 250 km away in a straight line at Pueblo Nuevo, Durango (23°14'04" N, 104°56'0.7" W; Bajío Seco, indigenous community of San Bernardino, El Chico) (Mendoza et al., 2011). Presence of the beetle in the southern limits of the SMOC supports the possibility that the record of this species in the state of Zacatecas is correct, despite absence of specimens and collection data (Cibrián-Tovar et al., 1995; Bright and Skidmore, 2002). Furthermore, its presence in unexplored regions of the SMOC confirms the predictive power of potential distribution models and suggests that *D. rhizophagus* may potentially be present in those areas of the SMOC where conditions are suitable for its growth.

Exploratory surveys should be carried out in the Guerrero state, and the Texas A and M University specimens must be examined in order to confirm the presence of this species in this geographic area of Mexico.

The collected specimens of *D. rhizophagus* were deposited in the Laboratorio de Variación Biológica y Evolución (ENCB-IPN) and the insect collection from the Museo de Historia Natural de la Ciudad de México (Specimens No. from 50089 to 50104). We are grateful to Jorge E. Macías-Samano, Yolanda Salinas-Moreno and Thomas H. Atkinson for comments and suggestions. This study is part of the CONAFOR-CONACyT project (69539). FAT (267436) and MFL (175839) are CONACyT and Programa Institucional de Formación de Investigadores del Instituto Politécnico Nacional (PIFI-IPN) fellowships.

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