

DIPLOTAXIS MULTICARINATA (COLEOPTERA: SCARABAEIDAE), A NEW SPECIES FROM A RELICT FOREST IN OAXACA, MEXICO

LEONARDO DELGADO AND EDER F. MORA-AGUILAR

Instituto de Ecología, A. C., Carretera Antigua a Coatepec No. 351, 91070 Xalapa, Veracruz, México

ABSTRACT

A new species of scarab beetle, *Diplotaxis multicolorata* **sp. nov.**, is described from a relict montane forest in the northeastern region of Oaxaca, Mexico. The new species belongs to the *simplex* species-group, and a new key to this group is presented in order to include the new species.

Key Words: Taxonomy, key, scarab beetle, Melolonthinae

RESUMEN

Se describe una nueva especie de escarabajo, *Diplotaxis multicolorata* **sp. nov.**, proveniente de un bosque relicto localizado en la región noreste del estado de Oaxaca, México. La nueva especie pertenece al grupo de especies *simplex*, presentándose una nueva clave de identificación para separar a todas las especies de este grupo.

Translation provided by the authors.

The genus *Diplotaxis* Kirby includes 241 species ranging from Panama to Canada, with most species (76%) founded in Mexico; these species are arranged in 38 species-groups, and 6 species are unassigned (McCleve 1993; Davidson & Davidson 2006; Delgado 2011). The *simplex* species-group of this genus includes 9 species, which are distributed from eastern and southern Mexico to Guatemala, and in the Greater Antilles (Jamaica). These species show a heterogeneous morphology, whose main shared character is a large labrum usually 2 x longer than the reflexed underside of clypeus (Vaurie 1958; Delgado & Capistrán 1993). We add a new species to this species-group, based on specimens collected in 2004 and 2005 from a relict montane forest in Oaxaca, Mexico.

MATERIALS AND METHODS

Morphological structures were studied using a Carl Zeiss Stemi SV-6 stereomicroscope. Measurements are given in millimeters. Length was measurement from apex of clypeus to apex of pygidium, and width across widest portion of elytra. Terminology and morphological characters are those defined by Vaurie (1958, 1960).

Abbreviations for institutions cited in this study are as follows: Museum für Naturkunde der Humboldt Universität zu Berlin, Germany (ZMHB), Martin-Luther-Universität Wissenschaftsbereich Zoologie Sektion, Halle, Germany (MLUH), The Natural History Museum, London, England (BMNH), Canadian Museum of Nature, Ottawa, Canada (CNCI), Colección Nacional de Insectos de la Universidad Autónoma

de México, México City (CNIN), Colección Entomológica del Instituto de Ecología, A. C., Xalapa, México (IEXA), S. McCleve collection, Arizona, USA (SMCC), L. Delgado collection, Mexico City (LLDC), and E. Mora-Aguilar collection, Xalapa, México (EMAC).

DIPLOTAXIS MULTICARINATA DELGADO AND MORA-AGUILAR, **Sp. Nov.**
(Figs. 1-3)

Type Material. Holotype ♂ and one ♀ paratype labeled: "MEXICO: Oaxaca, Santiago Comaltepec, San Bernardino, 16-VIII-2004, 1,715 m asl, bosque de *Oreomunnea mexicana*; en cópula sobre hojas de *Oreomunnea*, E. Mora col.". Paratypes (6 ♂♂, 5 ♀♀) same data as holotype, except: luz fluorescente (1 ♂); 17-IX-2004, luz fluorescente-incandescente (2 ♂♂); 20-VII-2005, luz mercurio (2 ♀♀); 30-IX-2005, luz mercurio (1 ♂, 2 ♀♀); La Esperanza, VIII-2005, 1,552 m asl, bosque mesófilo de montaña – *O. mexicana*, luz fluorescente, E. Mora col. (2 ♂♂, 1 ♀).

The holotype and one female paratype are deposited in IEXA. Eleven paratypes are deposited in the following collections: ZMHB (1 ♂), MLUH (1 ♀), BMNH (1 ♀), CNCI (1 ♂), CNIN (1 ♂), SMCC (1 ♂ 1 ♀), LLDC (1 ♂ 1 ♀, and EMAC (1 ♂ 1 ♀).

Description. Holotype male (Fig. 1). Total length: 11.5 mm; width: 6.1 mm. Body oval-elongate and convex; head, carina of pronotum, elytra, venter, femora and tibiae shiny black; tarsi and antennae shiny reddish brown; depressions of pronotum and base of elytra dull black. Dorsal



Fig. 1. Habitus of *Diplotaxis multicarinata* sp. nov. Delgado and Mora-Aguilar. Scale = 5 mm.

surface glabrous and venter with scarce, small setae. Clypeus rectangular, wide, apex truncate, anterior angles rounded, length $2/5$ cephalic length; surface broadly concave with large, dense and umbilicate punctures; apical fourth with small, simple punctures; sides slightly indented in front of eyes; ocular canthus not prominent. Frontoclypeal suture marked at sides, obliterated at central $2/3$. Frons with triangular, central, deep impression, and 2 oblique impressions adjacent to eyes and extending to the vertex; surface with large, dense, and umbilicate punctures. Transverse eye diameter almost $1/7$ as wide as head. Antennae 10-segmented, length of club equal to length of antennomeres 2-6 combined. Labrum flat, anterior margin slightly curved; at middle 2.1 times longer than and situated slightly below reflexed underside of clypeus; finely rugose. Mandibles large, bulbous. Mentum almost flat, with anterior declivity marked by a transverse, bisinuate, and setose ridge, and with a small, central tooth.

Pronotum wider than long (1.00:0.55), sides widest at middle and constricted at base; pronotal base lobed at central third; fore angles right, hind

angles obtuse; pronotal surface with a transverse, central ridge extending from side to side, and 2 anterior, central, convergent ridges extending from each side of midline of transverse ridge to anterior border; ridges delimiting 4 depressions as follows: two on anterolateral regions, one central, and one on basal third; ridges and depressions with umbilicate, large, dense punctures. Metasternum convex, with deep, narrow longitudinal apical fovea. Elytra longer than wide (1.00:0.40); elytral punctures umbilicate, slightly smaller than those of pronotum; striae scarcely discernible; intervals and costae with dense punctures, almost rugose. Abdomen with a lateral ridge on the first five visible sternites; abdomen ventrally with umbilicate, shallow and dense punctures; propygidium narrowly and distinctly grooved; pygidium wider than long, slightly convex, surface with umbilicate, dense punctures, and a few sparse setae.

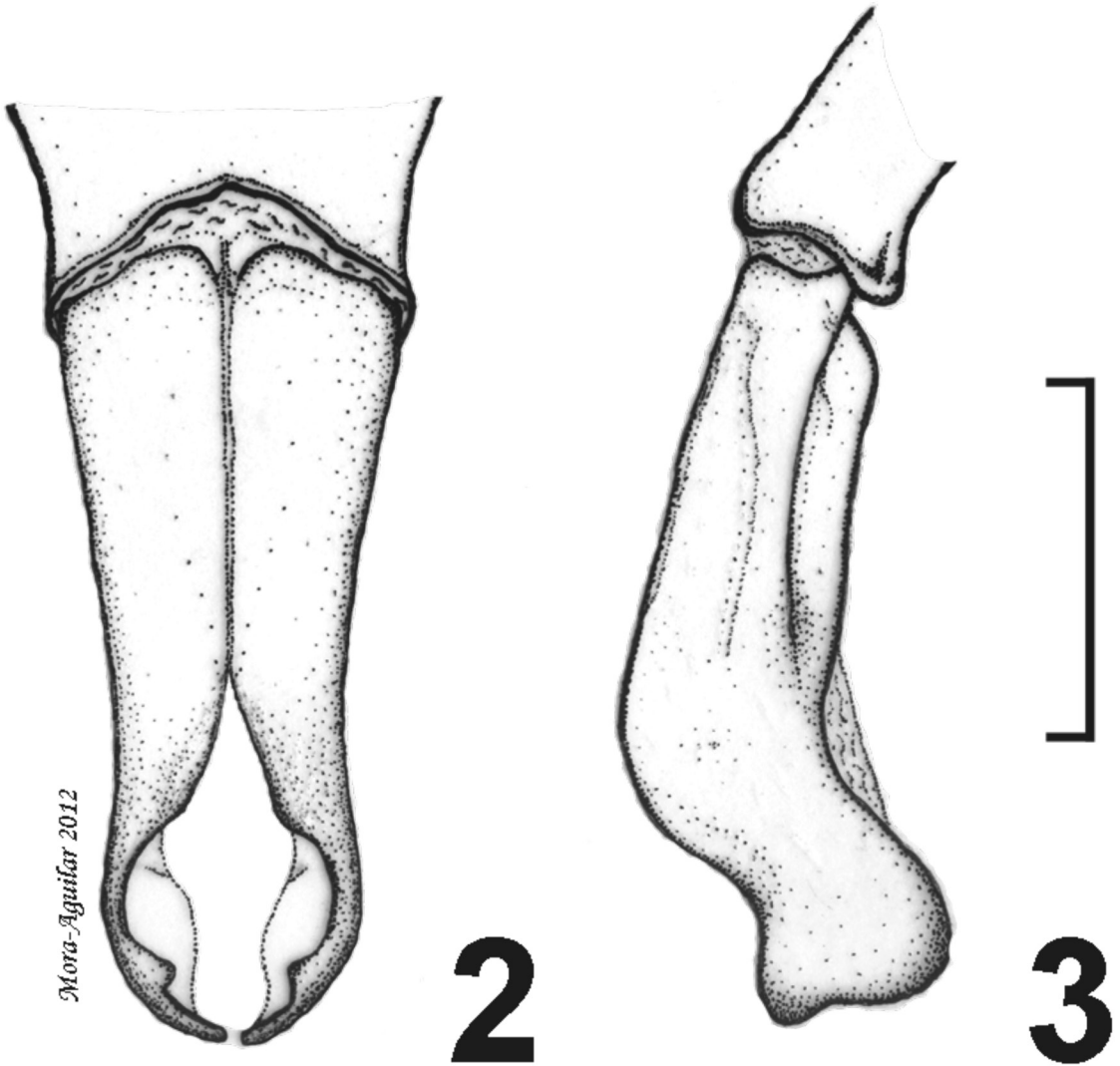
Metacoxae laterally angled; femora long and slender; protibiae tridentate, elongate, with basal tooth situated in front of middle, and separated from anterior two teeth; all three pairs of legs with first tarsomere longer than second; tarsi clothed with dense setae, more notably in meso and metatarsi. Claws angularly curved, subapically cleft, and with tooth longer than apex of claw. Genitalia with basal piece longer than parameres; parameres widened at apical third, jointed on inner margin at about basal $3/5$; in lateral view, parameres thickened and strongly, apically sinuate (Figs. 2 and 3).

Paratypes (6 ♂♂, 6 ♀♀). Total length: 10.1-11.4 mm; maximum width: 4.4-6.1 mm. Dorsal and ventral color varies from black to reddish brown or light red. Depressions of pronotum in some specimens are shiny black. Pronotal carina vary slightly in elevation and length. Femora and tibiae are a little stouter in females than in males.

Etymology. The specific epithet is derived from the Latin *multi* meaning many, and *carinata* meaning carinate, in relation to the several carinae or ridges present on the pronotal surface.

Remarks. *Diplotaxis multicarinata* sp. nov. shows the typical characters of the *simplex* species-group, *i.e.* the dorsum glabrous, the labrum at least twice as long as the reflexed underside of clypeus, the antennae 10-segmented, the protibiae tridentate with teeth situated in front of middle, and the claws angularly bent and subapically cleft. From the species included in this group, the new species is easily recognized by the combination of two characters: the abdomen laterally ridged and the pronotal surface with rounded ridges (Fig. 1). In addition, the shape of the male genitalia is also distinctive (Figs. 2-3).

Distribution. *Diplotaxis multicarinata* sp. nov. is only known from the state of Oaxaca in two nearly adjacent localities situated in the municipality of Santiago Comaltepec. This spe-



Figs. 2 and 3. Parameres of *Diplotaxis multicarinata* sp. nov. Delgado and Mora-Aguilar. 2) Frontal view; 3) Lateral view. Scale = 1 mm.

cies inhabits cloud forests with *Oreomunnea mexicana* (Standley) Leroy (Fagales: Juglandaceae) as the dominant tree and located between 1,500-1,750 m of elevation. Forests with *O. mexicana* as the dominant element are considered a relict and paleoendemic vegetation established in areas that presumably served as Pleistocene refuges of flora and fauna in Mexico (Rzedowski 1991). The nominate subspecies of *O. mexicana* has a discontinuous distribution in

Mexico (Orizaba, Los Tuxtlas, Sierra de Juarez, Chimalapas and Soconusco), Guatemala, and Nicaragua; the other subspecies (*O. m. costaricensis* Stone) is distributed in Costa Rica and Panamá (Rzedowski & Palacios-Chávez 1977, Challenger 1998).

Biological Notes. A pair of this species was collected in copula on leaves of *O. mexicana*. The remaining specimens were attracted to lights from July to September.

KEY TO THE SIMPLEX SPECIES-GROUP OF *DIPLOTAXIS* (MODIFIED FROM VAURIE 1958; DELGADO & CAPISTRÁN 1993)

- 1. Abdomen ridged or carinate at sides under edge of elytra 2
- Abdomen at sides smoothly rounded. 4

2. Pronotum with a transverse carina and two convergent longitudinal carinae at anterior middle; southern Mexico *D. multicarinata* **sp. nov.**
 — Pronotum without carinae. 3
3. Pronotal punctures on disc fine, sparse; punctures on outer rows of elytra large and foveate; eastern Mexico *D. aereomicans* Moser
 — Pronotal punctures on disc coarse, dense; punctures of elytra normal, not foveate; Jamaica, West Indies *D. jamaicensis* Cazier
4. Elytra with fine, short setae on narrow intervals and on subapical callosities (seen by tipping back specimen); pronotal lateral margins sinuately constricted at base; southern Mexico, Guatemala *D. alutacea* Bates
 — Elytra without dorsal setae; pronotal lateral margins slightly, if at all, sinuate at base 5
5. Clypeus tumid in front of suture, especially at middle; eastern and southern Mexico, Guatemala *D. simplex* Blanchard (in part)
 — Clypeus not tumid at middle 6
6. Clypeal suture bent back angularly at middle, often small depression at apex of angle; head not transversely carinate. 7
 — Clypeal suture either straight at middle or not visible among punctures; head behind clypeal suture transversely carinate, at least at sides 10
7. Front of head (viewed from above) with an elevated shelf following angular contour of clypeal suture 8
 — Front of head completely flat or depressed, not elevated 9
8. Frons densely punctured and evenly convex; pronotum without depressions; western and southern Mexico *D. metallescens* Bates
 — Frons sparsely punctured and with a depression on each side next to eyes; pronotum with a depression near each fore angle; northeastern Mexico *D. caelestis* Delgado & Capistrán
9. Size small (7 - 8 mm); second abdominal segment at middle often with sharp carina or tubercle; clypeus with front margin virtually straight and densely, entirely punctured; labrum flat; eastern and southern Mexico, Guatemala *D. simplex* Blanchard (in part)
 — Size large (9.5 - 10.5 mm); second abdominal segment not carinate or tuberculate; clypeus with front margin sinuate, and with the punctures rather sparse, at least at center; labrum hollowed out; eastern Mexico *D. fossifrons* Moser
10. Size small (7 - 8.5 mm); pronotum densely punctate, punctures contiguous, sides with two distinct rounded depressions one in front of other; southern Mexico, Guatemala *D. carinifrons* Bates
 — Size large (10 -10.5 mm); pronotum very irregularly and sparsely punctate, sides with one, if any, rounded depression; southern Mexico, Guatemala *D. rita* Vaurie

ACKNOWLEDGMENTS

We thank the authorities of the municipality of Santiago Comaltepec, Oaxaca for permission to carry out collections in this region.

REFERENCES CITED

- CHALLENGER, A. 1998. Utilización y Conservación de los Ecosistemas Terrestres de México. Pasado, presente y futuro. CONABIO, Instituto de Biología UNAM, Agrupación Sierra Madre, S. C. México D.F. 847 pp.
- DAVIDSON, J. P., AND DAVIDSON, J. M. 2006. Two new species of *Diplotaxis* Kirby, 1837, from Arizona with a key and notes on the *D. misella* group (Coleoptera: Scarabaeidae). Pan-Pacific Entomol. 82(1): 74-81.
- DELGADO, L. 2011. A new species of the genus *Diplotaxis* Kirby, 1837 (Coleoptera: Scarabaeidae: Melolonthinae: Diplotaxini) from northeastern Mexico. Coleopt. Bull. 65(2): 189-191.
- DELGADO, L., AND CAPISTRÁN, F. 1993. Two new species of *Diplotaxis* from Biosphere Reserve of El Cielo. Rev. Brasileira Entomol. 37(2): 267-272.

- MCCLEVE, S. 1993. Three new species of flightless *Diplotaxis* from Oaxaca, Mexico (Coleoptera: Scarabaeidae: Melolonthinae). *Coleopt. Bull.* 47(1): 43-50.
- VAURIE, P. 1958. A revision of the genus *Diplotaxis* (Coleoptera, Scarabaeidae, Melolonthinae) Part 1. *Bull. Amer. Mus. Natl. Hist.* 115 5: 267-396.
- VAURIE, P. 1960. A revision of the genus *Diplotaxis* (Coleoptera, Scarabaeidae, Melolonthinae) Part 2. *Bull. American Mus. Natl. Hist.* 120(2): 161-434.
- RZEDOWSKI, J. 1991. El endemismo de la flora fanerogámica mexicana: una apreciación analítica preliminar. *Acta Bot. Mexicana* 15: 47-64.
- RZEDOWSKI, J., AND PALACIOS-CHÁVEZ, R. 1977. El bosque de *Engelhardtia (Oreomunnea) mexicana* en la región de la Chinantla (Oaxaca, México) – una reliquia del Cenozoico. *Bol. Soc. Bot. México* 36: 93-127.