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New Species of *Macrodactylus* Dejean (Coleoptera: Scarabaeidae: Melolonthinae: Macrodactylini) from Mexico

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Abstract

Macrodactylus howdeni, **new species,** from pine-oak forest at 2,600 m elevation near Toluca, state of México, and *Macrodactylus noveloi*, **new species**, from cloud forest at 1,050 m elevation in the state of Michoacán and oak forests at 780–1,160 m elevation in the state of Nayarit, Mexico are described. Illustrations of diagnostic characters and comparative comments with similar species are included. New records are provided for *Macrodactylus submarginatus* Bates for the state of Michoacán, *Macrodactylus pokornyanus* Arce-Pérez and Morón for the state of México, and *Macrodactylus longicollis* (Latreille) for the state of Oaxaca. With these additions, 27 species of *Macrodactylus* Dejean are recorded from Mexico.

Resumen

Se describen *Macrodactylus howdeni* **nueva especie**, con ejemplares colectados en bosque de pino y encino situado a 2,600 m de altitud en las cercanías de Toluca, estado de México y *Macrodactylus noveloi* **nueva especie**, con ejemplares colectados en bosque mesófilo de montaña situado a 1,050 m de altitud en el estado de Michoacán, y en bosques de encino ubicados a 780–1,160 m de altitud en el estado de Nayarit, México. Se incluyen ilustraciones de los caracteres diagnósticos y comentarios comparativos con las especies afines. Se comentan nuevos registros para *Macrodactylus submarginatus* Bates, en el estado de Michoacán, para *Macrodactylus pokornyanus* Arce-Pérez y Morón en el estado de México, y para *Macrodactylus longicollis* (Latreille) en el estado de Oaxaca. Con estas adiciones, se reúnen registros para 27 especies de *Macrodactylus* Dejean en México.

The species of *Macrodactylus* Dejean from Mexico were studied by Bates (1887), who described 12 species and reported the first detailed records for the country. Carrillo and Gibson (1960) provided new distribution data and included a key to species, but did not describe any new species. Arce-Pérez and Morón (2000) reviewed the genus in North America, adding six new species and two new records from Mexico. During a recent study of specimens of *Macrodactylus* collected in Mexican localities, we found representatives of two undescribed species and new records for another three species. The purpose of this paper is to describe the new species and report new records of *Macrodactylus submarginatus* Bates, *Macrodactylus longicollis* (Latreille), and *Macrodactylus pokornyanus* Arce-Pérez and Morón.

Material and Methods

Technical terms and characters used in the species descriptions are taken from Arce-Pérez and Morón (2000). We use the phylogenetic species concept proposed

by Wheeler and Platnick (2000). Drawings were made with the aid of a camera lucida and stereomicroscope; measurements were obtained using calipers or an ocular micrometer. Voucher specimens are deposited in the collections of the Essig Museum of Entomology, University of California, Berkeley, CA (EMEC), Canadian Museum of Nature, Ottawa (CMNC), Canadian National Collection of Insects, Ottawa (CNCI), Instituto de Biología, UNAM, Mexico City (CNIN), Instituto de Ecología, A.C. Xalapa (IEXA), Smithsonian Institution National Museum of Natural History, Washington, D.C. (USNM), Universidad Autónoma del Estado de Hidalgo (UAEH), University of Nebraska State Museum, Lincoln, NE (UNSM), and the private collections of M. A. Morón, Xalapa (MXAL) and R. Arce-Pérez, Coatepec, Mexico (RAPC).

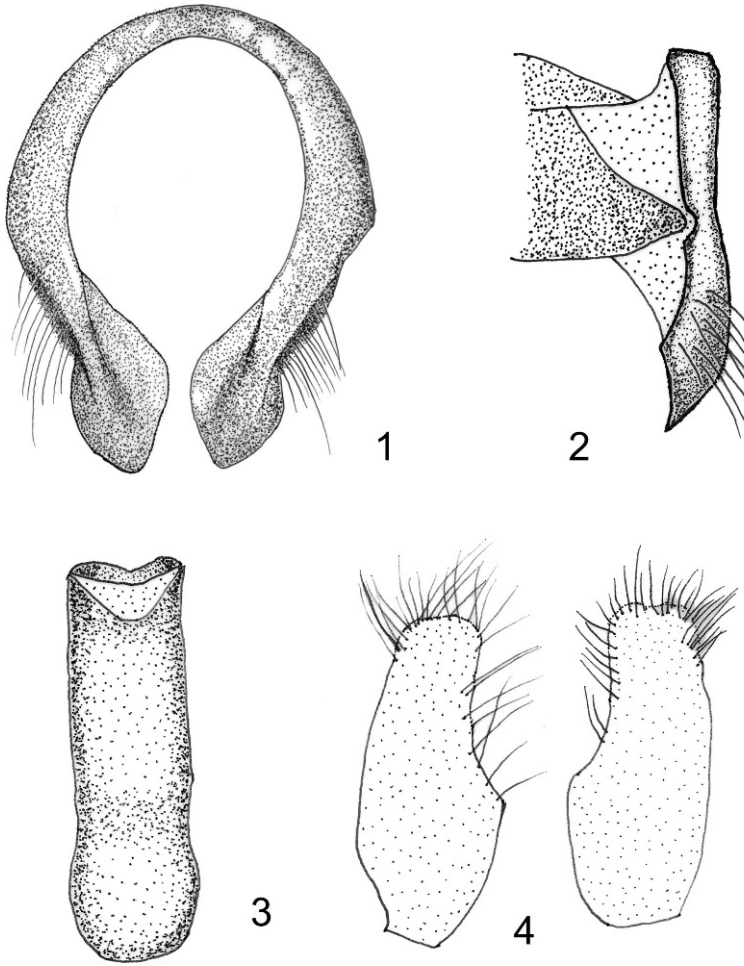
Macrodactylus howdeni Arce-Pérez and Morón, new species
(Figs. 1–4)

Type Material. Holotype male, labeled "MEXICO, State of México, 23 mi W Toluca, 2600 m, 20-VII-1965, P. H. Freytag and L.P. Gibson" (CMNC). Allotype female and two paratypes (male and female) with same data (CMNC).

Diagnosis. This species is distinguished by the following combination of characters: body surface entirely shiny black; pronotum, elytra, and pygidium with dense vestiture of scale-like, whitish, short setae; antennal club bicolored; femora and tibiae yellowish red, tarsi black with rings of short, whitish setae on basal half. The general appearance of the specimens is blue- gray resulting from a combination of the colors of the integument and vestiture.

Description. Holotype male. Body length 10.0 mm; humeral width 3.4 mm. *Color:* Integument entirely shiny black; antennal club bicolored; femora and tibiae yellowish red, tarsi black. *Surface:* Pronotum, elytra, and pygidium with dense vestiture of scale-like, whitish, short setae; ventrally with dense vestiture of scale-like, whitish, long setae. *Head:* Form short, punctate, clypeus trapezoidal, anterior border nearly concave; mentum elongate oval, longitudinally furrowed, anterior border straight, anterolateral emargination exposing basal segment of labial palpus. *Thorax:* Pronotum hexagonal, convex, 3.0 mm in length, 2.8 mm in width; prosternal process long, wide, curved, with apex slightly split, visible in frontal view; scutellum wide with rounded apex; elytra without apparent striae, inner suture rugose, with few setae. Metasternum with 2 longitudinal, dense rows of long, yellowish red setae between meso-and metacoxae. *Abdomen:* Sternites 2-5 moderately concave at middle, sternites 2-4 with 5-6 spine-like, yellowish red, long setae at each side of midline; length of sternite 5 twice length of sternite 4 with numerous spine-like, long setae; sternite 6 ovate, with scattered spine-like, long setae. Pygidium elongate, ovate, with dense vestiture of scale-like setae. *Legs:* Profemur with a subrectangular projection near base. Mesotibia widened towards apex, with 2 long, narrow, slightly curved, acute spurs, and long spine-like setae around apex. Tarsi enlarged, with rings of short, white setae on basal half and long spine-like setae around apex. *Genitalia:* Parameres stout with medium setae on distal half of lateral borders, completely fused dorsobasally, widely curved toward apex, horseshoe-like shape in distal view, each apex clearly lanceolate with rounded tip (Figs. 1–3).

Allotype Female. Body length 10.0 mm, humeral width 3.6 mm. Similar to male except: Pronotum 2.6 mm long, 2.6 mm wide; abdominal surface convex, sternites with 5-6 scale-like, medium-size setae; pygidium short, convex, nearly triangular; Genital plates ovate, with apex rounded and external border slightly sinuate (Fig. 4).



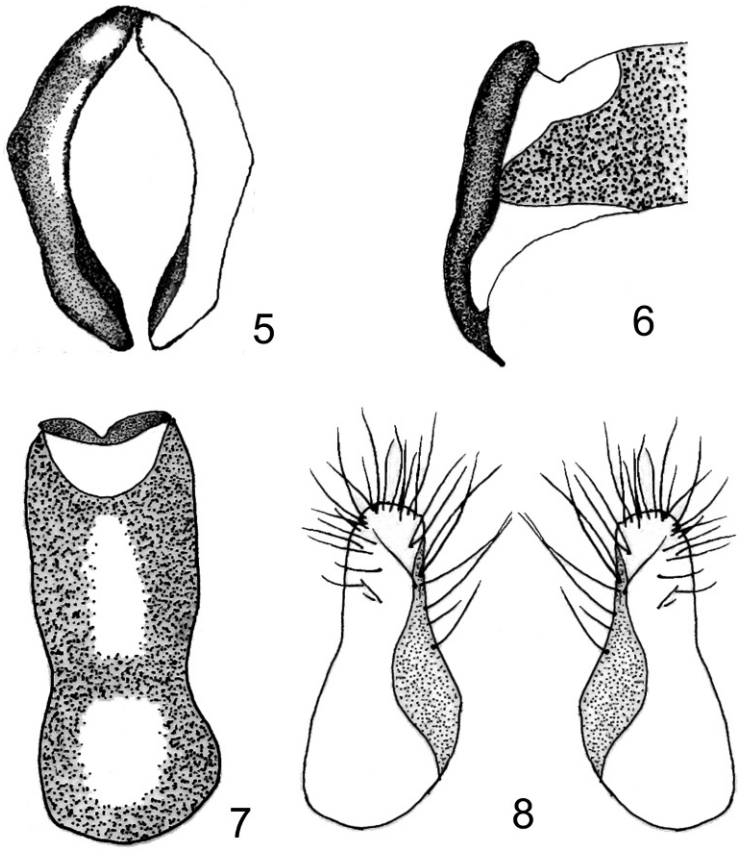
Figs. 1–4. *Macrodactylus howdeni.* **1)** Parameres, distal view; **2)** Parameres, lateral view; **3)** Phallobase, dorsal view; **4)** Female genital plates, ventral view.

Biological Data. Inhabits pine-oak mixed forests located at 2,600 m elevation. Adults are active during July.

Distribution. La Gavia mountains, state of México, Mexico (19°08′N 99°54′W) (Fig. 11).

Remarks. *Macrodactylus howdeni* is included in species-group IV "*subspinosus*" (*sensu* Arce-Pérez and Morón 2000). It is similar to *M. pokornyanus*, but these species are separated as follows:

a. Integument of pronotum and elytra black with greenish yellow luster; dorsal surface with scattered vestiture of long setae. Tarsi with rings of long setae..... ***M. pokornyanus***



Figs. 5–8. *Macrodactylus noveloi*. **5)** Parameres, distal view; **6)** Parameres, lateral view; **7)** Phallobase, dorsal view; **8)** Female genital plates, ventral view.

a′ Integument of pronotum and elytra shiny black, without colored luster; dorsal surface with dense vestiture of short setae. Tarsi with rings of short setae ..... ***M. howdeni***

Etymology. Named in honor of Dr. Henry F. Howden, for his contribution to the knowledge of the Scarabaeoidea in the Americas.

Macrodactylus noveloi Arce-Pérez and Morón, new species
(Figs. 5–8)

Type Material. Holotype male: México, Michoacán, Chinicuila, Sierra de Coalcomán, Cañada El Colorín, near La Nuez, 1,050 m, cloud forest, 5-VII-2005, R. Novelo (IEXA). Allotype female: same data as holotype (IEXA). Paratypes: same data as holotype (10 pairs) (IEXA), same data as holotype (6 pairs) (MXAL), same data as holotype (10 males, 7 females) (RAPC, CMCN, CNIN, UAEH, UNSM). México, Nayarit, El Pichón, 25-VI-1963, P.S. Barker (1 male);

same data except W. A. Foster (4 females); same data except J. Doyen (1 male, 2 females); Nayarit, 3 millas NW, Santa María del Oro, 27-VI-1963, J. Doyen (2 males) (EMEC).

Diagnosis. This species is distinguished by the following combination of characters: integument blackish red with weak golden shine, antennal club unicolored, elytra, protibiae, and femora yellowish red, tarsi black without rings of setae, dorsally with vestiture of scale-like, erect, yellow setae (dense on pronotum); ventral vestiture long, recumbent.

Description. Holotype male: Body length 11.0 mm; humeral width 3.5 mm. Color: blackish red with weak golden shine, pronotum, scutellum, pygidium, and tarsi black; antennae, elytra, femora, and protibiae yellowish red. Surface dorsally with vestiture of scale-like, erect, yellowish white setae (dense on pronotum); ventral vestiture long, recumbent. *Head:* Form elongate, clypeus, maxillary and labial palpi reddish black, clypeus trapezoidal, anterior border nearly straight; mentum elongate oval, longitudinally furrowed, anterolateral emargination exposing basal segment of labial palpus. *Thorax:* Pronotum hexagonal, convex, 2.92 mm long, 2.80 mm wide; prosternal process long, slightly flattened and with rounded apex, visible in frontal view; scutellum black, subtriangular with rounded apex; elytra yellowish red with vestiture yellow and with few scale-like, black setae on base; metasternum with few scale-like short, thick, black setae between meso- and metacoxae. *Abdomen*: Sternites 2-5 moderately concave at middle, sternites 2–4 with 2–3 spine-like, black, long setae on each side of midline; length of sternite 5 twice length of sternite 4, with 6 long setae; sternite 6 ovate, with scattered spine-like, black, long setae. Pygidium elongate oval, with dense vestiture of scale-like setae and some slender setae at apical border. *Legs:* Profemur with subtriangular projection near base. Mesotibiae widened towards apex, with 2 long, narrow, straight, acute spurs and long, spine-like setae around apex. Tarsi enlarged, without rings of white setae. *Genitalia*: Parameres stout, glabrous, completely fused dorsobasally, widely curved towards apex, forming an oval in distal view; each apex weakly lanceolate (Figs. 5–7).

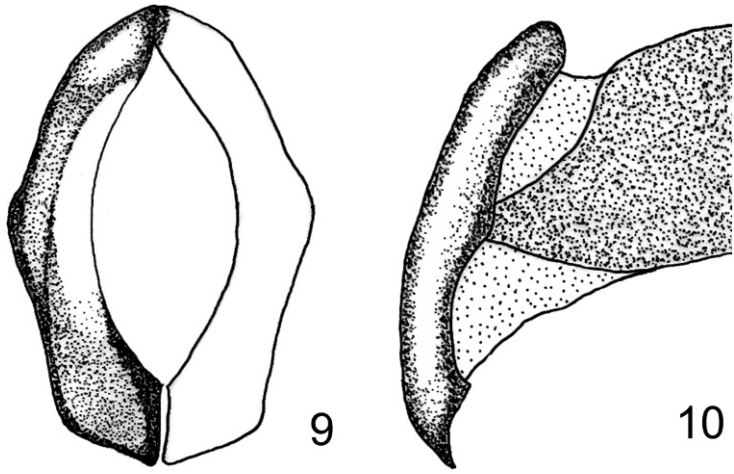
Allotype Female. Body length 11.0 mm, humeral width 3.5 mm. Similar to male except as follows: pronotum 2.88 mm wide, 2.80 mm long; elytra with long, slender setae on base and on suture; mesotibial spurs long and acute as in males. Genital plates ovate, apex asymmetrical and external border slightly sinuate (Fig. 8).

Variation. The specimens from Nayarit have the spine-like setae on abdominal sternites 2-4 more slender and reddish than the specimens from Michoacán. Also, the pygidium is yellowish red and the pronotum in some specimens is yellowish red.

Biological Data. This species inhabits cloud forest and oak forests at 780–1,200 m elevation. Some adults were collected on unidentified herbs during June (10) and July (89).

Distribution. Coalcomán Monuntains, state of Michoacán (18°39.54′N 103°24.57′W) and Sierra de Alica, state of Nayarit, Mexico (21°32′N 104°57′W (Fig. 11).

Remarks. *Macrodactylus noveloi* is included in species-group I "*lineatus*" (*sensu* Arce-Perez and Morón 2000) and is externally similar to *Macrodactylus ocreatus* Bates, but it can be distinguished by the color of the legs and genital shape. The femora, tibiae, and tarsi are dark reddish in *M. ocreatus*, but in *M. noveloi* the femora and protibiae are yellowish red, the meso- and metatibiae are black, and all tarsi are black. The parameres of *M. ocreatus* are flattened, with the distal



Figs. 9–10. *Macrodactylus ocreatus*. **9)** Parameres, distal view; **10)** Parameres, lateral view.

region wide and expanded (Figs. 9–10); in *M. noveloi*, they are convex with the distal region not expanded and the apex is long, straight, and converging (Figs. 5–6). Also, the body of *M. noveloi* is smaller, wider, and more flattened dorsoventrally than that of *M. ocreatus*.

Etymology. The new species is dedicated to Rodolfo Novelo, recognized Mexican specialist in Odonata, collector of most of the type series.

Macrodactylus submarginatus Bates, 1887

This is a rare species known only from Juquila, Oaxaca and Volcán de Colima (on the border between the states of Jalisco and Colima) (Bates 1887; Carrillo and Gibson 1960; Arce-Pérez and Morón 2000). These localities are separated by nearly 800 km in a NW-SE straight line. We examined two specimens collected in the Coalcomán Mountains, state of Michoacán, 95 km SE of Colima Volcano. This new record helps to confirm the distribution of *M. submarginatus* along the western part of the Neovolcanic Axis to the southern Sierra Madre.

Material examined was from Mexico, Michoacán, Chinicuila, Sierra de Coalcomán, Cañada El Colorín, near La Nuez, 1,050 m, cloud forest, 5-VII-2005, R. Novelo (2 males) (IEXA, MXAL).

Macrodactylus pokornyanus Arce-Pérez and Morón, 2000

This species was described from Atlacomulco in the northern area of the state of México at 2,500 m elevation. We examined two specimens collected in the eastern area of the state of México at about 2,400 m elevation. The labels of the specimens indicate "Michoacan," but taking into account the number of kilometers on the road of MEX 15, the locality is really in the municipality of Villa de Allende, state of México, in the vicinity of the border with the state of Michoacán. This new record extends the distribution of *M. pokornyanus* along the central part of the Neovolcanic Axis.

Fig. 11. New records for *Macrodactylus* in Mexico. *M. howdeni* (●), *M. longicollis* (×), *M. noveloi* (★), *M. pokornyanus* (■), *M. submarginatus* (♦).

Material examined was from Mexico, [Michoacán], state of México, El Salitre, Rt.15, km 125, 8-VII-1965, Flint and Ortiz (2 males) (UNSM).

Macrodactylus longicollis (Latreille, 1813)

This species was described by Latreille (1813) with specimens labeled as "Acapulco", but they were probably collected in the mountains on the old way to Acapulco, state of Guerrero. Bates (1887) added the locality of "Sacatepec, Oaxaca", actually referenced as "San Marcos Zacatepec, municipality of Santa Catarina Juquila, state of Oaxaca (16°08′37″N 97°21′14″W). Arce-Pérez and Morón (2000) confirmed the presence of *M. longicollis* in Sierra de Atoyac, state of Guerrero, 60 km NEE of Acapulco. We examined one male collected in Santa Catarina Juquila that confirmed the area cited by Bates. The species is not abundant but is widely distributed in the oak forests of the central part of the southern Sierra Madre at elevations of 1,200–2,030 m.

Material examined was from Mexico, Oaxaca, Santa Catarina Juquila, 24-V-2004, 2,030 m, G. Nogueira (1 male) (MXAL).

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