

Taxonomy and systematics

## Notes on Cybistrinae from Mexico (Coleoptera: Dytiscidae), with the description of 2 new species of *Trifurcitus*

### *Notas sobre Cybistrinae de México (Coleoptera: Dytiscidae), con la descripción de 2 especies nuevas de Trifurcitus*

Roberto Arce-Pérez, Andrés Ramírez-Ponce \*

Instituto de Ecología, A.C., Red de Biodiversidad y Sistemática, Carretera Antigua a Coatepec Núm. 351, El Haya, 91073 Xalapa, Veracruz, Mexico

\*Corresponding author: andres.ramirez@inecol.mx (A. Ramírez-Ponce)

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#### Abstract

A bibliographic and museum review is carried out on the Cybistrinae species of Mexico, as well as comparative analysis with species from South America, concluding that *Trifurcitus fallax* (Aubé, 1838) has been wrongly cited for Mexico. Additionally, 2 new species are described as the first country-specific records, *Trifurcitus mexicanus* sp. nov. from the state of Chiapas, and *T. maya* sp. nov. from the state of Yucatán. Also, new state records are provided for *Bifurcitus lherminieri* (Guérin-Méneville, 1829) in Mexico. Future reviews of specimens under the names *Bifurcitus*, *Cybister*, *Metaxydytes*, and *Trifurcitus* are recommended as this could likely uncover more new species.

**Keywords:** Coleoptera; Dytiscidae; Cybistrinae; *Trifurcitus*; *Bifurcitus*; Mexico; New species

#### Resumen

Se realiza una revisión bibliográfica y museística de las especies de Cybistrinae de México, así como un análisis comparativo con especies de Sudamérica, concluyendo que *Trifurcitus fallax* (Aubé, 1838) ha sido citada erróneamente para México. Adicionalmente, se describen 2 especies nuevas como los primeros registros específicos para el país, *Trifurcitus mexicanus* sp. nov. del estado de Chiapas, y *T. maya* sp. nov. del estado de Yucatán. También se proporcionan registros nuevos estatales para *Bifurcitus lherminieri* (Guérin-Méneville, 1829) para México. Se recomiendan revisiones futuras de especímenes bajo los nombres *Bifurcitus*, *Cybister*, *Metaxydytes* y *Trifurcitus*, ya que éstos, probablemente, podrían incluir más especies nuevas.

**Palabras clave:** Coleoptera; Dytiscidae; Cybistrinae; *Trifurcitus*; *Bifurcitus*; México; Especies nuevas

## Introduction

Until recently, the subfamily Cybistrinae Sharp, 1880 included 1 tribe, 7 genera, 8 subgenera and 129 species with 10 subspecies worldwide (Nilsson & Hájek, 2023), including 2 genera from the New World: *Megadytes* Sharp, 1880, with 21 species in 4 subgenera, and *Cybister* Curtis, 1827, with 6 species in 2 subgenera and additional species without subgeneric assignment (Arce-Pérez et al., 2021; Nilsson & Hájek, 2023; Trémouilles, 1984, 1989a, b; Trémouilles & Bachmann, 1980). A phylogenetic study (Miller et al., 2024) based on morphological characters, focused on reclassifying the genera of Cybistrinae, updated the information including 1 tribe, 12 genera, 4 subgenera and 130 species with 10 subspecies (Miller et al., 2024). In this work, for the New World 7 genera were included: *Bifurcitus* Brinck, 1945 (3 species), *Cybister* Curtis, 1827 (5 species in 2 subgenera), *Megadytes* Sharp, 1882 (2 species), *Metaxydytes* Miller et al., 2024 (9 species), *Nilssonodytes* Miller et al., 2024 (1 species), *Paramegadytes* Trémouilles & Bachmann, 1980 (2 species), and *Trifurcitus* Brinck, 1945 (6 species).

Of the 7 genera cited for the New World, 4 are reported for Mexico, *Bifurcitus* (2 species), *Cybister* (3 species), *Metaxydytes* (2 species), and *Trifurcitus* (1 species) (Arce-Pérez et al., 2021; Miller et al., 2024; Nilsson & Hájek, 2023). The only species of *Trifurcitus* cited for Mexico by Sharp (1882a, b), *T. fallax* (Aubé, 1838), was described from French Guyana. Dejean (1836: 60) lists it as *Trochalus fallax* from Cayenne. This name was made available by Aubé (1838: 54) as *Cybister fallax*. Sharp (1882a: 710 and 1882b: 47) placed the species in his new genus *Megadytes*, and Brinck (1945: 8) in his new subgenus *Trifurcitus* of *Megadytes*. Currently the species is classified in the genus *Trifurcitus* (Miller et al., 2024). Sharp (1882a, b) studied a female from the Edwin Brown collection reported it from Mexico without a precise locality. Wilke (1920: 247) cited 1 specimen from the British Museum from “Mexico” and another from “Orizaba-Mexico” (State of Veracruz). Zimmermann (1920: 256) listed Sharp’s specimen but cited it incorrectly from Central America. Trémouilles and Bachmann (1980: 125) and Trémouilles (1989b: 161) cited the species for Argentina, Bolivia and Brazil. Libonatti et al. (2013: 164) were the last to provide a new record of the species (Chaco province, Argentina). The larval stages of *T. fallax* were described by Ferreira (1995: 315) and Michat (2010: 381). Arce-Pérez et al. (2021: 331) provided a key for all the New World Cybistrinae species found north of Belize and Guatemala, including *T. fallax*.

For Mexico, there are no records later than those of Sharp (1882a, b) and Wilke (1920). Now, 104 years after, while reviewing Cybistrinae material from different

Mexican collections, some specimens were found identified as *T. fallax*. However, while undertaking a comparative analysis with specimens from Argentina, Bolivia, Brazil and México housed in different museums, Sharp’s opinions stand out: “I have seen only two individuals of this species, one of them, from Dejean’s collection, was there labelled “*Trochalus fallax mihi*, h. in Cayenne, D. Lacordaire”: the other was in Edwin Brown’s collection and labelled in his handwriting “*Cybister flavocinctus*, Chev., Mexico.” The determination being wrong it is probable that the locality also of this latter specimen may be erroneous. Cayenne.; 1 Mexico. 1107” (Sharp, 1882a). “This little-known species is represented in Salle’s collection by a single female labelled “*Trogus flavocinctus*”, this determination, however, was erroneous and the specimen, a very fine one, agrees with the 2 other female, these being all that we know of the species” (Sharp, 1882b).

Based on the above, we consider that *T. fallax* is only distributed in South America (Argentina, Bolivia, Brazil and French Guiana), and therefore, the Mexican specimens correspond to another species, whose description is the objective of the present work.

## Materials and methods

Type material and other specimens of *Trifurcitus fallax* (Aubé, 1838) were requested in different national and foreign museums. Four male specimens from Mexico were examined (CNIN), plus another dissected one and housed at BMNH by photographic comparison. The 4 Mexican specimens were hydrated in a humid chamber for 2 days, their genitals were removed and cleaned in hot water. The median lobe and parameres were disarticulated and mounted with the specimens. Two male specimens dissected from Argentina (MACN) determined by Trémouilles and Bachmann (1980) were reviewed in photographs as well as undissected specimens from Brazil and Bolivia deposited in collections in Germany (ZSM) (MZSP) and Brazil, that were used for comparison.

The Mexican specimens were studied with a LEICA MZ8 stereomicroscope and photographed with a Zeiss Stemi SV6 stereomicroscope, stacking several photographs into a final image. The final plates were edited in Photoshop CS6. The reviewed specimens come from the following collections —specimens reviewed directly: Colección Nacional de Insectos (CNIN), Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico (S. Zaragoza); Colección de Insectos del INECOL (IEXA), Instituto de Ecología A.C., Xalapa, Veracruz, Mexico (R. Arce-Pérez). Specimens reviewed by photographs: Museo Argentino de Ciencias Naturales

(MACN), Buenos Aires, Argentina (P. Mulieri); Muséum National d'Histoire Naturelle (MNHN), Paris, France (website); Museu de Zoologia da Universidade de São Paulo (MZSP), São Paulo, Brazil (S. Casari); The Natural History Museum (BMNH), London, UK (M. Geiser); and Zoologische Staatssammlung München (ZSM), Germany (M. Balke).

## Results

Historiographical analysis allowed us to trace the depository of type material from Cayenne (French Guiana). Unfortunately, the specimens are lost, as it is the material from Bolivia (MNHN) identified by Trémouilles and Bachmann (1980). Only 1 female syntype was compared from the website of MNHN, and dissected males were also used from Mexico (BMNH) and Argentina (MACN), and specimens from Brazil (MZSP) and Bolivia (ZSP) (not dissected) for comparison via photographs.

When trying to compare the diagnostic characters presented in the original description made by Aubé (1838), the diagnosis of Sharp (1882a, b), and the diagnosis of Trémouilles and Bachmann (1980), the identity of Mexican specimens of *T. fallax* could not be confirmed. This was also observed in studies that addressed with the larva of *T. fallax*; when describing the third stage (1 from Brazil and another from Argentina), they appear as different species (Fig. 1a, b) (Ferreira, 1995; Michat, 2010), probably

because the associated adults were different species, but were identified with the key of Trémouilles and Bachmann (1980) arriving to *M. (T.) fallax*.

The larva illustrated by Michat (2010) is now recognized as *T. fallax* (Miller et al., 2024). Also by making the determination by photographic comparison with specimens determined by specialists (determination labels of Guignot [1955, 1958], Bachmann [1979] and Trémouilles [1985]) deposited in several museums (MZSP, ZSM, BMNH) (Fig. 2a, f), among them a syntype female (MNHN), and by morphological comparison with the specimens 7715 and 7725 of the Museo Argentino de Ciencias Naturales, where it was observed that they are generally similar to the specimens from Mexico (length, shape, color, punctures) but differ in the diameter of the dorsal puncture and of ventrites III to V, being slightly thicker and denser in the South American specimens (Fig. 3a, h).

The specimens from Argentina, Bolivia and Brazil have transverse rows on ventrites III to V, plus a slight central accumulation of points in ventrite III (Fig. 3b, d, f, h); while the Mexican specimens present finer punctuations, with a transverse row in ventrites IV and V, and few central punctuations in ventrite III (Figs. 5b, 8b). The basal impression of the prosternal process in the specimens from Argentina (MACN) is variable, being present in specimen 7715 and completely absent in specimen 7725 (Fig. 3b), while in the specimens from

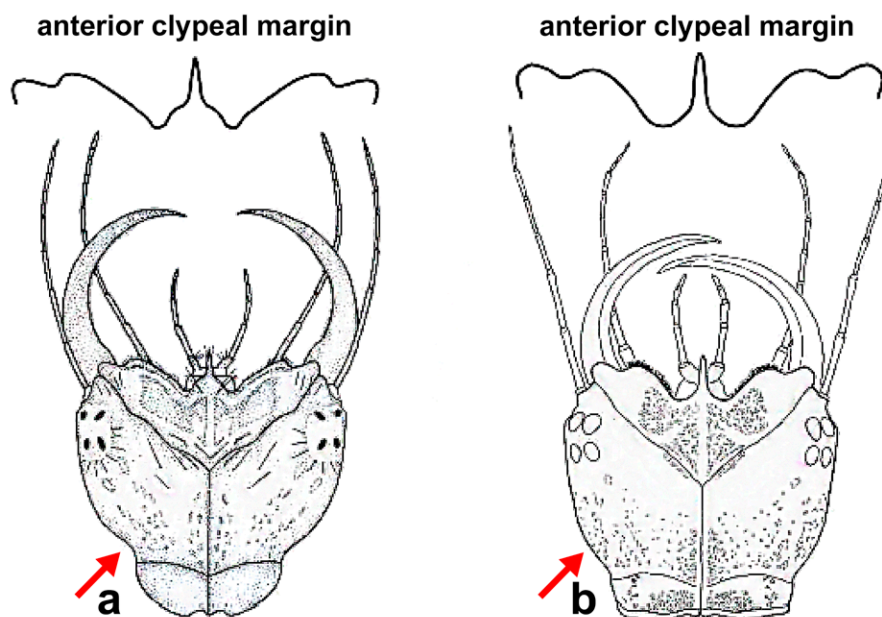


Figure 1. Front view of the head of larva III of *Trifurcitus fallax*. a) *Sensu* Ferreira (1995); b) *sensu* Michat (2010).



Figure 2. Identification labels of *Megadytes fallax* (Aubé, 1838) deposited in different museums: a-c, Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; d, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil; e, f, Zoologische Staatssammlung München, Germany.

Mexico it is present in *Trifurcitus mexicanus* nov. sp. (Fig. 5b, d), and absent in *T. maya* nov. sp. (Fig. 8b), also visible in the Bolivian specimen (Fig. 3d) and not observable in the Brazilian specimen (Fig. 3h).

Furthermore, the shape of the median lobe of the male genital in the Argentinean specimens and in the illustrations by Trémouilles and Bachmann (1980) is narrower and sharper at the apex (Fig. 4a, b, d, e) while in Mexican specimens it is slightly to moderately wider (Figs. 6a-f; 8c-e). In addition, the distance between the apex of the ventral sclerite and the apex of the median lobe appears to be smaller in South American specimens (these measurements may vary due to dehydration) (Figs. 4b, e, 6a, e, f, 8d, e).

The distribution of the species of *Trifurcitus* is Neotropical (Argentina, Bolivia, Brazil, French Guiana, and Panama), with *T. fallax* being recorded from Argentina, Bolivia, Brazil, and French Guiana (Nilsson & Hájek, 2023; Trémouilles & Bachmann, 1980), making its presence in Mexico unlikely. Historical analysis, morphological comparison and communication with specialists of the group allow us to support what was mentioned by Sharp (1882a, b), that *T. fallax* does not reach Mexico, and to report 2 new species of this genus for Mexico, *T. mexicanus* nov. sp. Arce-Pérez & Ramírez-Ponce for Chiapas, and *T. maya* nov. sp. Arce-Pérez &

Ramírez-Ponce for Yucatán, representing the first records of the genus *Trifurcitus* Brinck for Mexico.

## Descriptions

*Trifurcitus mexicanus* Arce-Pérez & Ramírez-Ponce, sp. nov.

(Figs. 5a-d, 6a-g)

<http://zoobank.org/urn:lsid:zoobank.org:act:C402DD76-7886-4E02-A8CD-20961D87851F>

**Differential diagnosis.** The new Mexican species can be differentiated from the South American ones by the diameter of the dorsal punctuation, and of ventrites III to V (Fig. 5a, b), being slightly thicker and denser in the South American specimens (Fig. 3a-h). In addition, the shape of the middle lobe of the male genital in South American specimens is narrower and sharper at the apex (Fig. 4a, b, d, e), while in Mexicans it is slightly to moderately wide (Fig. 6a, b, d, e).

**Description.** Holotype (male, IEXA). Habitus and general surface structure: dorsal (Fig. 5a); body oval, maximum width behind of the half of the elytral length. Length 29 mm, maximum width 18 mm. Dorsal coloration dark olive green shiny, with wide reddish-yellow stripe along the lateral margins of the pronotum and elytra, near the elytral apex the olive-green coloration is interspersed



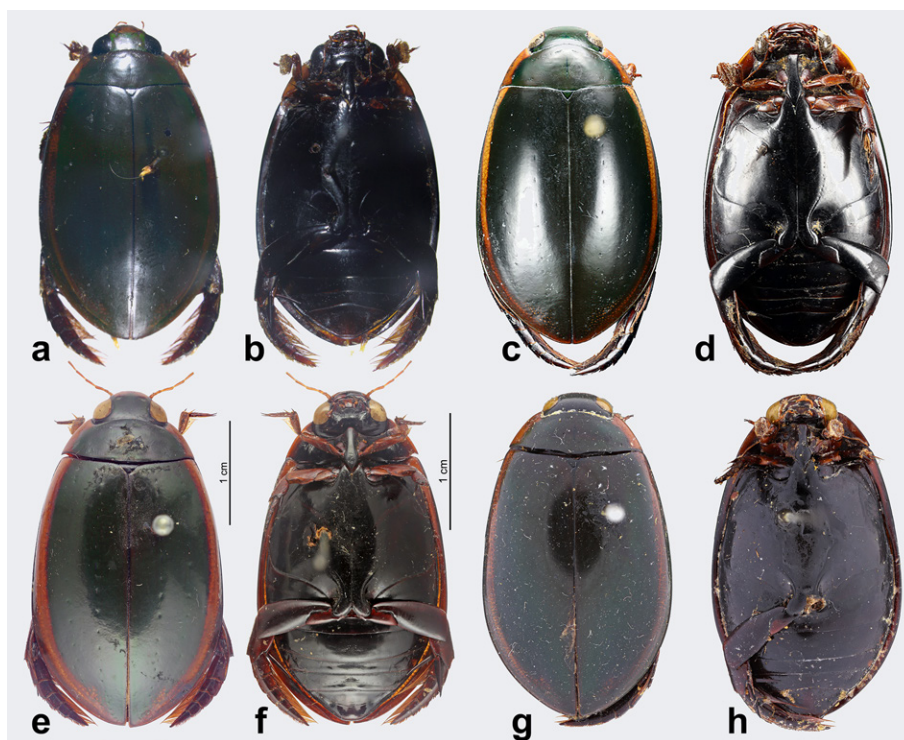


Figure 3. Dorsal and ventral view of *Trifurcitus fallax* housed in different museums: a, b, Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; c, d, Zoologische Staatssammlung München, Germany; e, f, Muséum National d'Histoire Naturelle Paris, France; g, h, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.

with yellow punctuation of the lateral stripe; clypeus anteriorly and labrum reddish-yellow. Ventral coloration (Fig. 5b) black, with reddish-yellow palps and antennae, yellowish-reddish front and middle legs, black hind legs. Sculpture on dorsum and venter largely smooth; with punctuations of variable diameter and faint wrinkles and striae; the setation is minute, slender and sparse, present in punctuations and often almost imperceptible. Median lobe wider in its basal half (0.55 mm), narrowing apically, apex slightly rounded (Fig. 6a, e). Dorsal surface (Fig. 5a, c), head: clypeus with almost straight anterior margin, labrum with slightly sinuous anterior margin, with small central concavity. Clypeal line incomplete, widely interrupted medially. Two small, punctuate grooves transverse, immediately posterior to anterior margin. Strongly punctuate oval longitudinal depression on each side posterior to incomplete clypeal line. Short row of small punctures along the posterior half of inner margin of eyes (Fig. 5c). Antennae filiform. Both palps are slender, but slightly thicker than the reddish-yellow antennae. Setae very short, sparse in the grooves of the clypeus; thicker and denser in the concavity of the labrum;

slightly longer in the longitudinal depression posterior to the interrupted clypeal line; very short and sparse on the inner margins of the eyes. Surface of the vertex with slight longitudinal wrinkles. Pronotum: anterior margin with short rows of small punctures interrupted medially; line of punctures slightly thicker, extending laterally reaching inner margin of reddish-yellow stripe; inner margin of stripe with scattered row of thicker punctures extending from base to apex. Surface with faint longitudinal striations and wrinkles, mainly in the posterior region, and a slight accumulation of punctures on each side of the disc. Lateral margin without edge, with complete yellowish-reddish band, which exceeds the yellowish-reddish border of the hypomeron. Short setae on the punctuation of the anterior edge, lateral margins and on the yellowish-reddish band. Elytra: 3 longitudinal lines defined by broad and widely separated punctuations; first line with slightly elongated punctuations reaching near the apex; second and third lines with circular punctuations; third line at inner edge of reddish-yellow stripe. Elytral margins with a thick, complete border and minute, irregular punctuation; dark olive-green margins in anterior half. Reddish-yellow band



Figure 4. Lateral and ventral view of the middle lobe and left paramere of *Megadytes (T.) fallax* housed at Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina: a-c, specimen number 7715; d-f, specimen number 7725.

along the margin of the elytra, not reaching the margin or the epipleura, more or less of equal width throughout its length, defined as a network of irregular polygonal

pigments, which mixes with the dorsal olive-green colour as scattered dots. Very sparse setiferous punctuation on the yellow stripe and lateral edge; very short setae. Ventral

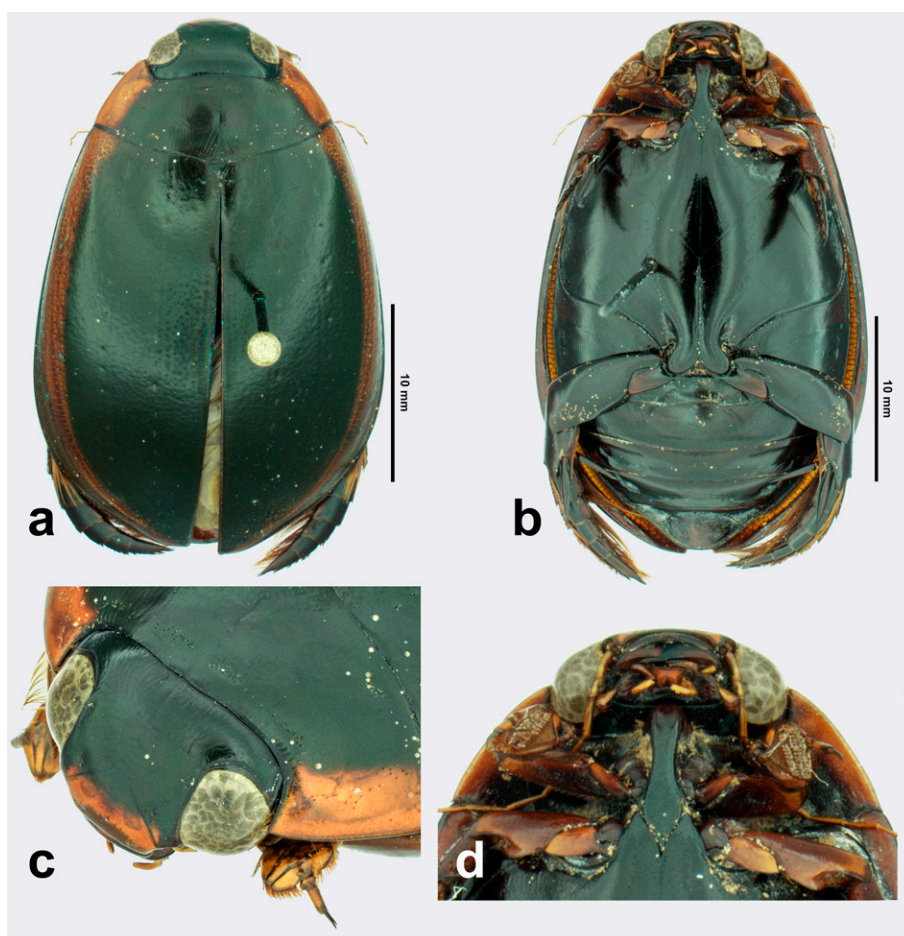


Figure 5. Habitus of *Trifurcitus mexicanus* sp. nov. a, dorsal view; b, ventral view; c, oblique view of the head; d, view of the prosternal process.

surface (Fig. 5b, d), head: shiny black; mouthparts dark reddish; antennae and palps reddish-yellow. Prothorax: shiny black; hypomeron yellowish-reddish. Prosternal process subrectangular in anterior half, flat surface, anterior edge not notched, continuing into an oval depression with rounded apex; posterior half widened and lanceolate, pointed, reaching the deeply triangular anteromedial process of the metaventrite; lanceolate region with a lateral rim, and the apex acute with transverse striations (Fig. 5d), length 4.1 mm long by 1.3 mm wide. Pterotorax: epipleuron reddish-yellow, broad, with slight mesial narrowing. Suture between metaventrite and metacoxal plates weakly marked. Metaventrite with conspicuous curved row punctuations in anteromedial region. Metacoxal lines strongly divergent anteriorly, not reaching anterior margin of metaventrite; with row of broad punctures extending beyond metacoxal lines to

suture of metaventrite. Posterior margin of metacoxal processes with deep central triangular incision; lobes of processes broadly rounded. Abdomen: colour: shiny black, with a semicircular reddish-yellow spot on lateral margin of ventrites III to V; with a slight lateral depression in ventrites II to VI, deeper and expanded in ventrites V and VI; suture between ventrites I and II clearly marked; ventrite III with few, tiny punctures and wrinkles on middle and parallel wrinkles on distal margin; ventrites IV and V with transverse line of small punctures and superficial wrinkles (evident in ventrite V); ventrite VI with uniformly rounded apex, with a slight transverse depression, with the lateral depression deeper and more extended, with few, tiny scattered punctures. Setiferous puncture, with very short yellowish setae. Legs: front and middle legs reddish-yellow, hind legs black, with a light reddish trochanter in its apical half. Protarsomere





Figure 6. Male genitalia of *Trifurcitus mexicanus* nov. sp. (holotype): a-c, full ventral, dorsal and oblique view of parameres and median lobe; d-f, lateral, ventral and oblique view of the middle lobe; g, lateral view of left paramere.

I-III enlarged, oval-shaped; 1.3 mm long by 1.9 mm wide; protarsomere I with numerous minute sucking setae at base and a row of large sucking setae at apex, protarsomere II with only 1 row of large sucking setae, protarsomere III with 2 rows of large sucking setae, protarsomere V with a pair of long, black, curved, sharp claws; anterior claw longer and thicker. Mesotarsomeres dark; mesotarsomeres I-IV with a series of setae near apical margin (posteroventrally); mesotarsomeres I-II with abundant ventral rows of long pale-yellow setae; claws sharp and curved, the anterior one longer and thicker; both longer and thicker than the protarsal claws. Metafemur with rounded dorso-distal angle, weakly acute (almost straight), not pointed. Metatibia with 2 apical spurs, the outer one noticeably thinner than the inner one and with trifold apex. Last metatarsomere with 2 straight

and sharp claws of equal length, the outer one slightly wider. Male genitalia (Fig. 6a-g). Median lobe wider in its basal half (0.55 mm), narrowing apically, apex slightly rounded (Fig. 6a, e). Median lobe in lateral view, length 4 mm (Fig. 6d, f); ventral, with maximum width 0.55 mm (Fig. 6e); ventrolateral (oblique view) 4 mm (Fig. 6f), and median sclerite 3 mm (Fig. 6e). Distance between the apex of the median sclerite and the apex of the median lobe 1 mm (Fig. 6e); Left paramere 4 mm, with row of external ridges, in oblique view, the ridges that reach the ventral margin in the apical 3/3 simulate small teeth (Fig. 6g).

Variation. A male specimen like the holotype (without genitalia) from Chiapas, Municipality of Cintapala (16°37' N, 93°46' W), 28.III.1985, Col. M.L. Lozano. "Small (length 27 mm, width 16.5 mm), dorsally, slightly brownish coloration; surface on the pronotum with more



wrinkles on the disk; more evident stippling and wrinkles on ventricles III to V.”

Females. Not present in the material studied. According to Trémouilles and Bachmann (1980), females present sexual sculpture formed by curved, anastomosing lines, or without sexual sculpture, and according to Aubé (1838), the females differ only by the simplicity of the front legs.

#### *Taxonomic summary*

*Type locality:* Mexico, Chiapas, Municipality of Concordia, km 17 carretera Jaltenango-Revolución Mexicana, 15°58' N, 92°48' W, elevation 575 m asl.

*Type material:* holotype: ♂, México: Chiapas/ Municipio de Concordia, 15°58' N, 92°48' W/18-V-2012, Col. D. Reynoso-Velasco [typed, white label], “holotipo/ *Trifurcitus mexicanus* nov. sp./Arce-Pérez & Ramírez-Ponce 2024” [typed, red label] (IEXA).

*Habitat:* *Megadytes* species have been reported to be associated with open, sunny environments in permanent and temporary lentic waters with dense vegetation; however, detailed habitat preferences are unknown for most species (Miller & Bergsten, 2016), except for *Bifurcitus iherminieri* (Hendrich et al., 2019). The specimen from Chiapas (Municipality of Concordia), was collected in a sunny and exposed area, on the banks of a permanent, slow-flowing stream, with an average depth of 80 cm, among grasses that grow on the riverbank (Fig. 7a, b) (Daniel Reynoso Velasco, personal communication).

*Distribution:* this species is known from Mexico, Chiapas, but being a species of a Neotropical genus, it is likely that it is also distributed in Oaxaca and Guatemala on the Pacific coast.

*Etymology:* because it is the first corroborate record of the genus *Trifurcitus* Brinck for the country, this species is named *mexicanus*.

#### *Remarks*

*Trifurcitus mexicanus* sp. nov. can be differentiated from *Trifurcitus maya* sp. nov. by the following characters (*Trifurcitus maya* nov. sp. [in brackets]). *Trifurcitus mexicanus* presents an oval depression with rounded apex in the anterior half of the prosternal process (Fig. 5d) [without depression (Fig. 8b)]; ventrites IV and V with a transverse line of small punctures and superficial wrinkles (Fig. 5b) [ventrite IV without apparent punctuation or wrinkles (Fig. 8b)]; Male genitalia in ventral view with broad median lobe in its basal half (0.55 mm), slightly narrowing apically and with rounded apex (Figs. 6a, e) [median lobe slender in basal half (0.53 mm), narrowing apically and with apex acute (Fig. 8d)].

*Trifurcitus maya* Arce-Pérez & Ramírez-Ponce, sp. nov. (Fig. 8a-f)

<http://zoobank.org/urn:lsid:zoobank.org:act:DEA31260-8EC4-47D7-AE64-9EA426F102BF>

*Differential diagnosis.* In *Trifurcitus mexicanus* Arce-Pérez & Ramírez-Ponce.

*Description.* Habitus and general surface structure: dorsal (Fig. 8a): body oval, maximum width behind the half of the elytral length. Length 29 mm, 17 mm wide. Coloration bright dark olive green, with a broad reddish-yellowish stripe along the lateral margins of the pronotum and elytra, near the elytral apex interspersed with the yellow punctuation of the lateral band; clypeus anteriorly and labrum reddish-yellowish. Ventral (Fig. 8b): black coloration with reddish-yellow palps and antennae, dark reddish front and middle legs, black hind legs. Sculpture dorsal and ventral largely smooth, with punctuations of variable diameter and faint wrinkles and striae; the setation is minute, slender and sparse, present only at punctuations and often almost imperceptible. In ventral view, with median lobe slender in its basal half (0.53 mm), narrowing apically, with apex slightly acute (Fig. 8c-e). Dorsal surface (Fig. 8a), head: clypeus with almost straight anterior margin, labrum with slightly sinuous anterior margin, with small central concavity. Clypeal line incomplete, widely interrupted medially. Two small, punctuations grooves transverse, posterior to anterior margin. A punctuate oval depression on each side, posterior to incomplete clypeal line. A short line of small punctures along posterior half of inner margin of eyes. Antennae filiform. Both palps thin, like the antennae, reddish-yellow. Setae very short, sparse in the grooves of the clypeus; denser and thicker in the concavity of the labrum; slightly longer in the oval depression posterior to the interrupted clypeal line; very short and sparse on the inner margins of the eyes. Front surface with slight longitudinal wrinkles on the posterior half. Pronotum: anterior margin with short rows of small punctures interrupted medially; line of slightly thicker punctures extending laterally, reaching inner margin of reddish-yellowish stripe; inner margin of stripe with scattered row of thicker punctures extending from base to apex. Surface with faint dark longitudinal wrinkles, mainly in posterior region, and a slight accumulation of punctures on each side of disc. Lateral margin without border, with complete reddish-yellowish stripe, extending beyond reddish-yellowish border of hypomeron. Short setae on anterior margin puncture, lateral margins and on reddish-yellowish stripe. Elytra: 3 longitudinal lines defined by wide and widely separated punctuation; first line with



Figure 7. Habitat of *Trifurcitus mexicanus* sp. nov., in La Concordia Chiapas, México.

slightly elongated punctuations reaching close to the apex; second and third lines with circular punctuations; third line on the inner edge of the reddish-yellowish stripe. Elytral margins with a thick complete border and tiny, irregular punctuations; dark olive-green margins in their anterior half. Reddish-yellowish stripe along the margin of the elytra that does not reach the margin or the epipleura, more or less of equal width throughout its length, defined as a network of irregular polygonal pigments, which mixes with the dorsal olive-green color as scattered dots. Very sparse setiferous punctuations on the reddish-yellowish stripe and lateral edge; very short setae. Ventral surface (Fig. 8b), head: shiny black; mouthparts dark reddish; antennae and palps dark yellowish reddish. Prothorax: shiny black; hypomeron dark reddish-yellowish. Prosternal process subrectangular in anterior half, smooth and flat surface, anterior edge not notched or depressed; posterior half widened and lanceolate, pointed, reaching the deeply triangular anteromedial process of the metaventrite; lanceolate region with a lateral rim, and the apex acute with transverse striations. Pterothorax: epipleuron dark reddish-yellow, broad, with slight mesial narrowing. Suture between metaventrite and metacoxal plates weakly impressed. Metaventrite with a curved row of small punctuations in the anteromedial region. Metacoxal lines strongly diverging anteriorly, not reaching anterior margin of metaventrite; with row of broad punctuations extending beyond metacoxal lines to suture of metaventrite. Posterior margin of metacoxal processes with deep central triangular incision; lobes of processes broadly rounded.

Abdomen: glossy black, with a slight reddish-yellow semicircular macule on the lateral margin of ventrites III to V; a slight lateral depression in ventrites II to VI, slightly deeper and expanded in ventrites V and VI; suture between ventrites I and II clearly marked; surface of ventrite II with faint parallel wrinkles on distal margin;

ventrite III with few and tiny punctures in the center and parallel wrinkles in the distal region; ventrite IV without apparent puncture, but with scattered faint surface striae; ventrite V with a transverse line of few punctures and elongated wrinkles that do not reach the lateral depression; ventrite VI with uniformly rounded apex; with a slight transverse depression, and with lateral depression surrounded by slight striae, with scattered small subapical punctures. Setiferous punctuation with very short yellowish setae. Legs: fore and middle legs dark yellowish reddish, hind legs black, with pale reddish trochanter at apical half. Fore and middle legs dark yellowish reddish, hind legs black, with pale reddish trochanter at apical half. Protarsomere I with numerous tiny sucking setae at base and a row of large sucking setae at apex; protarsomere II with only 1 row of large sucking setae; protarsomere III with 2 rows of large sucking setae; protarsomere V with a pair of long, black, curved, sharp claws, the anterior 1 longer and thicker. Mesotarsomeres dark. Mesotarsomeres I-IV with a series of setae near the apical margin (posteroventrally); mesotarsomeres I-II with abundant ventral rows of long pale-yellow setae. Claws sharp and curved, the anterior 1 longer and thicker; both longer and thicker than the protarsal claws. Metafemur with rounded dorso-distal angle, weakly acute (almost straight), not pointed. Metatibiae with 2 apical spurs, the outer 1 noticeably thinner than the inner one, with trifid apex. Last metatarsomere with 2 straight and sharp claws of equal length, the outer 1 slightly wider. Male genitalia (Fig. 8c-f): parameres and median lobe; c-e) median lobe in lateral, ventral and almost lateral (oblique) views; f) paramere in lateral view. c) Median lobe in lateral view (4.23 mm), and median sclerite (2.25 mm); d) median lobe in ventral view (maximum width 0.53 mm); e) median lobe in oblique ventrolateral view (4.26 mm), and median sclerite (3 mm); distance between median sclerite and apex of lobe 1.23 mm; f) left paramere (3.98 mm), with row of



Figure 8. Habitus and genitalia of *Trifurcitus maya* sp. nov. a, b, Dorsal and ventral view of the habitus; c-e, lateral, ventral and oblique view of the middle lobe; f, lateral view of left paramere.

external ridges; the ridges reaching the ventral margin in the apical 3/3 (depending on the angle of inclination), simulate small teeth.

Variation. Paratype small. Length 27.5 mm, width 14.5 mm, dorsal and ventral punctures slightly smaller (less obvious). Median lobe in lateral view 4.15 mm; in

ventral view, with maximum width 0.50 mm, and median sclerite 2 mm; ventrolateral (oblique) 4.20 mm, and median sclerite 2.95 mm; distance between the median sclerite and the apex of the lobe 1.20 mm; left paramere with row of external ridges, 3.95 mm; the ridges that reach the ventral margin in the apical 3/3 simulate small teeth.



Another male from Mexico: total length 28.5 mm, width 14.5 mm. Dorsal and ventral punctuations slightly smaller (less evident). Median lobe in ventral view 4.20 mm, with maximum width 0.51 mm, and median sclerite 2.95 mm. Left paramere with row of external ridges 3.95 mm.

#### Taxonomic summary

*Type locality:* Mexico, Yucatán, km 90, ruta 295, Río Lagartos, 21°31' N, 88°08' W, elevation 10 m asl.

*Type material:* holotype (♂, IEXA): “Mexico: Yucatán/21°31' N, 88°08' W, 18-vi-1985/Col.: H. Velasco” [typed, white label], “holotype/*Trifurcitus maya* nov. sp./Arce-Pérez & Fery 2024” [typed, red label] (CNIN). Paratypes: 1 ♂, same data as holotype (CNIN), and 1 ♂ without precise location (collected in Mexico) (BMNH). Both paratypes with the following label: “paratype/*Trifurcitus maya* nov. sp./Arce-Pérez & Fery 2024” [typed, yellow label].

*Distribution:* this species is known from northern Yucatán, but it is very likely that it is also distributed in Quintana Roo and Campeche, between the states of the Gulf of Mexico and Yucatán.

*Etymology:* the specific name “maya” is assigned because it is the first record of the genus *Trifurcitus* for the region where the indigenous Maya people originated and developed in Mexico.

*New state records:* the giant diving beetle *Bifurcitus lherminieri* (Guérin-Méneville, 1829) is widely distributed in Mexico, recorded for the states of Campeche, Chihuahua, Jalisco, Oaxaca, Quintana Roo, Sinaloa, Veracruz and Yucatán, at elevations up to 1,480 m asl in cloud forests and temperate forests (Arce-Pérez & Reynoso-Velasco, 2022). It is now reported for the first time for the state of Nayarit, Tepic, 28-xi-1989, A. Cadena col. 1♂; and with reservation for the states of Guerrero, Acapulco, 5-xi-1970, J. Hendrichs col. (junto al mar) (1♀) and Tabasco, Villa Hermosa, Macultepec, 15/30-iv-1953, J. Hendrichs col. (1♀); Tonalá, Chico Zapote, 10-x-1953, J. Hendrichs col. (1♀) (CNIN).

#### Discussion

The fact that only 4 specimens of the genus *Trifurcitus* have been found in Mexico, a few others in South America and very few in the most important collections in the world, confirms what Miller (2013: 401) stated: “It is an interesting feature of dytiscid systematics that often the largest species are among the lesser-known taxa, while many of the smaller dytiscids have been revised using modern methods” (see also Short and McIntosh [2015: 671] for members of the family Hydrophilidae, and Arce-Pérez et al. [2021: 331] for other members of Cybisterinae,

Dytiscidae). This also highlights the lack of collection activities (e.g. by using bottle traps as explained in Hendrich et al. [2019: 530] and faunal studies in aquatic environments in Mexico, as well as the need to restore, conserve and protect water bodies in various ecosystems in protected areas (and to the extent possible also in non-protected areas) to ensure the permanence of these beetles and other aquatic invertebrates.

Finally, it is evident that there is a need to review the material stored in collections under the generic names of *Bifurcitus*, *Cybister*, *Metaxydytes* (previously *Megadytes* and *Cybister*) to detect whether specimens of *Trifurcitus mexicanus* sp. nov., or *Trifurcitus maya* sp. nov. and other undescribed species may be hidden among them.

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