

# Pliocene freshwater isopods (Crustacea: Peracarida: Isopoda) from Jalisco, Mexico

## *Isópodos (Crustacea: Peracarida: Isopoda) de agua dulce del Plioceno de Jalisco, México*

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## ABSTRACT

A new genus and species of freshwater isopod is described from Pliocene volcanic sedimentary ashes found in an ancient lake basin in the Santa Rosa Dam region, Amatitlán, Jalisco, West-central Mexico. The new isopod is represented by a few corpses and molts. Due to the relatively poor preservation, no further morphological details can be offered to the moment, but the observed features are sufficient to distinguish this isopod from any living or fossil freshwater Sphaeromatidae species. This contribution extends the stratigraphic and geographic record of fossil isopod bearing localities in Mexico, being this the youngest fossil Peracarida recorded from this country.

**Keywords:** Sphaeromatidae, new genus and species, Pliocene, lacustrine volcanic ash deposits, mass mortality.

## RESUMEN

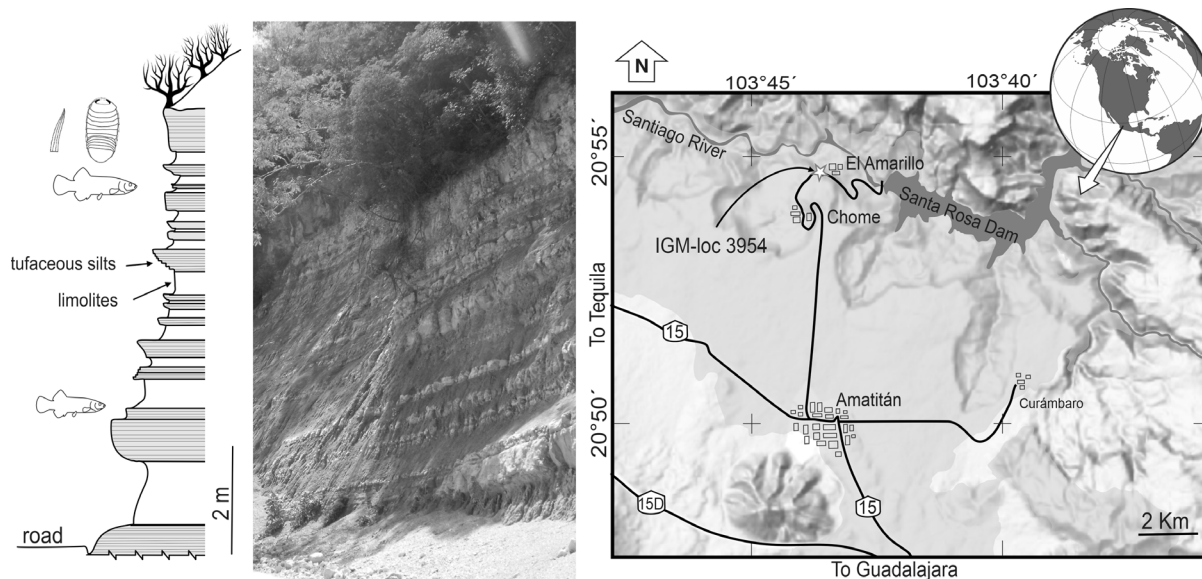
Se describe un nuevo género y especie de isópodo de agua dulce a partir de cenizas sedimentarias volcánicas del Plioceno encontradas en una antigua cuenca lacustre, en la región de la Presa Santa Rosa, Amatitlán, Jalisco, centro-oeste de México. El nuevo isópodo está representado por unos pocos cadáveres y mudas. Debido a la conservación relativamente pobre, no se pueden ofrecer más detalles morfológicos en este momento, pero las características observadas son suficientes para distinguir este isópodo de cualquier especie de Sphaeromatidae de agua dulce viva o fósil. Esta contribución amplía el registro estratigráfico y geográfico de localidades portadoras de isópodos fósiles en México, siendo este el fósil de Peracarida más joven registrado en este país.

**Palabras clave:** Sphaeromatidae, nuevos géneros y especies, Plioceno, depósitos de cenizas volcánicas lacustres, mortalidad masiva.

## 1. Introduction

During the 1980s, Professor Mario Ramírez (Facultad de Ciencias, Universidad de Guadalajara, Jalisco), and geologist Jaime Villarino-Guzmán, recovered fossiliferous Neogene rocks from the Santa Rosa Dam region, Municipality Amatitán, Jalisco (Figure 1). The fossil specimens were donated to the paleontology collection of the Instituto de Geología [currently Colección Nacional de Paleontología (CNP) of the Universidad Nacional Autónoma de México (UNAM), Mexico City]. Based on data provided by the collectors, the fossils were linked to two sites with incomplete field data, recorded in the Catalogue of Localities of the CNP under numbers IGM-loc 2449 and IGM-loc 2450. The fossil assemblage includes so far: pollen, diatoms, carbonized plants, ostracods, isopods, insects, fish remains, possible bird bone fragments, ichnofossils, and coprolites (Álvarez and Arriola-Longoria, 1972; Guzmán *et al.*, 1998). Among these fossils, the only properly identified species is the goodeid fish *Tapatia occidentalis* Álvarez and Arriola-Longoria, 1972. The presence of complete or partially preserved isopods, laying

together with some specimens of *T. occidentalis* was observed by Mario Ramírez through a handmade note provided together with his fossil donation, also mentioned in a geological study of the Amatitán region (Guzmán *et al.*, 1998), who analyzed the Neogene volcanic-sedimentary deposits present in the vicinity of the Santa Rosa Dam, calling these deposits the “Paleolago Amatitán”, where *T. occidentalis* is abundant. According to Rosas-Elguera *et al.* (2000), these sediments represent a Pliocene sequence between 5.0 to 2.5 My old, deposited into the Plan de Barrancas Santa Rosa Graben. In this region, Guzmán *et al.* (1998) interpreted four stratigraphic units along the ravine of the Santiago River between the curtain dam and the Chome village, suggesting that 100 mm of thick laminar, parallel, and millimeter-tuffaceous silt horizons (corresponding to their section C) is the only fossiliferous portion of this sequence. During a 2014 fieldwork, Alvarado-Ortega and his students found that the fossiliferous portion of Guzmán *et al.* (1998) is more complex, because the millimeter-lamination tuffaceous silts are interspersed with less-compacted, thinner greenish-gray limolites, which together form a 20 m thick sequence,



**Figure 1** Location map and stratigraphic section of locality IGM-loc 3954, north of Amatitán, Jalisco, Mexico. The stratigraphic section shows the occurrence of plant remains, fishes and isopods, near the top of the exposed sequence.

exposed 500 m alongside the El Amarillo and Chome road (Figure 1). The new exposures found in 2014 were labeled as IGM-loc 3954, registered at the CNP, UNAM.

The aim of this study is to determine the taxonomical identity of the Neogene fossil isopods of Amatitán. Specimens are deposited at the Colección Nacional de Paleontología, Instituto de Geología, Universidad Nacional Autónoma de México, Ciudad Universitaria, Coyoacán, Mexico City, 04510, Mexico.

## 2. Methodology

The fossil isopods were observed and photographed with a Zeiss Axiozoom v.16; the resulting images were digitized with a Kanvus Life 106 graphic tablet using the software Inkscape v0.92.3.

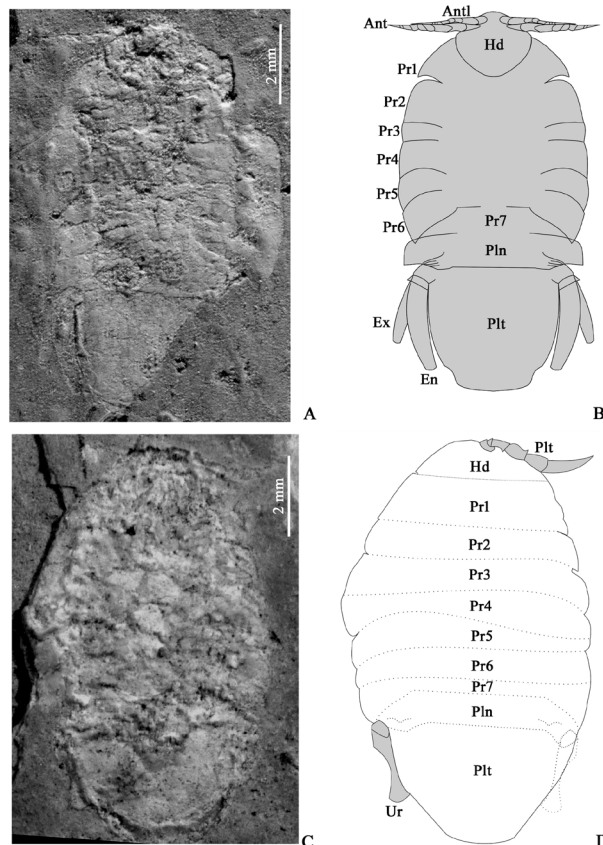
## 3. Systematic Palaeontology

Class Malacostraca Latreille, 1806  
 Superorder Peracarida Calman, 1904  
 Order Isopoda Latreille, 1817  
 Suborder *Sphaeromatidea* Wägele, 1989  
 Family *Sphaeromatidae* Latreille, 1825  
 Genus *Jaliscosphaera* n. gen.

**Type species:** *Jaliscosphaera pliocenica* n. gen. et sp., by monotypy.

**Etymology:** This name refers to the state of Jalisco, Mexico.

**Diagnosis:** Head partially inserted into pereonite 1; antennal peduncles robust. Pereonite 1 spaced from the rest. Coxal projections visible overlapped. Pleotelson with posterolateral margins with two indentations; uropods biramous finger-like, flattened, obtuse apex. *Jaliscosphaera pliocenica* n. gen. et sp. Figures 2-4.



**Figure 2** *Jaliscosphaera pliocenica* n. gen. et sp. A, holotype IGM 13091; B, drawing of same specimen; C, paratype 13092; D, drawing of same specimen. Abbreviations: Ant = antenna, Antl = antennula, Cx = coxa, En = endopod, Ex = exopod, Fs = fish, Hd = head, Pln = pleon, Plt = pleotelson, Pr = pereonite, Prp = pereopod, Ur = uropod.

**Etymology:** The name refers to the Pliocene age of volcanic ash sediments of the Santa Rosa region, Amatitlán, Jalisco, Mexico.

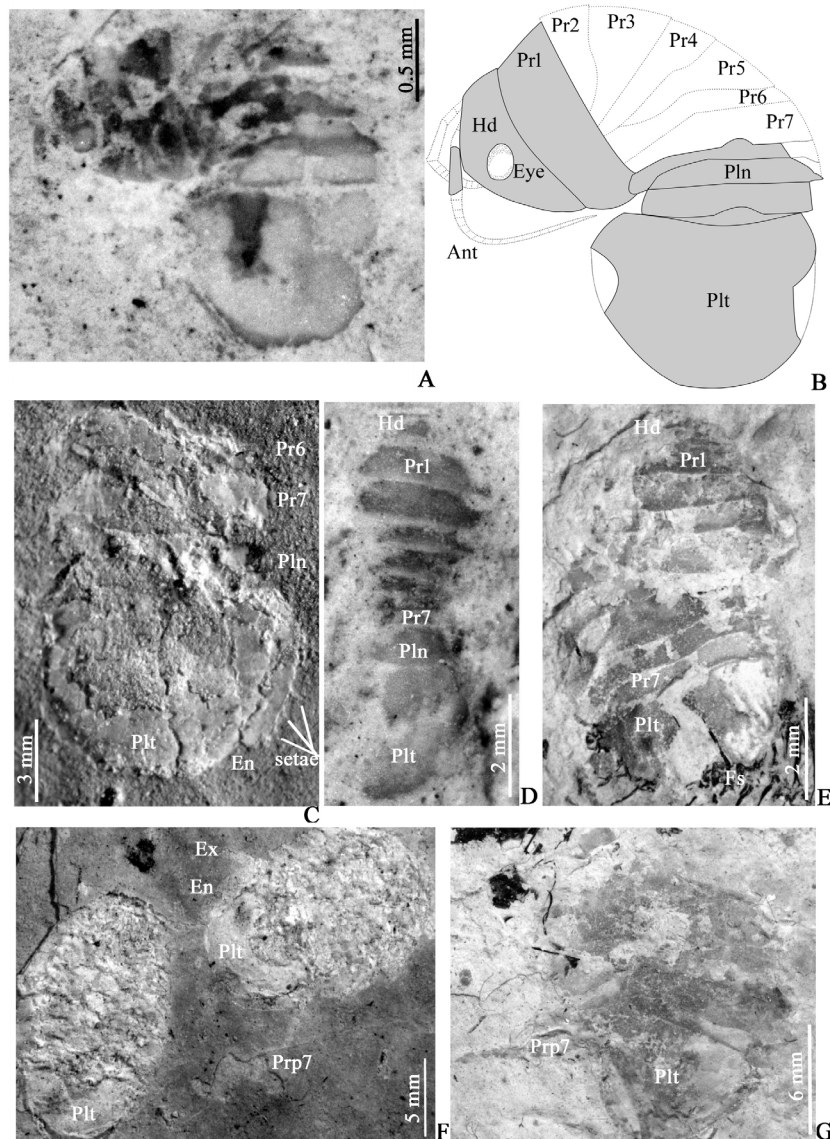
**Material:** Holotype IGM 13091; paratypes IGM 13092 to IGM 13104.

**Measurements:** See Table 1.

**Diagnosis:** Body vaulted, convex margins without setae. Pereonite 1 separated from rest, pereonite 3 reduced in length. Coxae 1 separated from the rest posteriorly triangular, coxae 2–7 pos-

teriorly triangular, slightly overlapped. Pleotelson posterolateral margins with two indentations.

**Description:** Body vaulted, convex, margins smooth, head inserted into pereonite 1. Antennae projecting laterally, extending posteriorly to anterior margin pereonite 2, with 5 peduncular segments, flagellum with 4 articles. Antennula projecting laterally, with 3 peduncular segments, flagellum with 6 articles. Pereon margins strongly convex, pereonite 1 separated from pereonites



**Figure 3** *Jalisco-sphaera pliocenica* n. gen. et sp. A, paratype IGM 13091; B, drawing of same specimen. C, paratype IGM 13092; D, paratype 13093; E, 13094; paratypes 13095 (left), and 13096 (upper right); G, paratype IGM 13097.

2–7, pereonites 2–7 overlapped. Pereopod not prehensile, ambulatory; coxae length 2.25 width; basis triangular reduced as long as coxae; ischium with external margin concave, length 2.6 width; merus subtriangular length; carpus, propodus, dactylus not well differentiated. Pleon subrectangular, width 5.3 length, 5 pleonites visible fused indicated by lateral sutures. Pleotelson subsquare, length 0.95 width, presumptively posterolateral margins with two indentations, uropods inserting anterolaterally. Uropods smooth biramous, protopod trapezoidal broader than long; exopod length 0.7 endopod length, endopod lateral margin simple, smooth, apex obtuse.

**Remarks:** *Jaliscosphaera pliocenica* n. gen. et sp. is the first freshwater isopod recorded from the Pliocene from the western slope of Mexico, the rest of the fossil isopods belong to Cretaceous marine environments and terrestrial species as inclusions in early Miocene amber (Feldmann *et al.*, 1998; Vega *et al.*, 2005, 2006, 2018, 2019, 2022; Serrano-Sánchez *et al.*, 2007, 2015, 2016; Broly *et al.*, 2017, 2018; Bruce *et al.* 2021). Since most of the specimens of *Jaliscosphaera pliocenica* n. gen. et sp. are preserved in ventral view, the morphological description is limited, although sufficient to erect a new genus and species. Poorly preserved pereopod and no pleopods are preserved and the sex could

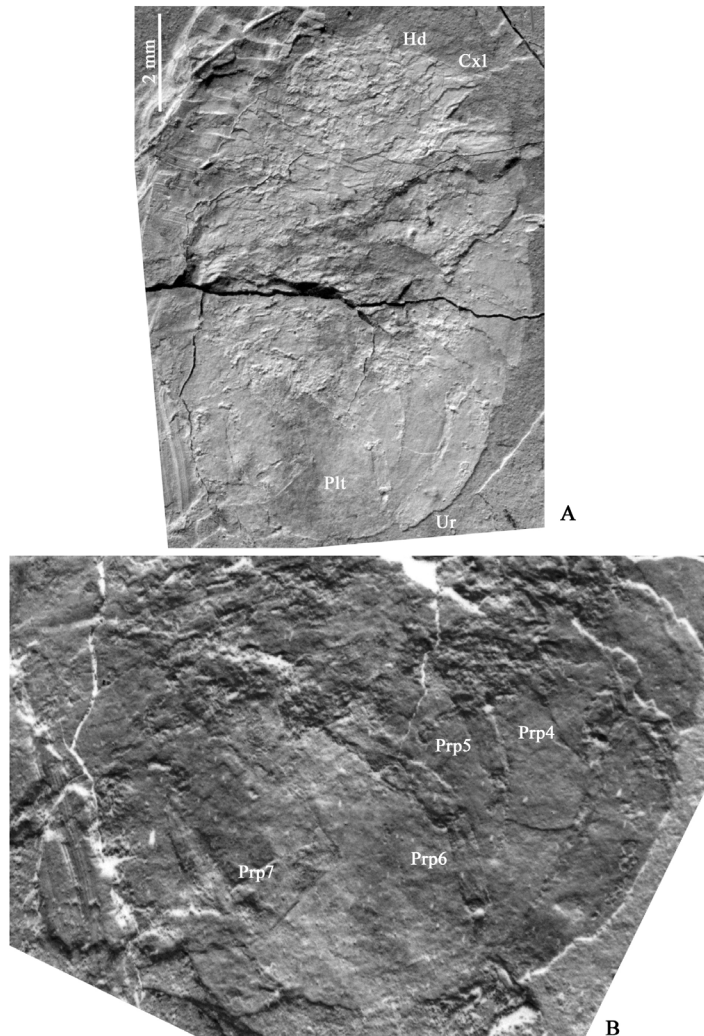


Figure 4 *Jaliscosphaera pliocenica* n. gen et sp. A, paratype IGM 13098; B, close up to pleotelson, pereopods 4 - 7 and uropods.

**Table 1. Measurements (in mm) of *Jaliscophaera pliocenica* n. gen et sp.**

Specimen	Length	Width
IGM 13091	12.2	6.8
IGM 13092	12.8	9.6
IGM 13093	3.4	2.5
IGM 13094	10.1	5.3
IGM 13095	9.7	5.3
IGM 13096	3.3	2.1
IGM 13097	10.8	8.5
IGM 13098	6.3	4.1
IGM 13099	3.5	1.4
IGM 13100	8.7	5.7
IGM 13101	10.8	8.6
IGM 13102	3.2	1.3
IGM 13103	3.7	1.5
IGM 13104	8.2	4.1

not be assigned. Along with type specimens of the here described new taxon, other smaller isopods with apparently different morphological characteristics are found. Some these individuals present conglobation (Figures 3A, 3B and 3G), probably due to the sudden burial event occurred that may cause a mass mortality event, affecting not only isopods, but other organisms, such as fishes. *Sphaeroma burkartii* Bárcena, 1875 is another lacustrine fossil species recorded from Ameca, Jalisco (whose physical position is unknown), the morphological differences in body conformation such as the shape of the head, pereon, pleon, pleotelson, and uropods, allow us to achieve clear separation with *Jaliscophaera pliocenica* n. gen. et sp.

#### 4. Conclusion

To the moment, 27 fossil isopod species from Mexico have been reported, with an age range from the Lower Cretaceous to the Pliocene (see Bruce *et al.*, 2021, table 1; plus Vega *et al.*, 2022 and data herein). Additions to this high diversity are waiting to be published from other Mexican localities under study. *Jaliscophaera pliocenica* n. gen. et sp. represents the second freshwater sphaeromatid isopod reported from Mexico, since *S. burkartii* might also be inhabitant of the Neogene freshwa-

ter lacustrine environments of Jalisco. The main problem is that it seems the type specimen of *S. burkartii* is lost, so a detailed review of the many collections from Jalisco (and elsewhere) is needed to confirm if the name is still valid. Opposed to *S. burkartii*, *Jaliscophaera pliocenica* n. gen. et sp. is represented by several specimens, most of them incomplete, due to the poor preservation, possibly linked to by mass mortality events, caused by volcanic ash fall that might increase not only the temperature, but also trigger anoxia events. The associated second species of isopod is relatively abundant, but its small size and poor preservation prevents a more detailed identification. Future collections at the same locality might produce more complete specimens of both species, but in the meantime, the report of a new fossil isopod is an important addition to the paleobiodiversity of Mexico.

#### Contribution of authors

(1) Descriptions and taxonomic analysis: García-Vázquez, L. (2) Figures and background: Alvarado-Ortega, J. (3) Conceptualization and photographs: Vega, F.J.

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#### Conflicts of interests

The authors declare that they have no conflict of interest.

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