



<https://doi.org/10.11646/phytotaxa.440.3.1>

## *Salacia frutiplatensis* (Celastraceae, Salacioideae), a new species of the coastal sand dunes of Los Tuxtlas, Veracruz, Mexico

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### Abstract

The new species *Salacia frutiplatensis* is described and illustrated herein. This new taxon is part of the arboreal strata of the coastal sand dunes scrub of Los Tuxtlas, Veracruz, Mexico, where it is considered endemic. *Salacia frutiplatensis* is similar to *S. elliptica*, *S. cordata*, and *S. impressifolia*, but differs from these in the shape and diameter of the extra-staminal disk, pericarp thickness, greater number of seeds, and not displaying the lianous habit.

**Keywords:** Catemaco, coastal dunes, Salacioideae, Sontecomapan

### Resumen

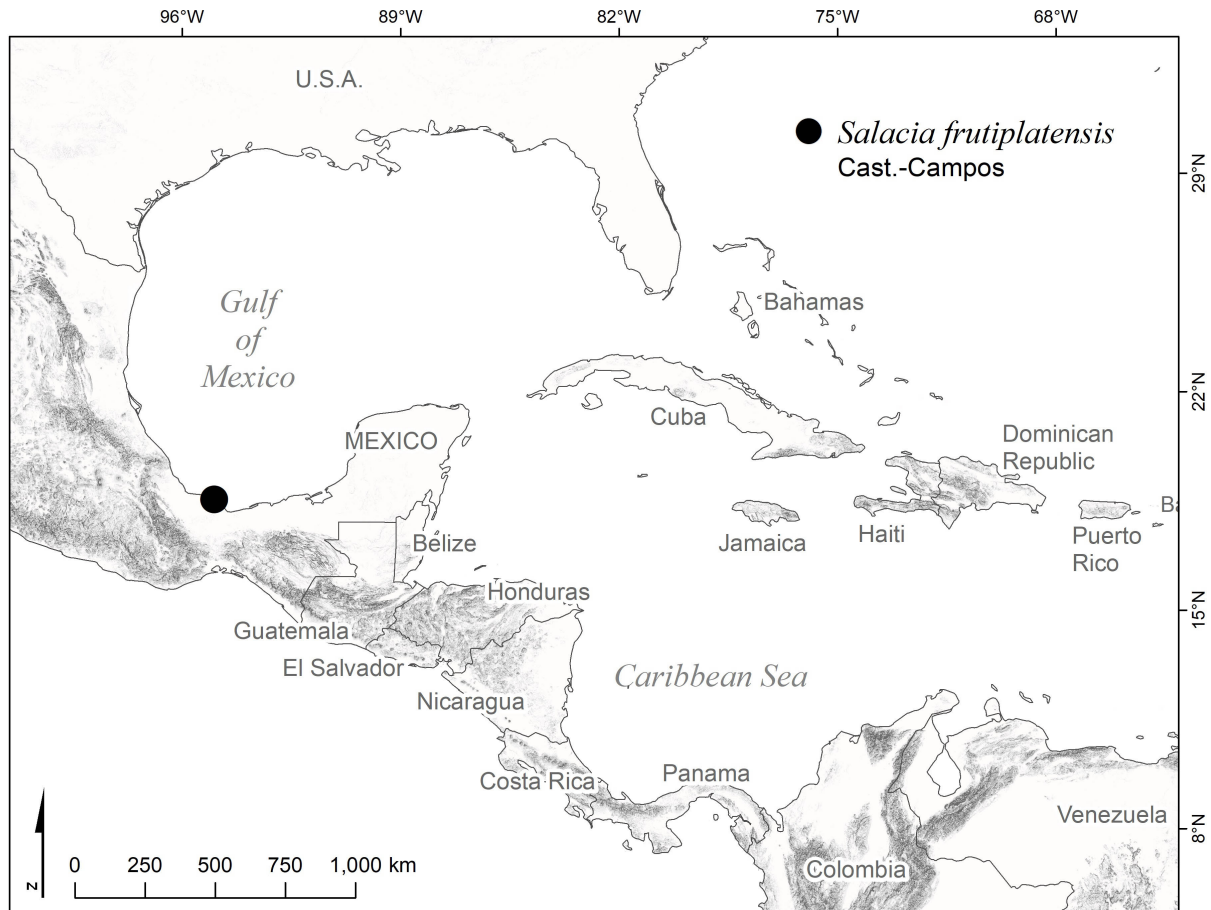
Se describe e ilustra a *Salacia frutiplatensis* como una nueva especie. Este nuevo taxón forma parte del estrato arbóreo del matorral de dunas costeras de la zona de Los Tuxtlas, Veracruz, México, de donde se considera endémica. La nueva especie tiene similitud con *S. elliptica*, *S. cordata* y *S. impressifolia*. Sin embargo, difiere de éstas por la forma y el diámetro de su disco extraestaminal, el grosor del pericarpo, por presentar un mayor número de semillas y por no tener el hábito de liana.

**Palabras clave:** Catemaco, dunas costeras, Salacioideae, Sontecomapan

### Introduction

Salacioideae was a subfamily of the Hippocrateaceae (Hallé 1962), later incorporated into the Celastraceae (Hallé 1986, 1990, APG 2003, Simmons 2004, Lombardi 2014, 2015). It is represented by six genera, four of which are found in Mesoamerica *Cheiloclinium* (Miers 1872: 420), *Peritassa* (Miers (1872: 402), *Salacia* (Linnaeus 1771: 159) and *Tontelea* (Miers 1872: 382) (Simmons 2004, Lombardi 2014, 2015), plus some 250 species distributed in the tropics, from Mexico, Mesoamerica, and South America to Bolivia and Paraguay, Asia, Africa, Australia, and Papuaia (Lombardi 2014, 2015). The genus *Salacia* is pantropical, being one of the most diverse genera of this subfamily, with about 200 species described worldwide (Gosline & Cheek 2014, Simmons 2004, Lombardi 2014, 2015). Thirty-two to 33 species are recognized for the Neotropics and seven for Mesoamerica (Lombardi 2014, 2015). This genus is generally characterized by a lianous or climbing habit; rarely trees or shrubs; leaves opposite or subopposite, rarely alternate; petioles rough, grooved; inflorescences axillary or cauliflorous, thyrsoïd, cymose, or fasciculate; flowers 5-merous in the perianth, tubular or campanulate; disk fleshy, annular; margin revolute, annular-pulvinate, truncated-conical, flattened or cupular, extra-staminal, stamens 2–3; anthers reniform, rhombic, or oblong, unilocular or bilocular; dehiscence longitudinal, oblique, or transverse, extrorse or apical; ovary 2–3-locular, 3-lobate, pyramidal or spherical; style elongated, triangular or cylindrical; stigma single or inconspicuously 3-lobed; fruit a berry with coriaceous or crustaceous epicarp (Simmons 2004, Castillo-Campos & Medina 2005, Lombardi 2014, 2015).

In Mexico, the genus *Salacia* is represented by *S. cordata* (Miers) Mennega (1992: 232) and *S. impressifolia* (Miers) Smith (1939: 247), which are distributed in the states of Chiapas, Oaxaca, Puebla, Tabasco, and Veracruz (Villaseñor 2016, Castillo-Campos & Medina 2005). The new species described here was found among the specimens collected during a field trip in the region of Los Tuxtlas, Veracruz, in July 2019. Consequently, the species described in this paper, together with the two species of the genus *Salacia* already known, adds up to three taxa of the genus *Salacia* for Mexico and eight species for Mesoamerica.



**FIGURE 1.** Location map of *Salacia frutiplatensis* Cast.-Campos, *sp. nov.* on the coast of the Gulf of Mexico.

## Materials and Methods

During the exploration of the coast of the Los Tuxtlas Biosphere Reserve, Veracruz, specimens of the genus *Salacia* were collected showing morphological traits that differ from those of the species already described. Contrasting the differences found in these specimens versus the species distributed in Mexico and Mesoamerica, it can clearly be described as a new taxon (Figs. 2, 3, Table 1). In addition, the traits of this new taxon were compared with the species of *Salacia* known to Mesoamerica, by examining specimens of the genus *Salacia* collected in Mexico and deposited in the most important herbaria in Mexico (CHAPA, ENCB, MEXU and XAL), using a stereomicroscope (Carl Zeiss Stemi 2000-C, Barrington, USA). This comparison revealed that *S. frutiplatensis* shares the closest similarity with *S. elliptica*. We also reviewed the original descriptions and images of the known Mexican *Salacia* species type specimens using Global Plants website of JSTOR (JSTOR, 2019).

**TABLE 1.** Comparison of the morphological characters of *Salacia frutiplatensis* sp. nov. with *S. elliptica*, *S. cordata* and *S. impressifolia*.

Character	<i>S. frutiplatensis</i>	<i>S. elliptica</i>	<i>S. cordata</i>	<i>S. impressifolia</i>
Habit	Tree	Tree or liana	Tree or liana	Shrub or liana
Size (m)	3–7	4–5	5–23	3–8
Leaf length and width (cm)	9–33 × 5.2–13.7	(7–)10–21 × (2.5–)4–7(–8)	5.5–42.6 × 1.9–20	6.5–26 × 3.2–11.6
Leaf apex	Acute, scarcely apiculate, commonly rounded, scarcely emarginate	Rounded or slightly emarginate, or obtuse, or obtusely cuspidate	Acute to acuminate, rarely lengthily acuminate or obtuse	Acuminate, obtuse or acute, rarely retuse
Leaf base	Obtuse, sometimes oblique	Rounded or obtuse or acute	Rounded, reniform or cuneate, rarely truncate	Rounded or cuneate
Disk: shape and diameter (mm)	Conical, 3-ribbed, 3–3.6	Annular-pulviniform, outer margin rounded 0.6–1.2	Cylindrical, 5-angle at the base, 5-toothed at the apex 0.4–1	Patelliform, outer margin flattened and erose, 1.4–2.8
Number of locules, and anther size (mm)	Bilocular, 0.6 × 0.8	Bilocular, 0.4–0.8 × 0.6–1.2	Unilocular, 0.1–0.2 × 0.1–0.2	Unilocular, 0.6–1 × 0.7–1.4
Pericarp thickness (mm)	6–10	1–2	4–8	5
Seeds (number)	14–16(–19)	Several	3–7	5
Seed shape, and color	Amorphous, brown	Ellipsoid	Elliptical, red	Elliptical, reddish-brown
Seed length (cm)	2–3.3	1.7–2	1.6–5.4	2.2–2.3
Distribution	Catemaco, Mexico, endemic	Mesoamerica, Colombia, Venezuela, Guianas, Ecuador, Peru, Bolivia, Brazil, Paraguay	Mexico, Mesoamerica, Colombia, Venezuela, Guiana, Surinam, Ecuador, Peru, Bolivia, Brazil	Mexico, Mesoamerica, Colombia, Venezuela, Guianas, Ecuador, Peru, Bolivia, Brazil

## Taxonomic treatment

*Salacia frutiplatensis* Cast.-Campos, *sp. nov.* (Figs. 2, 3).

Type:—MEXICO. Veracruz: Municipality of Catemaco, SE of Capulteolt, 18°33'8.698", 94°57'55.056", 15 m, 3 July 2019, *G. Castillo-Campos* & *O. Palacios-Wassenaar* 29785 (holotype XAL!; isotypes ENCB!, MEXU!).

*Salacia frutiplatensis* shows traits similar to those of *S. elliptica*, *S. cordata*, and *S. impressifolia*, but differs in that it never displays a lianous habit, the conic and larger extra-staminal disk, the thicker pericarp, and the greater number of seeds.

Tree measuring 3–7 m high; stem 10–30.5 cm in diameter at the base, extensively branched near the base; young branches green, brown when mature; bark lenticular, with longitudinal grooves on branches of previous years, scars of flower insertion remaining; wood very hard, crown rounded, leaves larger in the interior and smaller on the exterior of the crown of the tree. Leaves opposite, simple, elliptical, ovate, 9–33 × 5.2–13.7 cm, coriaceous, glabrous; margin

entire, thick, slightly revolute; apex acute, sparsely apiculate, commonly rounded, sometimes barely emarginate; base obtuse, rarely oblique; midvein anastomosed, 6–11 pairs of primary veins; adaxial side lustrous, intense green when fresh, green-yellowish to slightly brown when dry, midvein imprinted; abaxial side light green when fresh, green to slightly brown when dry, midvein and petiole venation prominent; petiole cylindrical, usually curved, 12–21 × 3–5 mm, slightly grooved adaxially, transversally corrugated abaxially, ribbed longitudinally; stipules axillary, free, deciduous, reddish-brown, triangular, 3 × 4 mm. Flowers brown (not seen when fresh, only dry on branches), cauline, fasciculate, pedicels 4–7.2 × 0.4–0.6 mm; sepals 5, imbricate, semicircular, 2–2.8 × 2.6–3 mm, apex rounded, margin ciliate; petals 5, widely obconical, imbricate towards the base, 4–5.8 × 4–5.2 mm thick; margin thick, revolute; disk conical, 3-ribbed, 3–3.6 mm in diameter, style 1.2 × 0.8 mm, stigma apiculate; stamens 3, attached to the disk, filament triangular, 1–1.4 × 0.4 mm, anther yellowish, extrorse, bilocular, 0.6 × 0.8 mm. Fruit amphisarca, one per inflorescence, coriaceous, indehiscent, silver-green when fresh, yellowish when mature, brown to black when dry, slightly grayish, subspherical, sparsely rugose, briefly 3-ribbed toward the base, 7.5–11.8 × 5.2–8.8 cm, 3-locular; apex punctiform, verrucous; base thick, verrucous; pericarp coriaceous, orange when fresh, 6–10 mm thick; pedicel woody, 5–10 × 12–14 mm or sessile. Seeds 14–16(–19) per fruit, 4–6(–7) per locule, brown, amorphous, 2–3.3 × 1.2–1.7 cm; cuticle reticulate, coated by an abundant mucilaginous aril; embryo whitish.

### Key to the species of the genus *Salacia* in Mexico

- |    |   |                                   |
|----|---|-----------------------------------|
| 1. | Foliar stipules in interpetiolar ring ..... | <i>S. cordata</i>                 |
| 1. | Foliar stipules free .....                  | 2                                 |
| 2. | Anthers unilocular .....                    | <i>S. impressifolia</i>           |
| 2. | Anthers bilocular .....                     | <i>S. frutiplatensis</i> sp. nov. |

**Geographic distribution and ecology:**—*Salacia frutiplatensis* is a species that is part of the tree stratum of the tropical deciduous forest and coastal dune scrubland, growing on sandy soil, at an altitude of 10 to 15 m, on the beach and coastal dunes southeast of the village of Capulteolt, south of the inlet of the Sontecomapan lagoon, Veracruz, an area that is located within the Los Tuxtlas Biosphere Reserve (Fig. 1). This species has not been observed in other localities; thus it is assumed to be endemic to this region of Mexico. According to the Köppen climate classification (Köppen 1948), the coastal area of Los Tuxtlas, Veracruz, includes a strip of Am(f) climate (warm and humid), with a regime of summer rains with monsoon influence. The percentage of winter rain is above 10% of the annual precipitation. This warm and humid climate subtype prevails in the Gulf of Mexico, stretching from the coast to an elevation of 900 m a.s.l. (Castillo-Campos & Laborde 2006, Soto 2006).

Trees or shrubs of the new taxon reach up to 7 m high and coexist with *Amphitecna apiculata* A.H. Gentry (1977: 435) (Bignoniaceae), *Aristolochia ovalifolia* Duchartre (1854: 50) (Aristolochiaceae), *Bursera simaruba* (L.) Sargent (1890: 260) (Burseraceae), *Chiococca alba* (L.) Hitchcock (1839: 94) (Rubiaceae), *Cnidocolus aconitifolius* (Mill.) Johnston (1923: 86) (Euphorbiaceae), *Coccoloba barbadensis* Jacquin (1760: 36) (Polygonaceae), *Cojoba graciliflora* (S.F. Blake) Britton & Rose (1928: 31) (Fabaceae), *Dendropanax arboreus* (L.) Decaisne & Planchon (1854: 107) (Araliaceae), *Ehretia tinifolia* Linnaeus (1759: 936) (Boraginaceae), *Inga pinetorum* Pittier (1916: 185) (Fabaceae), *Randia tomatillo* Loesener (1922: 360) (Rubiaceae), *Tabernaemontana alba* Miller (1768: 606) (Apocynaceae), *Vachellia cornigera* (L.) Seigler & Ebinger (2005: 153) (Fabaceae), *Verbesina persicifolia* Candolle (1836: 614) (Asteraceae), and *Zanthoxylum acuminatum* subsp. *juniperinum* (Poepp.) Reynel (2015: 22) (Rutaceae).

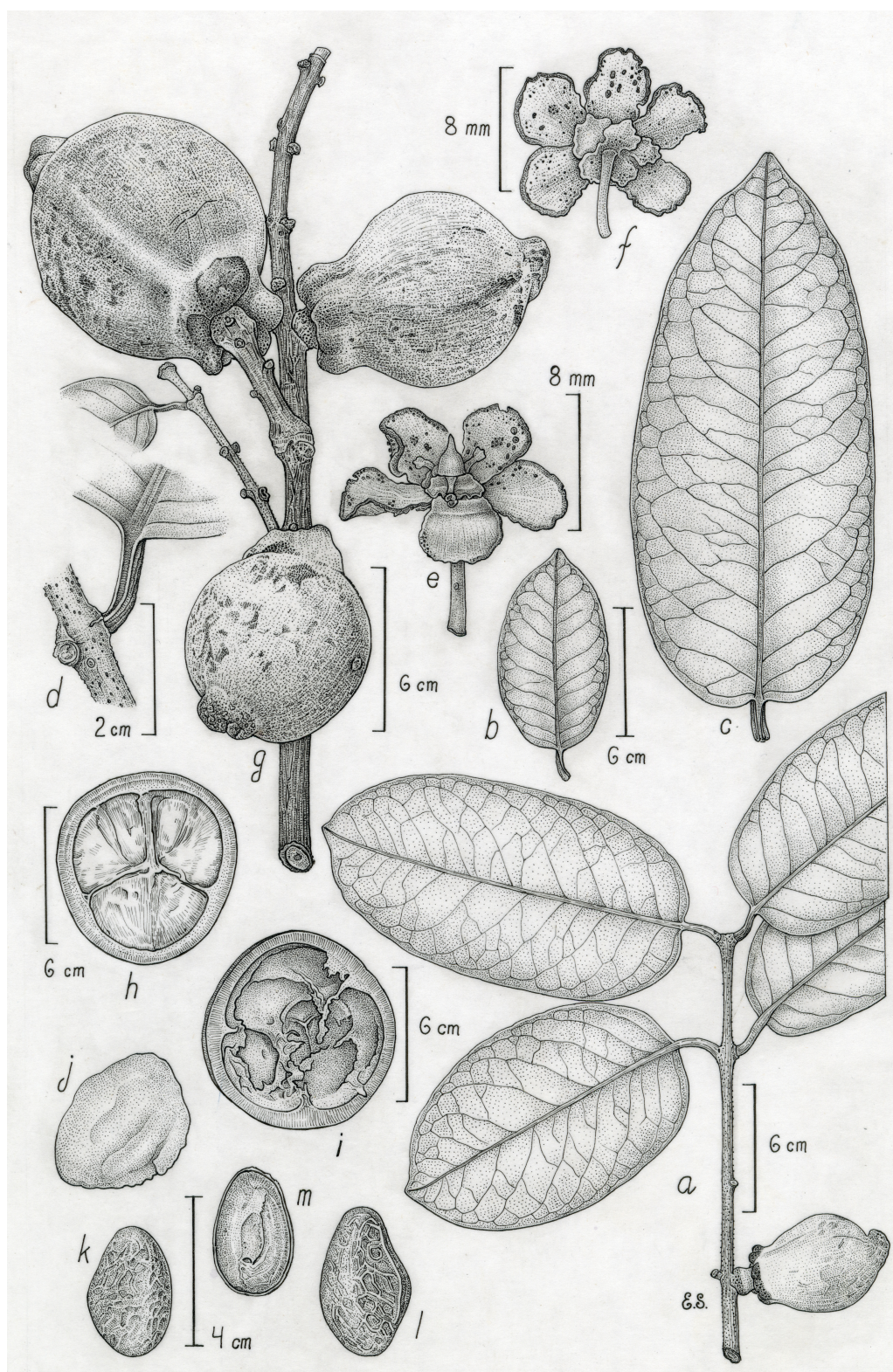
**Etymology:**—The name of the new species refers to the silver color of the fruit when fresh.

**Phenology:**—*Salacia frutiplatensis* flowers from May to June and fructifies from July to August.

**Additional species examined:**—MEXICO. Veracruz: Municipality of Catemaco, SE of Capulteolt, *G. Castillo-Campos & M. Escamilla B. 29844* (XAL).

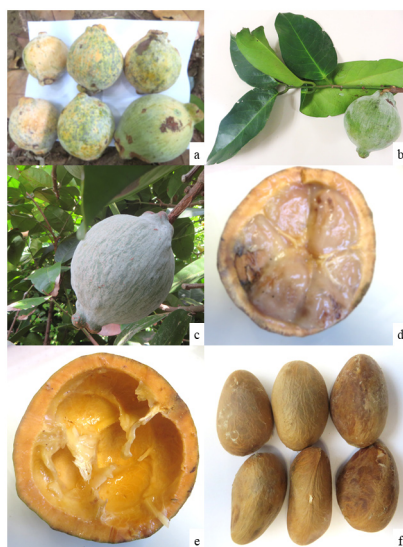
**Conservation status:**—In accordance with the management plan (CONANP 2006), the region where the species has been collected is located within the sustainable use area of the Los Tuxtlas Biosphere Reserve. Despite this area was decreed in 1998, it underwent a 1.1% annual deforestation rate for agriculture from 1980 to 2011 (CONANP 2011). Following the IUCN criteria, *Salacia frutiplatensis* should be listed as Endangered (EN B2a), as the known distribution range is smaller than 500 km<sup>2</sup> and the species has been reported in less than five locations (IUCN 2012; IUCN 2017). In addition, it should be considered for inclusion in a category under protection of the Mexican Standard on Endangered species (NOM-059-SEMARNAT 2010) (SEMARNAT 2010).





**FIGURE 2.** Illustration of *Salacia frutiplatensis*. a, branch with fruit; b, c, leaves; d, petiole; e, f, flowers; g, infructescence; h, i, fruit, cross-section; j, k, l, seeds with and without aril; m, seed, cross-section. Illustration by Edmundo Saavedra based on the holotype specimen G. Castillo-Campos & O. Palacios W. 29785 and G. Castillo-Campos & M. Escamilla 29844.





**FIGURE 3.** *Salacia frutiplatensis* a) mature fruits; b) branch with immature fruit; c) immature fruit on tree branch; d) cross-sectional view of a fruit with seeds coated with mucilaginous aril; e) fruit shell without seeds; f) seeds without mucilaginous aril. (Photographs by G. Castillo-Campos).

## Acknowledgements

The authors wish to thank José de Jesús Pale Pale for the integration of photographs, Rosario Landgrave Ramírez for the elaboration of the location map, María Elena Medina Abreo for her comments on the manuscript and data capture, and Manuel Escamilla Báez for his support in the field. Thanks also to the curators of the CHAPA, ENCB, MEXU, and XAL herbaria for allowing the review of voucher specimens in their collections, and to the Instituto de Ecología, A.C. for the support provided. This study was carried out thanks to the economic support of the fellowship granted by the Sistema Nacional de Investigadores (11336). María Elena Sánchez-Salazar translated the manuscript into English. This project was funded by CEMIE-Océano.

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