

NEW RECORDS OF BENTHIC MARINE DIATOM TAXA FOR MEXICAN LITTORALS

Nuevos registros de taxa de diatomeas marinas bentónicas para el litoral Mexicano

RESUMEN. La mayor parte de los registros de especies de diatomeas bentónicas marinas para litorales mexicanos corresponden principalmente al noroeste del país. Los últimos estudios sobre este tópico en esta región comprenden Laguna Guerrero Negro (LGN), Baja California-Baja California Sur. En este informe se describen y se representan iconográficamente seis nuevos registros taxonómicos de diatomeas bentónicas para los litorales mexicanos, en su mayoría raros, provenientes de sedimentos de LGN.

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The first floristic list focusing on benthic marine diatoms for Mexico showed that most of the benthic diatom species from Mexican littorals have been recorded for the NW region, and that many areas of its extensive coastal zone have yet to be surveyed (López Fuerte & Siqueiros Beltrones, 2016). It also showed that, although benthic diatom diversity is high along Mexico's NW coasts, common taxa are not distributed evenly either spatially or temporally, and that many taxa considered rare in one study may occur commonly in other localities of the region. Thus, unrecorded taxa were expected to be found in already surveyed localities such as Laguna Guerrero Negro (LGN) where several species of *Lyrella* were recently recorded for the first time (Siqueiros Beltrones *et al.*, 2017a). This lagoon is part of a complex located between Baja California (BC) and Baja California Sur (BCS) where the recent floristic survey on benthic diatoms yielded 232 taxa (Siqueiros Beltrones *et al.*, 2017b). However, in a later quantitative analysis to measure species diversity based on information theory, 52 species records were incorporated to the LGN diatom flora, thus raising the species richness to 285 taxa (Siqueiros Beltrones *et al.*, unpub.). Moreover, although most of these new taxa had been previously recorded elsewhere in the Mexican NW region, other taxa that are new records for the Mexican littorals were also identified and are here described.

Sediment samples were collected from twelve sites in the subtidal bottom of Laguna Guerrero Negro on November, 2013, and January, March and July 2014 and permanent slides mounted for each date (Siqueiros Beltrones *et al.*, 2017b) were observed under a compound microscope

with phase contrast at 1000×. Taxa were identified following Peragallo and Peragallo (1897-1908), and Schmidt *et al.* (1874-1959). The taxonomic status was updated according to the *Algaebase* web site (<http://algaebase.org/search/species/>, Guiry & Guiry, 2017) and the Catalogue of Diatom Names of the California Academy of Sciences (CAS) web site (<http://researcharchive.calacademy.org/>, Fourtanier & Kociolek, 2017). Morphometrics from the new diatom taxa records were gathered, and micrographs were taken with a CMOS Konus digital ocular lens microscope at 1000× of specimens of these and other taxa for which images are lacking in previous surveys (Siqueiros Beltrones *et al.*, 2017a, b).

Six new taxa for Mexican littorals from LGN are here recorded. Descriptive morphometrics are provided for these taxa, coupled with photographic images. Also included are micrographs of other taxa, such as *Ehrenbergiulva hauckii* (Grunow) Witkowski, Lange-Bertalot et Metzeltin, *Lyrella implana* (Hustedt) J.L. Moreno, *Amphora aspera* Petit, *Anaulus birostrata* Grunow and *Mastogloia pisciculus* Cleve (Figs. 1-19), which complete the iconographic reference of the LGN diatom flora.

In what follows, descriptions of six new benthic diatom taxa for Mexican littorals are presented and referred to their corresponding images:

Achnanthes citronella (A. Mann) Hustedt in Schmidt *et al.* 1937. Figures 15, 16.

Basionym: *Cocconeis citronella* A. Mann

Homotypic Synonym: *Cocconeis citronella* A. Mann

Dimensions: length = 35 µm, width = 17; 10 striae/10 PRV; RV st. not discernible (n = 3) References: Schmidt *et al.* (1874-1959), pl. 415, figs. 3-8; this taxon was recently recorded for the Mexican SW, albeit hitherto not published nor identified as a first record, and no image was provided. Occurrence: Rare, July

Amphora graeffi* var. *minor Peragallo. Figures 10, 11, 12.

Dimensions: length = 53 µm, width = 10; 24 striae/10 (n > 20). Reference: Peragallo & Peragallo (1897-1908), p. 211, pl. 46, figs. 14, 15 Occurrence: Common, mainly November, January.

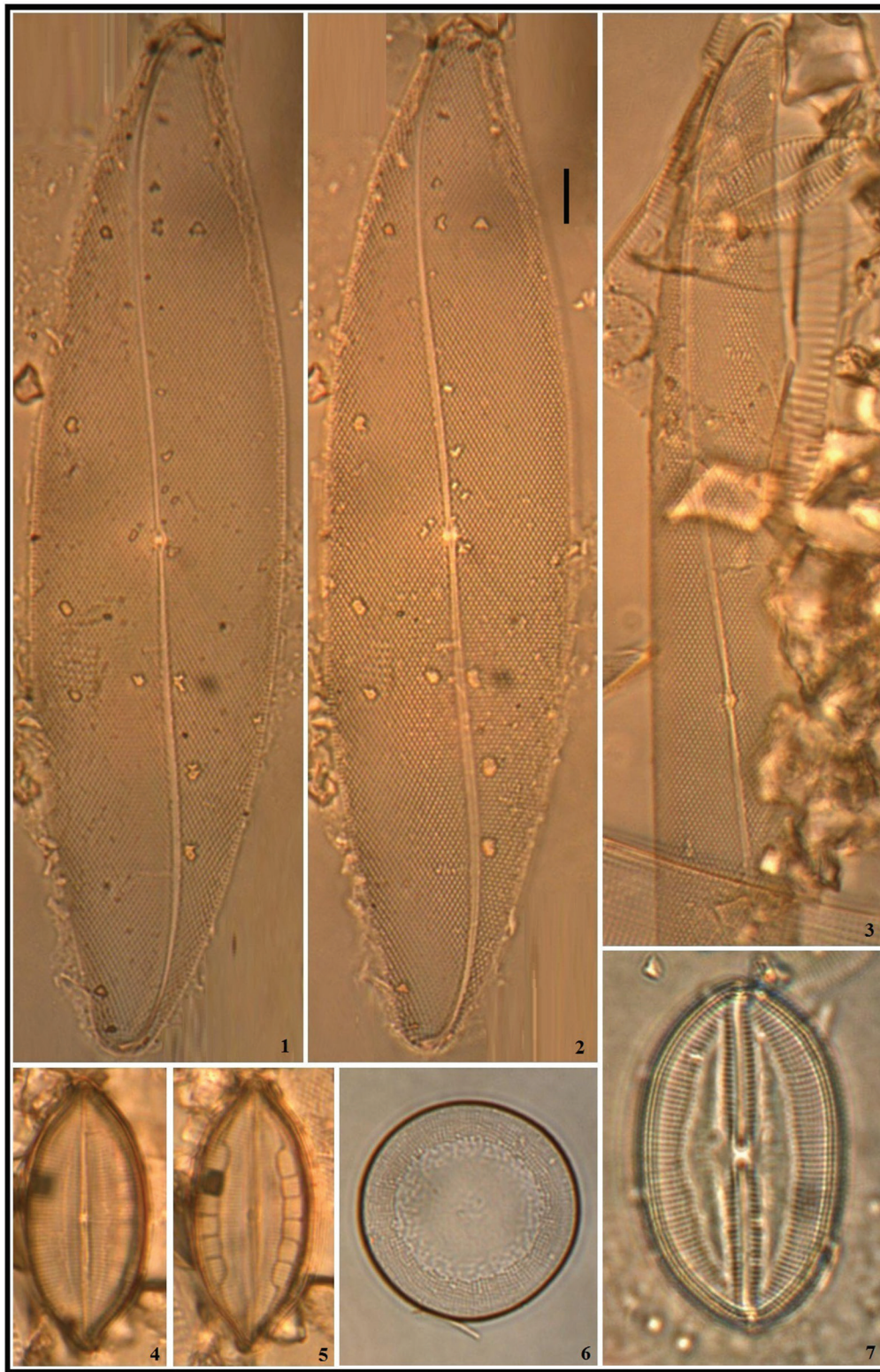
Other distribution: Mediterranean Sea

Navicula (Cocconeopsis?) aspera Hustedt. Figures 13, 14

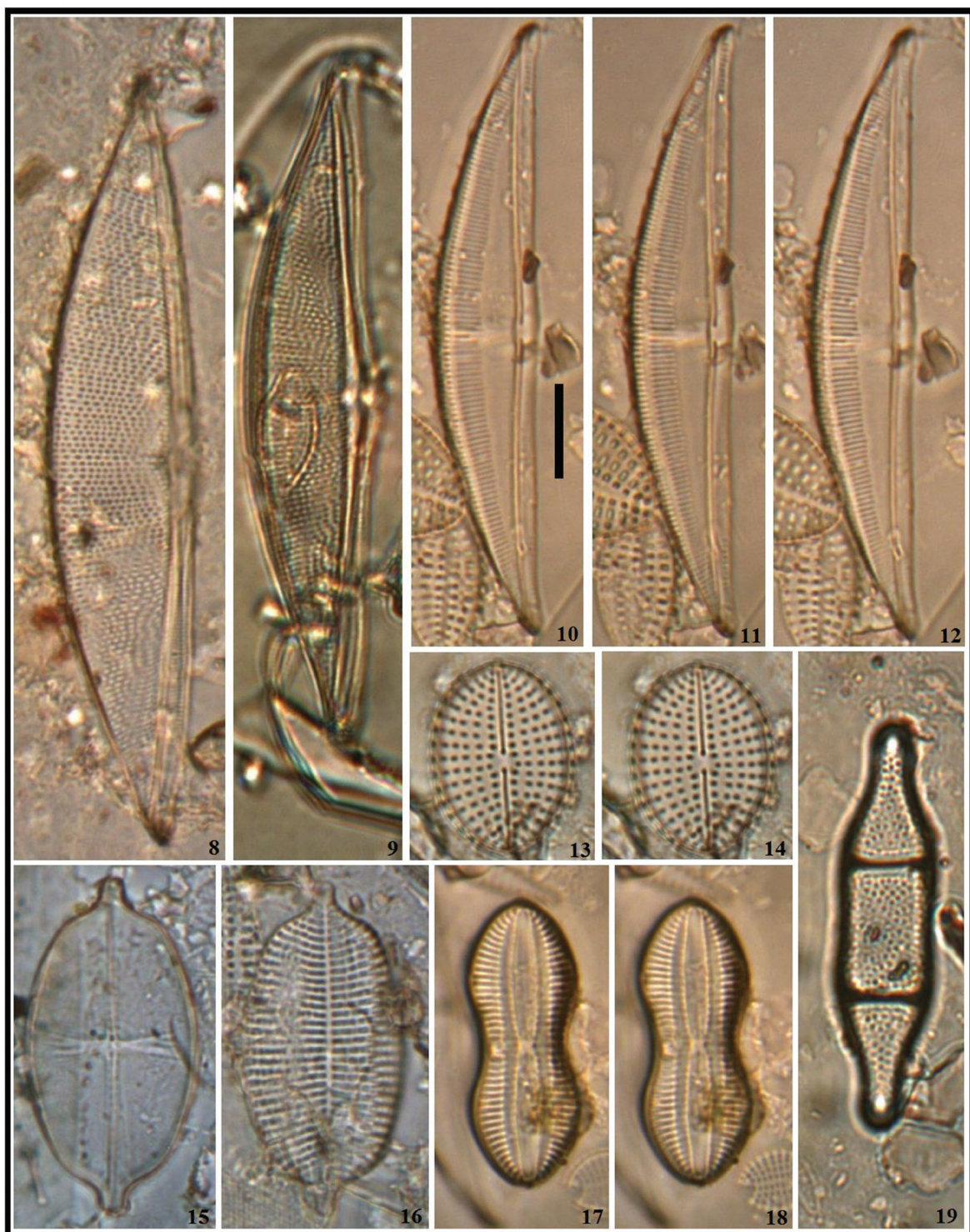
Dimensions: length = 19 µm, width = 14 µm; 9 striae/10 µm (n = 1). Reference: Hustedt, F. (1966), p. 636, fig. 1634. Occurrence: Rare, July. Other distribution: Campeche bay, Mexico.

Diploneis muscaeformis* var. *constricta (Grunow in Schmidt *et al.*) Cleve 1894 Figures 17, 18

Dimensions: length = 27 µm, width = 11; 14 striae/10 µm (n = 5). Reference: Peragallo & Peragallo (1897-1908),



Figures 1 – 7.- 1,2) *Pleurosigma affine*; 3) *Pleurosigma pulchrum*, 4, 5) *Mastogloia pisciculus*; 6), *Ehrenbergiulva hauckii*, 7) *Lyrella implana*. Scale bar = 10 μ m.



Figures 8 - 19.- 8, 9) *Amphora aspera*; 10, 11, 12) *Amphora graeffi* var. *minor*, 13, 14) *Navicula aspersa*, 15, 16) *Achnanthes citronella*, 17, 18) *Diploneis muscaeformis* var. *constricta*, 19) *Anaulus birostrata*. Scale bar = 10 μ m.

p. 113, pl. 16, figs. 2, 3. Occurrence: Rare, November, January, March. Other distribution: Mediterranean Sea

Pleurosigma affine Grunow. Figures 1, 2

Dimensions: length = 120-180 µm, width = 26 µm; 22-24 striae/10 µm (n = 5). Reference: Peragallo & Peragallo (1897-1908). p. 157, pl. 31, fig. 1. Although recorded for the Mexican NW in López-Fuerte *et al.* (2010) as synonym for *Pleurosigma normanii*, images and morphometrics do not correspond. Occurrence: Rare, January. Other distribution: Britain, Canada, Taiwan.

Pleurosigma pulchrum Grunow. Figure 3

Dimensions; length = 194 µm, width = 23 µm; 14-16 striae/10 µm (n = 1). Reference: Peragallo & Peragallo (1897-1908). p. 162, pl. 32, fig. 3. Occurrence: Rare, January. Other distribution: North and Adriatic seas

The six new records of marine benthic diatoms taxa for LGN and NW Mexico are also new for the Mexican littorals, and are added to the 1162 taxa previously reported, as well as *Amphora aspera*, missing from the check-list by López Fuerte and Siqueiros Beltrones (2016) albeit recorded in Moreno *et al.* (1996). Most of the taxa here depicted were rarely observed except for *Amphora graeffi* var. *minor*, which was common but not recorded in the earlier surveys. This, besides the scarcity of other taxa such as *Anaulus birostrata*, *Lyrella implana* and *Mastogloia pisciculus*, and other taxa for LGN, represents a problem on the actual occurrence and abundance of taxa, and needs to be strategically undertaken. Incorporation of images for the recorded taxa aids in resolving taxonomic confusions as in the case of *Pleurosigma affine*. On the other hand, the occurrence of alleged tropical forms such as *Navicula (Cocconeopsis) aspersa* and *Achnanthes citronella* (both observed in the Mexican SW), although rare in this survey, complicate biogeographical interpretations, as in the (particular) benthic diatom flora from the coast of Isla Guadalupe in NW Mexico (López-Fuerte *et al.*, 2015).

The uneven spatial and temporal distribution of benthic diatom taxa precludes the completion of floristic accounts because many rare taxa occur commonly in unexplored localities of the region, while taxa that are abundant in one locality are scarcely represented in other places. An immediate consequence of this is the case of *Navicula aspersa*, for which the suspected need for transferring it to the genus *Cocconeopsis* requires enough specimens to be analyzed under SEM. Moreover, the high species richness of benthic forms in the lagoon is expected to increase considering that only one type of substratum has been analyzed. All this shows that much exploration is still required, and that new records of benthic diatom species are expected to be made in further surveys for this region.

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