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FIRST RECORD OF THE DIATOM *Cocconeis notata* PETIT LIVING INSIDE THE HYDROTHECA OF A HYDROZOAN EPIPHYTE OF *Macrocystis pyrifera* (L.) C. AG.

Primer registro de la diatomea *Cocconeis notata* petit viviendo dentro de la hidroteca de un hidrozoario epífito de *Macrocystis pyrifera* (L.) C. Ag.

RESUMEN. Se registra por primera vez la presencia de la diatomea bentónica *Cocconeis notata* dentro de pólipos en forma de copa de un hidrozoario epífito en láminas de *Macrocystis pyrifera* colectadas en Baja California. *C. notata* ha sido registrada pocas veces y como especie rara en sedimentos.

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Apical blades from *Macrocystis pyrifera* (L.) C. Ag. fronds were collected in September 2000 from the surface of kelp beds located in Eréndira, Baja California, aproximately 180 km south of the U.S.A.-México border. The blades were stored dry to feed juvenile abalone under laboratory conditions in La Paz, B.C.S.

Dry and rehydrated blades were observed under a dissecting microscope. The blades were heavily fouled by bryozoans, while other filamentous organisms were noted on the base of the blades (Fig. 1). These turned out to be hydrozoans (Fig. 2a) and were separated and observed at 400X for detecting small epizoic diatoms.The organism was identified as the hydrozoan *Eucopella caliculata* (Hincks), formerly *Orthopyxis* (Calyptoblastea; Campanularidae) which has a stoloniferous body from where different shape polips emerge: globular gonangia with short pedicels and cup shaped hydrotheca with long pedicels with annuli (Fig. 2b). *E. caliculata* is cosmopolitan and considered a common inhabitant on seaweeds (Gossner, 1971; Johnson & Snook, 1967; Rickets & Calvin, 1939).

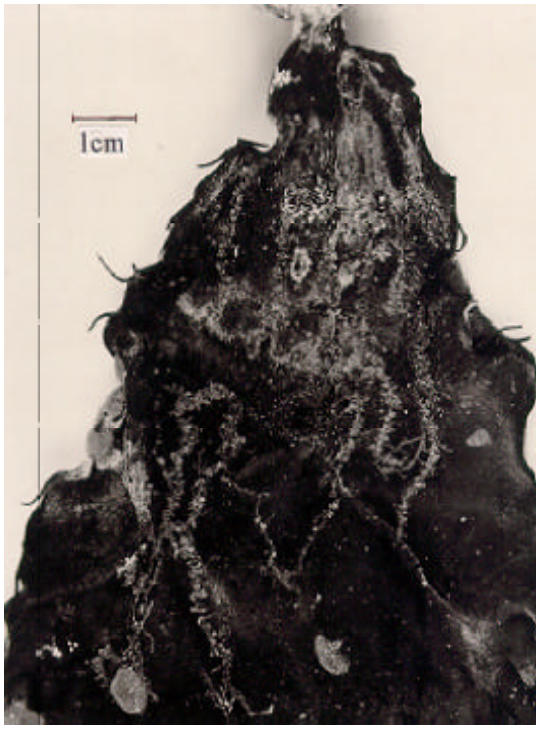

Figure 1. Blade of *Macrocystis pyrifera* showing filamentous habit of the hydrozoan.

Figura 1. Lámina de *Macrocystis pyrifera* mostrando filamentos del hidrozoario.

Several sections of the hydrozoan, mainly the polips, and pieces of the *Macrocystis* blade were mounted to search for diatoms under the microscope. The cup shaped hydrotheca observed under 400X (Fig. 3a) and 1000X (Fig. 3b) revealed to be harbouring dense monospecific populations of a cocconeiform diatom. Inside the gonangia other unidentified naviculoid diatoms (multispecific) were detected. The diatom frustules were cleaned and mounted permanently in

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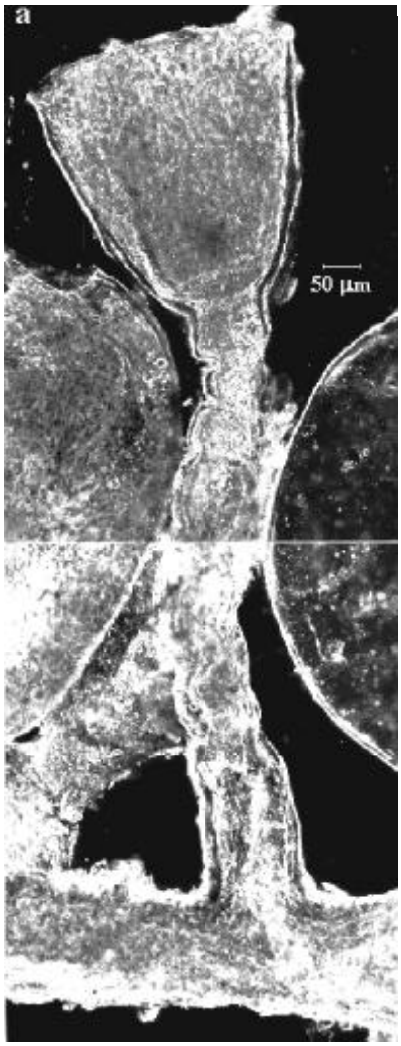

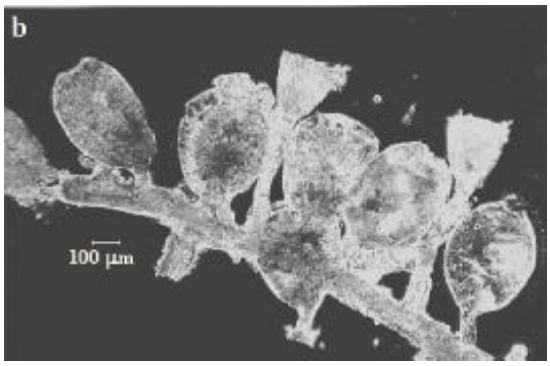

Figure 2. a) Segment of *E. caliculata* showing the globular and cup-shaped polips. b) Isolated hydrotheca of the hydrozoan containing a dense population of diatoms.

Figura 2. a) Segmento de *E. Caliculata* con polipos globulares y en forma de copa. B) Hidroteca del hidrozoario con población densa de diatomeas.

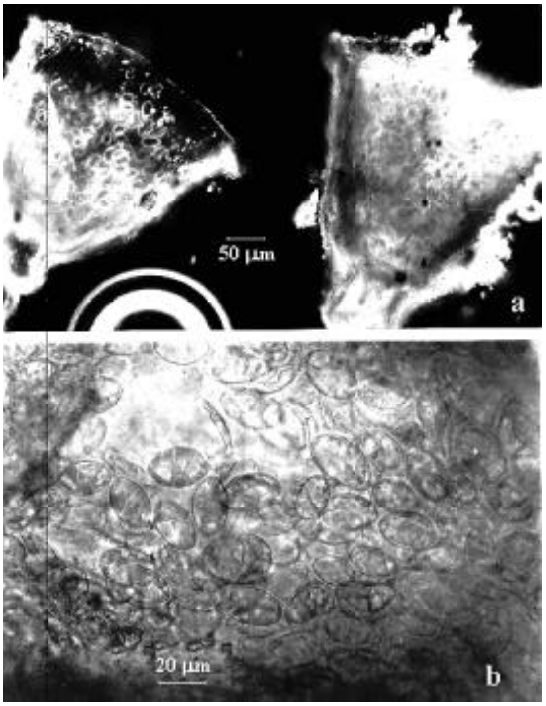

Figure 3. Close up of the cup-shaped hydrotheca (a), and of the densely packed populations of *Cocconeis notata* inside the hydrotheca (b).

Figura 3. Acercamiento de la hidroteca en forma de copa (a), y de las poblaciones densas de *Cocconais notata* dentro de la hidroteca.

Meltmount according to Siqueiros Beltrones (2000) and identified at 1000X.

The cocconeiform diatom was identified as *Cocconeis notata* Petit, which is clearly distinguished by its sigmoid rafe and pseudorafe, and a mid-lateral ''hoof-mark'' (Fig. 4), which is more typical of some *Achnanthidium* v.gr. *A. lanceolata* (Round & Bukhtiyarova, 1996). *C. notata* has a somewhat delicate frustules which were often seen broken (Fig. 4 b, d). The previous record for *C. notata* (Siqueiros Beltrones & Ibarra Obando,1985) as an epiphyte of *Zostera marina* shows the single specimen with a coarser valve structure and no evident ''hoof-mark''.

The valves of *C. notata* are oval-lanceolate with a maximum lenght of 35 µm and 21 µm in width, the smallest valves were 21 µm long and 12 µm wide, wider than in Schmidt *et al*. (1874-1959). Both the rafe and pseudorafe valves have 22-24 striae/10 µm.

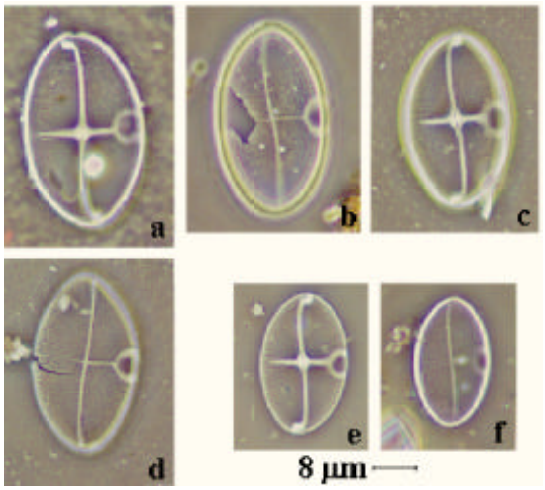

Figure 4. Rafe valve (a, c, e) and pseudorafe valve (b, d, f) of *Cocconeis notata* showing the characteristic ''hoof-mark'' and size variation.

Figura 4. Valva del rafé (a, c, e) y valva del pseudorrafé (b, d, f) de *Cocconeis notata* mostrando la marea en herradura y variación en tamaño.

The common epiphytic diatoms found earlier by Siqueiros Beltrones *et al*. (in press) on *Macrocystis pyrifera* blades (*Cocconeis* cf. *britannica, Cocconeis speciosa*, and *Gomphonemopsis pseudoexigua*) were scarce on the observed blades. The unhealthy appearance of the blades and the heavy fouling by bryozoans indicate that the macroalgae was waning by the date it was collected, and so was the diatom epiflora.

The fact that *C. notata* has been previously recorded as rare in sediments (Schmidt *et al*., 1874-1959) suggests that it may have a certain specificity for certain substrates. The density of the observed populations suggests that *C. notata* has a peculiar preference for the hydrozoan hydrotheca environment. This calls for a specific study on the establishment of the association to determine how and when are the diatoms incorporated into the harbouring structures. And, furthermore, to determine if there is any type of symbiotic interaction, depending on wether the diatoms get established when the hydrozoan is alive or after it is dead.

Because of the scarcity of *C. notata* in other habitats, and its absence from the *Macrocystis* blades surface, it is very unlikely that the hydrozoan was feeding on it at the time of the sampling. The *C. notata* cells were alive by that time as indicated by the presence of chloroplasts, but not the hydrozoan which seemed to be infected by a Nostocal type cyanophyte and an unidentified form which occupied the globular polips and portions of the stoloniferous body.

These type of new records of epiphytic diatoms on macroalgae indicate that much work is yet to be done with benthic diatoms, inasmuch many substrata remain to be analyzed in the the Mexican NW region and macroalgae represent a rich source of epiphytic diatoms.

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