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A NOTE ON *PSEUDEVADNE TERGESTINA* CLAUS, 1877 (BRANCHIOPODA: CLADOCERA: ONYCHOPODA) OF BANCO CHINCHORRO, WITH OBSERVATIONS ON ITS BIOLOGY

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ABSTRACT

Zooplankton samples from Banco Chinchorro cointaned individuals of the marine cladoceran *Pseudevadne tergestina*. Samples were taken from the surface layer (1–2 m) during few days in 2–3 September, 1999 and 28–29 March, 2000. This species was present only in September in the sampling stations outside the atoll with a maximum density of 0.6 ind m^{-3}. The species was not recorded inside the atoll. Parthenogenetic females carried from 1–5 embryos in the brood pouch. All the developing stages were represented (I–VI). The most frequent stage was IIIB followed by IIIC. The size of the animals captured ranged from 550–830 mm.

Marine cladocerans are the less represented in the superorder Cladocera (sensu Negrea et al., 1999) comprising about ten species (Ramírez, 1996), all of them are dominant in the plankton of surface layers of the neritic and oceanic environments (Morris, 1986). A few works related to the group of Mexican Caribbean is found in Castellanos-Osorio and Elías-Gutiérrez (1999). These authors worked on *Pseudevadne tergestina* from the oceanic part of the Mexican Caribbean, with some samples near Banco Chinchorro.

The aim of this work is to analyze the abundance, distribution and some aspects of the biotic potential of the marine cladoceran *P. tergestina* from samples obtained inside and outside of the Chinchorro atoll and to compare these data with previous reports from the Mexican Caribbean.

Zooplankton was collected during September (10 stations) and March (six stations). Sampling stations are presented in Figure 1. Samples were taken by 10-min surface circular tows with a round-mouthed net of 50 cm diam and a mesh of 0.333 mm. The volume of water filtered was estimated by a flowmeter attached to the mouth of the net. Zooplankton was fixed with a 4% formaldehyde solution buffered with sodium borate. Sea surface temperature was measured at each station. Temperature was measured with a standard thermometer (20–160 °C).

The taxonomic identification was made following Rivier (1998), and the developing stages of the embryos were classified according to Ramírez (1981), Mújica and Espinoza (1994), and Ramírez (1996). The egg and embryo numbers in the brood pouch were counted and the total and marginal lengths of adults (Ramírez, 1996) were measured. Abundance was standardized to ind m^{-3}.

Results

Only one species was found: *Pseudevadne tergestina* Claus, 1877, represented by parthenogenetic females. In general, the abundance of *P. tergestina* was low, with a maximum of 0.59 ind m^{-3} at station 3. They were more abundant in the eastern region, outside of Banco Chinchorro, and were represented by Stations 3 and 6 (see Table 1). No cladocerans were found inside the atoll in March, so the species was restricted to the outside of Banco Chinchorro during the September sampling. Only six out of 16 stations sampled

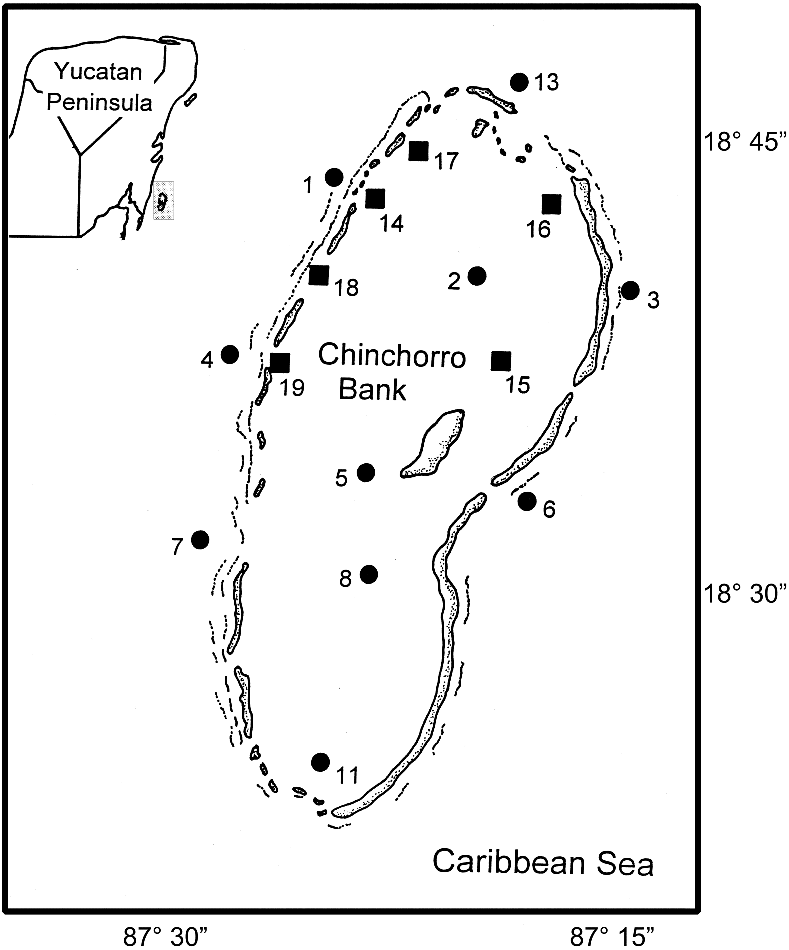

Figure 1. Map of Banco Chinchorro with sampling stations during September 1999 (n) and March 2000 (g).

were positive for this cladoceran. The temperature during September ranged from 30–31°C (Table 1), and from 26–27°C in March.

The total length of the specimens ranged between 550–830 µm. Larger size differences were detected in Stations 3 and 6 (from 560–830 µm and 550–790 µm, respectively).

In all the parthenogenetic females examined, 1–5 developing embryos were found. The most common stage of development observed in the embryos was IIIB, occurring in 43.4% of the females, followed by IIIC (16.9%), I (12%), V (10.8%), VI (7.2%), II and IV (3.6%) and IIIA (2.4%).

Discussion

Previous records in the Mexican Caribbean of *P. tergestina* were made by Della Croce and Angelino (1987), with no quantitative data. Castellanos-Osorio and Elías-Gutiérrez (1999) presented a complete set of quantitative data from four oceanographic cruises. From these, four sampling stations were near Chinchorro. We did not record any cladoce-

Table 1. Time of collection, abundance, embryo mean (± SD) and development of *Pseudevadne tergestina* at Banco Chinchorro.

Sampling station	Date	Time of collection	Abundance (org m^{-3})	No. eggs ± SD	I	II	III A	III B	III C	IV	V	VI	Temp ºC
1	2 Oct 1999	20:40	0.02	1							1		31
3	2 Oct 1999	18:54	0.59	2.79 ± 0.86	7	1	1	14	9	2	5		30
4	2 Oct 1999	21:25	0.09	2.33 ± 0.52		1		2			1	2	30
6	2 Oct 1999	18:00	0.35	2.48 ± 1.04	3	1		11	5	1	2		30
7	2 Oct 1999	22:15	0.11	2.29 ± 0.76			1	3				3	31
13	2 Oct 1999	19:45	0.11	3.57 ± 1.27				6			1		31

ran during March near or at Chinchorro, while employing the same methods we found maximum abundances for the whole Caribbean in the oceanic area adjacent to the atoll during February. A possible explanation for this phenomenon is that *P. tergestina* avoids shallower waters, near to the reef formation. In general terms, it is considered an epipelagic species, but also can be found to 2000 m (Ramírez, 1981). The same kind of avoidance was observed also in the Puerto Morelos reef lagoon, where cladocerans were absent (Suárez-Morales and Gasca, 1990). At Bahía de la Ascensión, also in the Caribbean, only ten individuals were found during a year-cycle study (Gasca et al., 1996). However, the average temperature (30.5°C) was close to the optimum for this taxon (Della Croce and Angelino, 1987; Alvarez-Silva, 1994). Their appearance in September is consistent with the typical abundances seen in the second half of the year.

Nevertheless, the species reached only 0.17% in average of the total planktonic fauna (4.82 org m^{-3}) for the Banco Chinchorro, a figure lower than the 1.58% recorded for the oceanic waters of the Mexican Caribbean (Castellanos-Osorio and Elías-Gutiérrez, 1999). The value recorded in Banco Chinchorro is closer to the adjacent reef zone of Mahahual, where cladocerans represented the 0.047% of the total zooplankton in the forereef (Castellanos-Osorio and Suárez-Morales, 1997). In contrast, high numbers that have reached up to 600 ind m^{-3} have been detected in the Campeche Bank, southeastern Gulf of Mexico (De la Cruz, 1971). The low local abundance of this cladoceran could be explained by an inverse migration, moving from the surface to deeper waters during the night. The highest density (0.6 org m^{-3}), was found at station 3, which was first sampled during the daytime (Table 1). This is opposite to the findings of the same species in Japan (Onbe, 1974) where it remains between 10–20 m during daytime ascending at nighttime up to the 0–10 m level.

Females carried two to five embryos (three on average), a lower number than that reported by Della-Croce and Angelino (1987), but similar to a previous report for the Caribbean (Castellanos-Osorio and Elías-Gutiérrez, 1999), other areas of the Atlantic Ocean (Ramírez, 1981), and Japan (Murakami and Onbe, 1967).

As was previously discussed, the absence of *P. tergestina* in March does not mean its disappearance from the Caribbean where the reproductive process is strongest in May–August, with larger females carrying more eggs (Castellanos-Osorio and Elías-Gutiérrez, 1999). As in previous reports, no males were recorded at Banco Chinchorro, indicating parthenogenetic teliotic reproduction during the entire year. The stability of these waters could explain the absence of stress for food or temperature. Only a 3–4°C difference was found from March–September, but there is a need for recording more data during the coldest months (January and February).

The size of *P. tergestina* ranged between 550–830 mm, which is slightly smaller than previous records for the Mexican Caribbean Sea (Castellanos-Osorio and Elías-Gutiérrez, 1999).

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