

Notes on the reproductive cycle of the blotchy scallop *Spathochlamys vestalis* (Reeve, 1853) at Isla Danzante, Gulf of California

Notas sobre el ciclo reproductivo del pectínido manchado *Spathochlamys vestalis* (Reeve, 1853) en isla Danzante, Golfo de California

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Resumen.- Este trabajo documenta algunas notas sobre el ciclo reproductivo del pectínido manchado *Spathochlamys vestalis* (Reeve, 1853), el cual se desconoce tanto para las costas del Pacífico como del Atlántico. En el Golfo de California es abundante sobre fondos de arena gruesa y entre las espinas de la concha china *Spondylus leucacanthus*. Es una especie hermafrodita funcional con la porción gonadal masculina separada de la porción gonadal femenina. Se observó alta proporción de individuos maduros durante diciembre de 1994 (87,5%) y en octubre de 1995 (100%). Los individuos desovados se observaron en baja proporción. Se

encontró un 5,5% en enero, cuando la temperatura del agua de fondo fue menor de 15°C y un 5,1% en abril, cuando la temperatura se incrementó a 21°C. El patrón reproductivo ocurrió de manera continua sin presentar una alta correlación con la temperatura del agua de fondo. La abundancia del fitoplancton fue alta en primavera, si embargo presentó una relación negativa con el desarrollo y la madurez del pectínido ($P < 0,05$).

Palabras clave: Reproducción, histología, *Spathochlamys vestalis*, pectínidos, Golfo de California

The scallop *Spathochlamys vestalis* (Reeve 1853) (= *Chlamys vestalis* Hertlein, 1935; in Keen 1971) is a species distributed from Santa Catalina Island (33.4°N), California, USA, to Isla La Plata (1.3°S), Ecuador, including the Gulf of California, and the Islas Galápagos, also in the western Atlantic. The species is found from 2 to 85 m (Coan *et al.* 2000). It is abundant at Isla Danzante, where the blotchy scallop lives on the spiny scallop *Spondylus leucacanthus* as epifauna, and in coarse bottoms. This species is not commercially exploited, but it is an important prey of invertebrates and fishes. The biology of the blotchy scallop *S. vestalis* is almost undocumented at the Pacific and Atlantic coasts (Waller 1995). The present study describes the reproductive annual cycle and the spawning season, using histological analysis, of a population of *S. vestalis* at Isla Danzante.

Isla Danzante is located in the Gulf of California, Mexico (25°48'54" N, 111°15'45" W) (Fig. 1). A study on the reproductive biology of *S. leucacanthus* was carried out from December 1994 to October 1995 (Villalejo-Fuerte & García-Domínguez 1998). Living over these spiny scallops we found specimens of the blotchy scallop *S. vestalis*. A total of 221 specimens of *S. vestalis* were collected and fixed in a neutral 10%

formalin solution prepared with sea water. Shell length measured with an electronic caliper, and total soft body wet weight were recorded for each scallop. Phytoplankton was sampled with a van Dorn bottle and the bottom water temperature was recorded at the time of sampling using a protected thermometer with range of -10 to 110°C attached to the van Dorn bottle.

As *S. vestalis* reached a maximum shell length of 16 mm, complete individuals were dehydrated in alcohol and embedded in paraplast for histological analysis. Sections (7 µm) with gonad present, were placed on slides and stained with hematoxylin-eosin according to histological procedures outlined in Humason (1979). Each gonadal slide was microscopically analyzed; sex was determined and a developmental stage was assigned according with the following scale: undifferentiated, early development, late development, ripe, spawning, and spent. For complete description see Villalejo-Fuerte & Ochoa-Báez (1993), and Félix-Pico *et al.* (1995). The abundance of phytoplankton (cell/mL) was considered as an estimation of the food availability for the blotchy scallop.

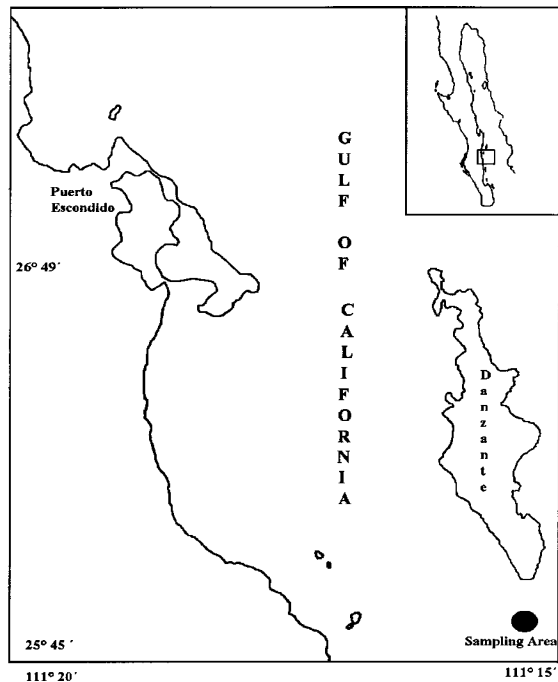


Figure 1

Location of Isla Danzante and sampling area, Gulf of California, Mexico

Ubicación de la Isla Danzante y área de muestreo, Golfo de California, México

A Pearson's correlation analysis was done to investigate the relationship between phytoplankton abundance and the frequency of developing and ripe scallops after arcsine transformed data (Sokal & Rohlf 1995).

S. vestalis is a functional hermaphrodite with male and female gonad portions regionally separated; gonad development was similar to that of *Argopecten ventricosus* (Villalejo-Fuerte & Ochoa-Báez 1993; Félix-Pico *et al.* 1995). The reproductive cycle of *S.*

vestalis is presented in Fig. 2. Undifferentiated individuals were found in January, April, and June, in low proportion (2%, 5%, 11% respectively). Early development was present in February, April and from July to September (3%, 23%, 2%, 4%, and 3% respectively), late development was present continuously throughout the year, with higher percentages in February, May and September (92%, 100% and 79% respectively). The highest proportions of ripe blotchy scallops were obtained in December (87.5%) and October (100%). The rest of the year the ripe blotchy scallop were present between 17% and 48%, except in April and May when no ripe scallops were present. Spawning individuals were registered in January (5.5%), when the bottom water temperature decreased to 15°C, and in April (5.1%) when temperature increased to 21°C (Fig. 3). Spent individuals were not observed. These results suggest a continuous reproductive pattern, without a clear relationship with the water temperature. This pattern is similar to that described by Villalejo-Fuerte & Ochoa-Báez (1993) for the catarina scallop *A. ventricosus* from Bahía Concepción, Gulf of California. The abundance of phytoplankton was higher in the spring (Fig. 3). The maximum values were in March, April and May (17, 18, and 15 cell/mL, respectively), coinciding with the presence of scallops in spawning stage. The minimum abundance of phytoplankton was in September (2 cell/mL). The phytoplankton abundance was seasonal, and it was negatively correlated to the percentages of developing and ripe scallops ($P < 0.05$). It is possible that *S. vestalis* has food resources (i.e. organic material) around the year supporting a continuous reproductive pattern. A similar pattern was reported for *Megapitaria squalida*, *M. aurantiaca*, *Dosinia ponderosa* and *Chione undatella* in the Gulf of California (Singh *et al.* 1991, Villalejo-Fuerte *et al.* 1996, García *et al.* 1994, Baqueiro & Massó 1988).

Acknowledgments

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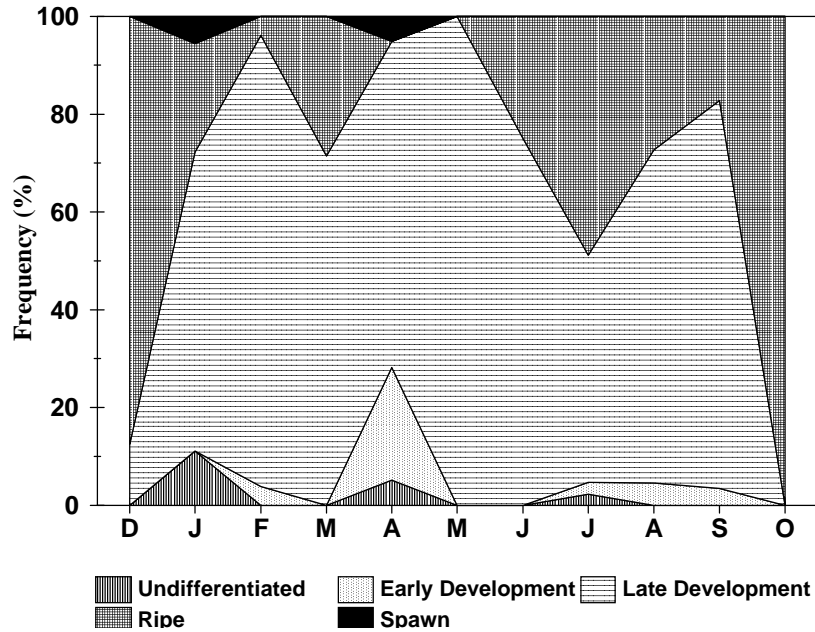


Figure 2
Reproductive cycle of *Spathochlamys vestalis* at Isla Danzante, Gulf of California.
December 1994 to December 1995
 Ciclo reproductivo de *Spathochlamys vestalis* en la isla Danzante, Golfo de California, México.
 Diciembre de 1994 a diciembre de 1995

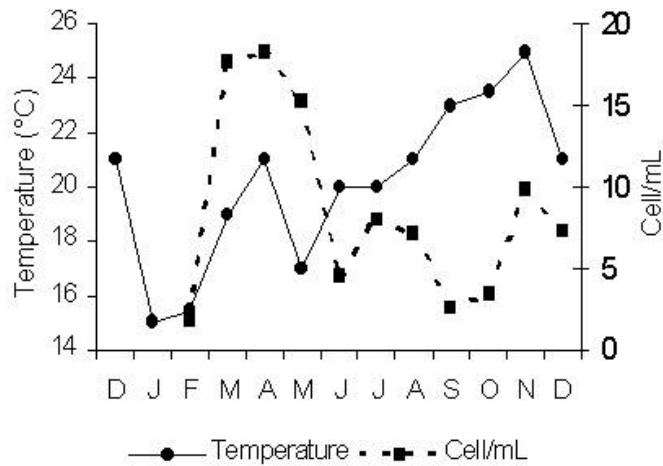


Figure 3
Variation of bottom temperature (°C) and phytoplankton (Cell/mL), near Isla Danzante, Gulf of California. December 1994 to December 1995
 Variación de la temperatura de fondo (°C) y el fitoplancton (Cel/mL), cercano a la isla Danzante, golfo de California, México. Diciembre de 1994 a diciembre de 1995.

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