

## COMUNICACIONES

## Distribution and reproduction of *Ambidexter panamense* and *Palaemonetes schmitti* in Pacific Costa Rica (Crustacea, Decapoda)\*

Ingo S. Wehrtmann

Universität Hamburg, Zoologisches Institut und Zoologisches Museum, Crustaceen-Sektion, Martin-Luther-King Platz 3, 2000 Hamburg 13, Federal Republic of Germany

(Rec. 14-VI-1989. Acep. 7-XI-1989)

**Resumen:** Este constituye el primer registro de las especies de carídeos *P. schmitti* y *A. panamense* para Costa Rica. Adultos de ambas especies fueron colectados en el estero de Punta Morales, Golfo de Nicoya, de enero a diciembre de 1987. *P. schmitti* fue el camarón más abundante. Solamente se colectaron tres ejemplares de *A. panamense*, sin embargo las larvas aparecieron frecuentemente en las muestras de plancton de esta región. El número de huevos aumenta con la longitud del caparazón de la hembra y varía considerablemente, de 58 a 381, con un promedio de 179 huevos.

**Key words:** shrimp reproduction, estuary.

Most information concerning tropical shrimps focuses on species of the family Penaeidae because of their commercial importance in fisheries and aquaculture. However, other crustaceans are likely to play an important role in the ecology of tropical habitats, and information regarding shrimp biology will improve our understanding and knowledge of different tropical ecosystems.

Field studies in Costa Rica led me to the collection of various caridean shrimp species and to obtaining information concerning their distribution and reproduction. The study site, Punta Morales, is a small estuary located on the eastern shore of the Gulf of Nicoya, Pacific coast. The area is surrounded by extensive mangrove swamps with sand-mud sediments. The main channel has an average depth of 5m at high tide with input of water from the Morales River and numerous smaller creeks. Sampling was conducted with a push net during low tide at three different stations (Fig. 1)

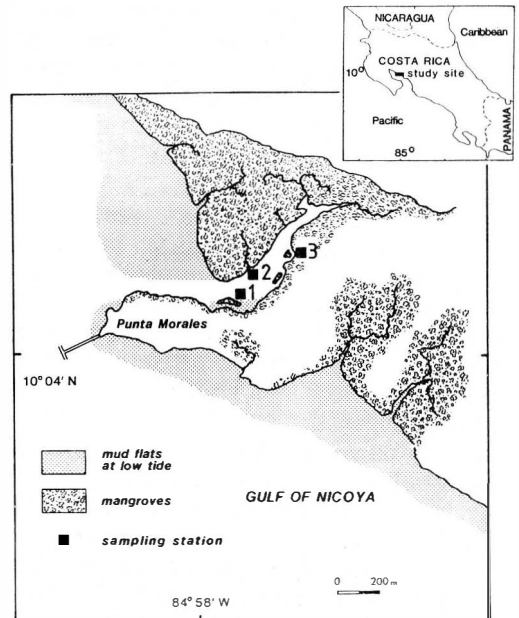


Fig. 1. Study site and sampling station in the estuary of Punta Morales, Gulf of Nicoya, Costa Rica.

\* Contribution 151 from CIMAR, Universidad de Costa Rica.

TABLE 1

Number and size of eggs (with standard deviation and range) attached to *P. schmitti* for the 3 stages of egg development; n represents the number of females from which eggs were counted and measured

Stage	Mean number	Range	(±SD)	Mean diameter	Range	(±SD)	n
I	193	117-286	(±46)	0.62	0.49-0.76	(±0.04)	18
II	185	58-381	(±97)	0.68	0.57-0.80	(±0.03)	11
III	147	65-214	(±49)	0.71	0.49-0.87	(±0.05)	10

on an irregular basis between January and December 1987. Station 1 was characterized by sandy sediments, and collections were conducted in small tide pools around a little mangrove island. Station 2 was located at an inlet of a small creek into the main channel. The third station represents a tide pool in the upper reaches of a creek entering the mangrove swamps; the sediment of the last two stations consisted of mud substratum.

Among others, specimens of *Ambidexter panamense* Abele, 1968 and *Palaemonetes schmitti* Holthuis, 1950 were obtained. This represents the first record of these two species for Costa Rica. Adults of *Ambidexter* Manning & Chance (1971) are characterized by having both first legs chelate. Only three species of this genus are known to date, all of them reported from Panama (Abele 1968). *A. panamense* has previously been recorded from the Pacific coasts of Panama, Mexico and the Gulf of California (Abele 1968, Rios & Carvacho 1982, Williamson 1980).

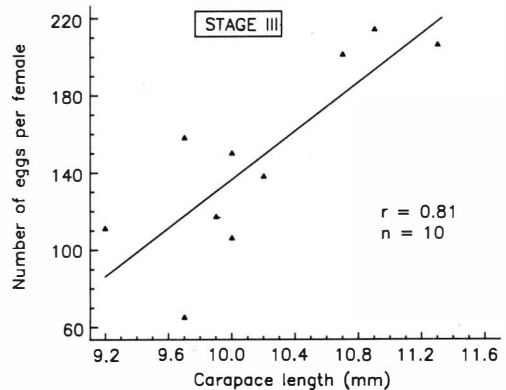
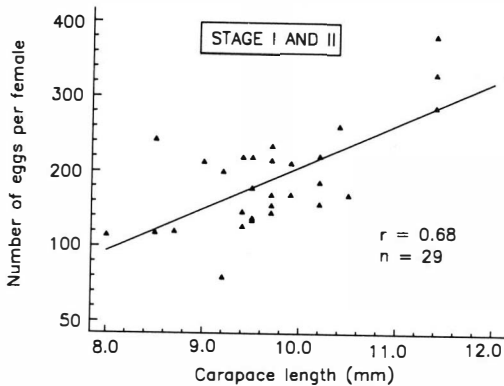
Collections of *A. panamense* were made on July 20, 1987 and were restricted to station 3. Only three specimens were obtained; all of them were caught on the surface of a mud flat near the tide pool at a water depth of a few centimeters. In previous investigations (Abele 1968, Williamson 1980) adults were found in or at the entrance of small burrows, most likely made by polychaete worms. However, in later attempts I was unsuccessful to obtain more individuals by digging. Despite the low number of collected adults, larvae of *A. panamense* were found frequently in plankton samples taken between January and December 1987 in the estuary of Punta Morales (Wehrtmann, unpublished data). This may indicate that the occurrence of the adults was not accidental and that a larger population of this shrimp is inhabiting

the upper reaches of the mangrove system. A similar discrepancy between number of collected adults and concentration of larvae in adjacent waters is documented by Williamson (1980) for Mazatlan, Sinaloa, Pacific coast of Mexico.

Little information is available regarding *P. schmitti*. To my knowledge, distribution seems to be restricted to Panama (Holthuis 1952, Abele 1976). However, *P. schmitti* was by far the most abundant shrimp species collected during the sampling period. It was present year-round at all stations as well as in the upper reaches of the river and in adjacent estuaries (personal observation).

Measurements were taken from 39 ovigerous females and the attached eggs. The samples originate from collections made on May 14, June 15 and November 29-30, 1987. Specimens had an average total length (from the tip of the rostrum to the end of the telson) of 28.3 mm, ranging from 24.2 to 32.2 mm which is in good agreement with the size range reported by Holthuis (1952). Carapace length varied between 8.5 and 11.9 mm with a mean length of 10.2 mm.

The development of the eggs was subdivided into three stages: I. uniform yolk; II. eye pigment barely visible; III. eyes clearly visible, abdomen free. A total of 6965 eggs were examined. The number of eggs per female varied considerably, ranging from 58 to 381 with an average of 179. Comparable data are available e.g. for *P. pugio* and *P. vulgaris* from the east coast of North America (Yan 1987); the fecundity was higher in both species (average of 590 and 330 eggs per female, respectively) than in *P. schmitti*. The mean number of eggs decreased continuously from stage I to stage III while the diameter of the eggs increased due to growth of the developing embryos (Tab. 1).



Figs. 2 and 3: Comparison between carapace length and number of eggs in stage I and II (A) and III (B) carried by ovigerous *P. schmitti* females.

The number of eggs is correlated with carapace length. The linear regression for the different developmental stages (Fig. 2 and 3) seems to indicate that larger females produce more eggs than smaller ones.

Early larval stages of *P. schmitti* were reared in the laboratory, and the morphological descriptions will be published elsewhere. Larvae occurred throughout the year in the Punta Morales plankton, but they were never numerous. This may indicate that hatching takes place in the adjacent coastal waters, but not directly in the estuary as in *A. panamense*.

#### ACKNOWLEDGEMENTS

The study was financially supported through a scholarship from the German Academic Exchange Service (DAAD). I am also grateful to the Centro de Investigación de Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, where I enjoyed being a Visiting Scientist for one year. Special thanks are due to Dr. L.B. Holthuis for identifying part of the shrimps and for his ongoing advice and support. A.V. Vázquez helped me in the laboratory counting and measuring the material. Drs C. Stagg, A.B. Williams and A.I. Dittel gave valuable comments on the manuscript.

#### REFERENCES

- Abele, L.G. 1968. A review of the genus *Ambidexter* (Crustacea: Decapoda: Processidae) in Panama. *Bull. mar. Sci.* 22 (2): 365-380.
- Abele, L.G. 1976. Comparative species composition and relative abundance of decapod crustaceans in marine habitats of Panama. *Mar. Biol.* 38:263-278.
- Holthuis, L.B. 1952. A general revision of the Palaemonidae. II The subfamily Palaemoninae. *Occ. Papers Allan Hancock Found.* 12: 1-396.
- Manning, R.B. & F.A. Chace, Jr. 1971. Shrimps of the family Processidae from the northwestern Atlantic Ocean (Crustacea: Decapoda: Caridae). *Smithson. Contr. Zool.* 89: 1-41.
- Rios, R. & A. Carvacho. 1982. Caridean shrimps of the Gulf of California. I. New records, with some remarks on amphiamerican distribution. *Pac. Sci.* 36(4): 459-465.
- Williamson, D.I. 1980. Larval development in a species of *Ambidexter* Manning & Chace (Decapoda, Caridae, Processidae). *Crustaceana* 39 (3): 235-246.
- Yan, H.Y. 1987. Comparative reproductive strategies of the grass shrimps, *Palaemonetes vulgaris* and *P. pugio* (Decapoda, Natantia) in Great Sippewissett salt marsh, Massachusetts, U.S.A. *Crustaceana* 52 (2): 141-148.