

CAECIDAE GASTROPODS FOUND IN BEDS OF THE MUSSEL Perna perna (BIVALVIA: MYTILIDAE), ON THE ROCKY SHORES OF BENEVENTE BAY, ESPÍRITO SANTO STATE

Gastrópodes Caecidae encontrados em bancos do mexilhão *Perna perna* (Bivalvia: Mytilidae), nos costões rochosos da Baía de Benevente, Estado do Espírito Santo

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ABSTRACT

Studies were conducted for the first time on the abundance and composition of the stages of development of gastropod mollusks of the family Caecidae in living beds of the mussel Perna perna from the rocky shores of Benevente Bay, located on the southern coast of Espírito Santo State. Developmental stages of Caecum ryssotitum and Caecum jucundum were found in the mussel's beds demonstrating the existence of microhabitats to enhance the survival of those microgastropods.

Keywords: *Caecidae, survival, Perna perna, microhabitat, Benevente Bay.*

RESUMO

Realizou-se pela primeira vez um estudo sobre a abundância e composição dos estágios de desenvolvimento dos moluscos gastrópodes da família Caecidae em bancos de Perna perna dos costões rochosos da Baía de Benevente, localizada no litoral sul do Estado do Espírito Santo. Foram encontrados estágios de desenvolvimento das espécies Caecum ryssotitum e Caecum jucundum em bancos habitados pelo mexilhão, demonstrando a existência de microhabitats para promover a sobrevivência desses microgastrópodes.

Palavras-chaves: *Caecidae, sobrevivência, Perna perna, microhabitat, Baía de Benevente.*

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INTRODUCTION

The mollusks of family Caecidae are marine Caenogastropoda found in the interstices of sand grains, on algae and seagrass meadows, on the roots of mangrove trees, calcareous and sandy-muddy sediments, and nearby coral and sandstone reefs, occurring between depths of 10 to 50 meters, and distributed across the tropical regions of the American continent (Absalão, 1989; Gomes & Absalão, 1996; Oliveira *et al.*, 2003; Lacerda *et al.*, 2009).

According to Rios (1994), the shell is tubular, curved and open at the front end, with length varying between one and five millimeters. The Caecidae show planktonic embryonic development with a free-swimming veliger stage, spiral shell with three stages of development, in the first the shell is coiled; in the second stage there is loss of embryonic laps and the shell acquires a cylindrical shape and the third stage forms a new septum in the posterior region of the shell (Abbot, 1974).

Their feeding habits are herbivorous and detritivorous with a clear preference for diatoms, in addition to serving as food for carnivorous crustaceans and gastropods, actively participating in the food web (Mello & Maestrati, 1986).

Banks of *Perna perna* are composed of an assemblage of individuals, dead shells, sediments, pseudofaeces and byssal filaments, and offer a diversity of suitable habitats to a variety of benthonic fauna (Suchanek, 1980; Tsuchiya & Nishihira, 1985; Mello & Maestrati, 1986; Albrechet, 1988; Reise, 2002; Hammond & Griffiths, 2004; Rocha *et al.*, 2006), providing food and shelter to organisms with limited tolerance to environmental stress (Thiel & Ullrich, 2002).

The aim of this study was to record and analyze variations in composition and abundance of the three growth stages of the species and of *Caecum ryssotitum* and *Caecum jucundum* in banks of *P. perna*, on the rocky shores of Ilha do Gambá, the beaches Monte Aghá, Itaipava, Itaoca, Costa Azul and Namorados, located in the Bay of Benevente, southern coast of Espírito Santo.

MATERIAL AND METHODS

The samples were collected in *Perna perna* banks from three distinct areas selected randomly, using a 0.04 m² sampler (20x20cm), which were chosen on account of their accessibility and abundance.

The following rocky shores were sampled: Ilha do Gambá 20°50'46,4"S - 40°43'28"W), the

beaches Monte Aghá (20°52'2,5"S - 40°45'29,8"W), Itaipava (20°53'30,5"S - 40°46'0,4"W) and Itaoca (20°54'18,3"S - 40°46'36,7"W), Costa Azul (20°49'58"S - 40°41'34,2"W) and Namorados (20°49'42,6"S - 40°41'23,6"W), located in the Benevente Bay, on southern Espírito Santo State (Figure 1).

Sampling was carried out in the morning, during low tide of a spring tide on February 20th (1st sampling) and September 4th (2nd sampling), 2010 in the localities Ilha do Gambá and Monte Aghá; September 4th, 2010 (1st sampling) and February 20th (2nd sampling), 2011 for Itaoca and Itaipava locations, February 21st (1st sampling) and July 22nd (2nd sampling), 2011 for Costa Azul and Namorados locations.

After two hours of relaxation in a freezer, fixation in 10% formalin was performed in the laboratory of the Center for Studies on Coastal Biomes of the southern coast, located in the city of Piúma (ES).

Counted and identified through specific literature, (Rios, 2004, 2009; Gomes & Absalão, 1996), the analyzed material was stored at the Laboratório de Protostômios II, Departamento de Zoologia, ICB, UFJF.

The specimens of *Caecum* were observed using a stereomicroscope Zeiss Stemi 2000-C attached to a digital camera Canon Power Shot A620. The related data in this study come from specimens deposited in the Invertebrates Collection of Juiz de Fora Federal University (CIUFJF).

RESULTS AND DISCUSSION

We found two species of the family Caecidae between and/or attached to the filaments of the byssus of *Perna perna*, the species *Caecum ryssotitum* Folin, 1867 (Rios, 1994) and *Caecum jucundum* Folin, 1870 (Rios, 2009).

The developmental stages I (Figure 2), II (Figure 3) and III (Figure 4) of *C. ryssotitum* were present in the six rocky shores studied (Table I).

The developmental stage I of *C. ryssotitum* occurred in the second sampling at the rocky shore of Itaipava beach and at the first and second samplings on the Namorados Beach. The abundance of this stage was represented by 1 ind./400 cm² in the first and second sampling on the Namorados beach and maximum of 17 ind./400 cm² at the second sampling on the Itaipava beach. The developmental stage II was not present at the first sampling of the rocky shore on the Monte Aghá beach, and at the second sampling from the rocky shore of the Ilha do

Gambá and on the Costa Azul beach. Regarding the least abundance, it was 1 ind./400 cm² in the first sampling on the beach Namorados and a maximum of 67 ind./400 cm² at second sampling on the Itaipava beach (Table I).

The developmental stage III occurred in the six rocky shores, with abundance of 391 specimens,

minimum of 1 ind./400 cm² at the second sampling in the Ilha do Gambá and maximum of 72 ind./400 cm² at the first sampling on the Itaipava beach (Table I). This growth stage III has been found attached to the byssus of *P. perna* at the second sampling of the rocky shores on the beaches of Monte Aghá, Itaipava, Costa Azul and Namorados (Figure 4).

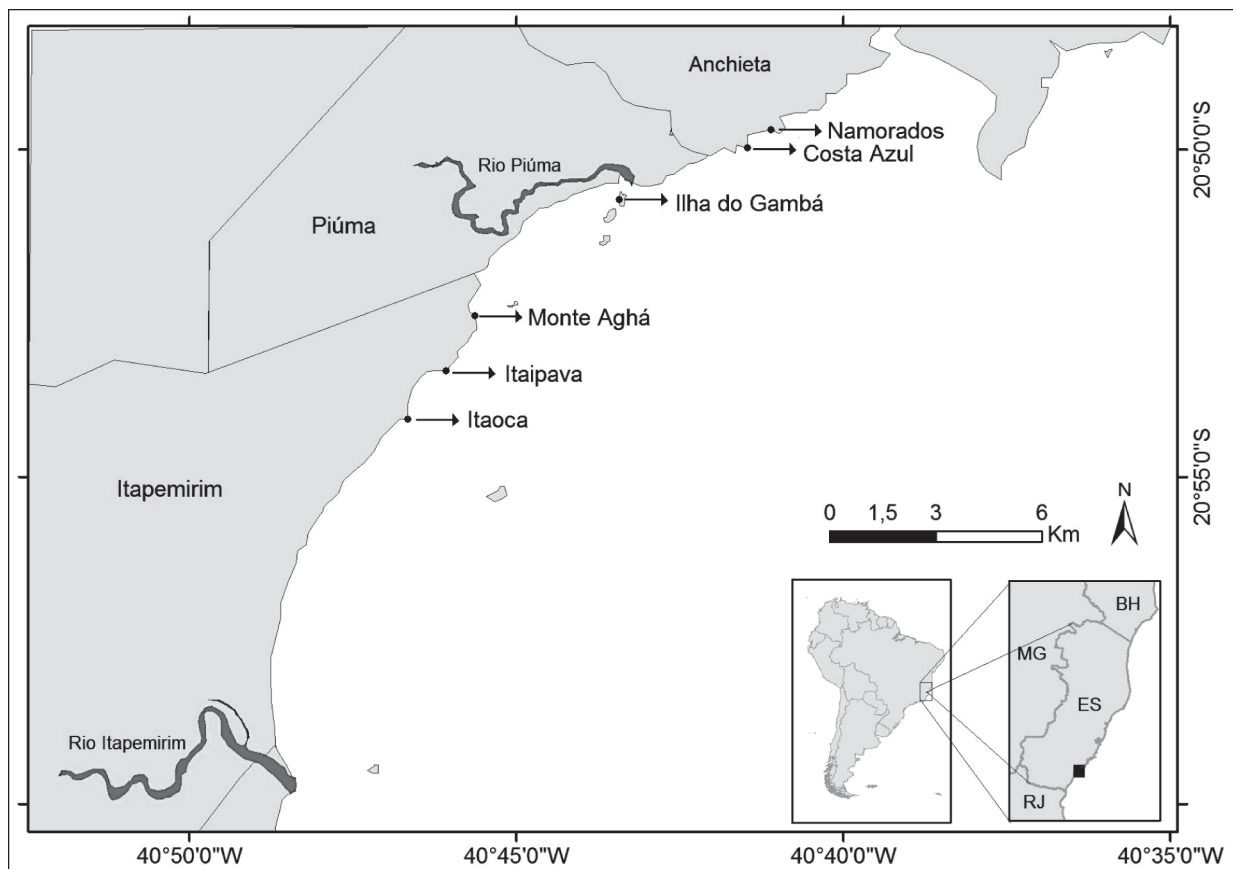


Figure 1 - Partial view of the Benevente Bay, Espírito Santo State, with its six sampling points (adapted from Pinheiro et al., 2009).

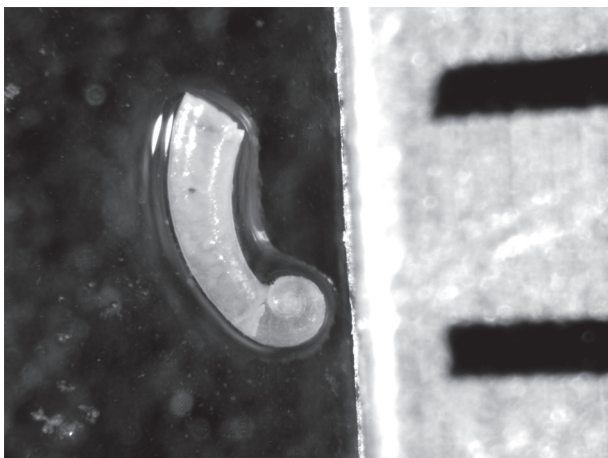


Figure 2 - Partial view of stage I of *Caecum ryssotitum* (scale: 1 mm).



Figure 3 - Partial view of stage II of *Caecum ryssotitum* (scale: 1 mm).

Table I - Abundance of developmental stages of *Caecum ryssotitum* and *Caecum jucundum* at the first and second samplings on the rocky shores of the ilha do Gambá and the beaches of Monte Aghá, Itaipava, Itaoca, Costa Azul and Namorados, in Benevente Bay, Espírito Santo State.

Species	<i>Caecum ryssotitum</i>			<i>Caecum jucundum</i>		
	I	II	III	I	II	III
Ilha do Gambá*	-	7	22	-	-	-
Ilha do Gambá**	-	-	1	-	-	-
Monte Aghá*	-	-	6	-	-	-
Monte Aghá**	-	6	56	-	-	5
Itaipava**	-	2	43	-	-	1
Itaipava*	17	67	18	-	-	-
Itaoca**	-	11	72	-	-	34
Itaoca*	-	10	30	-	2	4
Costa Azul***	-	26	52	-	1	-
Costa Azul****	-	-	9	-	-	2
Namorados***	1	1	7	-	-	1
Namorados****	1	27	61	-	-	3

* February 20, 2011; ** September 4, 2010; *** February 21, 2011; **** July 22, 2011.



Figure 4 - Partial view of stage III of *Caecum ryssotitum* fixed by the byssus of *Perna perna* (scale: 1 mm).

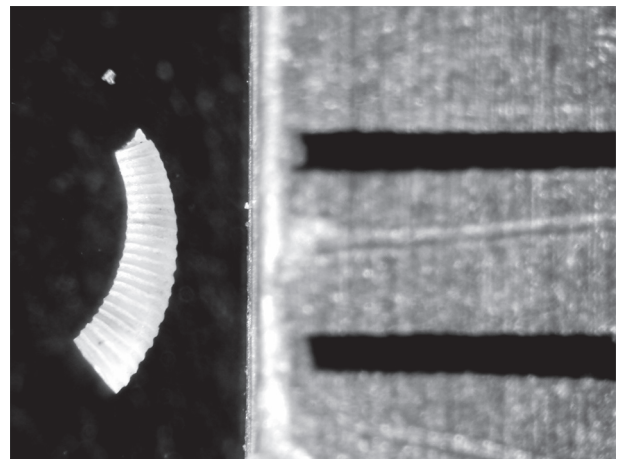


Figure 5 - Partial view of stage II of *Caecum jucundum* (scale: 1 mm).

The stages I and III of development in *C. ryssotitum* were more abundant in the samples collected during the rainy season, while the stage III of development of *C. ryssotitum* was more representative during the dry season. The greater abundance of individuals in the stage III of development reported for both seasons could be related to the increased tenacity of the shell in this phase of development, leading to higher survival rates.

The occurrence of stages II (Figure 5) and III (Figure 6) of development of *C. jucundum* in banks of *P. perna* was recorded for the first time, but not that of stage I probably due to the fragility of the shell and the methods applied for laboratorial analyses.

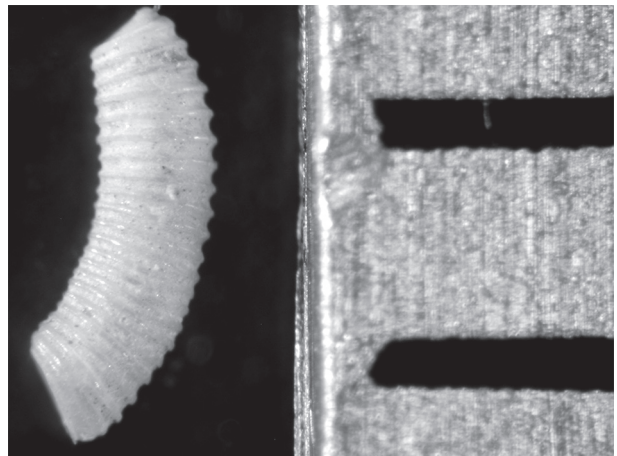


Figure 6 - Partial view of stage III of *Caecum jucundum* (scale: 1 mm).

The developmental stage II, with minimum abundance of 1 ind./0.04 m², was observed at the first sampling of Costa Azul Beach and abundance of 2 ind./0.04 cm² at the second sampling on the rocky shore of Itaoca beach (Table I).

The developmental stage III, with 50 specimens, minimum abundance of 1 ind./0.04 m² was noticed at the first sampling of Itaipava and Namorados beaches, and maximum abundance of 34 ind./0.04 m² at the first sampling of Itaoca beach (Table I).

The stages II and III of development of *C. jucundum* were found only in the mussel banks of Itaoca rocky shore, while stage III occurred in *P. Perna* banks of Monte Aghá (2nd sampling), Itaipava and Itaoca (1st sampling), Costa Azul (2nd sampling) and Namorados (1st and 2nd sampling) beach.

The developmental stage III of *C. jucundum* was more abundant in the samples collected during the dry season, while the stages I and III of *C. jucundum* were not significantly registered during the rainy season.

The comparison of the developmental stages I, II and III of *C. ryssotitum* and *C. jucundum* during the rainy and dry seasons provides evidence of similar population growth patterns by these species in *P. perna* banks from the six analyzed rocky shores of Benevente Bay.

CONCLUSION

As the main outcome of this research work one can conclude that the presence of microhabitats on the mussel beds of *Perna perna* has certainly contributed to the abundance of the developmental stages of *Caecum ryssotitum* and *Caecum jucundum* on the rocky shores of the Island do Gambá and the beaches of Monte Aghá, Itaipava, Itaoca, Costa Azul and Namorados, located in the Benevente Bay, Espírito Santo State.

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