PREDATION BY YOUNG Cassis tuberosa LINNAEUS, 1758 (MOLLUSCA: GASTROPODA) ON Mellita quinquiesperforata (CLARCK, 1940) (ECHINODERMATA:ECHINOIDEA), UNDER LABORATORY CONDITIONS

Predação de Mellita quinquiesperforata (Clarck, 1940) (Echinodermata: Echinoidea) por jovens de Cassis tuberosa Linnaeus, 1758 (Mollusca: Gastropoda), em condições de laboratório

Ana Paula Leite Cavalcante Pequeno¹, Helena Matthews-Cascon²

RESUMO

Na praia de Redonda, Município de Icapuí (Estado do Ceará), encontram-se frequentemente jovens indivíduos de Cassis tuberosa Linnaeus, 1758 predando Mellita quinquiesperforata (Clarck, 1940). Neste trabalho foi analisado o comportamento predatório de indivíduos jovens de C. tuberosa sobre M. quinquiesperforata. Os predadores e as presas foram coletados na faixa intertidal e levados para laboratório. Cada Cassis tuberosa jovem foi colocado com vinte indivíduos adultos de Mellita quinquiesperforata em um aquário de 60 litros. Durante o experimento o número de presas consumidas foi registrado e os indivíduos predados eram repostos. Este experimento durou um mês e foi replicado cinco vezes sob temperatura de 28°C. Foram registradas a posição e as dimensões dos orifícios causados pela predação de C. tuberosa sobre M. quinquiesperforata. Os orifícios mediam de 4 a 5 mm de diâmetro e tinham marcas da rádula em suas bordas. Foi encontrada, em cada presa, uma mancha escura ao redor do orifício, provavelmente devido à reação do carbonato de cálcio da carapaça da presa ao ácido sulfúrico do predador. Não foi observada estatisticamente preferência na predação entre o lado aboral e o oral da presa, mas a maioria da predação ocorreu na superfície oral próxima da boca. O mecanismo de defesa da presa observado foi baseado em estratégias comportamentais, tais como fuga.

Palavras-chaves: predação, Mollusca, Gastropoda, Echinodermata, Echinoidea.

ABSTRACT

In Icapuí County, Ceará State, Northeast Brazil, young individuals of Cassis tuberosa Linnaeus, 1758 are frequently found feeding on Mellita quinquiesperforata (Clarck, 1940). In this study we analyze the predatory behavior of young C. tuberosa on the sand dollar M. quinquiesperforata. Individuals of predator and prey were collected at low tide and were taken to the laboratory in aerated boxes. Each Cassis tuberosa was placed together with 20 adult individuals of Mellita quinquiesperforata in 60-liter tanks. During the experiment the number of consumed prey was registered and the eaten individuals were replaced. This experiment lasted for one month at 28°C and was replicated five times. We registered the position and the dimensions of the bore holes on the sand dollars. The bore holes were complete, with 4 to 5 mm of diameter and had teeth marks of the radulae on their edge. We found, in every prey, a dark spot around the predation holes, which was probably a reaction of the calcium carbonate shell of the prey to the sulfuric acid from the predator. Statistically-significant preference for oral or aboral sides was not observed, but most predation by C. tuberosa on Mellita quinquiesperforata was on the oral surface and close to the mouth. The defense mechanism of the prey was based on behavioral strategies.

Key words: predation, Mollusca, Gastropoda, Echinodermata, Echinoidea.

¹Professor Substituto do Departamento de Biologia, Universidade Federal do Ceará, Campus do Pici, Fortaleza.
²Professor Adjunto do Departamento de Biologia e Pesquisadora do Instituto de Ciências do Mar, Universidade Federal do Ceará, Campus do Pici, Fortaleza.
INTRODUCTION

Dietary generalists eat wider ranges of prey than dietary specialists (Curio, 1976). Specialization should be effective enough to achieve optimal hunting success but at the same time, it should not be so rigid as to prevent the predator from changing from a particular and originally preferred prey species when that species becomes rare (Curio, 1976).

The animals from the Cassidae family are specialist predators on Echinodermata (Hughes & Hughes, 1981). According to Fange & Lidman (1976) the species of Cassidae family had develop efficient strategies in catching the prey, as well as, morphological and physiological adaptations in their digestive system for producing sulfuric acid that make easy to bore on the shell of echinoderms.

Previous studies have investigated the predation by Cassis tuberosa on echinoderms. Moore (1956) observed Cassis tuberosa feeding on Tripneustes esculentus and Phalium granulatum on Mellita quinquesperforata. MacClintock & Marion (1993) found Cassis tuberosa preying on Leodia sexiesperforata.

In the present study, the predatory behavior of the young Cassis tuberosa on Mellita quinquesperforata was investigated.

MATERIALS AND METHODS

The predator and prey were collected at low tide in Redonda Beach (04° 40’ S, 37° 20’ W), Icapuí County, Ceará State, Northeast Brazil and taken to the laboratory in aerated boxes. Each Cassis tuberosa was placed with 20 individuals of Mellita quinquesperforata in 60-liter water tanks. During the experiment the number of consumed prey was noted and the eaten individuals were replaced. This experiment lasted for one month at 28 ºC and was replicated five times. The predators had in average, 75 mm in length and the preys 26.9 mm in diameter (Figure 1). The observations of the predatory behavior were done for seventy two hours.

RESULTS

In a total of 63 registered predation attacks of Cassis tuberosa on Mellita quinquesperforata, 50 (79%) were on oral surface and 8 (13%) were on the aboral surface (Figure 2). In the remaining 5 attacks (8%) the bore holes trespassed the prey body (Figure 3). The bore holes had 4 to 5 mm in diameter and teeth marks of the radulae on the edges (Figure 4). In every prey, a dark spot around the predation holes was also found (Figure 5). Most of the attacks by C. tuberosa on M. quinquesperforata were closer to the mouth (85%) than to the edge of the sand dollar.

Individuals of Cassis tuberosa initiated the attacks moving very fast in the direction of the prey with the foot under the sand removing it. When the predator catches the prey, the proboscide touches it and begins the acid liberation as indicated by the appearance of bubbles. During the experiments, the following defensive behavior by the individuals of Mellita quinquesperforata when attacked by Cassis tuberosa was observed in the water tanks. M. quinquesperforata individuals unburied themselves when noticed the approximation of the predator and moved to the opposite side of the predator. Another defense behavior by Mellita quinquesperforata was forming a pile of individuals that moved towards the predator and passed over it.
Moore (1956) observed predation by *Phalium granulatum* on *Mellita quinquiesperforata* and *Cassis tuberosa* on *Tripneustes esculentus*. We found in Redonda Beach, Icapuí County, these two predators preying on *Mellita quinquiesperforata*. MacClintock & Marion (1993), while studying predation by *Cassis tuberosa* on *Leodia sexiesperforata*, observed that the attack of *C. tuberosa* was more often on the oral surface the same way as we observed for *C. tuberosa* on *M. quinquiesperforata*. They also reported that most attacks were done at day time. In our study many attacks were seen to take place at day time but some also at night. Hughes & Hughes (1981) observed *Cassis tuberosa* preying only at night, and thought it to be a probable way to avoid predators like fishes.

According to Moore (1956), the bore holes observed by predation of *Phalium granulatum* on *Mellita quinquiesperforata* had less than 2 mm and no teeth marks of the radulae were found. Since this was different from our observations on the predation by *Cassis tuberosa* on *Mellita quinquiesperforata*, it may be that the bore hole can be specific of each kind of predator.

The stain and the bubbles found on the shell of the prey could be caused by the acid produced by the predator. According to Fange & Lidman (1976) bubbles could be due a strong acid.

**CONCLUSIONS**

1. The dark spot around the predation holes found in every prey, probably was a reaction of the calcium carbonate shell of *Mellita quinquiesperforata* to the sulfuric acid from *Cassis tuberosa*.
2. Most of predation by *Cassis tuberosa* on *Mellita quinquiesperforata* was on the oral surface and close to the mouth, maybe because this area has more tissue with energetic content.

**REFERENCES**


