



New data on the spawning of the Brazilian endemic gastropod *Voluta ebraea* (Mollusca: Volutidae)

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Abstract. This is the first record of the endemic Brazilian Caenogastropoda mollusk *Voluta ebraea* laying egg capsules on broken shells in rocky bottoms, not only on the green algae *Udotea occidentalis* in sandy bottoms.

Key words: reproduction, egg capsules, shell.

Novas informações sobre a desova do gastrópode endêmico do Brasil *Voluta ebraea* (Mollusca: Volutidae). **Resumo:** Este é o primeiro registro de que o molusco Caenogastropoda endêmico do Brasil, *Voluta ebraea*, desova cápsulas de ovos em conchas quebradas em substratos rochosos, e não apenas na alga verde *Udotea occidentalis* em substrato arenoso.

Palavras-chave: reprodução, cápsulas de ovos, concha.

The species *Voluta ebraea* Linnaeus, 1758 is an endemic gastropod mollusk from the northern and northeastern seas of Brazil. It is distributed from Pará to Bahia States (Clench & Turner 1964, Matthews 1969, Rios 2009) and has a robust shell (Fig. 1A), up to 200 mm long. *Voluta ebraea* exhibits a carnivorous diet, preying on mollusks such as bivalves (Dias 2009) and other gastropods (Mota *et al.* 2004). This species is known to lay egg capsules only on the calcareous green algae *Udotea occidentalis* (Fig. 1B), usually one capsule per algae (18.2 ± 2.63 mm in diameter) (Matthews-Cascon *et al.* 2010). In average, three juveniles hatch per capsule, each with a shell length of 7.8 mm (Matthews-Cascon *et al.* 2010, Matthews-Cascon *et al.* 2011). Here, the occurrence of *V. ebraea* spawning in different substrate types is reported.

Observations were made in the intertidal zone during the low tide at Pedra Rachada Beach, Paracuru – Ceará State (Northeast Brazil) (3°23'53"S; 39°00'58.8"W) (Fig. 2) in July of 2014. This beach has several microhabitats, most of them formed by sandy and rocky bottoms (Fig. 2). The *V. ebraea* spawns were found in a shell fragment on a rocky bottom and taken to the Laboratório de Invertebrados Marinhos da Universidade Federal do Ceará (LIMCE - UFC), where they were removed from the substrate with a small spatula and observed under a stereoscopic microscope. The spawn was measure with a 0.01 mm precision caliper, as well as the contents of each capsule. Then, they were preserved in 70% alcohol and deposited in the Prof. Henry Ramos Matthews Malacological Collection Series B (Coleção Malacológica Prof. Henry Ramos

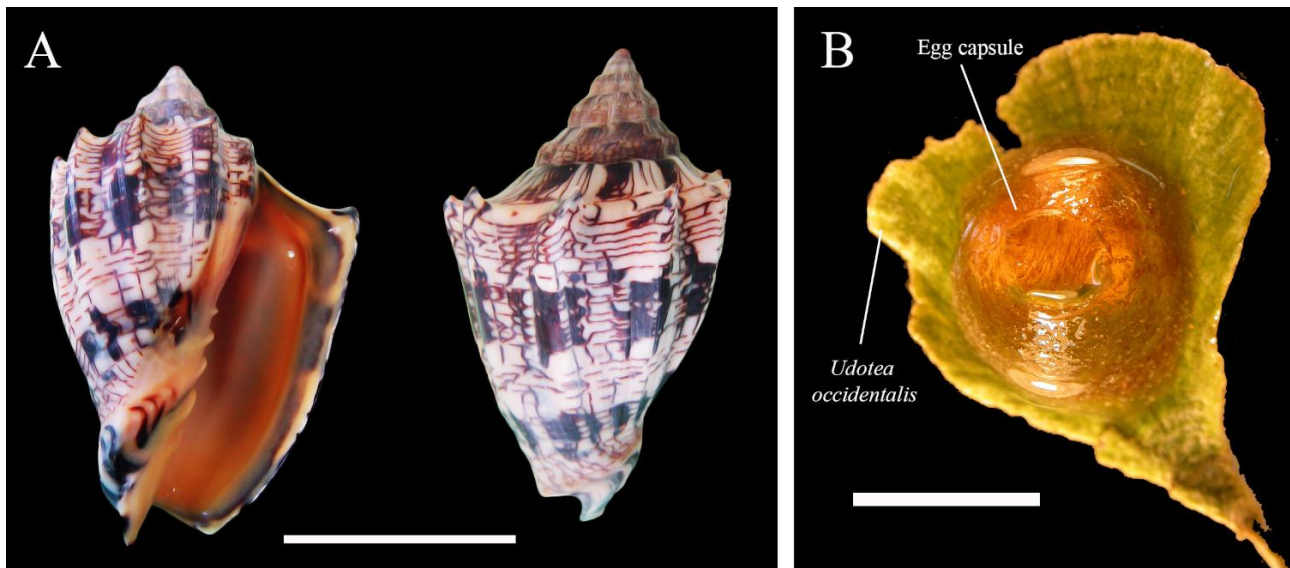


Figure 1. A. Ventral and dorsal views of shell of an adult *Voluta ebraea* (scale bar = 50 mm). B. The calcareous green algae *Udotea occidentalis* and an egg capsule laid by *V. ebraea* on its concave side (scale bar = 18 mm).

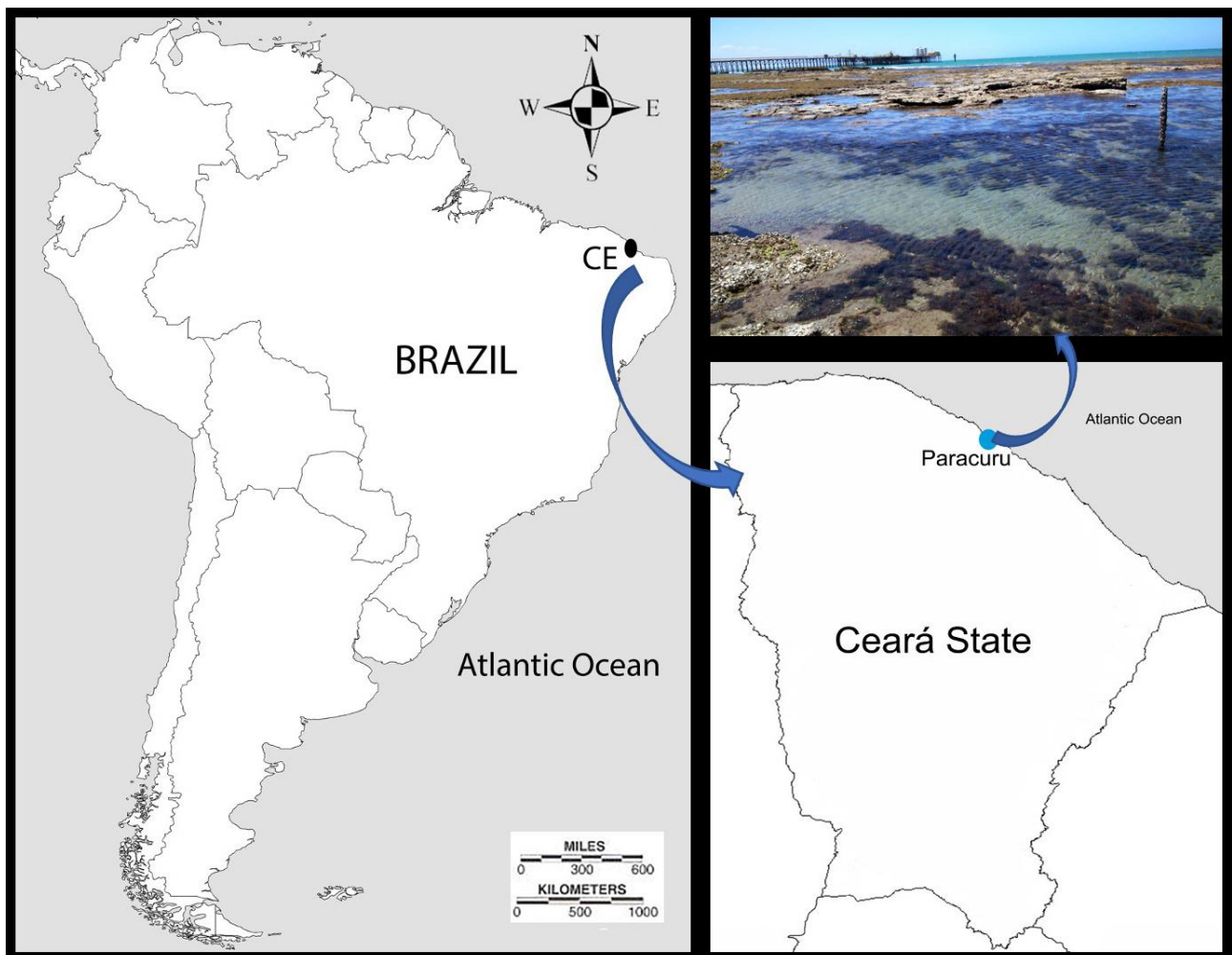


Figure 2. Study site, Pedra Rachada Beach, Paracuru – CE (Northeast Brazil) ($3^{\circ}23'53''\text{S}$; $39^{\circ}00'58.8''\text{W}$).

Matthews Série B) at the Department of Biology, Universidade Federal do Ceará, under the number CMPHRM 4368B.

Two egg capsules of *Voluta ebraea* were found attached to a shell fragment of the endemic Brazilian gastropod *Titanostrombus goliath*

(Schroter 1805), attached to the internal region (concave surface) of the ventral area of the Strombidae shell (Fig. 3A and 3B). The capsules are circular, flattened, 18.25 ± 0.35 mm diameter and have a small opening at the top (Fig. 4). One of them

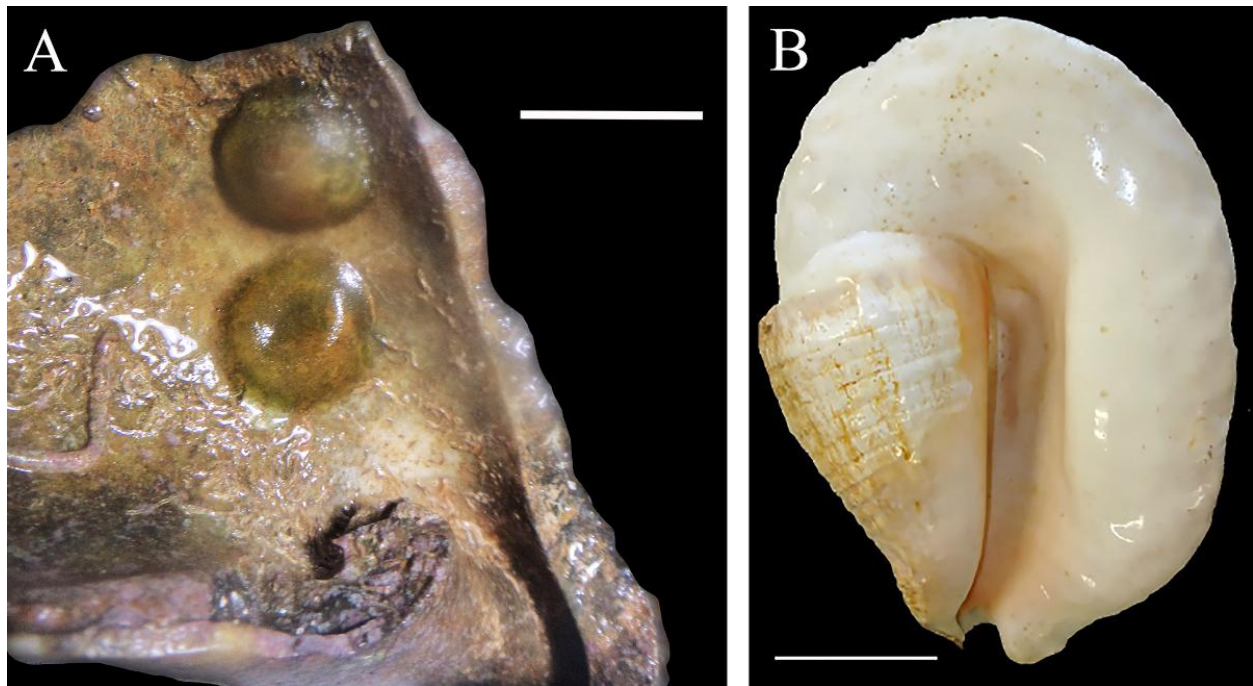


Figure 3. A. Two egg capsules laid by *Voluta ebraea* attached to a shell fragment of the Brazilian endemic gastropod *Titanostrombus goliath* from Pedra Rachada Beach, Paracuru – Ceará State (Northeast Brazil) (scale bar = 25 mm). B. Ventral view of the endemic gastropod *Titanostrombus goliath* shell (scale bar = 120 mm).

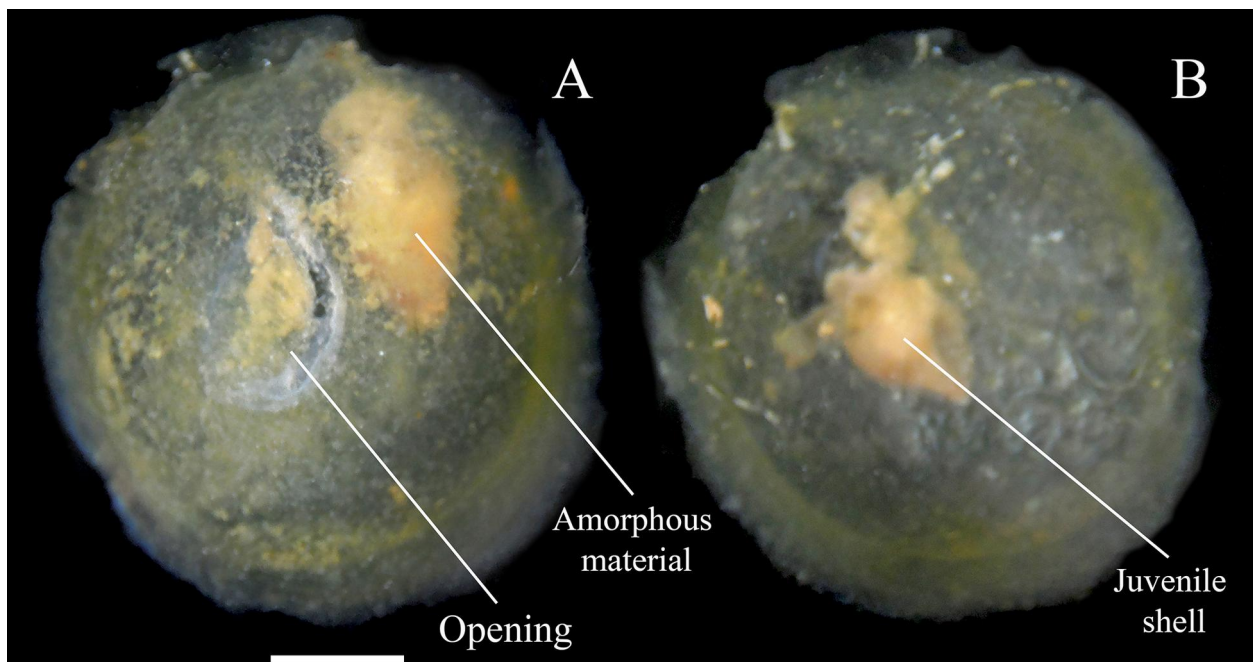


Figure 4. Two egg capsules laid by *Voluta ebraea* detached from the substrate, collected at Pedra Rachada Beach, Paracuru – CE (Northeast Brazil) (scale bar = 5 mm). A. Capsule contained amorphous material. B. Capsule contained a broken juvenile shell.

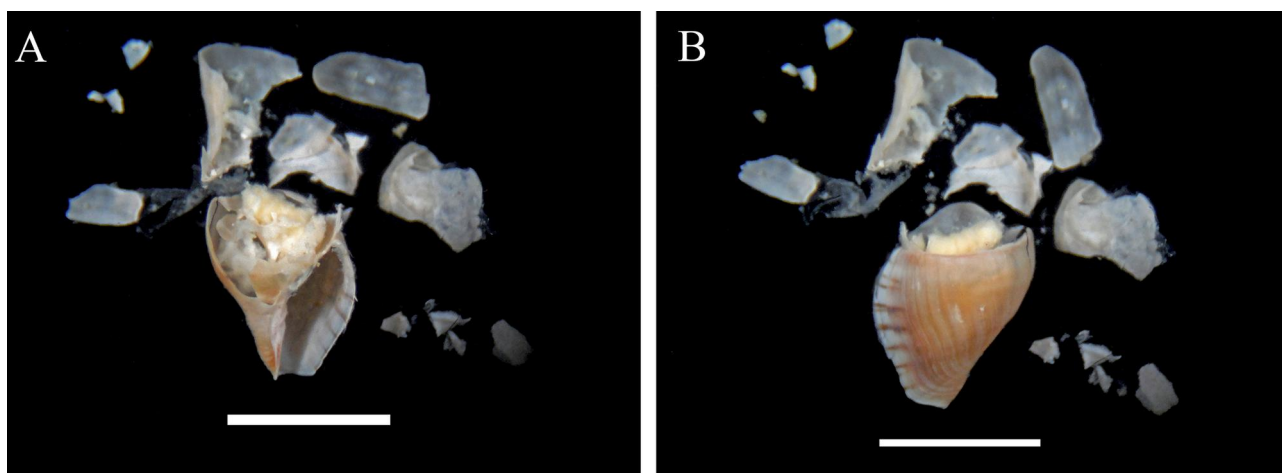


Figure 5. Broken juvenile shell from egg capsule laid by *Voluta ebraea* attached to a shell fragment of the Brazilian endemic gastropod *Titanostrombus goliath* from Pedra Rachada Beach, Paracuru – Ceará State (Northeast Brazil). A. Ventral view (scale bar = 3 mm). B. Dorsal view (scale bar = 3 mm).

contained fragments of a well-developed juvenile protoconch with well-defined opening and ornamentation (Fig. 4B, Fig. 5A and Fig. 5B). The other capsule contained only amorphous material that could not be identified (Fig. 4A).

Matthews-Cascon *et al.* (2010) observed 40 egg capsules of *V. ebraea* attached to the calcareous green algae *Udotea occidentalis* at Pedra Rachada Beach (first record of volutid egg capsules attached to algae), where 82% of them were fixed to the concave side of the algae and 86% of them had only one egg capsule attached. It was suggested the possibility of deeper populations of *V. ebraea* to utilize bivalve shells as spawn substrate as other volutes do and, as it was observed in this study, intertidal populations of this gastropod might also spawn on empty shells.

The algae *U. occidentalis*, usually found in sandy areas at Pedra Rachada Beach (Matthews-Cascon *et al.* 2010), was not observed during the field observation period. Dias (2009) observed at Cabo Branco Beach (Paraíba State) that 41,2% of *V. ebraea* sightings was in sandy bottoms, where it lives buried in the sand, resting and preying on its preferred food item, the bivalve *Dallicardia muricata* (Linnaeus, 1758). Probably in the absence of the green algae, this mollusk search for areas with hard substrate to spawn. It is characteristic of Volutidae from South America to spawn in stones, elasmobranch egg capsules and empty shells, especially bivalves (usually in the internal/concave side) (Bigatti *et al.* 2010).

Further studies regarding reproduction and development of *Voluta ebraea* are necessary, mainly on larval development (number of eggs, number of

embryos and development time from spawning to hatching), survival rate and veliger anatomy. The spawning behavior study in sandy and rocky areas is essential, especially on beaches with high anthropogenic impact (fishing, coastal construction, trampling), not only to increase the knowledge of its life history, but also for the conservation and protection of an endemic and important species from the Brazilian coast.

Ethical statement

The present investigation did not involve regulated animals and did not require approval by an Ethical Committee.

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