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RECORD OF *Ostrea puelchana* D'ORBIGNY, 1842 (BIVALVIA: OSTREIDAE), AS NEW EPIBIONT IN *Eriphia gonagra* (FABRICIUS, 1781) (CRUSTACEA: ERIPHIIDAE) FROM NORTHEASTERN BRAZIL

Registro de *Ostrea puelchana* d'Orbigny, 1842 (Bivalvia: Ostreidae), como novo epibionte em *Eriphia gonagra* (Fabricius, 1781) (Crustacea: Eriphiidae) para o Nordeste do Brasil

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ABSTRACT

In this paper, we describe the first association of the ostreid species *Ostrea puelchana* d'Orbigny, 1842, as new epibiont in *Eriphia gonagra* (Fabricius, 1781), with material collected in Northeastern Brazil. The specimens of *E. gonagra* were collected manually in November of 2020 during the low tide in the Barra de Catuama beach, State of Pernambuco. Among 10 specimens collected, only one adult male showed the presence of two commensal specimens of *O. puelchana* adhered in the epibranchial and antero-lateral regions of the basibiont (right side). The presence of the epibiont *O. puelchana* on the new host *E. gonagra* expands the range of the crustacean species potentially used as hosts by this oyster along the Brazilian coast.

Keywords: marine invertebrates, biological interactions, Pernambuco, commensalism, beachrocks.

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RESUMO

Neste artigo, nós descrevemos a primeira associação da espécie de ostreídeo Ostrea puelchana *d'Orbigny, 1842, como novo epibionte em* Eriphia gonagra *(Fabricius, 1781), com material coletado no Nordeste do Brasil. O espécime de* E. gonagra *foi coletado manualmente em novembro de 2020 durante a maré baixa na praia de Barra de Catuama, no estado de Pernambuco. Entre os 10 espécimes coletados, apenas um macho adulto demonstrou a presença de dois espécimes comensais de* O. puelchana *aderidos nas regiões epibranquial e anterolateral do basibionte (lado direito). A presença do epibionte* O. puelchana *como novo hospedeiro de* E. gonagra *expande a gama de espécies de crustáceos potencialmente utilizadas como hospedeiros dessa ostra ao longo da costa brasileira.*

Palavras-chave: *invertebrados marinhos, interações biológicas, Pernambuco, comensalismo, arenitos de praia.*

Biological interactions between marine invertebrates are widely reported in the literature, with observations of intra- or inter-specific associations in different aspects as: symbiosis, parasitism, mutualism or commensalism (Hoffmeister & Martin, 2003; Emparanza *et al*., 2011; Góngora-Gómez *et al*., 2015). For these associations, the body surface plays a crucial role as a hard substrate for the fixation of many invertebrate groups in a wider range of the marine hosts (Wahl, 2008).

In estuarine and marine zones, the mollusks can be observed in different lifestyles, being in free-living or occupying a wide range of substrates such as: mangrove roots, rocks, in anthropogenic areas (e.g. piers, ports, boats, ships), associated to marine litter (e.g. tires and pet bottle), or adhered to other invertebrates as: corals, sponges, polychaetes tubes, other mollusks and crustaceans, developing a wide plasticity of shapes for these occupations (O'Connor & Newman, 2001; McDermott, 2006; Emparanza *et al*., 2011).

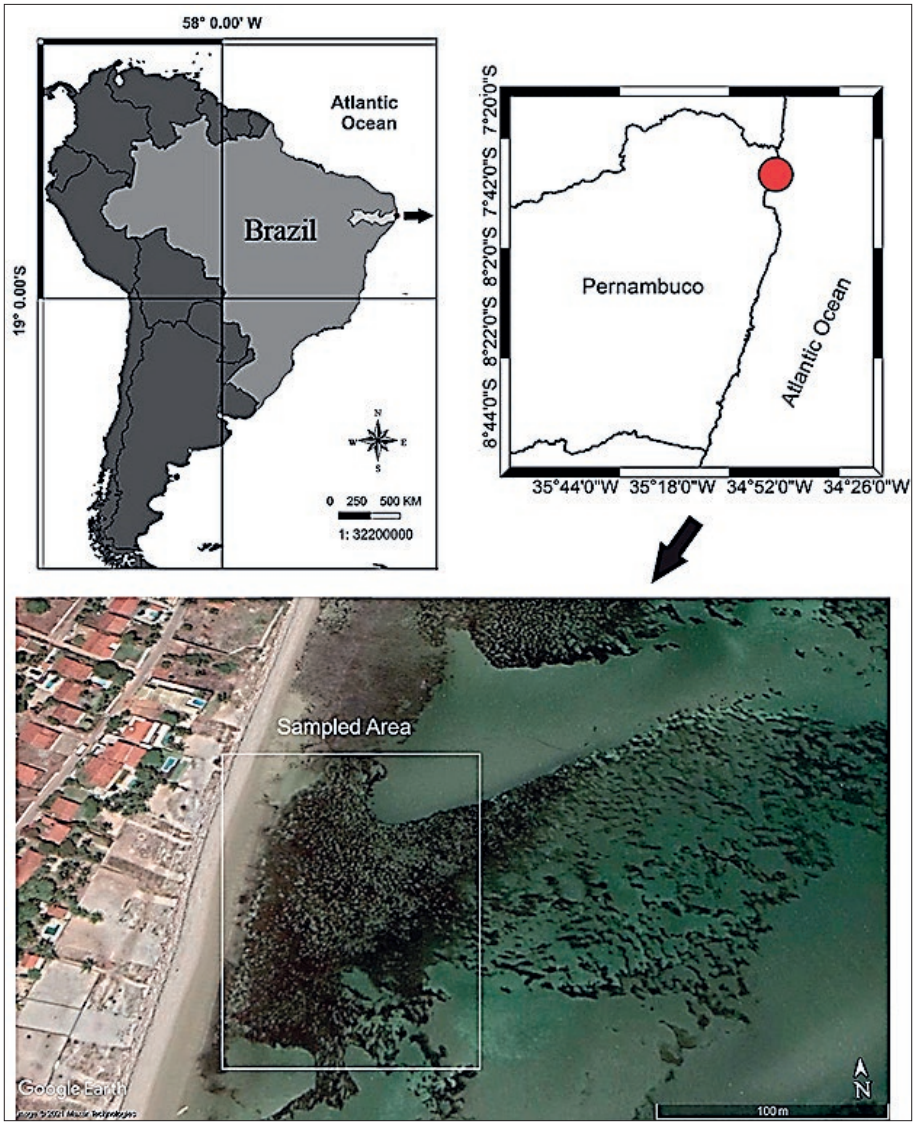
Bivalves of the family Ostreidae Rafinesque, 1815 are commonly found in coastal zones, occurring mostly in consolidated substrates or living as epibionts of invertebrates such as: sponges, corals, echinoderms and crustaceans (Amaral & Simone, 2014; Ferreira-Jr.; Christo & Abster, 2015; Hanke *et al*., 2015). Despite the great diversity of ostreids species in tropical areas, the genus *Ostrea* Linnaeus, 1758 is widely distributed in Americas as opportunistic commensal or symbionts, especially the species *O. puelchana* d'Orbigny, 1842, which is reported adhered in a wider range of invertebrate hosts (Rios, 2009; Lima *et al*., 2017).

Despite the wide distribution in coastal zones along the Americas, the crab species of *Eriphia gonagra* (Fabricius, 1781) (Eriphiidae MacLeay, 1838) is currently analyzed in many aspects as: taxonomy, ecologic and biologic aspects, reproductive traits or as bioindicators of anthropogenic impacts (Melo, 1996; Góes & Fransozo, 2000; Andrade *et al*., 2014). However, the information of aspects as symbiosis or parasitism with other groups are scarce (e.g. with punctual cases of observation of *E. gonagra* with coastal barnacles, bryozoans and sponges) or nonexistent (Mantelatto & Souza-Carey, 1998). Based on that, herein, we report the first association of the species *O. puelchana* as epibiont of *E. gonagra* with material collected in Northeastern Brazil.

A total of 10 specimens of *E. gonagra* were collected manually during the low tide in the Barra de Catuama beach (Figure 1), located on the north coast of Pernambuco (7° 33'

38'' S; 35° 0' 9'' W) in November of 2020, which the sampling was performed above the beachrocks (region influenced by the wave action and in biogenic substrate). The region of Barra de Catuama is formed by the influence of the estuary of the Itapessoca river giving rise to the coastal plain and the presence of beachrocks. This area is delimited by the megathermal climate with rainfall concentrated from March to August and a well-defined dry period (September to February), characterizing the As' climate (Hot Humid Tropical) (Köeppen, 1948).

Figure 1 – Location of the study area in Barra de Catuama beach, State of Pernambuco, Brazil

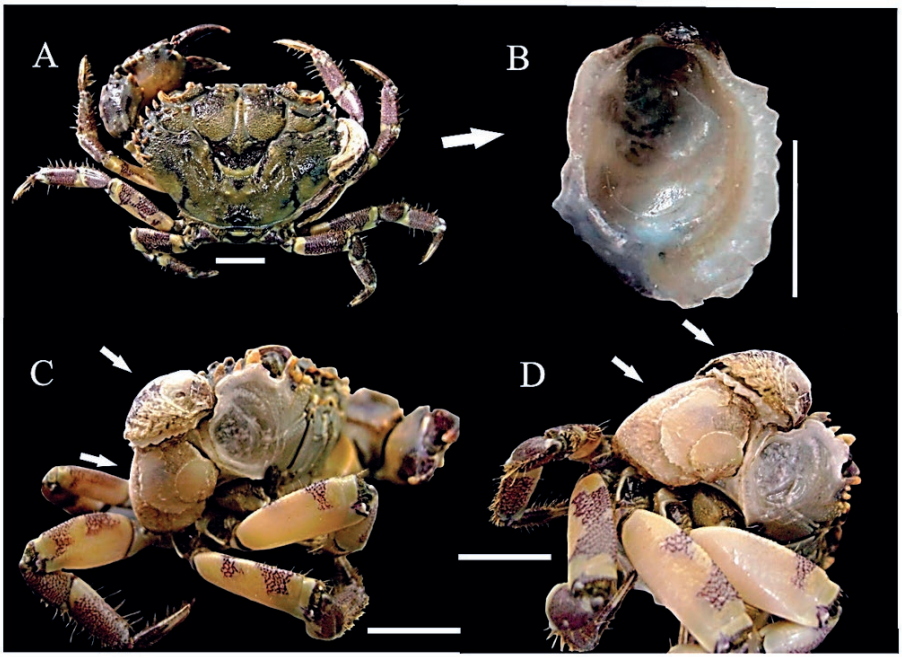


After collected, the individuals were allocated in plastic bags and stored in a styrofoam box filled with ice and forwarded to the *Laboratorio de Carcinologia (Lab. Carcino)* located in *Museu de Oceanografia Prof. Petrônio Alves Coelho* (MOUFPE) at Federal University of Pernambuco – UFPE. In laboratory, the specimens were sorted out, photographed and measured using a digital caliper (0.01 mm); for the crab in Carapace Length (CL) and

Carapace Width (CW), while for the oyster in Valve Length (VL) and Valve Width (VW). The crabs specimens were identified following Melo (1996) and the oysters according to Rios (2009), later both species were fixed in 70% ethanol and deposited under the voucher number at MOUFPE.

Among the 10 specimens of the crab *Eriphia gonagra* collected in the Barra de Catuama beach, only one adult male (CL: 5.8 cm; CW: 3.7 cm) showed the association in the right side of carapace with two epibionts specimens of *O. puelchana* (left valve- VL: 1.9 cm; VW: 1.4 cm; VL: 1.7 cm; VW: 1.3 cm) (Voucher number: 19998). The two morphotypes of O. *puelchana* were observed well cemented in epibranchial and antero-lateral regions (right side) of the capace of *E. gonagra* (Figure 2), covering about 12,3 % and 10,29 % respectively of its carapace surface.

Figure 2 – The species of Eriphia gonagra (Fabricius, 1781) associated with the epibiont *Ostrea puelchana* d'Orbigny, 1842, collected from Barra de Catuama beach, State of Pernambuco, Brazil. A: dorsal view of *E. gonagra* indicating the presence of *O. puelchana*; B: internal margin of the bivalve shell *O. puelchana*; C-D: lateral view of *E. gonagra* with two specimens of *O. puelchana* in epibiosis. Scale bars: A, C, D = 1 cm; B = 0.5 mm



Up to date, the biological interactions between mollusks and crustaceans are widely observed in several groups, and in different ecological aspects, such as: endosymbiosis provided by pea crabs in a wider range of ostreid species (Baeza & Thiel, 2007; Baeza *et al*., 2013; Martinelli-Filho; Santos & Ribeiro, 2014; Hanke *et al*., 2015); ectosymbiosis as observed in the porcelain crab *Porcellana sayana* (Leach, 1820), which living in a wide range of gastropods (Rodríguez; Hernández & Felder, 2005); commensalism of *Blepharipoda occidentalis* Randall, 1840 in the bivalve *Kurtiella pedroana* (Dall, 1899) (Boyko & Mikkelsen, 2002); parasitism of *Zaops ostreum* (Say, 1817) in *Crassostrea rhizophorae* (Guilding, 1828) (Stauber, 1945; Nascimento & Pereira, 1980) and opportunistic epibiosis performed by *O. puelchana* in the swimming crab *Callinectes exasperatus* (Gerstaecker, 1856) (Lima *et al*., 2017).

The association provided by ostreid species adhered in mobile crustaceans as observed in the crab species *C. exasperatus* and in present study on *E. gonagra*, can be favorable to protection of epibiont (oysters), due to the advantage of the escape from predators, and additionally, this relationship favors the oyster at different food offerings in different regions for the filtration of organic matters (Lima *et al*., 2017). For some species of crustaceans, the occurrence of oysters in its carapaces may be favorable to extra protection against the predators (e.g. fishes and octopus), however, the crustaceans carapace act as a semi-permanent substrate for fixation of oysters (epibiont) during their development, however, during ecdysis (molting) the old carapace is discarded, with this, the epibiont can be carried to unfavorable regions by marine currents, tides or waves, and being more easily predatory by the absence of the mobility of the basibiont (Marin & Belluga, 2005; Lima *et al*., 2017).

On the other hand, the occurrence of *O. puelchana* in crabs with lifestyles in intertidal zones, can negatively affect the oyster biology, specially due to long periods exposed out of water during low tide, as the case of *E. gonagra* which effectively live in cavities found in the upper portion on the coral reefs, being this behavior a negative point for the occurrence of epibionts in these individuals, which this characteristic favors the dehydration by exposure to the sun and air of the epibiont (Gili; Abello & Villanueva, 1993). Epibionts adhered on the crustacean carapaces in many cases hamper the mobility of individuals, due to the extra weight and the friction of the epibiont in the water or in cavities inside the rocks, as in studies provided by Villegas, Stotz and Laudien (2005), which reported the occurrence of *Semimytilus algosus* (Gould, 1850) preventing the body growth and the mobility of the basibiont *Emerita analoga* (Stimpson, 1857) (Lima *et al*., 2017).

The use of the hard substrate by the ostreid species *O. puelchana*, especially the use of the carapaces of the brachyuran crabs for the fixation, can be an advantage for the geographic distribution of the oyster along the Brazilian and Argentine provinces, due to wide mobility provided by these individuals from different coastal regions, which allows the occurrence of this species on a wide range of hosts (basibionts) (Doldan *et al*., 2012; Lima *et al*., 2017). The associations of *O. puelchana* with many crustaceans in the natural environment can be observed in different levels of occupation, as the use of crustacean as basibiont (e.g. as observed in *C. exasperatus*) (Lima *et al*., 2017) and in *E. gonagra* (present study). In the same way, the species of *O. puelchana* can be host from many others decapods as observed by Martins and D'lncao (1996), which analyzed the presence of the pea crab *Z. ostreum* as endosymbiont of *O. puelchana*, while Doldan *et al.* (2012) reported from the same ostreid host species the endosymbiont *Tumidotheres maculatus* (Say, 1818). Thus, here in we observed the opportunistic fixation observed by *O. puelchana* on the new basibiont *E. gonagra* from Brazilian coast.

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