Revista Nordestina de Zoologia

ISSN 1808-7663

Volume 6 Número 1 Jan/Jul Ano 2012


| Revista Nordestina de Zoologia | Recife | V. 6 (Jan/jun) | N. 1 | P. 1 - 79 | 2012 |
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# NEW RECORD OF MALFORMATION IN THE TRUE CRAB *UCIDES CORDATUS* (LINNAEUS, 1763) (CRUSTACEA, DECAPODA, UCIDIDAE), AT BRAZILIAN COAST.

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**Abstract:** Morphological abnormalities have been related for several groups of Crustacea, such as Cladocera, Copepoda and Decapoda. Such alterations are caused by parasites, complications during the molt, abnormal wound healing, mutations in the larval stage, or due to the action of chemical products. During samples accomplished at the Mundaú/Manguaba Estuarine Lagoon Complex (CELMM), State of Alagoas, Brazil, three individuals of *Ucides cordatus* were found with morphological anomalies: a female with asymmetric number of pereiopods; a male with deformity in the sixth abdominal somite and telson; and a female with asymmetric carapace. They occurred in low frequency, corresponding to 0.40% of the total sampled crabs. The size and weight of the abnormal individuals are the expected for the studied population. The causes of these anomalies were not determined, but we believe that they are consequences of the presence of pollutants at the area.
**Key words**: anomalous crustacean, estuarine system, Mundaú, Manguaba, Northeast of Brazil, Ocypodoidea.

**Resumo:** Anomalias morfológicas têm sido relatadas para diversos grupos de crustáceos, como Cladocera, Copepoda e Decapoda. Tais alterações são causadas por parasitas, complicações durante a muda, cicatrização anormal de ferimentos, mutações no estágio larval ou ação de produtos químicos. Durante coletas realizadas no Complexo Estuarino Lagunar Mundaú/Manguaba (CELMM), Estado de Alagoas, Brasil, foram encontrados três exemplares de *Ucides cordatus* com anomalias morfológicas: uma fêmea apresentando-se assimétrica em relação às patas; um macho com deformidade no sexto somito abdominal e télson; e uma fêmea com carapaça assimétrica. Eles ocorreram em baixa freqüência, correspondendo a 0.40% do total de caranguejos amostrados. O tamanho e o peso dos indivíduos anômalos são os esperados para a população estudada. Embora as causas dessas anomalias não tenham sido determinadas, acredita-se que elas podem ser decorrentes da presença de poluentes na área.
**Palavras-chave**: crustáceo anômalo, sistema estuarino, Mundaú, Manguaba, Nordeste do Brasil, Ocypodoidea.

## INTRODUCTION

Malformation is a type of anomaly, a morphologic defect of an organ or a larger portion of the body, resulting from an intrinsically abnormal developmental process. In invertebrates, these abnormalities can be caused by injuries resulting in abnormal regeneration (Okamoto, 1991), parasitic infestations (O'brien & Van Wyk, 1985), complications during the molt (Mantelatto *et al.*, 2000) or due to inappropriate environmental conditions

(Pinheiro & Toledo, 2010), as contaminant discharges (Sundelin & Eriksson, 1998). More recently, it's been given attention to the effects of the ocean's acidification on malformations as well (Kurihara, 2008).

These morphological abnormalities have been reported for several groups of Crustaceans, as Cladocera (Frey, 1965; Elmoor-Loureiro, 2004), Copepoda (Brylinski, 1984; Dias, 1999) and Decapoda (Mariappan *et al.*, 2000). Regarding the Infraorder Brachyura, stands out the papers: Gamo (1964), describing anomalies in the abdomen, pleopods, pereiopods and carapace of several species in Japan; Okamoto (1991), on abnormalities in the chelipods of *Geryon affinis* (Edwards & Bouvier, 1894), whose result from abnormal wound healing; Mantelatto *et al.* (2000), with anomalies in the abdomen of the swimming crab *Callinectes ornatus* Ordway, 1863, whose specific causes could not be determined, but the authors have raised some hypothesis for such anomalies, as the ones cited before; and Zou & Fingerman (2000), which registered an intersex individual of *Uca pugilator* (Bosc, 1802), i.e., intermediate sexual characters between those of a typical male and a typical female, probably due to endocrine problems.

The true crab *Ucides cordatus* (Linnaeus, 1763) (Ocypodoidea, Ucididae), one of the most commercially important species in the Eastern coast of America, also has a record of malformation. Pinheiro & Toledo (2010) found an individual with an anomaly in the immovable finger of the major claw, at São Vicente, State of São Paulo, Brazil. The probable cause of this abnormality raised by the authors was the pollution, but the fact that only one individual presented this anomaly leaves open other causes as well, such as abnormal wound healing/regeneration of this appendage.

During samplings accomplished at the Mundaú/Manguaba Estuarine Lagoon Complex (CELMM) in 2006, State of Alagoas, Brazil, three abnormal individuals of *U. cordatus* were sampled. They occurred in low frequency, corresponding to nearly 0.40% of the total sampled crabs (n = 752). Unfortunately, it was not possible to perform tests to verify the contamination of the organism. The following table summarizes the information on each malformed crab.

According to Araújo & Calado (2008), the mean carapace width of *U. cordatus* males at the CELMM was 47.38 ± 9.6 mm, and that of females, 46.28 ± 7.02 mm. The mean carapace length of males was 36.20 ± 6.98 mm, and that of females, 35.69 ± 5.41 mm. The mean humid weight of males was 48.31 ± 26.41 g, and that of females, 43.76 ± 19.44 g. Thus, the size and weight of the abnormal individuals are very close to what is expected for the population.

The bilaterally symmetric abdomen of male Brachyura presents six somites and a telson, lying closed under the cephalothorax (Melo, 1999). The abnormal male (Figure 1A) presents an asymmetric abdomen, due to a deformity in the sixth somite and telson. This anomaly also prevents the normal closing of the abdomen.

The genus *Ucides* presents an oval shaped carapace, laterally inflated (Melo, 1985). The abnormal female (Figure 1B) deviated from this pattern, with the left margin nearly in a straight line.

The decapod crustaceans receive this name due to the presence of five pairs of pereiopods (Ruppert *et al.*, 2005). The abnormal female (Figure 1C) presented five legs in one side of the body, and four in the other one. It was not related to an appendage loss,

such as autotomy, since there was no sign of the insertion of the missing pereiopods in the thorax.

The CELMM is located at the south of Maceió City, the capital of Alagoas State, between the coordinates: 35º42'30" - 35º57'30" W and 9º35'00" - 9º45'00" S. Besides Maceió, it also washes the Municipalities of Santa Luzia do Norte, Coqueiro Seco, Pilar and Marechal Deodoro. It is formed by the Mundaú and Paraíba do Meio Rivers, which disembogue in the Mundaú and Manguaba Lagoons, respectively (Calado & Souza, 2003). Together they disembogue in the sea through channels. The studied area suffers from a great variety of environmental impacts, such as industrial and domestic sewage, deforestation, silting, property speculation and predatory fisheries (Araújo & Calado, 2008).

In the Basin of Mundaú River, there are six sugarcane industries (Silva Jr & Agra, 1999). According to Marques (1991) and Melo-Magalhães *et al.* (1998), the spill of the sugarcane residue, called 'vinhoto', favors the development of Cyanophyceans and Dinoflagellates blooms, causing depletion of oxygen in the water and great mortalities of fishes. Besides the sugarcane industries, there are also other industries at the area: fertilizers, paper and celluloses, food, chemical and weaving ones (Marques, 1991). The domestic sewage of nine municipalities also disembogues on both lagoons (Leahy, 1995).

The aquatic living resources at the area are also endangered. According to Pereira-Barros (1981) and Calado & Sousa (2003), the CELMM has been suffering from a decrease in the abundance of these resources, especially the 'sururu' *Mytella charruana* (D'Orbigny, 1842), due to the pollution, siltation and unsustainable fisheries, the last one contributing to the scarcity of several species (Silva & Silva, 1983). *U. cordatus* is also affected by these environmental stresses, as reported by Araújo & Calado (2008).

The low capture per unit effort (CPUE) and the smaller sizes when compared to other populations were cited by these authors as indicatives of anthropic impacts, mainly due to pollution, deforestation of the mangroves and overexploitation of these crabs. They also concluded that the extractive activity of the crab at the area isn't sustainable.

The malformations observed in the present population of *U. cordatus* may be caused by several reasons, as the ones cited in the beginning of the article, but it quite likely that they occurred due to the effect of chemical pollutants at the area.

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Table I. Sampling date and station, sex, carapace width (CW), carapace length (CL), humid weight (HW) and description of the malformation found in *Ucides cordatus* at Mundaú/Manguaba Estuarine Lagoon Complex (CELMM), Alagoas, Brazil.

| **Date** | **Station** | **Sex** | **CW (mm)** | **CL (mm)** | **HW (g)** | **Malformation** |
|---|---|---|---|---|---|---|
| 02/02/06 | Mundaú Lagoon (9°41'80.9"S and 35°47'16.1"W) | ♂ | 40.60 | 30.70 | 26.83 | A) Deformity in the sixth abdominal somite and telson |
| 03/17/06 | Mundaú Lagoon (9°41'80.9"S and 35°47'16.1"W) | ♀ | 37.25 | 30.30 | 23.65 | B) Asymmetric carapace, at the left margin |
| 03/17/06 | Manguaba Lagoon (9°44'56"S and 35°51'33.5"W) | ♀ | 46.30 | 35.80 | 40.35 | C) Asymmetric number of pereiopods (4 in the right side) |

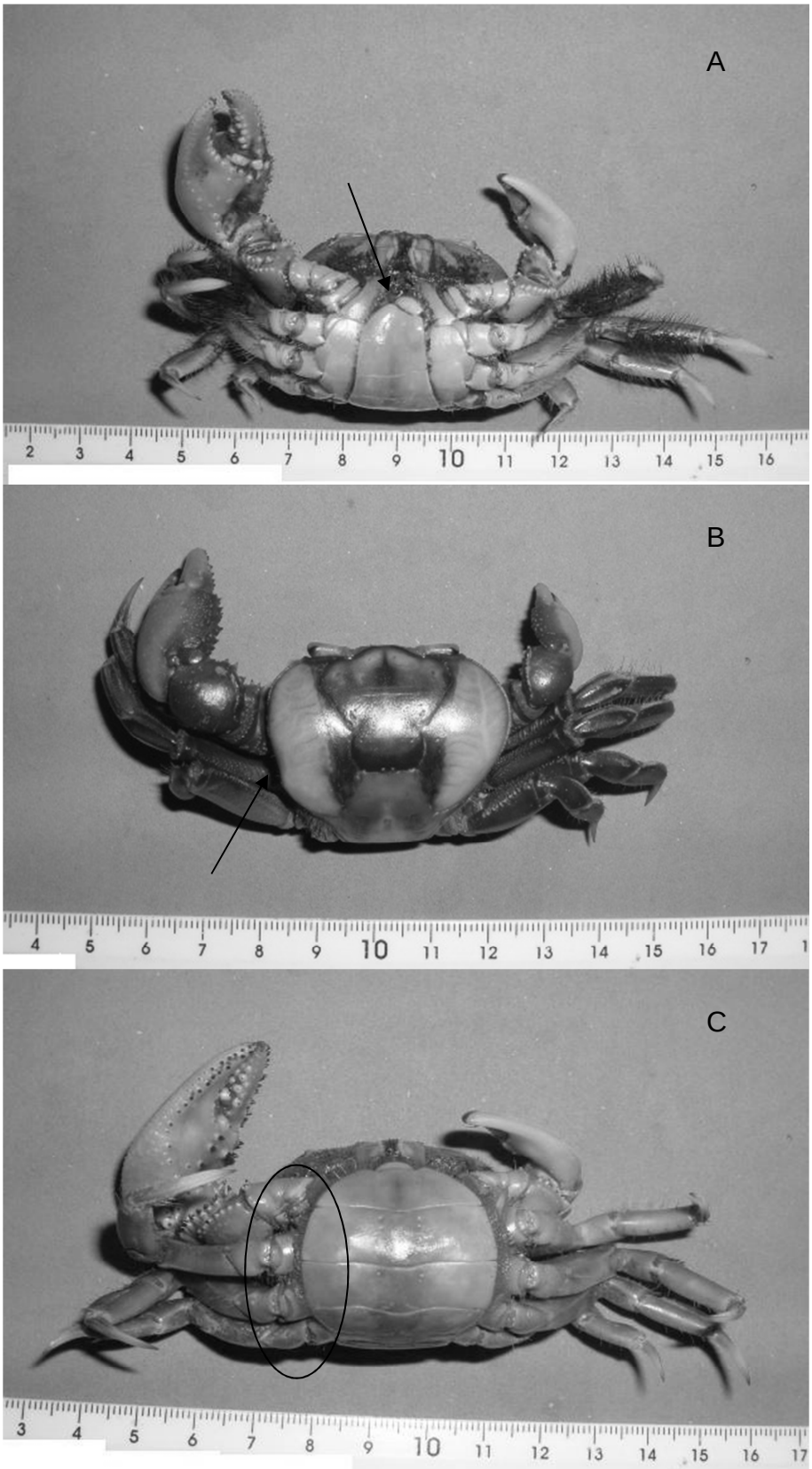


Figure 1. Malformed individuals of *Ucides cordatus* at Mundaú/Manguaba Estuarine Lagoon Complex (CELMM), Alagoas, Brazil. A) Deformity in the sixth abdominal somite and telson; B) Asymmetric carapace, at the left margin; and C) Asymmetric number of pereiopods (4 in the right side).