The first record of external abnormalities on abdomens of *Callinectes ornatus* (Portunidae) from Ubatuba Bay, Brazil.

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Abstract

During September 1996, *Callinectes ornatus* Ordway, 1863 were collected from bottom trawls conducted in Ubatuba Bay, São Paulo, Brazil as part of a study on their distribution and reproductive biology. Three individuals (a mature male, one immature female and one mature female) exhibited an abnormal abdomen shape, as well as abnormal pleopods. Over the years, a number of crab deformities have been described and attributed to either parasitic organisms or malformations that occur during molting. An extensive examination of the internal organs (including the heart, foregut, midgut, hindgut, thoracic ganglion, digestive gland, and gonads) revealed no identifiable multicelled symbiont. At present, the cause of these morphological abnormalities remains unknown.

Key words: Brachyura, morphological abnormality, swimming crab, molt

Introduction

There are approximately 5,000 species of brachyuran crabs worldwide (Melo, 1996), representing over half the number of species presently recognized within the Decapoda. There are 329 crab species, belonging to 171 genera and 20 families, distributed exclusively in the southwestern Atlantic region (Pohle *et al.,* 1999). The Portunidae, one of the best-known crab families, includes species that are extremely important ecologically, economically as a food source in coastal waters, and as biological indicators of water masses. In this family, swimming crabs of the genus *Callinectes* are ubiquitous representatives of the macro-crustacean fauna in tropical and subtropical habitats of the western Atlantic, including the northern coast of the State of São Paulo, Brazil.

Recent evidence suggests that populations are decreasing in number, emphasizing the need for frequent monitoring of natural stocks (Mantelatto and Fransozo, 1999). Because deformities of swimming crabs are often obvious, and so many crabs are harvested commercially, fairly large numbers of crabs exhibiting abnormalities have been found and preserved for study (Shuster *et al.,* 1963). Abnormal sexual differentiations are also interesting because they may contribute to the understanding of the mechanisms of sexual determination; such mechanisms are well known for some crustacean groups, but still debated within the Decapoda (Micheli, 1991).

According to Pires (1992), the crustacean fauna of the northern São Paulo State coastline is dominated by crabs, which represent approximately 66 to 90% of the benthic organisms found on the inner continental shelf. In this regard, portunid crabs are the most abundant species in the non-consolidated substrate of the Ubatuba region (Fransozo *et al.,* 1992). In Ubatuba Bay itself, ten species of swimming crabs have been reported by including *Callinectes ornatus.* Mantelatto and Fransozo (2000), General aspects of the life history of this species, a relatively large portunid crab of commercial value, have been documented along the western Atlantic coast, as well as along the Brazilian coast (see Mantelatto, 2000 in review).

In this study, we document the external abnormalities found in three specimens of *C. ornatus* from Ubatuba Bay. Our aim is to increase awareness about a phenomenon that could be important to monitor the health of the population and to stimulate further investigations on these organisms, which up to now have drawn little attention.

Material and Methods

During September 1996, *C. ornatus* were collected from bottom trawls conducted in different areas of Ubatuba Bay (23° 26' S, 45° 02' W), along the northern coastline of the State of São Paulo, Brazil, as part of a long-term study on their distribution and reproductive biology. The sampling was carried out monthly, on three consecutive days, over a one-year period (September 1995 to September 1996), where a total of 7,718 specimens (1,781 were mature males; 1,234 mature females, 435 ovigerous females, and 4,268 immature individuals - 1,749 males and 2,004 females) of *C. ornatus* were obtained (Mantelatto, 2000). Three individuals in intermolt with a completely calcified exoskeleton (a mature male, Carapace Width = 56.5 mm; one immature female, CW = 25.0 mm, and one mature female, CW = 51.3 mm) exhibited external abnormalities in the shape of their abdomens and pleopods (Figure 1) when compared with normal abdomens (Figure 2).

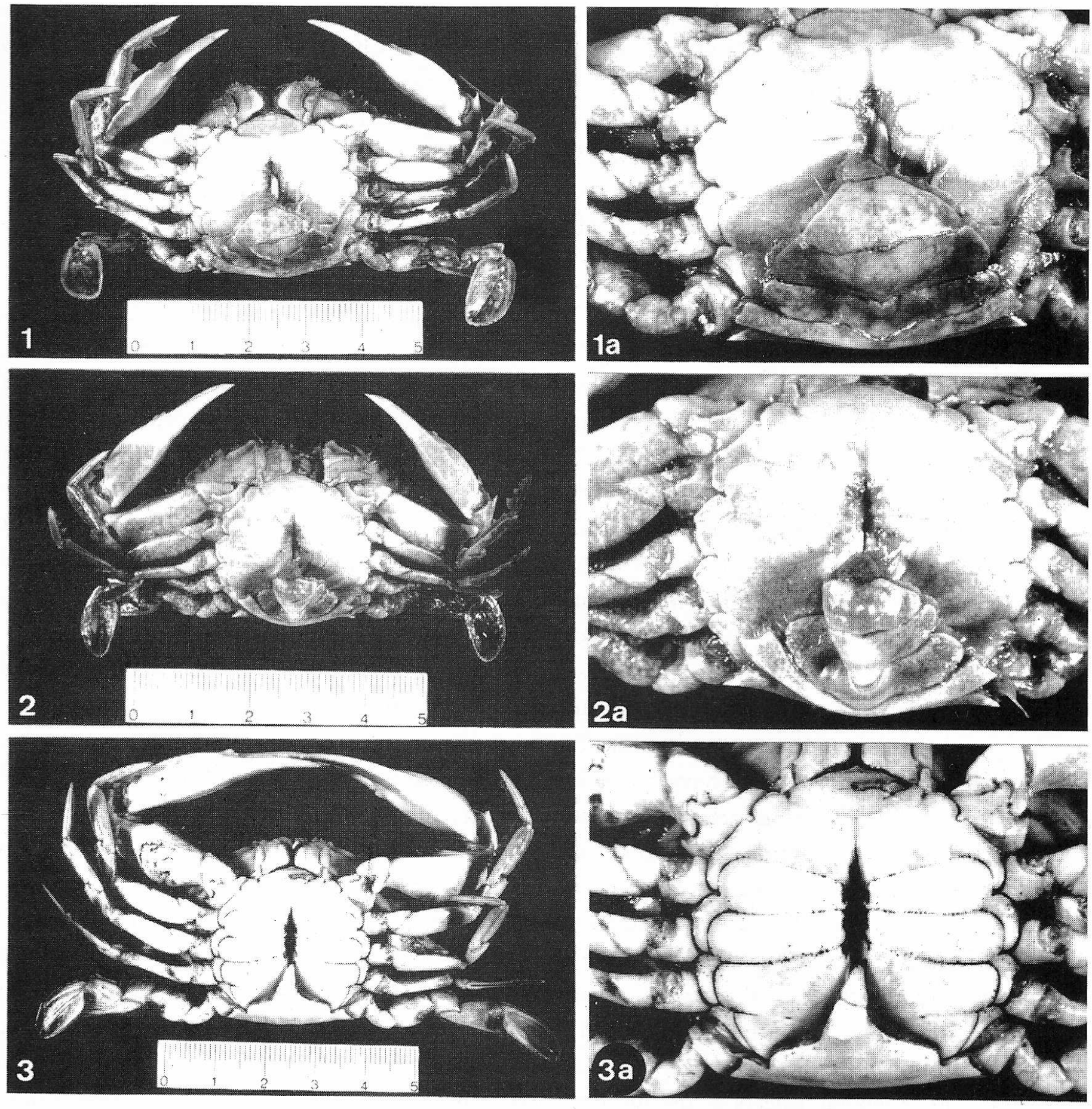
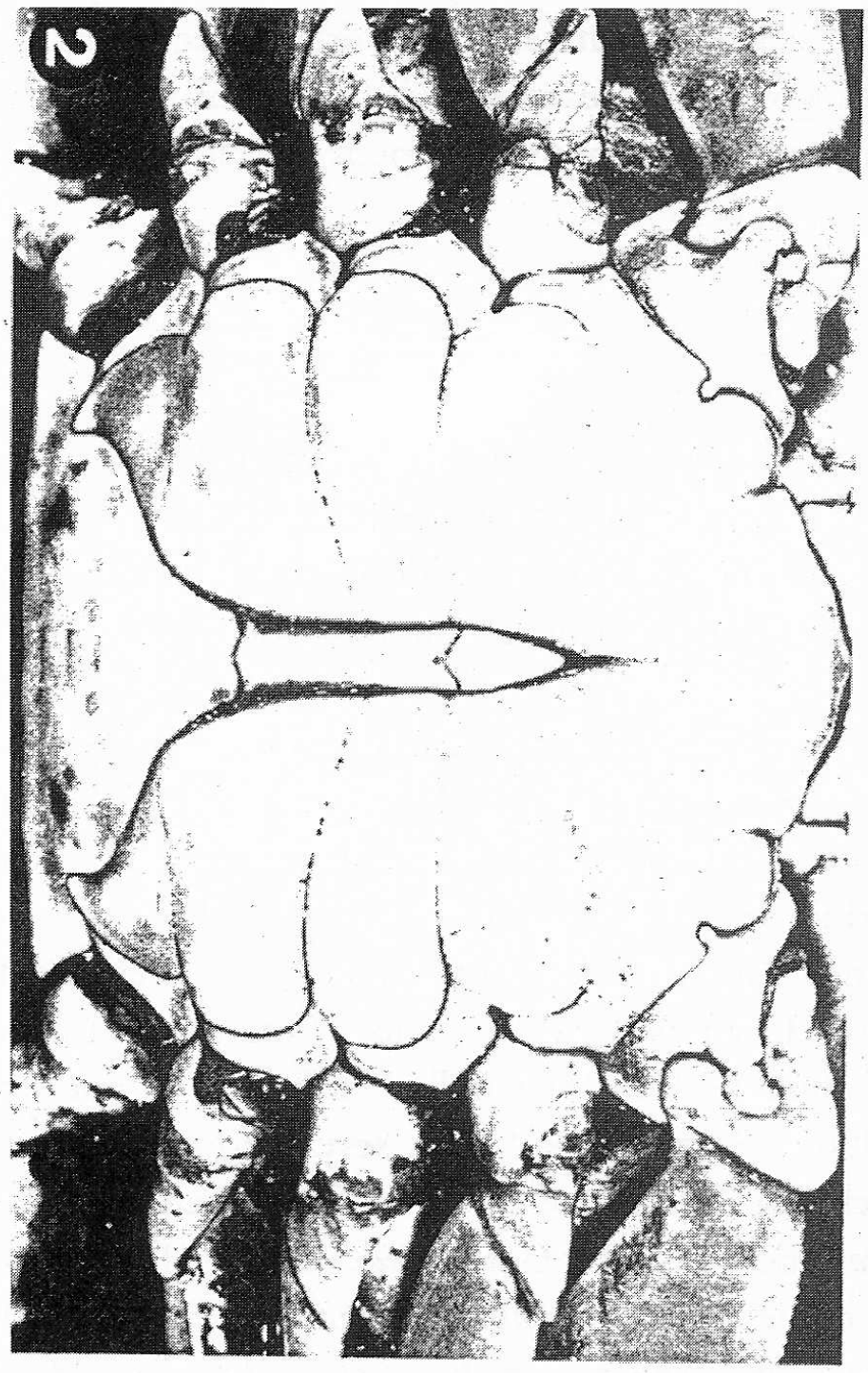
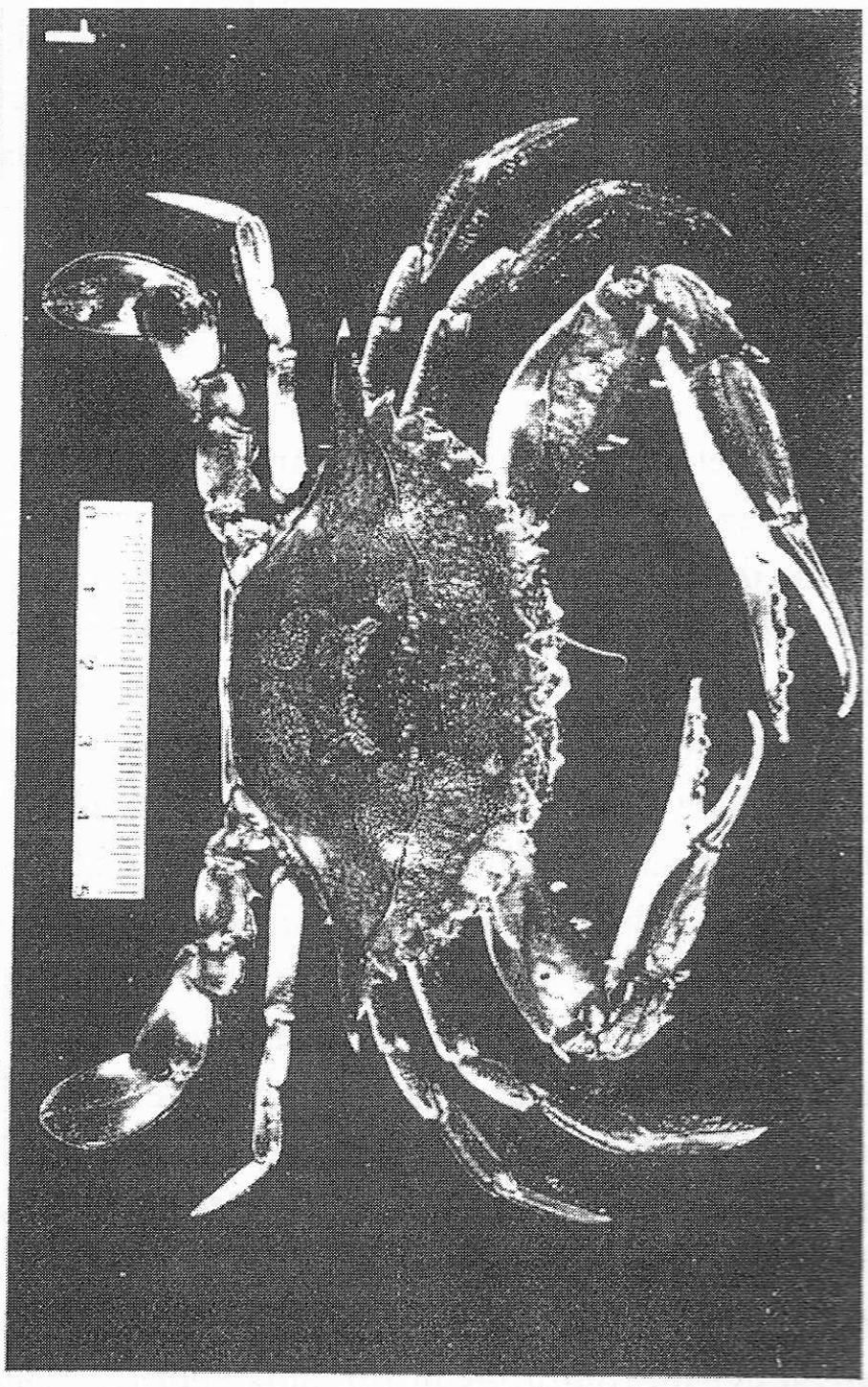
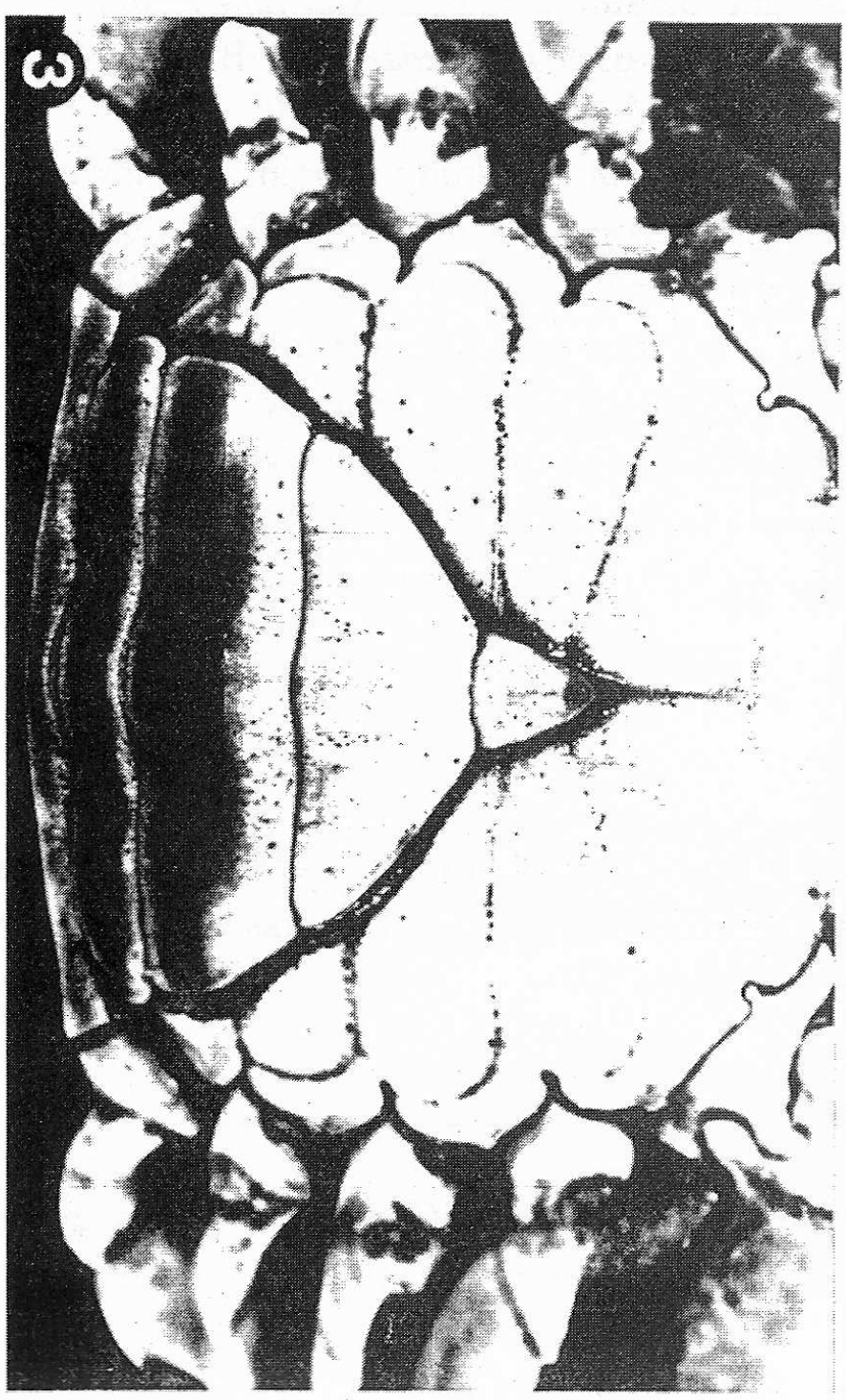


Figure 1. *Callinectes ornatus*. Specimens with external abnormalities on abdomens. 1/1a. Mature female. 2/2a. Immature female. 3/3a. Mature male.







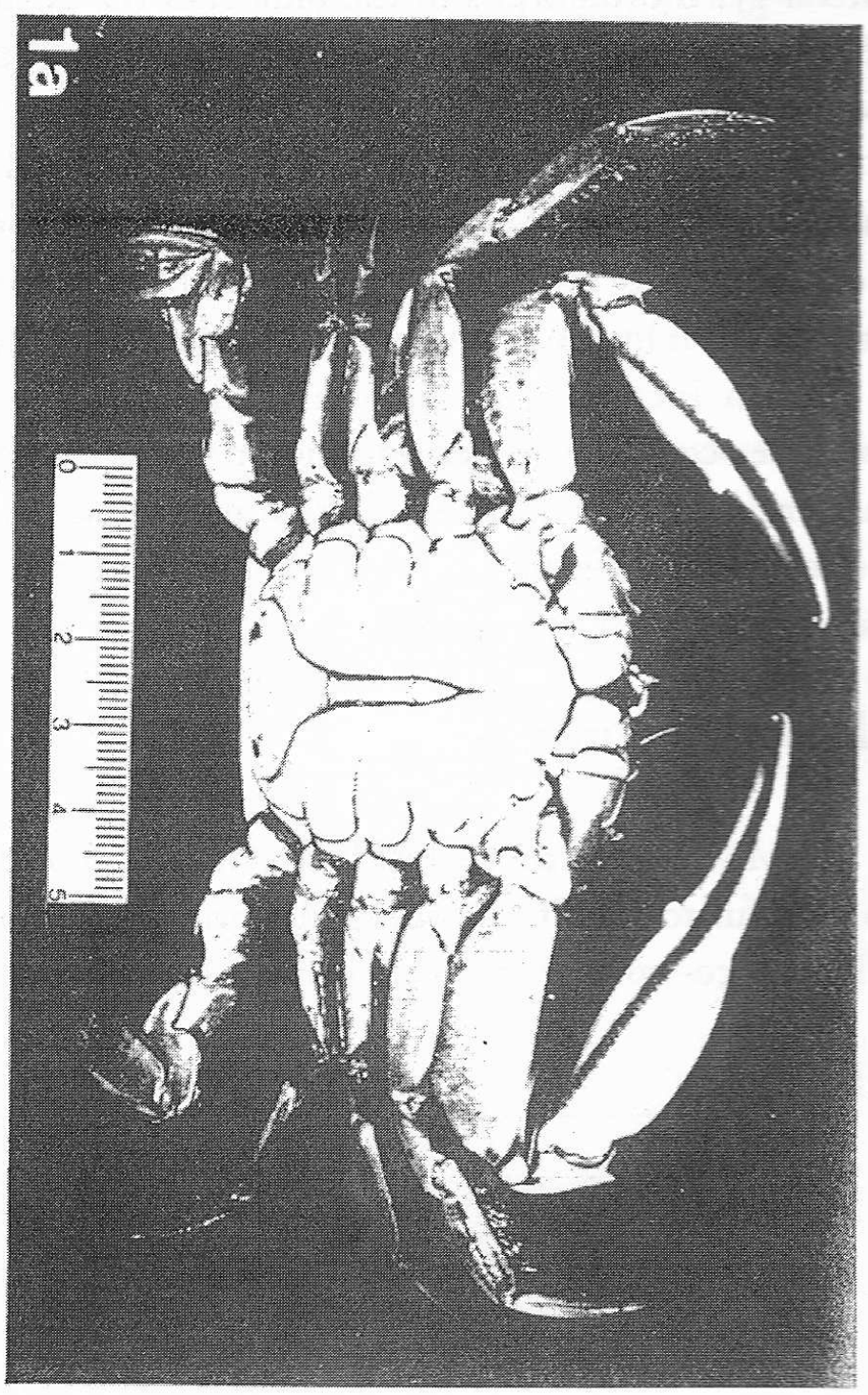


Figure 2: *Callinectes ornatus*. Specimens with normal abdomens. 1/1a. Dorsal and ventral view of adult male, respectively. 2. View of mature male abdomen. 3. View of mature female abdomen.

Crabs were examined externally for obvious signs of disease and symbionts. The carapace of each crab was lifted off the body for dissection. The branchial chambers, gills, heart, foregut, midgut, hindgut, thoracic ganglion, digestive gland, and gonads were removed and examined with a stereomicroscope for the presence of multi-celled parasites such as bopyrid isopods, entoniscid isopods, cestodes, nematodes, and trematodes.

Results and Discussion

No deformities were noted on other parts of the body such as chelipeds, walking appendages and the carapace, except on the ventral part of the right cheliped of the male. In both mature individuals, the gonads had developed normally, occupying 25% of the carapace inner volume, and were smaller than the hepatopancreas. This extensive examination of the internal organs revealed no identifiable multicelled symbionts.

Over the years, a number of crab deformities have been described. Modifications on chelipeds and carapace spines were reported for *Callinectes danae* Smith, 1869, *C. ornatus* and *Callinectes sapidus* Rathbun, 1896 (Shuster *et al.*, 1963; Moncada and Gomes, 1980) and attributed to accidents that occurred during molting, mainly injuries during the soft-shell stage. Rhizocephalan barnacles have been reported to induce a number of profound effects upon portunids such as: 1) castration (O'Brien, 1999), 2) adults of small size (O'Brien and Van Wyk, 1985), and 3) the acquisition of male crabs of the wide abdomen characteristic of adult females (Hartnoll, 1967), and 4) aberrant forms of the abdomen (Alvarez and Calderón, 1996), among others. Also, several forms of sexual abnormalities have been reported for different brachyuran crabs (see Zou and Fingerman, 2000 for review): on chelipeds of fiddler crabs [*Uca pugilator* (Bosc, 1802), *Uca pugnax* (Smith, 1870), *Uca rapax* (Smith, 1870)], hermaphroditic males with ovotestes [*Geothelphusa dehaani* (White, 1847)], bilateral gynandromorphs in the blue crab (*C. sapidus*) and oxystome crab (*Ebalia tuberculata* Miers, 1881), and a spider crab with male and female genital apertures *Hyas coarctatus* Brandt, 1851), among others.

The cause of the morphological abnormalities investigated in this study remains unknown, but considering that no identifiable multicelled symbiont was observed, it is likely that they were caused by complications during molting, most probably during the critical puberty molt or the first molt immediately following, since maturity occurs in the 42 – 46 mm of CW range in this species, and the growth increment is approximately 20% per molt (Mantelatto and Fransozo, 1996). Other hypotheses could be related to random mutations appearing during the intense reproductive process considering the vast number of larvae per brood produced in this species, or to the action of chemical products from different sources of pollution in this area (commercial and leisure boats and dumping of sewage without treatment).

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