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Short Note

A case of malformation on the third maxilliped of *Uca rapax* (Smith, 1870) (Decapoda: Ocypodidae)

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Abstract - This paper evaluates the malformation in the left third maxilliped of a specimen of the fiddler crab *Uca rapax* from Venezuela. There are some hypotheses and the cause of the malformation remains unknown, but the results are indicative that is most likely due to errors in morphogenetic processes.

Key words: Abnormality, aberrant appendix, Brachyura, fiddler crab, teratology

The occurrence of malformations in crustaceans has been poorly documented and attributed to various causes, such as injuries (Shelton *et al.,* 1981), parasitic diseases, including viral infections (Primavera and Quinio, 2000), somatic mutations or errors in morphogenetic processes (Von Vaupel Klein and Koomen, 1993), contaminants (Weis *et al.,* 1992) and exposure to extreme environmental conditions such as low temperatures (Pandoursky and Evtimova, 2009). In decapods, the most commonly reported teratologies are related to abnormal lateral growth process (Motoh, 2002; Lira *et al.,* 2003; Martínez and Rudolph, 2010) or abnormal distal process (Pinheiro and Toledo, 2010) in chelipeds, although other structures such as shell (Dexter, 1954), rostrum (De Grave, 1999; Aguirre and Hendrickx, 2005; Follesa *et al.*, 2008; Ashelby & Lavesque, 2011), thoracic esternites (Heerebout, 1969), ovaries (Nalini, 1975), abdomen (Heerebout, 1969; Mantelatto *et al.*, 2000), telson (De Grave, 1999; Aguirre & Hendrickx, 2005) and walking legs (Ros and Quiñones, 1981; Lira *et al.*, 2012) may also have atypical developments. This paper describes a malformation in the left third maxilliped of a specimen of the fiddler crab, *Uca rapax* (Smith, 1870).

On 02 October 2007, samples of decapod crustaceans were collected at Charagato Bay, Cubagua Island, Venezuela (10º49'28,17"N – 64º09'54,70"W). The samples were kept at low temperatures to prevent autotomy of appendages, and transferred to the laboratory of Carcinology at the Universidad de Oriente, Margarita Island, Venezuela for analysis. Samples were studied using an optical microscope. Measures of the carapace length (CL) and carapace width (CW) were obtained using an electronic vernier. The collected material included an adult specimen of *Uca rapax* (male, 25.02 mm CW and 16.11 mm CL), which had a malformation in the third left maxilliped consisting of a normal appendix being replaced by an aberrant cheliped. Description of this abnormal appendix is as follows: palm short, its length approximately 1/2 the length of the fingers, finger widths, strongly twisted one over another, with spoon-shaped apex; and exognath normal for the species (Fig. 1). The third right maxilliped had the appendix form typical in the species.

Some of the causes of malformation in decapods have been attributed to a double generation of growth areas, as well as a lack of coordination in the regeneration of wounds.

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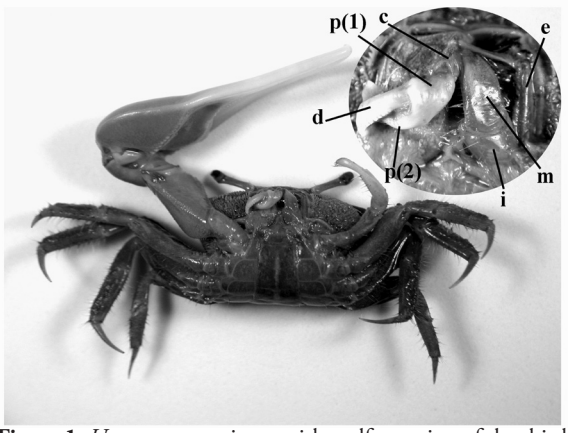

Figure 1. *Uca rapax*, specimen with malformation of the third left maxilliped, ventral view. In the circle there is a zoom of the maxilliped [e = exognath; i = ischium; m = merus; c = carpus; p = propodus (1 = palm; 2 = fixed finger); d = dactylus or movable finger].

Chelipeds, being frequently used in agonistic activities, and being the last to leave the exuvia in the molting process, are more likely to be injured than other parts of the body (Shelton *et al.,* 1981). Because of that, most of the malformations occur in these appendices.

However, these explanations are not useful for less frequent malformations, such as the growth of a kind of appendix in an inappropriate body segment, as pereiopods (or thoracopods) in abdominal somites [described by Costa (1966) for a specimen of *Panulirus argus* (Latreille, 1804) from Brazil] or substitution of unilateral or walking legs symmetrically by chelipeds [described by Ros and Qiñones (1981) for specimens of *Menippe mercenaria* (Say, 1818) from Cuba].

Replacement of a maxilliped for a cheliped, in decapod crustaceans, has been poorly documented and perhaps the only previous record is the one reported by Motoh and Toyota (2003) for a male adult of *Chionoecetes opilio* Kröyer, 1838 from Japan. This type of malformation could be due to a mutation, or more probably to errors in morphogenetic processes, as suggested by Von Vaupel Klein and Koomen (1993) to explain malformations observed in a specimen of the copepod *Euchirella pseudopulchra* Park, 1976 from a sample taken at "Dana" Exped. sta. 4777, 35º59'N 129º25'W, 29 March 1933.

Other causes that could explain the occurrence of malformations in crustaceans are stress, due to exposure to extreme environmental conditions [suggested by Pandourski and Evtimova (2009) to explain teratologies in copepods and branchiopods in circumpolar areas], and contaminants [which teratogenic effects on crustaceans have been amply demonstrated, among others by Weiss *et al.* (1992)].

Cubagua is a 22 km^2 desertic island situated in the southeastern Caribbean Sea, about 17 km off the coast of Venezuela. It is affected by strong coastal upwelling, with surface sea water temperature ranges between 22–28ºC and continuous high primary productivity (Gómez 1996). Fringing coral reefs, rocky shores, *Thalassia testudium* beds, *Arca zebra* and *Pinctada imbricata* banks and sandy areas are found in shallow water (0–10 m deep) (Hernández-Ávila *et al.*, 2007). There are few permanent residents and the first economic activity is artisan fishery. So, we think that neither exposure to extreme environmental conditions nor contaminants applies to explain the teratology observed in our specimen, and to some other decapods from adjacent areas (see references). As for the present record, the cause of the malformation remains unknown but we are of the opinion that is most likely due to errors in morphogenetic processes.

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