First record of dorsal and anal fin deformities in blue tang *Acanthurus coeruleus* (Acanthuridae, Actinopterygii) from northeastern Brazil

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**Abstract**: Dorsal and anal fin deformities in the blue tang *Acanthurus coeruleus* are reported for the first time from northeastern Brazil, based on observations during research dives at an artificial reef. Possible causative factors are discussed.

**Key words**: Acanthuridae, bony fish, fins, morphological deformities.

The first records of deformities in bony fish were documented on the 16th century (Gudger 1929, 1934, Berra and Au 1981). Since then, many teratology occurrences have been reported in different fish taxa (Lodi 1978, Lemly 2002, Boglione et al. 2006, Al-Mamry et al. 2010, Nagamuthu et al. 2014).

Among the morpho-anatomical deformities observed in fish, fins anomalies are the most severe, because fin development is an important feature from early life history and it is closely correlated with changes in swimming mode, swimming velocity and feeding strategies and preferences (Kendall et al. 1984, Blaxter 1988, Fukuhara 1992).

These anomalies are characterized by the total or partial lack of fins, and have been noted in both captive and wild marine fishes (e.g., *Nematalosa nasus* – Hussain 1979, *Dentex dentex* – Koumoundouros et al. 2001, *Sparisoma cretense* – Koumoundouros 2008, *Diplodus sargus* – Boglione et al. 2013, *Lates calcarifer* – Cobcroft and Battaglene 2013). Despite implications about ecosystem quality (Lemly 2002, Jawad 2004), a better understanding is still needed on how deformities affect the survival of fish in the wild.

In order to contribute to the growing literature about deformities of fishes, this study reports one blue tang *Acanthurus coeruleus* (Bloch and Schneider 1801) displaying an unusual lunate concavity in the dorsal and anal fins, as well as a pronounced caudal peduncle morphology (Figure 1, Supplementary Information – Video S1) from Paraíba state, northeastern Brazil. The observations were made on December 9, 2016, April 29 and May 1, 2017, during research dives at the artificial reef.
“Queimado” (07°05.07’ S; 034°44.852’ W), located in the Environmental Protected Area Queimado Shipwreck; at 18m deep, in good conditions of visibility (approx. 35m).

This is the first report of type of such anomalies in A. coeruleus. Meanwhile, other deformities observed in Acanthuridae, were a juvenile Tomini surgeonfish Ctenochaetus tominiensis from the Philippines and Acanthurus nigrofuscus from Australia displaying an unusual double-tailed morphology (Goatley et al. 2018).

Despite the observed deformities observed in the blue tang, its body condition and swimming mode were normal. Acanthurid species primarily use the pectoral fins for propulsion (Morgan and Kramer 2004, Fulton et al. 2005). Consequently, the negative effect of the deformities in their locomotory potential in predation or escape activities is low. Furthermore, usually this species swim in mixed groups to exploit territories with high resource quality (i.e. higher biomass and algal diversity) (Wolf 1987, Ferreira et al. 1998), decreasing the predation risk (Alevizon 1976, Dias et al. 2001, Nunes et al. 2013).

Fish injuries by a putative predator (Honma 1994) were not considered as a possible cause of the deformity, since there were no signs of bites to the lunate concavity of the dorsal and anal fins. Generally, these abnormalities take place during the early ontological stages, and their development may be due to pollutants, poor nutrition (Bengtsson 1988, Sfakianakis et al. 2006, Mazurais et al. 2009), inbreeding and mutations (Gjerde et al. 2005). The lack of additional data hampers the determination of the major drivers of this deformity.

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AUTHOR CONTRIBUTIONS
C.C.P.B., J.L.A., V.M.V., M.B.S. and R.S.R. conceived and designed the idea. C.C.P.B., J.L.A., V.M.V., M.B.S wrote the paper and led the revisions and C.C.P.B., J.L.A., V.M.V., M.B.S. and R.S.R critically reviewed and corrected the versions of the document.

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**SUPPLEMENTARY INFORMATION**

**Video S1** - A blue tang *Acanthurus coeruleus* with an unusual dorsal and anal fin deformity, swimming in a coastal reef on northeastern Brazil.