



## Uncommon colour patterns of specimens from *Acanthurus chirurgus* (Bloch, 1787) and *Thalassoma noronhanum* (Boulenger, 1890) in Rocas atoll, Brazil

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**Abstract:** In this article we describe uncommon colour patterns of specimens from *Acanthurus chirurgus* and *Thalassoma noronhanum* for the first time. It may be relevant to explain it under different points of view, such as parasitosis, hybridism, skin cancer related diseases, or melanosis unrelated to diseases.

**Key words:** reef fishes, images, diseases, hybridism

**Resumo:** Padrões incomuns de coloração em espécimes de *Acanthurus chirurgus* (Bloch, 1787) e *Thalassoma noronhanum* (Boulenger, 1890) no Atol das Rocas, Brasil. Neste artigo, registramos padrões de coloração incomuns em espécimes de *Acanthurus chirurgus* e *Thalassoma noronhanum*. Os registros podem ser relevantes para futuras explicações sob diferentes pontos de vista, como parasitose, hibridismo, doenças relacionadas à câncer de pele, ou melanismo não ocasionado por doenças..

**Palavras-chaves:** peixes recifais, imagens, doenças, hibridismo

Abnormal coloration, among other anomalies in fishes have been described. Abnormalities in the fishes coloration include albinism, ambicoloration and melanism (Dahlberg, 1970, Macieira et al., 2006; Simon et al., 2009; Simon et al., 2011, Piorski & Nunes, 2010, Souza et al. 2011, Jawad & Al-Kharusi, 2013, Sampaio et al. 2015). Melanism is characterized by the presence of an excessive amount of pigment in tissues and skin (Gould and Pyle, 1896).

The species *Acanthurus chirurgus* (Bloch, 1787) and *Thalassoma noronhanum* (Boulenger, 1890) are the most abundant among all reef fishes in Rocas atoll (Rosa & Moura, 1997). The acanthurids species play important role as the main herbivore on the enclosed tide pool ecosystem of Rocas Atoll, whereas *T. Noronhanum* is the most abundant species throughout the tide pools (Longo et al. 2015). The colour patterns present in these species found in Rocas atoll do not differ from populations elsewhere in the Brazilian coast. Rocas atoll is located 266 km from the Northeast coast of Brazil,

being the only atoll in the South Atlantic, one of the smallest in the world and mainly formed by calcareous algae (Kikuchi & Leão, 1997). The aim of this study was to record the unusual darkened patches found in the posterior body portions in *A. chirurgus* and *T.noronhanum* of the Rocas atoll.

A total of 240 free dives and 10 underwater SCUBA dives were done along eight expeditions to the Rocas atoll, between the period of December 2013 and April 2016. The specimens were recorded in photo (2.513) and video (257,34 minutes) and later analyzed in laboratory to register specimens with uncharacteristic colour patterns. Photo and video images were carried out in low tides, inside of the tide pools of the atoll, with depth ranging from 0.5 to 4 metres. Fish species were identified following fish IDs from Human and Deloach (2006) and consulting the website [www.fishbase.org](http://www.fishbase.org).

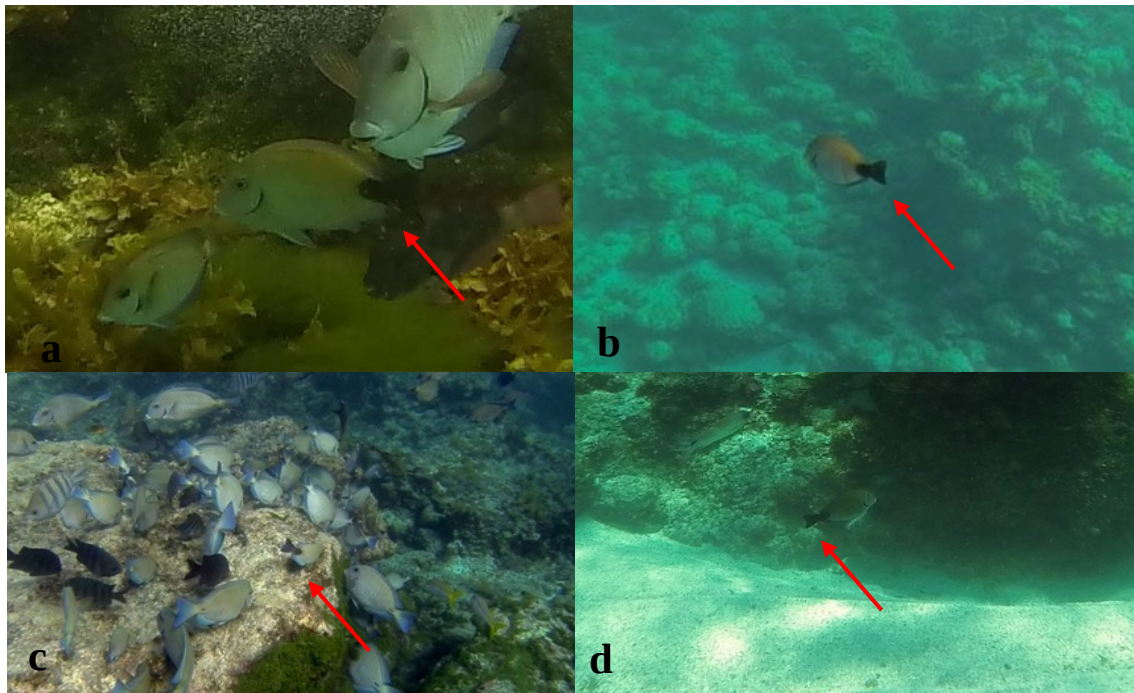
New and unique colour patterns of *A. chirurgus* and *T. noronhanum* were recorded in this study, both species showing a darkened patch in the

back part of the body (Figs. 1 and 2). In Rocas atoll we found this colour pattern to be very uncommon.

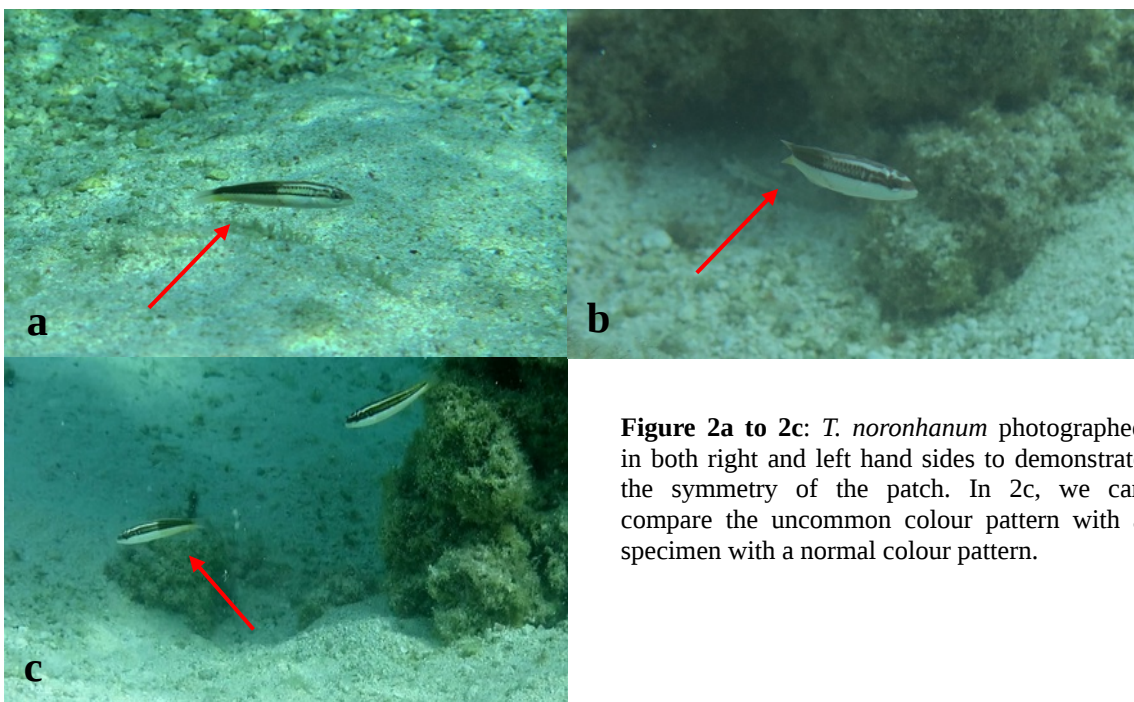
The specimen of *A. chirurgus* was observed in nine consecutive days (likely to be the same one).

The most uncommon colour pattern of *A. chirurgus* was recorded by Humann & Deloach (2006), in Caribbean, where the specimen shows black coloration with white spot near the mouth,

around the pectoral fins, and underneath the caudal fin. The most uncommon colour pattern of *T. noronhanum* ever registered was a specimen found in Rasas Islands, ES, Brazil by Gasparini (Fishbase, accessed 07/30/2016), which the dorsal parts were completely dark, white ventral area, transparent caudal fins with a yellow patch in its inferior part.



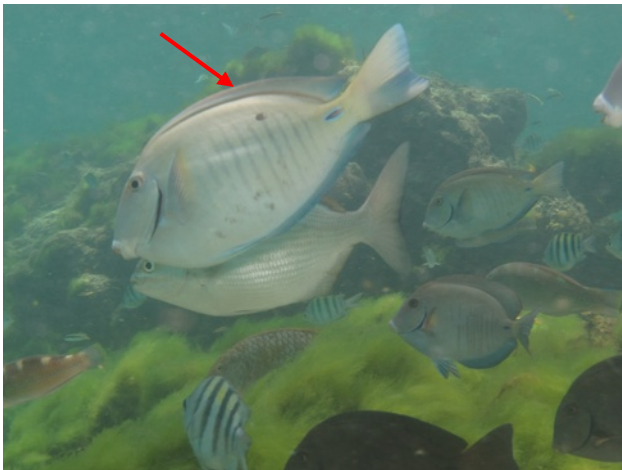
**Figure 1a to 1d:** *A. chirurgus* photographed from both left and right hand side, to demonstrate the symmetry of the dark pattern patch.



**Figure 2a to 2c:** *T. noronhanum* photographed in both right and left hand sides to demonstrate the symmetry of the patch. In 2c, we can compare the uncommon colour pattern with a specimen with a normal colour pattern.

In this article we describe uncommon colour patterns of specimens from *A. chirurgus* and *T. noronhanum* for the first time. Specimens were observed in Rocas atoll and despite not being found in many individuals, it may be relevant to identify the frequency of this pattern and try to explain it under different points of view, such as diseases, hybridism, skin cancer related diseases, or melanosis unrelated to diseases.

Darken patches in fishes can be related to parasites, however, the patches created by parasites are usually asymmetrical and randomly spotted along the body (Bernal et al. 2015). It is common to observe *Acanthurus* spp. with small dark patches along its body (Fig. 3). Our photos, however, indicate a symmetric patch and always located in the posterior part of the fish (Figures 1 and 2), thus possibly excluding the hypothesis of parasites.



**Figure 3:** *Acanthurus chirurgus* with dark patch asymmetrical and randomly spotted along the body.

The genus *Acanthurus* is represented by *A. chirurgus*, *A. coeruleus* and *A. bahianus* in Rocas Atoll. A hypothetical hybrid species with dark patches, therefore, would be the offspring of a combination of either species. *T. noronhanum* is the only species found in Rocas Atoll for the genus *Thalassoma*, however, there are four other species of the Family Labridae that inhabit the reefs of Rocas Atoll (Rosa & Moura, 1997; Batista et al., 2012). Even though hybridism is often found between species belonging to the same genus, there is one record of hybridism occurring in species from different genus but within the same Family in Rocas Atoll, *Paranthias fucifer* and *Cephalopholis fulva* (Serranidae). Thus, hybridism for *T. noronhanum* may be possible.

However, the hypothesis of hybridism in these records is unlikely, since both sister species from Rocas's Atoll do not show colour similarities to the specimens herein recorded with uncommon colour patterns.

In 2012, an intriguing case of melanoma in the coral trout of the Great Barrier was registered. A dark patch found in the head of the coral found to be related to the cancer and later confirmed by genetic analysis. The cancer may be associated with abnormal long periods of high UV incidence on the reef, and higher temperatures recorded in the Great Barrier Reef recently (Sweet et al. 2012). To our knowledge there is no studies evaluating the UV radiation and water temperature for the reefs of Rocas Atoll, however, it is likely that if any type of disease related to UV radiation will happen in a specific habitat, species with low genetic diversity may be the first ones to show signs of sickness. Thus, it is crucial to investigate further the possibility of disease like skin cancer in fish be happening in Rocas Atoll, and evaluate the genetic diversity of the key species of this habitat. Rocas atoll, despite relatively small in area, is an important stepping-stone for the Atlantic fish fauna. Any changes in this ecosystem may threaten the survival of many species and the resilience of the habitats. The populations of *A. bahianus*, *A. chirurgus* e *A. coeruleus* do not present genetic divergence within the Brazilian region and mid-Atlantic (Rocha et al 2002), thus suggesting a high genetic diversity and therefore diminishing a possible cancer due to poor genetic diversity.

Moreover, all fishes recorded here showed a normal behaviour, with no signs of any lethargy. The hypothesis of melanosis unrelated to diseases should be considered, as previously recorded by Simón *et al.*, 2011 for *C. fulva*.

In order to test the three hypothesis herein described it is necessary to conduct a genetic analysis, skin and blood samples of the specimens found with the uncommon dark patches, then providing a more in-depth explanation of the pattern registered in Rocas Atoll. This article presents the first records of uncommon dark patches seen in the two most abundant reef fishes of the Rocas Atoll, suggesting four hypothesis that could explain such pattern.

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