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*Short Communication*

# First record of hyper melanosis in the Patagonian redfish *Sebastes oculatus* Valenciennes, 1833 (Scorpaenidae) in the southeastern Pacific Ocean

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**ABSTRACT.** The coloration pattern alteration occurs at a low frequency in fish. The excesses of dark pigments in living organisms are known as melanism or melanosis, but a total blackening of the skin is known as hyper melanism or hyper melanosis. Little is known about why the extreme conditions of albinism and melanosis occur among fish. To date, there are no records of melanism for the genus *Sebastes*. Here, we report the first case of hyper melanosis in rockfish *Sebastes oculatus* (Patagonian redfish) in the southeastern Pacific Ocean. In 2005, small-scale fishers from Quintay Beach (Valparaiso, Chile) captured a single individual of Patagonian redfish covered with an excess of dark pigmentation. The specimen had a total length of 35.5 cm, and we followed the literature available to determine its morphometric and meristic features. The measurements led us to conclude that the specimen was a black *S. oculatus* with a rare melanosis condition. Our finding contributes to the knowledge of this species, and we infer that this melanosis case was caused by genetic heritage or some intergenetic hybridization. Still, genetic studies are necessary to confirm this hypothesis.

**Keywords:** *Sebastes oculatus*; melanosis; black skin; fishes; southeastern Pacific Ocean

In fish, the coloration patterns alteration occurs at a low frequency. These patterns refer to extreme changes in the fish's skin, such as leucism, albinism, or hypomelanosis, when a fish presents a skin coloration absence (Mansur 2011, Veena et al. 2011, Muto et al. 2016). The excesses of dark pigments are called melanism or melanosis. Still, a total blackening of the skin (very often an extreme case) is known as hyper melanism or hyper melanosis, a rare condition to find in fish (Simon et al. 2009, 2011, Bañon et al. 2010, Jawad et al. 2013, Flores & Poblete 2015). Little is known about why the extreme conditions of albinism and melanosis occur among fish. However, Love et al. (2002) related these phenotypes to the health condition of the specimen, such as dermal tumors resulting in black spots or lack of pigmentation in the skin. Most cases of mal pigmentation in the genus *Sebastes* have been reported from northern hemisphere waters. Follet & Dempster (1966) reported the first record of an unusual specimen of leucism in *S. melanostomus*, which they dominated as "melanalbinism".

Similarly, Muto et al. (2013) found a leucitic individual of *S. pachycephalus*, while Lewand et al. (2013) reported the first case of xanthochroism (yellow-green coloration) for an individual of *S. chrysomelas*. Muto et al. (2016) reported a rare case of abnormal body coloration in *S. trivittatus*. Thus, there are no records of melanism for the genus *Sebastes*. However, Orlov (2001) recorded the first case of melanosis for the family Scorpaenidae (*Sebastolobus*

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*macrochir*), a taxon close to the genus *Sebastes*. Hence, we report the first case of melanosis in the rockfish *Sebastes oculatus* (hereafter referred to as Patagonian redfish in the sub-family Sebastinae) in the southeastern Pacific Ocean (SPO).

The Patagonian redfish (Fig. 1a) in SPO waters are relatively abundant in small-scale fisheries, which often see this species in the local market; hence, the unusual appearance of abnormal fish coloration in the fishing catch is relatively easy to distinguish. In 2005, small-scale fishers from Quintay beach (33°19'S, 71°7'W, Valparaiso, Chile) captured a single individual of Patagonian redfish covered with an excess of dark pigmentation, which was caught at a depth of ~50 m using gillnet fishing. It should be noted that the capture zones are identical to zones where normally pigmented individuals are fished. The specimen had a total length of 35.5 cm (Fig. 1b), and we followed Chen (1971) and Kong (1985) to determine its morphometric and meristic features. According to Chen (1971) and Kong (1985), our measurements led us to conclude that the specimen was a black *S. oculatus* with a rare melanosis condition.

**Description (based on a single individual with melanosis of 35.5 cm standard length)**

The following measurements were expressed as percentages concerning a standard length: head length of 36.1%, nostril length of 10%, an orbital diameter of 8.6%, preorbital length of 12.4%, postorbital length of 17.9%, body height of 34.4%, predorsal length of 35.4%, pre pelvic length of 45%, the height of caudal peduncle as 8.3%, the pectoral fin of 25.8%, the pelvic fin of 20.3%, the upper jaw of 14.1%, the base of spiny part of dorsal fin as 35.4%, the base of soft ray part of dorsal fin as 19.6%, and base of the anal fin as 16.5%.

The specimen body is relatively high and covered with strongly adherent ctenoid scales. The body also has a convex dorsal profile and a slightly rectilinear ventral edge. The lateral line is straight and very marked. The pectoral fin is large and rounded at its posterior edge. The fish has a dorsal fin originating behind the nape, at the base of the pectoral fins, and is supported by thick and firm spines. The pelvic fin is well developed, and thoracic implantation is performed. The head is large, presenting opercular parts with strong, sharp spines. The mouth is large. The maxilla extends to meet the posterior border of the orbit when the mouth is closed. Many teeth are in the jaws, which are very small and irregularly distributed, forming a lawn. The dorsal-fin rays were XIII, 13; anal-fin rays III, 7; pectoral-fin rays 15, pelvic-fin rays I, 5. The first-gill raker has 27-gill spines, 18 on the lower branch. Their length is 1/2 the length of the gill filaments. The specimen presents teeth in the dentary, premaxillary, vomer, palatine, dorsal, and ventral pharyngeal bones and has 40 lateral line scales. The mandibles, maxillae, and gill plates do not contain scales. There were five divergent spines on the preopercle and two on the opercle. All these characteristics are consistent with previous authors' descriptions (Smith 1953, de Buen 1959), indicating that the individual is of the species *S. oculatus*.

**Remarks**

Our finding is the first record of melanosis for the genus *Sebastes*. However, this is not the first time that an abnormal coloration has been documented in redfishes of the genus *Sebastes* (Love et al. 2002, Muto et al. 2016). Phillips (1957, 1964, reviewed in Love et al. 2002) highlighted that some mal pigmentation is associated with skin tumors, which were discarded for our specimen. On the other hand, Venerus et al. (2013) hypothesized that these pigmentation patterns correspond to two morphotypes: "dark" and "light". Their research found that individuals of the "dark" morphotype are associated with a depth gradient between 40 and 50 m.

In comparison, the "light" morphotype is associated with deep waters (>80 m) in South Atlantic waters. In the southern South Pacific Ocean, de Buen (1959) described two subspecies of *S. oculatus*: one with light-dark brown coloration as *S. oculatus darwinii* and the other with orange-red coloration as *S. oculatus oculatus*. However, the subspecies thesis can be dismissed, as the work of Venerus et al. (2013) showed the presence of morphotypes. Consequently, our result could be placed in the "dark" morphotype, but this pattern refers to specimens with a light brown to dark brown coloration (Venerus et al. 2013). Furthermore, our specimen presented black coloration with no signs of tumors or parasites. Therefore, we infer that this specimen is a rare case of melanism in central Chile's *S. oculatus* population.

There are multiple causes of melanosis, including parasitism. The latter record dates to the 1910s, when Gamble & Drew (1911) discovered that trematode worms caused melanosis in gadiform fish, which was later ratified by Hsiao (1941). Additionally, other authors infer that melanosis may be caused by tumors or skin lesions (Dahlberg 1970, Love et al. 2002). However, our specimen did not show evidence of external parasites, tumors, or skin lesions; hence, we infer that melanosis was caused by genetic heritage or

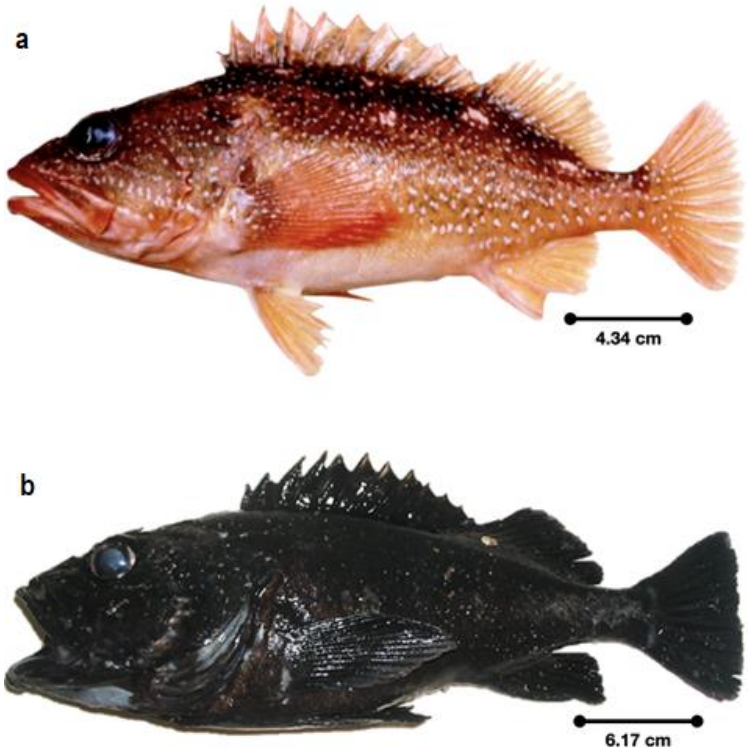


**Figure 1.** Color photography of fresh specimens of *Sebastes oculatus*, captured in Quintay, region of Valparaíso, Chile. a) Correspond to an individual with normal coloration of 25 cm standard length, b) correspond to an individual with melanosis of 35.5 cm standard length.

some intergenetic hybridization (Horth 2006). According to Takahashi & Kawauchi (2006), the phenotypic condition of this specimen could be associated with the action of the melanocortin receptor gene (MC1R). In vertebrates, MC1R allows a membrane protein to couple to a G protein present in melanocytes, acting as a switch mechanism that controls the type of melanin produced, such as eumelanin (for colors: black or brown) or pheomelanin (for red or yellowish colors). In fish, there is no production of pheomelanin, so it is considered that in this animal group, MC1R is directly related to the density of melanin production rather than the type of melanin produced, explaining the black and abnormal pigmentation of our specimen (Manríquez & Hernández 2012), but genetic studies are necessary to confirm this hypothesis. If other Patagonian redfish have hyper melanosis in SPO, this skin condition could alter individuals' social relationships with their conspecifics, similar to some groups of higher vertebrates (such as pinnipeds and dolphins). Melanic individuals are segregated from their populations or have difficulty finding reproductive mates (Simon et al. 2009).

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