



## On the status of the species of *Acanthistius* (Gill, 1862) (Percoidei) in the South-West Atlantic Ocean

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### Abstract

We review the species of *Acanthistius* Gill (1862) (Osteichthyes, Percoidei) from the South-Western Atlantic, solving a discrepancy concerning the taxonomic status of *Acanthistius brasiliensis* (Cuvier & Valenciennes 1828) and *Acanthistius patachonicus* (Jenyns 1842), and providing an objective diagnostic key for the two species. While Argentinean fishery biologists consider *A. patachonicus* to be a synonym of *A. brasiliensis*, ichthyologists elsewhere regard them as separate species with different distributional ranges. Based on a literature review, examination of museum specimens and observation of live individuals in the field, we identified the sources of the dissent and concluded that *A. brasiliensis* and *A. patachonicus* are separate species, differing in diagnostic morphological characters and distinctive color patterns and having slightly overlapping distributional ranges. Distinction between these two species has significant implications for management and conservation.

**Key words:** Fish taxonomy; South Atlantic; Conservation

### Introduction

The percoid fish genus *Acanthistius* (Gill, 1862) is confined to the southern hemisphere, and comprises ten marine species: five in Australian waters, two in the South East Pacific, two in the South West Atlantic, and one in the South East Atlantic (Hutchins & Kuitert 1982; Heemstra & Randall 1986; Pequeño 1989; Anderson *et al.* 2000). While historically the genus has been placed in different subfamilies of the Serranidae, Smith and Craig (2007) considered it *incertae sedis* within the Percoidei, based on an analysis of mitochondrial and nuclear DNA sequences (see also Craig and Hastings 2007).

The two South West Atlantic species were described in the eighteenth century: *Acanthistius brasiliensis* (Cuvier & Valenciennes 1828) based on two specimens collected off Brazil, and *Acanthistius patachonicus* (Jenyns 1842) based on three specimens collected by Darwin off Argentina (Fig. 1). Despite various attempts at clarifying the taxonomic status of these two species and defining their diagnostic morphological characters, fishery biologists still disagree on their status. While Argentinean fish biologists (e.g., Ciechomski & Casia 1976; San Román 1980; Dell'Arciprete *et al.* 1987; Cousseau & Perrota 2000) followed De Mahieu & Capezani (1974) considering *Acanthistius patachonicus* a synonym of *Acanthistius brasiliensis*, ichthyologists elsewhere regard them as separate species with different distributional ranges (e.g., Figueiredo & Menezes 1980; Nakamura 1986; Carvalho-Filho 1999).

We examined museum specimens, reviewed the literature, identified the sources of discrepancy about their taxonomic status, observed specimens in the field, and present a new diagnostic key to discriminate what we now regard as two species of *Acanthistius*. Furthermore we discuss how misidentification may undermine conservation efforts directed at these species.



**FIGURE 1.** Geographic ranges of *Acanthistius brasilianus* (dotted line, 15° to 23° S) and *A. patachonicus* (solid line, 23° to 48° S). (1) Type locality of *A. brasilianus* (15° S, off Ilheus); (2) Type localities of *A. patachonicus*, off Argentina (near mouth of La Plata River and 38° 20' S).

### Material and methods

We examined nine catalogued specimens of *Acanthistius brasilianus* and 49 of *Acanthistius patachonicus* deposited in the Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP) and in the Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN). Counts and measurements were

made following Hutchins & Kuiter (1982). Measurements were made with needlepoint dial calipers to the nearest 0.1 mm.

Through the assistance of Dr. Romain Cause (Muséum National d'Histoire Naturelle, Paris, MNHN) we obtained high quality pictures of one of the syntypes of *Acanthistius brasilianus* (Fig. 2 A), which were made by Claude Ferrara (Collection d'Ichthyologie). Some of the specimens stored at the Argentine museum come from the immediate vicinity of the type locations of *A. patachonicus*. They were compared to the pictures of the syntypes of *A. brasilianus*, and also photographed (Fig. 2 B). Both species were observed and photographed in their natural habitats.

## Results

### Genus *Acanthistius* Gill, 1862

#### *Acanthistius brasilianus* (Cuvier & Valenciennes, 1828)

(Figures 1, 2 A, 3, 4 A)

*Plectropoma brasilianum* Cuvier & Valenciennes, 1828: 397–398; Günther, 1859: 164.

*Acanthistius brasilianus*: Jordan & Eigenman, 1888: 348; Berg, 1899: 46–48; Miranda Ribeiro, 1917: 8–39; Devicenzi, 1924: 91–923; Fowler, 1951: 19; Ringuélet & Arámburu, 1960: 62; Figueiredo & Menezes, 1980: 28–29; Carvalho-Filho, 1999: 320.

Not *A. brasilianus*: De Mahieu & Capezzani, 1974: 209–227, fig. 1; Ciechomski & Casia, 1976: 27–36; San Roman, 1980: 1–50; Dell'Arciprete et. al., 1987: 67–84; Cosseau, 2000: 94–95; Rubinich, 2001: 1–44; Irigoyen, 2006: 1–47; Irigoyen & Venerus, 2008: 349–353.

**Type locality:** Cuvier & Valenciennes (1828, p. 397) mention only 'Bresil', and Delalande as collector. The catalogue of the MNHN indicates, more specifically, that the type material was collected by Delalande at 15° S, 35° E, East of Ilheus, Bahia State (Fig. 1). The longitude is most likely wrong. The information available from the MNHN's catalogue does not indicate the date of collection. Pierre Antoine Delalande (1787 – 1823), a French naturalist working for the MNHN, traveled to Brazil in 1816 to collect for the Museum. He arrived in Rio de Janeiro on June 1<sup>st</sup>, and returned after a short collecting trip. So the time of collection is most likely the winter of 1816.

**Type repository:** MNHN Paris 0000-6407, two syntypes, SL: 12.5 cm and 13.4cm; TL: 15.4 cm and 16.3 cm, respectively; preserved in ETOH.

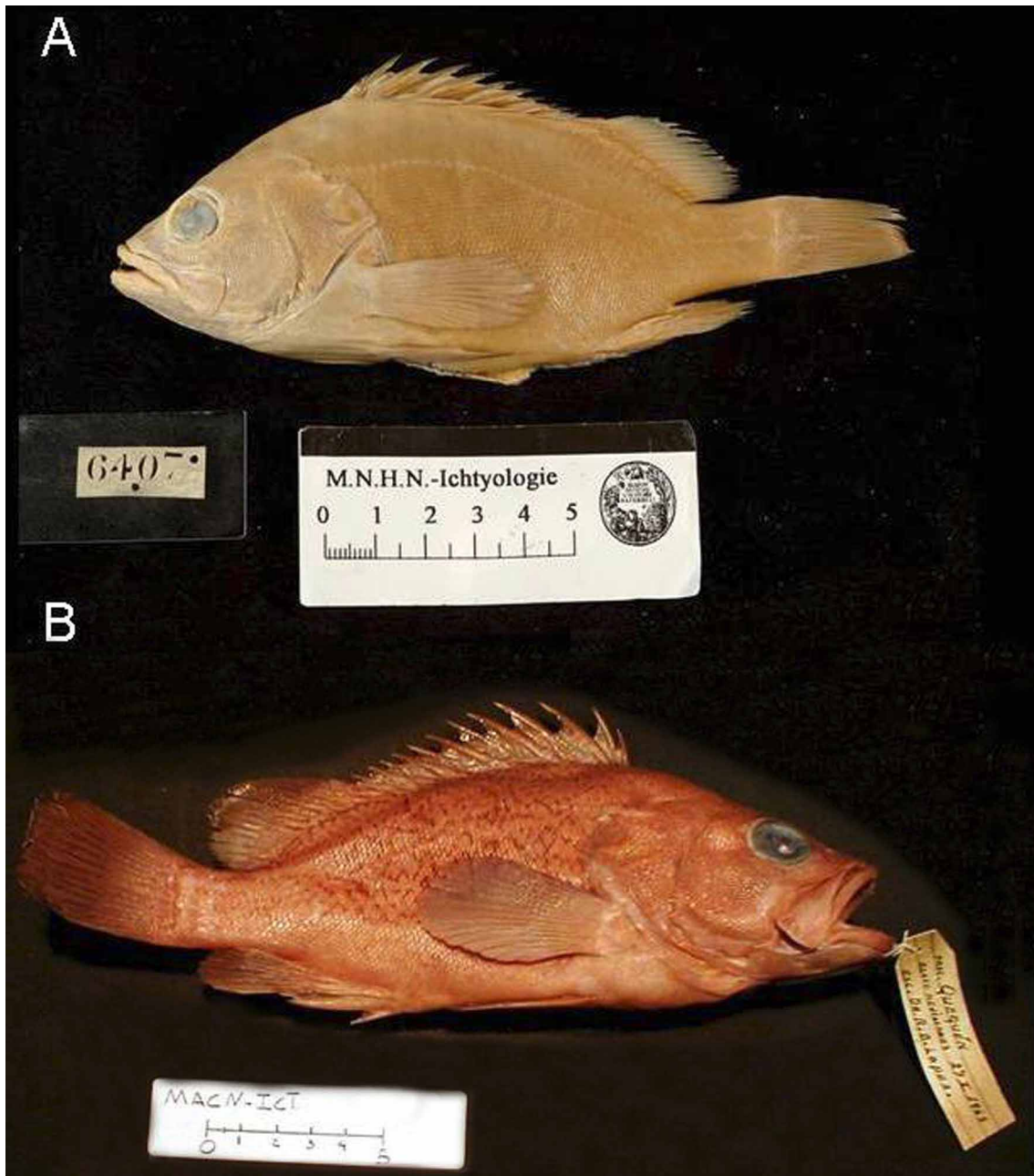
**Material examined:** MZUSP 2388 São Paulo, Brazil (three specimens, TL: 12.1 cm, 10.1 cm, 14.9 cm); MZUSP 14890 São Paulo, Brazil (four specimens, TL: 22.2 cm, 28.7 cm, 22.4 cm, 28 cm); MZUSP 70738 São Paulo, Brazil (one specimen, TL: 10.4 cm); MZUSP 70743 São Paulo, Brazil (one specimen, TL: 11.1 cm).

**Diagnosis:** Anal fin with 3 spines and 8 soft rays; caudal fin truncated or slightly rounded; pectoral fins with 15–16 soft rays. Three large spines on the inferior margin of the preopercle, the anterior two pointing anteriorly. Lateral line with 56–61 pored scales. Pectoral fins at least 35% longer than pelvic fins. Light or dark brownish color; 5 silvery-grey to dark brown vertical bars on sides and caudal peduncle, well defined at all ages; belly light, whitish to yellowish; no vermiculated pattern in the body; fins with similar body color pattern. Up to 40 cm TL.

**Field observations:** Observed and photographed in its natural habitat during diving surveys conducted at Cabo Frio (Brazil) in March 2008 (Fig. 3).

**Remarks:** Cuvier & Valenciennes (1828), Berg (1899), Fowler (1951), Figueiredo & Menezes (1980) and Carvalho-Filho (1999) reported a uniform brownish color with 5 or 6 vertical bands varying from bluish-grey to dark brown. Our observation of live and preserved specimens (Fig. 3) confirm that pattern. Figueiredo & Menezes (1980) reported a ratio between the lengths of the pectoral and pelvic fins in the range 1.43–1.56;

among the specimens examined by us (n=9) the range was somewhat wider: 1.35 to 1.63. Fowler (1956) counted 112 scales on the lateral line, while Figueiredo & Menezes (1980) counted 60; clearly, Fowler (op. cit.) was referring to the total number of scales (lateral scale series), and Figueiredo & Menezes (op. cit.) to pored scales. In the specimens examined by us the number of pored lateral line scales ranged between 58 and 61. There are three spines on the preopercle and opercle (Fig. 4 A), as noticed by Berg (1899).



**FIGURE 2.** Reference specimens. (A) Syntype of *Acanthistius brasiliensis* (MNHN, Paris). (B) “Topotypic” specimen of *A. patachonicus* collected in the immediacy of one of the two type localities (MACN Buenos Aires 5004, 38.4 °S, 1963, TL 24.6 cm, preserved in ETOH).

***Acanthistius patachonicus* (Jenyns, 1842)**

(Figures 1, 2 B, 4 B, 5)

*Plectropoma patachonica* Jenyns, 1842: 11–12; Perugia, 1890: 611.

*Acanthistius patachonicus*: Jordan & Eigenman, 1888: 348; Berg, 1899: 46–48; Devicenzi, 1924: 91–92; Ringuet & Arámburu, 1960: 62; Figueiredo & Menezes, 1980: 28–29; Nakamura, 1986: 196–197; Carvalho-Filho, 1999: 106. *A. brasilianus*: De Mahieu & Capezzani, 1974: 209–227 (fig. 1); Ciechowski & Casia, 1976: 27–36; San Roman, 1980: 1–50; Dell’Arciprete et. al., 1987: 67–84; Cosseau, 2000: 94–95; Rubinich, 2001: 1–44; Irigoyen, 2006: 1–47; Irigoyen & Venerus, 2008: 349–343.

**Type locality:** Syntypes were collected by Darwin at two locations, both off the coast of Buenos Aires Province (Argentina): one off the mouth of La Plata River, 40 fathoms (= 73 m) (TL: 15 inches ~ 38 cm), and two at 38° 20’ S (TL: 9 and 7.5 inches, ~ 23 and 19 cm) (Fig. 1). Darwin sailed through the type location between August, 1832 and December, 1833 in a series of survey cruises onboard of the Beagle Voyage, commanded by Cap. Fitz Roy. Some of the materials stored in the collections of MACN (Buenos Aires) were collected in the general area of the first locality, and in the immediate vicinity of the second.



**FIGURE 3.** Photographs of *Acanthistius brasilianus*, recently caught (top) and in its natural habitat, Arraial do Cabo, Brazil, March 2007 (bottom).

**Type repository:** BMNH London 1917.7.14.34–35, three syntypes; one dry specimen (uncatalogued).

**Material examined:** MZUSP 70739 São Paulo, Brasil (two specimens, TL: 12.6 cm, 17.2 cm); MZUSP 70740 São Paulo, Brasil (one specimen, TL: 17.5 cm); MZUSP 70741 Uruguay (one specimen, TL: 21.4 cm); MACN 5004 Argentina (two specimens, TL: 24.6 cm, 14.2 cm); MACN 4368 Argentina (one specimen, TL: 33.0 cm); MACN 4662 Quequen, Argentina (one specimen, TL: 24 cm); MACN 8211 Quequen, Argentina (five specimens, TL: 27 cm, 23.7 cm, 21.5 cm, 22.5 cm, 22.4 cm); MACN 5757 Golfo Nuevo, Argentina (three specimens, TL: 39 cm, 30 cm, 36 cm); MACN 4432 Quequen, Argentina (four specimens, TL: 23.2 cm, 23.5 cm, 30.5 cm, 30.2 cm); MACN 805 Mar del Plata, Argentina (two specimens, TL: 27.4 cm, 23.3 cm); MACN 6594 Golfo Nuevo, Argentina (one specimen, TL: 32 cm); MACN 4203 San Blas, Argentina (one specimen, TL: 25.4 cm); MACN 2293 (fourteen specimens, TL: 32 cm, 23.5 cm, 25 cm, 26 cm, 25.4 cm, 16.5 cm, 18.5 cm, 29.2 cm, 20.5 cm, 23.5 cm, 16.5 cm, 20 cm, 25.5 cm, 15.4 cm); MACN 5771 Argentina (one specimen, TL: 35.5 cm); MACN 1241 Golfo San José, Argentina (nine specimens, TL: 27.5 cm, 25.5 cm, 23 cm, 26.4 cm, 27.5 cm, 25.5 cm, 24.5 cm, 23 cm, 26 cm).

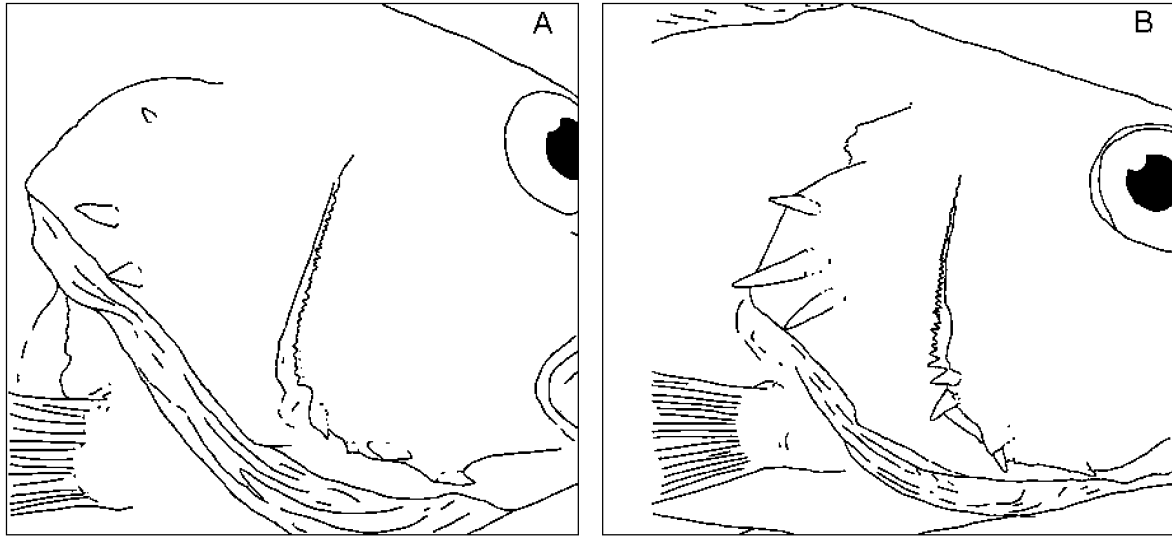


FIGURE 4. Opercular and preopercular spines. (A) *Acanthistius brasilianus*. (B) *A. patachonicus*.

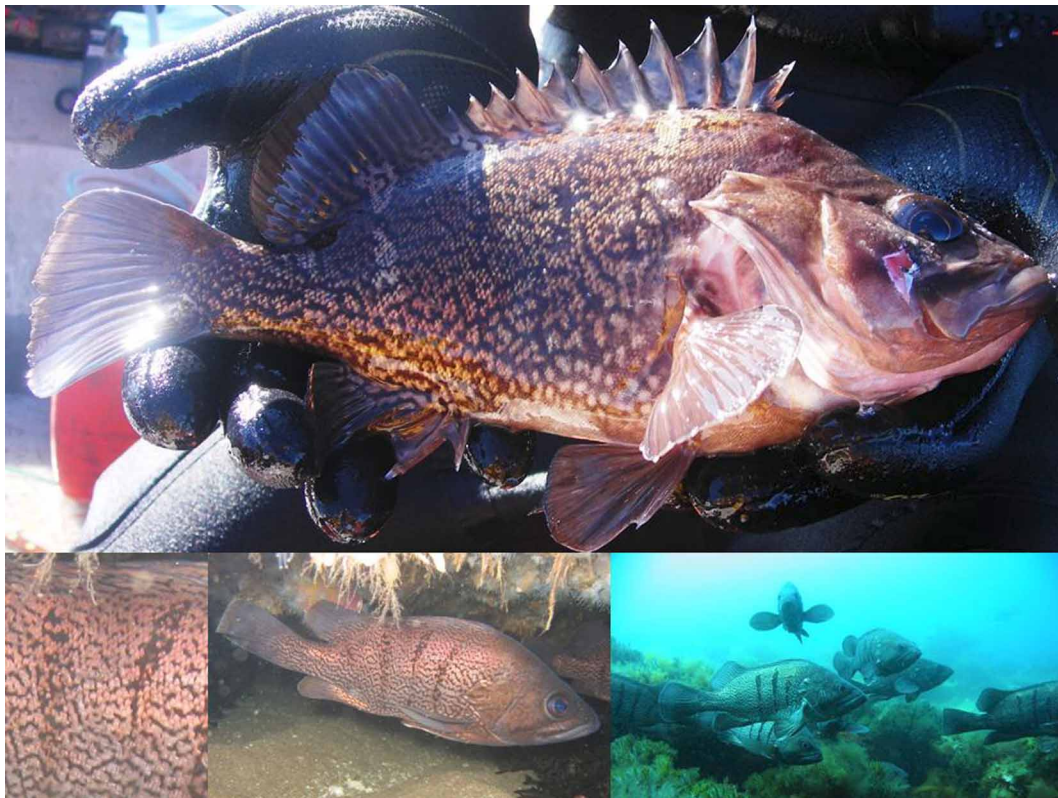


FIGURE 5. Photographs of *Acanthistius patachonicus*, recently caught (top) and in its natural habitat Golfo Nuevo, Argentina 2006–2007 (bottom).

**Diagnosis:** Anal fin with 2–3 spines and 8–10 soft rays; caudal fin rounded; pectoral fins with 15–17 soft rays. Three or four large spines on the inferior margin of the preopercle, two of them ventrally directed. Lateral line with 67–70 pored scales. Pectoral fin not more than 28% longer than pelvic fin. Dark red, brownish or grey depending on depth and color of the habitat substrate; irregularly shaped dark spots on body and dorsal and anal fins usually forming dark bands on the sides and irregular vermiculated lines, well defined at all sizes. Up to 65 cm TL.

**Field observations:** Thousands of individuals were observed while conducting diving surveys in rocky reefs off northern Patagonia, from the NW of San Matías Gulf (41° S) to Comodoro Rivadavia (46° S), many of them caught as part of sampling routines between 2000 and 2008 (Irigoyen 2006; Irigoyen & Venerus 2008). Furthermore thousands of individuals were observed from fisheries captures in the north coast of Argentina (38° S).

**Descriptive remarks:** Jenyns (1842), Perugia (1890), Figueiredo & Menezes (1980), Nakamura (1986) and Carvalho-Filho (1999) reported that *Acanthistius patachonicus* is grey to brownish, with dark bands not always visible on the sides, and irregular lines “zigzagging” in different directions over the body, dorsal fins and anal fins. The lined “zigzag” pattern of *A. patachonicus* is visible in individuals of all ages (Figueiredo & Menezes 1980; Carvalho-Filho 1999). Our observation of live and preserved specimens confirms that pattern (Fig. 5). Reported ratio between the length of the pectoral and pelvic fins is in the range of 1.18 to 1.28 (Figueiredo & Menezes 1980), and 1.12 to 1.27 in the specimens studied by us. De Mahieu & Capezzani (1976) counted 80–100 scales on the lateral line ( $n = 700$ ), Nakamura (1986) reported 84–98, and Figueiredo & Menezes (1980) 68; clearly, the former authors were referring to the total number of scales on the lateral line (lateral scale series), and the latter to pored scales only (lateral line scales). In the specimens examined by us the number of pored lateral line scales ranged between 67 and 70. Coincidentally with Berg (1899) we observed three comparatively long and robust spines on the opercle and preopercle (Fig. 4 B).

## Discussion

To date, eight descriptions of *Acanthistius patachonicus* and nine of *Acanthistius brasiliensis* have been published. Remarkably, however, only a few authors had the opportunity to directly compare specimens of both species (Figueiredo & Menezes 1980; Carvalho-Filho 1999). In total, four characters allowed their differentiation:

- a) Color pattern. As stated by Figueiredo & Menezes (1980), the lined (“zigzag”) pattern of *A. patachonicus* is visible in all sizes and therefore constitutes a secure character to differentiate it from individuals of *A. brasiliensis*. Authors who directly compared individuals of both species concluded that color pattern was the most important character to differentiate them (Figueiredo & Menezes 1980; Carvalho-Filho 1999). We found the same patterns described by Figueiredo & Menezes (1980), Carvalho-Filho (1999) and all other previous descriptions in the museum specimens examined.
- b) Ratio between the lengths of the pectoral and pelvic fins. Berg (1899) and Devicenzi (1924) emphasized that *A. brasiliensis* has longer pectorals fins. Figueiredo & Menezes (1980) stated that a key character for a positive identification of both species was the ratio between the lengths of the pectoral and pelvic fins. In the specimens examined by us the ratio was higher than 1.35 (1.35 to 1.63,  $n = 9$ ) in *A. brasiliensis* and less than 1.27 (1.12 to 1.27,  $n = 49$ ) in *A. patachonicus*.
- c) Scales on the lateral line. As stated by Figueiredo & Menezes (1980), *A. patachonicus* presents more pored scales on the lateral line than *A. brasiliensis*. In the specimens examined by us the number of pored lateral line scales ranged between 58 and 61 ( $n = 9$ ) for *A. brasiliensis* and between 67 and 70 in the specimens of *A. patachonicus* ( $n = 49$ ).
- d) Spines on the preopercle and opercle: As noted by Berg (1899), both species have three long spines on the opercle and preopercle, which are longer, more robust and less scaled in *A. patachonicus*. We found similar contrasts in the opercular and preopercular spines (Fig. 4).

Lack of consensus concerning the taxonomic status of South-Western Atlantic species of *Acanthistius* began with De Mahieu & Cappenzani (1974). These authors examined 700 specimens caught solely off Argentina, and concluded that *A. patachonicus* is a junior synonym of *A. brasiliensis*. Considering the distri-

butional range of both species as reported by Brazilian taxonomists and confirmed by us, it is clear that the large sample on which the analysis was based, collected from Argentinean waters, fell entirely within the geographic range to *A. patachonicus*. *A. brasiliensis* is an uncommon species occurring in Brazilian waters from Bahia to São Paulo (15° to 23° S). *A. patachonicus* is found from Rio Grande do Sul (South Brazil, 30° S) to San Jorge Gulf, Argentina (48° S), although some stragglers may appear as far north as Paraná and even São Paulo. De Mahieu & Cappenzani (1974) probably followed Berg (1899), who (erroneously) reported the two species as occurring in Argentina. Furthermore, De Mahieu & Cappenzani (1974) ignored important diagnostic characters, such as the color pattern described by Fowler (1951) and Cuvier and Valenciennes (1828).

Other pairs of closely related species of *Acanthistius* are known to differ in color pattern and meristic characters. *Acanthistius pardolotus* and *Acanthistius paxtoni*, for instance, differ subtly from other Australian congeners. *A. paxtoni* shows minor differences in the number of scales in the operculum and *A. pardolotus* differ in the number of scales between the upper origin of the gill cover and the base of the first dorsal spine (Hutchins 1981; 1982).

The recognition of two different species of *Acanthistius* in the South Atlantic is important for conservation purposes. *A. brasiliensis* is an uncommon species observed only rarely in rocky bottoms between 15 and 60 m depth, often near offshore islands and outcrops. Little is known about its habits and behavior. Considering its rarity, it is likely that this species faces a critical conservation status. On the other hand, *Acanthistius patachonicus* has a wide distribution and is one of the most common rocky reef fish species from Argentina, reaching its maximum abundance from 40° to 45° S and from shallow rocky reefs down to 90 m depth. This long lived “grouper” is a sport-fishing target, fished by spear-fishers and anglers, as well as commercially by bottom trawlers and longliners (San Román 1980; Dell’Arciprete *et al.* 1987; Cousseau & Perrota 2000; Irigoyen 2006).

Misidentification of these two species is not inconsequential. Distributional charts and other information in the widely-used database FISHBASE ([www.fishbase.org](http://www.fishbase.org)) are in error. Both species have disparate population abundances and different distributions, and pose differing conservation concerns. By considering *A. patachonicus* a synonym of *A. brasiliensis*, the need for conservation efforts for the latter may be ignored. We urge further research about the ecology and conservation status of *A. brasiliensis*.

## Acknowledgments

We acknowledge Ana Parma for assistance in preparation of the manuscript, Lobo Orensanz for critical discussion, and Mariana Adami for help with the bibliography. We are particularly grateful to Dr. Romain Cause (Muséum National d’Histoire Naturelle, Paris) and Claude Ferrara (Collection d’Ichthyologie) for kindly making available excellent pictures of the syntypes of *Acanthistius brasiliensis*. David Galván made available one of the pictures of *A. patachonicus* in its natural habitat. Eduardo Baumeier and Carlos Eduardo Ferreira (Kadu) provided information and the photograph of *A. brasiliensis*, and Ezequiel Vera made the illustrations. Field work was supported by the PADI Foundation.

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