

SHORT COMMUNICATION

The singlespot frogfish *Antennarius radiosus* (Lophiiformes, Antennariidae), a valid member of the ichthyofauna of the Azores

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The big-eyed frogfish *Antennarius radiosus* Garman, 1896 is confirmed as a valid record for the Azores. A revision of the historical records confirms three valid species of frogfishes from the Azores (*A. radiosus*, *A. nummifer*, *Histrio histrio*). Two species (*A. senegalensis*, *A. pardalis* or *A. multiocellatus*) require confirmation.

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INTRODUCTION

Antennarius radiosus Garman, 1896, the big-eyed frogfish, was first recorded in the Azores by the naturalist priest Ferreira (1940), who reported a specimen captured at 10 m depth at Velas, S. Jorge. The fish was deposited at the Museu Carlos Machado (MCM), in Ponta Delgada, but must have been lost (Azevedo & Heemstra 1995; Santos et al. 1997). Fifty-five years later, Azevedo & Heemstra (1995) recorded one specimen of *Antennarius* captured at S. Miguel Island at 140 m depth (MCM 698), which was identified as *A. senegalensis* Cadenat, 1959. Both *A. senegalensis* and *A. radiosus* pertain to the *A. ocellatus* group (Pietsch & Grobecker 1987), and Azevedo & Heemstra (1995) suggested that Ferreira (1940) could have misidentified his specimen. The two species were listed by Santos et al. (1997), but *A. radiosus* was attributed a non-confirmed status as a result of the statement by Azevedo & Heemstra (1995).

MATERIAL EXAMINED

One frogfish from Pico Island was sent to the authors in September 2003 (Fig. 1a). Later, two other specimens were received, both caught in the littoral zone, one from S. Miguel and one from Faial island (Table 1). We identified all three specimens as *A. radiosus* based on: 1) the configuration of dermal tubercles in 2nd and 3rd dorsal rays (Fig. 1d); 2) non-bifurcated pectoral rays, as opposed to bifurcated in *A. senegalensis* (Fig. 1b); 3) non-filamentous tip of illicium, as opposed to *A. senegalensis* (Fig. 1c); 4) and dark radial stripes around the eye and general colour pattern of the body (Fig. 1a). We also re-examined two specimens from Madeira (Museu Municipal do Funchal, MMF 4754, MMF 23116) previously identified as *A. radiosus* (see Pietsch & Grobecker 1987: 120), and the single *A. nummifer* (MMF 5254) known from the Azores.

The examination of photos of the specimen referred by Azevedo & Heemstra (1995), lead us

to conclude that this fish is *A. radiosus* instead of *A. senegalensis*, based on the diagnostic features mentioned above, with the exception of the tip of the illicium, which was broken.

Two of the specimens (Departamento de Oceanografia e Pescas, DOP-0126 and

DOP-0293) were mature males. The stomach content of DOP-0126 consisted of one scale-rayed wrasse, *Acantholabrus palloni*, about the same length as its predator (TL = 228 mm and TL = 242 mm, respectively) and having 35% of its body weight.

Table 1. Summary data for *Antennarius* specimens analysed.

Specimen	DOP-0126	DOP-0129	DOP-0293	MMF23116	MMF4754	MMF5254
Species	<i>A. radiosus</i>	<i>A. radiosus</i>	<i>A. radiosus</i>	<i>A. radiosus</i>	<i>A. radiosus</i>	<i>A. nummifer</i>
Locality	S. Roque, Pico	Maia, S. Miguel	Varadouro, Faial	Madeira	Porto Santo	Azores
Depth	83	10	130	-	-	-
Gear	trap	free diving	trap	-	-	-
Date	29-09-2003	10-2003	18-08-2004	03-12-1975	1954	11-1954
TL	242	173	231	253	243	123
SL	191	135	168	189	183	98
WT	452 (160)*		382	-	-	-
ED	11.9	7.3	10	12.2	14.5	4
IL	27.5	incomplete	26	29	28.5	
ED/SL	6.2	5.4	6.0	6.5	7.9	4.1
IL/SL	14.4	-	15.5	15.3	15.6	0
Sex	male (mature)	-	male (mature)	-	-	-

TL = total length (mm), SL = standard length (mm), WT = total weight (g), ED = eye diameter (mm), IL = illicium length (mm). * weight of stomach content in brackets. DOP – Departamento de Oceanografia e Pescas, Universidade dos Açores, Horta; MMF - Museu Municipal do Funchal, Madeira.

DISCUSSION

The specimens of *A. radiosus* confirm the original record of Ferreira (1940) for the Azores, and the range extension of this typically western Atlantic species to north-eastern subtropical Atlantic archipelagos of Madeira and the Azores. Four other species of Antennariidae were previously reported for the region: 1) *Histrio histrio*, originally reported by Collett (1896) based on one specimen caught during the Prince Albert of Monaco campaigns in the late 1890s; 2) *A. nummifer*, based on one specimen caught in 1954 and re-examined in this study (see also Santos et al. 1997), 3) *A. multiocellatus* or *A. pardalis*, reported by Pietsch & Grobecker (1987) based on a poorly preserved specimen (Muséum National d'Histoire Naturelle, MNHN A.6265); and 4) *A.*

senegalensis, reported by Azevedo & Heemstra (1995), but concluded here to be a mis-identification of *A. radiosus*. Therefore, there are four valid Antennariidae species for the region, all based on very few occurrences.

The scarcity of these records and the fact that the Azores represent the limit of the distribution range for the three *Antennarius* species raise the question whether these represent self-sustaining populations or, alternatively, sink populations fed by occasional pelagic larval transport away from their natural grounds. In the case of *A. radiosus*, the gonads of two Azorean fish examined were fully mature (Table 1), indicating that the species is able to reproduce in the area. Furthermore, Azorean and Madeiran individuals attain substantially larger sizes, and show some distinct characteristics (pigmentation of the illicial

aparatus - Fig. 1.d; ED/SL and IL/SL proportions - Table 1), when compared to western Atlantic individuals (Pietsch & Grobecker 1987). These facts may indicate the existence of a local population with some degree of genetic isolation, as documented for other coastal species of the Azores (e.g. Domingues et al. 2007; Stefanni et al. 2006). If this is the case, such apparent scarcity must reflect either a truly small population, or the inability to observe or capture individuals of *Antennarius*.

The occurrence of *A. radiosus* is an exception to

the Azorean coastal ichthyofauna, which shares major biogeographic affinities with the eastern Atlantic (Santos et al. 1995; Porteiro et al. 1996; Floeter et al. in press). It is interesting to note that, contrary to most other fishes, frogfishes have major rafting dispersal capacities during the egg and pre-juvenile (*scutatus*) phases (Pietsch & Grobecker 1987). This supports the possibility that colonization pattern from Western Atlantic can sporadically occur following the main pattern of North-Atlantic hydrology.



Fig. 1. General aspect (1a), pectoral fin (1b), illicial apparatus (1c) and details of dermal tubercles of dorsal fin (1d) of *Antennarius radiosus*, caught in the Azores.

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REFERENCES

- Azevedo, J.N. & P.C. Heemstra 1995. New records of marine fishes from the Azores. *Arquipélago. Life and Marine Sciences* 13A: 1-10.
- Collett, R. 1896. Poissons provenant des campagnes du yacht L'Hirondelle (1885-1888). *Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert Ier Prince Souverain du Monaco*, Fascicule X, Imprimerie du Monaco. 1-198 pp. (+ 6 plates).
- Domingues, V.S., R.S. Santos, A. Brito, M. Alexandrou & V.C. Almada 2007. Mitochondrial and nuclear markers reveal isolation by distance and effects of Pleistocene glaciations in the northeastern Atlantic and Mediterranean populations of the white seabream (*Diplodus sargus*, L.). *Journal of Experimental Marine Biology and Ecology* 346(1-2): 102–113.
- Ferreira, E. 1940. A pesca da Albacora em 1938 e 1939 e “Pediculados dos Açores. *Açoreana* 2(3): 129-134.
- Floeter S.R., L.A. Rocha, D.R. Robertson, J.C. Joyeux, W.F. Smith-Vaniz, P. Wirtz, A.J. Edwards, J.P. Barreiros, C.E.L. Ferreira, J.L. Gasparini, A. Brito, J.M. Falcón, B.W. Bowen & G. Bernardi (in press). Atlantic reef fish biogeography and evolution. *Journal of Biogeography*
- Pietsch, T.W. & D.B. Grobecker 1987. *Frogfishes of the World: Systematics, Zoogeography and Behavioral Ecology*. Stanford University Press, Stanford, California: xii+ 420 pp.
- Porteiro, F.M., J.P. Barreiros & R.S. Santos 1996. Wrasses (Teleostei, Labridae) of the Azores. *Arquipélago. Life and Marine Sciences* 14A: 22-39.
- Santos, R.S., F.M. Porteiro & J.P. Barreiros 1997. Marine fishes of the Azores: An annotated checklist and bibliography. *Arquipélago. Life and Marine Sciences Supplement 1*: xxi+ 231 pp.
- Santos, R.S., S.J. Hawkins, L.R. Monteiro, M. Alves & E.J. Isidro 1995. Marine research, resources and conservation in the Azores. *Aquatic Conservation: Marine and Freshwater Ecosystems* 5(4): 311-354.
- Stefanni, S., V. Domingues, N. Bouton, R.S. Santos, F. Almada & V. Almada 2006. Phylogeny of the shanny, *Lipophrys pholis*, from the NE Atlantic using mitochondrial DNA markers. *Molecular Phylogenetics and Evolution* 39:282–287.

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