

VIERAEA	Vol. 45	119-126	Santa Cruz de Tenerife, octubre 2017	ISSN 0210-945X
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**Northernmost record of *Gadella imberbis*
(Pisces, Gadiformes, Moridae) in the Eastern Atlantic
Ocean, with comments on the species**

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BISCOITO, M. & J. A. GONZÁLEZ (2017). Registro más septentrional de *Gadella imberbis* (Pisces, Gadiformes, Moridae) en el océano Atlántico Oriental, con comentarios sobre la especie. *VIERAEA* 45: 119-126. <https://doi.org/10.31939/vieraea.2017.45.07>

ABSTRACT: One specimen of *Gadella imberbis* (Moridae) was collected in the north-eastern Atlantic, off Portugal mainland, at 582 m of depth. In the eastern Atlantic, this ampho-Atlantic species was previously known to occur from Namibia to the Cape Verde Islands. The present record fixes the new northernmost distribution limit of this species off the Portuguese coast, at 36°46'N.

Key words: *Gadella imberbis*, new record, Portugal, northern limit, north-eastern Atlantic.

RESUMEN: Un ejemplar de *Gadella imberbis* (Moridae) fue capturado en el Atlántico nororiental, frente a Portugal continental, a 582 m de profundidad. En el Atlántico Oriental, la presencia de esta especie anfiatlántica era previamente conocida entre Namibia y las Islas Cabo Verde. La presente cita establece un nuevo límite septentrional de distribución de esta especie frente a la costa de Portugal, en 36°46'N.

Palabras clave: *Gadella imberbis*, primera cita, Portugal, límite norte, Atlántico nororiental.

INTRODUCTION

The genus *Gadella* Lowe, 1843 (Gadiformes, Moridae) is represented by 12 (Eschmeyer *et al.*, 2017) or 13 valid species (Froese & Pauly, 2017) distributed worldwide, three of which occurring in the Atlantic Ocean: *Gadella maraldi* (Risso, 1810) and *Gadella svetovidovi* Trunov, 1992, restricted to the eastern Atlantic (Froese & Pauly, 2017) and *Gadella imberbis* (Vaillant, 1888) from Canada (Scott & Scott, 1988, about 41°N) to the Caribbean and southward to Brazil (Figueiredo *et al.*, 2002, about 34°S), in the western Atlantic and from the Cape Verde Islands (Vaillant, 1888; González *et al.*, 2010, at 15°28'N) to Namibia (González *et al.*, 2010; Ruiz-Pico *et al.*, 2012; Froese & Pauly, 2017, about 11°S), including the Walvis Ridge (Trunov, 1992, at 18°23'S), in the eastern basin.

Until now, the Cape Verde archipelago, the type locality (Fig. 1), was the northernmost limit of *G. imberbis* in the eastern Atlantic, from where four specimens were known, two from Vaillant (1888) (as *Brosmiculus imberbis*) and two other recently caught (González *et al.*, 2010; 2014). The species is benthopelagic on the outer shelf and upper slope at depths ranging from 200 to 800 m, mainly between 230 and 500 m of depth on sandy mud or sand substrates (Cohen *et al.*, 1990; Froese & Pauly, 2017).

The specimen reported herein represents a new northernmost record in the eastern Atlantic, enlarging the previous distribution for more than 2500 km to the North.

MATERIAL AND METHODS

An experimental fishing survey was carried out on board the commercial trawler F/V “Atardecer” from September 2006 to January 2007 on the mainland Portuguese coast, resulting in 222 hauls from 446 to 778 m of depth (Ayza *et al.*, 2011).

One specimen of *Gadella imberbis* (Moridae) was collected. Meristic and morphometric measurements were made following Hubbs & Lagler (1958) and Paulin (1989). Light organ measurements follow Shcherbachev (1993). SL – standard length; InV-af – distance between interventral line and origin of anal fin; InV-Lo – distance between interventral line and anterior margin of light organ; Lo-An – distance between posterior margin of light organ and anus; LoD – light organ diameter. Institutional abbreviations follow Fricke & Eschmeyer (2016).

SYSTEMATICS

Family MORIDAE Moreau, 1881

Genus *Gadella* Lowe, 1843

Gadella imberbis (Vaillant, 1888)

(Figure 2)

As *Brosmiculus imberbis*, Poissons. In *Expéditions scientifiques du ‘Travailleur’ et du ‘Talisman’ pendant les années 1880, 1881, 1882, 1883*. Masson. Paris: p. 293, Pl. XXV, Fig. 4. Type-locality: Cape Verde, São Vicente-Santo Antão channel (Fig. 1), 460 m.

Material examined: MMF 39510, TL 193 mm, SL 172 mm, off Algarve, Portugal, 36°46'N 08°43'W (Fig. 1), 582 m, 13/09/2006, cruise APPE 29/2005 Portugal, St. E5, L5, bottom trawl, F/V "Atardecer".

Remarks: The meristics and body proportions of the specimen collected agree well with the species description (Table 1). The present record of *G. imberbis* (Fig. 1) is quite remarkable, since extensive surveys have been done to the north of Cape Verde Islands, namely along the Moroccan slope (González *et al.*, 2014) and in the Canary Islands (González *et al.*, 2008), as well as in the Azores, Madeira and adjacent seamounts (Maul, 1949; Santos *et al.*, 1997; Menezes *et al.*, 2006, 2009, 2012; Bergstad *et al.*, 2008; Biscoito *et al.*, 2017) and so far this species has not been recorded. Since the species is present in the Caribbean area and the Gulf Stream originates there and reaches Europe (Fofonoff, 1981), it is possible that *G. imberbis* has reached its present location via this route, which would explain its absence in the area between Europe and the Cape Verde Islands.

During this cruise only two other morids were caught: *Lepidion lepidion* (Risso, 1810) and *Laemonema yarrellii* (Lowe, 1838), both already known to occur in the surveyed area (Froese & Pauly, 2017).

ACKNOWLEDGMENTS

This work was financially supported by the SGMAR of the Spanish Ministry for Fisheries, as part of the cruise APPE 29/2005 Portugal. We thank to the on board scientific observers Olga Ayza, Alba Jurado, Marga López and Adriana Rodríguez for her technical help in collecting the fish samples. MB is partially supported by the Madeira Oceanic Observatory (Project M1420-01-0145-FEDER-000001 – *Observatório Oceânico da Madeira-OOM*) and *Fundação para a Ciência e Tecnologia* (FCT), through the strategic project UID/MAR/04292/2013 granted to MARE. This is contribution no. 5 of cruise APPE 29/2005 Portugal and no. 36 of the Marine Biology Station of Funchal.

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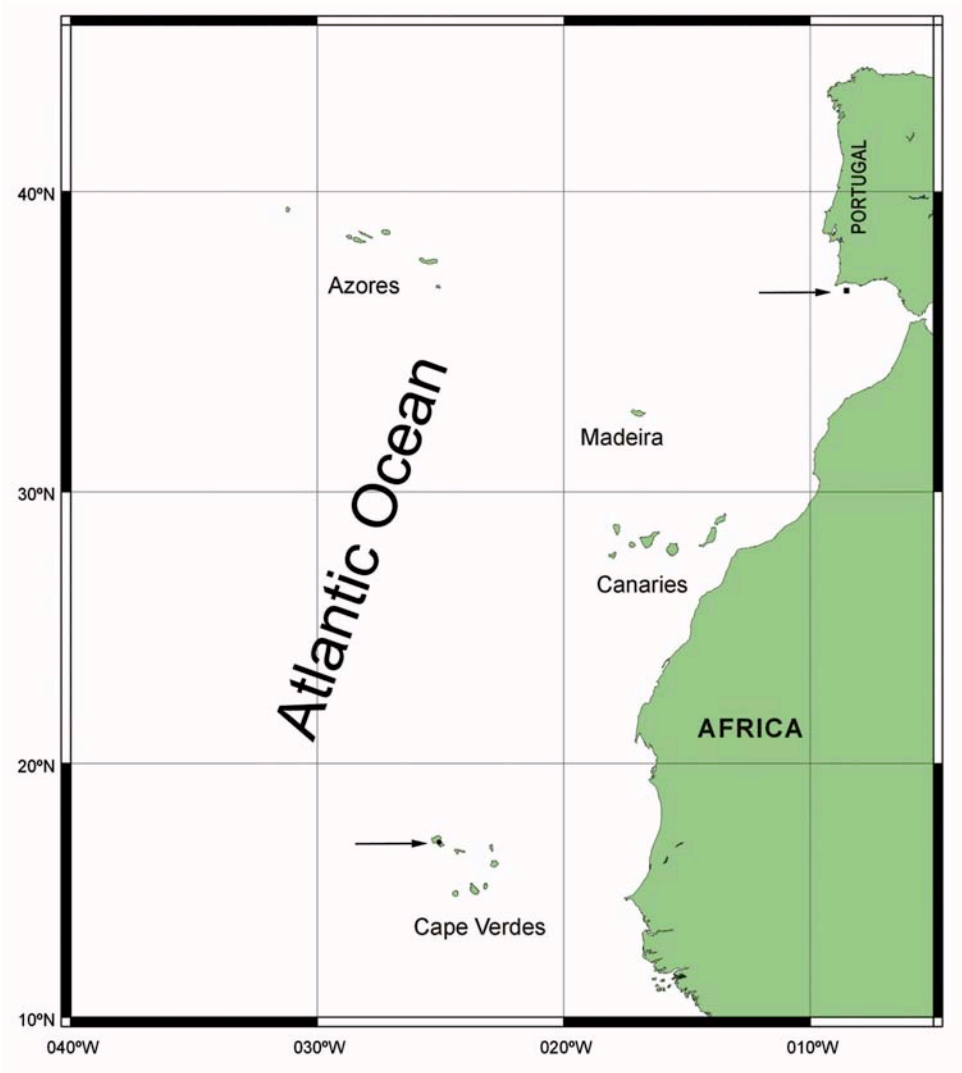


Figure 1.- North-eastern Atlantic Ocean between 10° N and 45° N, with indication of the previous and present northernmost limit of *Gadella imberbis* in the eastern Atlantic.



Figure 2.- *Gadella imberbis* from off Portugal mainland (MMF 39510, TL 193 mm, SL 172 mm, 36°46'N 08°43'W, 582 m).

Table 1.- Meristics and body proportions of the specimen of *Gadella imberbis* collected from off Portugal mainland.

Total length (mm)	216	
Standard length (mm)	172	
Morphometrics	%SL	%HL
Pre-anal length	32,6	–
Pre-anus length	27,9	–
Pre-pelvic fin length	20,9	–
Pre-pectoral fin length	24,4	–
Pectoral fin length	17,4	–
Pelvic fin length	8,7	–
Pre-first dorsal fin length	27,9	–
Pre-second dorsal fin length	33,7	–
First dorsal fin base length	7,0	–
Second dorsal fin base length	56,4	–
Anal fin base length	59,9	–
Head length	23,3	–
Preopercular length	17,4	75,0
Post-orbital head length	11,0	47,5
Snout length	6,4	27,5
Eye diameter	5,2	22,5
Inter-orbital width	5,2	22,5
Upper jaw length	12,2	52,5
Gape length	7,0	30,0
Head height at posterior border of orbit	14,0	60,0
Maximum body depth	22,1	–
Least depth of caudal peduncle	2,9	–
Caudal peduncle length	10,5	–
Pelvic fin not reaching anal fin ray		
Pectoral fin reaching dorsal 2 ray no.	8	
Continuous tube of LL reaching first third of body		
Discontinuous tubes of LL reaching: not visible		
Scales on head	yes	
Meristics		
First dorsal fin rays	10	
Second dorsal fin rays	54	
Anal fin rays	61	
Pectoral fin rays	22	
Pelvic fin rays	6	
Caudal fin rays	34	
Vertebrae (pre-caudal + caudal)	19+36=55	
Gill rakers (first gill arch)	2+1+10=13	
Gill rakers size and shape: small spiny tubercles		
Branchiostegal rays	7	
Teeth on premaxillary: small canines in two rows		
Teeth on maxillary	0	
Teeth on lower jaw: small canines in one row		
Teeth on vomer and palatines	0	
Scales in longitudinal series	106	
Transverse scale rows above LL & below D1	8	
Light organ	% InV-af	
InV-Lo	35	
LoD	7,5	
Lo-An	15	
Remarks: Interior of mouth dark		