

First record of Darwin's slimehead, *Gephyroberyx darwinii* (Johnson, 1866) (Beryciformes: Trachichthyidae), in association with Brazilian deep reefs

Áthila Bertoncini Andrade¹, Guilherme Scheidt de Souza Soares², João Pedro Barreiros³, João Luiz Gasparini⁴ and Maurício Hostim-Silva⁵

- 1) Universidade Federal da Paraíba – CCEN – DSE – PPGCB. 58059-900 Cidade Universitária 58059-900 João Pessoa, Paraíba, Brasil. E-mail: apnea@uol.com.br (corresponding author)
- 2) Universidade Federal de Pernambuco – Departamento de Oceanografia – Av. Arquitetura, s/n Cidade Universitária 50670-901 Recife, Pernambuco, Brasil.
- 3) Universidade dos Açores, Departamento de Ciências Agrárias, 9701-851 Angra do Heroísmo, Portugal.
- 4) Universidade Federal do Espírito Santo, Departamento de Ecologia, Lab. de Ictioplâncton, C.P. 5130, 29041-970 Vitória, Espírito Santo, Brasil.
- 5) Universidade do Vale do Itajaí, Centro de Ciências Tecnológicas da Terra e do Mar, C.P. 360, 88302-202 Itajaí, Santa Catarina, Brasil.

Accepted: 02.11.2004

Keywords

Trachichthyidae, *Gephyroberyx darwinii*, Brazil, new record, deep reef fishes, fisheries, over-exploitation

Abstract

Three species of the Trachichthyidae family occur in the south of Brazil: *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* and *Gephyroberyx darwinii*. *G. darwinii* may attain a length of 600 mm (TL). This benthopelagic species occurs at depths down to 1210 m and is generally found in subtropical waters between 43°N and 35°S. It is commercially exploited in the east central Atlantic for food and for oil. In this paper we report the occurrence of *G. darwinii* off the south and south-east coasts of Brazil between Vila Velha (Espírito Santo State) and Rio Grande (Rio Grande do Sul State), in outer shelf and slope areas, at depths between 70 and 520 m. In Brazil the trachichthyids were usually caught while fishing for *Lophius gastrophysus* over deep coral bottoms. Meristic and biometric data are presented for the three collected specimens.

Zusammenfassung

Drei Arten der Familie Trachichthyidae kommen in südbrasilianischen Gewässern vor: *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* und *Gephyroberyx darwinii*. *G. darwinii* kann eine Länge von 600 mm (TL) erreichen. Die genannten benthopelagischen Arten treten in Tiefen von bis zu 1210 m auf. Man findet sie grundsätzlich in subtropischen Gewässern, meist zwischen 43°N und 35°S; sie werden zu Nahrungszwecken kommerziell erbeutet, im östlichen Zentralatlantik zur Ernährung und Ölgewinnung. Im vorstehenden Artikel wird über das Vorkommen der Art *G. darwinii* vor den südöstlichen und

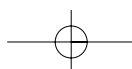
südlichen Küsten Brasiliens berichtet, genauer zwischen Vila Velha (Provinz Espírito Santo) und Rio Grande (Provinz Rio Grande) in den Lebensräumen des äußeren Schelfs und der Steilhänge in Tiefen von 70 bis 520 m. Die Fänge von Trachichthyiden ergaben sich auf Fangfahrten auf der Suche nach *Lophius gastrophysus* über tief liegendem Korallengrund. Für die drei dabei gesammelten Arten werden meristische und biometrische Daten wiedergegeben.

Résumé

Trois espèces de la famille des Trachichthyidae se rencontrent au sud du Brésil. *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* et *Gephyroberyx darwinii*. *G. darwinii* peut atteindre une longueur de 600 mm (LT). Cette espèce benthopélagique se rencontre jusqu'à des profondeurs de 1.210 m et se trouve généralement en eaux subtropicales, entre 43°N et 35°S. Elle est exploitée commercialement dans l'Atlantique du centre-est pour l'alimentation et l'huile. Nous mentionnons ici l'occurrence de *G. darwinii* au large des côtes sud et sud-est du Brésil, entre Vila Velha (état d'Espírito Santo) et le Rio Grande (état du Rio Grande do Sul), au bord extérieur du plateau continental et dans les versants, à des profondeurs de 70 à 520 m. Au Brésil, les Trachichthyidés sont habituellement capturés lors de la pêche au *Lophius gastrophysus* sur des fonds coralliens profonds. Les mesures méristiques et biométriques sont fournies pour les trois spécimens collectés.

Resumo

Três espécies da família Trachichthyidae ocorrem no sul do Brasil: *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* e *Gephyroberyx darwinii*. Esta última é uma espécie que atinge tamanhos da



First record of Darwin's slimehead, *Gephyroberyx darwinii* (Johnson, 1866), in association with Brazilian deep reefs

ordem dos 600 mm (CT), vive na província bentopelágica até profundidades de 1210 metros. É encontrada em águas subtropicais distribuindo-se entre os paralelos 43°N e 35°S, sendo utilizada como fonte de alimento no leste do Atlântico central. O presente trabalho reporta a ocorrência de *Gephyroberyx darwinii* na costa brasileira entre as localidades de Vila Velha (ES) e Rio Grande (RS), em áreas de plataforma externa e talude superior, com profundidades variando de 70 a 520 metros. Suas ocorrências nestas áreas estiveram relacionadas a lances de pesca (onde *Lophius gastrophysus* é espécie alvo) sobre formações de corais vivos. Dados biométricos e merísticos de três espécimes são apresentados no trabalho.

Sommario

Nel Brasile meridionale vivono tre specie della famiglia Trachichthyidae: *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* e *Gephyroberyx darwinii*. *G. darwinii* può raggiungere una lunghezza di 600 mm (TL). Questa specie bentopelagica è presente fino a profondità di 1210 m e abita di solito acque subtropicali tra il 43°N e il 35°S. Nell'Atlantico centro-orientale riveste una certa importanza economica come fonte di cibo e di olio. In questo articolo si riporta la presenza di *G. darwinii* al largo delle coste meridionali e sudorientali del Brasile tra Vila Velha (Stato di Espírito Santo) e Rio Grande (Stato di Rio Grande do Sul), presso la piattaforma e la scarpata continentale, a profondità comprese tra i 70 e i 520 m. In Brasile questi trachitidi sono stati catturati durante la pesca di *Lophius gastrophysus* su fondali corallini profondi. Sono riportati i dati meristici e biometrici per i tre esemplari raccolti.

Introduction

According to Figueiredo & Menezes (1980), three species of Trachichthyidae occur in southern Brazil: *Paratrachichthys atlanticus*, *Hoplostethus occidentalis* and *Gephyroberyx darwinii*, the occurrence of the last one being based on an identification of a single specimen collected in southern Brazil. Figueiredo & Menezes (1980) did not provide a precise locality for the *G. darwinii* specimen since their report was based on the work of Krefft (1976). The location of the specimen as reported by Krefft (1976) was 29°13'S, 48°12'W, at a 160 m depth according to J. L. Figueiredo (*pers. com.*). However, Froese & Pauly (2003) considered the occurrence of this species in South America doubtful.

G. darwinii has a wide distribution; in the eastern Atlantic, between Madeira and the Canaries down to Senegal, Gulf of Guinea and South Africa. In the western Atlantic, the species is known from the southern Scotian Shelf, Canada to the Greater Antilles, west Caribbean, Panama and the northern Gulf of Mexico (van Guelpen, 1993). In the Indo-Pacific region, it occurs in South Africa, southern Australia, New Zealand, Japan and the Philippines (Masuda *et al.*, 1984; Heemstra, 1986). This benthopelagic species occurs down to 1210 m and may reach 600 mm TL. It is generally found in subtropical waters, usually between 43°N and 35°S, and is commercially exploited both for food and oil, in the east central Atlantic (Maul, 1986; Masuda & Allen, 1993).

In this paper we report the occurrence of *G. darwinii* off the south-eastern and southern coast of Brazil between Vila Velha (Espírito Santo State) (20°18'S) and Rio Grande (Rio Grande do Sul State) (32°10'S), in areas of outer shelf and slope, at depths between 70 and 520 m.

Material and methods

Collected specimens were deposited in the Museu de Biologia Professor Mello Leitão (MBML); the Ichthyology Collection of the NEMAR (Núcleo de Estudos do Mar); at Universidade Federal de Santa Catarina (TRACHI); and at Coleção Zoológica da Universidade Federal do Espírito Santo (UFES). The description is based on the three specimens collected. Measurements were made in millimeters (mm).

MBML 602, 445 mm SL and 540 mm TL, collected by fishermen in October, 1999, at depth of approximately 70 m, 45 – 55 km off the coast of Vila Velha, Espírito Santo State (20°25'S, 39°50'W), south-western Atlantic.

56 TRACHI 001, 373 mm SL and 456 mm TL, 23°53'S, 42°42'S, 290 m depth, 25 April 2001, south-western Atlantic. Collected whilst fishing for anglerfish, *Lophius gastrophysus*, in Brazilian waters, by a British fishing vessel operating from Cabo Frio (Rio de Janeiro State) and Rio Grande (Rio Grande do Sul State). Sampling on board followed "Programa de observadores de bordo da frota arrendada – CTTMAR – UNIVALI", which provided observers contracted by the Brazilian government. *G. darwinii* specimen was collected with deep gill nets (five sets of nets, each 19.1 km long).

UFES 1433, 404 mm SL and 491 mm TL, Collected on April 7, 2003 by fishermen using hook and line, 42 km off the coast of Vitória, Espírito Santo State, south-

Table I. Meristic data for the three available specimens examined. **TL** (total length), **SL** (standard length), **D** (dorsal fin), **A** (anal fin), **P** (pelvic fin), **BD** in SL (body depth in standard length), **VS** (number of robust scutes on ventral keel).

Specimen	TL (mm)	SL (mm)	D	A	P	BD in SL	VS
MBML 602	540	445	VII + 14	III + 12	14	2.22	12
56. TRACHI.001	456	373	VII + 14	III + 12	14	2.11	6
UFES 1433	491	404	VII + 13	III + 12	14	2.11	12

Áthila Bertoncini Andrade, Guilherme Scheidt de Souza Soares, João Pedro Barreiros, João Luiz Gasparini and Maurício Hostim-Silva



Fig. 1. *Gephyroberyx darwinii* at MBML 602, 445 mm SL. 1999. Photo by J. L. Gasparini.

western Atlantic, at approximately 20°28'S, 39°52'W, from reefs at a depth of 120-140 m.

Results and discussion

Gephyroberyx darwinii (Johnson, 1866)

All the three specimens examined presented a head with a concave profile and large mucous cavities covered by tough skin. Body pinkish and fins red. Sides tinged silver, with tongue and gill cavity almost black but palate pink to reddish (Fig. 1 and 2).

Because *G. darwinii* is treated as a by-catch species, only three specimens were available for study despite the fact that large quantities of Darwin's roughy were collected, processed and frozen.

G. darwinii had previously been reported as occurring in Brazil by Figueiredo & Menezes (1980), based on the publication of Krefft (1976) (see also Menezes, 2002). Figueiredo & Menezes (1980) point out that this single specimen has a small rugose spine on the extremity of the snout, which distinguishes it easily from *Paratrachichthys atlanticus* and *Hoplostethus occidentalis*, but they do not provide any information on its measurements and counts.

The present report extends the occurrence of Darwin's roughy, indicating that it occurs off the southeastern and southern coast of Brazil between Vila Velha (Espírito Santo State) and Rio Grande (Rio Grande do Sul State), in outer shelf and slope areas, at depths between 70 and 520 m. Trachichthyids are invariably caught over coral-covered bottoms, and have always been associated with fishing operations over these substrates. They presumably require a habitat with a rocky substrate (see Van Guelpen, 1993). Likewise, *Lophius gastrophysis* also occurs in association with deep coral formations. Fishing pressure on trachichthyids wherever they occur in the world has recently increased. This is not the case in Brazil: due to the type of fishing gear used they are seldom caught and thus are rarely found in Brazilian fish markets. To date, nothing is known about its stocks in Brazilian waters.

Trachichthyid fishes are known for their long lifespan



Fig. 2. *Gephyroberyx darwinii* 56. TRACHI.001, 373 mm SL, 2001. Photo by R. Corbetta.

and for the time they take to reach sexual maturity (Looby, 1997). Overfishing of trachichthyids has occurred in many places and some stocks have been almost completely exhausted; the collapse of the New Zealand stock of *Hoplostethus mediterraneus* is particularly well documented (Moore & Paxton, 1999). The association of *G. darwinii* with deep water reefs draws attention to the conservation problem regarding these particular environments. Fishing over deep coral reefs (the most damaging techniques involve dragging heavy nets and associated gear over the bottom (Willison, 1998)) is having an impact in such places as Norway (Furevik *et al.*, 2000) Bay of Biscay (Bailey, 2000), Alaska (Witherell & Coon, 2000), Florida (Reed, 2000), destroying these poorly-studied environments as well as depleting fish stocks. This has already taken place in Australia and New Zealand (Higgins, 2000).

Acknowledgements

We thank J.-C. Joyeux and I. L. Rosa, for valuable suggestions on the manuscript; the «Programa de Observadores de Bordo da Frota Arrendada CTTMar-UNIVALI», which belongs to the protocol between «Universidade do Vale do Itajaí and Ministério da Agricultura, Pecuária e Abastecimento (UNIVALI-DPA/MAPA)» (MA/SARC/03-2000; MAPA/SARC/DPA 03-2001; MAPA/SARC/DENACOOP 176-2002) for logistical and financial support; G. C. Ribeiro and R. Corbetta for helping with the NEMAR specimen, H. Schneider and C.M. Musso and for collecting specimens and providing additional information for the Espírito Santo State fisheries; M. & R. Hoffmann for helping with the MBML specimen; and A.C.A. dos Santos (Toninho) for loan of the third specimen.

References

- Bailey, N.** 2000. Are there specialized fish species in deep sea corals? First International Symposium on Deep Sea Corals. World Wide Web Electronic Publication. <http://www.home.istar.ca/~eac.hfx/symposium/index.html>. 28 January 2001.
- Figueiredo, J. L. & N. A. Menezes.** 1980. *Manual de Peixes Marinhos do Sudeste do Brasil. III. Teleostei*

First record of Darwin's slimehead, *Gephyroberyx darwini* (Johnson, 1866), in association with Brazilian deep reefs

- (vol 2) Museu de Zoologia, Universidade de São Paulo, São Paulo, 90 pp.
- Freese, R. & D. Pauly.** 2003. FishBase. World Wide Web Electronic Publication. www.fishbase.org, version 06 May, 2003.
- Furevik, D., Nøttestad, L., Fossä, J. H., Husebø, Å., & S. B. Jørgensen.** 2000. Distribution and concentration of fish areas with deep sea corals. First International Symposium on Deep Sea Corals. World Wide Web Electronic Publication. <http://www.home.istar.ca/~eac.hfx/symposium/index.html>. 28 January 2001.
- Heemstra, P. C.** 1986. Trachichthyidae. In: *Smiths' Sea Fishes* (Eds. M. M. Smith and P. C. Heemstra,) pp. 410-413. Springer-Verlag, Berlin.
- Higgins, M.** 2000. Deep-sea coral: out of sight but in harm's way. ENN News – Environmental News Network 8/10/2000. World Wide Web Electronic Publication. http://www.enn.com/enn-news-archive/2000/08/08102000/s_30378.asp. 10 August, 2000.
- Krefft, G.** 1976. Ergebnisse der Forschungsreisen des FFS "Walther Herwig" nach Sudamerika. XLI. Fische der Ordnung Beryciformes aus dem Südwestatlantik. *Arch. Fischereiwiss*, **26** (2/3): 65-86.
- Looby, G.** 1997. *Management options for Pilbara demersal line fishing*. Fisheries Management Discussion n° 111. Fisheries Western Australia, 16pp.
- Masuda, H. & G. R. Allen.** 1993. *Meeresfische der Welt – Groß-Indopazifische Region*. Tetra Verlag, Herrenteich, Melle. 528pp.
- Masuda, H., Amaoka, K., Araga, C., Uyeno, T. & T. Yoshino.** 1984. *The Fishes of the Japanese Archipelago* (Vol. 1) Tokai University Press, Tokyo, Japan. pp. 437.
- Maul, G. E.** 1986. Trachichthyidae. In: *Fishes of the North-east Atlantic and the Mediterranean (FNAM)* (Eds. P. J. P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen and E. Tortonese,) pp. 749-752, Vol. II. UNESCO, Paris.
- Menezes, N. A.** 2002. Trachichthyidae. In: *Catálogo dos Peixes Marinhos e de Água Doce do Brasil* (Eds. P. A. Buckup and N. A. Menezes,) <http://www.mnrj.ufri.br/catalogo/>
- Moore, J. & J. R. Paxton.** 1999. Trachichthyidae. Slimeheads (roughies). In: *Species Identification Guide for Fisheries Purposes. The Living Marine Resources of the Western Central Pacific. Bony Fishes* (vol. 2) (Mugilidae to Carangidae) (Eds. K. E. Carpenter and V. E. Niems,) pp. 2215-2217. FAO, Rome.
- Reed, J. K.** 2000. Deep-water oculina coral banks of Florida: An assessment of status, impacts and management. First International Symposium on Deep Sea Corals. World Wide Web Electronic Publication. <http://www.home.istar.ca/~eac.hfx/symposium/index.html>. 28 January 2001.
- Van Guelpen, L.** 1993. Substantial northward range extension for *Gephyroberyx darwini* (Berycoidei, Trachichthyidae) in the western North Atlantic, possibly explained by habitat preference. *Journal of Fish Biology*, **42**: 807-810.
- Willison, M.** 1998. Deep Sea Corals of Nova Scotia. World Wide Web Electronic Publication. <http://biotype.biology.dal.ca/biotype/1998/dec98/coral.html> December 1998.
- Witherell, D. & C. Coon.** 2000. Protecting deep-sea corals off Alaska from fishing gear impacts. First International Symposium on Deep Sea Corals. World Wide Web Electronic Publication. <http://www.home.istar.ca/~eac.hfx/symposium/index.html>. 28 January 2001.