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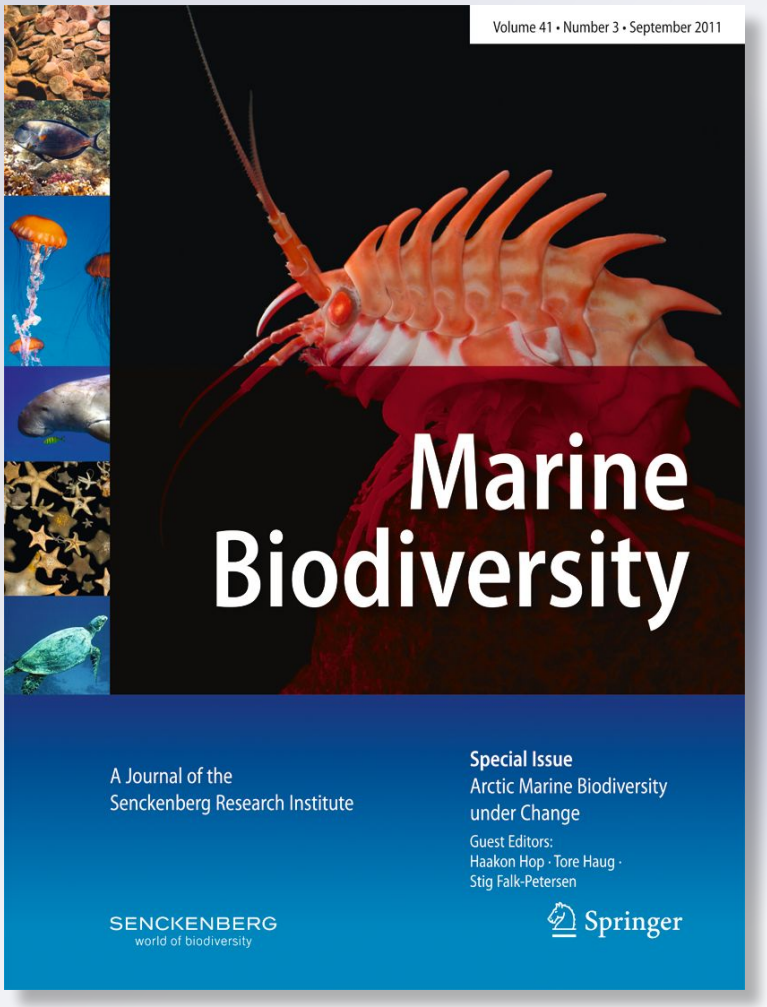
Marine Biodiversity

ISSN 1867-1616
Volume 42
Number 1

Mar Biodiv (2012) 42:73-78
DOI 10.1007/s12526-011-0088-x



Springer

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DOI 10.1007/s12526-011-0088-x

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SHORT COMMUNICATION

The presence of southern fishes in the Argentinian continental shelf and adjacent areas

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Received: 11 November 2010 / Revised: 20 January 2011 / Accepted: 22 February 2011 / Published online: 15 March 2011

Abstract A list of Southern Ocean fishes captured in the Argentinian continental shelf and adjacent areas is presented. The list comprises a total of 41 species. They represent 15% of the ichthyofauna registered in the Southern Ocean. The geographic position of the samples was considered in order to show the northward displacement of some Antarctic species toward southwestern Atlantic waters.

Keywords Fish distribution · Southern Ocean · Southwestern Atlantic

The tip of South America extends almost 20° farther south than any of the other continental masses reaching the circum-Antarctic region (Briggs 1974). Both continents were connected until the early Tertiary through the Scotia Arc (Balech and Ehrlich 2008). The Antarctic Convergence, characterized by great stability, is the northern boundary of the Antarctic area; the permanent occurrence of the convergence makes the Antarctic area one of the most isolated regions of the world. At the longitude of the American continent, the Antarctic Convergence sends two branches that flow northward, one along the west coast of South America, the Humboldt Current, and the other along the east coast, the Malvinas Current. Moreover, near the American continent, at the latitude of Tierra del Fuego and Malvinas Islands, the Antarctic Convergence is more meanderous, and those meanders facilitate the water mixture (Balech and Ehrlich 2008). Because of this, the cold-temperate area of South America is strongly influenced by the Southern Ocean.

The Southern Ocean fish fauna is well known through numerous papers based on research cruises carried out by several countries (Headland 1990). On the other hand, the relationship between the ichthyofaunas of the Antarctic region and the cold-temperate waters of South America is less well known.

The aim of this work is to show the presence of Southern Ocean fishes in the Argentinian continental shelf and adjacent areas, as a contribution to the knowledge of the relationship between the Southern Ocean and South American fish faunas from the ichthyological point of view.

The specimens collected came from the cruises indicated in Table 1, carried out between 1968 and 1998 with fishing boats and research vessels, mainly with the Argentine R/V "Capitán Oca Balda" and "Dr. Eduardo L. Holmberg", both belonging to the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP).

Species were identified on board or in the laboratory; we followed Eschmeyer (2010) for an updated taxonomy. The samples are preserved at the INIDEP Fish Collection (Copeia 1996). For each species, information was recorded as follows: catalog number; family; specific scientific name; author; year; number of specimens; size; locality (place name or latitude, longitude and depth); date; collector's name. Size was recorded as total length and standard length.

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Table 1 Cruises from which the species were obtained

Vessel	Type	Cruise	Date
"Martín Fierro"[a]	RV	Camaronera IV	1968
"Profesor Siedlecki"	RV	Camp. Pesca Exp.	1973
[b]	RV	Santa Cruz	1973–1974
"Cruz del Sur"	RV	Tierra del Fuego	1974
"Walther Herwig"	RV	No. 3	1978
"Shinkai Maru"	RV		1979
"Capitán Oca Balda"	RV	OB 05-87	1987
"Evrika"	RV	No. 25	1988
"Kaiyo Maru"	RV	Evaluación Calamar	1989
"Capitán Oca Balda"	RV	OB 02-91	1991
"Dr. Eduardo L. Holmberg"	RV	EH 01-92	1992
"Capitán Oca Balda"	RV	OB 01-93	1993
"Dr. Eduardo L. Holmberg"	RV	EH 15-94	1994
"Capitán Oca Balda"	RV	OB 09-95	1995
"Capitán Oca Balda"	RV	OB 10-95	1995
"Capitán Oca Balda"	RV	OB 13-95	1995
"Dr. Eduardo L. Holmberg"	RV	EH 08-97	1997
"Aguchi Maru"	FV	Marea 16-97	1997
"El Navegante"	FV	80-0027	1997
"Dr. Eduardo L. Holmberg"	RV	EH 02-98	1998

RV Research vessel, *FV* fishing vessel

[a] Fishing vessel rented

[b] Observation from land

The geographical location of the samples is shown in Fig. 1. In order to describe the distribution pattern, fish species were arranged according to two regions or categories. A: Argentine continental shelf and adjacent waters; B: mesopelagic species in the southwestern Atlantic.

From the continental shelf and adjacent areas, 25 species of Southern Ocean fishes were recorded, belonging to 16 families, mainly notothenioids (families Nototheniidae, Harpagiferidae, Bathylagidae, Bathydraconidae and Channichthyiidae) (Table 2). The most interesting case is *Paranotothenia magellanica*, captured at 38°S in temperate waters of the Argentinian Biogeographic Province, and far from its more usual area of occurrence, the Magellanic Province (Figueroa et al. 2005). Mesopelagic fishes are represented by species of the families Microstomatidae, Stomiidae, Notosudidae, Paralepididae, Myctophidae, Melamphaidae, Melanonidae and Gempylidae (Table 2). In a description of the mesopelagic fish distribution in the southwestern Atlanctic related to water masses, those species were classified as subantarctic by Figueroa et al. (1998). The abovementioned species represent altogether 15% of the Southern Ocean ichthyofauna, according to Gon and Heemstra (1990).

Balech and Ehrlich (2008) mentioned the close relationship between the ichthyofauna of the Magellanic Province, corresponding to southern South America, and that of the Antarctic continent, characterized by a high endemism at the generic level and also at senior taxonomic categories.

From the comparison of the species listed in Table 2 with those mentioned by Fischer and Hureau (1985) in the FAO species identification sheets for fishery purposes, relating to the Southern Ocean, the results are as follows. Among Agnatha, two species are mentioned, *Myxine australis* and *Geotria australis*, as inhabitants of the Argentinian continental shelf. Seven species of chondrichthyans are mentioned, two of them common to both areas. The bony fishes amount to a total of 48 species in the work of Fischer and Hureau (1985), 17 of them (35.4 %) having been captured on the Argentinian continental shelf.

Gon and Heemstra (1990) edited a more detailed list of fishes of the Southern Ocean, with a total of 49 families and 273 species described. The Agnatha are the same as mentioned above; one of the four shark species and three of the seven species of skates are also mentioned for the Argentinian continental shelf and adjacent waters according to the list of Cousseau et al. (2010). Of 44 families of bony fishes mentioned in the work of Gon and Heemstra (1990), 35 (79.54%) are represented on the Argentinian continental shelf and inadjacent waters (Cousseau et al. 2010). Of a total of 260 bony fish species of the Southern Ocean, as

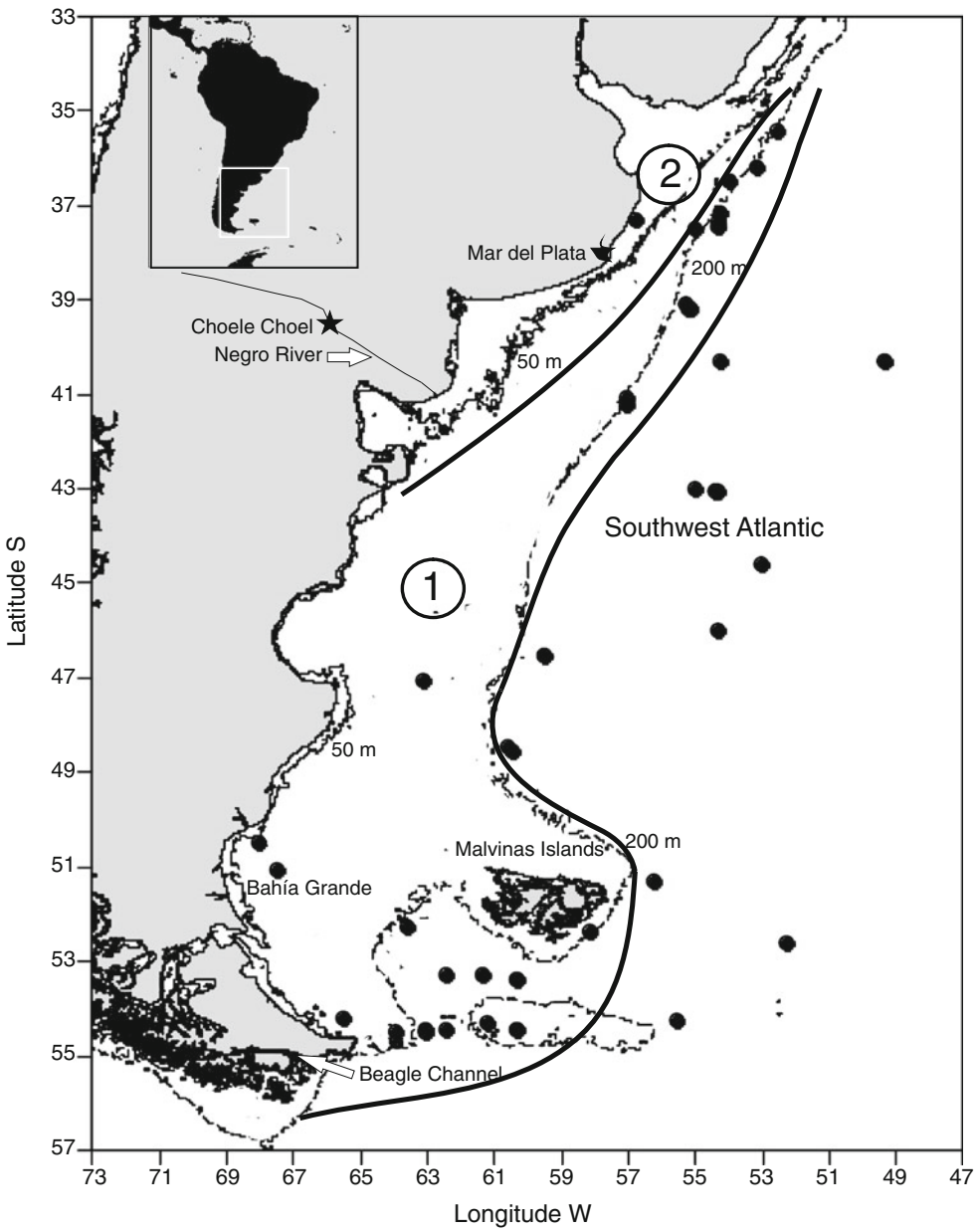

Fig. 1 Map showing the locations where Southern Ocean fishes were collected in the Argentinian continental shelf and adjacent areas. *1* Magellanic Province; *2* Argentine Province

mentioned by Gon and Heemstra (1990), 64 (24.61%), are represented on the Argentinian continental shelf and in adjacent waters (Cousseau et al. 2010).

It is interesting to remark that 9 of the families of bony fishes mentioned by Gon and Heemstra (1990), (Notacanthidae, Gonostomatidae, Sternoptychidae, Ophidiidae, Oneirodidae, Lampridae, Congiopodidae, Bovichtidae and Scombridae) are present on the Argentinian continental shelf and in adjacent waters, even though they have no species common to the Southern Ocean and the Argentinian continental shelf and adjacent waters (Menni et al. 1984).

The presence of *Somniosus antarcticus* on the Argentinian continental shelf and adjacent waters is detailed by Díaz de Astarloa et al. (1999).

The most interesting case of dispersion is that of the notothenids. Eastmann (1991) considered Nototheniidae the most speciose family among the notothenioids, and pointed out that its great diversification allows recognition of species of several ecological niches: pelagic, cryopelagic, benthopelagic and benthic. Figueroa et al. (2003) think that, between the Antarctic fishes, the Family Nototheniidae "could be considered as a family in expansion, exceeding all the geographic barriers that

Table 2 Species preserved at the INIDEP Fish Collection, arranged by families and regions

Cat.	Taxonomic categories	Area	Depth	Col. no.
A	Family Myxinidae			
	Myxine australis Jenyns, 1842	37°14′S, 54°28′W	230 m	54
		Bahía Grande (Prov. Santa Cruz)	0 m	251
	Family Petromyzontidae			
	Geotria australis Gray, 1851	Mar del Plata (38°S)	No data	60
	Larva *Ammocoetes*	Negro river (38°57′S)	Freshwater	543
	Macrophtalmia	Choele Choel Island (Prov. Río Negro)	Freshwater	649
	Family Dalatiidae			
	Somniosus antarcticus Whitley, 1939	54°45′S, 62°48′W	913–1,278 m	578
	Family Muraenolepididae			
	Muraenolepis orangiensis Vaillant, 1888	36°48′S, 54°00′W	330 m	469
		54°30′S, 61°24′W	140 m	712
	Muraenolepis marmoratus Günther, 1880	54°42′S, 60°35′W	330 m	211
	Family Moridae			
	Antimora rostrata (Günther, 1878)	46°53′S, 59°54′W	860 m	430
	Lepidion ensiferus (Günther, 1887)	46°53′S, 59°54′W	800 m	431
	Halargyreus johnsonii Günther, 1862	54°49′S, 63°07′W	1,350–1,500 m	561
	Family Gadidae			
	Micromesistius australis Norman, 1937	48°45′S, 60°58′W	206 m	207
		54°24′S, 55°56′W	400 m	219
		54°42′S, 68°20′W	330 m	264
	Family Macrouridae			
	Coelorinchus fasciatus (Günther, 1878)	Beagle Channel	22 m	359
		52°36′S, 58°13′W	385 m	427
	Coelorinchus marinii Hubbs, 1934	35°42′S, 52°57′W	138 m	433
	Family Carapidae			
	Echiodon criomargarites Markle, Williams & Olney, 1983	51°29′S, 56°25′W	658 m	500
		37°43′S, 54°34′W	800 m	648
	Family Ceratiidae			
	Ceratias tentaculatus (Norman, 1930)	39°10′S, 55°28′W	524 m.	377
		39°19′S, 55°18′W	780 m	388
		47°05′S, 63°15′W	105 m	594
		54°49′S, 63°07′W	1,350–1,500 m	595
	Family Oreosomatidae			
	Pseudocyttus maculatus Gilchrist, 1906	37°50′S, 55°01′W	600 m	372
		41°22′S, 57°09′W	712 m	379
		36°18′S, 53°19′W	700 m	428
		37°43′S, 54°34′W	800 m	605
	Family Nototheniidae			
	Dissostichus eleginoides Smitt, 1898	48°56′S, 60°45′W	230 m	208
		54°42′S, 60°35′W	330 m	214
		50°46′S, 68°06′W	83 m	231
	Paranotothenia magellanica (Forster, 1801)	Off Mar del Plata (38°S)	15 m	519
		37°30′S, 56°80′W	1.30 m	540
		52°24′S, 63°58′W	No data	609
	Patagonotothen guntheri (Norman, 1937)	54°18′S, 65°55′W	70 m	533
	Family Harpagiferidae			
	Harpagifer bispinis (Schneider, 1801)	Beagle Channel	No data	759
	Harpagifer palliolatus (Richardson, 1845)	Beagle Channel		818

Table 2 (continued)

Cat.	Taxonomic categories	Area	Depth	Col. no.
	Family Bathydraconidae			
	Bathydraco marri Norman, 1938	54°45′S, 63°07′W	1,350–1,500 m	566
	Family Channichthyidae			
	Chionodraco hamatus (Lönnberg, 1905)	Off Malvinas Islands	No data	443
	Family Centrolophidae			
	Pseudoicichthys australis (Haedrich, 1966)	53°30′S, 61°38′W	423–472 m	525
		51°06′S, 67°51′W	No data	530
	Family Achiropsettidae			
	Achiropsetta tricholepis Norman, 1930	46°01′S, 54°30′W	58–0 m	419
	Mancopsetta maculata (Günther, 1880)	54°42′S, 60°35′W	330 m	213
		41°07′S, 57°04′W	343 m	248
	Neoachiropsetta milfordi (Penrith, 1965)	39°10′S, 55°28′W	524 m	371
B	Family Microstomatidae			
	Nansenia antarctica Kamaguchi & Butler, 1984	39°18′S, 55°20′W	682–702 m	524
	Family Bathylagidae			
	Bathylagus antarcticus Günther, 1878	40°31′S, 45°50′W	80–140 m	413
		43°05′S, 54°34′W	1,000 m	515
	Bathylagus tenuis Kobyliansky, 1986	37°43′S, 54°34′W	800 m	603
	Family Stomiidae			
	Borostomias antarcticus Lönnberg, 1905	43°05′S, 54°39′W	1,000 m	573
		53°37′S, 60°34′W	740 m	586
	Stomias gracilis Garman, 1899	43°05′S, 54°39′W	1,000 m	507
	Family Notosudidae			
	Scopelosaurus hamiltoni (Waite, 1916)	54°49′S, 63°07′W	1,350–1,500 m	559
		43°28′S, 52°59′W	133–75 m	417
		43°01′S, 55°01′W	30 m	778
	Family Paralepididae			
	Magnisudis prionosa Rofen, 1963	53°37′S, 60°34′W	740 m	580
	Family Myctophidae			
	Electrona carlsbergi (Tåning, 1932)	53°27′S, 62°46′W	470 m	607
	Gymnoscopelu bolini Andriashev, 1962	46°53′S, 59°54′W	800 m	584
	Gymnoscopelus nicholsi (Gilbert, 1911)	40°29′S, 54°26′W	125–75 m	412
		53°30′S, 61°38′W	636 m	621
	Gymnoscopelus piabilis (Whitley, 1931)	44°57′S, 53°01′W	350–450 m	396
		40°29′S, 49°33′W	135–60 m	407
	Metelectrona ventralis (Bekker, 1963)	43°05′S , 54°39′W	1,000 m	514
	Protomyctophum tenisoni (Norman, 1930)	40°29′S, 49°33′W	135–60 m	400
		53°37′S, 60°34′W	740 m	572
	Family Melamphaidae			
	Sio nordenskjoldii (Lönnberg, 1905)	43°05′S, 54°39′W	1,000 m	516
	Family Melanonidae			
	Melanonus gracilis Günther, 1878	43°05′S, 54°39′W	1,000 m	440
	Family Gempylidae			
	Paradiplospinus gracilis (Brauer, 1906)	43°05′S, 54°39′W	1,000 m	571
		53°37′S, 60°34′W	740 m	579

A Argentine continental shelf and adjacent waters. *B* Mesopelagic species in the southwestern Atlantic

Col no. Collection number

confined its Antarctic ancestral habitat, it has settled in the Patagonian shelf and slope, competing with new fish groups and searching new habitats."

Acknowledgements The authors thank numerous collectors, the scientific crew on board the research vessels and to the INIDEP scientific staff. Thanks also to L.O. Lucifora for valuable comments and English grammar corrections and two anonymous reviewers for comments that greatly improved the manuscript. S.A. Barbini was supported by scholarship from CIC.

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