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Short Communication

First records of pelagic polychaetes in southern Chile (Boca del Guafo - Elefantes Channel)

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ABSTRACT. Pelagic polychaetes collected at 29 oceanographic stations in the southern channels of Chile between Boca del Guafo and Elefantes Channel (spring 1998, summer 1999) were analyzed. Seven species of pelagic polychaetes were identified: *Tomopteris planktonis* Apstein, *T. septentrionalis* Steenstrup, *Pelagobia longicirrata* Greeff, *Lopadorhynchus krohnii* (Claparède), *Maupasia caeca* Viguier, *Typhloscolex muelleri* Busch, and *Phalacrophorus pictus* Greeff. Seven species were collected in spring and five in summer. All the identified species are cosmopolitan and were recorded for the first time in this sector of southern Chile's interior waters. *Maupasia caeca*, *Lopadorhynchus krohnii*, and *Typhloscolex muelleri* are recorded for the first time in the southeastern Pacific Ocean and the southern distribution limit of *Phalacrophorus pictus* was extended to the coast of Chile.

Keywords: pelagic polychaetes, species composition, distribution, southern region, Chile.

Primeros registros de poliquetos pelágicos en el sur de Chile (Boca del Guafo - Canal Elefantes)

RESUMEN. Se analizaron los poliquetos pelágicos colectados en 29 estaciones oceanográficas en canales australes chilenos localizados entre la boca del Guafo y el estero Elefantes, en primavera de 1998 y verano de 1999. Se identificaron siete especies de poliquetos pelágicos: *Tomopteris planktonis* Apstein, *T. septentrionalis* Steenstrup, *Pelagobia longicirrata* Greeff, *Lopadorhynchus krohnii* (Claparède), *Maupasia caeca* Viguier, *Typhloscolex muelleri* Busch y *Phalacrophorus pictus* Greeff. Siete especies se colectaron en primavera y cinco en verano. Todas las especies identificadas son cosmopolitas y se registran por primera vez en este sector de aguas interiores del sur de Chile. *Maupasia caeca*, *Lopadorhynchus krohnii* y *Typhloscolex muelleri* se registran por primera vez en aguas del Pacífico suroriental y *Phalacrophorus pictus* extiende su límite de distribución sur hasta la costa de Chile.

Palabras clave: poliquetos pelágicos, composición específica, distribución, región austral, Chile.

The southern coast of Chile has an extensive estuarine system extending from Puerto Montt (42°30'S) to Cape Horn (55°30'S). This area covers nearly 1400 km in length and comprises an enormous quantity of islands, channels, and fjords. Most of the channels and fjords receive salt-water contributions from the adjacent ocean that mix with the fresh water coming from rivers and/or glaciers discharging into the fjords' heads (Sievers & Silva, 2006). This generates a two-layer circulation pattern: a low salinity surface layer with a net flow towards the sea and a saltier subsurface layer flowing toward the fjords' interiors (Silva *et al.*, 1998).

The development of tourism, maritime transport, and fish farming (particularly salmonid species) activities has been intense in this zone over the two last decades. Thus, since 1995, the entire estuarine ecosystem of southern Chile has been the subject of an oceanographic research program known as the Cimar Program (Cruceros de Investigación Marina en Áreas Remotas or Marine Research Cruises in Remote Areas). This program has provided quite a bit of information on the composition and distribution of zooplanktonic organisms in the southern region (Palma, 2006). However, no previous information is available regarding the presence of pelagic polychaetes in this vast area.

Polychaetes form the most important class in the phylum Annelida. Of the 83 families of known polychaetes (Rouse & Pleijel, 2001), only the Tomopteridae, Alciopidae, Lopadorhynchidae, Iospilidae, Typhloscolecidae, and Pontodoridae are exclusively pelagic (Fauchald, 1977; Støp-Bowitz, 1981). These organisms are morphologically adapted for living in this environment; their hyaline bodies and large appendages contribute to floating and swimming (Støp-Bowitz, 1981).

The pelagic polychaetes constitute a characteristic group of marine zooplankton, although they are not highly important in terms of species richness, abundance, and biomass in the planktonic communities. Most of the species are distributed in the first 50 m of the water column, although some reach greater depths. These organisms are widely distributed in all the world's oceans and seas, with the exception of the Arctic, where they have not been recorded (Orensanz & Ramírez, 1973).

The importance of pelagic polychaetes in the trophic chains of the global oceans is known. Some families (e.g., Tomopteridae) are voracious predators of plankton and some species that are considered to be dominant in planktonic communities are a source of food for several types of fish (Pettibone, 1963; Fernández-Álamo, 2000).

Scant studies are available about pelagic polychaetes in Chilean waters. These include the work of Apstein (1891), who studied the Alciopidae deposited in the Natural History Museum in Hamburg and described several new species for Chile. Rosa (1907, 1908a, 1908b), analyzed the Tomopteridae gathered by the Italian corvette R.N. Vettor Pisani (1882-1884) and the R.N. Liguria (1903-1905), reporting on the three first species of this family collected off the coast of Chile. Granata (1911) studied the Alciopidae collected during the Liguria expedition (1903-1905) and Chamberlin (1919) the Alciopidae captured over 1,000 miles off the Chilean coast and around Easter Island during the third expedition of the U.S. Fish Commission Steamer Albatross (1904-1905). Treadwell (1943) recorded some specimens of Tomopteridae obtained during the Carnegie Cruise VII (1928-1929) near Easter Island and the Juan Fernández Archipelago. Wesenberg-Lund (1962) reported the capture of a single Tomopteridae specimen in Ancud Gulf during the course of the Lund University Chile Expedition (1948-1949). Rozbaczylo *et al.* (1987) analyzed three Tomopteridae species found in plankton samples gathered between Antofagasta and Valparaíso on board the R/V Alexander Agassiz (1974). Recently, Rozbaczylo *et al.* (2004) recognized 19 species of pelagic polychaetes in the southeastern Pacific Ocean and around the oceanic islands, emphasizing that the majority of the studies carried out correspond to foreign expeditions.

Due to the limited knowledge of this group in the fjords and channels of southern Chile, the present work record the

pelagic polychaetes collected at 29 stations between Boca del Guafo (43°30'S) and Elefantes Channel (46°60'S) (Fig. 1). The two-stage Cimar 4 Fiordos cruise was carried out with the AGOR "Vidal Gormaz"; the first stage was in spring (28 September to 9 October 1998) and the second in summer (26 February to 5 March 1999).

At each oceanographic station, oblique tows for zooplankton were performed from a maximum depth of 200 m to the surface, using a Bongo net with a 200-micron mesh and an OSK flowmeter to estimate the volume of water filtered. The zooplankton samples were preserved in a solution of sea water with 5% formalin and neutralized with refined borax.

The pelagic polychaetes were separated and identified to the lowest possible taxonomic level, using the works of Izuka (1914), Støp-Bowitz (1949, 1981), Tebble (1960, 1962), Day (1967), Orensanz & Ramírez (1973), and Fernández-Álamo & Thuesen (1999).

A total of eight species of planktonic polychaetes were determined; seven of these belong to the families Tomopteridae, Iospilidae, Lopadorhynchidae, Typhloscolecidae and one undetermined species belongs to the family Alciopidae. The following section presents the species identified, the number of examined specimens, and their geographic distribution (Table 1, Fig. 1).

Family Lopadorhynchidae

Pelagobia longicirrata Greeff, 1879

Spring 1998: Sta. 1 (53 specimens), Sta. 2 (154 specimens), Sta. 3 (101 specimens), Sta. 4 (69 specimens), Sta. 5 (14 specimens), Sta. 6 (46 specimens), Sta. 7 (4 specimens), Sta. 8 (6 specimens), Sta. 9 (9 specimens), Sta. 10 (1 specimen), Sta. 15 (8 specimens), Sta. 16 (3 specimens), Sta. 25 (74 specimens), Sta. 35 (19 specimens), Sta. 37 (1 specimen).

Summer 1999: Sta. 1 (1 specimen).

Distribution: This cosmopolitan species is widely distributed in all the oceans, but with a greater affinity for cold waters (Day, 1975). It has been cited for the Mediterranean Sea, the South Atlantic to the Antarctic (Orensanz & Ramírez, 1973; Fernández-Álamo & Thuesen, 1999), and the Southern Ocean (Rozbaczylo, 1985). In the Pacific Ocean it has been recorded in the subarctic and subtropical (Tebble, 1962) and tropical zones (Chamberlin, 1919; Fernández-Álamo, 1983). In the southeastern Pacific Ocean, it has been collected off the coast of Peru (Berkeley & Berkeley, 1964) and around San Félix and Robinson Crusoe islands (Rozbaczylo *et al.*, 2004). In this study, it was recorded in the interior waters of Chile's southern zone (43°30'-46°05'S).

Table 1. Geographic location of the sampling stations.**Tabla 1. Ubicación geográfica de las estaciones de muestreo.**

Station	Latitude (S)	Longitude (W)	Depth (m)	Locality
1	43°45.00'	74°38.00'	240	Boca del Guafo
2	43°40.05'	74°24.00'	204	Boca del Guafo
3	43°41.30'	74°02.50'	201	Boca del Guafo
4	43°39.00'	74°49.90'	182	Boca del Guafo
5	43°48.80'	73°36.80'	144	Guaitecas Islands
6	43°59.00'	73°22.00'	198	Moraleda Channel
7	44°15.00'	73°19.50'	203	Moraleda Channel
8	44°25.30'	73°28.20'	458	Moraleda Channel
9	44°41.02'	73°29.05'	290	Moraleda Channel
10	44°53.20'	73°30.90'	209	Moraleda Channel
11	45°05.50'	73°38.25'	270	Moraleda Channel
12	45°12.09'	73°36.70'	160	Moraleda Channel
13	45°16.00'	73°40.00'	58	Meninea Island
15	45°22.90'	73°32.00'	338	Paso del Medio
16	45°21.60'	73°23.00'	345	Aysén Fjord
17	45°17.66'	73°15.95'	222	Aysén Fjord
18	45°21.03'	73°05.07'	337	Aysén Fjord
19	45°26.40'	72°56.70'	192	Aysén Fjord
20	45°29.80'	72°51.60'	160	Aysén Fjord
21	45°24.80'	72°51.80'	160	Aysén Fjord
22	45°29.20'	73°30.60'	303	Costa Channel
23	45°44.50'	73°34.50'	213	Costa Channel
24	45°52.10'	73°36.00'	124	Elefantes Gulf
25	46°04.60'	73°37.45'	52	Elefantes Gulf
26	46°19.90'	73°42.50'	23	Elefantes Gulf
27	46°30.70'	73°48.50'	99	Elefantes Gulf
35	45°26.30'	73°49.25'	228	Darwin Channel
36	45°23.10'	74°06.80'	150	Darwin Channel
37	45°25.80'	74°16.20'	135	Darwin Channel

Maupasia caeca Viguier, 1886

Spring 1998: Sta. 3 (1 specimen), Sta. 6 (1 specimen).

Distribution: This cosmopolitan species has been recorded occasionally in the Mediterranean Sea and the Indian, Atlantic, Southern, and North Pacific oceans (Tebble, 1960, 1962; Orensanz & Ramírez, 1973). The Boca del Guafo record is the first of this species in the southeastern Pacific Ocean.

Lopadorhynchus kohnii (Claparède, 1880)

Spring 1998: Sta. 8 (1 specimen).

Distribution: This cosmopolitan species has been recor-

ded in the Atlantic Ocean to 45°S (Fernández-Álamo & Thuesen, 1999). It has also been reported in the eastern tropical Pacific Ocean and in the Costa Rica Dome (Vicencio-Aguilar & Fernández-Álamo, 1996). The Moraleda Channel (north sector) record is the first of this species in the southeastern Pacific Ocean.

Family Iospilidae

Phalacrophorus pictus Greeff, 1879

Spring 1998: Sta. 1 (1 specimen), Sta. 2 (5 specimens), Sta. 3 (3 specimens), Sta. 4 (21 specimens), Sta. 6 (1 specimen), Sta. 7 (6 specimens), Sta. 8 (4 specimens), Sta. 10 (1 specimen), Sta. 16 (6 specimens), Sta. 23 (1 specimen).

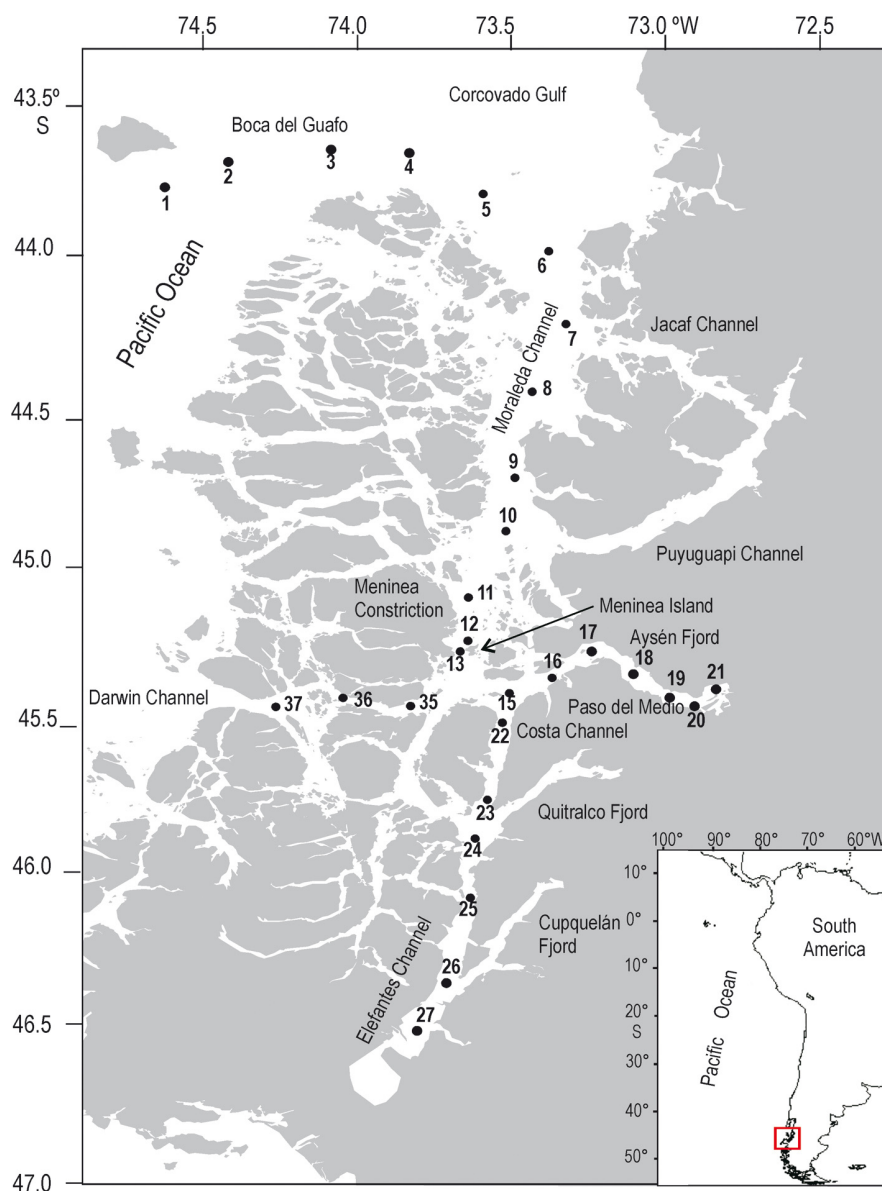


Figure 1. Location of oceanographic stations in the southern Chilean channels.

Figura 1. Ubicación de las estaciones oceanográficas en los canales del sur de Chile.

Summer 1999: Sta. 3 (2 specimens), Sta. 4 (13 specimens), Sta. 6 (214 specimens), Sta. 7 (21 specimens), Sta. 8 (9 specimens), Sta. 9 (246 specimens), Sta. 10 (39 specimens), Sta. 11 (279 specimens), Sta. 12 (6 specimens), Sta. 14 (12 specimens), Sta. 15 (5 specimens), Sta. 16 (4 specimens), Sta. 17 (3 specimens), Sta. 18 (37 specimens), Sta. 22 (5 specimens), Sta. 23 (123 specimens), Sta. 24 (6 specimens).

Distribution: This species has been found in the western South Atlantic Ocean (Orensanz & Ramírez, 1973; Fernández-Álamo & Thuesen, 1999) and Southern Ocean (Rozbaczylo, 1985). It has been recorded in the subarctic and subtropical zones of the North Pacific Ocean (Berkeley & Berkeley, 1957; Tebble, 1962) and off the coast of Mexico (Fernández-Álamo, 1983). In the southeastern Pacific Ocean, it has been found off Peru (Berkeley and Berkeley, 1964) and now in the southern Chilean channels.

Family Tomopteridae

Tomopteris planktonis Apstein, 1900

Spring 1998: Sta. 2 (7 specimens), Sta. 3 (12 specimens), Sta. 4 (2 specimens), Sta. 5 (1 specimen), Sta. 6 (46 specimens), Sta. 7 (4 specimens), Sta. 8 (2 specimens), Sta. 9 (1 specimen), Sta. 10 (2 specimens), Sta. 15 (19 specimens), Sta. 25 (1 specimen), Sta. 27 (6 specimens), Sta. 35 (2 specimens), Sta. 37 (4 specimens).

Summer 1999: Sta. 1 (24 specimens), Sta. 3 (6 specimens), Sta. 4 (15 specimens), Sta. 5 (2 specimens), Sta. 6 (4 specimens), Sta. 7 (14 specimens), Sta. 8 (10 specimens), Sta. 9 (2 specimens), Sta. 10 (11 specimens), Sta. 11 (57 specimens), Sta. 12 (17 specimens), Sta. 13 (1 specimen), Sta. 15 (65 specimens), Sta. 16 (11 specimens), Sta. 17 (1 specimen), Sta. 18 (1 specimen), Sta. 21 (1 specimen), Sta. 22 (15 specimens), Sta. 23 (1 specimen), Sta. 27 (29 specimens), Sta. 35 (49 specimens).

Distribution: This cosmopolitan species has a wide geographic distribution (Dales & Peter, 1972). It has been recorded in the western South Atlantic (Orensanz & Ramírez, 1973; Fernández-Álamo & Thuesen, 1999) and the Southern Ocean (Tebble, 1962). It has been collected at numerous sites in the subtropical and transition zones of the North Pacific Ocean, as well as in the California Current (Dales, 1957). In the southeastern Pacific Ocean, it has been found in Ancud Gulf, Chile (Wesenberg-Lund, 1962) and, in this study, it was distributed widely throughout the southern channels.

Tomopteris septentrionalis Steenstrup, 1849

Spring 1998: Sta. 1 (12 specimens), Sta. 2 (13 specimens), Sta. 3 (35 specimens), Sta. 4 (6 specimens), Sta. 5 (4 specimens), Sta. 7 (5 specimens), Sta. 8 (3 specimens), Sta. 9 (2 specimens), Sta. 37 (4 specimens).

Summer 1999: Sta. 2 (3 specimens), Sta. 3 (6 specimens), Sta. 4 (3 specimens), Sta. 7 (5 specimens), Sta. 8 (6 specimens), Sta. 9 (7 specimens), Sta. 10 (3 specimens), Sta. 11 (15 specimens), Sta. 12 (1 specimen), Sta. 23 (3 specimens), Sta. 24 (1 specimen), Sta. 27 (2 specimens), Sta. 35 (5 specimens).

Distribution: This species has been widely recorded in the Atlantic Ocean (Tebble, 1960; Orensanz & Ramírez, 1973; Fernández-Álamo & Thuesen, 1999) and Southern Ocean (Lana & Blankensteyn, 1989). In the Pacific Ocean, it has been found in subarctic and subtropical zones (Uschakov, 1955, 1957), in the Bay of Misaki, Japan (Izuka, 1914), and south of the San Francisco Bay (Dales, 1955, 1957). In the southeastern Pacific Ocean, it has been reported off the coast of Chile between 20°32'S and 34°58'S (Rosa, 1908b) and, recently, around Easter Island, the Desventuradas Islands, and Juan Fernández Archipelago (Rozbaczylo *et al.*, 2004). This study extended the southern distribution

limit of the species, which was found in all the analyzed channels.

Family Typhloscolecidae

Typhloscolex muelleri Busch, 1851

Spring 1998: Sta. 1 (1 specimen), Sta. 2 (3 specimens), Sta. 4 (4 specimens), Sta. 5 (1 specimen), Sta. 7 (1 specimen), Sta. 8 (2 specimens), Sta. 15 (1 specimen), Sta. 16 (7 specimens), Sta. 17 (2 specimens), Sta. 19 (2 specimens), Sta. 23 (2 specimens).

Summer 1999: Sta. 10 (9 specimens), Sta. 11 (1 specimen), Sta. 12 (1 specimen), Sta. 16 (1 specimen), Sta. 17 (3 specimens), Sta. 18 (3 specimens), Sta. 21 (6 specimens).

Distribution: This cosmopolitan species has a wide geographic distribution, and has been recorded in the southwest Atlantic Ocean (Orensanz & Ramírez, 1973; Fernández-Álamo & Thuesen, 1999) and the Southern Ocean (Rozbaczylo, 1985). It is widely distributed in the Pacific Ocean, being found in the subarctic, tropical, and subtropical regions (Treadwell, 1943; Dales, 1957; Tebble, 1962). This is the first record for the southeastern Pacific Ocean.

Family Alciopidae

Unidentified specimens.

Spring 1998: Sta. 1 (1 specimen), Sta. 5 (1 specimen).

Comments

In Chile's coastal waters representatives of three (Tomopteridae, Alciopidae, Lopadorhynchidae) of the six pelagic polychaete families had been found, in addition to two species of the family Polynoidae which, in spite of being essentially benthic, has two pelagic representatives (Rozbaczylo, 1985; Rozbaczylo *et al.*, 2004). Not one of them had been collected before in the southern channel and fjord zone. Therefore, the results of this study increased the records of pelagic polychaetes and added species from the families Iospilidae and Typhloscolecidae. *Phalacrophorus pictus*, *Pelagobia longicirrata*, *Typhloscolex muelleri*, *Tomopteris planktonis*, *T. septentrionalis*, *Lopadorhynchus krohnii*, and *Maupasias caeca* are reported for the first time in the southern channel and fjord waters.

Previously, only *T. planktonis*, *T. septentrionalis*, and *P. longicirrata* had been recorded off the Chilean coast: *T. planktonis* in Ancud Gulf (Wesenberg-Lund, 1962), *T. septentrionalis* off the coast between 20°32'S and 34°34'S (Rosa, 1908b), and *P. longicirrata* around San Félix and Robinson Crusoe islands (Rozbaczylo *et al.*, 2004). The remaining species constitute first records for Chilean waters, thereby increasing the number of pelagic species identified off the Chilean coast to 23.

The presence of these species in this highly particular

oceanographic zone, where salty ocean waters mix with less saline waters from rivers, rain, and glacial melting (Sievers & Silva, 2006), can only be understood by its euriotic nature, which is inferred from its biogeographic characteristics (Fernández-Álamo, 1992). All the species found in this study are considered to be cosmopolitan, but to have the highest affinity for cold waters (Dales & Peter, 1972; Orensanz & Ramírez, 1973; Day, 1975).

These results increase our knowledge on planktonic polychaetes in Chilean waters, particularly in the southern channel region, thereby furthering understanding of the planktonic biodiversity in the southeastern Pacific Ocean.

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