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Original article

Hydroid assemblages from Mar del Plata, Argentina, at depths between 0 and 500 m. Distribution and biological substrata

Assemblages d'hydraires de Mar del Plata, Argentine entre 0 et 500 m. Distribution et substrats biologiques

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Abstract

The first studies on hydroids of the subantarctic region (SW Atlantic Ocean) were based on samples from expeditions to the Antarctic at the end of the 19th and beginning of the 20th centuries. In spite of these works, hydroids from the northern Argentine continental shelf remained unknown until the 1960s. In coastal waters off Mar del Plata, studies on hydroids have been few in number and limited to species described from preserved material. Even rudimentary ecological information is lacking in these reports. Over the past few decades, samples from oceanographic expeditions, and specimens collected directly from the intertidal rocky shore or by means of scuba diving and snorkeling, have provided heretofore unpublished information on hydropolyps of the Mar del Plata region. The goal of this work is to analyze the hydroid fauna of the Mar del Plata coast, including bathymetric distributions, frequencies of occurrence, and biological substrata. A total of 36 species were included. Most were found at depths shallower than 8 m, where hard substrates predominated. Numbers of species decreased markedly below 80 m. The shallow-water hydroid fauna of Mar del Plata comprises a large number of cosmopolitan or widely distributed species. In deeper zones, species with subantarctic or south hemisphere distributions predominated. Hard bottom outcrops were surrounded by extensive areas of sand. Although such substrata are unfavorable for most hydroids, many species were found in soft bottom areas on polychaete tubes. Stems of hydroids provided the greatest number of epizoic species (18), followed by polychaete tubes (16 species) and sponges (15 species). Hydroids, bivalve mollusks, and sponges were the most frequent substrates. Colonies grew less frequently on bryozoans and tunicates. This general scheme changed at greater depths, where the most frequent substrates were polychaete tubes and sponges.

Résumé

Les premières études sur les faunes hydraires de la région subantarctique (Atlantique sud-occidental) ont été basées sur les échantillons récoltés par les expéditions antarctiques de la fin du XIXe siècle et du début du XXe siècle. Cependant, les hydraires du nord de la plateforme continentale Argentine ont été ignorés jusque vers les années 60. Dans la zone côtière de Mar del Plata, il y a peu d'études relatives aux hydropolypes ; les espèces ont été décrites à partir de matériel préservé, sans aucune information écologique. Les échantillons des expéditions océanographiques et les spécimens collectés sur la côte rocheuse ou par plongeurs ont apporté beaucoup d'informations sur les hydraires de Mar del Plata. Aujourd'hui, une information considérable sur ces espèces est disponible. Le présent travail étudie la faune des hydraires de la zone côtière de Mar del Plata avec sa distribution bathymétrique, sa fréquence et les substrats biologiques. Un total de 36 espèces sont étudiées. Le plus grand nombre d'espèces est trouvé à des profondeurs inférieures à 8 m où les substrats durs sont abondants ; ce nombre diminue à partir de 80 m de profondeur. La faune hydraire de faible profondeur à Mar del Plata comprend un grand nombre d'espèces cosmopolites. À plus grande profondeur, le nombre d'espèces subantarctiques ou de l'hémisphère Sud augmente. Les fonds durs sont entourés de grandes étendues de sable. Ces substrats sont défavorables à la majorité des hydraires ; cependant, certaines espèces ont été trouvées sur ces fonds meubles mais vivant sur les tubes de polychètes. Les caules des hydropolypes apportent le nombre le plus important d'espèces epizoïques (18), suivie par les tubes de polychètes (16 espèces epizoïques) et les spongiaires (15 espèces epizoïques). Les hydraires, les bivalves et les spongiaires sont des substrats très abondants. Les colonies se situent plus rarement sur des

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bryozoaires ou des tunicates. Ce schéma change à grande profondeur où les substrats dominants sont les tubes de polychètes et les spongiaires.

Keywords: Hydroids; Epibiosis; Distribution; Argentina; SW Atlantic Ocean

Mots clés: Hydraires; Epibiosis; Distribution; Argentine; Atlantique sud-occidental

1. Introduction

Studies on Hydrozoa from the continental shelf of Argentina are characterized by a space–time discontinuity. The first studies on benthic hydroids of the subantarctic region (SW Atlantic Ocean) were based on samples from Antarctic expeditions at the end of 19th and beginning of the 20th centuries, especially from south of the Patagonian sector. Hydroids from the continental shelf off northern Argentina remained unknown until the 1960s when, through the work of Olga Blanco, species from certain areas off Buenos Aires and north of Patagonia were studied (Zamponi and Mianzán, 1994; Genzano and Zamponi, 1997).

The Mar del Plata region is of considerable interest environmentally and biogeographically, yet few studies on hydropolyps have been carried out there. Studies have been limited largely to analyses of species that foul test panels in the harbor (Blanco, 1968; Blanco and Miralles, 1972). These accounts were based on preserved material, and even rudimentary ecological information was lacking. Biological and ecological studies, which analyzed the abundances, seasonality, and reproductive periods of intertidal colonies, are all quite recent (Genzano, 1994; 1998; Genzano and Rodríguez, 1998; Genzano and Zamponi, 1999). In sublittoral waters, only the taxonomy of some species (Genzano, 1990, 1995) and bathymetric distributions (Zamponi et al., 1998), have been studied.

Samples from oceanographic expeditions, and specimens collected directly from intertidal rocky shores or by means of Scuba diving and snorkeling, provide information about the hydropolyps of Mar del Plata and neighboring areas. The goal of this work is to analyze this unpublished information, focusing on bathymetric distributions, frequencies of occurrence, and biological substrata.

2. Material and methods

Most data presented herein were obtained during more than 11 years of studies conducted in the intertidal fringe of Mar del Plata (since 1989). Other qualitative samples were collected by snorkeling in Mar del Plata harbor during 1993–1994. Additional hydroid material from 1999 was collected seasonally by Scuba diving in this area. All colonies from sublittoral rocky outcrops (to a depth of 29 m) were collected by Scuba diving commencing in 1997.

Samples from greater depths came from explorations carried out off the coasts of Mar del Plata by the National Institute of Fisheries (Inidep) during 1987–1989 and 1992. More complete information on sampling is given in Table 1 and Fig. 1.

Colonies were preserved, together with their substrata when possible, in 5% formalin solution. Brief comments are provided for each species. Morphological descriptions are given only for species new to the subantartic region, or for structures not previously reported. Localities of hydroid collections are indicated in the Fig. 1.

2.1. Study area

The coast off the city of Mar del Plata is characterized by the presence of quartzitic rocks originating in the mountainous system of Tandilia (SE of Buenos Aires province). To the north and south of these rocky outcrops, the coast comprises sandy beaches with isolated hard bottoms consisting of loess platform (consolidated sedimentary rocks). The large rocky blocks that characterize the intertidal extend several miles seaward to a depth of up to 20–25 m. These outcrops are surrounded by large areas of soft sediments, with an abundance of sands and biogenic carbonate components.

In deeper waters the environment is more homogeneous, with rocky outcrops being infrequent, isolated, and small. Fine sediments predominate, especially from the 200 m isobath (≈ 170 km from the coast) to deeper waters.

The characteristics of the water change notably at depths of 60–80 m (≈ 50–75 km from the coast), it is difficult to establish with precision where is the boundary, between two different biogeographical provinces: the Argentine biogeographic province (= Bonaerensian Province or subtemperate warm subregion), influenced by both subantarctic and subtropical water masses, and the Magallanic biogeographic province (subtemperate cold subregion), influenced by cold waters such as those from the Malvinas Current.

3. Results

A total of 36 species of hydroids, 31 of them found during this study and five others recorded in the literature, was reported from the study area. Depth distributions of these species are summarized in Table 2. Species composi-

Table 1
Code, depth (m), dates and method of sampling for the hydroid collection

Code	Expedition	Latitude (S)	Longitude (W)	Depth	Date	Method
I	Rocky intertidal, Mar del Plata	38°05”	57°32”	0–1	September 1989 to February 1992, February 2000 to January 2001	Manual collecting
IS	Rocky intertidal, Santa Clara	37°50”	57°30”	0–1	October–November 1990, February 1992	Manual collecting
EN	Mar del Plata harbor	38°06”	57°27”	2–5	September 1999 to August 2000	Snorkelling and scuba diving
R	Restingas del Faro	38°06”	57°28”	4–7	May 1997 1998 and August 1998	Scuba diving
BP	Banco Pescadores	38°07”	57°28”	8	14 June 2000	Scuba diving
B 14	Banco Pescadores, M.14	38°07”	57°30”	12–14	14 June 2000, 22 February 2001	Scuba diving
BPS	Banco Pescadores Sur	38°08”	57°28”	16–18	14 December 2000, 17 April 2001	Scuba diving
BM	Banco del medio	38°10”	57°27”	19–23	30 April, 14 June 2000 and monthly between November 2000 and October 2001	Scuba diving
BA	Banco de afuera	38°10”	57°25”	18–20	April 30 2000, January, March, June and December 2001, April 2002	Scuba diving
BT	Banco Pozo del Tío	38°05”	57°28”	25	19 February 2001	Scuba diving
Bpa	Banco Patria	38°07”	57°15”	25–29	19 February 2001, 23 January, 27 July 2002	Scuba diving
O 1	OB 02/87 station 2	38°10”	57°12”	65	12 March 1987	Picard dredge
O 2	OB 02/87 station 3	38°28”	56°44”	76	12 March 1987	Picard dredge
O 3	OB 02/87 station 4	38°45”	56°13	87	13 March 1987	Picard dredge
O 4	OB 02/87 station 5	39°03”	55°41”	126	13 March 1987	Picard dredge
O 5	OB 02/87 station 6	39°20	55°11”	507	12 March 1987	Picard dredge
O 6	OB 04/87 station 3	38°27”	56°44”	76	6 May 1987	Picard dredge
O 7	OB 04/87 station 4	38°44”	56°13”	87	6 May 1987	Picard dredge
O 8	OB 04/87 station 5	38°58”	55°39”	127	7 May 1987	Picard dredge
O 9	OB 06/87 station 2	38°16”	57°00”	63	7 July 1987	Picard dredge
O 10	OB 06/87 station 3	38°29”	56°43”	74	7 July 1987	Picard dredge
O 11	OB 06/87 station 5	38°59”	55°42”	119	8 July 1987	Picard dredge
O 12	OB 06/87 station Ad. 1	39°02”	55°39”	199	8 July 1987	Picard dredge
O 13	OB 10/87 station 1	38°09”	57°13”	36	5 September 1987	Picard dredge
O 14	OB 10/87 station 2	38°16”	56°59”	58	4 September 1987	Picard dredge
O15	OB 10/87 station 3	38°28”	56°45”	80	3 September 1987	Picard dredge
O16	OB 04/88 station 2	38°15”	57°03”	59	9 October 1988	Picard dredge
O17	OB 06/88 station 2	38°15”	57°03”	50	11 November 1988	Picard dredge
O18	OB 01/89 station 1	38°10”	57°12”	38	2 February 1989	Picard dredge
O19	OB 01/89 station 2	38°17”	57°01”	60	30 January 1989	Picard dredge
H 1	H 06/93 station 340	37°56”	56°58”	65–75	20 July 1992	Modified oyster dredge
H 2	H 06/93 station 367	37°33”	56°17”	65–75	20 July 1992	Modified oyster dredge
H 3	H 06/93 station 370	37°25”	56°18”	65–75	20 July 1992	Modified oyster dredge
H 4	H 06/93 station 379	37°16”	55°53”	65–75	20 July 1992	Modified oyster dredge
H 5	H 06/93 station 419	36°58”	58°37”	65–75	20 July 1992	Modified oyster dredge
F 1	C.E. fouling	38°06”	58°27”	0.5	10 May 1993	Fouling panels

tion and richness varied considerably in the different zones. The largest number of species was found at depths shallower than 8 m, where hard substrates predominated, and diversity decreased markedly beyond a depth of 80 m. Anthoathecate hydroids were much less abundant than leptothecates in all zones (Fig. 2). Anthoathecates were important in number as well as in abundance only in the rocky intertidal fringe (Genzano, 1994).

The distributions of hydroids on different sampled substrata are indicated in Table 3. The species–substrata analysis show that stems of hydroids supported the greatest number of epizoic species (18), followed by polychaete tubes (16 species) and sponges (15 species).

Fig. 3 illustrates the frequency of substrata colonized by hydroid species for all analyzed samples. Hydroids, bivalve mollusks, and sponges were the most frequent substrates. Colonies grew less frequently on bryozoans and tunicates. This general scheme changed at greater depths, where the most frequent substrates were polychaete tubes and sponges (see Table 3). Changes in substrata for hydroids at different depths are summarized in Table 3.

Most hydroid species were recorded from many different substrates. Exceptions included *H. scandens*, found only on stems of *D. cornicina*, and *O. belgicae*, the only colony of which was found on the bryozoan *Bicelariella* sp.

Information on other hydroid species is summarized in the annotated list below; the codes of species indicated in bold are used in the Table 4.

Subclass Anthoathecatae

Order Filifera

Family Clavidae

Rhizogeton nudum (Broch, 1909)—Rn

Occurrence: I.

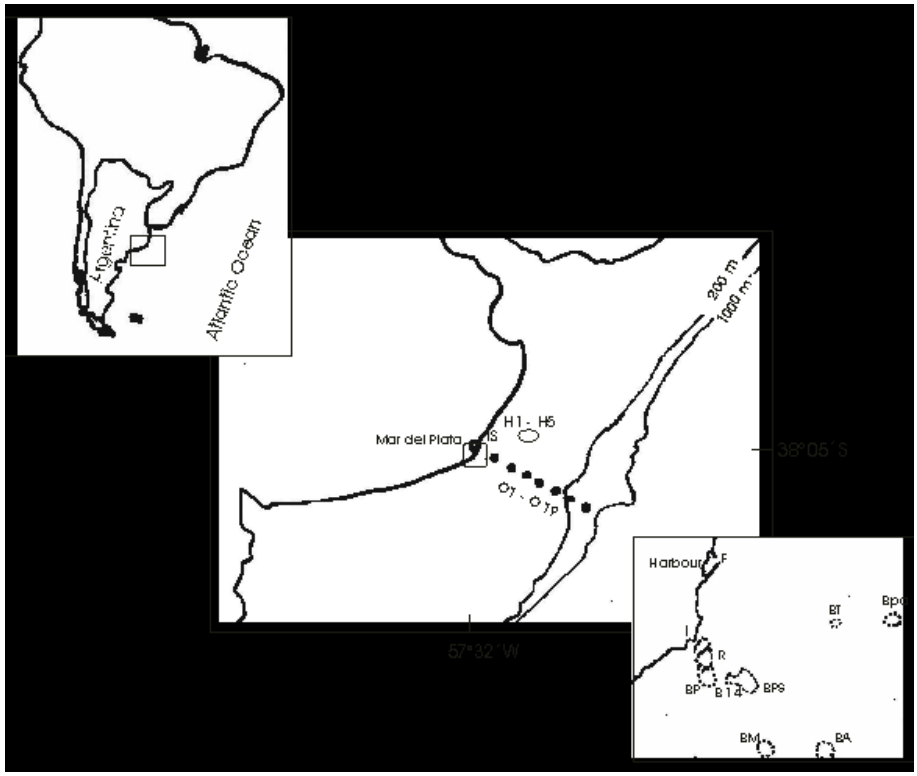

Fig. 1. Map with localities where hydroids were collected (see Table 1 for the codes and further information).

Remarks: This was a scarce species, with mature colonies occasionally found during the warm season; it was observed only in the rocky intertidal. Until now, no records of this species from the Argentine continental shelf exist outside the intertidal fringe of Mar del Plata (Genzano, 1993).

Family Bougainvilliidae

Bimeria vestita (Wright, 1859)—Bv

Occurrence: I, IS, R.

Remarks: This species was very abundant in the rocky intertidal, usually as an epizoite on other hydroids. In this zone fertile colonies were found throughout the year, although the frequency of colonies with gonophores was maximal between November and May (Genzano and Zamponi, 1999). Colonies in the sublittoral were scarce, and infertile.

Family Eudendriidae

Eudendrium ramosum (Linnaeus, 1758)—Er

Occurrence: B 14, BPS, BM, O5, O16.

Remarks: Colonies of this species were most abundant and mature at deeper stations. It was represented at depths of less than 18 m by small specimens having most of their stems deprived of polyps.

Order Capitata

Family Corynidae

Sarsia sarsii (Loven, 1836)—Ss

Occurrence: I, IS, R.

Remarks: *Sarsia sarsii* was observed in the intertidal zone during all seasons, with colonies being reproductively mature during summer and autumn. It was scarce and is considered rare in the sublittoral zone.

Family Tubulariidae

Tubularia crocea (Agassiz, 1862)—Tc

Occurrence: I, IS, EN, B 14, BM.

Remarks: This species was most abundant in the intertidal fringe. Gonophores were present all year. It is very common as a pioneer on bare rocks and concrete blocks of breakwaters. A very abundant associated fauna was found between hydrocaulus and hydrorhiza of these hydroids. Large colonies were found during summer in the harbor. In the sublittoral, colonies were occasionally present but were of minor importance.

Subclass Leptothecatae

Order Conica

Family Campanulinidae

Opercularella belgicae (Hartlaub, 1904)—Ob

Occurrence: EN.

Remarks: A single colony with one gonotheca only was found. This species was previously recorded from Mar del Plata harbor (Genzano, 1995). Only a single colony was found from the Argentine continental shelf outside of this zone (39°40”S–60°14”W, 48 m) (Genzano, personal observation).

Family Lafoeidae

Hebella scandens (Bale, 1888)—Hs

Occurrence: R, B 14, BA.

Remarks: Colonies were well developed but scarce, and only empty gonothecae were found. This species apparently has a very close association with other hydroids. All of the stolonial colonies recorded in this study were found as epizoites of *Dynamena cornicina* (Sertulariidae).

Table 2
Observed depth distribution of the hydroid species collected. Species are ordered according to their apparent depth preference. ○, present, ●, common/very common. Geographical distribution in the Argentine continental shelf: BA, Buenos Aires; NPS, North Patagonian sector; SPS, South Patagonian sector; MS & TdF, Strait of Magellan and Tierra del Fuego; MI, Malvinas Islands; Si & As, Subantarctic islands and Antarctic sector; *, species recorded only in Mar del Plata; WD, world distribution; Co, cosmopolite; HS, South hemisphere; En, endemic

	Depth distribution (m)						Geographical distribution						
Species	0–8	14–29	36–76	87–127	199	506	BA	NPS	SPS	MS TdF	& MI	SI & AS	WD
T. crocea	●	○	–	–	–	–	+	+	+	+	–	–	Co
B. vestita	●	–	–	–	–	–	+	+	–	–	–	–	Co
S. sarsii	●	–	–	–	–	–	+	–	+	+	–	–	HS
R. nudum	○	–	–	–	–	–	*	–	–	–	–	–	Co
O. belgicae	○	–	–	–	–	–	+	–	–	–	–	+	HS
H. delicatulum	○	–	–	–	–	–	+	–	+	+	+	+	Co
O. bidentata	○	–	–	–	–	–	+	+	+	+	–	–	Co
D. cornicina	○	○	–	–	–	–	*	–	–	–	–	–	Co
H. scandens	○	○	–	–	–	–	+	–	–	–	–	+	Co
F. serratum	○	○	–	–	–	–	+	+	+	+	–	+	Co
P. pulchella	○	○	–	–	–	–	+	+	–	–	–	–	Co
O. longissima	●	○	○	–	–	–	+	+	–	+	–	+	Co
S. mediterranea	○	●	–	–	–	–	*	–	–	–	–	–	Co
C. gracilis	●	●	–	–	–	–	+	+	+	–	–	–	Co
A. operculata	●	●	–	–	–	–	+	+	+	+	+	–	Co
S. striata	○	○	○	–	–	–	+	+	–	–	–	–	HS
C. agas	○	○	○	–	–	–	+	–	–	+	–	–	HS
M. quadridens	–	○	–	–	–	–	*	–	–	–	–	–	Co
C. hincksii	○	–	○	–	–	–	+	–	–	–	–	–	Co
A. acacia	–	○	●	–	–	–	+	+	+	–	–	–	Co
P. setacea	○	●	●	–	–	–	+	+	+	+	–	–	Co
H. beanii	○	●	●	○	○	○	+	+	+	+	–	+	Co
S. conica	–	–	○	○	–	–	+	–	+	+	+	–	Co
L. fruticosa	–	–	○	○	○	–	+	+	+	+	+	+	Co
E. ramosum	–	○	○	–	–	○	+	+	+	–	–	+	Co
S. robustum	–	–	○	○	○	–	+	–	+	+	+	–	Co
S. subdichotomus	–	–	○	○	○	–	+	+	+	+	+	+	HS
F. antarcticum	–	–	–	○	○	–	+	–	–	+	+	+	HS
O. longa	–	–	–	–	○	–	+	–	+	–	–	+	Co
P. insignis	–	–	–	–	–	○	+	+	–	–	–	–	HS
T. canepa	–	–	–	–	–	●	+	+	–	–	–	–	En
Species reported from Mar del Plata according to literature information													
C. subantarctica	○	–	–	–	–	–	+	+	–	+	–	–	HS
G. inornata	○	–	–	–	–	–	*	–	–	–	–	–	Co
G. loveni	○	–	–	–	–	–	+	–	–	–	–	–	Co
O. angulosa	○	–	–	–	–	–	+	–	–	–	–	–	HS
O. dichotoma	○	–	–	–	–	–	+	–	+	–	–	–	Co

Filellum antarcticum (Hartlaub, 1904)—Fa

Occurrence: O 3, O 7.

Remarks: The colonies observed were small, immature, and stolonial. They were found infrequently on polychaete tubes or on other hydroid species.

Filellum serratum (Clarke, 1879)—Fs

Occurrence: B 14, BM, BPa.

Remarks: Many immature colonies were observed growing at the bases of other hydroids. Previous to this record, its known range along the Argentine continental shelf extended in deeper waters from Tierra del Fuego to San Matías Gulf (Blanco et al., 1994). Our record from Mar del Plata extends its geographical distribution into the north of Argentina and in shallow waters is confirmed here.

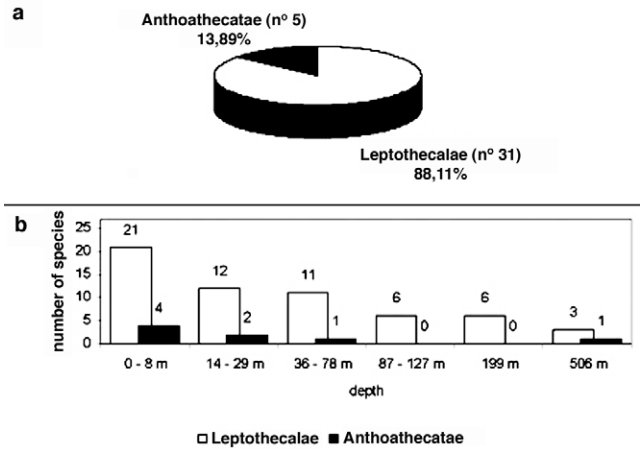

Fig. 2. a, Frequency of anthoathecatae and leptothecatae hydroid species found in the studied area. b, Distribution of species of anthoathecatae and leptothecatae species in the different depths (the number of species is indicated).

Lafoea fruticosa (Sars, 1851)—Lf

Occurrence: O 2, O 4, O 6, O 8, O 12.

Remarks: Small, stolonial, and immature colonies were infrequently recorded from deeper stations.

Family Haleciidae

Halecium beanii (Johnston, 1838)—Hb

Occurrence: I, B 14, BM, BT, BPa, O1, O 2, O 5, O 6, O 7, O 9, O 10, O 12, O 13, O 14, O 15, O 16, O 17, O 18, O 19, H 2, H 3, H 4.

Remarks: This species was very common at all stations. In the intertidal zone, mature colonies were found from December to April. In deeper waters, colonies with gonothecae were found all year. Colonies epizoic on many living substrata were usually small in size. Those on sublittoral rocky shores, mainly attached to rocks, attained a height of several centimeters and had a fasciculated hydrocaulus.

Halecium delicatulum (Coughtrey, 1876)—Hd

Occurrence: I, R, BPa.

Remarks: A few small, mature colonies were occasionally found in shallow waters on the sertulariid *Amphisbetia operculata* (L.).

Family Syntheciidae

Synthecium robustum (Nutting, 1904)—Sr

Occurrence: O 2, O 3, O 7, O 10, O 12, O 16.

Remarks: Immature colonies, mainly epizoites on sponges, were observed infrequently from deeper collections.

Family Sertulariidae

Dynamena cornicina (McCrady, 1859)—Dc

Occurrence: R, B 14.

Remarks: Monosiphonic colonies with scarce gonothecae were found on a red alga. This species has been recorded infrequently in the study area. All observed colonies hosted *H. scandens* as an epizoite.

Amphisbetia operculata (L.)—Ao

Occurrence: EN, R, B 14, BM, BA, BT, BPa.

Remarks: A few immature fragments of this species were found in the harbor during summer. Large colonies were very abundant all year on sublittoral hard bottoms (8–29 m deeper). Gonothecae were especially abundant from the end of winter to the commencement of summer. Many epizoic species, especially hydroids, bryozoans and juvenile blue mussels, were found attached to hydrocauli of this sertulariid.

Sertularella conica (Allman, 1877)—Sc

Occurrence: O 2, O 3, O 17.

Remarks: A few immature colonies from deeper stations were found, usually growing on polychaete tubes.

Sertularella mediterranea (Hartlaub, 1901)—Sm

Occurrence: I, EN, B 14, BM, BA.

Remarks: Colonies, scarce and immature, were occasionally found in Mar del Plata harbor. In the rocky intertidal it was collected between March and December but colonies were not observed in summer. The hydroid is fairly common on rocks in the sublittoral. It was present all year but reached peak abundance in autumn and winter. Gonothecae were very abundant during this period. This species was found only from the Mar del Plata area, where it has previously been reported as *Sertularella. picta* (Blanco, 1967; 1994).

Sertularella striata (Stechow, 1923)—Sst

Occurrence: I, R, BP, B 14, BPS, BM, BA, BT, BPa.

Remarks: Small and immature colonies were occasionally found on concrete blocks of breakwaters. It is predominantly distributed in deeper zones to 22 m, where colonies were well developed but occasionally bore gonothecae (December). The species was previously reported from Mar del Plata as *S. atlantica* (Blanco, 1967, 1994).

Symplectoscyphus subdichotomus (Kirchenpauer, 1884)—Sys

Occurrence: O 1, O 3, O 4, O 7, O 9, O 11, O 12, O 15.

Remarks: Small immature colonies were found only from greater depths. It was a very common epizoite on Porifera.

Family Halopteriddidae

Monastaechas quadridens (McCrady, 1858)—Mq

Occurrence: BM, BPa.

Description: Colonies forming erect structures arising from creeping, ramified stolon, 250 μm in diameter, reaching a height of 25 mm. Basal internodes, 280–300 μm in diameter, very long, ahydrothecate, with numerous movable two-chambered nematothecae and branching first in the form of a dichotomus sympodium, in which two subsidiary hydrocladia of equal diameter arise from opposite side of the primary one; later branching in form of a sympodium only, in which each subsidiary hydrocladium arise from the posterior surface of the previous one. Each hydrocladium consisting of a basal unsegmented ahydrothecate part bearing five to 10 nematothecae in a double row, and a distal hydrothecate part, the two separated by an oblique node. Distal part of hydrocladium bearing internodes alternatively with and without hydrothecae and terminated by transverse and oblique nodes, respectively. The transverse nodes were

Table 3
Distribution of hydroids on different substrata and depth (m). Open circle: present, full circle: frequent and/or abundant

	Hydroid species																													
Substrata	Depth (m)	Bv	Rn	Ss	Er	Tc	Ob	Hs	Fa	Fs	Lf	Hb	Hd	Sr	Dc	Ao	Sc	Sm	Sst	Sys	Mq	Pp	Ps	Aa	Ca	Ch	Cg	Ol	n
Algae																													
Ulva lactuca	0–8	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Dyctiota sp.	0–8	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	2
Phaeophyta indet.	36–76	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Corallina officinalis	0–8	○	.	○	.	○	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	5
Bossiela orbigniana	0–8	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	2
Polysiphonia sp.	14–29	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	2
Rodimenia sp.	0–8	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	○	.	.	.	.	.	2
	14–29	.	.	.	○	.	.	.	.	.	.	.	○	.	.	.	.	○	○	.	.	.	○	.	○	.	○	○	8
Porifera																													
Iophon sp.	36–76	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	2
	199	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Estereopsis sp.	36–76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	1
Haliclona sp.	0–8	.	.	○	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	36–76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	1
Hymeniacidon sanguinea	0–8	○	○	○	.	○	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	○	.	6
Tedania sp.	14–29	.	.	.	○	.	.	.	.	.	.	○	.	.	.	.	.	○	○	.	.	.	○	.	○	.	.	.	6
	36–76	.	.	.	○	.	.	.	.	.	.	●	.	●	.	.	.	.	.	○	.	.	●	.	.	.	.	○	6
	87–127	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Cliona sp.	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	○	.	.	○	.	.	.	.	.	.	3
Cnidaria																													
Eudendrium ramosum	14–29	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	○	.	3
Tubularia crocea	0–8	●	.	○	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	○	.	.	.	●	○	6
	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	1
Halecium beanii	14–29	.	.	.	.	.	.	.	.	○	.	.	.	.	○	.	.	.	.	.	.	.	.	.	○	.	.	.	3
	87–127	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Amphisbetia operculata	0–8	○	.	○	.	.	.	.	.	.	.	.	○	.	.	.	.	.	○	.	.	○	○	.	.	○	●	.	8
Dynamena cornicina	0–8	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	14–29	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Sertularella mediterranea	0–8	●	○	○	.	.	.	.	.	.	.	●	.	.	.	.	.	.	.	.	.	.	.	.	○	.	○	.	6
	14–29	.	.	.	.	.	.	.	.	○	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	3
Sertularella striata	14–29	.	.	.	.	.	.	.	.	○	.	○	.	.	.	.	.	.	.	.	.	○	.	.	○	.	.	○	5
Symplectoscyphus subdich	87–127	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Aglaophenia acacia	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	1
Monastaechas quadridens	14–29	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	○	3
Plumularia setacea	0–8	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	2
	14–29	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	○	○	4
	36–76	.	.	.	.	.	.	.	.	.	○	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Tripalea clavaria	14–29	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	○	.	.	.	○	.	○	.	.	.	4
Gorgonacean indet. 1	14–29	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	○	3
Gorgonacean indet. 2	36–76	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	○	.	.	○	.	○	4
	506	.	.	.	●	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Bryozoa																													
Bicelariella sp.	0–8	○	○	○	.	○	○	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	1
Bryozoa indet.	36–76	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	87–127	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Annelida (polychaete tubes)	0–8	○	.	○	.	.	.	.	.	.	.	○	○	.	.	.	.	○	.	.	.	.	.	.	.	○	○	.	7
	14–29	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	2
	36–76	.	.	.	.	.	.	.	.	.	○	○	.	○	.	.	○	.	.	○	.	.	○	.	○	○	.	○	9
	87–127	.	.	.	.	.	.	.	○	.	.	.	.	○	.	.	○	.	.	.	.	.	.	.	.	.	.	.	3
	199	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Mollusca																													
Brachydontes rodriguezi	0–8	.	.	●	.	●	.	.	.	.	.	○	.	.	.	.	.	○	○	.	.	.	●	.	.	.	○	.	7
	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	1
Mytilus platensis	0–8	.	.	○	.	○	.	.	.	.	.	○	.	.	.	●	.	.	.	.	.	.	●	.	○	.	.	.	6
	14–29	.	.	.	○	.	.	.	.	.	.	○	.	.	.	○	.	○	○	.	○	.	○	.	.	.	.	.	7
	36–76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	●	.	.	.	.	1
Ostrea sp.	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	○	.	.	○	.	.	.	.	.	3
Crepidula sp.	0–8	.	.	○	.	○	.	.	.	.	.	○	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	4
	14–29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	●	○	.	.	.	.	.	○	.	.	.	3
Decapoda, Majiidae	14–29	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Tunicata																													
Ciona intestinalis	0–8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	●	1
Molgula sp.	0–8	○	.	○	.	○	.	.	.	.	.	○	.	.	.	.	.	●	.	.	.	.	○	.	.	.	.	.	6
Syocozoa umbrellata	14–29	.	.	.	.	.	.	.	.	.	.	○	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	2
Indet	36–76	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	○	.	.	.	1
Rocks	0–8	.	.	○	.	●	.	.	.	.	.	.	.	.	.	○	.	●	.	.	.	○	.	.	.	.	.	○	6
	14–29	.	.	.	○	.	.	.	.	.	.	○	.	.	.	○	.	○	○	.	●		○	○	.	.	○	○	10
N		9	4	14	6	8	1	2	3	7	4	27	4	5	2	4	2	13	12	4	2	4	17	2	14	4	19	12	205

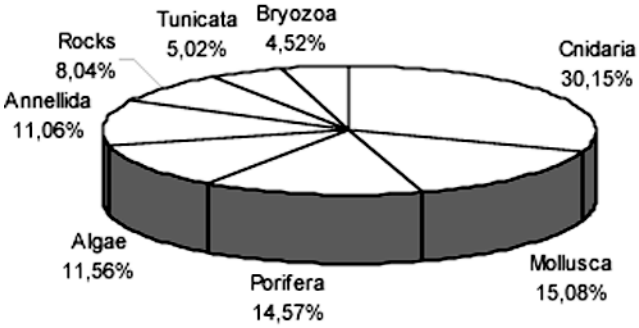

Fig. 3. Frequency of substrata colonized by hydroid species.

poorly defined. The hydrothecal internodes, 500–600 μm long, bear one hydrotheca and four nematothecae, one median inferior, one pair laterals (two-chambered) and one minute, one-chambered median superior. Each ahydrothecal internode, 350–420 μm long, bears only one movable nematotheca. Hydrotheca cup-shaped, adnate for about half height, 300–350 μm in height and 333–370 μm in marginal diameter, abcauline wall slightly convex, 200–220 μm long, free part of adcauline wall straight, 100–150 μm long.

Gonothecae borne on hydrocladia below hydrothecae, male and female on same colony, curved pear-shaped. Male (250–356) × (650–700) μm, smaller than female (600–650) × (1000–1100) μm. Female gonothecae with a pedicel of two segments, bearing two nematothecae near base. Male gonothecae usually with one nematotheca and pedicel with one segment.

Nematocysts: Microbasic mastigophores in nematophores and tentacles (4–5.5) × (9–11) μm.

Remarks: Abundant mature colonies were found attached to rocks at 18–22 m. The stem is rather varied in this species. Colonies with much branched stems were reported from south-east coast of USA (Calder, 1983). The material examined agrees well with this description, based on material from the type locality. In other regions the stem is mostly simple or absent (Millard, 1975). This author described colonies with two nematothecae in the ahydrothecal internodes, but Calder (op. cit.) reported ahydrothecal internodes with one or two nematothecae and Schuchert (1997) mentioned that occasionally one or three nematothecae can be found. The examined colonies show only one nematotheca in all ahydrothecal internodes analyzed.

Distribution: Pacific, side of Mexico, Western Atlantic, Massachusetts to Brazil; South Africa; Seychelles; India; Australia. This species is considered circumglobal in tropical and subtropical waters (Millard, 1975; Calder, 1983; Schuchert, 1997). Until now, no records of this species for the Argentine continental shelf exist outside the Mar del Plata.

This is the first record from Argentine Continental Shelf (subantarctic region).

Family Plumulariidae

Plumularia insignis (Allman, 1883)—Pi

Occurrence: O 5.

Remarks: Large colonies reaching a height of 25 cm were found anchored in the soft bottom. Stems were fasciculated and had well developed filamentous processes. It has been found only at considerable depths.

Plumularia pulchella (Bale, 1888)—Pp

Occurrence: BM, BA, BPa.

Remarks: Observed colonies, well developed but lacking gonothecae, were found in deeper rocky outcrops (20 and 30 m). Only a small colony of this species has previously been reported from the Mar del Plata area, in shallow waters (6–8 m) (Genzano, 1990).

Plumularia setacea (Linnaeus, 1758)—Ps

Occurrence: I, IS, R, BP, B 14, BM, BA, O 1, O 2, O 6, O 10, O 13, O 14, O 15, O 16, O 17, H 2, H 3, H 4.

Remarks: This species was very common at all stations. In the intertidal, mature colonies were found in moderate densities during the warm months (October–April). Both, frequency of occurrence and density of this species were highest in sublittoral rocky outcrops, where the colonies, found with gonothecae around all year, were larger than intertidal ones.

Table 4
Substrata of epizoic hydroids. Substrate groups were ordered according to the apparent hydroid preferences at different depths (m). Open circle, present; full circle, frequent and/or abundant

	Depth					
	0–8	14–29	36–76	87–127	199	506
Algae	○	○	–	–	–	–
Rocks	○	○	–	–	–	–
Mollusks (no mytilids)	○	○	–	–	–	–
Mytilids	●	●	○	–	–	–
Tunicates	○	○	○	–	–	–
Hydroids	●	●	○	○	–	–
Bryozoids	○	○	○	○	–	–
Sponges	○	●	●	○	○	–
Polychaets tubes	○	○	●	○	○	–
Gorgonacean	–	○	○	–	–	○

Family Aglaopheniidae

Aglaophenia acacia (Allman, 1883)—Aa

Occurrence: BM, BT, BPa, H 1, H 5.

Remarks: Large colonies of this species were found on deeper outcrops, frequently associated with mytilid valves. Only a few colonies were found attached directly to the rocks.

Thecocarpus canepa (Blanco and Miralles, 1971)

Occurrence: O 5.

Remarks: Large fasciculated and mature colonies were found only at great depth, where they were anchored by filamentous processes to the soft bottom. All reports of this species are from Buenos Aires and the north Patagonian zone at great depth (Blanco and Miralles, 1971; Blanco, 1994; Zamponi et al., 1998).

Order Proboscoida

Family Campanulariidae

Campanularia agas (Cornelius, 1982)—Ca

Occurrence: R, B 14, BPS, BM, BA, BT, BPa, O 10, H 2, H 4.

Remarks: This species was found at various depths between 8 and 75 m. The original description of *C. agas* (Hartlaub, 1905 = *C. laevis*) was based on colonies with empty gonothecae that were smaller than those examined in this study (judging from the magnified figure). Other descriptions were based on infertile colonies (Vervoort, 1972; Leloup, 1974; Genzano, 1995).

The specimens from rocky outcrops (B 14, BM, BA and BPa) were fertile. Gonothecae, oval in outline, originated from the hydrorhiza on short pedicels (99–139 μm) and contained eumedusoid gonophores. These had four pigmented radial canals bearing irregular diverticula. Males (316–376) × (1089–1400) μm, were smaller than females (594–693) × (1386–1801) μm. Females each bore six to 10 eggs that were 198–277 μm in diameter.

Campanularia hincksii (Alder, 1856)—Ch

Occurrence: R, O 1, O 9, O 16.

Remarks: Observed specimens, small and with scarce hydranths, were usually epizoic on other hydroids in shallow waters and on polychaete tubes and a gorgonacean from deeper stations (Genzano, 1990; Zamponi et al., 1998).

Campanularia subantartica (Millard, 1971)

Remarks: This species was not found in our samples but it was reported earlier from the Mar del Plata area on the sertulariid *Amphisbetia operculata* (L.) (Genzano, 1990).

Clytia gracilis (Sars, 1851)—Cg

Occurrence: I, IS, R, B 14, BPS, BM, BA, BT, BPa.

Remarks: Colonies were very common from the intertidal fringe to 20 m, sometimes as an epizoite on other hydroids but also on many other living substrata. Observed colonies were stolonial, and gonothecae were scarce.

Gonothyraea inornata (Nutting, 1901)

Remarks: This species was not found in our samples, but it was previously reported in the fouling community from Mar del Plata harbor. The identification is in doubt because specimens were scarce and poorly preserved (Blanco, 1968).

Gonothyraea loveni (Allman, 1859)

Remarks: This species was not identified in our samples, although it was reported in the fouling community from Mar del Plata harbor by Blanco and Miralles (1972).

Obelia angulosa (Bale, 1888)

Remarks: This species, not observed in our collections, was reported as part of the fouling community in Mar del Plata harbor by Blanco (1968). Blanco (op. cit.) remarked on the similarity between this species and *O. australis*, which is considered a synonym of *O. dichotoma*. Further studies will be necessary to determine the taxonomic status of *O. angulosa*.

Obelia bidentata (Clark, 1875)

Occurrence: F 1.

Remarks: Mature colonies colonizing panels for fouling studies were abundant in Mar del Plata harbor.

Obelia dichotoma (Linnaeus, 1758)

Remarks: This species was not found during this study, but it was reported earlier from the Mar del Plata area (Zamponi, 1987).

Obelia longa (Stechow, 1921)

Occurrence: O 12.

Remarks: This species was represented by a small immature fragment, found only in deep waters.

Obelia longissima (Pallas, 1766)—Ol

Occurrence: I, EN, R, B 14, BM, BA, BPa, O 1, O 2, O 6, O 9, O 13, O 14, O 15, O 16.

Remarks: The abundance of this species differed slightly in the different zones. It was very abundant in the harbor, usually as an epizoite of the tunicate *Ciona intestinalis* (L.). Gonothecae were present from late spring to autumn. A few large fertile colonies were observed on sublittoral rocky shores. In the intertidal zone, only small and unfertile colonies were found, in summer. At other stations, only a few colonies or fragments were found.

4. Discussion

Information on hydroids from the coast of Mar del Plata is both scarce and scattered. In recent years many species have been observed, most of them for the first time in the region, increasing to 36, the number of species known from the intertidal fringe to depths of 500 m. This number of species is quite high because only 46 species have been recorded for the entire Argentine Province (= Bonaerensian Province), and species numbers do not exceed 120 for the continental shelf of the entire country (Genzano and Zamponi, 1997).

This relatively high number of species could be due the diversity of habitats present in a region that, unlike the rest of the Buenos Aires littoral, consists of a coast incorporating quartzitic rocks extending several miles seaward as well as other outcrops of sedimentary rocks (loess).

The shallow-water hydroid fauna of Mar del Plata comprises a large number of widely distributed species. Most of them have been considered cosmopolitan or widely distributed species (Genzano and Zamponi, 1997). In deeper waters, an increase was noted in the number of species having subantarctic or south hemisphere distributions (Table 2).

Most of the species have been recorded from different zones of the Argentinian continental shelf, including the Patagonian sector and Tierra del Fuego. However, *R. nudum*, *D. cornicina*, *S. mediterranea*, *M. quadridens* and *G. inornata* were found only on the coast off Mar del Plata. It is still possible, however, that these species may occur in other areas of the Argentinian continental shelf that have yet to be carefully explored.

Analysis of hydroid distribution patterns confirms that marked changes in faunal composition occur at depths between 60 and 80 m, as previously reported for bryozoans, molluscs, echinoderms (Roux et al., 1988; Bastida et al., 1992), and cnidarians of the region (Zamponi et al., 1998).

Most species were recorded at depths of 0–80 m, with maximum specific richness in shallow waters (0–8 m). Few hydrozoan species tolerate extended exposure to air. Only 10 species were found in the intertidal zone, most of them forming small colonies located in channels, crevices, and protected micro-habitats. An exception was *T. crocea*, large clumps of which were very abundant on rocks and bivalves intertidally. Anthoathecates were important in number as well as in abundance only in rocky intertidal fringe (Genzano, 1994).

The number of species found in deeper sublittoral waters (87–500 m) was low, possibly as a consequence of the lack of rocky outcrops at these depths.

Halecium beanii and *E. ramosum* exhibited the largest bathymetric range distribution (0–500 and 14–500 m, respectively). Another group of species extended between 80–200 m (*L. fruticosa*, *S. robustum*, *S. subdichotomus* and *O. longa*). The plumulariids *P. insignis* and *T. canepa* were found only in deep waters (ca. 500 m).

The nature of the substratum significantly influences the species composition of hydroids. Hydropolyps are generally more diverse and abundant on firm or hard substrata (Calder, 1991). On rocky outcrops studied here, large colonies of *A. operculata*, *P. setacea*, and *A. acacia* attached directly to rocks or to bivalves. Most species were substrate generalists occurring on many other organisms, especially other hydroids but also on bivalves, sponges and algae.

The richest and most abundant epizoic hydrozoan fauna occurred on colonies of *A. operculata* (eight species) and *S. mediterranea* (seven species). The frequent occurrence of hydroid species on sertulariids was previously noted by Genzano (1990, 1994), Parapar and Ramil (1996) and Orlov (1997).

Colonies of *T. crocea* from the intertidal fringe were frequent substrata for epizoic hydroids (seven species). Large feather-like colonies of *P. setacea* and *A. acacia* provided substrate for seven and one species, respectively, which usually were less abundant. Hydroids colonized by other species were usually overgrown at the base of their stems; their hydrocladia were mostly free of epizoic species. The presence of defensive structures (nematothecae) could explain the reduced occurrence of epibionts on plumulariids.

The rocky outcrops studied here on the Argentinian continental shelf are surrounded by large areas of medium and fine sands. Such substrata are unfavorable for most hydroids. However, many species were found in this soft-bottom substratum living on exoskeletons or other parts of other invertebrates, especially polychaete tubes and sponges (*Tedania* sp.). The importance of worm tubes as hydroid substrates on soft bottoms was noted by Lees (1986). In the study area, only *T. canepa* and *P. insignis* live directly on soft bottoms as “rooting” species. They settle initially on a small firm substrate, grow in size, and then stay erect by an anchoring system.

Species usually found on outcrops can invade soft bottoms by settling on small “islands” or hard substrates dispersed across the sedimentary environment (Morri et al., 1991). *P. setacea* and *A. operculata* were frequently found on small rocks surrounded by expanses of sand, but these colonies were smaller and less abundant than those on rocky outcrops.

Hydroids tend to be substrate generalists. Hydroids that are small and short-lived are particularity prone to settle on many sorts of substrata (Boero, 1984; Gili and Hughes, 1995). Most species found in this study were non-specific epizoites, occurring on diverse substrata. Few exhibited any particular substrate selection, although abundances of *B. vestita* and *C. gracilis* were greatest on hydroids and least on other substrata (Genzano, 1998; Genzano and Rodríguez, 1998; Genzano and Zamponi, 1999). As well, colonies of *F. serratum* and *F. antarcticum* were more frequent on hydroid stems (see Table 3).

Only *H. scandens* was found exclusively on a single substrate (stems of *D. cornicina*); this association is very common (Genzano, 1992) and it might suggest a close species-specific relationship. *O. belgicae* was found only on the bryozoan *Bicelariella* sp. but the records were too few to allow any conclusion in this respect.

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References

Bastida, R.O., Roux, A., Martinez, D.E., 1992. Benthic communities of the Argentine Cont. Shelf. Oceanol. Acta 15 (6), 687–698.

Blanco, O., 1967. Un aporte al conocimiento de la fauna hidroide Argentina. Rev. Mus. de La Plata 10 (77), 97–127.

Blanco, O., 1968. Nueva contribución al conocimiento de la fauna marina hidroide. Rev. Mus. de la Plata, Sección zoología Tomo X, 195–224.

Blanco, O., 1994. Enumeración sistemática y distribución geográfica preliminar de los Hydroida de la República Argentina. Suborden Athecata (Gymnoblastea, Anthomedusae), Thecata (Calyptoblastea, Leptomedusae) y Limnomedusae. Rev. Mus. de la Plata (Nueva Serie) 14 (161), 181–216.

Blanco, O., Miralles, D., 1971. Nueva especie de *Thecocarpus* (Hydrozoa, Aglaopheniidae). Neotrópica 17 (54), 141–145.

Blanco, O., Miralles, D., 1972. Nuevos aportes a los campanuláridos de Argentina. Rev. Mus. de La Plata (Nueva Serie) 11 (101), 137–151.

Blanco, O., Zamponi, M.O., Genzano, G.N., 1994. Lafoeidae de la Argentina (Coelenterata, Hydrozoa, Hydroida). Naturalia Patagónica 2 (1), 1–31.

Boero, F., 1984. The ecology of marine hydroids and effects of environmental factors. Rev. Mar. Ecol. 5 (2), 93–118.

Calder, D., 1983. Hydroida from estuaries of South Carolina, USA: families Sertulariidae and Plumulariidae. Proceedings of the Biological Society of Washington, Washington 96 (1), 7–28.

Calder, D., 1991. Associations between hydroid species assemblages and substrate types in the mangle at Twin Cays, Belize. Can. J. Zool. 69 (8), 2067–2074.

Genzano, G.N., 1990. Hidropólipos (CNIDARIA) de Mar del Plata, Argentina. Nerítica, PR 5 (1), 35–54.

Genzano, G.N., 1992. La fauna de hidropólipos (CNIDARIA) del litoral de Buenos Aires, Argentina. I. Neotrópica 38 (100), 141–148.

Genzano, G.N., 1993. La fauna de hidropólipos (CNIDARIA) del litoral de Buenos Aires, Argentina. II. *Rhizogetum nudum* Broch,1909 (Clavidae; Anthomedusae). Neotrópica 39 (101–102), 73–75.

Genzano, G.N., 1994. La comunidad hidroide del intermareal rocoso de Mar del Plata (Argentina). I. Estacionalidad, abundancia y períodos reproductivos. Cah. Biol. Mar. 35 (3), 289–303.

Genzano, G.N., 1995. New records of hydropolyps (CNIDARIA, HYDROZOA) from south western Atlantic Ocean. Miscel. lània Zoológica 18, 1–8.

Genzano, G.N., 1998. Hydroid epizoites on *Tubularia crocea* (Agassiz,1862) and *Sertularella mediterranea* Hartlaub,1901 (Hydrozoa-Cnidaria) from intertidal of Mar del Plata (Argentina). Russ. J. Mar. Biol. 24 (2), 123–126.

Genzano, G.N., Rodríguez, G.M., 1998. Associations between hydroid species and their substrates from intertidal of Mar del Plata (Argentina). Miscel. lània Zoológica 21 (1), 21–29.

Genzano, G.N., Zamponi, M.O., 1997. Frequency of study and diversity of benthic Hydrozoa of the Argentine Cont. Shelf. Cienc. Mar. 23 (3), 285–302.

Genzano, G.N., Zamponi, M.O., 1999. Natural history of *Bimeria vestita* Wright, 1859 (Hydrozoa, Bougainvillidae) in rocky intertidal of Mar del Plata (Argentina). Cienc. Mar. 25 (1), 63–74.

Hartlaub, C., 1905. Die hydroiden der Magalhaensischen Region und Chilenischen Kuste. Zool. Jehrb. Suppl. 6 (3), 497–714.

Gili, J.M., Hughes, R.G., 1995. The ecology of marine benthic hydroids. In: Ansell, A.D., Gibson, M., Barnes, R.N. (Eds.), Oceanography and Marine Biology: an Annual Review UCL Press. pp. 351–426.

Lees, D.C., 1986. Marine hydroid assemblages in soft-bottom habitats on the Hueneme shelf off Southern California, and factors influencing hydroid distribution. Bull. Soc. Calif. Acad. Sci. 85 (2), 102–119.

Leloup, E., 1974. Hydropolypes calyptoblastiques du Chili. Report no. 48 of the Lund University Chile expedition 1948–1949. Sarsia 55, 1–61.

Millard, N.A.H., 1975. Monograph on the Hydroida of Southern Africa. Ann. S. Afr. Mus., Cape Town 68, 1–513.

Morri, C., Bavestrello, G., Bianchi, C.N., 1991. Faunal and ecological notes on some benthic cnidarian species from the Tuscan archipelago and eastern Ligurian sea (Western Mediterranean). Bollettino dei Musei e degli Istituti biologici dell' Università di Genova 54–55, 27–47.

Orlov, D., 1997. Epizoic associations among the White Sea hydroids. Scientia Marina 61 (1), 17–26.

Parapar, J., Ramil, F., 1996. Flora y fauna epibionte sobre los sertuláridos (Cnidaria; Hydrozoa) de Galicia (NW Pemínsula Ibérica). Thalassas 12, 19–26.

Roux, A., Bastida, R.O., Lichtschein, V., Barreto, A., 1988. Investigaciones sobre las cominidades bentónicas de la plataforma a través de una transecta frente a Mar del Plata. Spheniscus 6, 19–52.

Schuchert, P., 1997. Review of the family Halopteridídae (Hydrozoa, Cnidaria). Zool. Verh. 309, 1–162.

Vervoort, W., 1972. Hydroids from "Theta", "Vema" and "Yelcho" cruises of the Lamont Doherty Geological observatory. Zool. Verh. 120, 1–249.

Zamponi, M.O., 1987. Ciclos biológicos de celenterados litorales. II. Las formas pólipo y medusa de *Obelia dichotoma* Hincks, 1868 (Leptomedusae; Campanulariidae). Neotrópica 33 (89), 3–9.

Zamponi, M.O., Mianzán, H., 1994. Coelenterate research in Argentina. Plankton Newsletter 19, 22–26.

Zamponi, M., Genzano, G.N., Acuña, F.H., Excoffon, A.C., 1998. Studies on Benthic Cnidarian taxocenes along a transect off Mar del Plata (Argentina). Russ. J. Mar. Biol. 24 (1), 7–13.