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MACROFAUNA ASSOCIATED WITH *PHYLLOCHAETOPTERUS SOCIALIS* AGGREGATIONS IN THE SOUTHWESTERN ATLANTIC

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POLYCHAETES
REFUGES
MACROFAUNA
BIOGENIC STRUCTURES
RÍO DE LA PLATA ESTUARY

ABSTRACT. – Aggregates of *Phyllochaetopterus socialis* Claparède, 1868 have been found near the Rio de la Plata mouth (35° 23' – 35° 31' S; 55° 36' W – 55° 48' W) in November 1997. The depth of the sandy bottom was 11-12 m and the water salinity was 26-30‰. Each aggregate (*ca.* 20 cm diameter) arose from a shell or another small hard object. The macrofauna associated with these aggregates was studied and the results were compared with the available information on hard and soft bottom benthic communities in this area. The more abundant taxa registered were Polychaeta, Mollusca, Bryozoa and Decapod Crustacea. Several sessile species (serpulid polychaetes, thoracic cirripedia, bivalves, bryozoa and ascidiae) grow on the tubes. On the other hand, various polychaete and bivalve species, Anomura and Brachyura Decapod crustaceans and Ophiuroidea find refuge in the spaces between tubes. The macrofauna associated with the aggregates is more diverse than those found in the neighbourhood. The polychaete species belong to different trophic guilds; several species were recorded for the first time in the region and the distribution range of other species was extended. The importance of *P. socialis* aggregates in structuring marine benthic communities is discussed.

POLYCHÈTES
REFUGES
MACROFAUNE
STRUCTURES BIOGÉNIQUES
ESTUAIRE DE RÍO DE LA PLATA

RÉSUMÉ. – Des amas de tubes formés par l'Annélide Polychète *Phyllochaetopterus socialis* Claparède, 1868 ont été découverts et étudiés dans l'estuaire du Rio de la Plata (35° 23' – 35° 31' S; 55° 36' W – 55° 48' W) en novembre 1997. La profondeur du fond sableux est de 11-12 m et la salinité de l'eau 26-30 ‰. Chaque amas (20 cm de diamètre en moyenne) a pour base une coquille ou un autre objet dur de faible dimension. L'inventaire de la macrofaune associée à ces amas est réalisé et les résultats sont comparés aux informations disponibles concernant les communautés benthiques de fonds durs et de fonds meubles de la région. Les taxa les plus abondants numériquement appartiennent aux Polychètes, Mollusques, Bryozoaires et Crustacés Décapodes. Plusieurs espèces sessiles (Polychètes Serpulidae, Cirripèdes thoraciques, Bivalves, Bryozoaires et Ascidies) se développent sur les tubes. En outre, des espèces variées de Polychètes, de Bivalves, de Crustacés Décapodes Anomoures et Brachyoures, et d'Ophiurides sont récoltées entre les tubes. La macrofaune associée aux amas est plus diverse que celle récoltée dans le voisinage. Les Annélides Polychètes appartiennent à différents groupes trophiques. Plusieurs espèces sont signalées pour la première fois dans la région et la répartition d'autres espèces est élargie. L'action de structuration des communautés benthiques par les amas de tubes de *P. socialis* est discutée par les auteurs.

INTRODUCTION

Some marine benthic organisms create biogenic structures which provide structural complexity due to their intrincate architectural forms: seagrasses, seaweed, sponges, hydrozoa, corals, polychaetes, molluscs and bryozoans (Nalesso *et al.* 1995 for a review). These structures are then colonized by other species that obtain food and shelter from predators or physical disturbances. Among polychaetes, many Serpulidae build large biogenic structures, often called "heads" or "reefs", (e.g. *Filograna implexa*, *Serpula vermicularis* and *Ficopomatus enigmaticus*, among others) (Bianchi & Morri 1994), and some Sabellaridae (the European *Sabellaria alveolata* and its new-world counterpart *Phragmatopoma lapidosa*) form extensive "reefs" or bioherms in shallow waters (Pinheiro *et al.* 1997, Wilson 1976). On the other hand, the Onuphidae *Diopatra cuprea* (Woodin 1978) and the Chaetopteridae *Phyllochaetopterus socialis* (Gettleson

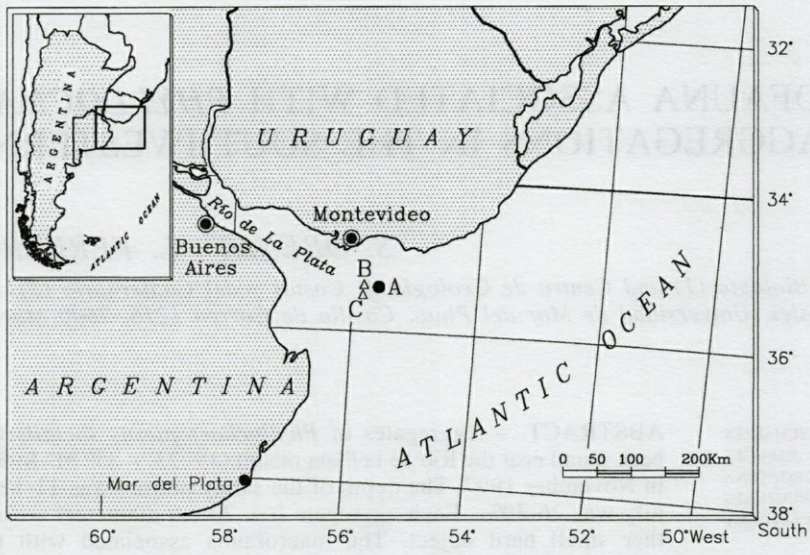

Fig. 1. – Location map and sampling sites (A, B, C). The analiysed sample is denoted with a black circle.

et al. 1985, Nalesso *et al.* 1995) could be considered "refuge-forming" species. All these worms construct tubes, which are calcareous (Serpulidae), made of sand particles and a mucoproteinaceous cement (Sabellaridae, Onuphidae) or only organic (Chaetopteridae); the tubes may eventually coalesce to form large colonies.

The family Chaetopteridae always presents palps of varying lengths. Anterior region has uniramous parapodia; median and posterior regions have biramous parapodia. Setae include capillary, limabate setae and modified spines in setiger 4. The genus *Phyllochaetopterus* has a pair of small tentacular cirri at the base of the large palps. Median notopodia are foliaceous, bilobed and asetigerous. Neuropodia of the median and posterior region have pectinate uncini (Fauchald 1977). *Phyllochaetopterus socialis* Claparède, 1868 is a "small worm seldom exceeding 30 mm length and dark green posteriorly" (Day 1967) which lives in horny tubes, ringed distally, with ramifications, "often aggregated into branching colonies". It is worldwide distributed in coastal waters, from 10 to more than 300 m, and is found on different substrates (muddy, sandy or rocky bottoms) (Abbiati *et al.* 1994). The cosmopolitism of this species is not accepted by all authors (M. Bhaud, pers comm) and the specific name is probably wrong; however face to the absence of pertinent arguments we retain the traditional identification.

There are reports of the presence of *P. socialis* in the Atlantic Ocean, from the USA and the English Channel south to the Falkland (Malvinas) Islands and South Africa, the Mediterranean Sea, the Indian and Pacific Oceans and Australia. Abbiati *et al.* (1994) review the geographic distribution of this species; there are new records from Brazil (Nalesso *et al.* 1995), Rio de la Plata (this paper) and the Argentine continental shelf, 14-30 miles away Mar del Plata (R. Elías, pers comm). Macrofaunal assemblages associated with colonies of *P. socialis* have been described from intertidal (Nalesso *et al.* 1995), 14 m depth (Felder & Chaney 1979) and 50/60 m depth (Gettleson *et al.* 1985) populations.

The aim of this paper is to characterize the macrofauna associated with *Phyllochaetopterus socialis* aggregations in an estuarine subtidal habitat in the southwestern Atlantic and to compare it with other epibiotic communities inhabiting this and other polychaete species.

MATERIAL AND METHODS

Aggregates of *Phyllochaetopterus socialis* have been collected on November 20, 1997, in the mouth of the Rio de la Plata (Fig. 1), by fishing trawls during the BIN Dr Eduardo Holmberg cruise H12/97. The hydrographic conditions are summarized in Table I. On arriving on board, the aggregates were fixed with 4% formaldehyde solution. In the laboratory, 12 aggregates were carefully broken, large organisms were removed by hand, and the remaining debris were washed with tap water through a sieve (0.35 mm mesh). The total sample volume was measured by water displacement. The organisms registered in the aggregates were classified and their relative abundance were estimated as follows: rare (1 individual), scarce (2-5 individuals), abundant (5-20 individuals), and very abundant (> 20 individuals). Poriferans, bryozoans and some polychaetes were identified by E Cuartas, JJ López Gappa and R Elías, respectively. All the polychaete specimens present in the two best preserved aggregates were counted and the species assigned to a feeding guild classification (Fauchald & Jumars 1979)

Table I. – *Phyllochaetopterus socialis.*
Sampling sites of the aggregates and their hydrographic conditions.

sampling site	latitude	longitude	depth (m)	temperature (°C)	salinity (‰)	bottom
A	35°23'S	55°36'W	12	17.3	29.9	sandy
B	35°23'S	55°48'W	11.5	17.8	26.7	sandy
C	35°31'S	55°48'W	11	17.4	28.8	sandy

according to their nutrition type, motility and pharyngeal structures.

RESULTS

Mats were attached to rocky sustrates or empty mollusk shells, and supported a diverse fauna. Eleven phyla were represented: Porifera, Cnidaria, Nemertea, Nematoda, Annelida, Sipuncula, Mollusca, Arthropoda (Crustacea), Bryozoa, Echinodermata and Chordata (Urochordata) (Table II). The available information on the habitat of most of the specimens identified at the species level (in other localities) is summarized in Table III.

The sessile fauna include Demospongiae (Porifera) attached to the tubes and incrusting the hard basis, scarce colonies of *Sertularella striata* (Cnidaria: Hydrozoa), abundant individuals of an indetermined sea anemone, and five bryozoan genera that covers the tubes (although *Aetea anguina* and *Electra monostachys* are also registered on the basis). Abundant *Balanus improvisus* (Cirripedia: Thoracica) and *Corella* sp. (Ascidiacea) are observed on the tubes.

Between the tubes and on the basis there are abundant nemertean, nematoda and polychaete worms. The Sipuncula *Themiste petricola* is found on the hard substrate and densely intertwins among the tubes. Few specimens of *Ophiotrix angulata* and another indetermined ophiurid living between the tubes are the only echinoderms collected.

The total number of polychaetes in the two best preserved *Phyllochaetotpterus socialis* mats (250 and 550 ml respectively) is 1682. The percentage of polychaete families found in these mats is shown in Table IV. The most abundant polychaetes belong to the Serpulidae (78%) and the Terebellidae (10%) in mat #1, Syllidae (58%) and Cirratulidae (11%) in mat #2. Most species belong to the filter-feeder/sessile/tentaculate guild (#1) and to the carnivore/motile/ jawed guild (#2). Both mats presented surface deposit-feeder/sessile/ tentaculate polychaetes and a low percentage of subsurface deposit-feeder/carnivore/motile/jawed (or with eversible sac-like pharinge) polychaetes. Herbivorous polychaetes are absent.

The most abundant molluscs are the bivalves *Lithophaga patagonica, Mytilus edulis platensis* and *Hiatella solida*. The bivalves *Musculus viator, Lyonsia patagonica, Sphenia hatcheri* and *Crassinella marplatensis* are less represented. The bivalves *Gastrochaena carcellessi*, *Brachydontes* sp., *Crassinella lunulata* and the gastropod *Caecum antillarum* are seldom registered. Among the bivalves, *Lithophaga patagonica* is found boring in the hard substrate which forms the basis of the mat and the other species are found attached to the tubes or living in the soft sediment trapped among them.

The decapod crustacean fauna associated with *P. socialis* aggregates consists of two porcellanids crabs (*Pachycheles haigae* and *P. chubutensis*) and one xanthid crab (*Pilumnus reticulatus*) that find shelter between the tubes.

DISCUSSION

The Rio de la Plata is a large, funnel-shaped, estuary which drains the vast Paraná-Uruguay hydrographic basin, the largest in South America after the Amazon River (Urien 1972). It is 270 km long and its width varies from 32 to 230 km. The sediment distribution represents a textural gradation from sands and silty sands, silts and clayed silts, with dispersal rocks and mollusc valves (Urien 1966, Urien *et al.* 1996). Thus, because of the sedimentological characteristics, the bottom of Rio de la Plata represents a monotonous environment and the *Phyllochaetopterus socialis* mats may be a source of variation in the structure of substratum.

The Polychaeta, Mollusca, Bryozoa and Decapod crustacean fauna of *Phyllochaetopterus socialis* aggregates is more diverse than the fauna found in the surrounding benthic communities. Roux & Bremec (1996) studied the benthic communities of the estuary along a transect from the shallow and brackish waters of the Rio de la Plata to the adjacent continental shelf and found 4, 9, 0, 1 species of Polychaeta, Mollusca, Bryozoa and Decapod crustacean respectively. In the mats of *P. socialis*, we found 28 species of polychaetes, 10 of

Table II. – *Phyllochaetopterus socialis*. Macrofauna associated with 12 aggregates and their microhabitats. R: rare, S: scarce, A: abundant, V: very abundant (1, 2-5, 5-20 and > 20 individuals respectively, * more than 400 individuals).

	epizoic, living on the tubes	sheltered, living between the tubes	epifaunal, living on the "basis"	infaunal, living buried in the "basis"	abundance
Phylum Porifera					
Class Demospongiae					
Order Hadromerida					
genus et species indeterminate	x				A
Order Axinellida					
Suberites	x		x		S
genus et species indeterminate	x		x		S
Phylum Cnidaria					
Class Hydrozoa					
Sertularella striata	x				S
genus et species indeterminate	x				R
Class Anthozoa					
Subclass Hexacorallia	x				V
Phylum Nematoda		x	x		V
Phylum Nemertea		x			S
Phylum Sipuncula					
Themiste petricola				x	V
Phylum Arthropoda					
Subphylum Crustacea					
Order Cirripedia					
Balanus improvisus	x				V
Order Decapoda					
Pachycheles haigae		x			S
Pachycheles chubutensis		x			S
Pilumnus reticulatus		x			S
Suborder Amphipoda		x			A
Subclass Ostracoda		x			A
Phylum Mollusca					
Class Bivalvia					
F. Anomiidae					
Pododesmus sp	x				S
F. Mytilidae					
Mytilus edulis platensis	x				A
Musculus viator	x				A
Lithophaga patagonica				x	A
Brachydontes sp.	x				S
F. Lyonsidae					
Lyonsia patagonica		x			S
F. Hiatellidae					
Hiatella solida	x	x			A
F.Gastrochaenidae					
Gastrochaena carcellessi		x			R
F. Crasatellidae					
Crasinella lunulata		x			A
Crassinella marplatensis		x			S
F. Myidae					
Sphenia hatcheri				x	A
Class Gastropoda					
F. Caecidae					
Caecum antillarum		x			S
Class Polyplacophora		x			S
Phylum Annelida					
Class Oligochaeta		x			S
Class Polychaeta					
Family Eunicidae					
Eunice argentinensis		x	x		A
Marphysa aff.*gallucci*		x	x		R
F. Lumbrineridae					
Lumbrineris tetraura		x	x		V
F. Phyllodocidae					
Steggoa sp.				x	V
F. Polynoidae					
Halosydnella australis		x	x		V
Harmothoe sp.		x	x		S
Admetella?		x	x		A
F. Hesionidae					
genus and species indeterminate		x			A
F. Cirratulidae					
Dodecaceria sp				x	V
genus et species indeterminate				x	V

Table II. – (*continued*)

F. Flabelligeridae					
Pherusa cf. *laevis americana*				x	A
F. Terebellidae					
Thelepus plagiostoma				x	V
Thelepus? sp.				x	A
Pista sp				x	S
F. Chrysopetalidae					
genus et species indeterminate		x			A
Paleanotus sp.		x			V
F. Syllidae					
Typosyllis sp		x	x		A
Odontosyllis sp		x	x		S
genus et species indeterminate		x			V*
F. Sabellaridae					
Sabellaria bellis	x		x		A
F. Sabellidae					
Potamilla sp.	x				A
Potamilla cf. platensis	x				V
genus et species indeterminate 1	x				A
genus et species indeterminate 2	x				S
F. Serpulidae					
Hydroides plateni	x		x		V*
Hydroides sp. 1	x				A
Hydroides sp. 2	x				R
F. Spionidae					
Polydora sp.		x		x	V
Polydorella sp.		x		x	R
Phylum Bryozoa					
Aetea anguina	x		x		V*
Celleporella hyalina	x				V
Electra monostachys	x		x		V
Conopeum reticulum	x				V
Alcyonidium sp.	x				A
Phylum Echinodermata					
Class Ophiuroidea					
Ophiothrix angulata		x			S
gen. et sp. indet.		x			S
Phylum Chordata					
Class Ascidiacea					
Corella sp.	x			x	V

Mollusca, 5 of Bryozoa and 3 of Decapod crustacean.

The feeding habits of polychaetes living in *Phyllochaetopterus socialis* mats and in the benthic muddy habitat can be compared. In *P. socialis* mats, the predaceous families represented 40%, the filter-feeder 29%, and the surface deposit-feeder 29% of the total polychaetes found. In those habitats without *P.socialis*, the carnivore/motile or discretaly motile guild represented 50%, and the surface deposit feeder/motile or sessile guild the other 50% of the benthic polychaete families (Roux & Bremec 1996). The apparition of filter-feeder polychaetes in the *P. socialis* mats reflects a larger complexity of the habitat, which provides a suitable and protected habitat for early juvenile development.

According to Nalesso *et al* (1995) the presence of organisms belonging to different trophic level (e.g. the polychaetes in this study) suggests that the community living between the tubes has a complex food web. In fact, this web is more complex that in the soft bottom communities outside the aggregates.

The mollusc species registered in the Rio de la Plata muddy bottom by Roux & Bremec (1996) are different from that associated with *Phyllochaetopterus socialis*. Here, in mats, the most abundant molluscs were Mytilidae that lived attached to the tubes, to the hard basal substrate or buried in it; Roux & Bremec (1996) found only soft-bottom bivalves. On the other hand, the presence of abundant specimens of the bivalve *Hiatella solida* between the tubes is remarkable. The relationship between larvae and adults of members of Hiatellidae and the *Phyllochaetopterus* mats has been well studied in Pugget Sound, Washington (Cooper & Pease 1988). These autors found evidence that a chemical induction of settlement exists for the larvae of the geoduck clam *Panope* (Hiatellidae) and that this induction is originated in the chaetopterid mats. Although *Hiatella* is able to bore into relatively soft rocks, individuals unable to find a suitable spot for penetration, can survive without boring as was observed during this study (Moore & Teichert 1969).

Table III. – *Phyllochaetopterus socialis*. Previously recorded habitat of some macrofaunal species found in aggregates. (*) infaunal habitat.

	Species	hard bottom	soft bottom	ref.
Hydrozoa	*Sertularella striata.*	rocky shores, epibiont of Hydrozoa		Genzano G. personal communication
Polychaeta				Orensanz,1974
Eunicidae	*Eunice argentinensis*	*Mytilus* bed	-	
	Marphysa aff.*gallucci*	under stones, limestone	-	Orensanz,1990
Lumbrineridae	*Lumbrineris tetraura*	*Mytilus* bed, crevices, algal beds	-	Orensanz,1990
Phyllodocidae	*Steggoa* sp.	*Mytilus* bed	-	Orensanz,1974
Polynoidae	*Harmothoe* sp.	*Mytilus* bed, *Macrocystis* beds	-	Orensanz,1974
Cirratulidae	*Dodecaceria* sp	*Macrocystis* beds	-	Orensanz,1974
Terebellidae	*Thelepus plagiostoma*	under stones, cobbles, algal mats	sand	Orensanz,1974
Chrysopetalidae	*Paleanotus* sp.	limestone	coarse sand	Orensanz,1974
Syllidae	*Typosyllis* sp	cobbles	-	Orensanz,1974
Sabellaridae	*Sabellaria bellis*	rocky shores, limestone	sand	Lana &Bremec,1994
Sabellidae	*Potamilla cf. platensis*	-	sand, gravel	Hartmann,1953
Serpulidae	*Hydroides platei*	stones, limestones, mollusks shells		Zibrowius,1971
Sipuncula	*Themiste petricola*	limestone (*)	-	Amor *et al.*,1991
Crustacea				
Cirripedia	*Balanus improvisus*	rocky shores, limestone	-	Spivak & L'Hoste, 1975
Decapoda	*Pachycheles haigae*	rocky shores, limestone	-	Boschi *et al.*, 1992
	Pachycheles chubutensis	rocky shores, limestone	-	Boschi *et al.*, 1992
	Pilumnus reticulatus	rocky shores, limestone	-	Boschi *et al.*, 1992
Bivalvia				
Mytilidae	*Mytilus edulis platensis*	rocky shores, limestone	-	Castellanos,1967
	Musculus viator	limestone	-	Castellanos,1967
	Lithophaga patagonica	limestone *	-	Amor *et al.*,1991
	Brachydontes sp.	rocky shores, limestone	-	Penchaszadeh, 1973
Lyonsidae	*Lyonsia patagonica*	-	sand	Castellanos,1967
Hiatellidae	*Hiatella solida*	rocky shores, limestone	-	Castellanos,1967
Gastrochaenidae	*Gastrochaena carcellessi*	*Mytilus* bed	-	Castellanos,1967
Myidae	*Sphenia hatcheri*	rocky shores, limestone	-	Castellanos,1967
Gastropoda				
Caecidae	*Caecum antillarum*	-	sand	Ríos,1994

The bryozoan fauna of the Rio de la Plata estuary has been scarcely studied (López Gappa, pers comm). The species found in *Phyllochaetopterus socialis* mats have wide geographical distributions. *Celleporella hyalina*, *Electra monostachys* and *Conopeum reticulum* live in shallow coastal Argentine waters (Bremec 1990). *Aetea anguina* has been detected in coasts and continental shelf of southern Patagonia (Lopez Gappa & Lichtschein 1990); this is the first record for the Rio de La Plata area. It is a cosmopolitan species.

European, Floridean and Brazilian sabellarid worm reefs (*Sabellaria alveolata*, *S. nanella* and *Phragmatopoma lapidosa*) (Gore *et al.* 1978) support a diverse decapod crustacean fauna, that always includes a filter-feeder crab (porcellanid), a carnivore crab (usually a xanthid, sometimes *Pilumnus* spp.), and an omnivore crab (either a grapsid or pagurid). Although not highly diverse, the decapod crustaceans found in *P. socialis* mats also includes two porcellanid (*P. haigae* and *P. chubutensis*) and a xanthid (*Pilumnus reticulatus*).

The echinoderm fauna that lives in *Phyllochaetopterus socialis* is more diverse and abundant in North Carolina (USA) and Sao Paulo (Brazil) (Gettleson *et al.* 1985, Nalesso *et al.* 1995) than in the Rio de la Plata.

In this paper we extend the known distribution range for some polychaete species. Some of the indeterminate species, from several families, are probably new for the Rio de la Plata region. *Marphysa* aff. *gallucci*, *Steggoa* sp., *Harmothoe*, *Pista* sp., *Odontosyllis* sp., *Typosyllis* sp. were registered previously for the Magellanic Province but not for the Argentine Province. Meanwhile *Polydorella* sp., *Pherusa* cf. *laevis americana*, an indeterminate Chrysopetalidae, *Admetella* (?) sp. and *Sabellaria bellis* have not been cited for both biogeographical regions (Orensanz 1974, Bremec comm. pers., Bremec 1990) The previous southernmost record of *Sabellaria bellis* was Santa Catarina island, Brazil (Lana & Bremec 1994).

Table IV. – *Phyllochaetopterus socialis*. Trophic guilds of some polychaete species found in two mats (#1 and #2). B: subsurface deposit-feeder; C: carnivore; F: filter-feeder; H: herbivore; S: surface deposit-feeder; D: discretely motile; M: motile; S: sessile; J: jawed; P: pumping; T: tentaculate; X: other structures, usually eversible sac-like pharynges; n: number of specimens.

Family	Species	#1		#2		Guild
		n	%	n	%	
Hesionidae	genus and species indeterminate	-	-	7	0,93	?MJ
Lumbrineridae	*Lumbrineris tetraura*	11	4,07	6	0,80	BMJ
Phyllodocidae	*Steggoa ?*	-	-	19	2,54	CMX
Polynoidae	*Halosydnella australis*	4	1,48	6	0,80	CD?J
	Harmothoe sp.	-	-	2	0,27	CD?J
	Admetella? sp.	-	-	1	0,13	CD?J
Cirratulidae	*Dodecaceria* sp.	-	-	43	5,74	SST
	genus and species indeterminate	-	-	35	4,67	SST
Flabelligeridae	*Pherusa* cf. *laevis americana*	1	0,37	8	1,07	SDT
Terebellidae	*Thelepus plagiostoma*	27	10,00	19	2,54	SST
	Pista sp.	1	0,37	-	0,00	SST
Chrysopetalidae	genus and species indeterminate	4	1,48	4	0,53	CMX
	Paleonotus ? sp.	-	-	9	1,20	CMX
Syllidae	genus and species indeterminate	3	1,11	435	58,08	CMJ
Sabellaridae	*Sabellaria bellis*	-	-	1	0,13	FST
Sabellidae	*Potamilla* sp.	2	0,74	1	0,13	FST
	Potamilla cf. *platensis*	1	0,37	26	3,47	FST
	genus and species indeterminate 1	3	1,11	1	0,13	FST?
	genus and species indeterminate 2	-	-	2	0,27	FST?
Serpulidae	*Hydroides plateni*	212	78,52	65	8,68	FST
	Hydroides sp.1	-	-	5	0,67	FST
	Hydroides sp.2	1	0,37	-	0,00	FST
Spionidae	*Polydora* sp.	-	-	53	7,08	SDT?
	Polydorella sp.	-	-	1	0,13	SDT?
TOTAL		270	100,00	749	100,00	

Biogenic structures provide shelter against predation and food resources to many marine and estuarine organisms due to their structural complexity, and have an important role in the organization of tropical and temperate communities (Menge & Lubchenko 1981). The role of polychaete aggregates as shelters for soft-bottom invertebrates was described for *Diopatra cuprea* (Onuphidae) (Woodin 1978, 1981). However Luckenbach (1987) demonstrated that this species can increase post-settlement mortality of an infaunal bivalve because it provides a shelter for its predators. *Filograna implexa* (Serpulidae) (Heck & Hambrook 1991), *Phyllochaetopterus socialis* (Nalesso *et al.* 1995), *Phragmatopoma lapidosa* (Sabellaridae) (Gore *et al.* 1978, Pinheiro *et al.* 1997) and *Ficopomatus enigmaticus* (Serpulidae) (Luppi 1999) serve as refuges for hard-susbtrate invertebrates. The recruitment success of brachyuran and porcellanid crabs in *F. implexa*, *P. socialis*, *P. lapidosa* and *F. enigmaticus* reefs seems to be related with refuge availability (Gore *et al.* 1978, Felder & Chaney 1979, Heck & Hambrook 1991, Pinheiro *et al.* 1997, Luppi 1999). On the other hand, *Sabellaria alveolata* reefs have a key role in the development of a polychaete community providing the necessary habitat structure (Porras *et al.* 1996). The presence of juvenile polychaetes (syllids, chrysopetalids), juvenile molluscs (hiatellids and mytilids) and decapod crustacea (*Pilumnus reticulatus*, *Pachycheles haigae* and *P. chubutensis*) living in *Phyllochaetopterus socialis* aggregates supports the idea that they act as refuges for recruits of different invertebrates as well as for adult crabs and crab-like decapods.

Most of the species found in mats of *Phyllochaetopterus socialis* are benthic invertebrates which live in hard-substrates (Table III) but not in the sandy-bottom surrounding communities. However, none of them are restricted to the aggregates. These pattern of colonization was also observed in *P. socialis* mats from southern Brazil (Nalesso *et al.* 1995) and in coralligenic aggregations (Laubier 1966). The *P. socialis* mats studied here were collected offshore Punta del Este, Uruguay. The coast in that area is characterized by sandy beaches separated by rocky points. An available list of macrobenthic species from Gorriti and Lobos islands, the nearest hard substrata communities to the sampling sites (80 km), includes 4 polychaetes (some other specimens were identified at

the family level), 8 bivalves, 5 gastropods, 2 cirripedia, 3 crabs, 1 asteroid and 1 bryozoa, among other invertebrates (Riestra & Defeo 2000). From these species, only *Musculus viator*, *Brachydontes* spp., *Pilumnus reticulatus* and the cosmopolitan barnacle *Balanus improvisus* were found in *P. socialis* agreggates. Unfortunately, the intertidal and subtidal polychaete fauna of southern Uruguay rocky shores is poorly known and comparisons with mats of *P. socialis* polychaete fauna were not possible.

Many questions remained unsolved due to the lack of studies on the invertebrate fauna in this area. What is the abundance of the mats? How are colonized these mats? Does colonization involve the settlement of planktonic larvae, trapped in the mats, or the recruitment of juveniles or adults during a wagrant period of their lifes? On the other hand, two other points to develop in the future will be the observation of fauna on mats at different stages of development and the sampling of water in order to identify forms of dissemination. Future research dealing with these and other aspects could elucidate the role of *Phyllochaetopterus socialis* mats in the recruitment pattern of the species living in this assemblage and the impact of a more complex community structuring and stabilizing an estuarine ecosystem.

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