Polychaete distribution patterns on *Chlamys patagonica* of the Magellan Strait

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ABSTRACT

The composition of the community with epibiont polychaetes on a population of *Chlamys patagonica* (King & Bodrerip) was studied together with the rates of covering on the opposite valves and the distribution patterns. A clear differentiation was noted between the covering of the right valves and the left ones, which on average, for the polychaetes is 0.7 % an the right valves but 4.2 % on the left ones. Differences were noted in the patterns and rates of colonization of some polychaete species. *Serpula narconensis* and the sabellariid *Idanthyrsus armatus* were rare on small *Chlamys*, but very common on medium and large ones, averaging about 9 % cover on the left (uppermost) valve in large *Chlamys*, but less than 1 % on the right valve. They ranked fourth, behind bryozoans, sponges and algae, in their contribution to a rich epizoan community, which covered about half the surfaces of both valves, even in small *Chlamys*, and became denser with age. In contrast the spirorbid *Protolaeospira lebruni* was much more numerous on right than left valves, and on small than large *Chlamys*, suggesting that initial colonisation by spirorbids may occur during the juvenile stage, when the *Chlamys* are attached to rocks.

RÉSUMÉ

Modalités de distribution de Polychètes sur *Chlamys patagonica* du détroit de Magellan

La composition d'un peuplement de polychètes épibiontes sur une population de *Chlamys patagonica* et ses rapports avec les autres organismes sessiles ont été étudiées. On a examiné les taux de recouvrement sur les valves opposées ainsi que les modalités de distribution des épibiontes. Une nette différenciation de ces recouvrements a été observée : ils ont (pour les polychètes) des valeurs moyennes de 0,7 % sur les valves de droite et de 4,2 % sur les valves de gauche. Le recouvrement total croît rapidement avec la taille des *Chlamys*. De profondes différences ont également été relevées dans les modalités et le temps de colonisation chez quelques espèces de polychètes. *Serpula narconensis* et le sabellariide *Idanthyrsus armatus* suivent la tendance générale d'augmentation du recouvrement au cours de la croissance des *Chlamys*, atteignant un recouvrement d'environ 9 % sur les valves de gauche des *Chlamys* les plus âgés, mais seulement 1 % sur les valves de droite. Ces espèces participent, en quatrième position, après les bryozoaires, les éponges et les algues, à la formation d'une riche communauté d'épizoaires laquelle recouvre environ la moitié de la surface des deux valves, même chez les jeunes *Chlamys*, et qui devient plus dense avec l'âge. Au contraire, le spirorbe *Protolaeospira lebruni* présente une colonisation initiale rapide des deux valves des *Chlamys* de petite taille, ce qui suggère que cette colonisation initiale des spirorbes peut avoir lieu durant la période juvénile des *Chlamys*, lorsqu'ils sont encore attachés aux rochers.

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INTRODUCTION

As part of an Italian research program on subantarctic areas, an oceanographic expedition visited the Magellan Strait in February-March 1991. The station examined was rich in the pectinid bivalve *Chlamys patagonica* (King & Broderip). Specimens measured up to 8 cm in length and were densely covered with epibionts. This scallop is commercially important and is fished along the Argentinian shelf. Adults belong to the vagile epifauna whereas juveniles attach to the substratum by means of the byssus, but these juveniles were rare in the population examined. This is probably because juveniles do not live in the same area as the adults as in other pectinids (WALOSZEK & WALOSZEK, 1986; DI GERONIMO & ROSSO, 1990). When at rest, adults lie on the substratum on the right valve, which is white and slightly convex, whereas the left valve is turned up, brownish red and more convex. Swimming occurs briefly and rather rarely. *Chlamys patagonica* lives on soft bottoms that can be characterized as sandy to gravelly-sandy. Its shells are among the larger available substrata for attachment of sessile epifauna.

MATERIAL

The study is based on 50 specimens of *C. patagonica* obtained alive at station 21, 52°52,7' S, 70°31,8' W, at a depth of 80 m, North-East of Punta Arenas, in the southernmost part of Paso Ancho, near the mouth of the Segunda Angostura (Fig. 1).

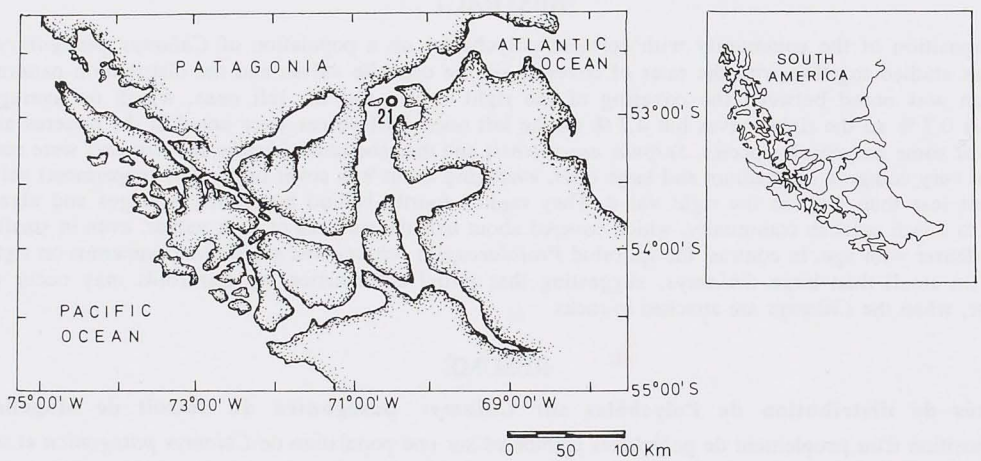

FIG. 1. — Location of station 21

The area is characterized by a sustained hydrodynamism and by turbulent and irregular currents (BRAMBATI *et al.*, 1991). The substratum is gravelly sand with no muddy fraction. *Chlamys patagonica* is both alive and dead (disarticulated valves). Large pebbles and the scallop shells are densely colonized by numerous epibionts. The station is also characterized by the abundance of sponges, gasteropods (trochids), decapod crustaceans, echinoids, asteroids, ophiuroids and ascidians. Mollusk shells dominate the thanatocoenosis (DI GERONIMO *et al.*, 1992).

METHODS

The percentage of the surface occupied by polychaete tubes was calculated for each valve with respect to the total area. The sample of *Chlamys* was then subdivided into three size classes each corresponding to a different growth stage (Table 1). The growth rate of *C. patagonica* is slow; according to WALOSZEK & WALOSZEK (1986),

this species needs 3-5 years to reach a size of 50-60 mm. The average dominance value of each polychaete species is given for each size group, the composition of the epifauna varying with the age (i.e. size) of the single pectinid. The patterns of encrusting species found on each shell (left and right valves) were drawn, showing the position and relative areas covered by each of the polychaete species. The shells mapped were arbitrarily divided into nine regions and the percentage cover of each species was estimated for each region and was then calculated for the three size classes, roughly following the method used by WARD & THORPE (1991).

TABLE 1. — Subdivision into three size classes of the sample of *Chlamys patagonica.*

	Length (mm)	Width (mm)	Thickness (mm)
Group A	< 3.5	< 3.5	< 1.4
Group B	3.5 - 6.2	3.5 - 6.1	1.4 - 1.2
Group C	> 6.3	> 6.2	> 2.1

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RESULTS

The data collected provided information on the composition of the epifauna and distribution of the polychaete species and other epibionts. Epibionts (ROSSO & SANFILIPPO, 1992) essentially belong to a few group of organisms (Table 2).

TABLE 2. — Epibiont groups on *Chlamys patagonica.*

Epizoan community on *Chlamys patagonica*								
	Group A		Group B		Group C		TOTAL	
	Left	Right	Left	Right	Left	Right	Left	Right
	%	%	%	%	%	%	%	%
Bryozoans	27.7	8.0	35.0	25.8	48.3	40.6	36.5	25.0
Sponges	32.1	3.0	18.3	21.4	13.6	6.8	20.6	13.4
Algae		34.1	4.2	3.8	0.4	3.1	2.2	11.2
Polychaetes		1.0	2.7	0.7	9.7	0.7	4.2	0.7
Hydroids			0.6	0.4	3.2	2.7	1.1	0.9
Barnacles					0.5		0.1	
Brachiopods			0.1	0.1	0.1	0.1	0.1	0.1
Bivalves		0.1	0.1	0.1	0.1	0.1	0.1	0.1
Foraminifers		0.1	0.1	0.1	0.1	0.1	0.1	0.1
Others			0.1		1	0.1	0.3	0.1
TOTAL COVERING	**59.8**	**46.3**	**61.2**	**52.4**	**77.0**	**54.3**	**65.3**	**51.6**

Bryozoans and sponges are dominant, followed by the green algae; whereas, polychaetes and hydroids are subordinate. The composition of the epifauna differed between the right and left valves. The left valves are colonized by epibionts which develop in height like large agglutinant polychaetes, colonies of celleporiform bryozoans, large barnacles, brachiopods and erect hydroids. On the contrary, the right valves are dominated by less voluminous forms like membraniporiform bryozoans and spirorbids. The differentiation between the opposite

valves is also shown by the average total covering: 51.6 % on the right valves, 65.3% on the left valves. On some valves the covering may even reach and exceed 100 %. The total covering tends to increase from the smaller sized scallops to the larger ones, a phenomenon particularly evident in bryozoans and hydroids.

Five species of polychaetes were identified including three Spirorbidae, one Serpulidae and one Sabellariidae (Table 3). Four were common and widespread around the southern part of South America and Magellan strait (HARTMAN, 1966; KNIGHT-JONES & KNIGHT-JONES, 1984, 1991), whereas *Romanchella* cf. *inventis* was here recorded for the first time. Instead *R. inventis* was only known from the subantarctic Tristan da Cunha and Marion Islands (HARRIS, 1969; KNIGHT-JONES & KNIGHT-JONES, 1984).

Tubes of *Serpula narconensis* from Magellan station 21 and other subantarctic areas have a pink or light orange colouring, whereas tubes from high latitude Antarctica were entirely white and opaque. In fact, the Magellan Strait tubes have a thin, coloured, transparent outer layer. It was also observed that juvenile tubes were morphologically different: they were devoid of the pigmented transparent outer layer and appeared white, with three longitudinal, toothed keels. The keels disappear in the adults and the tube tends to become smooth, in contrast to young specimens.

TABLE 3. — List of polychaete species identified on *Chlamys patagonica*.

Polychaete community on *Chlamys patagonica*								
POLYCHAETA	Group A		Group B		Group C		TOTAL	
	Left	Right	Left	Right	Left	Right	Left	Right
	%	%	%	%	%	%	%	%
SABELLARIIDAE								
Idanthyrsus armatus Kinberg			1.9		8.6		3.5	
SERPULIDAE								
Serpula narconensis Baird			0.4	0.2	0.6	0.2	0.3	0.1
Serpulidae spp.				0.1				
SPIRORBIDAE								
Protolaeospira lebruni (Caullery & Mesnil)		0.6	0.2	0.2	0.1	0.4	0.1	0.4
Romanchella perrieri (var.a) Caullery & Mesnil)			0.1	0.1	0.1	0.1	0.1	0.1
Romanchella cf. *inventis* (Harris)			0.2	0.1	0.1	0.1	0.1	0.1
Spirorbidae spp.			0.1	0.1	0.1	0.1	0.1	0.1
Others			0.1	0.3	0.4	0.1	0.1	0.1
TOTAL COVERING	**0.0**	**0.6**	**3.0**	**1.1**	**10.0**	**1.0**	**4.3**	**0.9**

The average total surface covering by these species showed a higher rate of encrustation on the left valves (4.2 %) than on the right (0.7 %). Similarly, the total covering increased as the pectinids grew larger. Although the serpulids and sabellariids were more common in larger scallops, the reverse was true for the spirorbids (Fig. 2).

S. narconensis was not present on the smallest pectinids (group A) and colonized only medium to large scallops which thereby followed the general trend of the other epibionts (Fig. 2). The average covering by *S. narconensis* was higher on the left valves (0.4 % and 0.6 % of groups B and C) compared to the right ones (0.2 % and 0.2 % of groups B and C).

The sabellariid *Idanthyrsus armatus* showed, even more markedly, the same distribution trend as *S. narconensis*: its big agglutinant tubes encrust only the left valves of medium and large sized scallops, with covering values from 1.9 % to 8.6 %.

The spirorbid *Protolaeospira lebruni* colonizes all three size groups. More right valves are covered than left ones which is the reverse of that observed in the serpulid and sabellariid. It colonizes first the right valves of the smaller scallops (group A) with a 0.6% dominance which progressively decreases to 0.4 % (group C). Moreover, *P. lebruni* predominantly settles on the umbonal region of both valves (Fig. 2). The other species of spirorbids are rare and are present only on the larger size groups.

CONCLUSIONS

The frequency of polychaetes tends to increase from the smaller valves to the larger ones which follows the general trend of the other epibionts. However, the principle spirorbid species colonizes the smaller scallops, whereas the other polychaetes encrust only medium or large sized scallops. This could be due to different strategies depending on the species. Some species appear to be pioneer forms that colonize the newly available substrata (young pectinids), whereas others appear only when the community is already mature, on medium and large sized pectinids.

The larger serpulids and sabellariids colonize only the left upturned valves, a survival strategy related more to the size of their tubes, rather than to a phototropism. In contrast, the principle spirorbid species, which are abundant on the low profiled right valves, appear better adapted to the physical abrasion effects, in direct contact with the substratum. KNIGHT-JONES & KNIGHT-JONES (1984) also concluded that *P. lebruni* has the capacity of withstanding sand abrasion. This was hypothesized by WARD & THORPE (1991) for bryozoans. The spirorbid distribution was not homogeneous on the right valve, but showed a concentration towards the umbonal regions, particularly on the posterior side. The higher umbonal density may be due to more prolonged settlement, since this area has been available for colonisation for a longer period than the younger peripheral parts of the shell. It is unlikely to be related to the swimming of *Chlamys*. This is caused by two jets of water emitted from between the valves dorsally (MOORE & TRUEMAN, 1971), but swimming excursions are brief and very infrequent.

It seems possible that the asymmetrically posterior distribution of spirorbids may be related to the pattern of eddies set up by the excurrent stream from the *Chlamys* mantle cavity, which could conceivably bring in settling larvae and nutrients in suspension. Probably, moreover, much of the initial spirorbid settlement occurs during the juvenile stage, when the *Chlamys* is attached with the anterior side partially in contact with the substratum. The relative abundance of spirorbids on smaller *Chlamys* could be due to their having been recently in juvenile situations, with byssal attachments to larger rocks in shallower water, where spirorbids are more dominant (KNIGHT-JONESS, com. pers.) The much denser algal cover also suggests that they may have been recently in shallower water, although it must be admitted that algae are among the earliest colonisers of new surfaces.

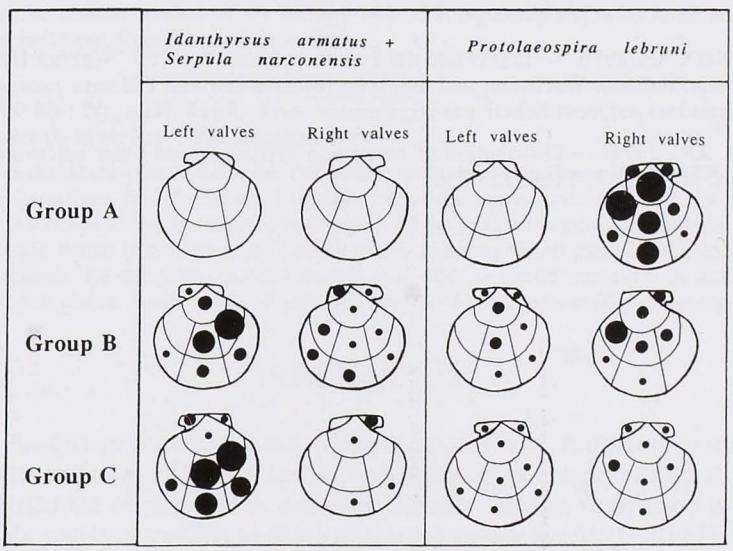

FIG. 1. — Diagrams showing changes in abundance of covering of some significant polychaetes species depending on shell size (covering percentage for each of the nine mapped areas).

• < 1 %
● = 1 % to 10 %
● = 10 % to 30 %
● > 30 %

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