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The peracarid epifauna associated with the ascidian *Pyura chilensis* (Molina, 1782) (Ascidiacea: Pyuridae)

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Epifaunal peracarids inhabit a variety of biogenic substrata, including ascidians. Herein we examined the peracarid fauna living on the tunica of the sublittoral ascidian *Pyura chilensis* growing in offshore and nearshore conditions in Bahía San Vicente, Chile. From a total of 38 samples we collected 17 species of Amphipoda, five Isopoda and two Tanaidacea. The similarity between the sites was high (73.8%, Sorensen's index). Species diversity (H') was 2.8 and 2.6, evenness (J) was 0.7 and 0.6 at the offshore and nearshore site, respectively. Both species and individual number increased significantly with the size (volume) of the ascidian samples, and these relationships did not differ between the sites. Many species, in particular the most abundant ones, occurred at both sites, but some species were restricted either to the offshore (three species) or to the nearshore site (seven species). Amphipods and tanaids were the most abundant taxa at both sites. The peracarid fauna at both sites was dominated by suspension-feeding peracarids ($>80\%$ of the individuals), which utilize the ascidians primarily as shelter, feeding on allochthonous material, i.e. not originating from the ascidians. It is suggested that the high percentage of suspension-feeding species among the epifaunal peracarids is due to the fact that ascidians settle and grow at sites that provide optimal feeding conditions for these organisms.

KEYWORDS: Peracarida, diversity, tunicata, epifauna, suspension-feeding.

Introduction

Epifaunal peracarids colonize a variety of different substrata ranging from algae, eelgrass, cordgrass, worm tubes, bivalves, bryozoan and hydrozoan colonies to sponges (Frith, 1976; Biernbaum, 1981; Moore, 1986; Tsuchiya and Nishihira, 1986; Costello and Myers, 1987; Tsuchiya and Bellan-Santini, 1989; Gambi *et al*., 1992; Lewis, 1992; Nelson and Demetriades, 1992; Krapp-Schickel, 1993; Covi and Kneib, 1995; Conradi *et al*., 1997; Taylor, 1998). Within these microhabitats, peracarids

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find food (e.g. Schaffelke *et al.*, 1995; Pavia *et al.*, 1999) and shelter (e.g. Holmlund *et al.*, 1990; Duffy and Hay, 1991). Some of these substrata serve both these functions simultaneously, in particular seagrasses and algae (Duffy and Hay, 1994; Boström and Mattila, 1999; Arrontes, 1999; but see also Buschmann, 1990). Consequently, these plant substrata harbour large aggregations of herbivore peracarids that either feed directly on their hosts or on epiphytes growing on them (e.g. Gambi *et al.*, 1992). Substrata composed of or constructed by metazoan organisms such as worm tubes, bivalves, bryozoans, hydrozoans and sponges may also host high densities of herbivorous peracarids (e.g. Nelson and Demetriades, 1992) which graze on epiphytic algae growing on or between these hosts. Besides these herbivorous peracarids that feed on resources produced by or growing on their primary settlement substratum, there is a large group of peracarids that feed on allochthonous materials. These resources are produced elsewhere and independently from the substrata, to which they are transported by water currents. Peracarids that feed on such allochthonous materials may comprise deposit-feeders (Moore, 1973) or suspension-feeders (Fenwick, 1976; Krapp-Schickel, 1993). It can be hypothesized that on metazoan hosts of no or limited food value for peracarids, those species that feed on allochthonous materials will dominate.

Many studies on epifaunal peracarids indicate that a linear relationship exists between the size of the substratum-forming organisms and the numbers of individuals and species of associated epifauna (Gunnill, 1982; Costello and Myers, 1987; Lewis, 1987; Thiel and Vásquez, 2000). Within particular sites, a linear increase in abundance of epifaunal peracarids has often been reported, regardless of whether the substratum-forming organisms were plants or metazoans. However, between sites, distinct differences in number of epifaunal peracarids per substratum unit can exist, which usually is related to site-specific differences in wave exposure, predation pressure or food supply (e.g. Fenwick, 1976; Edgar and Aoki, 1993; Taylor and Cole, 1994). Several of these studies indicated that suspension-feeding epifauna occurred at much higher densities at exposed sites than at wave-sheltered sites.

Peracarids do occur abundantly on/in suspension-feeding organisms such as bivalves, sponges and ascidians. Interestingly, studies on the peracarid epifauna associated with sponges are numerous (Frith, 1976; Biernbaum, 1981; Peattie and Hoare, 1981; Vader, 1984a; Voultsiadou-Koukoura *et al.*, 1987; Serejo, 1998), while relatively little is known about the peracarid epifauna associated with ascidians (for exceptions reporting on epifauna of ascidians see Monniot, 1965; Vader, 1984b; Fielding *et al.*, 1994). Many of the studies on the peracarid fauna associated with sponges revealed that tube-building and suspension-feeding species tend to dominate (Frith, 1976; Biernbaum, 1981; Peattie and Hoare, 1981; Costello and Myers, 1987). Species that feed on the sponges themselves may also occur, albeit usually in low abundance (Kunzmann, 1996). A similar pattern with a dominance of suspension-feeding species can also be expected for the peracarids living on large solitary ascidians. Despite the common occurrence of dense ascidian assemblages (see e.g. Svane and Lundälv, 1982; Fairweather, 1991; Clarke *et al.*, 1999; Cohen *et al.*, 2000), which are comparable to extensive sponge communities, worm reefs or mussel beds with respect to their spatial extensions, little is known about the peracarid fauna dwelling among these ascidians. In the present study, we examined the species composition of the peracarid assemblage dwelling on the ascidian *Pyura chilensis* Molina, 1782 at a nearshore and an offshore site in south-central Chile.

Materials and methods

The ascidian *Pyura chilensis* occurs along the Pacific coast of Chile from latitude 18 to 44 S (Lancellotti and Vásquez, 2000). Many individuals of this large solitary ascidian grow together in dense clumps. The tunicae of various individuals fuse intimately, providing abundant interstitial spaces of different sizes. Aggregations of individuals of *P. chilensis* can comprise varying numbers of either a few individuals forming small clumps or hundreds of individuals forming dense carpets. The surface of the ascidians and the spaces between neighbouring individuals are colonized by a diverse community of epifaunal organisms comprising among others polychaetes, molluscs and crustaceans (Guiler, 1959). *Pyura chilensis*, locally denominated as 'piure', is highly sought after by the coastal population. In some regions of the Chilean coast, it is of great economic importance (Cea, 1973). Reports by local fishermen had indicated that individuals of *P. chilensis* growing at offshore sites differ in their load of epibionts from those growing at nearshore sites.

Samples were taken in June 1998 at two sites in Bahía San Vicente, Chile (36°44′48″S, 73°10′22″W). The offshore site is close to Roca Navia while the nearshore site is located near Playa Ramuntcho (figure 1). At a depth of approximately 5 m below MLW, clumps of ascidians comprising several individuals were separated from the rock surface using flat knives and chisels. Immediately upon removal from the substratum, the samples were placed in meshbags (1 mm mesh size). In the laboratory, samples were fixed in 10% formalin and later preserved in 70% ethanol. The samples were processed over a white tray. The ascidian aggregations were

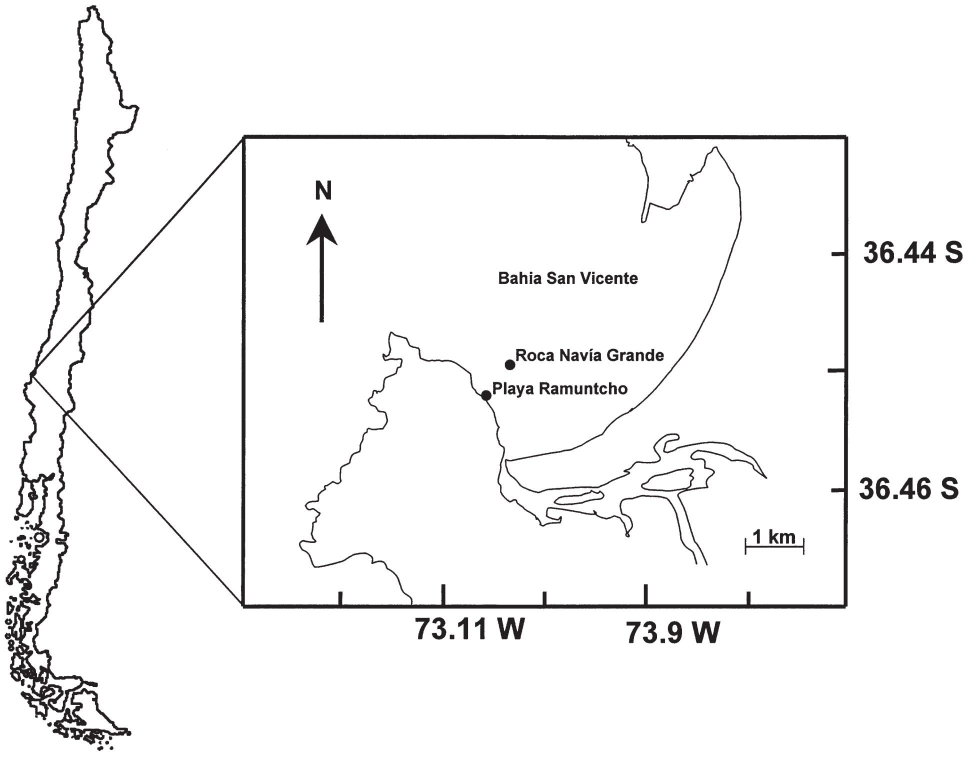

FIG. 1. Map of Bahia San Vicente (Chile) with the two sampling sites, one at the exposed outer coast (offshore) and the other one in the wave-sheltered inner bay (nearshore).

separated and all macrofauna individuals >1 mm were sorted from the samples. For volume determination, the ascidians were placed in a jar filled to the rim with water, and the volume of the displaced water was measured. A total of 38 samples, 17 from the offshore site and 21 from the nearshore site, was collected and analysed in this study.

We calculated diversity (Shannon-Wiener, H') and evenness (J) of the peracarid assemblage at the two sites. Additionally, the possible influence of individual number and sample volume on the number of species at the two sites was evaluated via ANCOVA after $\log(N+1)$ transformation of the data (Sokal and Rohlf, 1995).

Results

Taxonomic and functional composition of the peracarid fauna

We found a total of 24 epifaunal peracarid species living on *Pyura chilensis*, 17 species of Amphipoda, five Isopoda and two Tanaidacea (table 1). The majority of peracarid species occurred at both sites, but three species were only recorded at the offshore sites, and seven species have only been found at the nearshore site. The taxonomic analysis of the peracarid assemblage revealed that amphipods and tanaids occurred in most of the samples while isopods only occurred in 23.5% of the samples at the offshore site and in 47.6% of the samples at the nearshore site (table 2a; figure 2a). At both sites, the amphipod *Ventojassa frequens* and the two tanaid species were the most abundant peracarids (table 1). These three species also occurred in the majority of samples, and many individuals of these species were juveniles. Mean abundance was higher at the nearshore site owing to the fact that some samples at this site were substantially larger than at the offshore site (see below). The analysis of functional groups demonstrates that suspension-feeders strongly dominated the peracarid assemblage at both sites (table 2b; figure 2b). Besides grazing peracarids that reached a relative abundance of 8.3% at the offshore site and 13.9% at the nearshore site, no other functional group was of numeric importance (figure 2b). Deposit-feeding peracarids did not occur in the samples.

Structure of the peracarid assemblage

Diversity at the offshore site ($H'=2.8$) was slightly higher than at the nearshore site ($H'=2.6$) (table 1). Accordingly, evenness was slightly higher at the offshore site ($J=0.7$) compared to the nearshore site ($J=0.6$). The similarity between the two sites was 73.8% (Sorensen's index).

At both sites, the number of species per sample depended significantly on the number of individuals per sample (ANCOVA, $F_{1,34}=286.159$, $P<0.001$) (figure 3). The ANCOVA on the scaling relationships of the covariable (individual number) and number of species revealed that the slopes did not differ significantly between the offshore and the nearshore site ($F_{1,34}=0.643$, $P=0.428$). Following adjustment for the effect of the covariable (individual number), significant differences between the two sites were found (table 3). Also, at both sites, the number of individuals as well as the number of species were dependent on the volume of the individual samples of *Pyura chilensis* ($\mathrm{ANCOVA}_{\mathrm{individuals}}$, $F_{1,34}=32.381$, $P<0.001$; $\mathrm{ANCOVA}_{\mathrm{species}}$, $F_{1,34}=29.367$, $P<0.001$) (figure 4a, b). The ANCOVA on the scaling relationships of the covariable (volume) and number of individuals ($F_{1,34}=3.918$, $P=0.056$; figure 4a) as well as on number of species ($F_{1,34}=2.179$, $P=0.149$, figure 4b) revealed that the slopes did not differ significantly between the offshore

Table 1. Species, functional group, and taxonomic relationship of epifaunal peracarids from *Pyura chilensis* at an offshore ($N=17$) and a nearshore site ($N=21$) in Bahia San Vicente, Chile.

	Offshore						Nearshore			
	Functional group	Taxon	Mean	Maximum	Relative abundance	Frequency	Mean	Maximum	Relative abundance	Frequency
Jassa alonsoae Conlan	s	a	0.1	1	0.6	5.9	–	–	–	–
Ventojassa frequens (Chilton)	s	a	3.7	21	40.1 (1)	64.7 (1)	6.4	37	32.9 (2)	76.2 (1)
Gammaropsis typica (Chilton)	s	a	0.2	1	2.5	23.5 (5)	0.2	1	1.0	19.0
Gammaropsis sp. A	s	a	–	–	–	–	0.1	1	0.2	4.8
Corophium sp. A	s	a	0.3	2	3.2	23.5	0.4	3	2.2	28.6 (4)
Ericthonius sp. A	s	a	–	–	–	–	0.1	1	0.5	9.5
Stenothoe sp. A	s	a	0.5	2	5.7 (4)	41.2 (4)	0.2	1	1.0	19.0
Caprella equilibra Say	s	a	0.1	1	0.6	5.9	–	–	–	–
Deutella venenosa Mayer	s	a	0.1	1	0.6	5.9	0.1	1	0.2	4.8
Tanais cf. *marmoratus* Nordenstam	s	t	1.2	5	12.7 (3)	58.8 (2)	6.5	30	33.4 (1)	76.2 (1)
Tanaid sp.†	s	t	1.9	10	20.4 (2)	47.1 (3)	2.2	10	11.2 (3)	66.7 (3)
Elasmopus rapax Costa	p	a	–	–	–	–	0.1	1	0.2	4.8
Elasmopus sp. A	p	a	0.2	1	1.9	17.6	0.2	2	1.2	14.3
Seba typica Chilton	p	a	0.2	1	1.9	17.6	0.1	1	0.5	9.5
Lysianassidae sp. indet.	p	a	0.1	1	0.6	5.9	0.1	1	0.5	9.5
Hyale maroubrae Stebbing	g	a	0.1	1	0.6	5.9	–	–	–	–
Ischyromene tuberculata Menzies	g	i	–	–	–	–	0.1	1	0.5	9.5
Jaeropsis bidens Menzies	g	i	0.4	4	3.8 (5)	11.8	1.9	22	9.5 (4)	28.6 (4)
Neojaera elongatus Menzies	g	i	0.1	1	0.6	5.9	0.2	2	1.2	19.0
Cymodocella foveolata Menzies	g	i	–	–	–	–	0.1	1	0.5	9.5
Iais cf. *chilensis* (Winkler)	g	i	0.3	3	3.2	17.6	0.4	5	2.2 (5)	23.8
Gitanopsis sp. A	?	a	–	–	–	–	0.1	1	0.2	4.8
Ampilochus sp. A	?	a	0.1	1	0.6	5.9	0.1	1	0.5	9.5
Maera cf. *incerta* Chilton	?	a	–	–	–	–	0.1	1	0.2	4.8
Total number of individuals per sample			9.2	32			19.5	74		
Total number of species per sample			3.6	8			4.5	12		
Diversity (H')					2.79				2.59	
Uniformity (J)					0.68				0.59	

Values in parentheses indicate the five dominant species with respect to relative abundance (percentage total peracarid individuals) and to frequency of occurrence (percentage of samples containing respective species).

s, suspension-feeder; g, grazer; p, predator/scavenger; a, amphipod; i, isopod; t, tanaid.

†Same species as in Thiel and Vásquez (2000).

Table 2. Number (and percentage) of samples that contained members of (a) taxonomic groups and (b) functional groups of epifaunal peracarids from *Pyura chilensis* at an offshore and a nearshore site in Bahia San Vicente, Chile.

	Offshore	Nearshore
(a) Taxonomic groups		
Tanaids	12 (70.6%)	18 (85.7%)
Isopods	4 (23.5%)	10 (47.6%)
Amphipods	14 (82.4%)	16 (76.2%)
Total samples	17 (100%)	21 (100%)
(b) Functional groups		
Unknown	1 (5.9%)	3 (14.3%)
Predator	5 (29.4%)	7 (33.3%)
Grazer	5 (29.4%)	10 (47.6%)
Suspension-feeder	15 (88.2%)	19 (90.5%)
Total samples	17 (100%)	21 (100%)

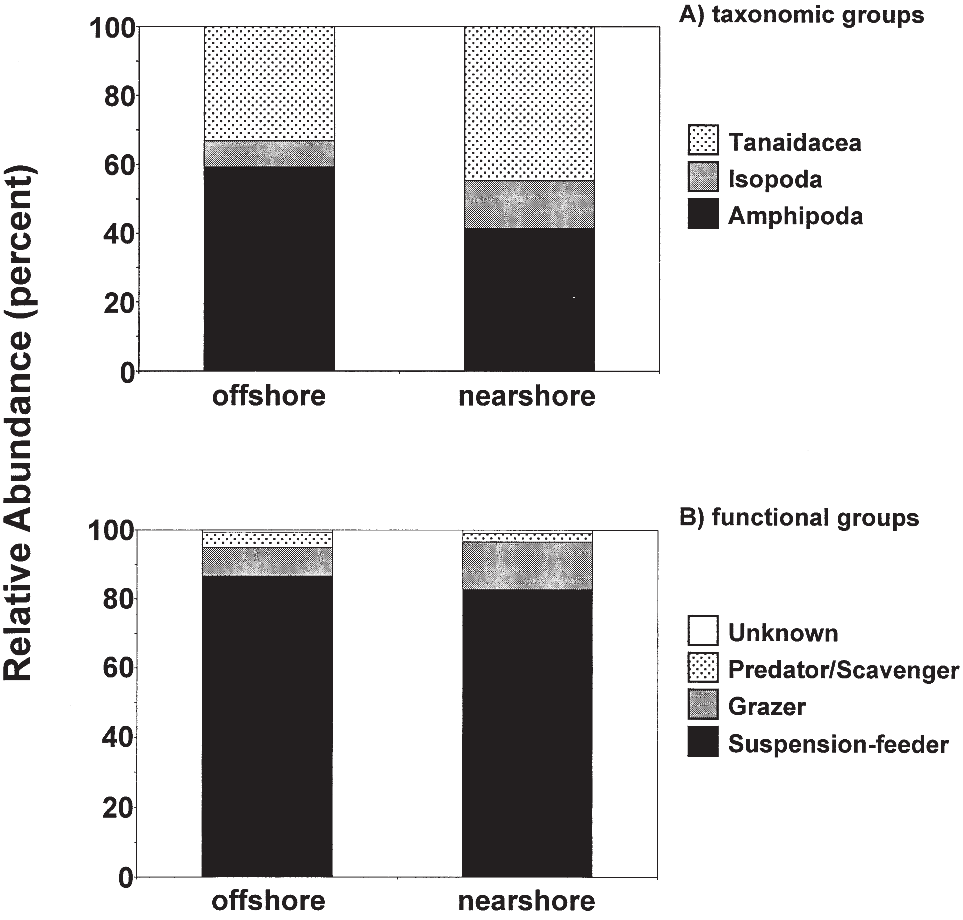

FIG. 2. Relative abundance of (a) taxonomic groups and (b) functional groups of epifaunal peracarids from *Pyura chilensis* at the offshore and the nearshore site.

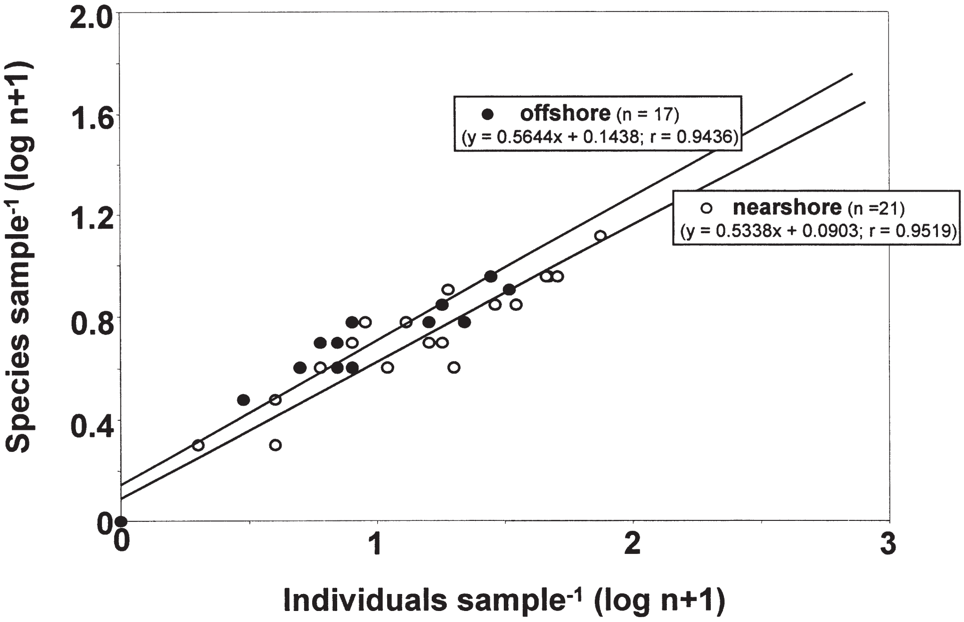

Fig. 3. Relationship between species number and individual number for epifaunal peracarids from *Pyura chilensis* at the offshore ($N=17$) and the nearshore site ($N=21$).

Table 3. Peracarid crustaceans on ascidians *Pyura chilensis*; results of ANCOVA on adjusted means for differences in species number per sample between the nearshore ($N=21$) and the offshore site ($N=17$) with individual number as covariable.

	Sum of squares	df	*F*	*P*
Site	0.058	1	6.821	0.013*
Individual number (covariable)	0.671	1	312.796	<0.001*
Error	0.299	35		

*$P<0.05$.

and the nearshore site. Following adjustment for the effect of the covariable (volume), no significant differences were found between sites, neither for the number of individuals (table 4a) nor for the number of species (table 4b).

Discussion

The peracarid assemblage that colonizes the outer surface of *Pyura chilensis* is strongly dominated by suspension-feeding species. Three suspension-feeding species constitute >70% of all peracarid individuals both at the offshore and the nearshore site. Most of the peracarid species reported in this study also occur on a wide variety of algal substrata (e.g. Thiel and Vásquez, 2000). This suggests that these species colonize any substratum as long as environmental conditions are favourable. Possibly, large solitary ascidians grow only in environments that are also beneficial for suspension-feeding peracarids.

Ascidians, such as aggregations of individuals as found in the genus *Pyura*, represent a substratum of high structural complexity offering many interstitial spaces in which associated macroinvertebrates can find shelter from disturbance and

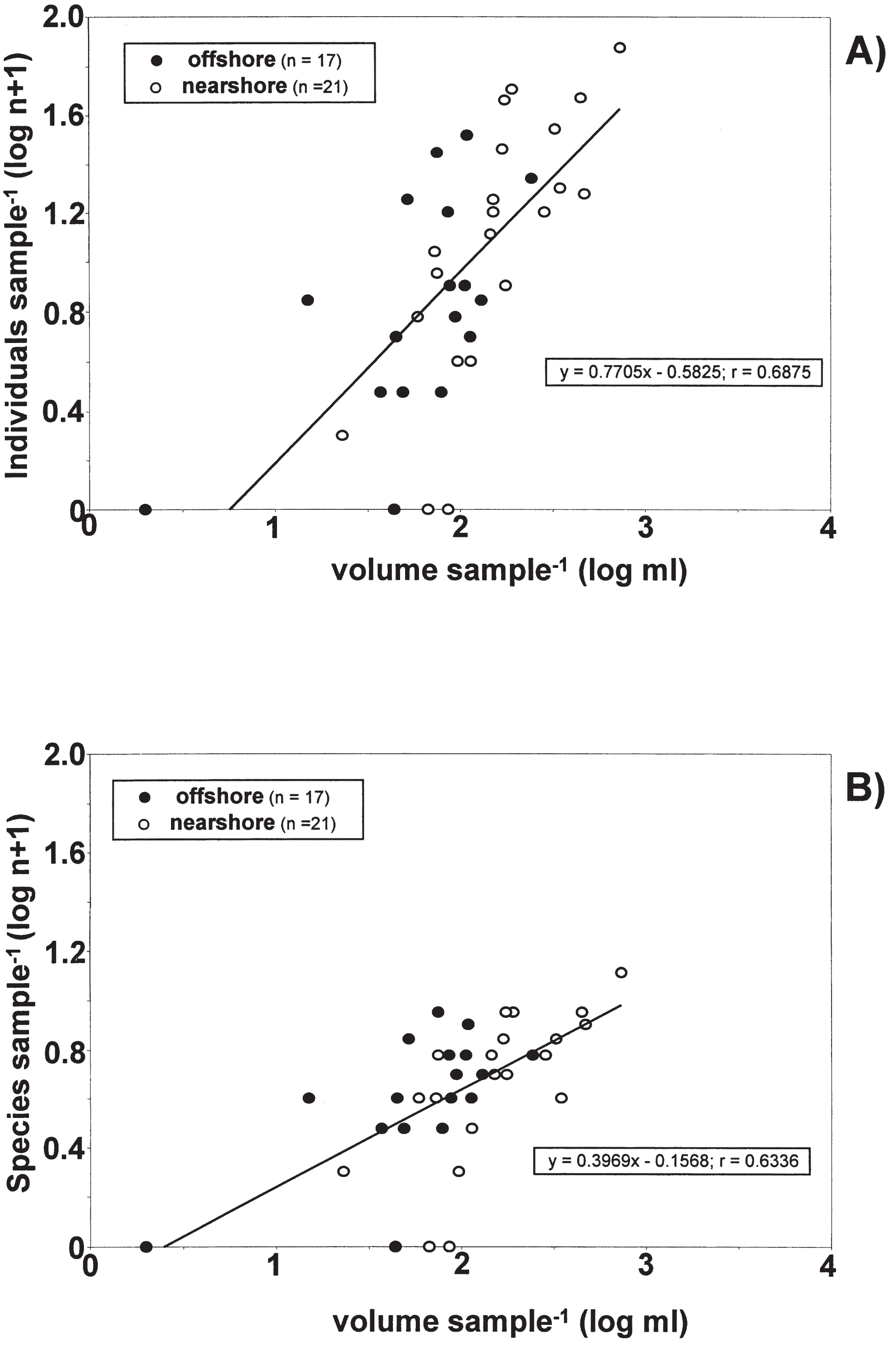

FIG. 4. Relationship between volume of sample and (a) number of individuals and (b) number of species for epifaunal peracarids from *Pyura chilensis* at the offshore ($N=17$) and the nearshore site ($N=21$).

Table 4. Peracarid crustaceans on ascidians *Pyura chilensis*; results of ANCOVA on adjusted means for differences in (a) Individual number per sample and (b) Species number per sample between the nearshore ($N=21$) and the offshore site ($N=17$) with sample volume as covariable.

	Sum of squares	df	*F*	*P*
(a) Individual number				
Site	0.061	1	0.424	0.519
Volume (covariable)	3.993	1	27.933	<0.001*
Error	0.004	35		
(b) Species number				
Site	0.146	1	3.108	0.087
Volume (covariable)	0.320	1	28.015	<0.001*
Error	1.649	35		

*$P<0.05$.

predation (Fielding *et al.*, 1994). Thus, ascidians provide a substratum ideally suited for survival and growth of small and juvenile organisms, such as is known from other biotic habitats. Indeed, in aggregations of *P. chilensis* high percentages of juveniles were found among the associated macrofauna (e.g. Pycnogonida with 44% juveniles, and Bivalvia with 50% juveniles—Sepúlveda, unpublished data). Many of these juveniles, after growing up, may emigrate from these biotic habitats, while new recruits may continuously arrive. Thus, for many associated species, aggregations of *P. chilensis* represent a transitory habitat, primarily for juveniles. Similar observations have also been made for macrofauna associated with macroalgae (Worthington and Fairweather, 1989; Moreno, 1995; López and Stotz, 1997) or with mussel beds (Navarrete and Castilla, 1990). In contrast to these transitory macrofauna species, peracarid crustaceans (usually <10 mm adult body length) possibly remain for long time periods in aggregations of *P. chilensis*. Long-lasting residence has recently been demonstrated for juvenile amphipods living on their food algae (Poore and Steinberg, 1999), and suggested for epifaunal peracarid species inhabiting kelp holdfasts (Thiel and Vásquez, 2000). Peracarid crustaceans abound in environments created by habitat-forming species, which may be due to the fact that the available interstitial spaces strongly correlate with peracarid body size. The peracarid epifauna in these biogenic habitats is dominated by grazing and suspension-feeding species (table 5). Suspension-feeding peracarids appear to dominate on subtidally growing ascidians and sponges, but they can also be frequently found on blades of macroalgae and seagrasses (table 5). These epibenthic substrata may represent ideal vantage points (*sensu* Moore and Earll, 1985) for suspension-feeding peracarids.

Many epifaunal peracarid species occur on a variety of different substrata (Poore *et al.*, 2000). Taylor and Cole (1994) mentioned that epifaunal species are not very selective with respect to their hosts. Similar observations were made by Holmlund *et al.* (1990) and Duffy and Hay (1991, 1994) who found that certain peracarid species occur on a wide variety of algal substrata. However, these authors revealed that epifaunal amphipods prefer particular algal species as food and have higher survival rates on some algal species, which they attributed to different protective values of these algae. These studies were primarily concerned with grazing amphipods, which also use their algal substratum as food; it is therefore not surprising

Table 5. Functional groups of dominant epifaunal peracarid species reported from the respective biogenic substratum; for each study only the five dominant species are considered, if less than five species were reported only these are considered.

	Suspension-feeders	Grazers/borer	Deposit/detritus-feeders	Predators/scavengers	Unknown	Reference
Macroalgal blades (s)		4				Kraufvelin, 1999
Macroalgal blades (i)	1	4				Gunnill, 1982
Macroalgal blades (s)		4			1	Edgar, 1983
Macroalgal blades (i)	1	3				Krapp-Schickel, 1993
Macroalgal blades (s)	3	1			1	Krapp-Schickel, 1993
Macroalgal blades (s)	2	3				Taylor, 1998
Macroalgal blades (s)	3	1			1	Duffy, 1990
Macroalgal blades (s)	3	1			1	Fenwick, 1976
Macroalgal blades (s)	4	1				Moore, 1973
Macroalgal holdf. (s)	2	2			1	Thiel and Vásquez, 2000
Seagrass blades (s)	3	1			1	Lewis, 1987
Seagrass blades (s)	2	2	1			Nelson *et al.*, 1982
Seagrass blades (s)	2	1		1	1	Mattila *et al.*, 1999
Seagrass blades (s)	3					Baden and Boström, 2001, euryhaline
Seagrass blades (s)		2				Baden and Boström, 2001, oligohaline
Seagrass blades (s)		5				Marsh, 1973
Seagrass blades (s)	3	1	1			Collett *et al.*, 1984
Seagrass blades (s)	1	3		1		Stoner, 1983
Seagrass blades (s)	1	4				Currás and Mora, 1992
Sabellariid reefs (i)		4			1	Nelson and Demetriades, 1992
Bivalves (i)		3		1	1	Ong Che and Morton, 1992
Bivalves (i)	1	2	1			Svane and Setyobudiandi, 1996
Bivalves (i)	3	2				Tsuchiya and Bellan-Santini, 1989
Bivalves (i)	1	4				Tsuchiya and Nishihira, 1986
Bivalves (i)		4				Ragnarsson and Raffaelli, 1999
Bivalves (i)		5				Thiel and Ullrich, in press
Bryozoans (s)	5					Conradi *et al.*, 1997
Sponges (s)	3	1			1	Biernbaum, 1981
Sponges (s)	3	1			1	Peattie and Hoare, 1981
Sponges (s)	5					Costello and Myers, 1987
Sponges (s)	4	1				Frith, 1976
Ascidians (s)	2	1		1	1	Fielding *et al.*, 1994
Ascidians (i)	1	2		1	1	Fielding *et al.*, 1994
Ascidians (s)	4	1				This study

s, Subtidal; i, intertidal.

that these amphipods show preferences for particular algal species owing to differences in food value and taste. Habitat selection in peracarid species, which feed on autochthonous resources (e.g. grazing amphipods), will thus depend both on food as well as on shelter value of the settlement substrata (Buschmann, 1990). In peracarid species, which feed on allochthonous resources (e.g. deposit-feeding and suspension-feeding species), the food value of their settlement substrata will be of minor importance, but protective value of the substratum and the environmental conditions (e.g. food supply) will gain importance. It could even be hypothesized that biotic microhabitats of low food value will preferentially be colonized by species feeding on allochthonous materials since on these substrata they will face no or little disturbance by grazing species feeding on autochthonous materials. Suspension-feeding peracarids may thus prefer biotic substrata that are deleterious to grazing species. Indeed, observations by Frith (1977) demonstrated that suspension-feeding amphipod species are attracted much more to sponge than to algal substrata. This author suggested that these amphipods react to chemical substances produced by hosts but gave no explanation of why these suspension-feeding amphipods should prefer sponges to algae. Two different scenarios could be envisioned in which suspension-feeding amphipods preferred sponges over algae: (1) sponges produce substances deleterious to other species (disturbers and predators), or (2) sponges grow in regions with high concentrations of suspended material.

In the present study, we found low numbers of grazing peracarids and relatively high numbers of suspension-feeding peracarids on the ascidians. Since we did not measure the relationship between ascidian volume and surface available for peracarids, it cannot be determined whether densities of these suspension-feeding species are higher than on comparable surface areas of other biotic microhabitats (e.g. algae). However, most of the species that we found living on *P. chilensis* can also be found in large abundance among kelp holdfasts in subtidal waters (Thiel and Vásquez, 2000), or on algae growing in the intertidal zone (own unpublished data). This indicates that the suspension-feeding peracarids that dominated on *P. chilensis* may be relatively unselective with respect to the substratum on which they settle.

Our data demonstrated that there are hardly any differences in the number and species composition of peracarids colonizing *P. chilensis* at the offshore site and at the nearshore site. Suspension-feeding peracarids construct their tubes on *P. chilensis* regardless of the site. Also, Fielding *et al.* (1994) reported large numbers and high biomass of suspension-feeding organisms to be associated with *P. stolonifera* Heller both in subtidal as well as in intertidal habitats. Possibly, these ascidians only grow at sites that provide sufficient flux of suspended materials, and suspension-feeding fauna occur on these ascidians simply because these constitute the most abundant substrata (association by chance). Alternatively, ascidians by their pumping activity, provide a microenvironment that is beneficial to suspension-feeding fauna (specific association). The dominant peracarids found in the present study also occur frequently on algal substrates at exposed sites but not at wave-sheltered sites (Thiel, unpublished data). We therefore consider it likely that suspension-feeding peracarids are associated with *P. chilensis* simply by chance, since these ascidians grow at sites favourable for suspension-feeding organisms. This conclusion is supported by the fact that most of the suspension-feeding peracarids found on the outer surface of sponges also occur on a wide variety of different substrata (e.g. the amphipods *Lembos websteri* Bate and *Corophium* spp.; Shillaker and Moore, 1978). Many studies reported suspension-feeding peracarids as epi- and endofauna of suspension-feeding organisms (Biernbaum, 1981; Peattie and Hoare, 1981; Costello and Myers, 1987; Lewis, 1992; table 5); it is also frequently emphasized that host organisms grow in regions of high current velocities and high particle load. We therefore suggest that suspension-feeding peracarids may select sponges (see e.g. Frith, 1977), ascidians and bivalves as substratum, because these usually occur at sites with optimal food supply. This hypothesis is supported by the fact that large numbers of suspension-feeding peracarids are also found on macroalgae at exposed sites (Fenwick, 1976).

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