

THE MAGELLAN-ANTARCTIC CONNECTION: LINKS AND FRONTIERS AT HIGH SOUTHERN LATITUDES.
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Scotia Arc bryozoans from the LAMPOS expedition: a narrow bridge between two different faunas*

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SUMMARY: The 78 bryozoan species collected by the German R/V "Polarstern" during the LAMPOS cruise in April 2002, encompassing the Scotia Arc archipelagos between Tierra del Fuego and the Antarctic Peninsula, were studied to discern the biogeographical patterns of the Magellan region of South America, the Scotia Arc archipelagos and the Antarctic. The resulting dendrogram shows three clusters: an isolated one with the three easternmost archipelagos and the other two linking some of the northern and southern Scotia Arc archipelagos with Tierra del Fuego. A more comprehensive analysis using all the species previously recorded from the Scotia Arc archipelagos and adjacent areas (214 spp.) produced a clearer zoogeographical pattern without isolated clusters of localities. The Antarctic Peninsula plus the Scotia Arc archipelagos form a large cluster distinct from the Magellan-Falkland Subantarctic area. A third analysis making use of 78 genera present in the study area plus Australia and New Zealand reinforces this pattern, showing two clusters: one uniting South America and the Australian-New Zealand realm and the other linking the Scotia Arc archipelagos with the Antarctic Peninsula. These results indicate that the Scotia Arc archipelagos represent merely a very narrow bridge connecting two different bryozoan faunas with only a few bryozoan species in common between the study areas.

Keywords: Scotia Arc, bryozoans, zoogeography.

RESUMEN: BRYOZOA DE LA EXPEDICIÓN LAMPOS AL ARCO DE SCOTIA: UN PUENTE ESTRECHO ENTRE DOS FAUNAS DIFERENTES. – Se estudiaron 78 especies de briozoos recolectados por el B/I alemán "Polarstern" durante el crucero LAMPOS realizado desde Tierra del Fuego a la Antártida, incluyendo los archipiélagos del Arco de Scotia, para discernir las conexiones zoogeográficas existentes. El dendrograma resultante muestra tres conjuntos de localidades: uno desconectado de los otros y que agrupa a Shag Rocks y los archipiélagos más orientales y los otros dos unen el área de las Malvinas con las Shetland y la Isla Elefante. Un nuevo análisis más amplio usando todas las 214 especies previamente registradas en el Arco de Scotia y áreas adyacentes produjo un patrón zoogeográfico más claro sin localidades o grupos de ellas aislados. En éste la Península Antártica y los archipiélagos del Arco de Scotia forman un gran conjunto antártico que se opone a otro formado por el área magallánica y las Malvinas. Finalmente se realizó un tercer análisis utilizando los 78 géneros a los que pertenecen las especies estudiadas y que también se hallan en el área australo-neozelandesa. Este tercer dendrograma viene a reforzar al segundo mostrando dos grandes agrupaciones: una que liga a Sudamérica con el área australo-neozelandesa y la otra que agrupa a los archipiélagos del Arco de Scotia con la Península Antártica. Estos resultados sugieren que la fauna de briozoos del Arco de Scotia simplemente un puente muy estrecho que conecta dos faunas diferentes, con sólo unas pocas especies comunes de las dos áreas estudiadas.

Palabras clave: Arco de Scotia, briozoos, zoogeografía.

INTRODUCTION

The known Magellan bryozoans total more than 220 species. Those of the Antarctic Peninsula also reach a similar total. Endemism of the former is

about 55%, whereas that of the latter is higher, varying from 65% to more than 90% (Moyano, 1991; Hayward, 1995).

The physical links between the two bryozoan faunas are the Scotia Arc archipelagos, which might constitute stepping stones between South America and the Antarctic for dispersal and interchange of

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TABLE 1. — LAMPOS expedition collecting stations yielding bryozoans.

	Localities	Date	Latitude	Longitude	Depth
St 145	Burdwood Bank	05.04.02	54°2,00'S	62°0.52'W	272 m
St 153	Burdwood Bank	06.04.02	54°33,23'S	56°10.12'W	297 m
St 164	Shag Rocks	09.04.02	53°24'S	42°43'W	178 m
St 207	South Sandwich Islands	16.04.02	57°40' S	26°27'W	210 m
St 217	East of Drygalski Seamount	18.04.02	59°55.24'S	32°26.46'W	518 m
St 238	South Orkneys	23.04.02	61°11.05'S	45°43.76'W	324 m
St 251	Off Elephant Island	25.04.02	61°23.91' S	55°27.62'W	293 m
St 252	Off Elephant Island	25.04.02	61°23.14'S	55°27.66'W	268 m
St 253	Off Elephant Island	25.04.02	61°22.32'S	55°31.51'W	211 m

faunal elements (Crame, 1999; Gorny, 1999; Moyano, 1996, 1999, 2000; Barnes and De Grave, 2000).

This, and other issues concerning the role of the Scotia Arc archipelagos in interactions between the Antarctic and Subantarctic ecosystems, led to the German LAMPOS cruise on board RV "Polarstern" in April-May 2002 (ANT XIX/5; Arntz and Brey, 2003). The bryozoan collection gathered included some 80 species.

The species collected were dominated in mass by large flexible colonies of flustriform and cellariiform bryozoans, whereas the encrusting species were less abundant, forming calcareous sheets on small pebbles. A new genus and species were discovered among the former and a new species in the latter.

Preliminary results of the German LAMPOS expedition plus previously published data from several authors are employed in this work to assess the role of bryozoans in linking the Magellan and Antarctic ecosystems.

MATERIALS AND METHODS

Table 1 gives station data for the LAMPOS expedition of RV "Polarstern", which yielded bryozoans. Samples were collected by means of an Agassiz trawl and stored in an aqueous ethanol solution of at least 90%. In the Universidad de Concepción Bryozoology Laboratory they were transferred to 70% ethanol to be sorted and identified.

Colony pieces to be photographed by SEM were boiled in a NaClO solution, rinsed with tap water, dried from 70% ethanol and finally coated with gold.

Analysis of the zoogeographical affinity between Antarctic and Subantarctic bryozoan faunas from the Magellan area to the Antarctic Peninsula through the Scotia Arc archipelagos was performed primarily using the bryozoan faunal list obtained from the LAMPOS expedition and subsequently in combina-

tion with other faunal lists by Hastings (1943), Hayward (1995) and López de la Cuadra and García Gómez (2000).

Dendrograms were constructed by the UPGMA mode (Crisci and López, 1983) using the Kulczynsky-2 index (Sibouet, 1979) to assess zoogeographical affinity (Moyano, 1982).

RESULTS

The species collected during the LAMPOS cruise are shown in Table 2 and the dendrogram comparing different Subantarctic and Antarctic stations on the basis of their bryozoans is shown in Figure 1. The number of species per station varied between 5 and 21, with an average of 12. The richest station was that at Burdwood Bank (south of Falkland Islands – Islas Malvinas) with 21 spp. and the poorest stations were stns. 207 and 217 off South Sandwich with only 5 spp. each. The last three stations, near Elephant island are very close, so the real number of species should be some 29.

The 78 species of Table 2 belong to ten different zoarial forms. Most frequent were the encrusting species (32%), followed by the flustriform ones (15.4%). The erect (50 spp.), rigid (18 spp.) and flexible (32 spp.) forms constitute the largest number in comparison with the encrusting (32 spp.) and the irregular plurilaminar celleporiform forms (3 spp.). The flustriform species predominate within the flexible forms and also in the number of zoaria and mass considering the whole set of species and samples.

The dendrogram (Fig. 1) shows two clear-cut sets of stations on the basis of their bryozoan species. The largest group includes 6 stations subdivided in turn into two clusters: Subantarctic stns. 145 and 153 and Antarctic stns 238, 251, 252 and 253. The two sets exhibit an affinity of only 5%. The

TABLE 2.— Bryozoa collected during the LAMPOS expedition between Punta Arenas and the northernmost tip of the Antarctic Peninsula.

	145	153	164	207	Stations 217	238	251	252	253	FZ
1. <i>Acanthophragma polaris</i> ?				x						I
2. <i>Adelascopora jeqolqa</i>						x	x			CE
3. <i>Adelascopora secunda</i>									x	F
4. <i>Amastigia</i> sp.	x									CE
5. <i>Antarcticaetos bubeccata</i>							x			CE
6. <i>Aspidostoma coronatum</i>					x					I
7. <i>Aulopocella brachyrhyncha</i>							x			V
8. <i>Austroflustra australis</i>	x	x								F
9. <i>Austroflustra gerlachi</i>	x	x								F
10. <i>Austroflustra vulgaris</i>								x	x	F
11. <i>Beania challengerii</i>		x								I
12. <i>Beania erecta</i>							x			I
13. <i>Beania magellanica</i>	x									I
14. <i>Bostrychopora dentata</i>							x			I
15. <i>Caberea darwini</i>		x								CE
16. <i>Carbasa curva</i>							x		x	F
17. <i>Carbasa ovoidea</i>								x		F
18. <i>Camptoplites giganteus</i>								x		BU
19. <i>Camptoplites tricornis</i>						x	x			BU
20. <i>Cellaria incula</i>						x	x			CE
21. <i>Cellaria malvinensis</i>	x									CE
22. <i>Cellaria tenuis</i>	x	x								CE
23. <i>Cellaria variabilis?</i>	x									CE
24. <i>Cellarinella</i> sp.						x	x			A
25. <i>Cellarinella wateri</i>						x	x	x		A
26. <i>Chaperiopsis</i> sp.			x	x						I
27. <i>Chartella notialis</i>	x									F
28. <i>Cornucopina polymorpha</i>						x	x	x	x	BU
29. <i>Cornucopina</i> sp.	x									BU
30. <i>Crisidia delicatissima</i>								x		CA
31. <i>Dakariella concinna</i>				x						I
32. <i>Disporella octoradiata</i>			x							I
33. <i>Escharella</i> sp.			x		x					I
34. <i>Exochella</i> sp.					x					I
35. <i>Fenestrulina rugula</i>								x		I
36. <i>Flustrapora magellanica</i>									x	F
37. <i>Foveolaria terrifica</i>	x	x								F
38. <i>Himantozoum antarcticum</i>									x	F
39. <i>Hornera</i> sp.							x			V
40. <i>Hippothoa flagellum</i>			x	x						I
41. <i>Ichthyaria oculata</i>	x	x								BU
42. <i>Isoschizoporella secunda</i>									x	E
43. <i>Melicerita blancoae</i>	x									A
44. <i>Melicerita obliqua</i>						x			x	A
45. <i>Menipea</i> sp.	x									CE
46. <i>Micropora brevisima</i>			x							I
47. <i>Microporella hyadesi</i>	x	x								E
48. <i>Nematoflustra flagellata</i>						x				F
49. <i>Nevianipora</i> sp.	x									V
50. <i>Notoplites drygalskii</i>								x	x	BU
51. <i>Notoplites</i> sp.	x									BU
52. <i>Ogivalia elegans</i>	x									V
53. <i>Orthoporidroides erectus</i>	x									V
54. <i>Osthimosia bicornis</i>	x						x	x	x	Cel
55. <i>Osthimosia</i> sp.1	x									Cel
56. <i>Osthimosia</i> sp.2						x				Cel
57. <i>Paracellaria cellarioides</i>		x								Cel
58. <i>Parafigularia</i> sp. n.			x							I
59. <i>Platychelina planulata</i>		x								I
60. <i>Reteporella erugata</i>					x					RE
61. <i>Reteporella frigida</i>								x	x	RE
62. <i>Reteporella hippocrepis</i>							x			RE
63. <i>Reteporella magellensis</i>		x								RE
64. <i>Schizoporella</i> ? sp.		x								I
65. <i>Securiflustra bifoliata</i>		x								F
66. <i>Smittina antarctica</i>						x	x	x	x	E
67. <i>Smittina monacha</i> ?		x								I
68. <i>Smittina</i> sp. n.					x					I
69. <i>Smittinella</i> sp.			x							I
70. <i>Smittoidea pugiuncula</i>			x							I
71. <i>Smittoidea conspicua</i>							x			I

TABLE 2 (Cont.). – Bryozoa collected during the LAMPOS expedition between Punta Arenas and the northernmost tip of the Antarctic Peninsula.

	145	153	164	207	Stations 217	238	251	252	253	FZ
72. <i>Systemopora contracta</i>						x				A
73. <i>Talivitticella frigida</i>	x								x	CA
74. <i>Toretocheilum turbinatum</i>			x							I
75. <i>Tricellaria</i> sp.		x								BU
76. <i>Trilochites biformatus</i>			x	x						I
77. <i>T. phylactelloides</i>								x	x	E
78. Flustridae n. gen. n. sp.		x								F
	21	17	10	5	5	11	16	12	13	

FZ = Zoarial forms: A = adeoniform (6.4%) F = flustriform (15.4%) E = eschariform (5.1%)
 Re = reteporiform (5.1%) Ce = cellariiform (12.6%) I = encrusting (32%)
 Bu = buguliform (10.25%) V = vinculariiform (6.4%) Ca = catenacelliform (2.6%)
 Cel = celleporiform (3.85%)

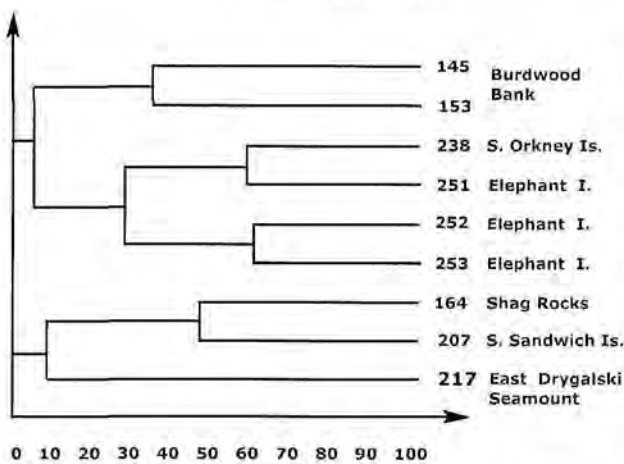


FIG. 1. – Dendrogram relating stations on the basis of their bryozoan fauna. Stations 145 and 153 are located between Burdwood Bank and Shag Rocks-South Georgia. Stations 164, 207, 217, 238, 251, 252 and 253 are situated east and south of South Georgia.

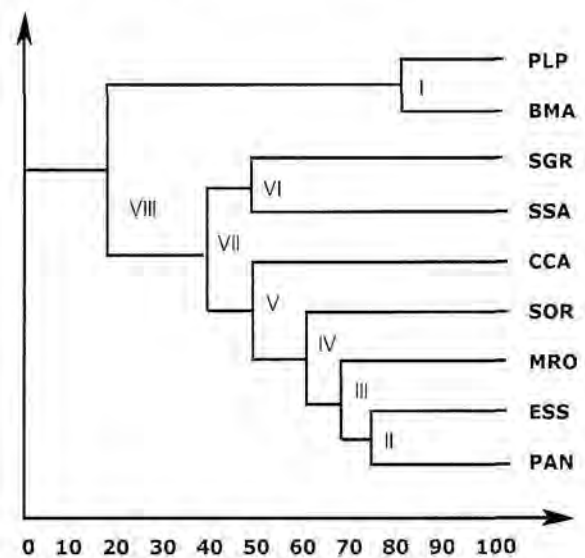


FIG. 2. – Dendrogram resulting from the geographical matrix for bryozoans (Table 4, Appendix 1). Localities: PLP: Patagonian shelf; BMA: Falklands-Malvinas and Burdwood Bank; SGR: South Georgia; SSA: South Sandwich; SOR: South Orkneys; ESS: Elephant I. and South Shetlands; PAN: Antarctic Peninsula; MRO: Ross Sea; CCA: Antarctic continental coasts.

station group 164, 207 and 217, which does not unite with the larger one, joins the most isolated places of the Scotia Arc in relation to South America and Antarctica.

As these primary results do not indicate a clear pattern of bryozoan distribution along the Scotia Arc archipelagos or the relationships between South America and the Antarctic, a larger set of data, compiled from the works of several authors published over the past 60 years, was analysed (Table 3, Figs. 2 and 3, Appendix 1).

In order to further test the zoogeographical pattern shown in the dendrogram in Figure 2, an analysis of the bryozoan genera present in the Scotia Arc archipelagos was carried out in comparison with the Subantarctic Magellan region and "Australasia" *sensu* Mawson (i.e. Australia and New Zealand

TABLE 3. – Scotia Arc bryozoans after Hastings (1944) (HS), Hayward (1995) (HY), López de la Cuadra and García Gómez (2000) (L-G) and Moyano (LAMPOS expedition 2002, this study) (LAM). Localities: PLP = Patagonian shelf; BMA= Falklands and Burdwood Bank; SGR = South Georgia - Shag Rocks; SSA = South Sandwich; SOR =South Orkneys; ESS = Elephant-South Shetland; PAN = Antarctic Peninsula; MRO = Ross Sea; CCA = Antarctic continental coasts.

HS	Authors			LAM	Localities									
	HY	L-G	LAM		PLP	BMA	SGR	SSA	SOR	ESS	PAN	MRO	CCA	
23	145	85	78		48	51	94	43	66	117	89	79	38	

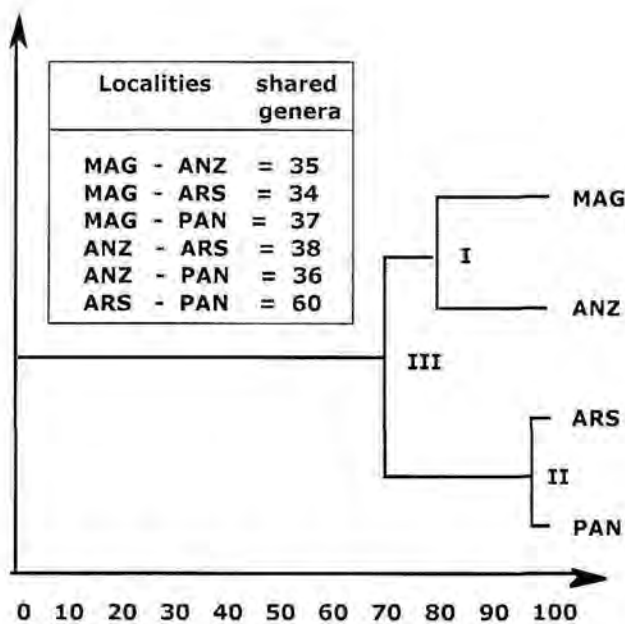


FIG. 3. – Dendrogram showing the relationships among the Scotia Arc with Subantarctic and Antarctic areas on the basis of the shared bryozoan genera (Table 5, Appendix 2); MAG: Magellan area; ANZ: Australia – New Zealand realm; ARS: Scotia Arc archipelagos; PAN: Antarctic Peninsula.

(Table 5 and Fig. 3, Appendix 2). The list of bryozoan genera in Appendix 2 does not contain all the genera known to exist south of the Antarctic Convergence, but certainly more than 85% of them. Other endemic Antarctic genera are *Cellarinelloides*, *Eminoecia*, *Dendroperistoma* and *Filaguria*. There are also some Subantarctic genera not listed here like *Sclerodomus*.

The dendrogram in Figure 3 exhibits the same pattern as Figure 2, this time on the basis of bryozoan genera, showing the Scotia Arc closely united with the Antarctic Peninsula and joining the Magellan region with New Zealand and Australia.

TABLE 5. – Geographical distribution of 72 cheilostomatid bryozoan genera from the Scotia Arc archipelagos in Antarctic and Subantarctic areas after the data by López de la Cuadra and García Gómez (2000) and Moyano (this study). MAG = Magellan area including Patagonian shelf; ANZ = Australian and New Zealand areas; ARS = Scotia Arc archipelagos; PAN = Antarctic Peninsula. Information on bryozoan genera from New Zealand and Australia after Gordon (1984, 1986, 1989) and Moyano (1996)

	MAG	ANZ	ARS	PAN
Number of genera	46	42	63	60

DISCUSSION

The role of the Scotia Arc archipelagos in the interactions between Antarctic and Subantarctic ecosystems stimulated the LAMPOS cruise on board the German research vessel "Polarstern" in April-May 2002. The bryozoan collection gathered included some 80 species that belong to two completely different groups: a Subantarctic group to the west and north of Shag Rocks and an Antarctic group originating from east and south of that archipelago.

Both groups are dominated by large flexible bryozoan colonies, namely flustriform, buguliform and cellariiform, plus some rigid forms such as eschariiform and reteporiiform. The encrusting species are less abundant, forming calcareous sheets on small pebbles. Most species were previously known except for two new ones. One of them belongs to a new flustrine genus and the other to the cribriline genus *Parafigularia*.

Systematically the links of Antarctic and Subantarctic Bryozoa are more at the generic than at the specific level although, as demonstrated above, the highest generic affinity appears between the Scotia Arc and the Antarctic Peninsula. There are some

TABLE 4. – Geographical matrix for the bryozoans of the Scotia Arc, based on Appendix I. Values above the diagonal represent Kueziński-2 indices. Values below the diagonal are the number of species shared between localities. Localities (Lc): PLP = Patagonian shelf; BMA = Falklands–Malvinas and Burdwood Bank; SGR = South Georgia - Shag Rocks; SSA = South Sandwich; SOR = South Orkneys; ESS = Elephant-South Shetland; PAN = Antarctic Peninsula; MRO = Ross Sea; CCA = Antarctic continental coasts. Number of species per locality (Sp) appearing above and left of localities after Hastings (1944), Hayward (1995), López de la Cuadra and García Gómez (2000) and Moyano (this study).

Sp	Lc	48 PLP	51 BMA	94 SGR	43 SSA	77 SOR	117 ESS	89 PAN	79 MRO	38 CCA
48	PLP		77	32	20	19	19	16	5	5
51	BMA	38		27	19	12	16	15	3	2
94	SGR	20	18		44	38	35	44	36	26
43	SSA	9	9	26		36	40	43	38	35
77	SOR	11	9	32	20		65	59	50	33
117	ESS	13	11	36	25	60		71	60	56
89	PAN	10	10	40	25	49	72		67	49
79	MRO	3	2	31	21	39	57	56		58
38	CCA	2	1	14	14	17	32	26	30	

species, mostly from shallow waters, like *Celleporella bougainvillei*, *Inversiula nutrix* and *Beania inermis*, living in Magellan South America and at the Antarctic Peninsula (See Moyano, 1999, Moyano and Cancino, 2002). More abundant are vicariant species such as *Parafigularia magellanica* and *P. discors*, *Aulopocella petiolata* and *A. brachyrhyncha*, *Adelascopora stellifera* and *A. secunda*, *Austroflustra australis* and *A. vulgaris*. However, more abundant are species endemic to each fauna. These statements result from a comprehensive analysis of all known bryozoan species, both Magellan and Antarctic.

In the bryozoans collected during the LAMPOS cruise, connections between the two faunas are almost non-existent, probably due to the collecting depths of more than 200 m. In this context, all archipelagos showed a typical Antarctic bryozoan fauna. The limit between the two faunas seems to be situated not too far off Shag Rocks, probably coinciding with the Antarctic Convergence boundary.

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APPENDIX I. – Bryozoans from Scotia Arc and adjacent Subantarctic and Antarctic areas, after Hastings (1944) (HA), Hayward (1995)(H) López de la Cuadra and García Gómez (2000) (LG) and Moyano (this study) (MO). Localities: PLP: Patagonian shelf; BMA: Falkland Is. - Is. Malvinas and Burdwood Bank; SGR: South Georgia; SSA: South Sandwich; SOR: South Orkney; ESS: Elephant I. and South Shetland; PAN: Antarctic Peninsula; MRO: Ross Sea; CCA: Antarctic continental coasts.

	PLP	BMA	SGR	SSA	SOR	ESS	PAN	MRO	CCA
1. <i>Acanthophragma polaris</i> ?				MO				H	
2. <i>Adelascopora jegolqa</i>					H/MO	MO	H	H	
3. <i>Adelascopora secunda</i>					LG	H/MO	H		
4. <i>Aimulosia antarctica</i>			H/LG		H	LG		H	H
5. <i>Aimulosia australis</i>	H	H	H	H	H/LG	H	H		
6. <i>Amastigia</i> sp.	MO								
7. <i>Amastigia gaussi</i>	HA	H	H/LG		HA		HA		H
8. <i>Amphiblestrum georgensis</i>	H		H/LG						
9. <i>Amphiblestrum inermis</i>				H	H	LG	H	H	H
10. <i>Andreella uncifera</i>	H	H			H				
11. <i>Antarcticaetos bubeccata</i>				H	H	MO	H	H	H
12. <i>Apiophragma hyalina</i>						H	H		
13. <i>Arachnopusia aquilina</i>						H			H
14. <i>Arachnopusia aviculifera</i>			H/LG		LG				
15. <i>Arachnopusia decipiens</i>						H/LG	H		
16. <i>Arachnopusia ferox</i>						H			
17. <i>Arachnopusia inchoata</i>	H		H/LG	H/LG	H/LG	H/LG			
18. <i>Arachnopusia monoceros</i>	MO	MO	LG						
19. <i>Arachnopusia tubula</i>						H			
20. <i>Aspericreta georgensis</i>			H						
21. <i>Aspidostoma coronatum</i>				MO	LG				
22. <i>Aspidostoma giganteum</i>	MO	H				H			
23. <i>Aulopocella brachyrhyncha</i>						MO	H	H	
24. <i>Aulopocella stenorhyncha</i>					LG	H	H	H	
25. <i>Austroflustra australis</i>	MO	MO							
26. <i>Austroflustra gertachi</i>	MO	MO							
27. <i>Austroflustra vulgaris</i>			LG		LG	H/MO			
28. <i>Beania challengeri</i>		MO							
29. <i>Beania erecta</i>				H/HA	H	H/MO	H	H	H
30. <i>Beania erecta livingstonei</i>			LG		LG	LG	HA		
31. <i>Beania inermis</i>	H						MO		
32. <i>Beania magellanica</i>	MO	MO							
33. <i>Bostrychopora dentata</i>						MO	H	H	H
34. <i>Brettiopsis triplex</i>			H						H
35. <i>Buffonellodes antarctica</i>					H			H	
36. <i>Bugulella klugei</i>						H		H	H
37. <i>Caberea darwini</i>	MO	MO	LG	HA	LG	LG	HA		
38. <i>Camptoplites angustus</i>					H	HA	H	HA	HA
39. <i>Camptoplites areolatus</i>						HA			HA
40. <i>Camptoplites asymmetricus</i>	H		H/HA						
41. <i>Camptoplites bicornis</i>	HA		H		HA	HA	H	HA	H
42. <i>Camptoplites giganteus</i>			H			MO	H	H	HA
43. <i>Camptoplites latus</i>			H/HA						
44. <i>Camptoplites retiformis</i>				H		H/HA	H	HA	HA
45. <i>Camptoplites tricornis</i>			H		MO	MO	H	H	HA
46. <i>Carbasea curva</i>			H/LG		LG	LG/M			
47. <i>Carbasea ovoidea</i>	H	H				H/LG	MO		
48. <i>Cellaria aurorae</i>			H	H		H	H	H	H
49. <i>Cellaria diversa</i>				LG	H	H/LG	H	H	H
50. <i>Cellaria incula</i>					MO	MO		H	H
51. <i>Cellaria malvinensis</i>	H/M	H/M	H/LG						
52. <i>Cellaria moniliorata</i>					LG	H	H	H	H
53. <i>Cellaria sobrinói</i>						LG			
54. <i>Cellaria tenuis</i>	MO	MO							
55. <i>Cellaria variabilis?</i>	MO	MO							
56. <i>Cellarinella anomala</i>			H		LG				
57. <i>Cellarinella</i> sp.					MO	MO			
58. <i>Cellarinella latilaminata</i>			LG			H/LG		H	
59. <i>Cellarinella nutti</i>					LG	LG			
60. <i>Cellarinella rogickae</i>					LG	LG			
61. <i>Cellarinella terminata</i>						H			
62. <i>Cellarinella virgula</i>						H			
63. <i>Cellarinella watersi</i>			H		H/LG	MO	H	H	
64. <i>Celleporella alia</i>			H	H	H	H	H		
65. <i>Celleporella antarctica</i>					H/LG	H/LG			
66. <i>Celleporella bougainvillei</i>	H	H	H/LG	LG	LG	H/LG	H		
67. <i>Celleporella dicryota</i>					H	H			
68. <i>Celleporella discreta</i>	H	H	H						
69. <i>Chaperiopsis</i> sp.			MO	MO					
70. <i>Chaperiopsis galeata</i>	H	H	H	H					
71. <i>Chaperiopsis orbiculata</i>			H						

APPENDIX 1 (Cont.). – Bryozoans from Scotia Arc and adjacent Subantarctic and Antarctic areas, after Hastings (1944) (HA), Hayward (1995)(H) López de la Cuadra and García Gómez (2000) (LG) and Moyano (this study) (MO). Localities: PLP: Patagonian shelf; BMA: Falkland Is. - Is. Malvinas and Burdwood Bank; SGR: South Georgia; SSA: South Sandwich; SOR: South Orkney; ESS: Elephant I. and South Shetland; PAN: Antarctic Peninsula; MRO: Ross Sea; CCA: Antarctic continental coasts.

	PLP	BMA	SGR	SSA	SOR	ESS	PAN	MRO	CCA
72. <i>Chaperiopsis protecta</i>				H			H		
73. <i>Chaperiopsis rotundata</i>			H						
74. <i>Chartella notialis</i>	MO	MO							
75. <i>Cornucopina ovalis</i>	H		H/HA						
76. <i>Cornucopina pectogemma</i>	H	H	H/HA	H/HA		H/LG			
77. <i>Cornucopina polymorpha</i>			H	H	MO	H/LG	H	HA	HA
78. <i>Cornucopina</i> sp.		MO							
79. <i>Crisidia delicatissima</i>				MO		MO	MO		
80. <i>Dakariella concinna</i>								H	
81. <i>Dakariella dabrowni</i>			H					H	
82. <i>Dendroperistoma projecta</i>			H/LG	H	LG	H	H	H	
83. <i>Disporella octovadiata</i>			MO						
84. <i>Electra longispina</i>	H		H						
85. <i>Ellisia antarctica</i>		H	H		H	LG			
86. <i>Eminoecia carsonae</i>					H		H	H/MO	
87. <i>Escharella mamillata</i>			H	H		H		H	
88. <i>Escharella watersi</i>			H/LG				H	H	
89. <i>Escharella</i> sp.			MO	MO					
90. <i>Escharoides praestita</i>			H/LG				H	H	
91. <i>Escharoides torquata</i>			H						
92. <i>Escharoides tridens</i>					H		H		
93. <i>Exochella elegans</i>						H/LG			
94. <i>Exochella hymanae</i>			H/LG		H		H		
95. <i>Exochella umbonata</i>						H/LG			
96. <i>Exochella</i> sp.				MO					
97. <i>Fenestulina antarctica</i>					LG	LG	H	H	
98. <i>Fenestulina exigua</i>			H/LG				H	H	
99. <i>Fenestulina fritilla</i>		H	H/LG						
100. <i>Fenestulina jocunda</i>			H/LG						
101. <i>Fenestulina proxima</i>						H	H		
102. <i>Fenestulina rugula</i>			H		H/LG	LG/M	H		
103. <i>Filaguria spatulata</i>			LG			H		H	H
104. <i>Flustrapora magellanica</i>	MO	MO							
105. <i>Foveolaria terrifica</i>	MO	MO							
106. <i>Galeopsis bullatus</i>			H						
107. <i>Harpecia spinosissima</i>			H	LG	H	LG	H	H	
108. <i>Himantozoum antarcticum</i>			H	LG	HA	LG/M	H	H	H
109. <i>Hippadenella inerma</i>						H	H	H	
110. <i>Hippomonavella pellucidula</i>			H/LG						
111. <i>Hippomonavella ramosae</i>			LG						
112. <i>Hippothoa flagellum</i>	H	H/MO	MO	MO		LG	H	H	
113. <i>Hornera</i> sp.						MO			
114. <i>Icelozoon dichotomum</i>						H			H
115. <i>Ichthyaria oculata</i>	MO	MO							
116. <i>Inversiula nutrix</i>	H	H	H	H	H	H/LG	H		
117. <i>Isoschizoporella secunda</i>					H/L	LG/M	H	H	
118. <i>Isoschizoporella similis</i>					H		H	H	
119. <i>Isoschizoporella tricuspis</i>					LG	LG			
120. <i>Isoseculiflustra rubefacta</i>					H	H/LG			
121. <i>Isoseculiflustra temis</i>						H	H		H
122. <i>Isoseculiflustra thysanica</i>						H	H		
123. <i>Klugeflustra antarctica</i>			H	H		HA		H	HA
124. <i>Klugeflustra onychocelloides</i>				H					H
125. <i>Klugeflustra vanhoffeni</i>						H	H		
126. <i>Klugerella antarctica</i>						H	MO	H	
127. <i>Klugerella olaso</i>			LG						
128. <i>Kymella polaris</i>					LG	LG	H	H	H
129. <i>Lacerna eatoni</i>	H	H			H	LG	H		
130. <i>Lacerna hosteensis</i>	H	H	H/LG	H	H	H			
131. <i>Lacerna watersi</i>						H	H	H	
132. <i>Larvopora mawsoni</i>			H		LG	LG	H		
133. <i>Macropora georgensis</i>			LG						
134. <i>Melicerita blancoae</i>	MO	MO							
135. <i>Melicerita flabellifera</i>						H			
136. <i>Melicerita latilaminata</i>					LG	H/LG	H	H	
137. <i>Melicerita obliqua</i>					H/MO	H	H	H	H
138. <i>Menipea</i> sp.	MO	MO							
139. <i>Menipea patagonica</i>	H	H							
140. <i>Micropora brevisima</i>			H/HA		LG	H/LG	H	H	H
141. <i>Micropora notialis</i>	H		H/LM				H		
142. <i>Microporella hyadesi</i>	MO	MO	H/LG						
143. <i>Microporella stenopora</i>			LG	H			H	H	
144. <i>Nematoflustra flagellata</i>			H/LG		LG/M	LG	H		

APPENDIX 1 (Cont.). – Bryozoans from Scotia Arc and adjacent Subantarctic and Antarctic areas, after Hastings (1944) (HA), Hayward (1995)(H) López de la Cuadra and García Gómez (2000) (LG) and Moyano (this study) (MO). Localities: PLP: Patagonian shelf; BMA: Falkland Is. - Is. Malvinas and Burdwood Bank; SGR: South Georgia; SSA: South Sandwich; SOR: South Orkney; ESS: Elephant I. and South Shetland; PAN: Antarctic Peninsula; MRO: Ross Sea; CCA: Antarctic continental coasts.

	PLP	BMA	SGR	SSA	SOR	ESS	PAN	MRO	CCA
145. <i>Nevianipora</i> sp.		MO							
146. <i>Notoplites</i> sp.		MO							
147. <i>Notoplites antarcticus</i>			H			HA	H		
148. <i>Notoplites crassiscutus</i>			H/HA						
149. <i>Notoplites drygalskii</i>			H	HA		LG/M	H	H	H
150. <i>Notoplites tenuis</i>			H	HA			H	H	H
151. <i>Ogivalia elegans</i>	MO	MO							
152. <i>Orthoporidra compacta</i>					H/LG	H/LG	H	H	
153. <i>Orthoporidroides erectus</i>	MO	MO							
154. <i>Osthimosia bicornis</i>	H/MO	H	H/LG		LG	LG/M	MO	H	
155. <i>Osthimosia</i> sp.1		MO							
156. <i>Osthimosia</i> sp.2					MO				
157. <i>Osthimosia clavata</i>				H	H		H	H	
158. <i>Osthimosia curtioscula</i>			H/LG						
159. <i>Osthimosia fuscicula</i>						H			
160. <i>Osthimosia malingae</i>					H/LG	H/LG		H	
161. <i>Osthimosia milleporoides</i>			H/LG	H	H/LG	H/LG		H	
162. <i>Osthimosia notialis</i>				H	H/LG	H	H	H	
163. <i>Osthimosia phalacrocoeraca</i>			H					H	
164. <i>Paracellaria calveti</i>		H				H			
165. <i>Paracellaria cellarioides</i>	MO	MO							
166. <i>Paracellaria elephantina</i>						H			
167. <i>Parafigularia</i> sp. n.			MO						
168. <i>Penmatoporella marginata</i>					LG				
169. <i>Platychelina planulata</i>	MO	MO							
170. <i>Plesiothoa calcuosa</i>						H		H	
171. <i>Polirhabdotox inclusum</i>						H		H	H
172. <i>Relepria conforma</i>			H						
173. <i>Reteporella antarctica</i>			H		LG	LG	H	H	
174. <i>Reteporella erugata</i>			LG	MO					
175. <i>Reteporella frigida</i>					LG	H/MO	H	H	
176. <i>Reteporella hippocrepis</i>					LG	MO			
177. <i>Reteporella lepralioides</i>					LG				
178. <i>Reteporella magellensis</i>	MO	MO							
179. <i>Reteporella protecta</i>			H/LG			H	H		
180. <i>Rhynchozoon fistulosum</i>			H						
181. <i>Romancheina asymmetrica</i>						H	H	H	
182. <i>Schizoporella</i> ? sp.		MO							
183. <i>Securiflustra bifoliata</i>		MO							
184. <i>Smittina abdaviticularis</i>			H					H	
185. <i>Smittina alticollarita</i>			H			H	H	H	
186. <i>Smittina antarctica</i>			LG		H/MO	MO	H	H	
187. <i>Smittina exertaviculata</i>					H			H	
188. <i>Smittina incernicula</i>			H		LG	H/LG		H	
189. <i>Smittina monacha</i> ?	MO	MO							
190. <i>Smittina</i> sp. n.				MO					
191. <i>Smittina obicullata</i>					H		H	H	
192. <i>Smittina pocilla</i>						H			
193. <i>Smittina rogickae</i>						H		H	H
194. <i>Smittinella</i> sp.			MO						
195. <i>Smittinella rubrilingulata</i>			H	H		H	H	H	
196. <i>Smittoidea conspicua</i>						MO			
197. <i>Smittoidea malleata</i>						H	H	H	
198. <i>Smittoidea pugiuncula</i>			MO			H		H	
199. <i>Smittoidea rhynchota</i>		H	LG	H					
200. <i>Strombypsosaria watersi</i>	H			H	H	LG	H	H	H
201. <i>Swanomia brevimandibulata</i>						LG	MO	H	A
202. <i>Swanomia membranacea</i>				H			H	H	H
203. <i>Systemopora contracta</i>					MO	H	H	H	H
204. <i>Talivittaticella frigida</i>	H	MO				H/MO	H		
205. <i>Toretocheilum turbinatum</i>			MO		H			H	
206. <i>Tricellaria</i> sp.		MO							
207. <i>Tricellaria aculeata</i>	H	H	H/HA						
208. <i>Trilaminopora trinervis</i>			H			LG	H		H
209. <i>Trilachites biformatus</i>			H/MO	H/MO		H	H		
210. <i>Thrypticocirrus phylactelloides</i>					LG	MO	H	H	
211. <i>Turritella cribrata</i>			H				H	H	
212. <i>Valdemunitella lata</i>			H		LG	LG	H		
213. <i>Flustridae</i> n. gen. n. sp.		MO							
214. <i>Xylochotridens rangifer</i>						H			
	48	51	94	43	77	117	89	79	38

APPENDIX 2. – Cheilostomatous bryozoan genera from the Scotia Arc archipelagos after López de la Cuadra and García Gómez (2000) and Moyano (LAMPOS 2002, this study); MAG = Magellan area; ANZ = Australia and New Zealand with bryozoan genera after Gordon (1984, 1986, 1989); ARS = Scotia Arc; PAN = Antarctic Peninsula. Endemism: the endemic Antarctic genera including those present in Scotia Arc archipelagos appear in **bold**. * = One Subantarctic species and seventeen Antarctic species. ** = North Atlantic genus represented in the southwest Atlantic by only one species. *** = Subantarctic Magellan genera located around the southern tip of South America, 5.**** = New flustriform genus collected during the LAMPOS expedition off Shag Rocks in Subantarctic waters (because all other species in the sample were typically Subantarctic).

	MAG	ANZ	ARS	PAN		MAG	ANZ	ARS	PAN
1. <i>Acanthophragma</i>	-	-	x	x	39. <i>Isoseculiflustra</i>	-	-	x	x
2. <i>Adelascopora</i>	x	-	x	x	40. <i>Klugerella</i>	-	x	x	x
3. <i>Aimulosia</i>	x	x	x	x	41. <i>Kynella</i>	-	-	x	x
4. <i>Amastigia</i>	x	x	x	x	42. <i>Lacerna</i>	x	x	x	x
5. <i>Amphiblestrum</i>	-	x	x	x	43. <i>Larvapor</i>	-	-	x	x
6. <i>Antarcticaetos</i>	-	-	x	x	44. <i>Macropora</i>	-	x	x	-
7. <i>Arachnopusia</i>	x	x	x	x	45. <i>Meliceria</i>	x	x	x	x
8. <i>Aspidostoma</i>	x	x	x	x	46. <i>Menipea</i>	x	x	-	-
9. <i>Aulopocella</i>	x	x	x	x	47. <i>Micropora</i>	x	x	x	x
10. <i>Austroflustra</i>	x	-	x	x	48. <i>Microporella</i>	x	x	x	x
11. <i>Beania</i>	x	x	x	x	49. <i>Nematoflustra</i>	-	-	x	x
12. <i>Bostrychopora</i>	-	-	x	x	50. <i>Ogivalia</i>	x	x	-	-
13. <i>Caberea</i>	x	x	x	x	51. <i>Orthoporida</i>	-	x	x	x
14. <i>Carbasea</i>	x	-	x	x	52. <i>Orthoporidaeoides</i> ***	x	-	-	-
15. <i>Camptoplites</i>	x	x	x	x	53. <i>Osthimosia</i>	x	x	x	x
16. <i>Cellaria</i>	x	x	x	x	54. <i>Paracellaria</i>	x	-	x	x
17. <i>Cellarinella</i> *	x	-	x	x	55. <i>Parafigularia</i>	x	-	x	x
18. <i>Chaperiopsis</i>	x	x	x	x	56. <i>Pemmatoporella</i>	-	-	x	x
19. <i>Celleporella</i>	x	x	x	x	57. <i>Platyhelina</i> ***	x	-	-	-
20. <i>Chariella</i> **	x	-	-	-	58. <i>Reteporella</i>	x	x	x	x
21. <i>Cornucopina</i>	x	x	x	x	59. <i>Securiflustra</i>	x	x	x	-
22. <i>Dakariella</i>	-	-	x	x	60. <i>Smittina</i>	x	x	x	x
23. <i>Dendroperistoma</i>	-	-	x	x	61. <i>Smittoidea</i>	x	x	x	x
24. <i>Ellisina</i>	x	x	x	x	62. <i>Stomhypselosaria</i>	x	x	x	x
25. <i>Escharella</i>	x	x	x	x	63. <i>Swanomia</i>	-	-	x	x
26. <i>Escharoides</i>	-	x	x	x	64. <i>Systemopora</i>	-	-	x	x
27. <i>Exochella</i>	x	x	x	x	65. <i>Talivittaticella</i>	x	x	x	x
28. <i>Fenestrulina</i>	x	x	x	x	66. <i>Toretocheilum</i>	-	-	x	x
29. <i>Filaguria</i>	-	-	x	x	67. <i>Tricellaria</i>	x	x	x	x
30. <i>Flustrapora</i> ***	x	-	-	-	68. <i>Trilaminopora</i>	-	-	x	x
31. <i>Foveolaria</i>	x	x	-	-	69. <i>Trilochites</i>	-	-	x	-
32. <i>Harpecia</i>	-	-	x	x	70. <i>Trypticocirrus</i>	-	-	x	x
33. <i>Himantozoum</i>	x	x	x	x	71. <i>Valdemunitella</i>	-	x	x	x
34. <i>Hippomonavella</i>	-	x	x	x	72. Flustridae n. gen. ****	x	-	-	-
35. <i>Hippoithoa</i>	x	x	x	x					
36. <i>Ichthyaria</i>	x	x	-	-	72 = 19/53	46	42	63	60
37. <i>Inversiula</i>	x	x	x	x	100% = 26%/72%				
38. <i>Isoschizoporella</i>	-	-	x	x					