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Biogeographical affinities of polychaetes from Îles Crozet

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Abstract: The study of polychaetes from the *Marion Dufresne* expedition to the Îles Crozet in 1982 provided 45 species from depths ranging from 50–1055 m. The most abundant was *Eunice pennata*, found at all depths and in all types of substratum in about 66% of the samples. This species with *Laetmonice producta, Harmothoe spinosa* and *Lanice marionensis* made up over 50% of all polychaete specimens. A homogenous polychaete assemblage dominated by the above mentioned group of species was encountered in the shallower stations (100–300 m). A mosaic-like and less abundant polychaete fauna with some characteristic, abundant species: *Amage sculpta, Laetmonice wyvillei, Leanira quatrefagesi* and *Melinna cristata* was encountered in the deeper stations (300–1055 m). Clear similarities between the polychaete fauna of Îles Crozet and soft-sediment polychaete assemblages of Marion and Prince Edward Islands were noticed. No such affinity was encountered with the polychaete fauna of Îles Kerguelen. Their position in relation to the Polar Front as well as possible differences in bottom deposits (calcareous versus siliceous) may in part explain these dissimilarities. The biogeographical status of Kerguelen Islands is also discussed.

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Key words: annelids, Antarctica, distribution, diversity, sub-Antarctic islands

Introduction

When considering the zoobenthos, the Îles Crozet together with Prince Edward, Marion, Kerguelen and Macquarie islands, are usually included in the Kerguelen biogeographical province within the limits of the sub-Antarctic region (Hedgpeth 1969, Picken 1984). The Crozet archipelago is situated to the north of the Antarctic Convergence and far from the northern limit of pack ice.

Polychaetes from the Kerguelen Islands area were studied by Fauvel (1952, 1953a, 1953b), Rullier (1966, 1973), Bellan (1974) and Guille & Soyer (1976); from Morbihan Gulf (Îles Kerguelen) by Chardy *et al.* (1976), Desbruyères (1977) and Duchêne (1984); from Îles Crozet by Gillet (1991), and from Marion and Prince Edward Islands by Branch (1994).

The biogeographical relationships relating to the above mentioned areas of the Kerguelen biogeographical province are still far from conclusion (e.g. Siciński 1986, Branch 1994). The presentation of some new data on the Îles Crozet polychaete fauna (species richness, diversity), to determine patterns of species distribution as part of an attempt to explain the faunistic affinities of Îles Crozet with other islands in the Kerguelen biogeographical province is the main purpose of this study. In addition, we attempt to explain biogeographical relationships of Marion and Prince Edward Islands and Îles Crozet with the Îles Kerguelen, as well as the links that both areas have with the Antarctic province.

Material and methods

The macrozoobenthos samples were collected between 29 January and 13 March 1982 during the MD30/BIOMASS Expedition on board RV *Marion Dufresne* in the areas surrounding the Îles Crozet. The Charcot dredge (d) and the bottom trawl (c) were used at depths ranging from 50 m to 1055 m. Sampling stations as described by Arnaud (1982) are listed in Table I. The location of sampling sites is presented in Fig. 1. Sand and muddy-sand with irregularly distributed stones were the distinctive feature of these bottoms.

Altogether 2144 specimens of Polychaeta were collected. A few bottom samples without polychaetes were not included in the analysis. Material preserved in ethyl alcohol is deposited in the Museum of Natural History in Paris (France), in Department of Invertebrate Zoology and Hydrobiology, Laboratory of Polar Biology and Oceanobiology, University of Łódź (Poland), and in the Centre d'Etude et de Recherche sur les Ecosystemes Aquatiques, Institute of Fundamental and Applied Research UCO, Angers (France). Serpulidae and Spirorbidae were not included in this analysis.

Multivariate analysis was used in order to classify species according to their co-occurrence and to classify stations based on their faunal inventory. The data matrix for cluster analysis comprises 45 species in 68 samples. Jaccard index ("presence-absence" data) was used to calculate the distance values of stations as well as species. The flexible

Table I. Îles Crozet polychaetes, the number of individuals per catch is presented.

group of stations and stations	Group A				Group B				Group B							
	N	D	F	A	N	D	F	A	39d	64d	72c	12d	52d	43d	76d	54c
a.																
Austrolaenilla sp.					6	1.4	8.0	100.0								
Lumbriclymenella robusta Arwidsson, 1911					9	2.1	8.0	100.0								
Eusamythella sexdentata (Hartman, 1967)					7	1.6	8.0	100.0								
Melinna cristata (Sars, 1851)					14	3.3	4.0	100.0								
Oweniidae gen. sp.					2	0.5	4.0	100.0								
Spiophanes kroeyeri Grube, 1860					7	1.6	4.0	63.6								
b.																
Harmothoe spinosa Kinberg, 1855	195	11.8	74.3	97.5	4	0.9	12.0	2.0				1				
Trypanosyllis gigantea (McIntosh, 1885)	100	6.1	80.0	97.1	2	0.5	8.0	1.9								
Thelepus cincinnatus (Fabricius, 1780)	135	8.2	51.4	90.6	13	3.0	24.0	8.7			1	2				
Eunice pennata (Mueller, 1776)	412	25.0	74.3	90.7	40	9.3	60.0	8.8	5	5		2	4	3		
Laetmonice producta Grube, 1877	240	14.6	77.1	94.5	14	3.3	24.0	5.5				2			1	
Lanice marionensis Branch, 1998	174	10.6	62.9	96.1	7	1.6	12.0	3.9				3				
Nicon maculata Kinberg, 1866	70	4.3	40.0	92.1	6	1.4	12.0	7.9								
Axionice godfroyi (Gravier, 1911)	31	1.9	17.1	93.9	2	0.5	4.0	6.1				2				
Polyeunoa laevis McIntosh, 1885	30	1.8	22.9	53.6	26	6.0	32.0	46.4								
c.																
Pherusa kerguelarum (Grube, 1877)	2	0.1	5.7	100.0												
Abarenicola sp.	1	0.1	2.9	100.0												
Travisia kerguelensis McIntosh, 1885	1	0.1	2.9	50.0												
Perkinsiana antarctica (Kinberg, 1867)	28	1.7	5.7	77.8	8	1.9	4.0	22.2								
Thelepus extensus Hutchings and Glasby, 1987	35	2.1	14.3	100.0												
Euphrosine armadilloides Ehlers, 1900	33	2.0	25.7	100.0												
d.																
Euchone pallida Ehlers, 1908					3	0.7	8.0	100.0								
Jasmineira sp.					2	0.5	4.0	100.0								
Laetmonice wyvillei McIntosh, 1885					38	8.8	12.0	100.0								21
Harmothoe magellanica (McIntosh, 1885)	1	0.1	2.9	6.7	14	3.3	28.0	93.3								1
Harmothoe opalina McIntosh, 1885					1	0.2	4.0	100.0								1
e.																
Notomastus latericeus Sars, 1851	2	0.1	5.7	66.7	1	0.2	4.0	33.3						1		
Amage sculpta Ehlers, 1908	1	0.1	2.9	1.9	52	12.1	12.0	98.1				41		1		
Euchone sp.					1	0.2	4.0	100.0						1		
Leanira quatrefagesi Kinberg, 1855	7	0.4	11.4	18.4	31	7.2	44.0	81.6	2	1	1	1	4	1	5	3
Amphicteis gunneri (Sars, 1835)					7	1.6	20.0	100.0				2	1	2	1	
Aglaophamus ornatus Hartman, 1967	70	4.3	45.7	47.0	35	8.1	28.0	23.5				5	3	1	17	1
Nothria anoculata Orensanz, 1974	44	2.7	14.3	51.2	41	9.5	20.0	47.7				1	29	8		
Glycera kerguelensis McIntosh, 1885	2	0.1	5.7	18.2	9	2.1	16.0	81.8				4	1			
Zverlinum monroi (Hartman, 1964)					1	0.2	4.0	100.0					1			
Harmothoe kerguelensis (McIntosh, 1885)	7	0.4	14.3	35.0	7	1.6	8.0	35.5				5	2			
Lumbrineris sp.	2	0.1	5.7	25.0	2	0.5	8.0	25.5					1			
Terebellides stroemi kerguelensis McIntosh, 1885	7	0.4	8.6	77.8												
Pionosyllis comosa Gravier, 1906	1	0.1	2.9	33.3	2	0.5	4.0	66.7				2				
Scoloplos marginatus mcleani (Benham, 1921)	11	0.7	20.0	91.7	1	0.2	4.0	8.3						1		
Steggoa magalhaensis (Kinberg, 1866)	2	0.1	5.7	50.0	2	0.5	4.0	50.0								
Harmothoe sp.					12	2.8	4.0	100.0							12	
Eulagisca sp.	2	0.1	5.7	100.0												
Amphinomidae gen. sp.					1	0.2	4.0	100.0								
Ampharete kerguelensis McIntosh, 1885	1	0.1	5.7	100.0												
Total number of specimens	1647				430				7	6	2	73	46	19	36	27

Notes: N = total number of individuals in a group of stations, D = dominance in %, F = frequency in %, A = degree of association index.

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							Group B											Group C							
81d	75c	66c	64c	70d	69c	52c	21c	41d	36d	25d	42c	49c	28c	25c	58d	53d		50d	67d	78d	28d	35d	46d	57d	55d
1	5																								
1	8																								
6	1																								
	14																								
2																									
7																							4		
		2	1												1									1	
1															1									1	
1		3				1							5												1
4		2	4	4	2	1		1	1	1	1										2				
					3	2						5	1												
					3									1											
						3				2	1														
		1	7	1	9	5	1	1	1																
							8											1							
				2						1															
										2															
								4	3	2	14			2	3										
									1		1														
																10									
6	6								1																
1																									
7								1										14	1	6	15	3	2	2	1
				2											1										1
								3	1																
																					4	1	1		
					1																		2	1	1
																				1	1				
														2											
															1										
37	34	8	12	9	18	12	9	10	8	8	17	5	6	5	6	10		15	1	7	22	4	9	5	4

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Table I. Îles Crozet polychaetes, the number of individuals per catch is presented (continued).

Groups of stations and stations	Group A 60c	26c	79c	23d	24c	14d	14c	78c	79d	80d	60d	51d	27d	74d	68d
a.															
Austrolaenilla sp.															
Lumbriclymenella robusta Arwidsson, 1911															
Eusamythella sexdentata (Hartman, 1967)															
Melinna cristata (Sars, 1851)															
Oweniidae gen. sp.															
Spiophanes kroeyeri Grube, 1860															
b.															
Harmothoe spinosa Kinberg, 1855	6	2	1	3	6	6	7	2	1	2					
Trypanosyllis gigantea (McIntosh, 1885)	8				1	2	8		1	3	8		1		1
Thelepus cincinnatus (Fabricius, 1780)				1	2	1									1
Eunice pennata (Mueller, 1776)	6	3		12						13	1			1	3
Laetmonice producta Grube, 1877	6	1	11	1	4	1	7	47	1	3	1	2	5	4	3
Lanice marionensis Branch, 1998	4	9	2	22	2		2		1	1	10	1	2	1	5
Nicon maculata Kinberg, 1866							1					1			
Axionice godfroyi (Gravier, 1911)															
Polyeunoa laevis McIntosh, 1885															
c.															
Pherusa kerguelarum (Grube, 1877)						1					1				
Abarenicola sp.						1									
Travisia kerguelensis McIntosh, 1885						1									
Perkinsiana antarctica (Kinberg, 1867)						12	16								
Thelepus extensus Hutchings & Glasby, 1987						8	7								1
Euphrosine armadilloides Ehlers, 1900				15		2	1	1			8				
d.															
Euchone pallida Ehlers, 1908															
Jasmineira sp.															
Laetmonice wyvillei McIntosh, 1885															
Harmothoe magellanica (McIntosh, 1885)															
Harmothoe opalina McIntosh, 1885															
e.															
Notomastus latericeus Sars, 1851															1
Amage sculpta Ehlers, 1908															
Euchone sp.															
Leanira quatrefagesi Kinberg, 1855													2		1
Amphicteis gunneri (Sars, 1835)															
Aglaophamus ornatus Hartman, 1967						11	1		6	3	1	15	7	6	5
Nothria anoculata Orensanz, 1974									31	2				6	
Glycera kerguelensis McIntosh, 1885														1	
Zverlinum monroi (Hartman, 1964)															
Harmothoe kerguelensis (McIntosh, 1885)						1									
Lumbrineris sp.						1						1			
Terebellides stroemi kerguelensis McIntosh, 1885												5	1	1	
Pionosyllis comosa Gravier, 1906															
Scoloplos marginatus mcleani (Benham, 1921)								1	1						1
Steggoa magalhaensis (Kinberg, 1866)															
Harmothoe sp.															
Eulagisca sp.															
Amphinomidae gen. sp.															
Ampharete kerguelensis McIntosh, 1885														1	
Total number of specimens	30	15	14	54	15	48	50	51	42	27	30	25	18	21	22

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37d	61d	62c	80c	29c	22d	46c	12c	73c	73d	59c	37c	13c	45c	55c	39c	77d	59d	29d	26d
	3	8	6	4	11	22	13	15	21	3	24	7	9	10	2				1
1		7	3	3	1	2	1	2	2	1	9	18	1	6	5	1	2	1	1
		2	5		1	5	27	15	4	1	17	40	1	7	4	1			
77	1	51	75	1	22	2	8	23	58	3	12	16		2	6	1	1	2	12
			7	49	1	4	15	3	18	16	5	9						15	1
1	99	1	6		1					1	1	1					1		
			7	1	1	8	8	12	3	8	9	5	3	3					
							8	1	1		6	13	2						
		1	6	5	3		3			8		2	2						
	18																		1
	1	1							3	1									
					1														
					1														
3					1														
1	1		2	3	1				5					2					
					1		1		4										
											1								
						3	1									1			1
												1							
1	2	2										3							
		1						1											
										1	1								
84	125	74	117	66	46	46	85	72	119	43	85	115	18	30	17	4	4	18	17

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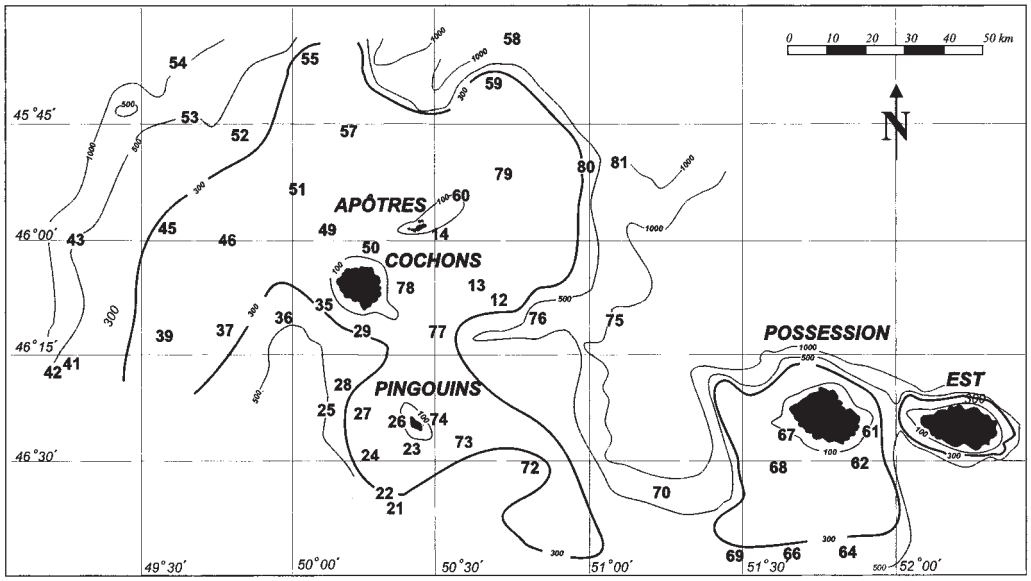

Fig. 1. Location of sampling sites.

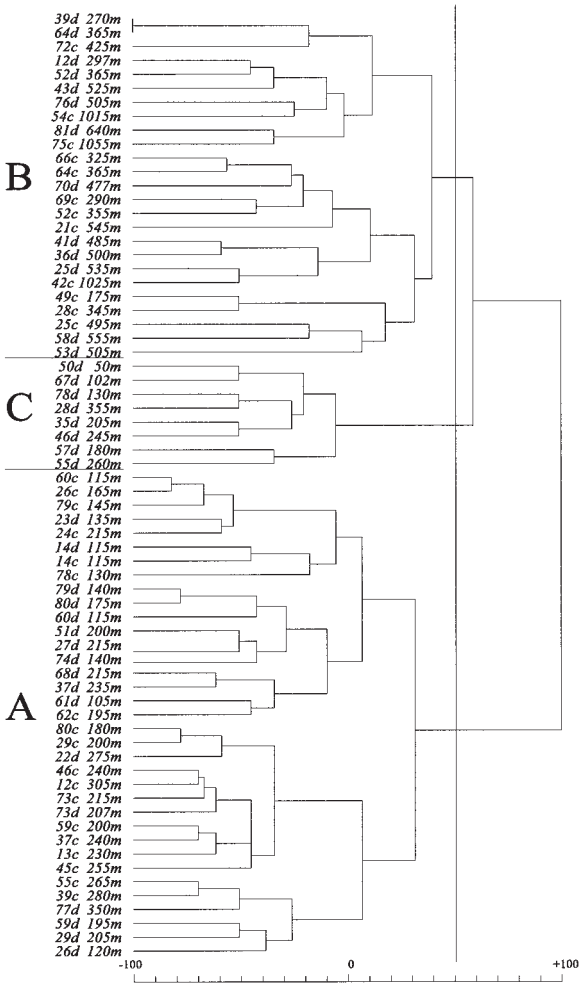

Fig. 2. Dendrogram of 68 samples constructed on the basis of distribution of 45 polychaete species. Samples are denoted by the number of station (two first figures), a letter (d = dredge, c = trawl) and the depth in metres.

sorting method with clustering intensity coefficient α = -0.25 was adopted for samples and species clustering (Figs 2 & 3). In Table I the degree of association index (Salzwedel *et al.* 1985) was used which expresses the percentage of individuals of a given species recorded in a given station group (= assemblage) within the total number of specimens of that species in the overall study area. Frequency (the percentage of samples in which a particular species occur) and dominance (the proportion of individuals of a particular species in relation to the sum of individuals of all polychaete species in a particular group of stations, in percent) were also used in the analysis of polychaete assemblages.

Results

Forty five polychaete species were identified (Table I). The most numerous (dominance value in brackets) were: *Eunice pennata* (21.2%), *Laetmonice producta* (11.9%), *Harmothoe spinosa* (9.3%), *Lanice marionensis* (8.4%), *Aglaophamus ornatus* (7.0%), *Thelepus cincinnatus* (7.0%), *Trypanosyllis gigantea* (4.8%) and *Nothria anoculata* (4.0%). Together, these eight species constitute almost 75% of the whole polychaete collection.

The sixty eight samples can be divided into three groups on the basis of their polychaete composition (Fig. 2). The shallower stations of group A are at a depth of about 100–300 m. Group B stations are at about 300–1055 m. Only a few stations between 50 m and 350 m make up a group C, all having an extremely poor polychaete fauna with only one frequent species, the eurytopic *Aglaophanus ornatus.* Therefore these are not taken into consideration in the further analysis.

The bottom area investigated can be divided into two parts. The shallower A stations are populated by an

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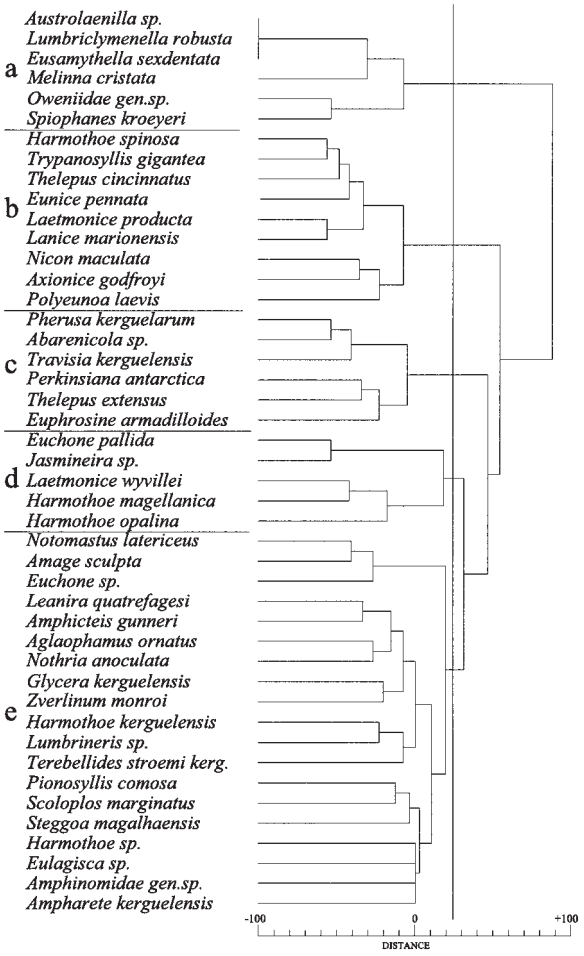

Fig. 3. Dendrogram of 45 polychaete species derived from their distribution in 68 samples round Îles Crozet.

abundant, homogenous, and well defined polychaete assemblage (Table I) of 30 species and dominated by some very frequent species, namely *Eunice pennata, Laetmonice producta, Harmothoe spinosa, Lanice marionensis* and *Trypanosyllis gigantea* with dominance values 25.0%, 14.6%, 11.8%, 10.6% and 6.1% respectively. Together with *Thelepus cincinnatus* they make up a group of species typical for this part of the bottom.

The deeper B stations have 37 polychaete species (Table I). The fauna here is heterogeneous and species are distributed irregularly. A characteristic group of species is not apparent. There are no species with a high frequency. *Melinna cristata* and *Laetmonice wyvillei* make up a small group of most numerous species in the deepest part of the area.

In general polychaete distribution can be explained by depth, and, it appears that the homogeneity of the shallower polychaete assemblage is linked to the prevalence of the muddy and sandy bottom. On the other hand, heterogeneity of the polychaete fauna in the B group of stations is related to the more strongly marked mosaic character of the bottom.

Possible explanations for some species clusters in Fig. 3 are as follows:

Cluster "a" represents one group of species from the deepest part (640–1055 m). It may be connected with muddy bottom.

Cluster "b", is a very characteristic group of species from the shallower part of the area (assemblage "A", at the depth of about 100–300 m with mostly muddy and sandy bottom).

Cluster "c" represents some rare species collected in the shallow stations (mostly about 100 m).

Cluster "d" represents some species mostly from the deepest part of the area (500–1025 m). These were found in muddy bottoms with stones.

Cluster "e" are species irregularly distributed in the whole area.

Amongst the groups of species distinguished the group "b" is the most constant representation of the shallow sandy bottom polychaete assemblage.

Discussion

Comparison between these data and those already published are difficult owing to the widely different collecting methods used. However, similar methods, including dredging, were used by Gillet (1991), Branch (1994) and in this study. Here, the comparison is relatively accurate. It points to faunistic similarities between the polychaete fauna at Marion and Prince Edward islands (Branch 1994) and Îles Crozet (this study). In both areas, at depth ranges of 50–300 m, the fauna was dominated by *Lanice marionensis, Eunice pennata, Aglaophamus ornatus* and *Harmothoe spinosa.* Branch (1994) distinguished on the Marion–Prince Edward shelf a soft-bottom polychaete assemblage (her "group 3") at a depth range of 150–300 m with abundant *L. marionensis, E. pennata* and *Laetmonice producta.* These polychaetes are considered by Branch as "indicator species of communities between 50 and 350 m". This is clearly similar to assemblage A described in this paper. Gillet's (1991) Marion – Prince Edward Island – Îles Crozet "assemblage 3_2" from mostly sandy bottoms was dominated by *Laetmonice producta, Harmothoe magellanica* and *Eunice pennata.* The last is also the most characteristic element of assemblage A recognized in this analysis. Both archipelagos apparently form a clearly uniform and biogeographically homogenous area in terms of the polychaete fauna. This is also confirmed by other authors on the basis of brachiopods (Hiller 1994), crustaceans (Kusakin 1967, Branch *et al.* 1991), pycnogonids (Arnaud & Branch 1991) and fish (Andriashev 1987).

On the other hand, no clear biocenotic affinities could be found between the polychaete fauna of Îles Kerguelen and that recorded in the Îles Crozet and Marion–Prince Edward

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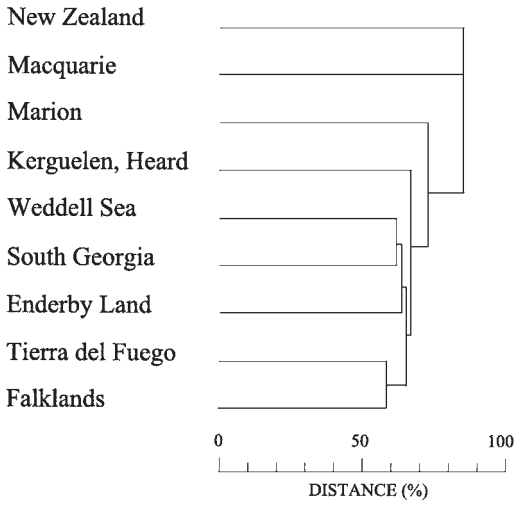

Fig. 4. Dendrogram of nine Antarctic localities based on data by Branch (1994). Explanations in text.

Islands based on the data by Gillet (1991), Branch (1994) and this study. The problem of biogeographical relationships of the sub-Antarctic islands: Marion and Prince Edward islands, Îles Crozet, Îles Kerguelen, Heard and Macquarie islands, has been discussed for a long time. All these islands have been treated by many authors as a single biogeographical entity, defined as "Kerguelenian District or Province" (Knox 1960, Andriashev 1965, Powell 1965, Hedgpeth 1969, 1970, Dell 1972, Averintsev 1972, Briggs 1974, Cantera & Arnaud 1984) or as "Kerguelen Transitional Province" (Kensley 1980). Other opinions on the biogeographical status of these islands by Kusakin (1967), Briggs (1974), Kusakin & Vasina (1982) as well as Andriashev (1987) stress, for example, the biogeographical heterogeneity of the area, dividing it into three or two independent provinces. The analysis of the distribution of peracarid crustaceans (Branch *et al.* 1991) points, however, to a strong relationship between the indo-ocean sub-Antarctic archipelagos. Such similarities appear also in the analysis of the distribution of brachiopods (Hiller 1994). Similar conclusions have also been reached by Branch *et al.* (1993) on the basis of the distribution of ophiuroids and holothurians. On the other hand Clark (1962) and Branch *et al.* (1993) point to closer similarities between Marion Island and the Magellan area than with the Kerguelen Islands, when taking into consideration the Asteroidea. The information presented by Arnaud & Branch (1991) point to a lack of biogeographical connections between the Marion–Prince Edward group and Îles Kerguelen. The difficulties in the creation of a satisfactory biogeographical classification of the sub-Antarctic islands have been noted by Knox & Lowry (1977), who have placed the Kerguelen and Heard islands on the basis of the analysis of polychaete fauna within the Antarctic area. On the basis of the analysis of distribution of Amphipoda the Îles Kerguelen (as well as Auckland, Campbell, Macquarie and Prince Edward islands) were included in the sub-Antarctic area as one of the elements of "a loose knit group with low within-area affinities and lower between-area affinities".

The view on the biogeographical affinities of Îles Kerguelen and the Antarctic region is especially strongly documented, taking into consideration the distribution of Polychaeta. This has been stressed by Knox & Lowry (1977) and also supported by the dentritic (minimum spanning tree) analysis made by Siciński (1986). Averintsev (1972) pointed to the impact of Antarctic area fauna on shaping of the Polychaeta fauna of the Îles Kerguelen. In the opinion of Ushakov (1962) the Polychaeta fauna from the Phyllodocidae and Aphroditidae families of the Îles Kerguelen derives from the fauna of the Antarctic area.

The results of the present work do not provide a sufficiently strong basis for making a statement on close biogeographical affinities of the Marion–Prince Edward and Crozet group islands with the Îles Kerguelen. Taking into account the polychaete data by Rullier (1966, 1973), Bellan (1974), Chardy *et al.* (1976) and Duchêne (1984) such characteristic, and in Branch's (1994) opinion, indicator species as *Lanice marionensis* and *Eunice pennata* were not encountered in the Kerguelen area. Gillet (1991) discusses the characteristic groups of dominant Polychaeta species, found earlier by different authors on the shelf of Îles Kerguelen. Totally different groups of such characteristic species have been found on the Marion–Prince Edward and Îles Crozet shelf (Gillet 1991 - assemblages). On the other hand there are also indications supporting the view on connecting the Îles Kerguelen with the Antarctic area. This is supported, for example, by the similarities of the shallow, sandy, sub-littoral polychaete fauna of the Admiralty Bay (Siciński & Janowska 1993, Siciński 1998) and Morbihan Gulf (Chardy *et al.* 1976).

Branch (1994) concluded that "when regarding polychaetes, Marion–Prince Edward and Kerguelen islands may be linked together into a Kerguelen Province". She notes at the same time that "Kerguelen also shows close links with the Falklands, South Georgia and the Antarctic whereas Marion–Prince Edward Islands has lower links with these areas". A similar conclusion is obtained also from the analysis of Branch's figs 6 and 8. Her data show stronger affinities between Kerguelen and South Georgia (Antarctic Region) than with Marion–Prince Edward Islands. An objective analysis of the problem has been presented in single-link dendrogram (Fig. 4) constructed on the basis of Branch's data (1994, fig. 6, p. 49). Îles Kerguelen are connected mostly with the areas of Antarctic province and with South Georgia. They are even closer to Magellan area than to the Marion–Prince Edward area. Consequently, Marion–Prince Edward group together with Îles Kerguelen cannot be taken as a biogeographical unit.

For the needs of this analysis the mutual affinities of the four areas: Western Antarctica, Eastern Antarctica, Îles

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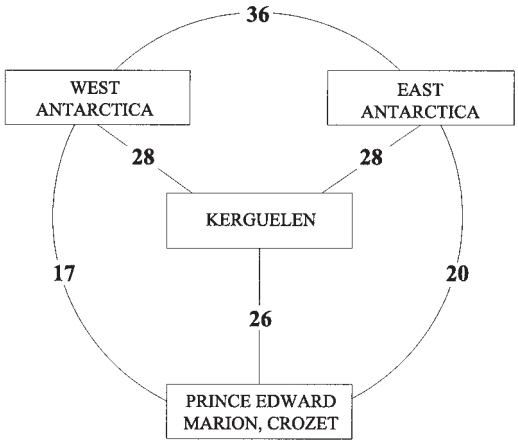

Fig. 5. Mutual affinities based on the Jaccard's formula (in %) between polychaete fauna of biogeographical provinces discussed in text.

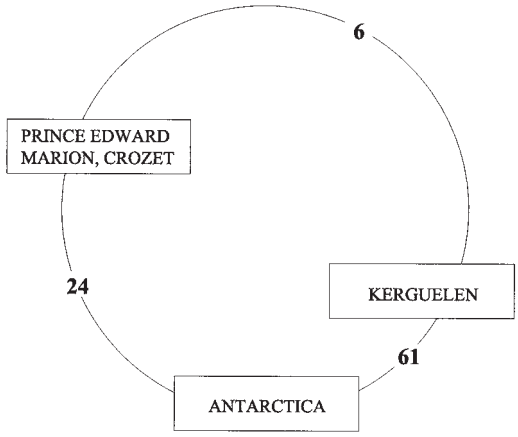

Fig. 6. Number of polychaete species endemic for each pair of compared areas (other explanations in text).

Kerguelen and the archipelagos Marion, Prince Edward and Crozet were calculated. The data matrix which has been the base for construction of a dendrogram (Fig. 5) covers 412 species of Polychaeta found at a depth not exceeding 600 m. For preparing the checklist the data on Polychaeta occurrence contained in the works of Rullier (1966), Hartman (1967, 1978), Day (1971), Averintsev (1972), Arnaud (1974), Bellan (1972, 1974), Duchêne (1984), Hartmann-Schröder (1986), Hartmann-Schröder & Rosenfeldt (1988, 1989, 1990, 1991, 1992), Branch (1994), Guillermo & Parapar (1997), Cantone *et al.* (1999), Siciński (2000) and the data from this work have been used. The similarities have been calculated using Jaccard's formula i.e. an equivalent of "coefficient of community" index applied in papers by Knox & Lowry (1977) and Branch (1994).

The results of such an analysis do not give an unequivocally strong solution of the problem of the biogeographical status of Îles Kerguelen in relation to Antarctica and Marion, Prince Edward, and Crozet archipelagos. Nonetheless the results clearly indicate that there are greater similarities between Îles Kerguelen and Western and Eastern Antarctica than there is between Marion, Prince Edward and Crozet archipelagos with Antarctica. Similarity values for Îles Kerguelen with Antarctica on one hand and with Marion, Prince Edward and Îles Crozet on the other, allow us to perceive the Polychaeta fauna of Îles Kerguelen as intermediate between a typically Antarctic fauna and a sub-Antarctic fauna of Indian Ocean Islands located outside the Polar Front (to the north from the Antarctic Convergence). Anyhow the suggestion to combine the Kerguelen archipelago with the Marion, Prince Edward and Crozet archipelagos into one bio-geographic province seems unjustified.

A different method of analysis provides further evidence. From the prepared data matrix it follows that Îles Kerguelen have 61 species common with Antarctica which are absent in the Marion, Prince Edward and Crozet archipelagos. On the other hand Marion, Prince Edward and Îles Crozet have only 24 common species with Antarctica, which are absent on the Îles Kerguelen. Finally, Îles Kerguelen have only six species common with the Marion, Prince Edward and Crozet archipelagos, species absent in Antarctica (Fig. 6). When species endemic to two compared areas are taken into account, the high faunistic similarities of Îles Kerguelen and Antarctica are clearly visible against the background of nearly three times lower similarities of Marion, Prince Edward and Îles Crozet with Antarctica and exceptionally small similarities between the archipelagos. This suggests that these archipelagos do not form a common biogeographical province.

Thus we share the opinion of Knox & Lowry (1977), also supported by the analysis of Siciński (1986), that on the basis of polychaete distribution the Îles Kerguelen show closer affinities with the Antarctic region than with the sub-Antarctic Marion–Prince Edward and Îles Crozet. This can be explained by the different hydrographical conditions. Firstly, according to many authors, the Îles Kerguelen are located inside or even southwards of the Polar Front; whereas, the Marion–Prince Edward and Îles Crozet are situated north of the Polar Front. Secondly, Marion–Prince Edward and Îles Crozet are situated in an area with prevailing calcareous sediments whereas the Îles Kerguelen are located in an area with siliceous sediments.

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