View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Scientia Marina (E-Journal)

SCI. MAR., 63 (Supl. 1): 133-137 SCIENTIA MARINA 1999

MAGELLAN-ANTARCTIC: ECOSYSTEMS THAT DRIFTED APART. *W.E. ARNTZ and C. RÍOS (eds.)*

Sublittoral Harpacticoida (Crustacea, Copepoda) from the Magellan Straits and the Beagle Channel (Chile). Preliminary results on abundances and generic diversity*

KAI HORST GEORGE and HORST KURT SCHMINKE

FB Biologie, Geo- und Umweltwissenschaften, AG Zoosystematik und Morphologie, Carl von Ossietzky-Universität, D-26111 Oldenburg, Germany.

SUMMARY: Samples of meiofauna were collected with a Multicorer during the "Magellan 'Victor Hensen' Campaign" of RV 'Victor Hensen' in 1994 at 62 stations along the Magellan Straits and the Beagle Channel. Seventeen samples were analysed in the framework of a larger project. Only 69 species of Harpacticoida are known from Chile so far, all of them inhabiting the littoral zone. The "Magellan Campaign" of RV 'Victor Hensen' provided the first opportunity to obtain sublittoral samples of meiobenthos of Chilean coasts. In these samples the Copepoda were represented by 4 of its orders: Calanoida, Cyclopoida, Poecilostomatoida and Harpacticoida, the latter exhibiting the highest abundances. Representatives of 19 harpacticoid families (6 of which are new for Chilean waters) were identified in the samples. The species found in 15 of these families belong to 28 genera of which 18 are new to the Chilean fauna. With respect to taxa composition and distribution, the following preliminary results can be presented: the number of new families and new genera for the southern tip of South America increased considerably; a relatively high similarity between the Magellan Straits/Beagle Channel and areas of corresponding northern latitudes can be observed; the Magellan Straits and Beagle Channel show considerable differences with respect to taxa composition and diversity of the harpacticoid fauna.

Key words: Copepoda, Harpacticoida, Chile, Magellan Straits, zoogeography, biodiversity.

RESUMEN: HARPACTICOIDA (CRUSTACEA, COPEPODA) SUBLITORALES DEL ESTRECHO DE MAGALLANES Y DEL CANAL DEL BEAGLE (CHILE). RESULTADOS PRELIMINARES SOBRE ABUNDANCIA Y DIVERSIDAD GENÉRICA. – Durante la Campaña Magallánica del "Victor Hensen" en 1994, se muestrearon 62 estaciones con un Multicorer (MUC) en el Estrecho de Magallanes y el Canal del Beagle. De ellas, 17 han sido analizadas en el marco de un proyecto más extenso. La composición de comunidades meiobentónicas y en especial de los Harpacticoida (Crustacea, Copepoda) a lo largo de la costa chilena aún es desconocida. En la actualidad se conocen sólo 69 especies harpacticoídeas marinas de Chile, estando éstas restringidas exclusivamente a zonas litorales. La Campaña Magallánica del buque científico "Victor Hensen" ofreció por primera vez la oportunidad de obtener muestras meiobentónicas del sublitoral de las costas chilenas. En las muestras analizadas, los copépodos están representados por 4 de sus órdenes: Calanoida, Cyclopoida, Poecilostomatoida y Harpacticoida, presentando los últimos las mayores abundancias. Fueron identificados representantes de 19 familias harpacticoídeas, siendo 6 familias nuevas para las aguas chilenas. Especies encontradas en 15 familias pertenecen a 28 géneros, de los cuales 18 deben ser considerados cómo géneros nuevos para la fauna chilena. Con respecto a la composición de taxones y su distribución se pueden presentar los siguientes resultados preliminares: el número de familias y géneros nuevos para el extremo meridional de América del Sur aumentó considerablemente; se puede observar una similitud relativamente alta entre el Estrecho de Magallanes/Canal del Beagle y áreas de latitudes correspondientes del hemisferio norte; el Estrecho de Magallanes y el Canal del Beagle presentan grandes diferencias con respecto a la composición de taxones y diversidad. El análisis de las abundancias y diversidad a nivel de especies será el objetivo de futuras investigaciones. Sin embargo, para cumplir tal objetivo los extensos trabajos taxonómicos deben ser finalizados con anterioridad.

Palabras clave: Copepoda, Harpacticoida, Chile, Estrecho de Magallanes, zoogeografía, biodiversidad.

*Accepted March 18, 1999.

INTRODUCTION

Compared with the marine meiofauna of temperate and polar regions of the Northern Hemisphere, the species composition and distribution of the meiofauna in Antarctic and Subantarctic regions are still poorly known. For zoogeographic reasons it is very important to compare the meiofauna of the southern tip of South America with that of the Antarctic. When these two continents started separating as the last of the Gondwanian fragments approximately 30 million years ago (see Brandt, 1991; Arntz, 1996; Winkler, 1994), the Drake Passage opened and the circumpolar currents became established, which led to a significant isolation of the Antarctic continent. Due to the relatively late separation of the two continents and the short distance between them, it is to be expected that faunal exchanges between the two have been more extensive and longer lasting than between the Antarctic and other southern continents (Arntz, 1996).

Whereas the study of High Antarctic meiofauna and in particular of Harpacticoida (Crustacea, Copepoda) has been intensified in the last decade (e.g. Dahms, 1992a, b; Dahms and Dieckmann, 1987; Dahms *et al*., 1990; George, 1993; Herman and Dahms, 1992; Schminke and Dahms, 1989; Vanhove *et al*., 1995; Willen, 1995; 1996a, b), practically nothing is known on the meiofauna of the southern tip of South America or the Antarctic Peninsula. As regards the Harpacticoida only 69 species are known so far from Chile, having been recorded from the littoral mainly along the coast of northern and central Chile (see George, 1996). Therefore, the "Magellan Campaign" of RV "Victor Hensen" in 1994 was a good opportunity to obtain material from an area poorly investigated so far, not only from the littoral but also from the sublittoral down to several hundred metres depth.

The preliminary results presented here are part of a larger project comparing harpacticoid communities of various parts of the Magellan Region with each other and with those in the Antarctic at the species level. This requires time-consuming taxonomic work because of a very high proportion of new species. This work is still in progress, so the results presented here refer to taxa of higher taxonomic levels.

MATERIAL AND METHODS

During the "Magellan Campaign" of RV "Victor Hensen" between 17 October and 25 November 1994 a total number of 62 stations were sampled with a Mini-Multicorer (MUC) bearing 4 cores (size

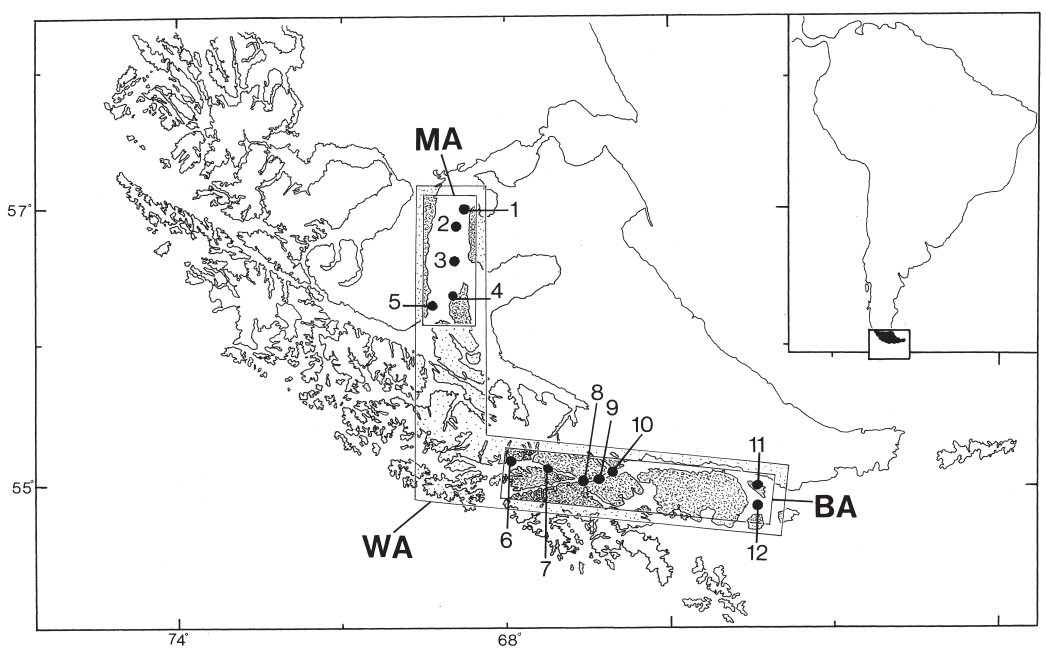

FIG. 1. – Location of the analyzed sampling stations, and schematic representation of the presumed distribution at family and genus level. Stations 954/956 (1), 840 (2), 847 (3), 977 (4), 864, 866, 872 and 877 (5) belong to the so-called "Magellan Area (**MA**)"; the remaining stations 1033 (6), 1076 (7), 1123 (8), 1135 (9), 1138 (10), 1234 (11), 1144 and 1181 (12) constitute the so-called "Beagle Area (**BA**)". **WA**: Whole Area, comprising taxa of MA and BA. Taxa corresponding to respective areas are presented in Table 3.

TABLE 1. – List of the sampling stations studied from the Magellan Straits and the Beagle Channel. The list presents the station number, its locality, geographical position and depth.

no	station	area	locality	geograph. position	depth (m)
1	840	"Magellan Area"	Paso Ancho, st. 19	53°08.8S/70°38.4W	123
2	847		Paso Ancho, st. 18	53°21.2S/70°42.7W	200
3	954		Paso Ancho, st. 20	53°59.7S/70°33.0W	79
4	956		Paso Ancho, st. 20	53°59.9S/70°32.9W	80
5	977		Paso Ancho, st.15	53°33.0S/70°39.2W	459
6	864		Bahía Voces	53°42.6S/70°48.7W	550
7	866		Bahía Voces	53°41.8S/70°54.6W	440
8	872		Bahía Voces	53°43.4S/70°56.0W	351
9	877		Bahía Voces	53°41.5S/70°56.5W	227
10	1033	"Beagle Area"	Garibaldi	54°52.7S/69°55.2W	309
11	1076		Romanche	54°53.6S/69°30.3W	346
12	1123		Pta. Yámana	54°58.7S/69°01.9W	219
13	1135		C. Beagle	54°58.1S/68°49.9W	257
14	1138		Yendegaia	54°54.5S/68°38.7W	320
15	1144		I. Picton	55°08.4S/66°54.5W	110
16	1181		I. Picton	55°07.0S/66°55.4W	110
17	1234		I. Gardiner	55°00.4S/66°53.6W	100

of each core 30.38 cm^2). Thus, at each station a maximum of 4 could be taken. The material of each core was split into 2 fractions: an upper one, comprising the first 5 cm of substrate, and a second one containing the rest of the sampled material. The material was fixed on board with 5% buffered formaldehyde and later centrifuged in Gent (Belgium) for separation of the meiofauna from the substrate. Copepoda were sent to Oldenburg for further research. The results presented here refer only to the upper fraction (first 5 cm) of each core. Of the 62 stations, 17 have been analyzed (Table 1, Fig. 1). The copepods have been counted and identified at higher taxonomic levels (orders, families, genera). Identification was done with the aid of a Leitz-Dialux 20 EB stereo microscope, using identification keys from Lang (1948), Wells (1976), Huys *et al*. (1996) and original literature.

TABLE 2. – List of harpacticoid families found in the sampled area, including relative abundances (rel. abund.) (in %) of each taxon in the Magellan Straits and/or the Beagle Channel respectively. Taxa restricted to one of the areas indicated by bold names and data. Families marked by an asterisk* are new for the Chilean marine fauna.

Nr.	Taxon	Rel. abund. (%) Mag. Str.	Rel. abund. (%) Bea. Ch
1.	**Adenopleurellidae***	**0.36**	0
2..	Ameiridae	7.99	13.03
3.	Ancorabolidae	1.12	0.47
4.	Argestidae*	7.58	5.74
5.	Canthocamptidae*	1.30	4.36
6.	Cerviniidae*	1.24	1.42
7.	Cletodidae	7.64	13.72
8.	Diosaccidae	30.37	7.55
9.	Ectinosomatidae	27.65	38.36
10.	**Harpacticidae**	**0.06**	0
11.	Huntemanniidae*	0.06	0.17
12.	**Laophontidae**	0	**0.09**
13.	**Leptastacidae**	**3.97**	0
14.	Normanellidae	1.36	0.30
15.	Paramesochridae	**2.19**	0
16.	Paranannopidae*	1.24	2.85
17.	**Tetragonicipitidae**	0	**6.78**
18.	Thalestridae	2.25	1.04
19.	Tisbidae	3.32	3.24

RESULTS AND DISCUSSION

In the material studied, 4 orders of Copepoda were represented: Calanoida, Cyclopoida, Poecilostomatoida and Harpacticoida, which showed the highest abundances varying between 4 and 779 individuals per core. Among Harpacticoida the highest abundances were found in the eastern Beagle Channel, and the lowest in the northern Magellan Straits.

A total number of 19 harpacticoid families has been recorded, 6 of which are new for Chilean waters (Table 2). At the generic level, identifications are still in progress, but so far 28 genera belonging to 15 families have been identified, 18 of them being new for Chile (Table 3). It is to be expected that at the species level the number of new taxa will increase drastically.

One of the aims of the project is the comparison of species composition in the cold temperate region of the Southern Hemisphere with corresponding regions in the Northern Hemisphere. In this context it can be said that at the family level there is a rela-

TABLE 3. – List of harpacticoid genera found in the Magellan Straits and/or Beagle Channel. + = present, - = absent. Taxa restricted to one of the areas indicated by bold names and symbols. Genera marked with an asterisk* are new for the Chilean marine fauna.

Nr.	Taxon	Magellan Area	Beagle Area
1.	***Ancorabolus****	**+**	-
2.	***Arthropsyllus****	-	**+**
3.	***Ceratonotus****	**+**	-
4.	***Laophontodes****	**+**	-
5.	*Eurycletodes**	+	+
6.	*Mesocletodes**	+	+
7.	*Cervinia**	+	+
8.	*Cletodes**	+	+
9.	***Stylicletodes****	**+**	-
10.	***Amphiascus***	**+**	-
11.	***Bulbamphiascus****	**+**	-
12.	***Robertgurneya***	**+**	-
13.	*Stenhelia**	+	+
14.	*Typhlamphiascus**	+	+
15.	*Bradya**	+	+
16.	*Halectinosoma*	+	+
17.	***Hastigerella(?)***	**+**	-
18.	***Microsetella***	**+**	-
19.	***Harpacticus***	**+**	-
20.	***Metahuntemannia****	-	**+**
21.	***Laophonte***	-	**+**
22.	***Leptastacus***	**+**	-
23.	*Normanella*	+	+
24.	***Kliopsyllus***	**+**	-
25.	***Leptopsyllus****	**+**	-
26.	*Pseudomesochra**	+	+
27.	*Pseudotachidius**	+	+
28.	*Zosime**	+	+

TABLE 4. – List of harpacticoid families collected in the Magellan Straits/Beagle Channel and the Laptev Sea/Barents Sea, respectively. Presences marked with +, absences marked with -. Taxa restricted to one of the regions indicated by bold names and symbols. Data of the Laptev and Barents Sea after P. Martínez, unpublished.

Nr.	Taxon	Mag. Str./ Beagle Ch.	Laptev/ Barents Sea
1.	**Adenopleurellidae**	**+**	-
2.	Ameiridae	+	+
3.	Ancorabolidae	+	+
4.	Argestidae	+	+
5.	Canthocamptidae	+	+
6.	**Canuellidae**	-	**+**
7.	Cerviniidae	+	+
8.	Cletodidae	+	+
9.	**Cylindropsyllidae**	-	**+**
10.	**Darcythompsoniidae**	-	**+**
11.	Diosaccidae	+	+
12.	Ectinosomatidae	+	+
13.	Harpacticidae	+	+
14.	Huntemanniidae	+	+
15.	Laophontidae	+	+
16.	**Leptastacidae**	**+**	-
17.	**Marsteiniidae**	-	**+**
18.	**Normanellidae**	**+**	-
19.	Paramesochridae	+	+
20.	Paranannopidae	+	+
21.	**Peltidiidae**	-	**+**
22.	**Rhizothricidae**	-	+
23.	**Tegastidae**	-	**+**
24.	**Tetragonicipitidae**	**+**	-
25.	Thalestridae	+	+
26.	Tisbidae	+	+

tively high similarity between the "Magellan Straits/Beagle Channel Region" and the northern "Laptev Sea/Barents Sea Region" (Table 4) (additional data by P. Martínez, unpubl.). Of 26 families known from both regions, 15 have been found in the southern as well as in the northern region, whereas 11 families seem to be restricted to one of the two regions. Furthermore, in material from the Patagonian continental shelf (see Arntz *et al*., 1997) which is not part of this study a few additional families also known from the northern region were detected (Cylindropsyllidae, Peltidiidae, Tegastidae), underlining the above mentioned high similarity. This similarity seems to be valid also at lower taxonomic levels. The genus *Ceratonotus* Sars, 1909 (Ancorabolidae), the distribution of which seemed to be restricted to the Northern Hemisphere, was also recorded in the Magellan Straits (George and Schminke, 1998). The genus *Arthropsyllus* Sars, 1909 (Ancorabolidae), which seemed to be restricted to boreal and northern subpolar seas, was found to be represented also in the Beagle Channel (George, 1998).

If the taxa composition in the samples of the Magellan Strait and the Beagle Channel is compared, clear differences can be seen between the two areas. At family as well as at genus level 3 groups of taxa can be distinguished; in one group the distribution covers the whole area, whereas two other groups are restricted in their distribution either to the "Magellan Area" or to the "Beagle Area" (Fig. 1). The first group comprises 12 out of the 19 families, whereas the "Magellan group" comprises 4 and the "Beagle group" 3 families (Table 2). At the generic level the differences are even more clearcut. The first group comprises 12 genera, the "Magellan group" 13 genera and the "Beagle group" only 3 (Table 3). The high number of genera in the "Magellan Area" is remarkable and contributes to the high diversity (in the sense of taxa richness) in this area as compared with the "Beagle Area" (Fig. 2). At stations 840-877 in the "Magellan Area" the number of genera in relation to the number of specimens is very high. It will be interesting to see how this relationship will look at the species level employing multivariate analyses, and how distributions and abundances correlate with parameters such as depth, temperature, salinity, granulometry and content of the substrate in organic matter.

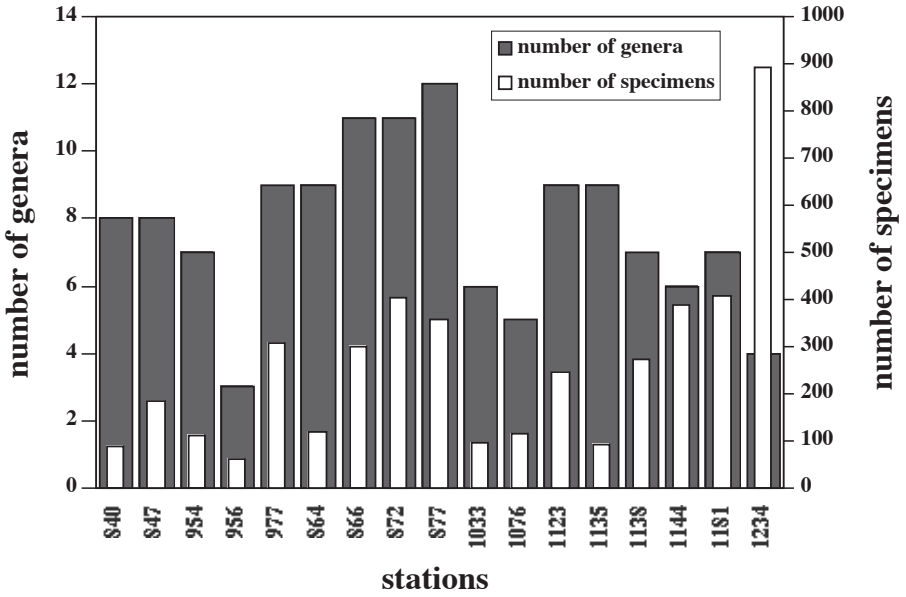

FIG. 2. – Graphical presentation of the relationship between the number of genera (left axis; shaded bars) and the number of specimens (abundances) (right axis; open bars) at each station. Stations 840-877 = "Magellan Area", Stations 1033-1234 = "Beagle Area".

ACKNOWLEDGEMENTS

We would like to thank Mr. Chen Guo Tong (Gent, Belgium) for sorting of the Copepoda. Special thanks to Dipl.-Biol. Pedro Martínez Arbizu (Oldenburg, Germany) for providing us with the data of his research in the Laptev and the Barents Sea. The participation of K.H. George in the "Magellan Campaign 1994" of RV "Victor Hensen" was supported by Deutscher Akademischer Austauschdienst (DAAD) and the Alfred-Wegener-Institut für Polar- und Meeresforschung, and the participation of K.H. George in the IBMANT '97 Workshop in Punta Arenas/Chile was made possible by the Deutsche Forschungsgemeinschaft (DFG).

REFERENCES

Arntz, W.E. – 1996. Introduction. *Ber. Polarforsch.*, 190: 10-15.

Arntz, W.E., A. Buschmann, K.H. George, D. Gerdes, M. Gorny, M.A. Lardies Carrasco, K. Linse, A. Montiel, E. Mutschke, M. Rauschert and C. Ríos. – 1997. Benthologische Arbeiten. *Ber. Polarforsch.,* 239: 53-57.

Brandt, A. – 1991. Zur Besiedlungsgeschichte des antarktischen Schelfes am Beispiel der Isopoda (Crustacea, Malacostraca). *Ber. Polarforsch.*, 98, 1-240.

Dahms, H.-U. – 1992a. Importance of zoosystematic research as demonstrated by the Antarctic meiofauna. *Verh. Dtsch. Zool. Ges.*, 85 (2): 277-284.

Dahms, H.-U. – 1992b. Peltidiidae (Copepoda, Harpacticoida) from the Weddell Sea (Antarctica). *Zool. Scr.*, 21 (2): 181-195.

Dahms, H.-U. and G.S. Dieckmann. – 1987. *Drescheriella glacialis* gen.nov., sp.nov. (Copepoda, Harpacticoida) from Antarctic Sea Ice. *Polar Biol.*, 7: 329-337.

Dahms, H.-U., M. Bergmans and H.K. Schminke. – 1990. Distribution and adaptations of sea ice inhabiting Harpacticoida (Crustacea, Copepoda) of the Weddell Sea (Antarctica). *P.Z.N.I. Mar. Ecol.*, 11 (3): 207-226.

George K.H. – 1993. *Harpacticoida (Crustacea, Copepoda) aus Chile und der Antarktis unter besonderer Berücksichtigung der Ancorabolidae*. Diplomarbeit Fachbereich Biologie, Universität Oldenburg.

George, K.H. – 1996. Revisión de los harpacticoídeos marinos (Crustacea: Copepoda) de Chile. *Rev. Chil. Hist. Nat.*, 69: 77-88.

George, K.H. – 1998. A new species of Ancorabolidae (Copepoda, Harpacticoida) from the Beagle Channel. *Hydrobiologia,* 379: 23-39.

George, K.H. and H.K. Schminke – 1998. First records of the genus *Ceratonotus* Sars, 1909 (Crustacea, Copepoda, Ancorabolidae) in the Southern Hemisphere, with the description of two new species. *Crustaceana,* 71(7): 801-817

Herman, R.L. and H.-U. Dahms. – 1992. Meiofauna communities along a depth transect of Halley Bay (Weddell Sea - Antarctica). *Polar Biol.*, 12: 313-320.

Huys, R., J.M. Gee, C.G. Moore and R. Hamond. – 1996. Marine and brackish water harpacticoid copepods, part 1. *Synop. British Fauna (New Series),* 51: 1-352.

Lang, K. – 1948. *Monographie der Harpacticiden*. Otto Koeltz Publishers, Königstein, reprint.

Schminke, H.K. and H.-U. Dahms. – 1989. Re-discovery of the Antarctic species of the family Neobradyidae (Copepoda, Harpacticoida) after over eighty years. *Hydrobiologia,* 182: 249-259.

Vanhove, S., J. Wittoeck, G. Desmet, B. Van den Berghe, R.L. Herman, R.P.M. Bak, G. Nieuwland, J.H. Vosjan, A. Boldrin, S. Rabitti and M. Vincx. – 1995. Deep-sea meiofauna communities in Antarctica: structural analysis and relation with the environment. *Mar. Ecol. Prog. Ser.*, 127: 65-76.

Wells, J.B.J. – 1976. *Keys to Aid in the Identification of Marine Harpacticoid Copepods*. Dept. Zool., Univ. Aberdeen, UK.

Willen, E. – 1995. *Archilaophonte maxima* gen.n. sp.n., a new taxon of the Laophontidae (Copepoda, Harpacticoida) from the high Antarctic (Weddell Sea). *Hydrobiologia,* 302: 241-255.

Willen, E. – 1996a. Two new genera of Laophontidae (Copepoda: Harpacticoida) from the high Antarctic Weddell Sea. *J. Nat. Hist.*, 30: 1297-1327.

Willen, E. – 1996b. *Pseudomesochra* T. Scott, 1902 as a member of the Paranannopidae Por, 1986 (Copepoda, Harpacticoida) with a description of three new species. *Senckenb. marit.,* 28 (1/3): 81-109.

Winkler, H. – 1994. Charakterisierung der Isopodenfauna (Crustacea, Malacostraca) des Scotia-Bogens aus biogeographischer Sicht: Ein multivariater Ansatz. *Ber. Polarforsch.*, 139: 1-196.