Expedition ANTARKTIS XIX/5 (LAMPOS) of RV „Polarstern“ in 2002

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2.1.5 Biodiversity, biogeography, phylogeny and trophodynamics of amphipod and isopod crustaceans (C. De Broyer, A.-N. Lörz , F. Nyssen, M. Rauschert, Y. Cariceo, C. Ríos)

Objectives

Their diversity, abundance, ubiquity and low dispersal capabilities make amphipods and isopods good model groups for studying patterns and processes of biodiversity and biogeography. A large dataset on amphipod diversity, distribution and ecology has been produced by previous cruises in the eastern Weddell Sea, the Antarctic Peninsula and the Magellan region. Many of these data and reference collections have been concentrated in the Biodiversity Reference Centre for Antarctic Amphipods ("Ant'Phipoda") at IRScNB, Brussels. The Ant'Phipoda reference centre is supported by the "Antarctic Amphipodologist Network (AAN)". Isopods have been scarcely analyzed both from a taxonomical and zoogeographical point of view since the seminal work of Brandt (1991, 1999). New material collected in the Magellan region and along the Scotia Arc will allow a general comparison of geographical distribution.

Relying on this expertise, the present project aims at characterising the biodiversity and biogeography of the Scotia Arc amphipods and at investigating the phylogeny and phylogeography of selected amphipod and isopod taxa in order to contribute to the understanding of the biogeographical and evolutionary links between the Magellan region (South America) and the Antarctic continent.

Investigations on habitat, trophic diversity and trophic role of amphipods in the benthic shelf communities of the eastern Weddell Sea indicated a large diversity of trophic niches and types. The LAMPOS cruise along the Scotia Arc offered a new opportunity to pursue the investigation of the ecological roles, in particular the trophic role, of the amphipod taxocoenosis in the shelf benthic communities by a multiple approach (stomach contents, feeding behaviour, functional morphology, stable isotopes, and fatty acids).

This project will contribute to the following programmes: SCAR EASIZ, SCAR EVOLANTA, DIVERSITAS (Systematics Agenda 2000) and Census of Marine Life.

Several complementary objectives are addressed by the project:

Biodiversity:

- To characterize the composition of the Scotia Arc amphipod and isopod fauna in comparison with other zoogeographic regions (Magellan, Subantarctic, Antarctic) and with the Antarctic deep sea (ANDEEP).
- To complete the comprehensive photographic documentation of live benthic animals (in particular amphipods) undertaken in previous cruises.
- To contribute to the ongoing revision of the whole Antarctic amphipod fauna and the preparation of new identification tools undertaken by the AAN.

Phylogeny:

- To investigate the phylogeny of selected amphipod families (Epimeriidae, Iphimediidae, Lysianassidae s.l., Oedicerotidae) by parallel molecular and ecomorphological approaches.

Biogeography and phylogeography:
- To evaluate distributional patterns along the Scotia Arc and the role of the Polar Front.
- To investigate the Scotia Arc colonisation and the polar submergence hypotheses within selected taxa by a molecular approach.

Ecofunctional diversity and trophodynamics:
- To characterize the ecological traits of the amphipod and isopod taxocoenosis, in particular habitat diversity, ecomorphological types and life styles.
- To investigate in detail the trophodiversity and the trophodynamics of the amphipod taxocoenosis in the Scotia Arc benthic communities by a multiple approach involving: digestive tract analyses and feeding behaviour observations in aquaria and the use of stable isotope (carbon and nitrogen) ratio and fatty acids as tracers to delineate the trophic relationships involving amphipods in the benthic food webs of the Scotia Arc shelf.
- To evaluate the significance of the amphipods as prey for macrobenthos and demersal fish by stable isotope and fatty acid analyses.

Work at sea
Sampling, sorting, measuring and identifying: Amphipoda (De Broyer, Lörz, Nyssen, Rauschert) and Isopoda (Cariceo, Rios) were collected at all benthic stations by AGT, RD, GSN and traps. A large part of the samples was sorted on board to species level and identified, where possible.
Preserving and extracting DNA samples (Anne-Nina Lörz): selected taxa (in particular Iphimedoidea, Lysianassoidea and serolid isopods) were preserved for molecular analyses in pre-chilled ethanol 100 or 96 % soon after sampling, preferably alive, in order to avoid possible DNA degradation by enzymatic activity.
Trophodiversity and trophodynamics (Fabienne Nyssen): Samples from selected species were collected and frozen for isotopic, fatty acid and gut content analyses. Gut content analysis was performed on some fixed specimens and digital pictures of stomach structure and contents were taken. Live specimens of more than 20 amphipod species (some collected during ANDEEP) and one isopod species were kept in a cool container at a temperature of -1°C (±1°C). Animals were reared in different aquaria (of 6 to 30 l) permanently alimented by fresh sub-surface seawater and provided with various biological or inorganic substrates. Ethological observations of all species were performed as well as feeding experiments on some selected species. The performed experiments were of four different types:
- Feeding rate estimation (on the herbivorous eusirid *Djerboa furcipes* and the scavenger lysianassoids *Abyssorchomene plebs*, *A. rossi*, *Eurythenes gryllus*, *Pseudorchomene coatsi*) with calibrated food (i.e. brown algae or pre-weighed pieces of freeze-dried squid).
- Estimation of the isotopic fractionation and tissular turnover rates of selected species (idem 1 & the scavenger lysianassid *Waldeckia obesa*). Isotopically known food (i.e. soy beans or pieces of freeze-dried cod) was provided *ad*

libitum to a defined number of amphipods. Food and amphipod specimens were regularly collected and frozen for isotopic and fatty acid analyses.
- Study of starvation effects on the isotopic ratios of selected amphipod species. A defined number of amphipods of selected species was isolated and starved. Amphipods were regularly sampled and frozen for isotopic and fatty acid analyses.
- Estimation of the gut clearance time in species collected in traps (amphipod species: *A. plebs*, *P. coatsi*, *A. rossi*, *W. obesa*; isopod species: *Natatolana* sp.).
Specimens that survived till the end of the LAMPOS cruise were transported by air to I.R.Sc.N.B., Brussels for further behaviour observations and feeding experiments. Samples from different phyla which are known or suspected to be prey or predators of amphipods were collected and frozen for further lipid and stable isotope analyses.
Photographic documentation of living crustaceans and benthos (Martin Rauschert): More than 1900 colour slides of live specimens of macrobenthos were taken with the purpose to create at the AWI a photographic identification guide. About 500 species of the following taxa were documented: Porifera, Cnidaria, Tentaculata, Mollusca, Polychaeta, Chelicerata, Crustacea, Echinodermata and Ascidiacea.

Preliminary results
- Material collected
About 24000 specimens of amphipods and 3200 isopods were collected (Table 8). Additional material is expected from multibox corer (MG) and multicorer (MUC) samples.

Tab. 8 Numbers of specimens collected per gear

Gear	Amphipoda	Isopoda
AGT	< 100	> 83
TRAP	18748	1033
GSN	< 50	> 19
RD	~ 5000	?
TOTAL	~ 24000	> 1135

- Biodiversity
The amphipod species collected by trawls, dredge and traps have been provisionally attributed to 131 (morpho)species belonging to 88 genera and 33 families. Fifteen species are probably new to science. A preliminary list of the sorted and identified species is given in Table 9.

Tab. 9 Preliminary list of identified amphipod species. Station numbers according to Annex table 3.2.

Family	Genus	Species	Station	A	B 1	B 2	C1-3	C4-5	D	E
ACANTHONOTOZOMELLIDAE	*Acanthonotozomoides*	cf. *oatesi* (eyes without teeth)	169		x					
ACANTHONOTOZOMELLIDAE	*Acanthonotozomoides*	*oatesi* (K.H. Barnard, 1930)	223					x		
ACANTHONOTOZOMELLIDAE	*Acanthonotozomoides*	*sublitoralis* Schellenberg, 1931	145	x						
AMPELISCIDAE	*Ampelisca*	*bouvieri* Chevreux, 1912	179, 182, 231			x			x	
AMPELISCIDAE	*Ampelisca*	*richardsoni* Karaman, 1975	179, 231, 252			x			x	x
AMPELISCIDAE	gen.	sp.	164, 179		x	x				
AMPHILOCHIDAE	gen.	sp. n.	194, 252				x			x
CAPRELLINOIDIDAE	*Caprellinoides*	*spinosus* Barnard, K.H., 1930	223					x		
CAPRELLINOIDIDAE	*Caprellinoides*	cf. *spinosus* Barnard, K.H., 1930	194				x			
COLOMASTIGIDAE	*Colomastix*	*castellata* K.H. Barnard, 1932	169		x					
COROPHIIDAE	*Gammaropsis*	*serricra* (K.H. Barnard, 1932)	187, 252				x			x
COROPHIIDAE	*Jassa*	*goniamera* Walker, 1903	252							x
DEXAMINIDAE	*Lepechinella*	sp.	252							x
EPIMERIDAE	*Epimeria*	*georgiana* Schellenberg, 1931	169		x					
EPIMERIDAE	*Epimeria*	*inermis* Walker, 1903	252							x
EPIMERIDAE	*Epimeria*	*puncticulata* K.H. Barnard, 1930	169		x					
EPIMERIDAE	*Epimeria*	*similis* Chevreux, 1912	194, 252, 253				x			x
EPIMERIIDAE	*Metepimeria*	*acanthurus* Schellenberg, 1931	150	x						
EUSIRIDAE s.l.	*Atyloella*	*magellanica* (Stebbing, 1888)	214				x			
EUSIRIDAE s.l.	*Atylopsis*	cf. *fragilis* Rauschert, 1989	145	x						
EUSIRIDAE s.l.	*Atylopsis*	cf. *megalops* (red eyes)	169		x					
EUSIRIDAE s.l.	*Atylopsis*	*megalops* Nicholls, 1938	194, 200, 252		x		x			x
EUSIRIDAE s.l.	*Eusirus*	*antarcticus* Thomson, 1880	194, 200				x			
EUSIRIDAE s.l.	*Eusirus*	*perdentatus* Chevreux, 1912	258							x
EUSIRIDAE s.l.	*Liouvillea*	sp.n. (cf. oculata)	194, 217, 223				x	x		
EUSIRIDAE s.l.	*Oradarea*	*tricarinata* K.H. Barnard, 1932	194				x			

Family	Genus	Species	Station	A	B 1	B 2	C1-3	C4-5	D	E
EUSIRIDAE s.l.	*Oradarea*	*tridentata* K.H. Barnard, 1932	169		x					
EUSIRIDAE s.l.	*Oradarea*	*walkeri* Shoemaker, 1930	194				x			
EUSIRIDAE s.l.	*Prostebbingia*	*brevicornis* (Chevreux, 1906)	187							
EUSIRIDAE s.l.	*Rhachotropis*	*antarctica* K.H. Barnard, 1932	214, 217, 223, 237, 252				x	x	x	x
EUSIRIDAE s.l.	*Schraderia*	*gracilis* Pfeffer, 1888	169, 179, 187		x	x	x			
EUSIRIDAE s.l.	*Schraderia*	*barnardi* Thurston, 1974	194, 217, 223, 252				x	x		x
EUSIRIDAE s.l.	*Schraderia*	cf. *gracilis* Pfeffer, 1888	223					x		
EUSIRIDAE s.l.	*Atylopsis*	sp.n. (cf. fragilis)	223					x		
EXOEDICEROTIDAE	*Parhalimedon*	*turqueti* Chevreux, 1906	217					x		
GAMMARELLIDAE	*Austroregia*	*huxleyana* (Bate, 1862)	145, 187	x			x			
GAMMARELLIDAE	*Austroregia*	sp.(n.?)	145, 164, 169	x	x					
HYPERIIDAE	*Themisto*	*gaudichaudii* Guerin, 1825	157		x					
IPHIMEDIIDAE	*Echiniphimedia*	sp.	166		x					
IPHIMEDIIDAE	*Gnathiphimedia*	*sexdentata* (Schellenberg, 1926)	145	x						
IPHIMEDIIDAE	*Iphimedia*	*magellanica* Watling & Holman, 1980	145	x						
IPHIMEDIIDAE	*Pseudiphimediella*	*glabra* (Schellenberg, 1931)	150	x						
ISCHYROCERIDAE	*Cerapus*	sp.	252							x
ISCHYROCERIDAE	gen.	spp.	231						x	
ISCHYROCERIDAE	gen.	sp.	187			x				
ISCHYROCERIDAE	*Haplocheira*	*barbimana* (Thomson, 1879)	237						x	
ISCHYROCERIDAE	*Pseudericthonius*	cf. *hesperidesi* Rauschert, 1997	187				x			
ISCHYROCERIDAE	*Pseudericthonius*	*hesperidesi* Rauschert, 1997	217					x		
ISCHYROCERIDAE	*Pseudericthonius*	sp.	164		x					
LAPHYSTIOPSIDAE	gen.nov.	sp.n..	217					x		
LAPHYSTIOPSIDAE	*Prolaphystiopsis*	*platyceras* Schellenberg, 1931	145	x						
LEUCOTHOIDAE	*Leucothoe*	*spinicarpa* (Abildgaard, 1789) s.l.	169, 214, 217, 252		x		x	x		x
LILJEBORGIIDAE	*Liljeborgia*	*longicornis* (Schellenberg, 1931)	194				x			

Family	Genus	Species	Station	A	B 1	B 2	C1-3	C4-5	D	E
LILJEBORGIIDAE	*Liljeborgia*	*macrodon* Schellenberg, 1931	145, 187, 217, 223	x			x			
LILJEBORGIIDAE	*Liljeborgia*	*quadridentata* Schellenberg, 1931	214, 217				x	x		
LYSIANASSIDAE s.l.	*Abyssorchomene*	*plebs* (Hurley, 1965a)	162,191, 234, 261		x		x		x	x
LYSIANASSIDAE s.l.	*Abyssorchomene*	*rossi* (Walker, 1903a)	191, 261				x			
LYSIANASSIDAE s.l.	*Eurythenes*	*gryllus* (Lichtenstein, 1822)	261							x
LYSIANASSIDAE s.l.	*Hippomedon*	*kergueleni* (Miers, 1875)	214				x			
LYSIANASSIDAE s.l.	*Hirondellea*	sp.	223					x		
LYSIANASSIDAE s.l.	*Opisa*	sp.	214				x			
LYSIANASSIDAE s.l.	*Orchomenella*	sp. SG 1	187				x			
LYSIANASSIDAE s.l.	*Orchomenopsis*	cf. *acanthura* (Schellenberg, 1931)	187				x			
LYSIANASSIDAE s.l.	*Orchomenopsis*	sp. (orange)	187				x			
LYSIANASSIDAE s.l.	*Orchomenopsis*	sp. SG1	162		x					
LYSIANASSIDAE s.l.	*Orchomenopsis*	sp.T1	157	x						
LYSIANASSIDAE s.l.	*Orchomenopsis*	sp.T2	157	x						
LYSIANASSIDAE s.l.	*Orchomenopsis*	sp.T3	261		x					
LYSIANASSIDAE s.l.	*Pachychelium*	sp.	145	x						
LYSIANASSIDAE s.l.	*Pseudorchomene*	cf *coatsi* (Chilton, 1912)	157, 162, 261		x					x
LYSIANASSIDAE s.l.	*Shackletonia*	*robusta* K.H. Barnard, 1931	194				x			
LYSIANASSIDAE s.l.	*Stomacontion*	sp.	145	x						
LYSIANASSIDAE s.l.	*Tryphosella*	sp T1 (us.1 sharp)	261							x
LYSIANASSIDAE s.l.	*Tryphosella*	sp T2	261							x
LYSIANASSIDAE s.l.	*Tryphosella*	sp. (red antennae)	214				x			
LYSIANASSIDAE s.l.	*Tryphosella*	sp. Burdwood 1	157	x						
LYSIANASSIDAE s.l.	*Tryphosella*	sp. Burdwood 2	157, 162	x	x					
LYSIANASSIDAE s.l.	*Tryphosella*	sp. Burdwood 3	162		x					
LYSIANASSIDAE s.l.	*Tryphosella*	sp. SG1	162		x					
LYSIANASSIDAE s.l.	*Uristes*	sp. (special eye)	214				x			
LYSIANASSIDAE s.l.	*Uristes*	sp. 1 (Burdwood 2)	157	x						

Family	Genus	Species	Station	A	B 1	B 2	C1-3	C4-5	D	E
LYSIANASSIDAE s.l.	*Uristes*	sp. 2 "red"	191				x			
LYSIANASSIDAE s.l.	*Waldeckia*	*obesa* (Chevreux, 1905)	191				x			
MELITIDAE	*Maera*	sp.	252							x
MELITIDAE	*Paraceradocus*	*miersi* (Pfeffer, 1888)	231						x	
MELITIDAE	*Paraceradocus*	sp.	169		x					
MELPHIDIPPIDAE	*Melphidippa*	*antarctica* Schellenberg, 1926	194, 217, 252				x	x		x
ODIIDAE	*Odius*	sp.n. (cf. antarcticus Watl. & Holman, 1981)	214, 217, 223				x	x		
OEDICEROTIDAE	*Monoculodes*	sp.	237						x	
OEDICEROTIDAE	*Oediceroides*	*emarginatus* Nicholls, 1938	160		x					
PARDALISCIDAE	gen.	sp.	217, 223					x		
PARDALISCIDAE	*Halice*	cf. *profundi* Barnard, K.H., 1932	214				x			
PARDALISCIDAE	*Pardalisca*	cf. *magellanica* Schellenberg, 1931	194				x			
PARDALISCIDAE	*Pardalisca*	*magellanica* Schellenberg, 1931	223					x		
PHOXOCEPHAEALID	*Proharpinia*	*antipoda* Schellenberg, 1931	252							x
PHOXOCEPHALIDAE	gen.	sp.	169		x					
PHOXOCEPHALOPSIDAE	*Phoxocephalopsis*	*zimmeri* Schellenberg, 1931	145	x						
PHRONIMIDAE	*Phronima*	sp.								
PHTISICIDAE	*Aeginoides*	cf. *gaussi* Schellenberg, 1926	187				x			
PLEUSTIDAE	*Parepimeria*	*bidentata* Schellenberg, 1931	164, 179, 200		x	x	x			
PLEUSTIDAE	*Parepimeria*	cf. *crenulata* Chevreux, 1912	252							x
PLEUSTIDAE	*Parepimeria*	*minor* Watling & Holman, 1980	223, 252					x		x
PODOCERIDAE	*Neoxenodice*	cf. *hoshiai* Takeuchi & Takeda, 1992	187				x			
PODOCERIDAE	*Podocerus*	*capillimanus* Nicholls, 1938	145	x						
PODOCERIDAE	*Podocerus*	cf. *septemcarinatus* Schellenberg, 1926	164, 169, 217		x			x		

Family	Genus	Species	Station	A	B 1	B 2	C1- 3	C4 -5	D	E
PODOCERIDAE	*Podocerus*	*cristatus rotundatus* Schellenberg, 1931	169		x					
PODOCERIDAE	*Podocerus*	*septemcarinatus* Schellenberg, 1926	223, 252					x		x
PODOCERIDAE	*Podocerus*	sp.n. (cf. septemcarinatus)	169, 187		x		x			
STEGOCEPHALIDAE	gen.	sp.	164, 169		x					
STENOTHOIDAE	gen.	sp. (rot gestreift)	145	x						
STENOTHOIDAE	gen.	sp.1	194				x			
STENOTHOIDAE	gen.	sp.2	194				x			
STENOTHOIDAE	gen.	sp.3	194				x			
STENOTHOIDAE	gen.	sp.4	194				x			
STENOTHOIDAE	*Probolisca*	*elliptica* (Schellenberg, 1931)	194				x			
STENOTHOIDAE	*Probolisca*	*nasutigenes* (Stebbing, 1888)	194				x			
STENOTHOIDAE	*Probolisca*	*ovata* (Stebbing, 1888)	223					x		
STENOTHOIDAE	*Scaphodactylus*	sp.	194				x			
STENOTHOIDAE	*Thaumatelson*	*herdmani* Walker, 1906	194, 217				x	x		
STENOTHOIDAE	*Torometopa*	cf. *carinata* (Schellenberg, 1931)	164		x					
STENOTHOIDAE	*Torometopa*	sp.n.	200				x			
STENOTHOIDAE	*Torometopa*	sp.n.(humpbacked)	194				x			
STILIPEDIDAE	*Alexandrella*	*dentata* Chevreux, 1912	252							x
STILIPEDIDAE	*Alexandrella*	sp.	169		x					
SYNOPIIDAE	*Syrrhoe*	*nodulosa* Barnard, K.H., 1932	214				x			
SYNOPIIDAE	*Syrrhoe*	*psychrophila* Monod, 1926	179, 223, 252			x		x		x
SYNOPIIDAE	*Syrrhoites*	*anaticauda* Barnard, K.H., 1930	169, 187, 194, 200		x		x			
UROTHOIDAE	*Urothoe*	*oniscoides* (Barnard, K.H., 1932)	252							x
UROTHOIDAE	*Urothoe*	sp.1	217					x		
UROTHOIDAE	*Urothoe*	sp.2	217					x		

Isopods represented a small fraction only of the total catches obtained with AGT and GSN trawls (Table 10). At a first glance, the preliminarily identified species are not closely related with isopods collected at several places in the Straits of Magellan. Serolidae were the most abundant family, whereas Arcturidae were the most frequent one.

Tab. 10 Preliminary list of isopod species abundance in AGT and GSN samples. Station numbers according to Annex table 3.2.

AGT	Station													
	145	150	160	164	182	187	194	207	214	217	223	231	238	TOTAL
Serolis sp. 1	16	0	0	1	0	0	0	0	0	0	0	0	0	17
Serolis sp. 2	4	0	0	1	0	0	0	0	0	0	0	3	0	8
Serolis sp. 3	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Natatolana sp. 1	1	3	0	4	1	0	1	0	0	0	0	0	0	10
Natatolana sp. 2	0	1	0	0	1	0	0	0	0	0	0	6	4	12
Natatolana sp. 3	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Janthopsis laevis	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Ianiridae INDET	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Iathrippa sp.	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Sphaeromidae INDET. 1	3	0	0	0	1	0	0	0	0	0	0	0	0	4
Sphaeromidae INDET. 2	0	8	0	0	0	0	0	0	0	0	0	0	0	8
Antarcturidae INDET.	2	0	3	5	0	0	1	0	1	0	0	3	0	15
TOTAL	33	12	3	11	3	0	2	0	1	1	0	13	4	83

GSN	Stations							
	154	166	174	196	208	229	241	TOTAL
Serolis sp. 1	0	0	0	0	0	0	1	1
Serolis sp. 2	0	0	0	0	0	0	7	7
Serolis sp. 3	0	4	0	0	0	0	0	4
Natatolana sp. 1	1	0	0	0	0	0	0	1
Sphaeromidae INDET. 2	6	0	0	0	0	0	0	6
Antarcturidae INDET.	0	5	0	1	0	0	1	7
TOTAL	7	9	0	1	0	0	9	26

- Biogeography

A preliminary analysis of the new records indicated significant new range extensions along the Scotia Arc for several species. Species seen as typical Magellan species so far were found at Antarctic locations (e.g. the liljeborgiid *Liljeborgia macrodon* off South Sandwich Islands and on Discovery Bank). On the other hand, some typical Antarctic species extended their distribution towards the middle of the Scotia Arc (e.g. the lysianassid scavenger *Abyssorchomene plebs* was found west of South Georgia). 51 amphipod species occurred north of the Polar Front (areas A-B) and 91 species occurred south of the Polar Front (areas C-D). 11 species occur on both sides of the Polar Front.

Cluster analysis of amphipod data indicated overall low similarity between the sampled areas of the Scotia Arc. Especially the Burdwood Bank amphipod assemblage differs distinctly from the other six areas. Only three of the 116

species used for clustering show a wider distribution within the Scotia Arc. More quantitative studies are necessary to determine which species are related with the level of dissimilarities between areas observed with this qualitative analysis.

- Ecofunctional diversity
Scavenger guild investigation: the 5 baited trap deployments provided 17 scavenger amphipod species (all Lysianassidae), 4 species of isopods (Natatolana, Cirolanidae), one ostracod species and one fish, *Patagonotothen guntheri* (Nototheniidae) (Table 11). The animals collected were usually in good condition and part of them were kept in aquaria for observations and further feeding experiments. At Station 261 we caught 471 specimens of the giant cosmopolitan amphipod *Eurythenes gryllus*.

Tab. 11 Animals collected with baited amphipod traps (TrapA). Station numbers according to Annex table 3.2.

Station TrapA	Depth (m)	Duration (h)	Amphipoda	Isopoda	Ostracoda	Pisces
			N spp/N ind	N spp/N ind	N spp/N ind	N spp/N ind
157	416	24	5/1429	2/864	1/2	
162	293	19	6/639	1/1058		1/3
191	266	22	4/6000	1/133		
234	311	14	1?/10000	1/97		
261	745	23.30	7/680	1/17		
TOTAL			17/18748	4/3033	1/2	1/3

The isopod size distribution in the trap samples indicated an overall size range of 13 to 35 mm at all stations but a distinct separation of size ranges in sympatrically occurring species. Apparently the height of the trap above ground did affect the numbers caught, but not the size range.

- Habitat characterisation
The microhabitats, e.g. sponges, hydrozoans or actinians, of some species were identified more precisely. Compared to previous studies (EASIZ III: Lörz, 2001), surprisingly few amphipods were found living in sponges. They all belonged to the families Lysianassidae and Stegocephalidae.

- Molecular phylogeny and phylogeography of selected amphipod taxa
Only a few specimens of the target genera within the Iphimedoidea and Lysianassoidea were found. Specimens of expected outgroup taxa were also collected for further analysis. On board DNA was extracted from 104 amphipods (29 species, 20 genera, 12 families) collected during ANDEEP and LAMPOS.

- Trophodiversity and trophodynamics
Ingestion and assimilation rates could be determined on board. Stomach content analysis focused on few species, in particular *Epimeria similis*, due to its abundance and large size. This species seems to have a very specific diet mainly composed of hydrozoans (stomach content dominated by

nematocysts characteristic of Leptomedusae and Anthomedusae) as indicated by previous observations made in the eastern Weddell Sea.

2.1.6 Echinodermata of the Scotia Arc (J. Bohn)

Objectives

The LAMPOS expedition offered the chance to investigate the echinoderm fauna of the Scotia Arc in terms of biodiversity, biogeography and evolution. Starting with a faunal inventory, questions such as the relationships of the Scotia Arc echinoderm fauna to the faunas of Antarctica and the Magellanic region, and its relationships to the fauna of the surrounding deep sea (ANDEEP I & II) were to be adressed. Together with phylogenetic investigations of selected taxa (Asteroidea: J. Pearse [USA], E. Mutschke [UMAG] and W.Arntz [AWI]; Cidaroida: J. Pearse, R.J. Mooi and S. J. Lockhard [all USA]) of this area it might be possible to determine the origins and directions of colonisation.

Tab. 12 Preliminary number of echinoderm species collected during LAMPOS. AGT Agassiz trawl, GSN bottom trawl, LD Lovrich dredge, RD Rauschert dredge Station numbers according to Annex table 3.2.

Station No.	Gear	Crinoidea	Asteroi-dea	Ophiuroi-dea	Echinoi-dea	Holothuroi-dea
145-1	AGT	2	7	5	2	5
150-1	AGT	2	14	7	3	5
151-1	LD	1	-	2	-	2
153-1	GSN	1	12	6	1	3
160-1	AGT	1	2	-	-	1
164-1	AGT	2	8	6	4	4
167-1	GSN	1	10	5	2	-
169-1	RD	2	1	7	2	3
174-1	GSN	-	1	1	1	-
182-1	AGT	-	4	4	4	-
187-1	AGT	1	7	5	1	5
194-1	AGT	2	12	4	1	6
196-1	GSN	1	11	3	1	5
200-1	RD	1	1	4	-	6
207-1	AGT	1	7	3	1	7
208-1	GSN	1	4	3	-	2
214-1	AGT	2	12	5	2	5
217-1	AGT	-	5	4	2	6
223-1	AGT	1	4	4	2	5
229-1	GSN	-	5	4	2	-
231-1	AGT	-	6	5	5	4
238-1	AGT	-	1	2	1	-
241-1	GSN	-	1	1	1	2
251-1	RD	-	-	2	1	-
252-1	AGT	1	9	6	5	2
253-1	GSN	-	8	3	6	1

Work at sea

During the LAMPOS expedition Echinodermata have been collected from four different nets (Agassiz trawl, bottom trawl, Lovrich dredge, Rauschert dredge, Table 12). The specimens were sorted to species level, specimens in good condition were photographed to document colouration and all specimens