Even though some data are not directly comparable, the lower values of oxygen consumption appear to be more reliable, because larger body sizes and lower temperatures should decrease the amount of oxygen consumed.
Although the single measurement carried out during this cruise cannot fully solve the problem, it may be taken as a first hint that the data presented by BELMAN (1975) are probably overestimated.

Tab. 20: Oxygen consumption of *Glyptonotus antarcticus*.

Reference	wet weight	water temp.	oxygen consumption
Belman 1975	25-30g	-1.8°C	216 µl O_2/g/h
White 1975	10-30g	-1.5°C	25.2 µl O_2/g/h
White 1975	3-10g	0.5°C	37.4 µl O_2/g/h
this work	3.3g	1.2°C	128 µl O_2/g/h

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2.4.8. Trophodynamics, Biodiversity and Gigantism of the Amphipod Crustacea Taxocoenosis (C. De Broyer, M. Rauschert, G. Chapelle)

Objectives

a) Trophodynamics

To characterize and quantify the trophodynamic role of the amphipod taxocoenosis in Kapp Norvegia, eastern Weddell Sea, and compare it with the Admiralty Bay system, King George Island.

The particular topics to investigate are: diet composition, food consumption and assimilation efficiency, characterization and functional role of the amphipod trophic guilds, significance of amphipods as preys for other macrobenthos and demersal fish.

b) Biodiversity

To further document the structural and ecofunctional biodiversity: taxonomy, geographical and bathymetric distribution, habitats and microhabitats, and ecological traits of the eastern Weddell Sea amphipod fauna (and other selected peracarid Crustacea and Leptostraca).

One particular topic is a zoogeographical comparison between the Weddell Sea, the South Shetland Islands and the Magellan gammaridean amphipods and benthic leptostracan faunas, with a special attention to the family Stenothoidae.
This biodiversity approach takes place in the framework of the preparation of the "Synopses of Antarctic Amphipods" (De Broyer, Andres, Bellan-Santini, Coleman, Jazdzewski, Rauschert, Takeuchi, Vader, Wakabara in prep.), of the monograph of the "South Shetlands Amphipod Fauna" (Rauschert in prep.) and the development at IRSNB, Brussels, of the first "EASIZ-SA 2000 Antarctic Biodiversity Research Reference Center" focussing on Amphipoda.

c) Gigantism

To characterize the life history, growth and ecological traits of the largest Antarctic amphipod species in order to compare them with the giant Baikal gammarids.

Focus will be put on life history traits such as fecundity, size of eggs and frequency of reproduction, and on the other hand, live specimens of 2 species will be selected for long term studies of growth.

Work at sea

Gammaridean amphipods and, in addition, Mysidacea, Cumacea, Leptostraca and Pycnogonida were collected from 48 GSN, AGT, D, BPN and EBS catches, from baited traps, and from the GKG and MG corers samples. Systematic sampling by baited traps was performed for the first time in the Weddell Sea at depths between 219m and 2009m (6 operations).
Samples for life history, growth and fecundity studies, for stomach contents analysis as well as data on amphipod predators were systematically collected .
Live specimens of 33 species were kept in aquaria in cool containers for ethological observations and feeding experiments on board and for further feeding, ethological and growth studies in the cool laboratory at IRSNB, Brussels.
Sorting material from traps and trawl samples to at least the family level was performed on board, taking advantage of the natural colours of live or freshly preserved material.

Preliminary results

a) Trophodynamics

To identify the trophic type of at least the most common species, stomach content samples were taken and in a few cases analysed on board. In addition, observations on feeding behaviour were made in aquaria on predators or potential predators (*Eusirus* spp., *Epimeria* spp., *Epimeriella* spp., *Rhachotropis* sp, *Paraceradocus* sp.) and on "predatory grazers" (*Iphimediella* spp., *Maxilliphimedia* sp., and *Gnathiphimedia* spp.), allowing to compare the different modes of detection and prehension of the food items.
The trap results indicated 29 spp. to be regular scavengers. On the other hand, the very low occurrence in trawl catches of presumed filter feeders (corophiids, ischyrocerids...) was noticed and contrasts with the abundance and diversity of presumed specialists (iphimediids).
Six quantitative feeding experiments using calibrated lyophilized squid as food were performed for 7 days on 4 scavenger species (*Abyssorchomene nodimanus, Parschisturella carinata, Tryphosella murrayi, Waldeckia obesa*) showing an important peak of the feeding rate in the first 24h after starvation, followed by a much lower rate during the rest of the week. Systematic observations were also made of general behavioural traits (attitude, swimming, burrowing and other locomotory activity,...)

b) Biodiversity

More than 12 000 specimens of at least 122 spp. of gammaridean amphipods have been sorted, as well as 2 species of Caprellidea and 3 species of Hyperiidea. 11 species (2 Cyproideidae, 1 Eusiridae, 4 Lysianassoidea, 1 Oedicerotidae, 3 Stenothoidae) are presumably new to science. In addition, new material completing existing samples of poorly known species will provide comparative material for variability studies and detection of possible new taxa. Selected species samples have been preserved for DNA analysis. Dredge samples (22 successful dredgings) allowed to collect a good number of small amphipods and other peracarids usually in good condition, and this very usefully supplemented the larger mesh-sized Agassiz trawl catches.

The faunal composition of the 22 dredge catches was so diverse that an analysis can only be provided later; a preliminary list of amphipod species is given in Annex 3.4. The following families (groups) were found: Acanthonotozomellidae, Ampeliscidae, Colomastigidae, Cyproideidae, Eusiridae, Gammarida (*Ceradocus* group), Iphimediidae, Ischyroceridae, Liljeborgiidae, Lysianassoidea, Melphidippidae, Oedicerotidae, Phoxocephalidae, Podoceridae, Stegocephalidae, Stenothoidae, Synopiidae, Urothoidae, Caprellidea, Hyperidea.
As previously observed (De Broyer & Klages1991), the lysianassoid component of the fauna (with 37 spp) is clearly dominant, followed by Iphimediidae (14 spp) and Eusiridae s.l. (14 spp.). The Epimeriidae (with 10 spp) take the fourth rank in the faunal composition. The family Stenothoidae, so far often overlooked by previous expeditions, possibly because of their small size, was discovered in most of the samples. At least 3 species of stenothoids seem to be new to science, and one of them, found in several samples, differs from the Stenothoidae normal habitus. One commensal stenothoid was found living in the ascidian *Molgula* sp., mainly at depths around 200m. Stenothoids were found in the same host at depths of 400m as well, but lysianassoids and stegocephalids were more common there. The family Cyproideidae was detected for the first time in Antarctic waters, represented by 2 species which are probably new to science.
Two species of Leptostraca were found in some dredge samples and were caught for the first time, to our knowledge, in baited traps.
Baited trap samples (Table 21) provided 30 different amphipod species (28 lysianassoids, 1 eusirid, 1 iphimediid) represented by more than 10 000 specimens in good condition. Among them, 15 species were not collected by other gears. These samples, along with trawl and some corer samples, will complete the already existing distributional data. Differences in bathymetric occurrence of different stages of several species have been noted for the first time. The deepest trap operation (2009m) provided 8 different species, mostly of abyssal affinities, among which 7 were not found in shallower operations. Four specimens (up to 12cm long) of the giant abyssal species *Eurythenes gryllus* were collected for the first time in the East Antarctic.

On the other hand, the extension to the East Antarctic (or at least to the eastern Weddell Sea) of several species so far known only from the West Antarctic, has been noted. For example, the stenothoid species *Antatelson walkeri*, a well known and very common species in the West Antarctic was detected for the first time in the East Antarctic.
The natural habitats (in sponges, in the sediment,...) have been identified for few species e.g. by means of observation of undisturbed box corer samples and experiments in aquaria, but the precise identification of the microhabitats remains problematical for most specialists (iphimediids for instance), with the investigation gears used during this cruise.

c) Selection and maintenance of live specimens for long-term studies

About 3400 specimens of 33 species have been kept alive onboard in aquaria using a permanently running open seawater system. This allowed feeding experiments and observations, and general behaviour observations on board. Samples of 21 species have been selected for long-term studies of life history and growth, and to continue feeding biology studies in the cool laboratory of IRSNB, Brussels, after transportation by air.

d) Gigantism

Paraceradocus sp and *Epimeria similis* have been selected as the 2 principal species for growth studies. Some other epimeriid and lysianassoid species will also be included in these investigations. In addition, ovigerous females of the most common species have been systematically isolated and preserved to allow the characterization of reproductive traits in "giant" species.

e) Photographic inventory of the macrobenthic species

More than 1000 colour photographs of live specimens of zoobenthos (320 species of 36 taxonomic groups) have been systematically taken to record natural colours and attitudes.

In addition, about 500 pictures of more than 70 species of amphipods were taken in aquaria to show natural attitudes and colours, including cases of polychromatism.

Tab. 21: Results of trap operations.

Station	Location	Depth	Hours on bottom	AMPH	ISOP	MYSI	LEPT	DIVERS
				spp (ind)	spp (ind)	spp (ind)	spp (ind)	spp (ind)
05/T1	KN	223m	23h	13 (548)	1 (1)	1 (9)	-	ostr 1 (123)
06/T2	KN	234m	74h	15 (>2,614)	1 (28)	-	1 (1)	-
28/T5	KN	219m	74h	11 (2,838)	1 (5)	1 (2)	1 (4)	deca 1 (1)
04/T4	KN	421m	132h	10 (2,923)	1 (10)	1 (2)	1 (1)	ostr 1 (2)
12/T3	VK	791m	65h	13 (769)	1 (1)	-	2 (17)	ostr 1 (4) cope 1(1) fish 1 (1)
30/T6	KN	2009m	86h	8 (818)	-	-	-	gast 1 (1) cope 2 (2)
TOTAL				30 (>10,510)	2 (45)	1 (13)	2 (23)	

Amph: Amphipoda, Isop: Isopoda, Mysi: Mysidacea, Lept: Leptostraca, Ostr: Ostracoda, Deca: Decapoda (*Chorismus antarcticus*), Cope: Copepoda, Gast: Gastropoda, Fish: Zoarcidae.

2.5 Nekton: Cephalopods

2.5.1 Cephalopod Ecology and Physiology

(S. Steimer, L. Allcock, H. Palm)

The cephalopods of the samples taken in the Weddell Sea were divided between the working groups of the University of Liverpool, working on octopus, and the Institute of Marine Research, Kiel, working on squid.

Objectives

Cephalopods play an important role in the high Antarctic ecosystem. It is known from stomach content investigations that many top predators such as whales, seals, penguins and other sea birds prey mainly on cephalopods. However, in contrast to the important role of cephalopods in the food chain, the research in this field of interest is still in the elementary stages. For example, distribution patterns and life cycles of high Antarctic squids as well as their feeding ecology are still unknown. In Antarctic octopods, even the taxonomic status of several groups is unclear. Therefore, on the EASIZ cruise, a combination of basic research in both squid and octopod ecology was undertaken.

The focal point of the study on squids was to get more detailed information on the life cycle and distribution of the most abundant species in the eastern Weddell Sea. To achieve this aim it was necessary to take statoliths for age determination. Another field of interest was the functional morphology of squid tentacles and arms.

The aim of the research on octopods was to elucidate the taxonomic status of the most abundant species using traditional taxonomic methods in conjunction with a biochemical technique, namely allozyme electrophoresis. A secondary objective was to provide data on the distribution and depth zonation of the different octopod species.

Work on board

Squid

The majority of the specimens caught were taken by bottom trawl; only the paralarvae and 2 *Psychroteuthis glacialis* were caught by benthopelagic trawl. The jigging machine was used at night at several localities in the Kapp Norvegia region and north of Halley Bay. It worked properly but without success. A possible reason for this failure could be a reduced attractive effect of the chosen light source to the squids due to the very bright nights in the high Antarctic. A second possibility could be that the species known from this area do not undertake diel