Cruise report
of the Joint Chilean-German-Italian
Magellan "Victor Hensen" Campaign in 1994

---

edited by
Wolf Arntz and Matthias Gorny
with contributions of the participants

Ber. Polarforsch. 190 (1996)
ISSN 0176 - 5027

Joint
Chilean-German-Italian
Magellan "Victor Hensen" Campaign
with participants from other European countries

17 October - 25 November 1994

Chief Scientist:	Wolf Arntz Alfred - Wegener - Institut für Polar und Meeresforschung Bremerhaven, Germany
Chilean coordinator:	Víctor A. Gallardo Centro EULA, Univ. Concepción Concepción, Chile
Italian coordinator:	Riccardo Cattaneo ISAM, Univ. Genova Genova, Italy

Contents

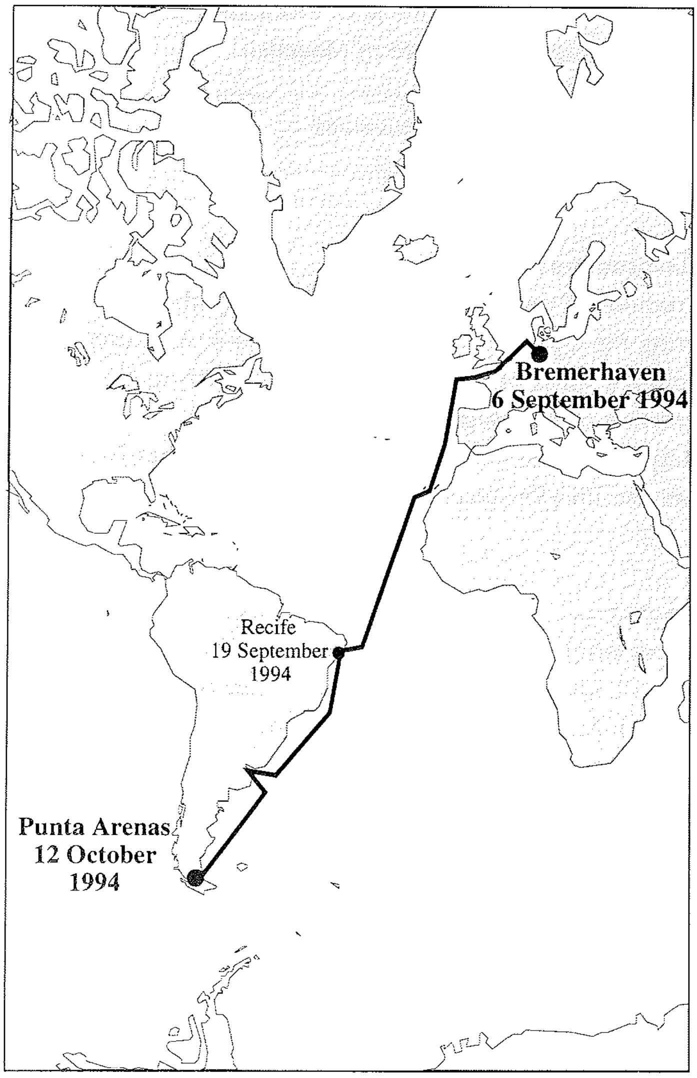


Figure 1: Itinerary of RV "Victor Hensen" Bremerhaven - Punta Arenas

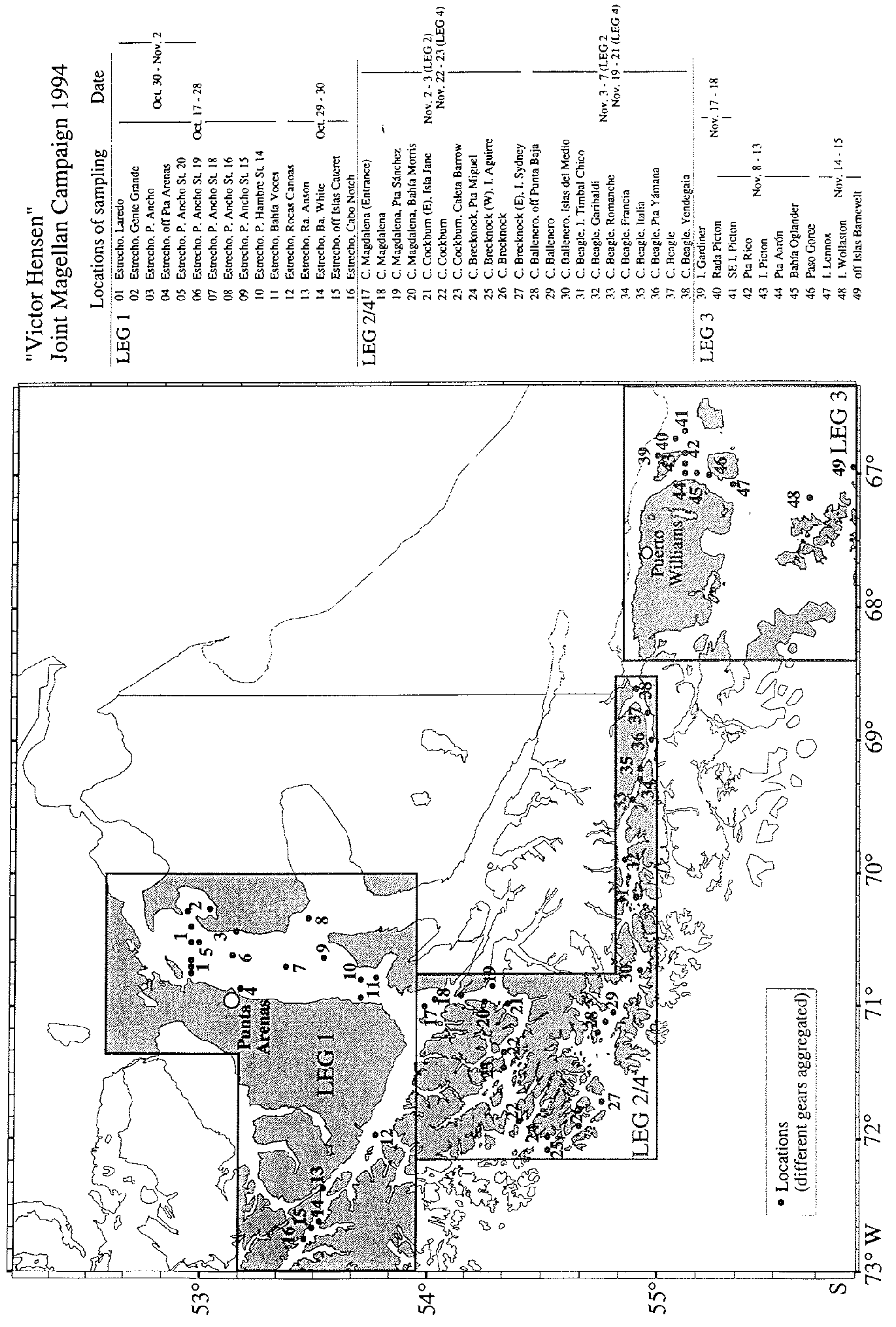


Figure 2: Cruise track of RV "Victor Hensen" during the Magellan Campaign indicating sampling sites.
For details see list of stations (Annex, Table 13).

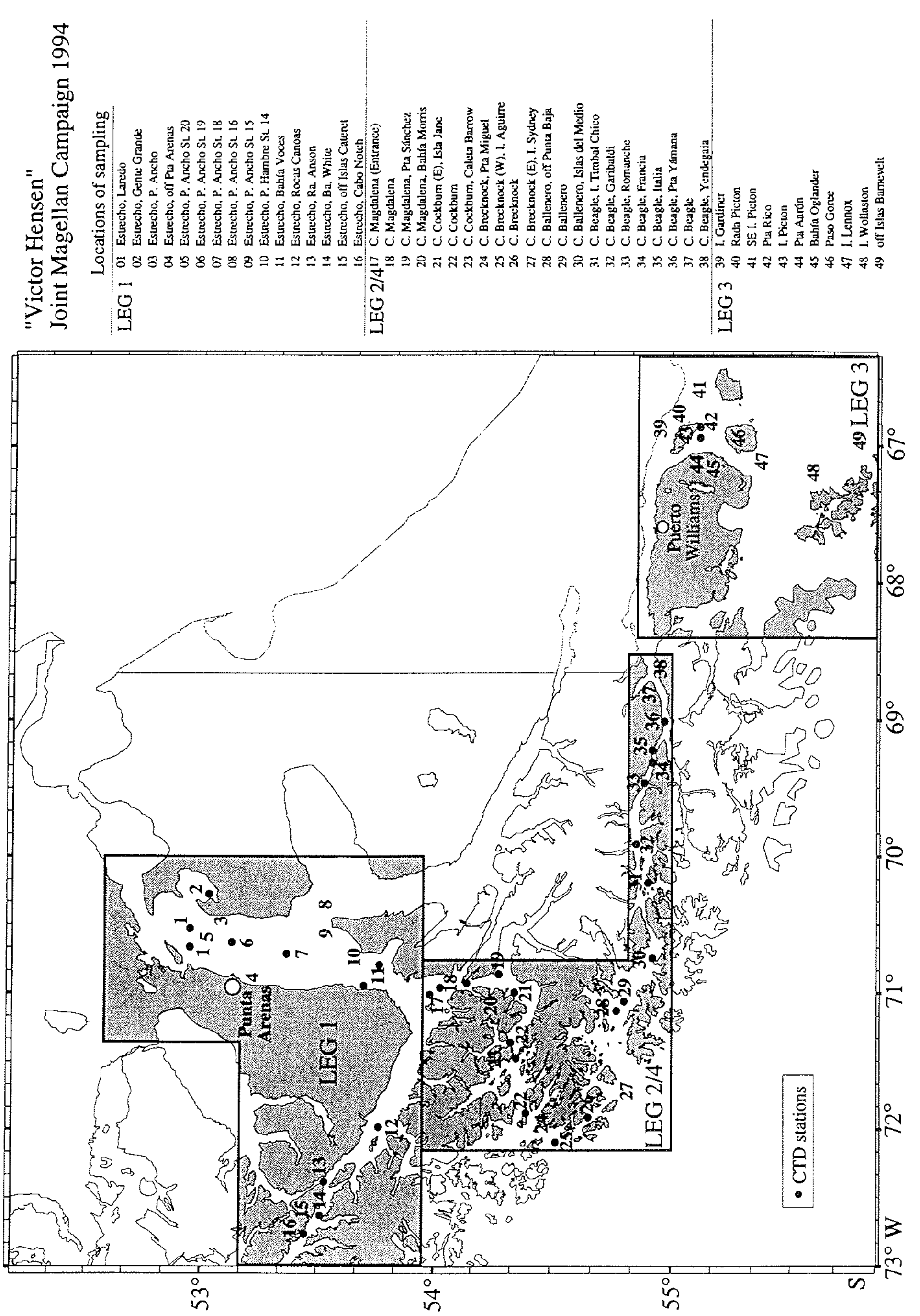


Figure 3: Locations of CTD stations during the Magellan Campaign. For details see list of stations (Annex, Table 13).

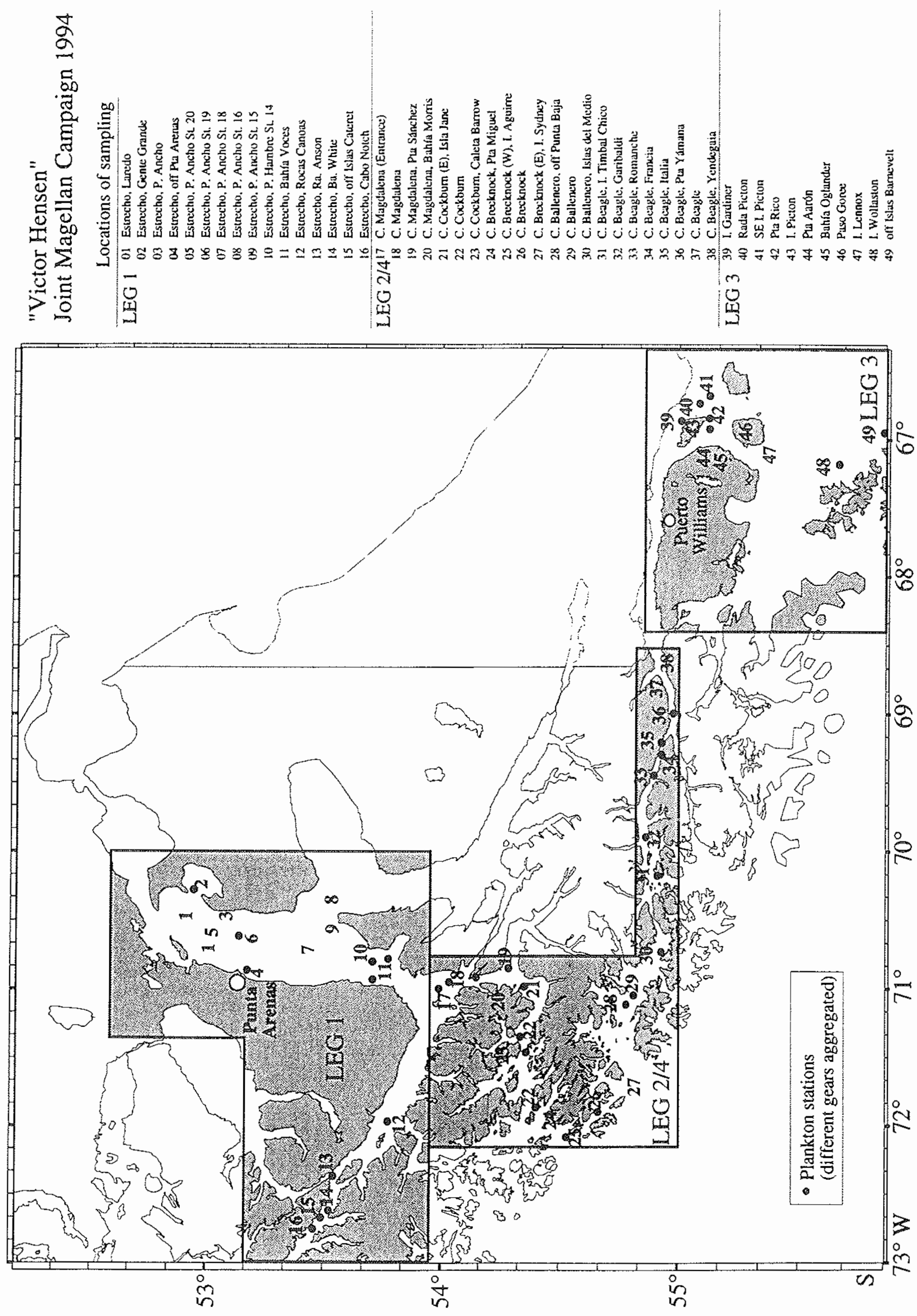


Figure 4: Locations of plankton sampling sites during the Magellan Campaign. For details see list of stations (Annex, Table 13).

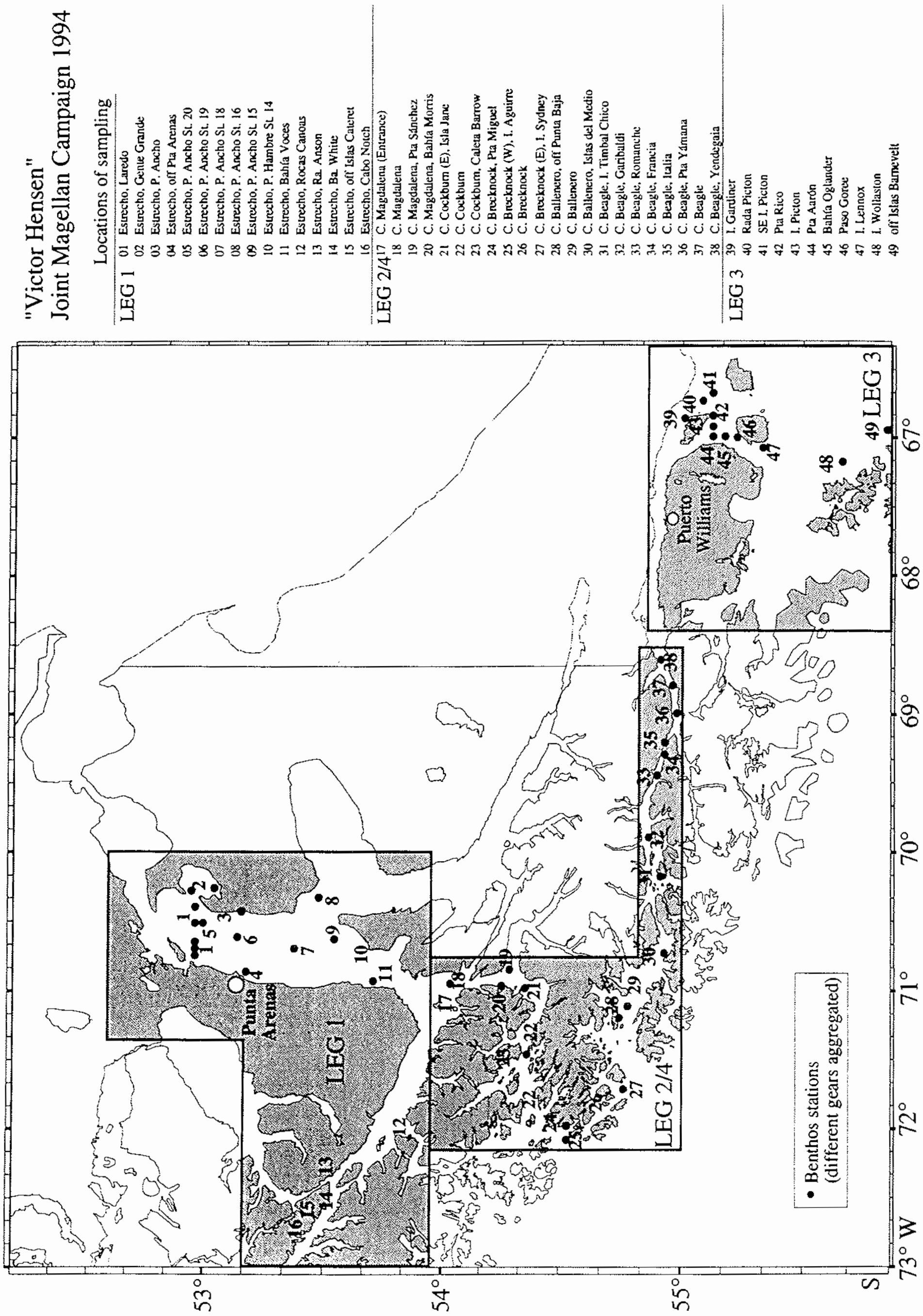


Figure 5: Locations of benthos sampling sites (deep-water) during the Magellan Campaign. For details see list of stations (Annex, Table 13).

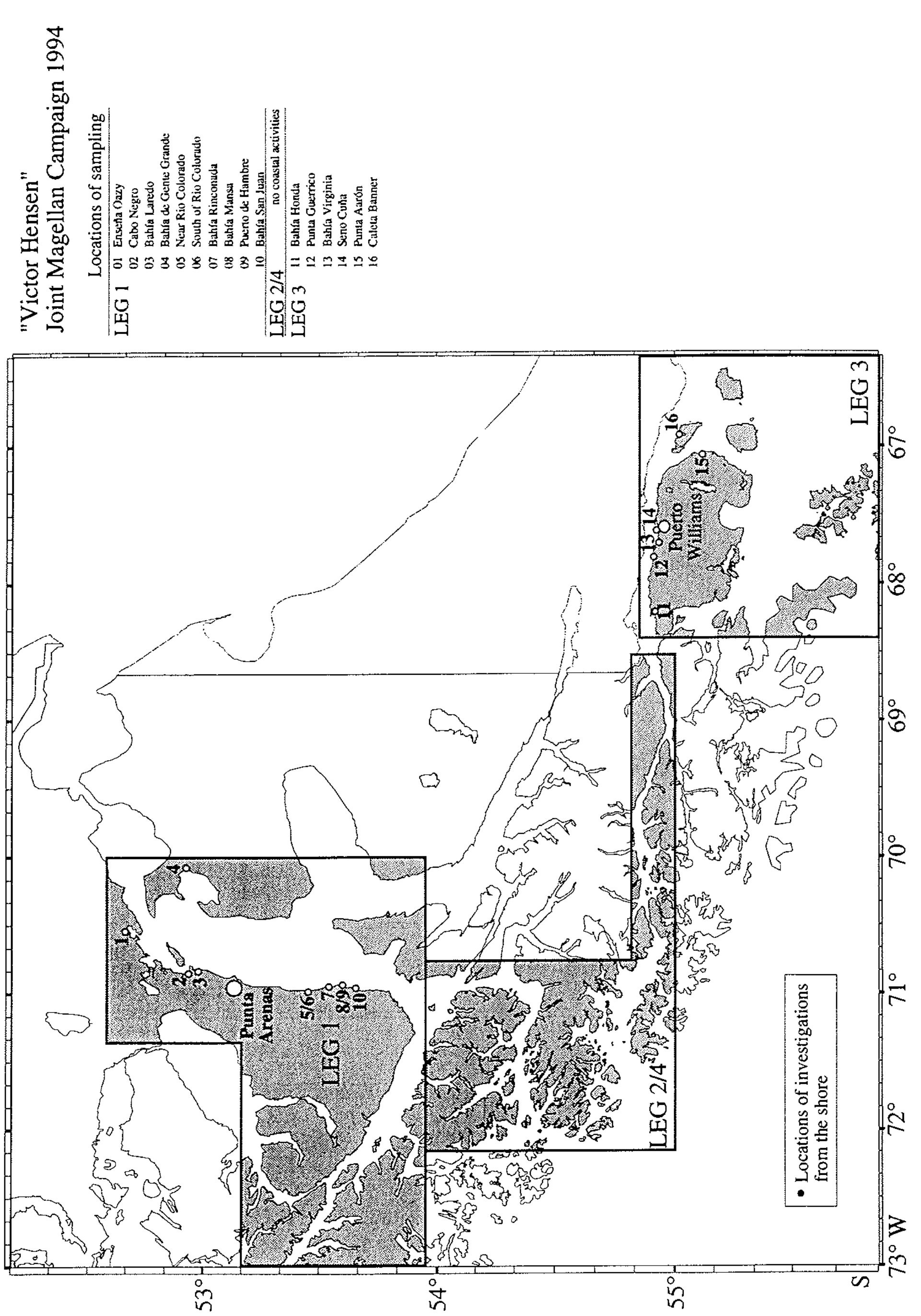


Figure 6: Locations of benthos sampling sites (shallow-water) during the Magellan Campaign. For details see list of stations (Annex, Table 14).

1. INTRODUCTION

1.1 Objectives of the Magellan Campaign

The reason to publish this cruise report in "Reports on Polar Research", despite the fact that the Magellan region ist just outside the South Polar Sea, lies in the intimate connection of this areas to the Antarctic. The South American continent was the last fragment that separated from Gondwana; of all the ancient Gondwana fragments surrounding the Antarctic it is still closest to it; and exchange between the southern tip of South America and Antarctica is supposed to have lasted longer, and to have been more frequent, than that between other continents in the southern hemisphere. On the other hand the formation of the Drake Passage some 30-20 million years ago, nowadays a deep-sea barrier, and the origin of circumpolar currents should have caused an increasing degree of separation of the two areas. A comparison between the fauna and flora of the Antarctic (principally, Peninsular) and Magellan areas, including a comparison of ecosystem structure, thus appeared to be of great scientific interest; much more so since information on marine life from the Magellan region, particularly from the channel system south of the Magellan Strait and the area off the eastern entrance of the Beagle Channel, turned out to be extremely limited.

A second scientific objective of the campaign was the study of latitudinal clines in population dynamics (especially, reproductive biology) and physiology of invertebrates. Such gradients had been detected in Antarctic populations of, e.g., shrimps, isopods and bivalves, and it seemed worth while continuing the high vs. low Antarctic comparison into Magellan waters.

The two themes include a variety of interesting research problems that will occupy the participants of the "Victor Hensen" campaign for years to come, as a consequence of the rich material taken during the cruise and the operations from shore associated to it. This research includes:

- Biogeographic relationships of Antarctic and Patagonian/Fuegonian fauna and flora,
- (Dis)similarities of benthos and plankton community structure in Antarctica and the Magellan channel system;
- Plankton communities in different basins of the Magellan Strait characterized by differing environmental conditions;
- Spatial distribution of macroalgae and invertebrates, and interactions between algae, fish and invertebrates along the latitudinal gradient;
- Latitudinal clines in population dynamics and physiology of invertebrates and algae;
- Role of suspension feeders in the benthos and plankton along the latitudinal gradient;

- Species associations and trophic relations in the Antarctic and Magellan regions;
- Variations of palaeo-communities during the Quaternary;
- Isotopic ($^{16}O/^{18}O$) composition of benthos organisms and their importance for dating.

After a first revision of the voluminous material obtained during the campaign and presently under analysis in various countries (see Annex, Table 18) it seems that most of these research goals can be achieved in the coming years. A first step to compile data will be a workshop to be held in Chile in April 1997, however it is obvious that not all of the material will have been analyzed by that time. The participants hope to fill up gaps in the information derived from this cruise in the framework of close future cooperation with the Instituto de la Patagonia (Magellan University, Punta Arenas), which will also be in charge of a reference collection, and the Centro EULA-Chile in Concepción.

It should be mentioned that a number of additional research items had to be cancelled either because of the rather limited time schedule of the cruise or due to space problems on board. All research on warm-blooded animals was omitted during this campaign, a previously planned leg to the channels north of the Magellan Strait was cancelled, and some of the hydrographic and plankton work had to be restricted due to equipment (CTD) failure and lack of time. The cruise leader apologizes for all the inconveniences that may have been caused to particular programmes.

Last not least, one of the prime objectives of the "Victor Hensen" Magellan Campaign was the interaction with marine biologists and physical oceanographers from other countries. Chileans held a majority if all persons are counted that embarked at any time (see Annex, Table 19), and among the Europeans there were participants from Italy, Belgium, Sweden and Germany. There are many more persons who did not embark but are now engaged in the working up of the samples (Annex, Table 21). The great amount of cooperation and international friendship during the campaign has been a very positive experience for all participants, and is expected to continue also during the analysis and joint publication phase.

1.2 Summary Review

As has been outlined above, the samples and data derived from this cruise will require detailed analysis during the coming years. For this reason, the compilation of results that can be presented at this stage has a highly preliminary character and may be subject to changes once a greater part of the material has been analyzed.

At this time, we might cautiously draw the following conclusions:

As a whole, the Magellan region holds a rich marine life both in the benthic and pelagic subsystems. In the plankton, there is no such overwhelming dominance of euphausiids or salps as in many parts of the Antarctic, and the most important euphausiid, *Euphausia vallentini*, is smaller than most of its Antarctic relatives, in particular *E. superba*. However, in some parts gelatinous forms such as *Beroe cucumis* were found to represent a very high biomass, and copepods hold a dominant position in the mesozooplankton as in many parts of the Antarctic.

In the benthos, the kelp (*Macrocystis pyrifera*) forests covering great part of the shallow bottoms have no equivalent in the Antarctic where other large laminarians such as *Himantothallus grandifolius* are dominant in shallow waters, whereas large areas in medium water depths, particularly off the ice shelves, are not inhabited by macroalgae at all. There are no such extremely rich, three-dimensional communities of suspension feeders in the Magellan region comparable to those in the Antarctic; in particular, sponges, bryozoans and gorgonarians seem to play a minor role on this side of the Drake Passage, and the same may be true for compound ascidians despite the occurrence of some very large species in Magellan waters. However, hydrozoans were much more common than in Antarctic waters and were very abundant on *Macrocystis* leaves. Echinoderms are very dominant on either side of the Drake Passage and also in the high Antarctic, but crinoids were not found at all in the entire area of study during this cruise whereas they are very common in the Antarctic. The taxonomic relations between the echinoderms of both areas have yet to be determined. Mollusks, both bivalves and gastropods, play a major part in Magellan waters whereas they are of minor importance, and small and brittle, in most of the South Polar Sea. The same holds true for cirripedes, especially barnacles. There seem to be similar conditions on the Magellan and Antarctic side of the Drake Passage in the role of brachiopods (which are, however, larger in Magellan waters) and actinians. Pycnononids were found seldom during this cruise compared with the Antarctic, and were all much smaller than their Antarctic relatives. In turn decapod crustaceans, in particular anomurans and brachyurans, are very dominant in the Magellan region, whereas caridean shrimps are the only group with few, but quite abundant species on the Antarctic side. Carideans, on the other hand, contribute relatively little to Magellan benthic assemblages in terms of abundance and biomass, especially in the Strait of Magellan; their importance increases somewhat towards the south. Interesting encounters included the occurrence of *Callianassa* and *Stereomastis* (a small palinuran) as well as a stomatopod in the Beagle area. Peracarid crustaceans were caught in very large amounts during this cruise by the epibenthic sledge but have been analysed only to a small degree. Our first impression is that despite the occurrence of common genera on either side of the Drake Passage, separation of the two areas has caused considerable differences in the peracarid composition; e.g. Sphaeromatidae are common in the Cape Horn area and scarce in the Antarctic whereas Serolidae and Arcturidae have undergone considerable specific radiation in the Antarctic and play a minor role in Magellan waters. In general, the large isopod and amphipod forms characteristic of the Antarctic are missing altogether in the Magellan region. On the basis of the few stations of the multigrab corer which have been quantitatively analysed to date, there seems to be little difference in infaunal biomass between Magellan waters and the high Antarctic Weddell Sea. Depth zonation of macrozoobenthos is clearer in the Magellan area whereas horizontal patchiness in all water depths is the rule in Antarctic waters.

Comparison of recent assemblages in the Strait of Magellan with palaeoassemblages from central Chile shows that the Magellan Province retracted from 36°S to 43°S from the Plio-Pleistocene to Recent.

Many more interesting results are due during the process of analysing the samples taken by different gears, and can hopefully be presented at the workshop planned for 1997.

1.3 Itinerary of the cruise

RV "Victor Hensen" left Bremerhaven on 06 September and arrived in South America (Recife, Brazil) on 19 September 1994, after short stages in Las Palmas and Porto Grande. After another short interruption in Montevideo (Uruguay) the vessel arrived at Punta Arenas on 12 October 1994 (Fig. 1), and changed the captain and part of the crew (Annex, Table 20).

Using the port of Punta Arenas as a logistic base during the first leg of the campaign, which had been authorized by a decrete of the Servicio Hidrográfico y Oceanográfico de la Armada de Chile (SHOA), dated 11 October, 1994, RV "Victor Hensen" worked until 02 November in different parts of the Magellan Strait (Fig. 2) using various kinds of equipment in the water column and at the seafloor for oceanographic registration and biological sampling (for list of stations, gear used and participants see Annex, Tables 12 and 18). Due to the vicinity of Punta Arenas, a frequent change of scientific personnel during this part of the campaign was possible, and on several occasions scientific groups embarked on the vessel to work in shallow water from rubber boats or from the shore. The total number of scientists participating in this leg was 37. Work in the pelagic and in deep water principally covered the Italian stations of the "First Oceanographic Cruise in the Straits of Magellan" carried out in 1991. Benthic samples were taken to a maximum depth of 550 m. The northern limit of shipboard work in the Magellan Strait was Cabo Negro and Bahía Gente Grande, the southernmost station was Isla Spider in the Paso Largo. A short excursion into the western branch of the Strait (up to Cabo Notch) was dedicated exclusively to hydrographic and plankton work in the water column. Shallow-water sampling during leg 1 was carried out at various locations between Bahía Laredo (52°08'S) and Punta Aarón (55°08'S), as can be seen from Annex, Table 13.

After an extension of the authorization by SHOA dated 02 November 1994, the second leg (03-07 November 1994) with 10 scientists on board concentrated on plankton and hydrographic work in the Magdalena, Cockburn, Brecknock and Ballenero channels and on both plankton and benthos sampling in the northwestern branch of the Beagle channel up to Bahía Yendegaia (Fig. 2), and ended in Puerto Williams on Isla Navarino.

During leg 3 (08 - 15 November 1994) Puerto Williams served as a logistic base for shipboard sampling and work from the shore from the eastern entrance of the

Beagle channel to the vicinity of Cape Horn (Isla Wollaston). 18 scientists participated in this leg. Benthos and plankton sampling was combined during this phase, with the deepest benthos station at 121 m, and RV "Victor Hensen" took a short excursion to round Cape Horn. Due to rough sea conditions, the idea to take samples south of Isla Nueva on a transect from the shelf down to the upper continental slope had to be cancelled. The intention is to ask for another authorization to include this transect on "Polarstern" cruise ANT 13/4, in May 1996.

On leg 4 (19 - 25 November 1994), which included the return of the vessel from Puerto Williams to Punta Arenas, only benthic work was done from Bahía Yendegaia through the northwestern branch of the Beagle Channel and in the channels Ballenero, Brecknock, Cockburn and Magdalena. The deepest samples were taken at 665 m in the Beagle and at 655 m in the Ballenero, respectively, revealing a particularly interesting - possibly relic -fauna in this part of the channel system which is open to the Pacific Ocean. 9 scientists took part in this final leg of the cruise.

After a short stay in Punta Arenas, RV "Victor Hensen" left Chilean waters on 26 November for Montevideo and Brazil where she was to start another cooperative project. Some of the scientists extended their stay to separate samples at the Instituto de la Patagonia and to help with the distribution of the samples.

The Magellan Campaign has been a great success due to close international cooperation and the combination of many different approaches, sampling methods and gears. Despite limited space on a relatively small vessel, the combined shipboard and shore approach enabled a total of 47 scientist to take part in the four legs of the campaign, 24 of whom came from Chilean universities. A total of 510 casts of equipment (Annex, Table 13) resulted in an enormous amount of material and data which are now being analyzed to improve our knowlege on this interesting and little known area in relation to Antarctica.

1.4 Weather conditions

On her way to South America, RV "Victor Hensen" had to face severe wind and swell during the first days until she left the Biscaya towards Las Palmas. The remainder of the voyage across the Atlantic and along the South American coast was fairly calm. In the Magellan Strait after a calm start, rough conditions prevailed during the first half of leg 1 with winds reaching at times 9 Bft, which kept the ship out of port several times, and much calmer conditions during the second half. An interesting experience in this area - as also in the channel system towards the south and the Cape Horn region - is that winds may increase from almost calm conditions to 8 Bft within half an hour, which makes all land excursions from the ship potentially dangerous. In the southern channel system the steep side walls mostly protected the vessel from major wind impact; otherwise work in these areas, which are additionally characterized by needles of rock emerging from great depth close to the surface, would be virtually impossible. South of Isla Nueva strong westerly winds prevailed so that work had to be interrupted and the vessel had so seek shelter off Isla Wollaston.

On the whole, RV "Victor Hensen" behaved very well even under strong wind and rough sea conditions. This was due to its sturdy nature, the expert management of the captain and crew, and the skilful assistance of the three Chilean pilots.

1.5 Acknowledgements

The cooperation between scientists from different nations and institutions during this campaign was as enjoyable as it was successful. Captain and cruise leader would like to express their gratitude to all civil and naval authorities in Punta Arenas and Puerto Williams for their logistic assistance and friendly support of the "Victor Hensen" activities. Special thanks go to the Chilean pilots Cap. Juan Echeverría, Cap. Leonardo Guerrero and Cap. Jorge Orsola who accompanied the vessel during the four legs and guided it safely through hazardous situations. The naval and meteorological posts along the channels provided information on topographic and weather conditions. Our agency ULTRAMAR, in particular Don Kurt Schwarz and Don Luís Sagredo in the two logistic ports of Punta Arenas and Puerto Williams, was extremely helpful in any respect and solved all difficult situations. Drs. Víctor A. Gallardo, Richardo Reich and Augusto Parra of the University of Concepción made great efforts in stimulating investigators and finding financial support for their participation in the campaign; Dr. Gallardo, together with Dr. Cattaneo from Italy, also coordinated part of the international interaction. Prof. Giancarlo Albertelli incorporated the Italian group both in an efficient and friendly manner. The Instituto de la Patagonia of the Magallanes University received us very kindly and offered all its facilities; we are particularly grateful to M.Sc Carlos Ríos and Lic. Erika Mutschke for their friendship and efficient support. Finally we would like to convey our special thanks to the German Ambassador in Santiago, Dr. Werner Reichenbaum, the personnel of the German Embassy, and the German Honorary Consul in Punta Arenas, Horst George, who untiringly supported our petition of extension to the Chilean authorities. Last not least we thank Admiral Jorge Martínez Busch, the Servicio Hidrográfico y Oceanográfico de la Armada de Chile in Valparaíso and the Chilean Foreign Office in Santiago who provided the authorization to carry out the present study.

2. REPORTS OF INDIVIDUAL WORKING GROUPS

The preliminary reports of the different working groups presented on the following pages reflect the state of analysis of the individual studies. As can be expected only half a year after the end of the campaign, the different projects have advanced at a different pace. The Europeans had to await the arrival of their samples which were sent by container or brought by RV "Italica" only in May 1996; in Chile the holiday season coincided with the arrival of the samples. More detailed results can be expected for the analysis workshop planned for April 1997.

2.1 Hydrography

2.1.1 Hydrography in Chilean fjords: Strait of Magellan to Beagle Channel (legs 1 and 2)

Tarsicio Antezana[1], Madeleine Hamamé[1,] Yoanna Eissler[1] and Sergio Jara[2]

[1] Departement of Oceanography, University of Concepción, Chile
[2] Institute of Fishery Development, Punta Arenas, Chile

The Subantarctic waters off the Patagonian shelf intruding in the fjords and channels as part of the southern branch of the West Wind Drift or Cape Horn Current are mixed to a wide extent with freshwater from persistent precipitation, runoff and ice-melting, creating an environment with somewhat reduced salinity throughout the entire study area.

Salinity varies significantly among basins; some are mixed throughout the water column whereas others have a distinct influence of fresh water in the uppermost layer only.

Several basins could be identified in a saline/marine gradient, according to their vertical profiles of temperature and salinity (Figs. 7a-g).

<u>Paso Ancho-Canal Magdalena (Fig. 7a)</u>
Fully mixed
Temperature: ca. 6.5°C
Salinity: 31.0-31.2 ‰

<u>Canal Cockburn (Fig. 7b-c)</u>
Weak pycnocline
Temperature: ca 6.5°C
Salinity: 31.2 ‰ at 0m to 32.4‰ at 200m

<u>Canal Ballenero (Fig. 7d)</u>
Strong pycnocline
Temperature: 6.5°C at 0-10m; 6°C at 10-70m and 7.7°C below 80m
Salinity: 31.2‰ at 0m to 32.8‰ at 90m and below

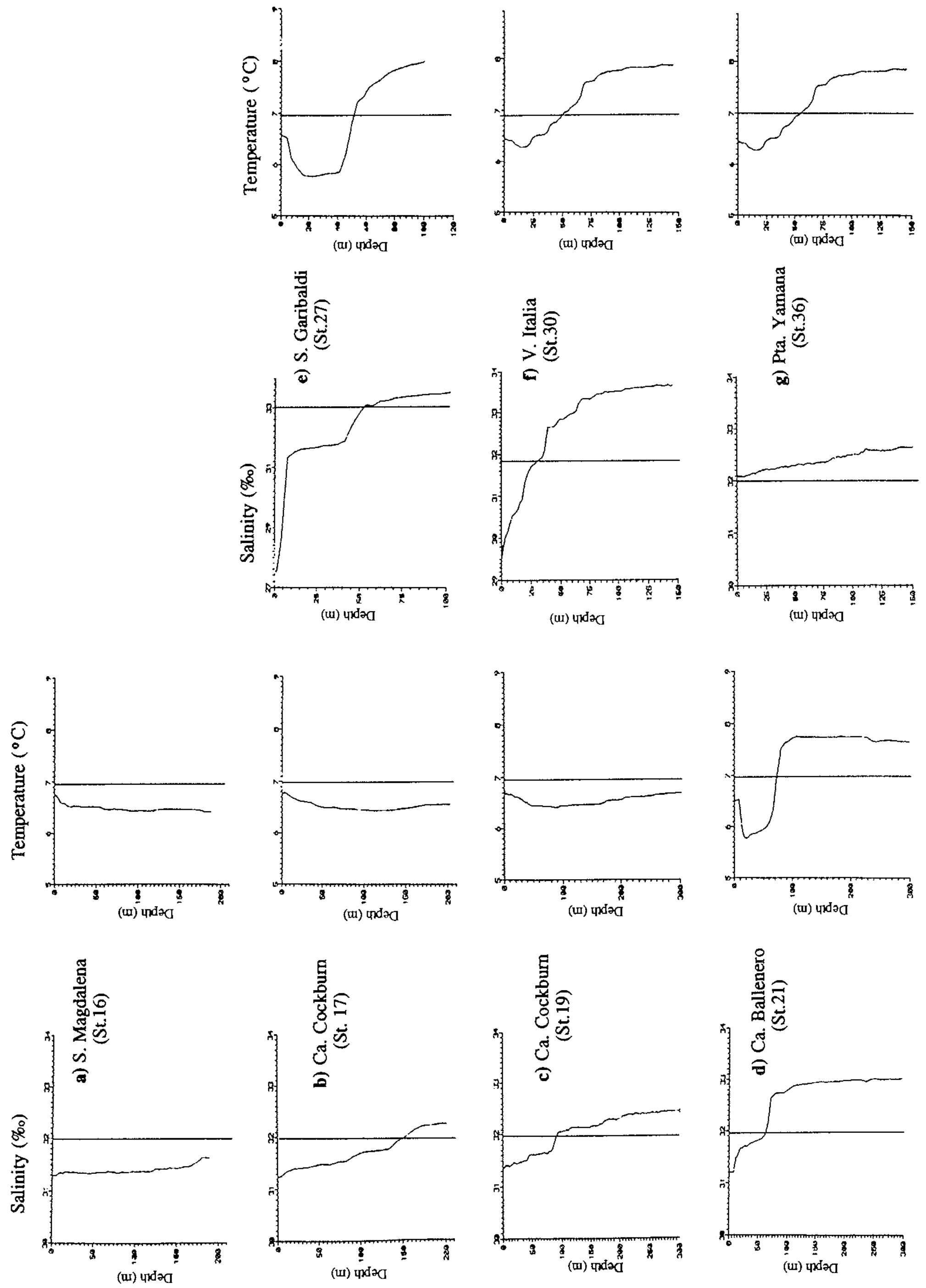


Figure 7: Salinity and temperature profiles on the transect from the Strait of Magellan to the Beagle Channel.

Canal Beagle near glaciers Garibaldi, Italia, Romanche, Francia (Fig. 7e-f)
Strong pycnocline (1 or 2)

Temperature:	6.5°C 0-10m; 5.8-6.0°C in upper 50m; 7.5-8.0°C below 60m
Salinity:	27‰ at 0m to 33.0-33.5‰ below 60m

Canal Beagle at Pta. Yámana (Fig. 7g)
Weak pycnocline

Temperature:	6.5°C
Salinity:	32.0-32.5‰

In conclusion, waters from Paso Ancho are less saline and colder than those of the transect Magdalena-Beagle and even less saline than the Pacific and the Atlantic waters. Lowest salinity surface waters were recorded in front of the glaciers in the Beagle Channel. Water stratification is absent in Paso Ancho and increases towards the Beagle and particularly in front of the glaciers. The influence of Pacific waters extends to Canal Tortuoso, and that of Atlantic waters only to Primera and Segunda Angostura. Therefore Paso Ancho may be considered a rather semiclosed and isolated basin with major influence from runoff and some minor influence from Canal Magdalena.

The strong stratification in the Canal Ballenero and in the Beagle Channel mirrors specific local water masses. The uppermost water is a very thin, lowest salinity layer with occasional elevations in temperature, which may result from glacier melting and subsequent solar warming at the surface in spring. The low salinity and low temperature subsurface layer found immediately underneath, may be related to high river discharge in winter. The deepest water is warmer than the above mentioned layers but highest in salinity.

No anoxic basins were located throughout the study area, not even in Seno Garibaldi which is separated from the Beagle by a sill of 15 m.

2.1.2 Hydrography of the Beagle Channel (leg 4)

Heinz Klöser, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

The objective of this study was to obtain a longitudinal profile of temperature and salinity in the Beagle Channel.

Preliminary results
The hydrographic situation in the Beagle Channel was generally very homogenous (Fig. 8). However, a surprising result was the higher salinity at the eastern mouth of the channel (stn 1252) compared to stations in the western part (stns 1304 - 1320), since open ocean water is supposed to enter the channel from the west according to the principal current regimes.

Interestingly north of the large island of Navarino a weak stratification was observed. Possibly, Navarino and Isla Grande de Tierra del Fuego act as barriers to give this part of the channel the character of a semi-enclosed water body. However, stratification at stations 1256 and 1260 was produced by a salinity decrease close to the surface, whereas salinity was homogenous, and a distinct thermal gradient was present, at station 1268. A strong salinity reduction in surface waters was also present at station 1283 in an area where numerous glaciers reach the channel. The low surface salinity at this station may be explained by local input of great amounts of glacial meltwater.

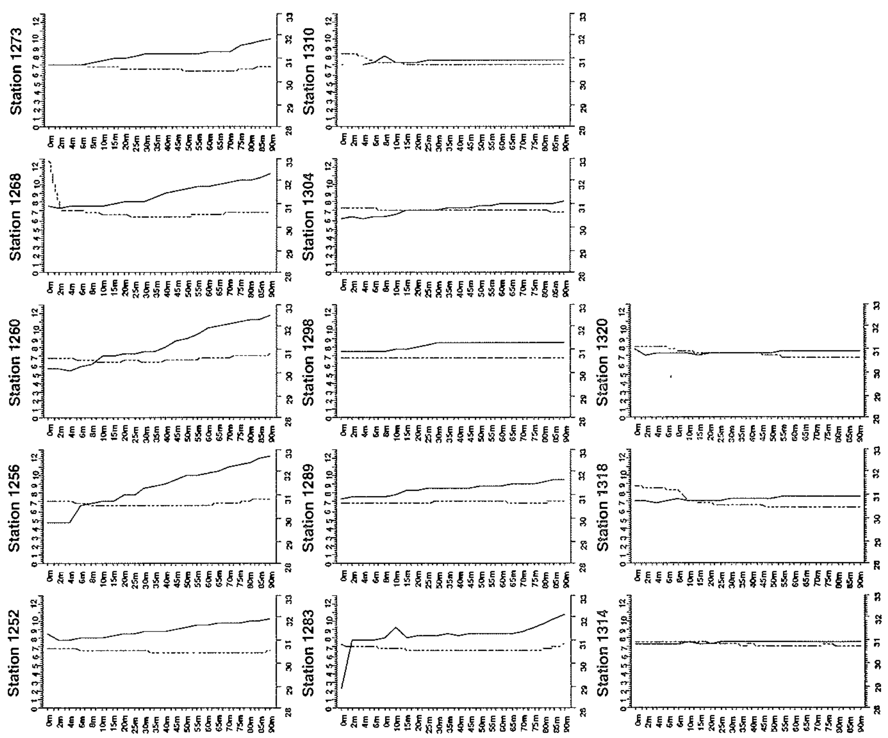


Figure 8: Salinity (solid line) and temperature (broken line) profiles in different Fuegan channels on the transect from the Beagle Channel to the Strait of Magellan (leg 4). for further explanations see text.

2.1.3 Physical oceanography of the Strait of Magellan in spring

Dante Figueroa M. & Gabriel Yuras Z
Departement of Oceanography, University of Concepción, Chile

Material and Method

Between 17 and 31 of October 1994 13 hydrographical stations were performed at various locations in the Strait of Magellan, coincident with stations of benthos and/or plankton samples (cf. Annex, Table 13). Five of these stations belonged to a cross section between Punta Arenas and Isla Carlos III. One station (corresponding to station 19 of the former Italian expedition) was continuously occupied for 15 hours in order to detect temporal fine scale changes. The water depth at which the hydrographical measurements were carried out, varied between 9 m (Bahia Gente Grande) and 532 m (Puerto de Hambre).
The measurements were done with a CTD Sea Bird SBE911 plus (24 registrations per second), a CTD Sea Bird 19 (2 registrations per second) and a current meter General Oceanics MKII. To avoid artefacts, data sets from each type of instrument were analysed separately.

Results

Practically all measured profiles were homogenous within the upper 50 m, except that a slight increase in temperature was noted with depth. This confirms data already given for this zone by Céspedes et al. (1993).
Taking into consideration that winds of 45 - 50 km/h are not unusual in this region (Santana 1991), this is easily explained by the strong currents and winds of this zone. Using the formulas of Andrade and Ekman, a wind speed of about 50 km/h = 14 m/s will result in a mixed layer of 67 m depth and a surface current of 20 cm/s, respectively.

The profiles measured with SBE911 at the Italian sta. 19 showed no differences in the upper 60 m. However, the data obtained with SBE19/MKII on the same station indicated a strong change in salinity at 100 m depth. Due to the lower accuracy of the latter instrument, it cannot be stated whether this variation is significant.
Figures 9 and 10 showed the calculated field of temperature and salinity at station 13 over the day. A slight increase in temperature was noted over the day, with a more pronounced gradient between 5 and 6 o'clock in the morning and between 2 and 3 o'clock in the afternoon. However, this may be an effect of more frequent measurements during these periods. Salinity similarly increased slightly, showing pockets of higher salinity in deeper water. Density remained fairly constant during the day with lower density at the surface and higher values in the depth.

Literature

Céspedes R., Lillo, S., Quinoñes, R., Paillaman, A., Reyes, H., Osses, J. & Adasme, L. (1993) Evaluación directa del recurso Merluza del sur e identificación de recursos alternativos en aguas interiores de la XII región, Chile. Informe del Instituto de Fomento Pesquero (IFOP), Chile.

Santana, A. (1991) El clima de Punta Arenas durante 1991. Anales del Instituto de la Patagonia, Serie Ciencias Naturales, Punta Arenas, Vol. 7(1): 113-123.

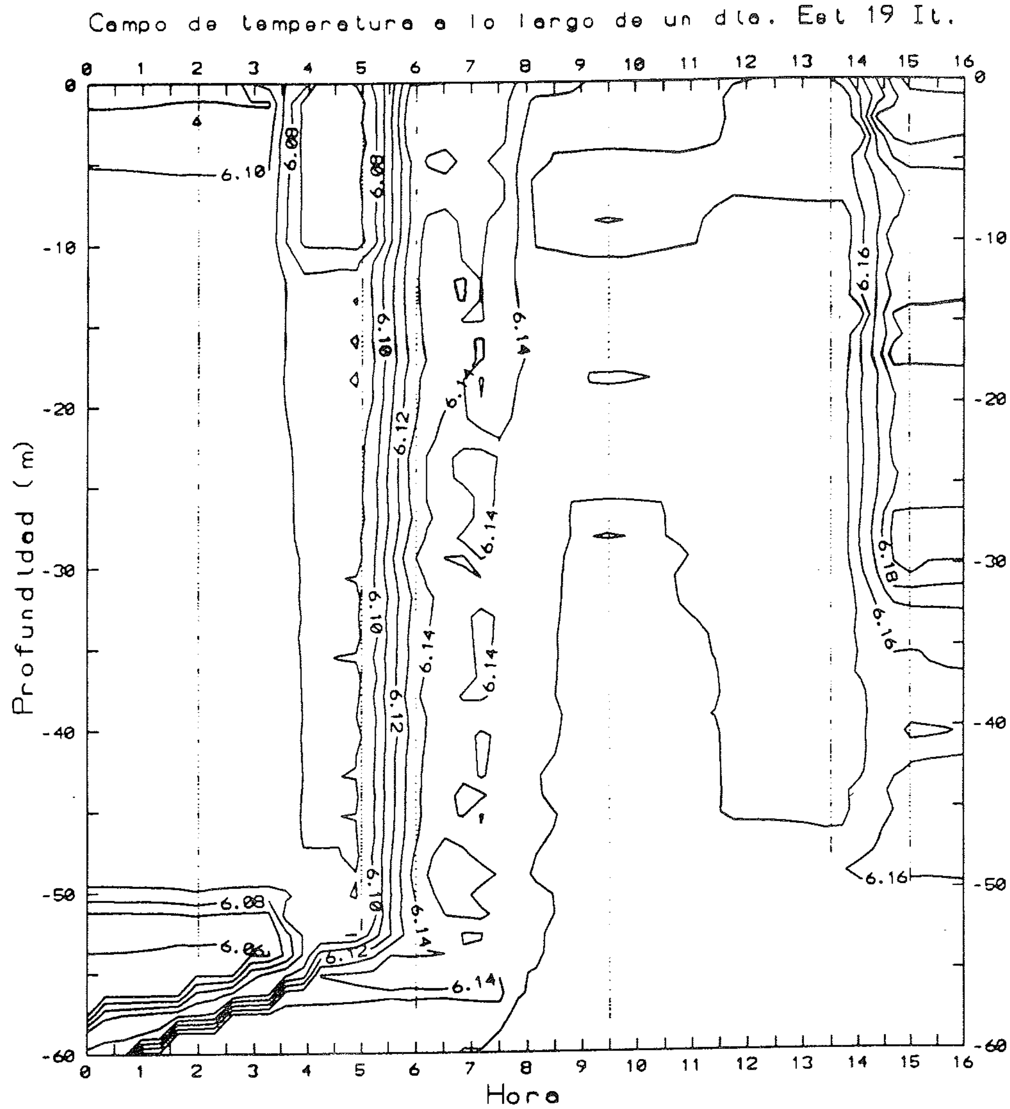


Figure 9: Temperature profile recorded during one day at Paso Ancho (Strait of Magellan, former Italian Sta. 19).

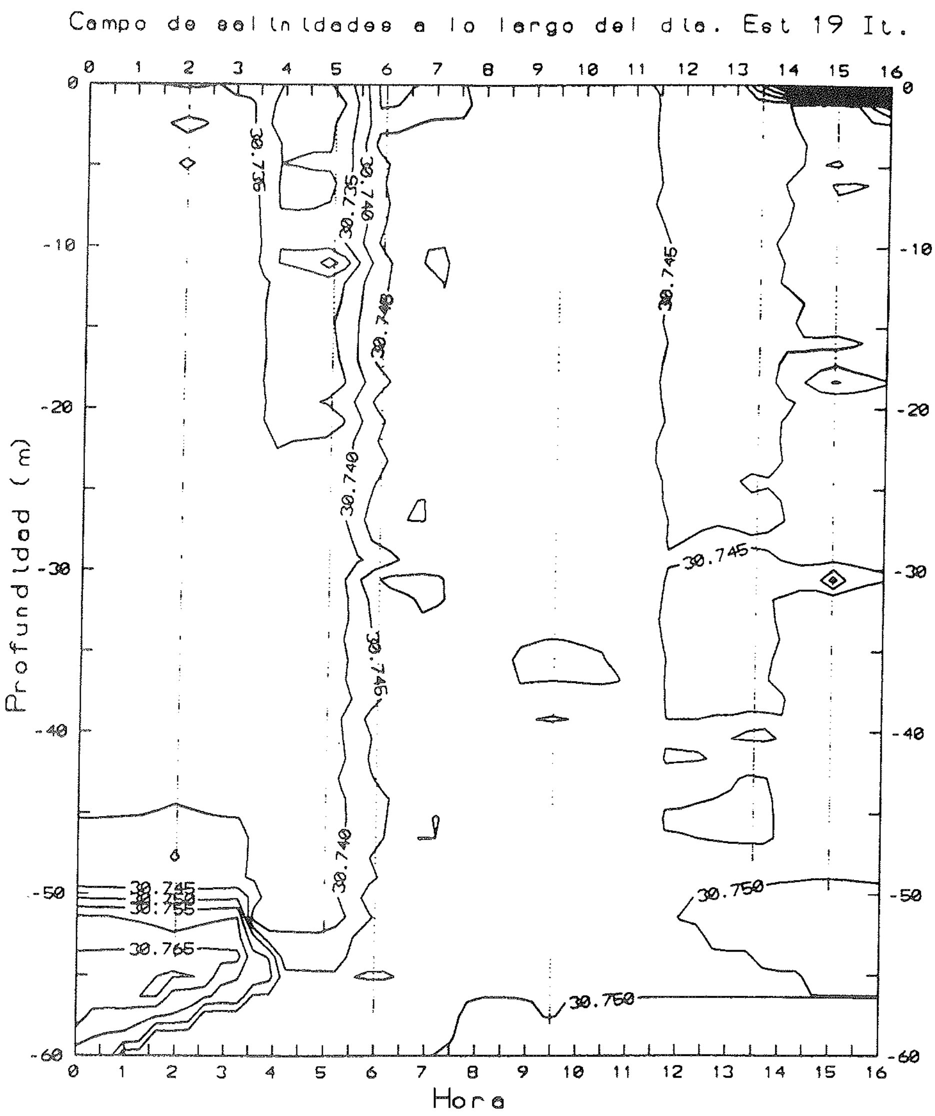


Figure 10: Salinity profile recorded during one day at Paso Ancho (Strait of Magellan, former Italian Sta. 19).

2.2 PLANKTON

2.2.1 Traits of Phyto- and Zooplankton from the Strait of Magellan to Beagle Channel on board RV "Victor Hensen" leg 1 and 2, Oct - Nov 1994

Tarsicio Antezana[1], Madeleine Hamamé[1], Yoanna Eissler[1] and Sergio Jara[2]

[1] Departamento de Oceanografía, University of Concepción, Chile
[2] Instituto de Fomento Pesquero, Punta Arenas, Chile

The Strait of Magellan, the Beagle Channel, and connecting channels constitute an environment where a confluence of Pacific and Atlantic waters and input of continental runoff and precipitation take place. Therefore a simple gradient of mixing of both flora and fauna may occur. Alternatively, more or less isolated biota could be found among several basins formed within its large and intrincated geography. The objective of this work was to evaluate these alternatives by assessing the degree of isolation of plankton assemblages in term of group and species dominance, chlorophyll and zooplankton biomass and grazing rates of mesozooplankton. Furthermore, measurements were taken, in order to identify short-term changes of plankton in the largest basin of the study area, Paso Ancho.

Material and methods

A. *Collection of samples and data*

Phytoplankton was collected with

- with a 5l Niskin bottle at 5-7 layers between 0 - 50 m during day or night,
- with a conical net, 70 µm mesh size tow at the surface for 5 min during day or night.

Zooplankton samples were taken by oblique hauls with a Bongo net, 70 cm mouth diameter and 300 µm mesh size, between 0 - 50 m, during day and night.

Other complementary samples and data:

- Irradiance, depth profiles with a Licor quantometer at selected stations and times,
- Oxygen concentrations at most stations and in a time series in Paso Ancho
- Nutrients vertical profiles at most stations.

B. *Analyses*

- Chlorophyll profiles were made for every station and in the time-series in Paso Ancho.
- Qualitative estimates of genera and species dominance were made from net collections.
- The major groups of zooplankton were identified and counted for every Bongo net sample.
- Grazing estimates were made after partition of every sample within 4 size categories.

Results

Phytoplankton:: Taxonomic composition
Genera and species dominance of net phytoplankton varied according to basins as follows (Figs.11a-d).

Paso Largo (Fig. 11a)
Chaetoceros sp. and *Asterionelopsis* and a number of species of *Ceratium* and other dinoflagellates.

Paso Ancho/Canal Magdalena (Fig. 11b)
Clearly dominated by *Chaetoceros* and *Thalassiosira;* other diatoms were present.

Canal Ballenero (Fig. 11c)
Dominated by *Chaetoceros, Pseudonitzschia* and *Protoperidinium.*

Canal Beagle: Garibaldi/Italia/Francia (Fig. 11d)
Dominated by dinoflagellates (*Protoperidinium, Ceratium, Diplopsalis*) and diatoms (*Chaetoceros* and *Pseudoniztschia*)

A succession from diatoms to dinoflagellates was identified from more enclosed/mixed waters (Paso Ancho) to more stratified/oceanic waters (Canal Beagle). The Paso Largo was equally dominated by diatoms and dinoflagellates.

Chlorophyll
Levels of chlorophyll in the 0 - 50m layer were moderately high (over 2 µg Chl/l) throughout the entire region with differences between basins and fluctuations between days in a single basin (Paso Ancho).

Daily fluctuations in Paso Ancho:
During 21-23 October, chlorophyll was around 1.5 µg/l and homogeneously distributed (Fig 12a).
During 24-27 October, chlorophyll was also homogeneously distributed, but with higher concentration around 2µg/l (Fig 12b).
During 28 October -2 November, a subsurface peak of 6 µg/l was conspicuous at 10 - 20m (Fig 12c).

Basin variations along the transect Magellan to Beagle:
Paso Largo
Chlorophyll shows to peaks of ca. 3-5µg/l.

Canal Tortuoso(Fig. 13a)
Chlorophyll was homogeneously distributed with a mean value of 1.5µg/l.

Canal Magdalena to Brecknock (Fig. 13c-d)
A gradient was observed from profiles with a surface peak of ca. 4 µg in the upper 20 m in Seno Magdalena to profiles of homogeneously distributed chlorophyll at ca. 2 µg/l in Canal Brecknock.

Canal Ballenero (Fig. 13e)
Chlorophyll had two subsurface peaks at 10 and 50 m of ca 4.5 µg/l.

Canal Beagle, Garibaldi (Fig. 13f)
Near 0 values in the upper 10m and a smooth increase with depth to reach ca 2µg/l, on the 4th November, but an abrupt surface peak (over 3 µg/l) on 05 November.

Italia, Romanche, Francia and Yámana (Fig. 13 g, h)
Upper layer 0-10m with high values of chlorophyll (2-4 µg/l) and a subsurface gradient reaching to 5-6 µg/l at 40-50 m depth. High values of 4-5 µg/l extended down to 80 m off Yámana. The gradient here is less pronounced between the shallow meltwater and the subsurface winter layers. such an upper layer mixing may have resulted in a stable environment, favourable for plankton growth (see also Fig. 7f-g).

As a whole, chlorophyll distribution fluctuated from homogeheously low or minor shallow peaks in Paso Ancho to great subsurface and deep peaks near the glacier areas.

Zooplankton: Taxonomic composition
Plankton throughout the study area was dominated by larvae of planktonic and benthic animals and other major groups such as copepods or cladocerans (Table 1a, b).

Differences between basins were as follows:

Canal Tortuoso (Fig. 14a)
Cladocerans, copepods and larvae and among these, Nauplius and Calyptopis; the presence of euphausiids and ostracods should be noted.

Paso Ancho (Fig. 14b)
Copepods and larvae were dominant, and among these Zoea and Nauplius.

Canal Magdalena - Canal Cockburn (Fig. 14c)
Copepods, cladocerans and larvae dominated and among these Nauplius and Pluteus.

Canal Brecknock - Canal Ballenero
Copepods, cladocerans and larvae dominated. The presence of chaetognaths, ostracods, euphausiids and larvae was recognised. Among larvae, Nauplius and Pluteus dominated over Calyptopis, Cyphonautes, Zoea and others.

Canal Beagle: Garibaldi/Italia (Fig. 14d)
Copepods, cladocerans and larvae dominated over chaetognaths, ostracods, polychaetes and others. Among the larvae, Pluteus larvae dominated.

A gradient was observed from a Zoea/Nauplius/copepod assemblage, characterising Paso Ancho, to a Pluteus/Nauplius/copepod/cladoceran assemblage characterising the canals Tortuoso, Magdalena, Ballenero, to end in a Pluteus /copepods/cladoceran assemblage near the glacier sector of Canal Beagle.

Zooplankton: Grazing rates

Partition of grazing among size categories studied in a daily cycle at Paso Ancho (Fig. 15). Grazing of Nauplii and copepodites in the 300 - 500 µm category fluctuated around 0.002 µg Chl/ind and was more or less evenly distributed throughout day and night. Grazing of Nauplii and copepods in the 500 - 1000 µm category varied around 0.006 µg Chl/ind with a peak at noon. Grazing of Zoeas in the 1000 - 2000 µm category varied daily with daylight maxima at 0.012 µg Chl/ind and night minima at around 0.006 µg Chl/ind. Grazing of Euphausiids (*E. vallentini*) showed a strong daily rhythm with minimum values in daytime and maxima around 0.200 µg Chl/ind. throughout the night. Grazing rates of Euphausiids were about 2 orders of magnitude greater than those of other size categories.

Further aspects

Oxygen, apparent oxygen utilisation, nutrient concentrations and irradiance will be related later to plankton biomass distribution, vertical distribution of mesozooplankton and reproductive strategies of *Calanus chilensis*.

Table 1: a) Abundance (no of individuals) of the major taxa and b) of larvae in plankton samples taken during leg 1 and 2.

	Paso Ancho	Paso Ancho	Gente Grande	C. Toruoso	C. Magd.	C. Notch	C. Magd.	C. Magd.	Isl. Fitzroy	Isl. Gormáz	C. Ballenero	B. Lomas	C. Breckn.	Gl. talia	S. Garibaldi
a) M ajor Taxa															
Amphipoda	0	16	4	0	0	0	0	0	4	0	8	48	0	0	12
Branchiopoda	0	0	0	12000	580	3400	840	1920	1008	12	468	0	3920	372	480
Copepoda	3868	60000	1150	6000	400	500	11200	2520	7600	2400	4000	18400	2920	1000	8800
Chaetognatha	0	0	0	0	0	0	0	0	4	0	0	0	8	2	28
Euphausiacea	0	46	0	8	0	0	0	0	0	0	8	72	0	0	76
Isopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Ostracoda	8	0	0	16	0	0	0	0	0	0	28	24	0	42	288
Larvacea	0	0	0	48	0	0	48	20	100	12	0	0	8	8	0
Polychaeta	68	0	4	104	12	250	36	128	240	92	8	144	252	18	24
Thaliacea	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0
b) Larvae															
Calyptopsis	60	320	40	160	2	0	32	0	420	16	68	144	20	2	48
Ciphonauta	0	0	0	0	0	70	0	16	5	0	0	0	20	2	0
Cipris	0	0	0	8	0	34	8	28	0	8	8	8	16	4	20
Furcilia	0	32	0	144	0	0	28	0	20	16	36	32	24	4	52
Eggs	10000	0	38	208	653	218	84	4008	4	2200	348	2016	3612	200	0
Fish larvae	16	0	28	0	2	6	8	0	0	4	0	16	12	4	8
Nauplius	8716	23440	2000	7520	600	600	960	4400	2320	4320	1800	3200	6800	240	0
M.trochophora	116	0	0	0	0	0	0	0	4	0	0	0	16	0	0
Pluteus	252	0	0	0	1500	1500	820	2000	2640	1200	800	160	6496	2380	8160
Veliger	4	16	0	0	0	0	4	0	0	0	0	0	0	0	0
Zoea	3644	640	1250	56	60	60	96	136	0	0	0	0	0	0	0

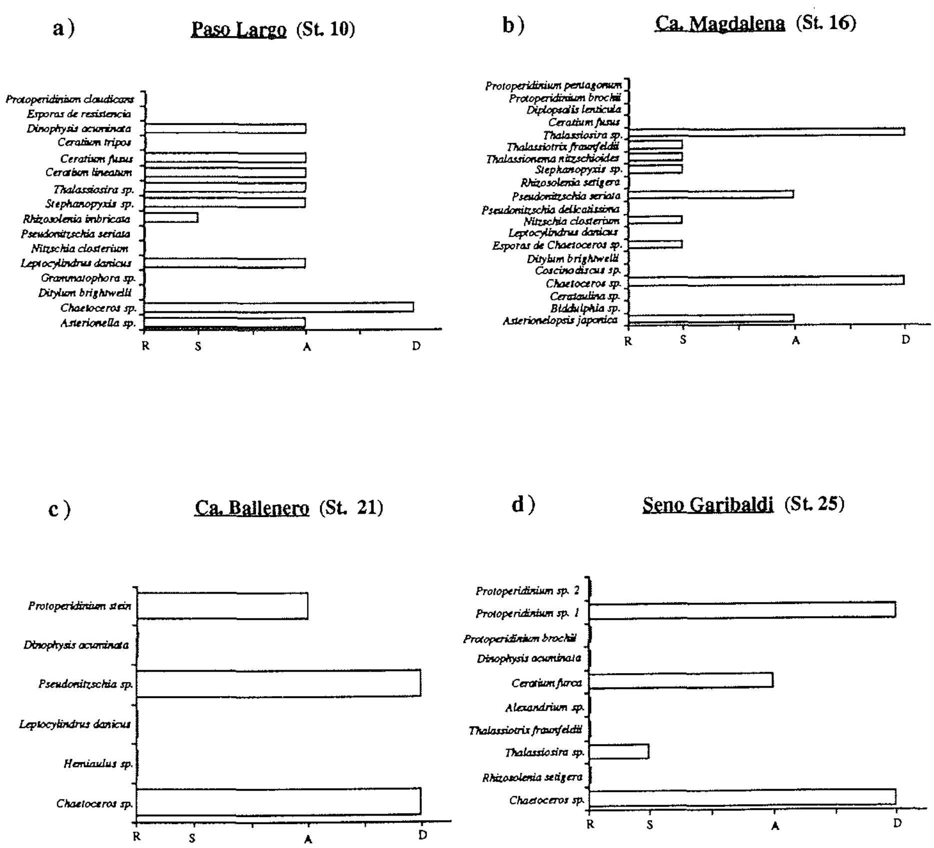
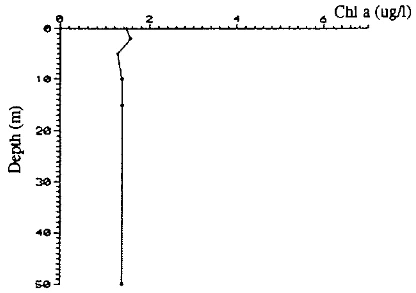
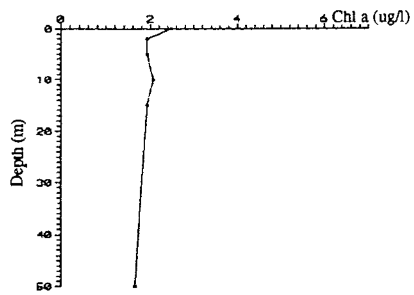


Figure 11: Species composition of phytoplankton and relative abundance at four representative stations (R=rare; S=scare;A=abundant; D=dominant).

a) Ca. Tortuoso (St.12; 23:15 hrs)



b) P. Hambre (St.3; 15:20 hrs)



c) P. Ancho (St. 14; 00:14 hrs)

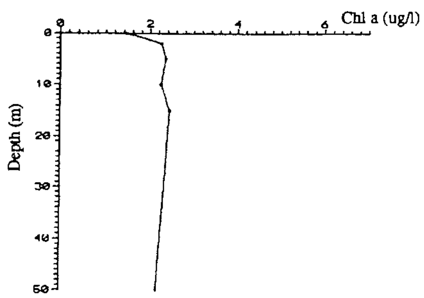


Figure 12: Temporal changes in chlorophyll profiles in the Magellan Strait.

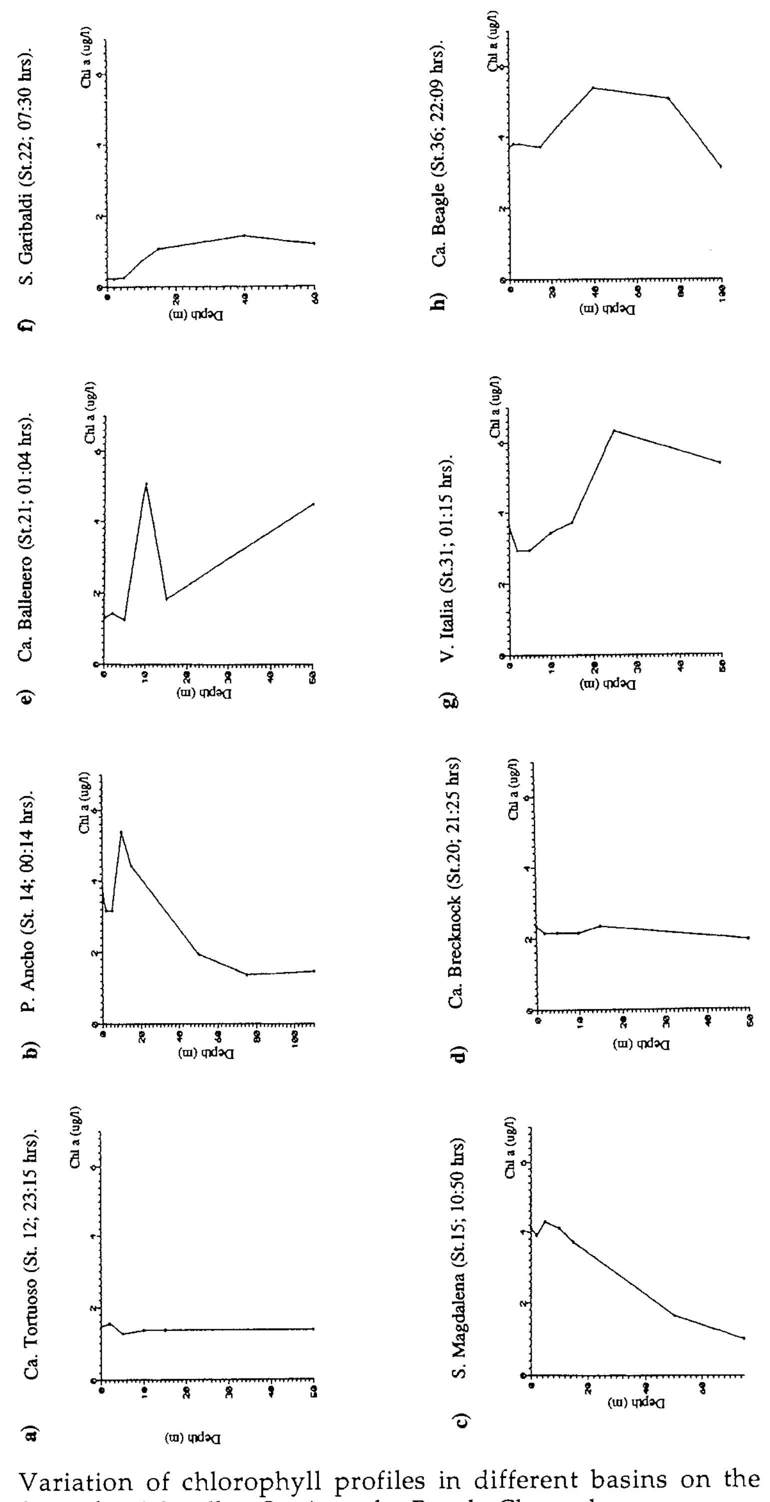


Figure 13: Variation of chlorophyll profiles in different basins on the transect from the Magellan Strait to the Beagle Channel.

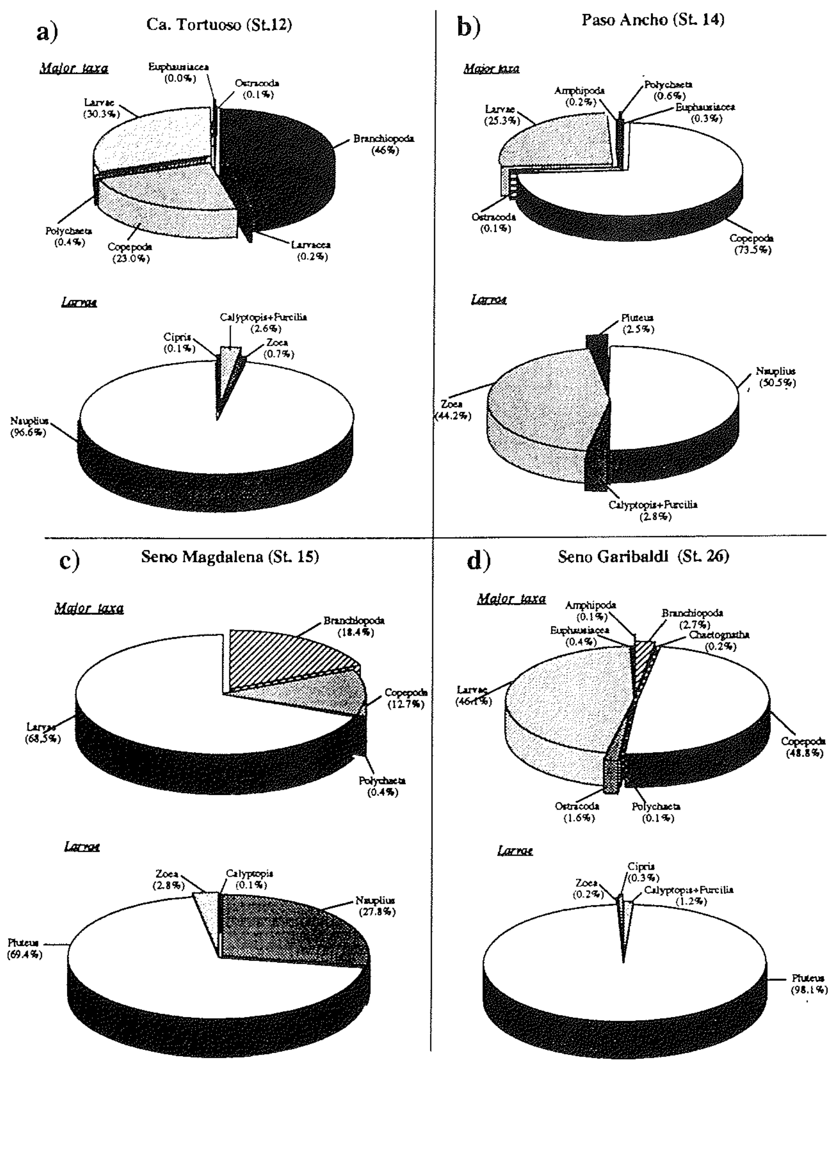
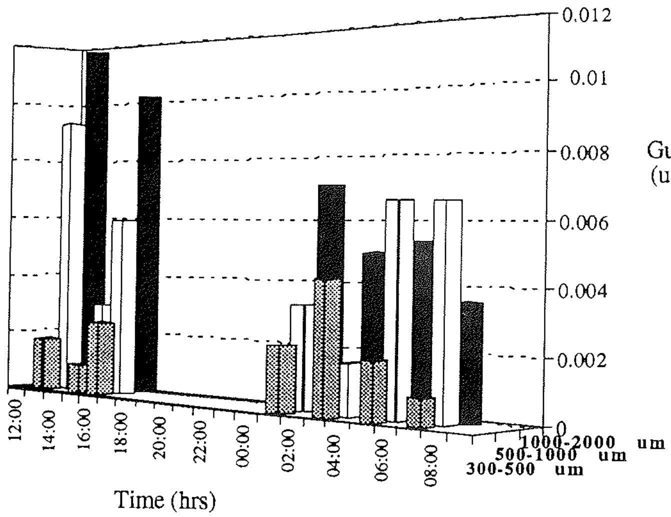


Figure 14: Relative abundance of major groups and of larvae at four selected stations.

Paso Ancho Station

a)



b)

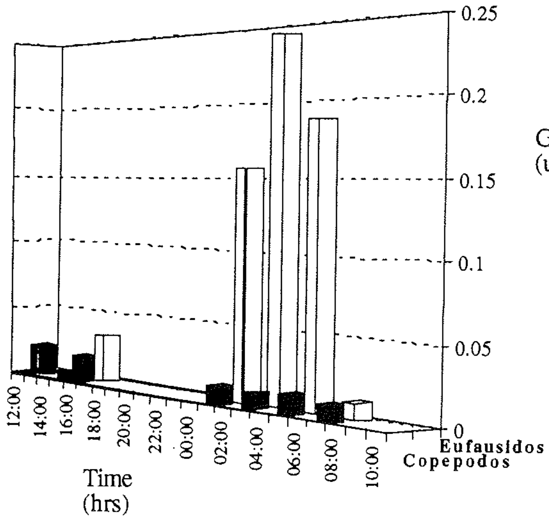


Figure 15: Gut pigment content (as μg chlorophyll/ind.) of (a) three size classes of copepods (300-500μm, 500-1000μm and 1000-2000μm), and (b) of *Euphausia vallentini* (for comparison, totals for all size classes of copepodes are also given).

2.2.2 Growth of *Calanus australis* during the spring season in the Magellan Strait from an onboard experiment

Rubén Escribano, Instituto de Investigaciones Oceanológicas, University of Antofagasta, Chile

Calanus australis was maintained live onboard under simulated in situ conditions. The copepods developed from early to late stages under those conditions during 5-6 days. Egg production also took place during that period.

Temperature was stable between 5.6 to 6.3°C, while chlorophyll concentration was in the range of 4 to 8 $\mu g \times l^{-1}$.

Under simulated conditions the inital cohort was predominated by copepodites CII and CIII, which within 5 days developed into copepodites CV. The changes in stage frequency allowed estimates of the duration of the different stages, and estimates of dry weight from subsamples permitted an estimate of the instantaneous growth rate.

The results will be used to discuss if this species is developing at its maximal capacity during this time of the year, to find out whether population growth takes place under food-satiated conditions.

2.2.3 Spatial distribution of mesozooplankton in the Beagle Channel, Southern Chile

Claudio Richter, Institute for Polar Ecology (IPÖ), University of Kiel, Germany present affiliation: Center for Tropical Marine Ecology (ZMT), University of Bremen, Germany

The objective of this study was to assess the effects of estuarine circulation on mesozooplankton community distribution in the Beagle Channel, in particular the fate of meroplankton and holoplankton in a counter-flowing two-layered system.

Samples were collected with a 300 µm mesh multiple opening-closing net ("Kiel Multinet") during legs 3 and 4 of the Magellan cruise of RV "Victor Hensen" between Ites Valderrama (55°48' S; 66°59' W), SE of the eastern mouth of the Beagle Channel, and its western mouth at 54°31' S; 72°05' W. Further stations were sampled in the Cockburn and Magdalena channels, yielding a total of 151 samples at 23 stations. Daytime vertical hauls were conducted between 30 and 400 m maximum wire length, depending on bathymetry, covering standard depth intervals of 0-10-20-30-50-100 m for the shallow casts, and 0-100-150-200-300-400 m for the deep hauls. Samples were preserved in 4% borax-buffered formalin and shipped to Germany for microscopic analysis (to be started by a doctorand in the second half of 1995).

Preliminary results are based on quick on-board inspection of the material through a simple microscope.

The plankton system appeared to be in an early stage of succession, judging by

- a weak vertical stratification of the water column, also in the most protected areas within the channel (cf. chapter on hydrography);
- high overall phytoplankton biomass dominated by diatoms, including a heavy (non-diatom) bloom around I. Timbal Chico, clogging the 0-50 m nets at station 1265
- high abundance of meroplankton (larvae of decapods, polychaetes, echinoderms)
- dominance of juvenile stages within the holoplankton (copepods, euphausiids, ostracods), virtual absence of adult female *Calanus australis/chilensis* except for the deepest samples.

The vertical distribution was characterized by a depth zonation of the zooplankton community, according to the following general scheme:

- neritic and brackish water forms dominated in the surface layer (Cladocera), followed by
- meroplanktonic larvae and small-sized copepods in the subsurface layer down to about 50 m.
- From 50 to 150 m, large-sized herbivorous copepods predominated, whereas
- omni- and carnivorous copepods typical of deeper water (Euchaetidae, Aetideidae), as well as euphausiids and ostracods, occurred below.

Chaetognaths and salps were relatively scarce, while other gelatinous forms appeared to be patchily distributed. Thus, ctenophores (*Mertensia, Beroe*) occurred locally in very high numbers in the Cockburn Channel from the surface, where they could be collected from the drifting ship with dip nets, down to 150 m (Caleta Barrow). They were rare in the Beagle Channel. (The gelatinous plankton will be studied by F. Pagès).

Regional differences were evident but appear difficult to dissociate from the effect of depth. Thus, meroplankton was a dominant component of the plankton on the shallow eastern shelf outside the Beagle Channel whereas holoplanktonic oceanic forms dominated in the western depressions of the Beagle.
The detailed analysis of the zooplankton and hydrographic data sets will enable us to address biological-physical interactions in this Subantarctic fjord environment.

2.2.4 Preliminary results on the gelatinous zooplankton collected in the Magellan Strait

Francesc Pagès, Instituto de Ciencias del Mar, Barcelona, Spain

Only the gelatinous zooplankton (medusae, siphonophores, ctenophores and salps) collected during the first leg of the "Magellan Cruise" has been examined to date. Most of the material was collected by a Bongo net. Six species of hydroidomedusae, two scyphomedusae (Table 2) and one ctenophore have been identified. Salps and siphonophores did not occur in the samples.

Hydroidomedusae occurred at all stations but data on abundance are not available yet. Most of the population was composed of young specimens and early stages which shows that benthic hydroids inhabit the region. The hydroids collected by the Agassiz trawl are currently examined for their identification.
The medusae collected are common in neritic waters of the South Atlantic. However, two common species (*Proboscidactyla* sp. and Leptomedusa 1) require further examination for a correct identification. Species associated to Pacific waters were not collected.
The ctenophore *Beroe cucumis* was extremely abundant in Cabo Negro and several specimens (up to 12cm in length) were collected. *Beroe* prey mainly on gelatinous plankton and may be the organism that mainly controls the populations of gelatinous plankton in the region.
The most conspicuous gelatinous organism in the Strait of Magellan was a scyphomedusa (20-25cm in diameter) tentatively ascribed to the genus *Desmonema*. Specimens were often observed by divers near the shoreline (particularly in Puerto Hambre), and others were collected by the Agassiz trawl.

The observation of the hydroidomedusae stomachs under the microscope revealed a relatively high percentage of specimens with gut contents. Most of the prey were copepods but meroplanktonic larvae were also found. Medusae seem to be one of the most important planktonic predators in the Magellan region.

Table 2. Relative presence of medusae in the Bongo samples collected in the Strait of Magellan: 1=rare, 2=frequent, 3=common.

Station No.	825	831	853	856			908	910	915			938	942	946	948	983
Bongo No.	1	3	6	8	9	12	15	16	17	18	19	20	21	22	23	25
Hydroidomedusae																
Bougainvillia macloviana	2		3	3	3	2	3	1	3	3	3		1	2	2	
Obelia spp				1		2		1	1		2					
Aequorea macrodactyla			1													
Laodicea undulata									1							
Leptomedusae	1	2	2	2	2	2	2	3			2	2	3	2	2	3
Proboscydactila sp.		1	1					1	1		1	1	1	2	3	1
Scyphomedusae																
Aurelia aurita												1	2			

2.3 SEDIMENTS, BENTHOS AND DEMERSAL FISH

Deep-water benthos
2.3.1 Sponge biology and sediment biochemistry

Ursula Witte, GEOMAR, Kiel, Germany

Sponge biology: Preliminary results
Contrary to our expectations deduced from the current knowledge of Antarctic benthos the sponge fauna of the Beagle Channel and adjacent areas was found to be very poor. During leg 3 samples were taken east of the Beagle Channel between the islands of Navarino, Picton and Wollaston. Only at station 42, at 40 m water depth in the channel between Navarino and Picton, a number of large demosponge species was found to present a considerable contribution to benthic biomass. At all other statons during this leg no sponges were found. Sampling during leg 4 revealed a few specimens colonizing small boulders also at greater depth in the Beagle Channel. In the Cockburn Channel, a large boulder was taken with the Agassiz trawl that was colonized by more then ten encrusting demosponge species. Only one species of Hexactinellids, conspicuous members of Antarctic benthos, were found.

Sediment biochemistry
Sediment samples were taken at ten stations during leg 3 and 4 in order to analize bacterial numbers and biomass and DNA content of sediments. In addition, chloroplastic pigments are analysed as a measure of the sedimentation potential of primary organic substances and in order to indirectly determine bioturbation depth. At the eastern mouth of the Beagle Channel (leg 3) sediments were sampled at four stations of 33 - 120 m water depth. Whereas at most stations the upper sediment column (10cm) was well oxygenated owing to heavy particle reworking by macrofaunal organisms, northeast of Picton Island Picton at 103 m depth only the upper four cm were homogenously reworked; below the sediment exhibited a greyish-black colour and a strong H_2S odour. Several of the 6 stations in the Beagle and Ballenero Channels at 218 - 660 m revealed a fluff layer of 1-2 cm, most pronounced at station 31 with 5 cm thickness. Sediments at station 25 (Islas Furias) were sandy and well oxygenated and thus mirrored the canyon-like situation of the sampling site.

(Note: No final report has been received to date from the group working on resting cysts of phytoplanktonic organisms.)

2.3.2 Epibenthic communities analysed by underwater camera

Julian Gutt & Thomas Schickan, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

To classify epibenthic communities, the underwater camera was deployed at 46 stations (13 in the Magellan Strait, 11 in the Beagle Channel, 14 southeast of Puerto Williams, 8 in the Magdalena, Cockburn, and Ballenero Channels). A total of 2135 photos were taken at a constant distance from the seafloor, representing 1 m^2 each. A full transect consists of about 70 photos.

Magellan Strait (leg 1)
The richest species associations in terms of abundance and biomass were found in the shallow areas (approx. 15-130 m). The benthos at these stations was partly dominated by a mass occurrence of clams, bryozoans (stn 917) or brachiopods (stn 927). In addition, several species of star fishes, sea cucumbers, sea urchins, decapod crustaceans, and sessile suspension feeders, e.g. sponges and alcyonarians were recorded. These communities give the impression of an intermediate species diversity, with an uneven distribution of the specimens over the species in combination with a high number of species. This patchiness was observed at different spatial scales. The mostly dark sediment had differing percentages of stones, sand, and soft bottom. At several stations the sediment was almost totally covered by debris of clams, bivalves or barnacles (e.g., stns 880 and 959). At other stations the benthos was partly dominated by a high density of brachiopods; these populations were significantly poorer or totally missing, however, in places where ripple marks were visible. This leads to the conclusion that these organisms may have a preference for a distinct (limited) near-bottom current velocity. Close to the shore different species of red and green algae were also photographed.
The deeper stations (stns 310 and 246) in the southern part of the Magellan Strait were totally different. The epifauna was poor, the abundance values were roughly estimated to be below those of the shallower areas by at least one order of magnitude. The sediment seemed to consist of a fluffy soft bottom. The only macrobenthic organisms visible were brittle stars and sea cucumbers. Many tracks and trails ("Lebensspuren") indicated that here the motile life forms are more dominant than at the shallower stations. Both deepest stations are very similar, which gives the impression of more constant environmental conditions. Due to the low abundances and an equal distribution of the specimens over the species we expect for these deeper areas an intermediate to high within-habitat diversity.

Beagle Channel (leg 2)
In this part of the channel system the epibenthos was clearly poorer in terms of abundance than in the Magellan Strait. The complete transect from the middle of the channel across a deep sill (approx. 200 m), a depression, a shallow sill (approx. 20 m) into the Seno Garibaldi revealed soft bottoms in the deeper areas with few brittle stars and irregular sea urchins. Numerous holes in the sediment gave evidence of a rich infauna. The stations of intermediate depth were characterised by a stony sea floor, with a very poor epifauna consisting of only a few echinoderms. The sediment was covered by a thick layer of "fluff" (deposited organic material). At station 1058, between the deep and the shallow sill, mounds of faeces were frequently observed which were produced by an elsewhere not recorded tube worm. The relatively rich fauna of the shallow sill was dominated by different dendrochirote sea cucumbers attached to boulders, various starfishes, brittlestars and compound ascidians. The fauna of the inner slope of the Seno Garibaldi seemed to be the same as the fauna at the outer slope. The epibenthos in the area of the glaciers was poor at all water depths. In addition to the generally common brittle stars different species of sea anemones were conspicuous benthic organisms. The sediment was poorly sorted, and in this area we found the

thickest layers of "fluff" in the entire area of investigation. Regionally a high turbidity due to phytoplankton was observed in the near-bottom water. At station 1125, close to the confluence of the "Brazo del Noroeste" and "Brazo del Suroeste", an apparently spatially distinct cloud of suspension was probably created by a gyre.

Area southeast of Puerto Williams (leg 3)
In this study area the camera was deployed only in shallow areas (<115 m). Stalked compound ascidians settled in high abundances on stones (stn 1217). Galatheid decapods reached densities of 30 specimens per m^2 and were relatively uniformly distributed. Due to these high concentrations of species which differ from station to station, the diversity within one station appeared to be low, similar to the results from the Magellan Strait. Occasionally lithodid decapods (both *Paralomis* and *Lithodes*) and shrimps as well as various suspension feeders such as sponges, sea anemones and dendrochirote sea cucumbers were photographed. Due to the combination of some dominant species and the "additional" fauna the species diversity in these shallow areas seemed to be intermediate to high.

Magdalena, Cockburn and Ballenero Channels (leg 4)
In contrast to the Beagle Channel photographed during leg 2 we found here a deep station (stn 1305, 315 m) with a high abundance of many species, especially of sessile suspension feeders, such as gorgonarians, gorgonocephalids, compound ascidians, sea cucumbers, and actinians. A blue star fish, with four specimens per m^2 (stn 1276), locally reached the highest density of this taxon in the entire area of investigation. The abundance of bivalves and tube worms was significantly lower than in the Magellan Strait; at the shallowest stations (<50 m) the coverage of the sea floor by red and green algae was high compared with the other subareas of investigation.

Zoogeographic classification
On the basis of a very preliminary analysis of the underwater photographs we conclude that the benthos of the Magellan area is obviously different from the much more southerly high Antarctic fauna (Weddell Sea, Lazarev Sea) and from the fauna around South Georgia, which is situated approximately at the same latitude but south of the Antarctic Convergence. In the Magellan area a clear faunal separation at approx. 150 m (in the Beagle Channel much shallower) is visible; above this depth contour the species assemblages regionally differ a lot, which may be explained by the variability of environmental conditions. In the Antarctic horizontal patchiness at all water depths on the shelf is the rule. The Magellan epibenthic fauna is dominated by representatives of taxa which are rare or absent in the high Antarctic ecosystem, such as bivalves, barnacles, anomuransand brachyuran crabs. In comparable water depth of the Antarctic shelf (South Georgia included), sessile organisms such as sponges, compound ascidians and bryozoans have the highest densities. With some exceptions these filter feeders were found to be rare in the Chilean area of investigation. Based on visual methods, a co-occurrence in both adjacent, but nowadays separated, ecosystems can be suggested on a higher taxonomic level for the locally dominant brachiopods, bryozoans or sea anemones, however a co-occurrence on the species level seems to be very rare.

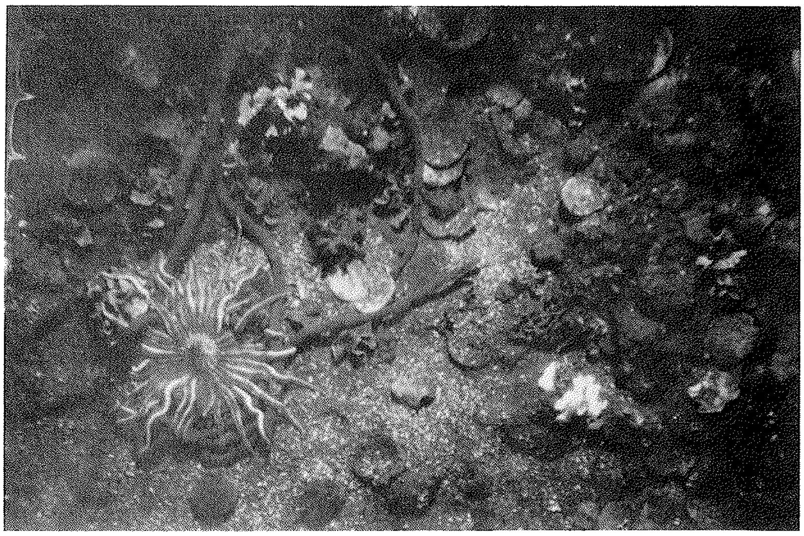


Fig 16 a) stn 917, off Punta Arenas, 29 m depth: Sea-star (Solenogasteridae), corn-shaped bryozoans and debris of clams (Foto: J. Gutt and T. Schickan).

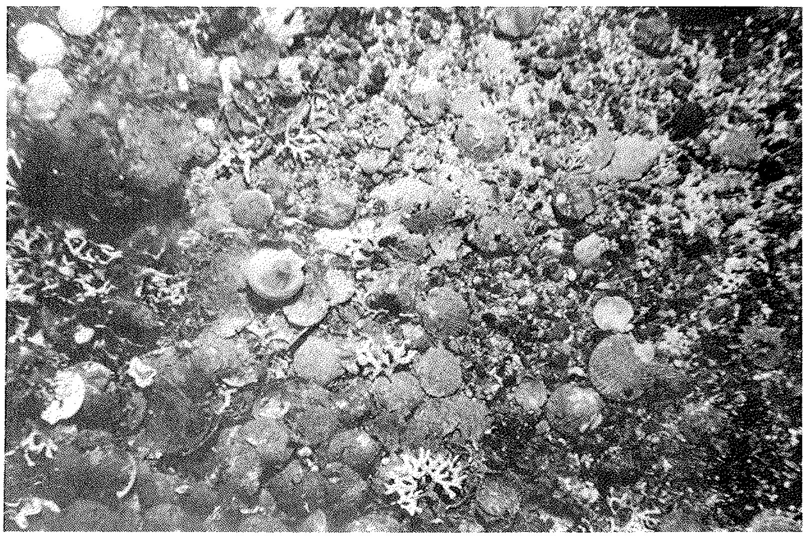


Fig. 16 b) stn 968, Paso Ancho, 51 m depth: Clams and bryozoans (Foto: J. Gutt and T. Schickan).

Figure 16: Fotos taken with the underwater camera in the Strait of Magellan.

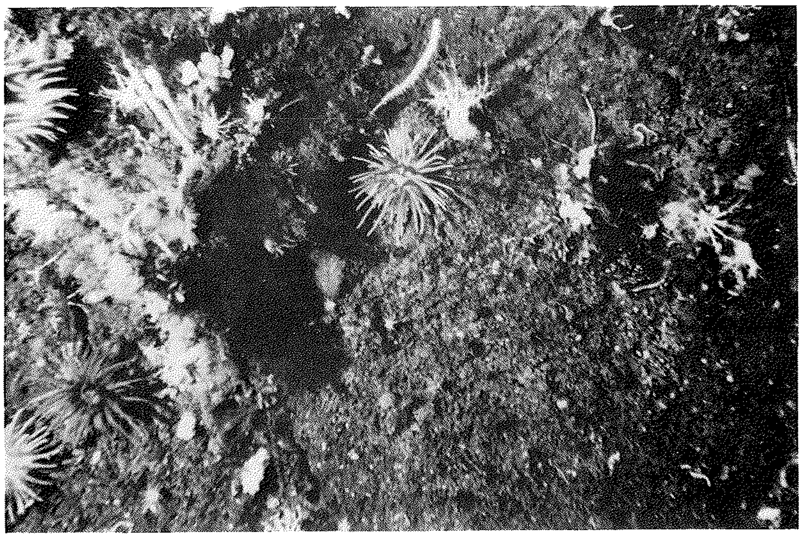


Fig. 17 a) stn 1305, C. Cockburn: Different sea-anemons, holothurians and gorgonarians on hard substratum (Foto: J. Gutt and T. Schickan).

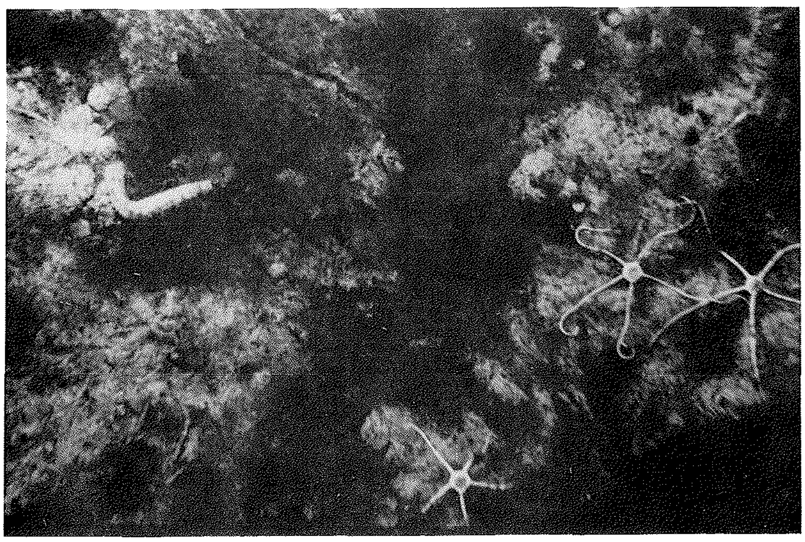


Fig. 17 b) stn 1041, C. Beagle, Garibaldi: sediment up to 100% covered by deposited phytodetritus, 3 Ophiuroids and one holothurian (Foto: J. Gutt and T. Schickan).

Figure 17: Fotos taken with the underwater camera in the channel system.

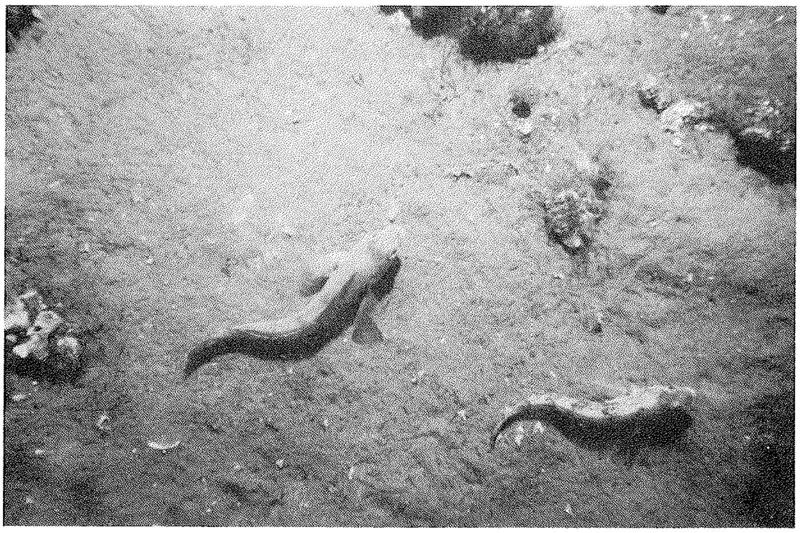


Fig. 18a) stn. 1193: 2 fishes photographed at 53 m depth off Isla Picton (Foto: J. Gutt and T. Schickan).

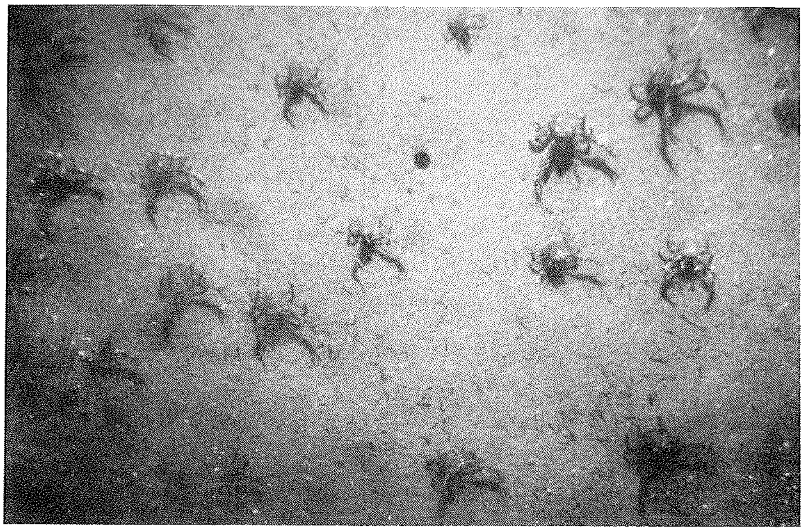


Fig. 18b) stn. 1148: Numerous galatheid crabs (*Munida subrugosa*) photographed at 15 m depth in the Bahía Oglander (Foto: J. Gutt and T. Schickan).

Figure 18: Fotos taken with the underwater camera south of the Beagle.

Outlook
A detailed analysis of the underwater photographs in comparison with the samples taken by different gear will be carried out under the aspects of abundance, biomass, and community analysis. Finally we will try to find ecological explanations for the different species associations observed.

2.3.3 Preliminary results of the multibox corer investigations

Dieter Gerdes, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

Objectives
The - nowadays isolated - Antarctic fauna is often said to be most strongly related to South America. Up to the present day, however, knowledge of the ecology of the South Chilean benthic fauna is very limited. The objective of our work in the Magellan Strait, the Beagle Channel, and the shelf off the eastern mouth of the Beagle Channel therefore was to obtain quantitative results on the benthic assemblages of the area and to find out, in which respects the fauna is similar to comparable Antarctic sites and where it differs.

Status quo of work
The multibox corer was deployed at 34 stations in the Magellan Strait, the Beagle Channel, and on the shelf off the eastern mouth of the Beagle Channel. The Leg I stations (13 stations with a total of 108 single cores) from the Magellan Strait area are under study in the laboratory of the Instituto de la Patagonia (Pta Arenas), whereas Leg II and Leg III stations (21 in total, with 142 single cores) from the Beagle Channel and the shelf off its eastern mouth are being sorted at the AWI Bremerhaven. So far abundance data from 11 stations have been calculated on the basis of 34 taxonomic groups. For the presentation of these preliminary results abundance values of 4 stations - 3 from the Beagle Channel and 1 station in the vicinity of Isla Picton - are considered.

Multibox-corer samples provide the basis for the quantitative evaluation of abundance and biomass distribution patterns of benthos organisms, especially those living in the sediment (endobenthos). Abundance values of motile epibenthic organsims may be underrepresented by this gear. The combination of different methods (AGT, MG, MUC and underwater photography) will result in more reliable abundance values of all fractions of benthic animals, but this will have to be done at a later stage.

Preliminary results and comparison with the Weddell Sea situation
At this time, abundance values are available from stations 1108, 1122, and 1104 in the Beagle Channel and station 1233, situated on the eastern shelf in the vicinity of Isla Picton. From these 4 stations a mean abundance value of 3748 ind. m^{-2} resulted; the respective value for the eastern Weddell Sea Shelf (22 stations, ANT VI/3) was 4034 ind m^{-2}, i.e. from this point of view macrobenthic density in both areas seems to be very much the same. However, sessile colonial forms such as hydrozoans, bryozoans, hemichordates, and sponges are considered for the

moment only as "being present". These organsims are better represented by their biomass. It is obvious, however, that these forms are by no means as important in South Chile as on the Weddell Sea shelf, where they are dominant elements of the fauna.

On the basis of abundance, dominant groups at both sites are polychaetes and crustaceans; echinoderms seem to be more abundant on the Weddell Sea shelf, whereas molluscs occur in comparable densities in both areas (Fig 19). Another difference between the Magellan and the Weddell Sea fauna is the comparably frequent occurrence of small worms such as echiurids, priapulids and especially sipunculids in the Beagle Channel area.

Due to identifcation problems down to species level, the material is separated at the moment only into major taxonomic groups. Further separation has to be done by specialists. We expect to find more pronounced differences between the two areas in the future.The decapod Callianassa sp. may act as one example for such differences on a higher taxonomic level; it is unknown from the Weddell Sea area, but it occurs quite regularly in the Beagle Channel MG samples.

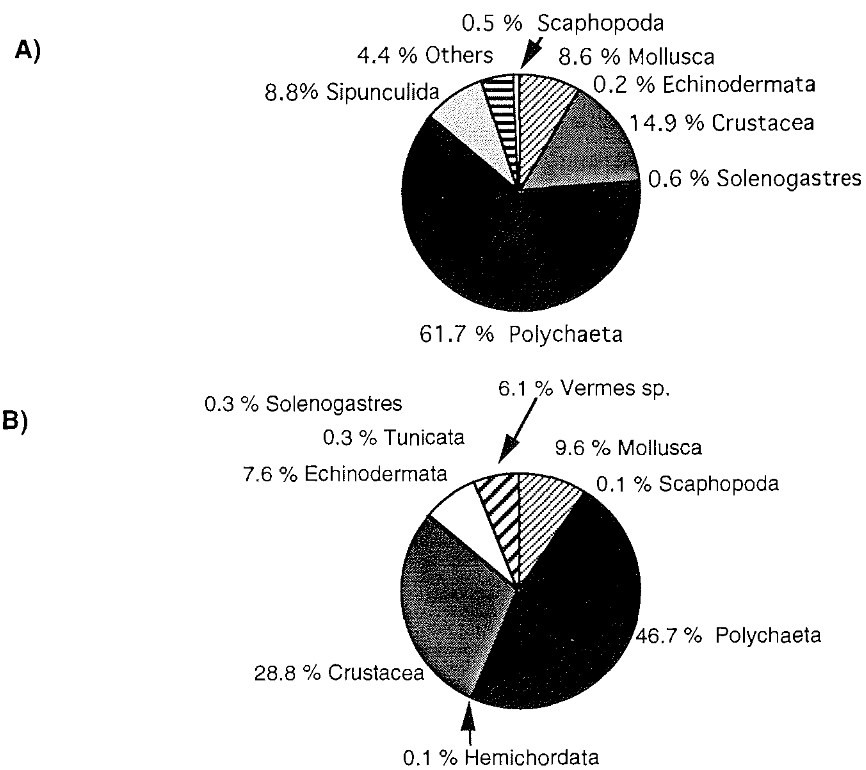


Figure 19: Composition of macrozoobenthos; basis: Ind. m^{-2}
A: 4 stations in the Beagle Channel, South Chile
B: 22 stations from the Weddell Sea Shelf; ANT VI/3

2.3.4 Benthic macrofauna sampled with the Agassiz trawl

Wolf E. Arntz[1], Matthias Gorny[1], Marco Lardies[2], Erika Mutschke[3] & Carlos Ríos[3]

[1] Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany;
[2] Instituto de Zoología, Universidad Austral de Chile, Valdivia, Chile;
[3] Instituto de la Patagonia, Universidad de Magallanes, Punta Arenas, Chile

Sampling, data analysis and objectives
A modified Agassiz trawl (AGT) with a mouth width of 1.5m and 10-mm mesh in the codend was deployed at a total of 63 stations (see Annex, Tables 14, 15). 21 hauls were taken between 9 and 527m depth in the Magellan Strait, 11 hauls between 20 and 640 m in the channels connecting the Magellan Strait with the Beagle Channel, 15 hauls between 30 and 653 m in the Beagle Channel itself, and 16 hauls between 15 and 112 m in the area to the south of Puerto Williams. All depth values represent averages between the moment when the gear arrived at the seafloor and the moment when it was heaved up again. The mean effective trawling time mostly varied between 5 and 15 minutes, depending on the roughness of the bottom as revealed by the echograph. No significant relation was found between the duration of the hauls and the amount of the catches, but catches decreased significantly at depths >400 m (Fig. 20).

From the total catch on deck, a 5-liter subsample was taken at random and preserved entirely, before the remainder was searched for the different systematic groups to be distributed among the specialists. The idea was to arrive at representative samples of as many species as possible and to collect some more substantial samples of dominant species for special purposes such as the study of population dynamics and reproductive biology. All material was preserved in buffered 5% formalin, and species with calcareous shells were transferred into 70% ethanol after fixation. Preliminary abundance and biomass data of major taxa in the subsamples are presented in Tables 15 (see Annex). After picking the fauna from the catch, the biologists who had participated in this work sat together and agreed on rough abundance estimates for higher taxonomic categories (e.g. bivalves, asteroids), using a point system that had been applied before in the Antarctic: 0 = missing, - = rare, + = regular occurrence to abundant, ++ = very abundant/dominant. The results of this evaluation have been summarized in Table 15a in the Annex.

Thus, the AGT catches yielded three sets of samples or data:
a. The subsamples, which provide an idea of the composition of the catch before it was biased by picking individual specimens, as well as of the relative abundance and biomass of dominant groups or species. These samples also yield some small species which may have been overlooked while sorting on deck, and have therefore been washed on a 500 µm screen.

b. The data provided by the joint evaluation of the catch using the point system. They refer only to higher taxonomic levels, but have been quite useful in separating Antarctic macrobenthic associations using TWINSPAN statistics (Galéron et al., 1992). The "0" and "-" categories can be counterchecked using the subsample data. The "Victor Hensen" campaign data will be compared with our Antarctic data and should provide a base to recognize differences in community structure on higher taxonomic levels.

c. The voluminous material of individual groups and species that has been picked from the catch on deck. This material has been distributed among a large number of specialists (see Table 21 in the Annex) who will analyze it for various purposes:

- taxonomy (also to identify species on underwater photographs)
- biogeography
- bathymetric distribution
- population dynamics, reproductive biology.

Some preliminary results related to these specific themes are presented in the reports on individual taxa.

First results on relative abundance and biomass of higher taxa
The results of the joint inspection of the catches on deck have been summarized for the four areas of study, respectively (Figs. 21-24). As additional information, these figures also present the biomass composition of those subsamples which have been weighed to date. This information is preliminary, however, because only part of the subsamples have been analyzed, and has to be considered with caution because the depth distribution of hauls in the individual areas differs greatly due to the percentage of untrawlable grounds in each of them. In a further step of analysis we will try to include some kind of depth stratification.

In the *Magellan Strait* (Fig. 21), anomuran and brachyuran decapods, above all *Munida subrugosa, Peltarion spinosulum* and *Eurypodius* spp., bivalve mollusks (principally *Chlamys patagonica* and *Limopsis* spp.), asteroid and echinoid echinoderms, hydroid polyps, bryozoans and sedentary and errant polychaetes occurred on at least 20 of the 21 stations sampled. However, the decapods, bivalves and the two echinoderm taxa were numerically abundant or dominant on a large number of stations whereas the other taxa occurred mostly in reduced numbers. Some other taxa, above all scaphopod mollusks (only at deep stations), brachiopods and holothurian echinoderms were dominant at a few stations. A large number of taxa occurred fairly regularly but in small quantities, and some were extremely scarce or were not found at all. Compared with our data from the Antarctic, there are obvious differences at first glance in the strong dominance of reptant decapods and bivalves, the relatively frequent occurrence of cirripedes, the little significance of pterobranchs and sponges, and the apparent total lack of echiurids and crinoid echinoderms in the Magellan AGT samples. Brachiopods were much larger, and most peracarid crustaceans (e.g. the isopod *Acanthoserolis* sp. and the amphipods in general) and the pycnogonids were much smaller than their Antarctic relatives. The relative significance of echinoderms seemed to be in the same order of magnitude in both areas, and many of them are large in both areas.

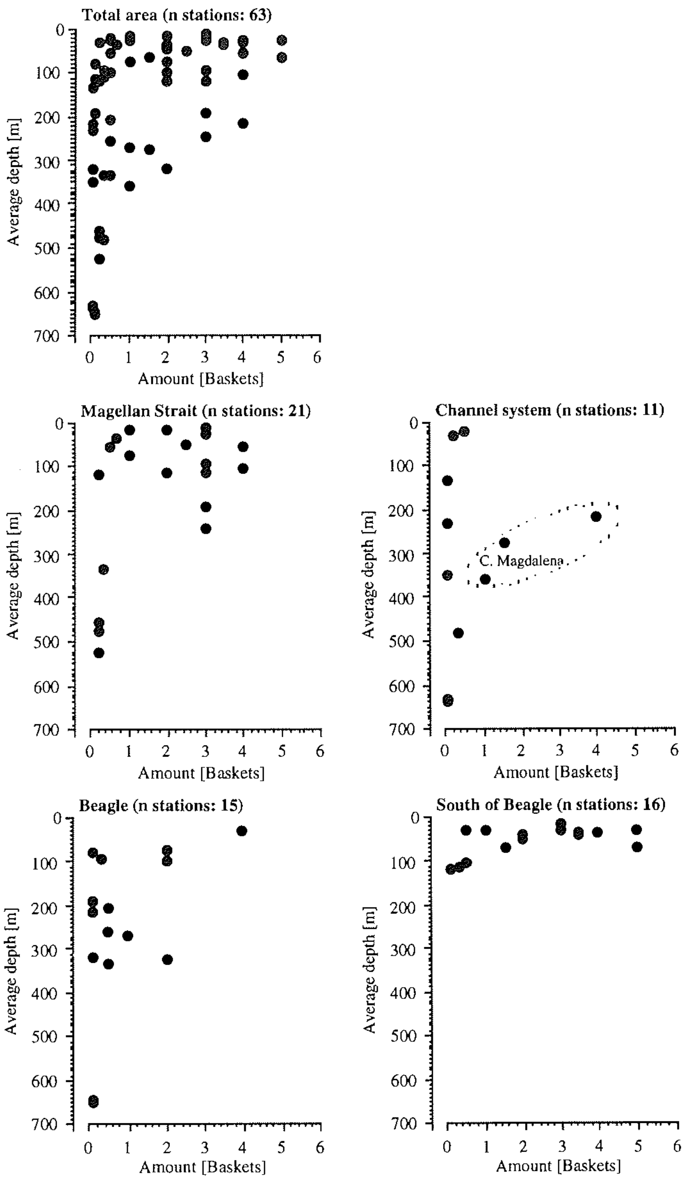


Figure 20: Amount of catch (no. of baskets) in AGT catches versus average depth (see text) in the total area of study and the four subareas.

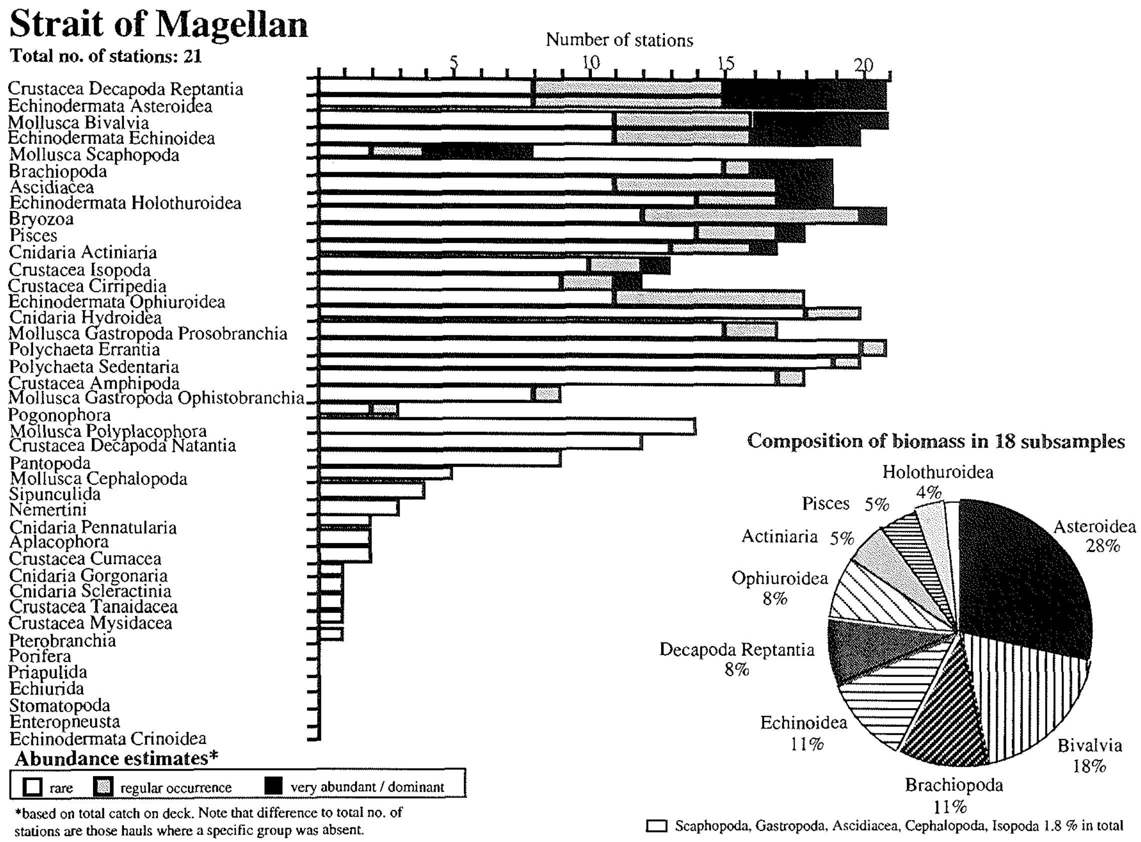


Figure 21: Abundance estimates of benthic macrofauna in AGT catches and composition of biomass in subsamples.

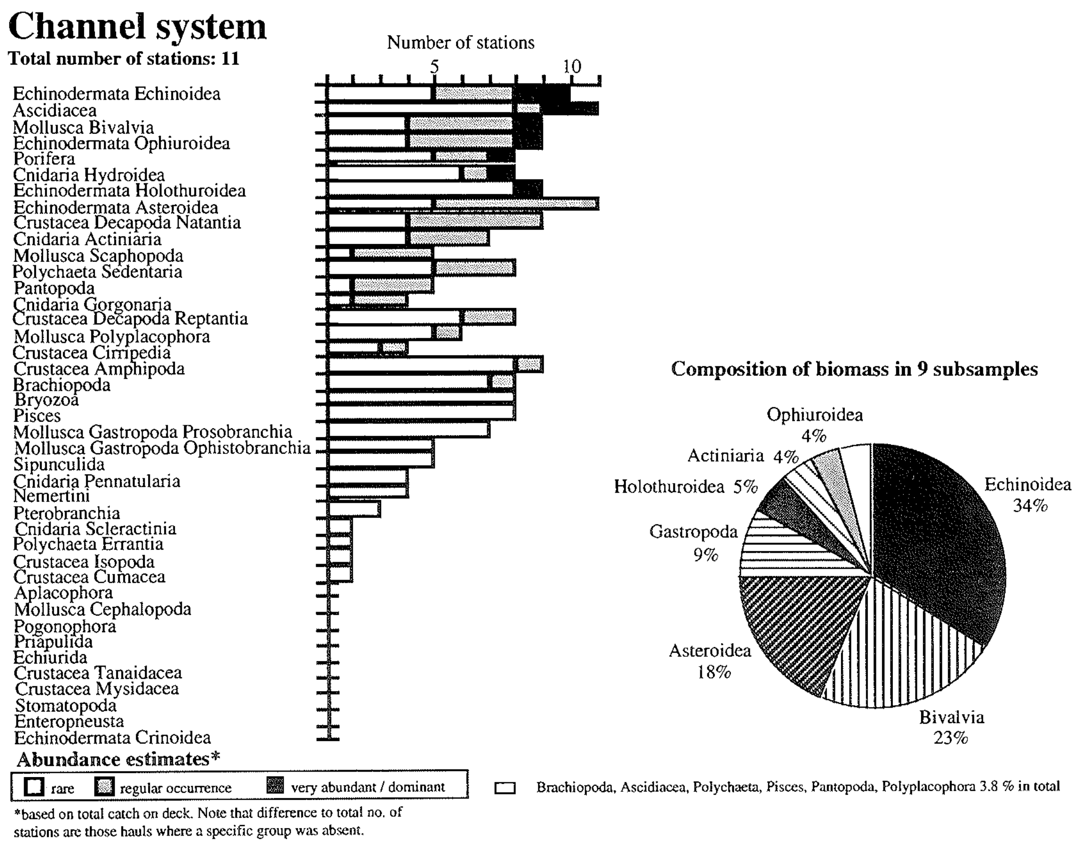


Figure 22: Abundance estimates of benthic macrofauna in AGT catches and composition of biomass in subsamples.

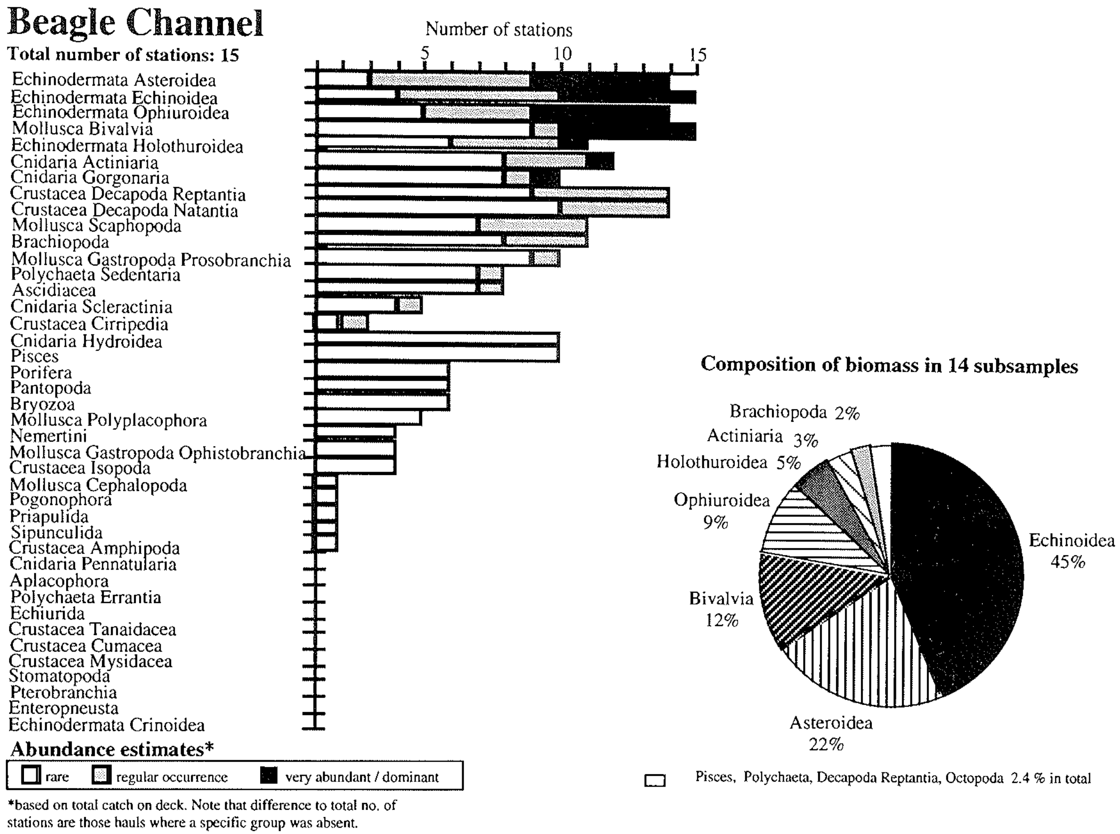


Figure 23: Abundance estimates of benthic macrofauna in AGT catches and composition of biomass.

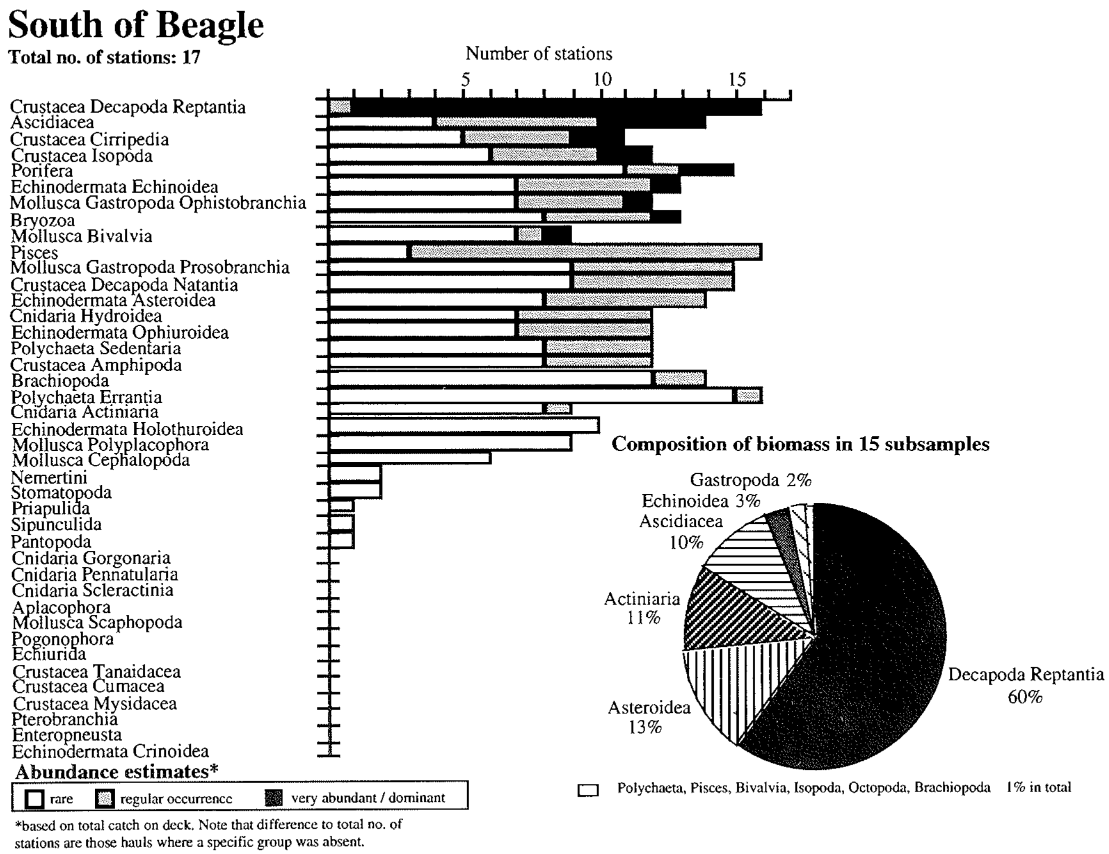


Figure 24: Abundance estimates of benthic macrofauna in AGt catches and composition of biomass.

The biomass data at hand (same Fig.) confirm the importance of asteroids and echinoids which constituted >40% of the weight of the subsamples, the large share of bivalves (24%) and the significance of brachiopods and reptant decapods.

In the connecting *channel system* (Fig. 22), ascidians and asteroids were found at all 10 stations, but the latter taxon, although often abundant, was nowhere dominant in terms of numbers. Echinoids, both regular and irregular, occurred at 9 stations and were dominant at 2 of them. Other common taxa included bivalve mollusks (particularly, *Limopsis* spp. and taxodonts at the deep stations) as well as ophiuroid and holothuroid echinoderms, the latter with the genus *Psolus* dominating on stones. Caridean decapods (shrimps) were found more frequently in this area than in the Magellan Strait, sponges and hydroids were also more common and even dominant in one haul each. Two specimens of the palinuran *Stereomastis suhmi* were caught at station 1264, off Timbal Chico Island, at >600m depth. Again, echiurids and crinoids were missing altogether.
Biomass data from the subsamples suggest an overwhelming weight dominance of echinoderms (the four taxa constituted 59% by weight of which irregular and regular echinoids held 30%) and a high share of bivalves (25%) and gastropods (10%). Actinians contributed 4% in this area.

In the *Beagle Channel* (Fig. 23) the four echinoderm groups and bivalves (*Nucula* spp., *Limopsis* spp.) were found to be numerically dominant at many stations. The dominance of irregular sea urchins was often overwhelming. On rocks *Psolus* spp. were quite common. Actinians, large compound ascidians and gorgonarians were locally dominant; registration of the latter group cannot be considered complete as they are only occasionally torn off the rocks.
Both decapod groups, scaphopods and brachiopods were quite abundant at several stations. The scarceness of amphipods and isopods in the AGT samples may be due to the 10mm mesh used and the rough grounds in this area which allowed only small catches which are easily washed out before reaching the deck. Pterobranchs and crinoids were again missing.

The biomass dominance of echinoderms in the subsamples (78%) was even more spectacular in this area, with echinoids alone (mostly irregular sea urchins) accounting for 44% and regular as well as irregular asteroids accounting for 20%. Bivalves, mostly taxodonts, contributed 14%.

The area *south of the Beagle*, i.e. between the eastern mouth of the Beagle Channel and Cape Horn, was unique because of its enormous numerical (and weight, see below) dominance of anomuran decapods, above all the galatheid *Munida subrugosa* (Fig. 24). Ascidians were also of great importance in this area. Sponges occurred regularly, mostly on stones, and were abundant to dominant at some stations, and the numbers of cirripedes, isopods (principally *Acanthoserolis* sp., *Aega* spp. and Sphaeromatidae) and opisthobranch gastropods increased greatly. Echinoids (with an increasing share of regular species), asteroids (above all, a large blue species) and ophiuroids were still numerous but not as dominant as in the Beagle and the connecting channels whereas holothurians were comparatively scarce. Echiurids, pterobranchs and crinoids were again missing despite the vicinity of the Antarctic. In general, the dense, three-dimensional communities of filter feeders (sponges, bryozoans) that dominate much of the

Antarctic are almost non-existent on this side of the Drake Passage although the taxa as such do occur; the size of common genera of other taxa (e.g. the isopods *Acanthoserolis* and *Aega*, many amphipods, the pycnogonids) is much smaller, and the communities are dominated by reptant decapods which are extremely scarce on the Antarctic side. Interestingly, two stomatopods (which are non-existent in the Antarctic) were caught at station VH 1182, near Picton Island.
The overwhelming dominance of the anomurans and brachyurans is even more obvious in the biomass values of the subsamples which have been sorted to date, although the occasional large lithodid crabs (*Lithodes santolla, Paralomis granulosa*) were excluded from these samples. Still, reptant decapods with the principal species *Munida subrugosa, Peltarion spinosulum* and *Eurypodius* spp. constituted 60% by weight in this area whereas asteroids and echinoids together contributed only 14%. The share of ascidians (8%) was lower than expected from the inspection on deck despite the occasional occurrence of very large compound forms whereas actinians (12%) seemed to be more important. 40 specimens of a very large actinian were taken by the AGT from a silt bottom with strong H_2S smell east of Picton Island at station VH 1235.

2.3.5 Early reproductive stages of Cheilostomatid bryozoans in the Strait of Magellan

Hugo Moyano, Department of Zoology, Universidad Concepción, Chile

Collections were made in the Magellan Strait, between Cabo Negro and Bahía Gente Grande, during the first leg of the cruise using the Agassiz trawl.

Preliminary results
In samples obtained in the vicinity of Cabo Negro, bryozoans were collected from valves of Pectinids and from cirripedes and brachiopods. In Bahía Gente Grande many bryozoans were found on *Macrocystis pyrifera.*

The majority of species, particularly off Cabo Negro, are of the incrusting type, which mainly develops on live and dead valves of Pectinids. A first revision revealed the existence of the first developing stages, according to the principal goal of investigation.

In addition to this, several giant colonies of *Alcyonidium australe* were found which resemble laminarian algae. One of them measured more than a metre of length and occupied a volume of >3l. This is probably one of the largest colonies of Ctenostomatid (non-calcified) bryozoans which have been found to date.

Delicate ramified and tree-shaped colonies of the genus *Bugula* appeared in the samples from Bahía Gente Grande, likely because of less turbulence in this area as compared with the Magellan Strait as such.

The total number of species from the Strait of Magellan is supposed to be over 30. The material from legs 2 - 4 is still under revision.

2.3.6 Deep-water bivalves and gastropods

(as yet not all final reports received)

A substantial material of bivalves, gastropods (and scaphopods) was collected from the AGT catches carried out in deep water. Except for a few larger samples of individual species to be studied for their population dynamics, these samples have been distributed among several specialists for taxonomic revision.

The Gastropoda Prosobranchia are investigated by Cecilia Osorio, University of Chile, Santiago. The Gastropoda Opisthobranchia Nudibranchia of the first leg are studied principally by the Italian group, those of leg 2-4 were analysed by Michael Schrödl, Munich.

The bivalves are studied by Olga Aracena and Irene Lépez, Depto de Oceanografía, University of Concepción. They also collected *Gaimardia trapesina* from *Macrocystis* thalli at Navarino Island for special purposes.

Furthermore, substantial material was collected of a relatively large bivalve species of the genus *Limopsis*. It will be studied by Thomas Brey, Bremerhaven, in relation to the Antarctic *Limopsis marionensis*.
Additional mollusk material, mostly small specimens, was obtained from the epibenthic sledge and the little dredge. It is being sorted and will be distibuted among the specialists.

Opisthobranchs (Gastropoda) collected by the research vessel "Victor Hensen"

Michael Schrödl, Zoologisches Institut der Ludwig Maximilians-Universität München, Abt. Prof. Bohn, Germany

There is very little information on Magellanic opisthobranchs. More than 50 different species were reported from waters around the cone of South America, especially by studies of Eliot (1907), Odhner (1926) and Marcus (1959), but most of them still are incompletely described and only known from few localities.

In 1994, during the expedition carried out in magellanic waters by the German research vessel "Victor Hensen", several opisthobranchs were collected in different localities using an Agassiz trawl (Table 3). The formol preserved specimens have been examined externally and anatomically. They belong to one notaspidean and nine different nudibranch species. The anatomy of the pleurobranch *Berthella platei* (Bergh, 1898) and of the dorid nudibranchs *Acanthodoris falklandica* (Eliot, 1907), *Anisodoris punctuolata* (D'Orbigny, 1837), *Diaulula hispida* (D'Orbigny, 1837) and *Holoplocamus papposus* Odhner, 1926 is poorly known and will be redescribed in detail. One small white dorid belongs to *Gargamella immaculata* (Bergh, 1894), a species which recently has been shown to be conspecific with another magellanic species, *G. latior* Odhner, 1926 (Schrödl, in prep.). Two aeolid specimens are *Aeolidia papillosa* var. serotina Bergh, 1873.

According to Marcus (1959) this magellanic variation of the typical cosmopolitan *Aeolidia papillosa* should be regarded as a subspecies until a thorough revision using sufficient material may separate both into two valid species. Another small aeolid was severely damaged and lost nearly all its ceras. According to radular characters it belongs to the family Eubranchidae and agrees well with the description of the single known specimen of *Eubranchus fuegiensis* Odhner, 1926. This species is incompletely known and should be redescribed and critically compared with other Chilean and Antarctic Eubranchidae. Whereas all specimens mentioned above were collected in quite shallow waters from 25 to 65 m depth, two dendronotacean specimens belonging to the genus Tritonia were found in deeper waters (215 m and 360 m). Its huge buccal apparatus identifies the specimen found at C. Magdalena as *Tritonia vorax* (Odhner, 1926), a species which was recently redescribed by Wägele (1995) on material from the Shag Rock Bank. The specimen from Pta. Yámana is assigned to *Tritonia challengeriana* Bergh, 1884 due to much smaller jaws and less radular rows and teeth.

Regarding geographical distribution, all species found already were known from the southern magellanic area (see: Odhner, 1926; Marcus, 1959). For *T. vorax* the station C. Magdalena is the southernmost locality in South America, for the other nine opisthobranch species collected the new localities in the Beagle Channel and near Picton Island are their southernmost findings worldwide.

Thus, even not yielding new species, the collections of the "Victor Hensen" provided material for future studies on the morphology of a number of poorly known opisthobranchs and interesting distributional data from the southernmost area of the South American shelf.

Table 3: Localities at which opisthobranchs were found

Station No.	Haul No.	Date	Locality	Mean depth (m)	Opisthobranch species	No. of specimens
VH 1121	AGT 32	6.11.94	Pta. Yámana	215	*Tritonia challengeriana* Bergh, 1884	1
VH 1175	AGT 40	12.11.94	Pta. Rico	25	*Holoplocamus papposus* Odhner, 1926	
					cf. *Eubranchus fuegiensis* Odhner, 1926	
VH 1191	AGT 42	13.11.94	Picton Island	46	*Acanthodoris falklandica* Eliot, 1907	1
					Anisodoris punctuolata (D'Orbigny, 1837)	1
					Diaulula hispida (D'Orbigny, 1837)	1
					Gargamella immaculata Bergh, 1894	1
VH 1209	AGT 44	14.11.94	Ites. Valderrama	65	*Aeolidia papillosa var. serotina* Bergh, 1873	2
VH 1215	AGT 45	15.11.94	Picton Island	65	*Berthella platei* (Bergh, 1898)	1
VH 1223	AGT 46	15.11.94	Picton Island	35	*Acanthodoris falklandica* Eliot, 1907	2
VH 1316	AGT 62	24.11.94	C. Magdalena	360	*Tritonia vorax* (Odhner, 1926)	1

References:

ELIOT, C.N.E. 1907. Nudibranchs from New Zealand and the Falkland Islands. Proceedings of the Malacological Society London 7:327-361, pl. 28.

MARCUS, E. 1959. Lamellariacea und Opisthobranchia. Reports of the Lund University Chile Expedition 1948-49, No. 36. Acta Universitatis Lundensis N.F. (2) 55(9):1-133.

ODHNER, N.H. 1926. Die Opisthobranchien. Further Zoological Results of the Swedish Antarctic Expedition 1901-1903 2(1):1-100, pls.1-3, text figs. 1-83.

WÄGELE, H. 1995. The morphology and taxonomy of the Antarctic species of Tritonia Cuvier, 1797 (Nudibranchia: Dendronotoidea). Zoological Journal of the Linnean Society 113:21-46.

2.3.7 First observations on the composition and occurrence of Peracarida (Crustacea, Malacostraca) in the Beagle Channel

Angelika Brandt, Institute for Polar Ecology, Kiel, Germany

Objectives
The aim of the study was to compare the taxonomic composition, abundance, and diversity of peracarids in various biogeographical provinces of the Beagle Channel with the macrobenthic peracarid communities found in the Magellan Strait,and also with the former records of Peracarida Isopoda found in Antarctica until now.

Material
Peracarid crustaceans (Amphipoda, Cumacea, Isopoda, Mysidacea, Tanaidacea) were collected by means of an epibenthic sledge, modified after Rothlisberg and Pearcy, in the Beagle Channel and southeast of Navarino Island. The sledge was towed at 1 knot for 10 minutes, using 1.5 times the cable length of the water depth. On deck of RV "Victor Hensen", the complete sample was fixed in a 4% formaldehyde solution and after 2 days washed into 70% ethanol. As the towed distances of the catches varied, the numbers of peracarids found in the samples will all be standardized to 1000m trawled distance, in order to allow a comparison of the abundance values. The complete samples will be treated in the analysis.

Preliminary results
Already at first view, we can say that the number of peracarids sampled in the Beagle Channel is much lower than that found southeast of Navarino and also in the Magellan Strait. Interestingly differences were observed in samples which were taken from different grounds. On sandy bottoms Amphipoda of the families Oedicerotidae and Phoxocephalidae dominated the amphipod communities, whereas on hard bottoms and also on coarser sediments species of the Eusiridae

and Ischyroceridae were more common.The first evaluation of the material revealed that the samples are rich enough to allow for a complete revision of the Beagle Channel peracarid fauna. Peracarida of the Beagle Channel have not been studied in detail until now, and especially the small species have been neglected in the past. Moreover we hope to be able to see changes in peracarid composition and abundance with increasing distance from the open water and close to glaciers, where a change in salinity and also in the input of terrigenous material has to be expected. Our comparison with the species known from the Subantarctic and Antarctic might help to explain routes of migration between both continents and to answer the question, whether a migration of species from southern South America via the Scotia Arch is still possible nowadys, despite the high current velocity of the Circumpolar Current, the geographical distance and the great depth of the seafloor between the islands of the Scotia Arch. Interestingly the isopod family Sphaeromatidae was quite frequent at the shallow stations southeast of Navarino, whereas only 2 different species, *Cymodocella tubicauda* and *Exosphaeroma gigas*, are known from the Antarctic. This might indicate that this shallow water family was not successful in the Antarctic or was unable to reach the coasts of the Antarctic Peninsula, due to the above mentioned geographical barriers. The isopod families Serolidae and Arcturidae, however, which have experienced an adaptive radiation in the Antarctic, were also sampled in the Beagle Channel and east of the Island Navarino, but only with a small number of species compared to the numbers we know from the Antarctic.The number of fish parasites collected with our gear, however, was quite high, especially isopods of the family Aegidae, indicating the frequent occurrence of fish in this area.

2.3.8 Biodiversity and ecological roles of the amphipod crustaceans of the Antarctic and Magellan regions: a comparison

Claude De Broyer[1] and Martin Rauschert[2]

[1] Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
[2] Alfred Wegener Institute for Polar and Marine Research, Bremerhaven & Zoological Museum, Berlin, Germany

Objectives
To compare the faunal composition, and the ecological and biogeographical traits, of the amphipod crustaceans in the Magellan benthic assemblages with the previously studied West and East Antarctic benthos.

Stations and samples
Amphipods were collected at nearly all stations by Agassiz trawl, small dredge (48 stns) and multibox corer; during leg 3 (only) also by epibenthic sledge and by baited traps (at 20, 40, 60 and 110m). The dredge was particularly successful in collecting small benthic organisms, especially Amphipoda but also Leptostraca, Ostracoda, Cumacea, Tanaidacea, Isopoda. Additional material was collected on several beaches around Punta Arenas, on Isla Navarino (around Puerto Williams and Punta Aaron) and on Isla Picton (Caleta Banner).

Table 4: Amphipods collected during the "Victor Hensen" cruise in comparison to findings in neighbouring Antarctic regions (preliminary list).

				K. George Island		Livingston Island	Chile
no	family	genus	species	*FP*	*PC*	*BENT*	*VH*
1	Ampeliscidae	indet.		X	X	X	X
2	Amphilochidae	*Amphilochus*	*marionis* STEBBING, 1888				X
3	Caprellidae	indet.		X	X		X
4	Cheidae	*Cheus*	spec. nov.				X
5	Colomastigidae	*Colomastix*	spec.	X	X	X	X
6	Corophiidae	indet.		X	X		X
7	Cyproideidae	*Victorhensenoides*	*arntzi* RAUSCHERT, in press				X
8	Dexaminidae	indet.		X	X	X	X
9	Dexaminidae	*Polycheria*	*antarctica* (STEBBING, 1875)	X	X		X
10	Eophliantidae	*Bircenna*	*fulva* CHILTON, 1884				X
11	Eusiridae	*Atyloella*	*magellanica* (STEBBING, 1888)	X	X	X?	X
12	Eusiridae	*Atylopsis*	spec.	X	X	X	X
13	Eusiridae	*Atylopsis*	*megalops* (NICHOLLS, 1938)	X		X	X
14	Eusiridae	*Eusiroides*	spec.	X			X
15	Eusiridae	*Eusirus*	spec.	X		X	X
16	Eusiridae	*Gondogoneia*	spec.	X	X	X	X
17	Eusiridae	*Oradarea*	spec.	X	X	X	X
18	Eusiridae	*Rhachotropis*	*antarctica* BARNARD, 1932				X
19	Eusiridae	indet.		X	X	X	X
20	Haustoriidae	*Urothoe*	*falcata* SCHELLENBERG, 1931				X
21	Haustoriidae	indet.		X	X	X	X
22	Iphimediidae	indet.		X			X
23	Ischyroceridae	*Cerapus*	spec. nov.				X
24	Ischyroceridae	*Jassa*	*falcata* (MONTAGU, 1808)	X	X	X	X
25	Leucothoidae	*Leucothoe*	*spinicarpa* (ABILDGAARD, 1789)	X	X		X
26	Liljeborgiidae	indet.		X	X	X	X
27	Lysianassidae	*Acontiostoma*	cf. *marionis* STEBBING, 1888				X
28	Lysianassidae	*Lysianassa*	cf. *subantarctica* SCHELLENBERG,1931	X			X
29	Lysianassidae	*Stomacontion*	*pepinii* (STEBBING, 1888)				X
30	Lysianassidae	*Orchomene*	spec.	X	X	X	X
31	Lysianassidae	*Tryphosella*	spec.	X	X	X	X
32	Lysianassidae	indet.		X	X	X	X
33	Oedicerotidae	indet.		X	X	X	X
34	Phoxocephalidae	*Heterophoxus*	*videns* K. BARNARD, 1932	X	X	X	X
35	Phoxocephalidae	*Pseudharpinia*	spec.	X	X		X
36	Phoxocephalidae	indet.	spec.	X	X	X	X
37	Phoxocephalopsidae	*Phoxocephalopsis?*	spec. nov.				X
38	Podoceridae	*Podocerus*	spec. nov.				X
39	Stenothoidae	*Metopoides*	cf. *clavata*				X
40	Stenothoidae	*Metopoides*	*heterostylis* SCHELLENBERG, 1926				X
41	Stenothoidae	*Metopoides*	spp. nov.				X
42	Stenothoidae	*Probolisca*	*ovata* (STEBBING, 1888)	X	X	X	X
43	Stenothoidae	*Probolisca*	*nasutigenes* (STEBBING, 1888)				X
44	Stenothoidae	*Stenothoe*	spec. nov.				X
45	Stenothoidae	*Torometopa*	antarctica (WALKER, 1906)	X			X
46	Stenothoidae	*Torometopa*	cf. *andresi* (RAUSCHERT, 1990)	X	X		X
47	Stenothoidae	*Torometopa*	cf. *crenatipalmata* (STEBBING,1888)				X
48	Stenothoidae	*Torometopa*	*crassicornis* SCHELLENBERG,1931				X
49	Stenothoidae	*Torometopa*	*parallelocheir* (STEBBING,1888)				X

FP: Around **F**ildes **P**eninsula (King George Island)
PC: **P**otter **C**ove (King George Island)
BENT: Spanish expedition "**BENT**ART 94" (Livingston Island)
VH: RV "**V**ictor **H**ensen" cruise (Magellan Strait and Beagle Channel)

The total amphipod samples amount to about 10,000 specimens. About half the material has been sorted onboard , where this was possible to the family level. The material is supposed to contain at least one hundred species of which about 30 have been determined with certainty to date. New to science are at least 7 species or subspecies of the families Cheidae, Cyproideidae, Phoxo-cephalopsidae, Podoceridae and Stenothoidae.

Preliminary results

Taxonomic work

The preliminary checking and sorting of the material indicates that the samples will allow to revise a good part of the still poorly known Magellan fauna. This taxonomic work will be undertaken in the framework of a general revision of the Southern Ocean amphipod fauna for the preparation of the "Synopses of the Antarctic Amphipods", and the development of the "Antarctic Crustacea Biodiversity Research Reference Center", at I.R.S.N.B., Brussels. Colour patterns of the most common species have been recorded from live specimens. Except for the Cheidae and Cyproideidae which were found for the first time in Chilean waters, all registered families and many of the genera are common to the Magellan area and the South Shetland Islands. However, on species level only 10 common occurrences have been detected so far.

Bio-ecological work

Lack of time prevented the study of fresh stomach contents on board but appropriate samples were collected for further analysis.
In addition, careful sorting and preserving of ovigerous females and delicate species provided adequate material to characterize their feeding types and habitats, and their reproductive biology parameters.

2.3.9 Crustacea Decapoda: Summary report

Wolf E. Arntz[1], Matthias Gorny[1], Ingo Wehrtmann[2], Marco Lardies[2] and Raul Soto[3]

[1] Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany
[2] Instituto de Zoología, Universidad Austral de Chile, Valdivia, Chile
[3] Dpto de Ciencias del Mar, Universidad Arturo Prat, Iquique, Chile

There is little information on the recent decapod fauna in most of southern Chile, especially in the channel system connecting the Strait of Magellan with the Beagle Channel and in the waters between Picton and Wollaston Island (Holthuis 1952, Haig 1955, Garth 1957, Retamal 1972). Our objective was to determine spatial distribution patterns of species and population structures, to get an idea which ecological niches decapod crustaceans hold in the benthic communities of southern Chile, and to compare the reproductive biology of the most abundant species with that of their relatives in the Antarctic and temperate regions.

Preliminary results

Decapod crustaceans were common within all three principal areas of investigation, and occurred in 62 out of of 63 successful Agassiz trawl (AGT) catches. Only one haul in the Cockburn Channel yielded no decapods. A total of 20 decapod species were found in the AGT samples taken between the Strait of Magellan and Wollaston Island (Tab. 5). All of them had been recorded in the antiboreal region of South America before, but the southernmost distributional range of 8 species was shifted towards the south: 6 species were recorded for the first time in the area between Picton and Wollaston Island, the galatheid anomuran crab *Munidopsis opalescens* was found in the Strait of Magellan, and the palinurid lobster *Stereomastis suhmi* occurred at the western entrance of the Beagle Channel off Timbal Chico (54°54,1'S; 70°12,7'W). Species number varied between the three sampling sites, with most of the species (17) occurring between Picton and Wollaston Island and smaller numbers in the Strait of Magellan (14) and the connecting channel systems (13). In addition several specimens of *Callianassa sp.* (Decapoda: Thalassinidea) were caught with the multigrab south of Pto Williams, where also a few individuals of stomatopod crustaceans were obtained with the trawl and multigrab.

Totally, several thousand individuals were caught, and numerous hauls yielded more than 5 kg of decapod crustaceans/5 min trawling. The most frequent and most abundant species were the anomuran galatheid crab *Munida subrugosa* with 32 records and the brachyuran crabs *Peltarion spinosulum* (Atelecyclidae) and *Eurypodius latreilli* (Majidae), which were present at 31 and 27 stations, respectively. The collection of the "Victor Hensen" expedition holds subsamples of the most abundant species, in total about 5000 specimens of *M. subrugosa* and 1000 specimens of *P. spinosulum* and *E. latreillei*, each. Less abundant species of brachyuran and anomuran decapods were all picked out of the samples, with total numbers of the individual species below 100. About 1000 specimens of caridean shrimps were caught.

Decapods were present throughout the whole depth range covered by the AGT. In general, caridean shrimps coverd the widest range of bathymetric distribution between 15 and 653 m depth, whereas the occurrence of anomuran and brachyuran crabs was restricted to shallower depths between 9 and 245, and 9 and 480 m depth, respectively. The two records of the palinurid lobster *Stereomastis suhmi* were obtained at 649 and 653 m depth.

Conclusions

40 species of decapod crustaceans are known from the Chilean part of the Strait of Magellan and the waters between Picton and Wollaston Islands (Retamal 1981, Boschi et al. 1992). The fact that not all of them were present in our samples may be due to the restricted sampling area, which excluded some parts of the Strait of Magellan and in the adjacent channels towards the south. Also, trawling was carried out below 9 m depth and thus, the occurrence of decapods in very shallow water could not be studied by shipboard sampling. However, the dominance of brachyuran crabs in the Strait of Magellan and of the anomuran crab *Munida subrogosa* between Picton and Wollaston Island was obvious, whereas caridean shrimps were less abundant in both areas. This was in strong contrast to the benthic communities of the adjacent Subantarctic islands and the high Antarctic

shelves, where shrimps represent the dominant element of the decapod crustacean fauna (Arntz & Gorny 1991).

Table 5: Presence/absence (P/A) of decapod crustaceans in the three principal areas of investigation during the Joint "Victor Hensen" Magellan Campaign 1994. Given is the known distribution in the total area between the Strait of Magellan (SM, Chilean part) and along the Chilean coasts of Tierra del Fuego (Gorny unpubl). LEG1 refers to samples taken in the Strait of Magellan between Bahia Gente Grande and Paso Largo, LEG 2/4 to the channels Magdalena, Cockburn, Brecknock, Ballenero and the Beagle Channel, LEG 3 to the area between Picton Island and Wollaston Island (* indicate either new records in the area or extension of the southernmost distributional range).

Infraorder	Family	Species	Distribution	LEG 1	LEG 2/4	LEG 3
Caridea	**Campylonotidae**	*Campylonotus vagans*	SM - TF	P	P	P
		Campylonotus semistriatus	SM - TF	P	P	P
	Alphaeidae	*Betaeus truncatus*	SM - TF	A	A	P
	Hippolytidae	*Eualus dozei*	SM - TF	A	A	P
		Nauticaris magellanica	SM - TF	A	A	P
	Pandalidae	*Austropandalus grayi*	SM - TF	P	P	P
	Oplophoridae	*Acanthephyra carinata*	SM	A	A	A
		Acanthephyra approximata	SM	A	A	A
	Pasiphaeidae	*Pasiphaea dofleini**	SM	A	P	A
		*Pasiphaea acutifrons**	SM	P	P	P
Palinura	**Polychelidae**	*Stereomastis suhmi**	SM	A	P	A
Anomura	**Galatheidae**	*Munida subrugosa*	SM - TF	P	P	P
		Munida gregaria	SM - TF	A	A	A
		Munidopsis aspera	SM	A	A	A
		*Munidopsis opalescens**	A	P	A	A
	Lithodidae	*Lithodes santolla*	SM - TF	A	A	P
		Lithodes murrayi	SM - TF	A	A	A
		Paralomis granulosa	SM - TF	P	P	P
	Paguridae	*Pagurus gaudichaudi**	SM	P	P	P
		Pagurus comptus	SM - TF	A	P	A
	Parapaguridae	*Parapagurus dimorphus*	SM	A	A	A
		Porcellanopagurus platei	SM	A	A	A
Brachyura	**Majidae**	*Eurypodius longirostris**	SM	P	P	P
		Eurypodius latreilli	SM - TF	P	P	P
		Libidoclaea smithi	SM - TF	P	P	P
		Libidoclaea granaria	SM	A	A	A
		Pisoides edwardsi	SM	A	A	A
	Hymenosomatidae	*Halicarcinus planatus**	SM	P	A	P
		Pseudocorystes sicarius	SM	A	A	A
	Atelecyclidae	*Acanthocyclus albatrossis*	SM	A	A	A
		Peltarion spinosulum	SM - TF	P	P	P
	Cancridae	*Cancer edwardsi*	SM	A	A	A
		Cancer coronatus	SM	A	A	A
	Corystidae	*Gomeza serrata*	SM	A	A	A
	Xanthidae	*Eurypanopeus crenatus*	SM	A	A	A
		Gaudichaudia gaudichaudii	SM	A	A	A
		Homalaspis plana	SM	A	A	A
		Pilumnoides perlatus	SM	A	A	A
	Grapsidae	*Plagusia immaculata*	SM	A	A	A
	Pinnotheridae	*Pinnixa valdiviensis**	SM	A	A	P
		Pinnotherelia laevigata	SM	A	A	A

Literature cited

Arntz, W. E. & Gorny, M. (1991): Shrimp (Decapoda, Natantia) occurrence and distribution in the eastern Weddell Sea, Antarctica. Polar Biol 11: 169-177.

Boschi, E. E., Fischbach, C. E. & Iorio, M. I. (1992): Catálogo ilustrado de los crustáceos estomatópodos y decápodos marinos de Argentina. Frente Marítimo 10, sec A: 7-94.

Garth, (1957): The Crustacea Decapoda Brachyura of Chile. Reports of the Lund University Chile expedition 1948-49. Lunds Univ Arsskr, N F (2)53(7): 1-130.

Haig, J. (1955): The Crustacea Anomura of Chile. Reports of the Lund University Chile Expedition 1948-49. Lunds Univ Arsskr, N F (2)51(12): 1-68.

Holthuis, L. B. (1952): The Crustacea Decapoda Macrura of Chile. Reports of the Lund University Chile expedition 1948-49 5: 110 pp.

2.3.10 Crustacea Decapoda: Report on the anomuran and brachyuran crabs

Matthias Gorny[1], Wolf E. Arntz[1] & Raul Soto[2]

[1] Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany
[2] Dpto de Ciencias del Mar, Arturo Prat University, Iquique, Chile

Anomuran and brachyuran crabs occurred most frequently and were the most abundant groups of decapod crustaceans. Except for the few specimens which were preserved in the subsamples taken for a general faunistic analysis of each haul, the material has been worked up in terms of a revision of the species and sex determination. 57 of a total of 63 AGT hauls yielded about 10,000 specimens, belonging to 6 species of anomuran and 6 species of brachyuran crabs (Table 6). The most frequent species were *Peltarion spinosulum, Munida subrugosa, Eurypodius latreillei* and *Pagurus comptus.*

All species caught during this expedition are known from former studies in the south-eastern part of the Pacific Ocean (Haig 1957, Garth 1957, Retamal 1981, Boschi et al. 1992). However, in some cases the southernmost distribution range in Chilean waters was extended to the south. The southernmost former record of the brachyuran crabs *Pagurus gaudichaudi, Eurypodius longirostris, Halicarcinus planatus* and *Pinnixa valdiviensis* was in the Strait of Magellan; all of them were found in the area between Picton and Wollaston Island during this cruise. The anomuran galatheid crab *Munidopsis opalescens,* which was known from the Magellan Province, was now also recorded in the Strait of Magellan itself.

Anomuran and brachyuran decapods were recorded in the depth range between 9 and 480 m (cf. Table 6). Among them, 4 shallow-water forms commonly occurred to 100 m depth (*Munida opalescens, Pagurus gaudichaudi, Halicarcinus planatus* and *Pinnixa valdiviensis*). All other species exhibited a wide bathymetric range, except the majid crab *Libidoclaea smithi,* which was restricted to greater depth exclusively. Furthermore, from our data the maximum record of 4 species was shifted towards greater depth.

Species composition and abundance varied among the 3 principal areas of investigation. The most abundant species in the Strait of Magellan were *Munida subrugosa* and *Peltarion spinosulum*. In the channel system *P. spinosulum* was most abundant, whereas the waters around the islands south of Pto Williams were dominated by *M. subrugosa* only (Fig. 25). In the Strait of Magellan, *P. spinosulum* was most abundant in the northern part between Bahía Laredo and Bahia Gente Grande, whereas the abundance of *M. subrugosa* increased towards the southern Pacific entrance of the Strait.

Most of the analysed specimens were females (64.2 %). Only in the case of *Pagurus comptus*, *Eurypodius longirostris* and *Libidoclaea smithi* males were more abundant than females. Large numbers of berried females (31.6 % of the female population) were found in *Eurypodius latreilli*, exclusively, whereas in all other species less than 10% of the females carried eggs. This was low in contrast to the results obtained in caridean shrimps (cf. Wehrtmann & Lardies) and may indicate that anomuran and brachyuran crabs finish their breeding season before October-November, when our samples were taken.

Future work will concentrate on morphometric measurements and investigation of reproductive parameters to gain a more detailed knowledge of the ecology of the common species in this southernmost part of Chilean waters.

Table 6: Species list of anomuran and brachyuran crabs collected in the total area of study during the "Victor Hensen" expedition. Frequencies of occurrence in AGT hauls and the bathymetric distribution of each species are given.

Decapoda Anomura

Family	*Species*	Freq. occ. %	Depth range [m]			
Galatheidae	*Munida subrugosa*	33	9	-	480	
	Munidopsis opalescens	1		18		
Lithodidae	*Lithodes santolla*	4	25	-	112	
	Paralomis granulosa	10	18	-	336*	(100)
Paguridae	*Pagurus gaudichaudii*	2	30	-	65	
	Pagurus comptus	26	9	-	360*	(315)

Decapoda Brachyura

Family	*Species*	Freq. occ. %	Depth range [m]			
Majidae	*Eurypodius longirostris*	11	9	-	480	
	Eurypodius latreilli	28	15	-	527*	(128)
	Libidoclaea smithi	4	214	-	418	
Hymeno-somatidae	*Halicarcinus planatus*	5	15	-	115	
Atelecyclidae	*Peltarion spinosulum*	34	9	-	480*	(120)
Pinnotheridae	*Pinnixa valdiviensis*	2	15	-	46	

* indicates greater maximum depth during this expedition than known from former records

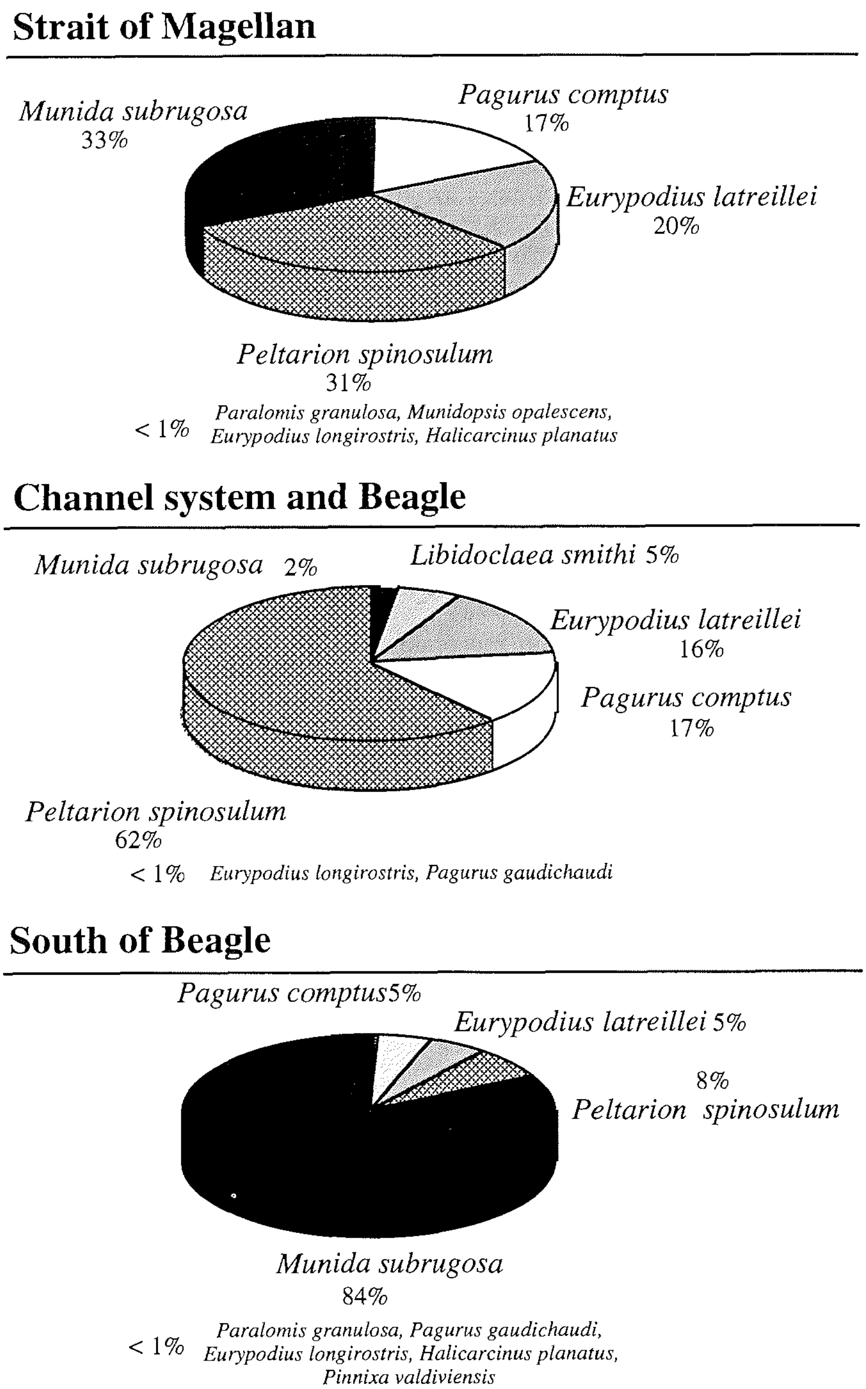


Figure 25: Percentage composition of anomuran and brachyuran crabs in the 3 principal areas of investigation (100 % = total number of specimens caught within each area). "South of Beagle" refers to the islands south of the eastern mouth of the Beagle; "Channel system" to the connecting channels between the Strait of Magellan and the Beagle Channel.

Literature cited

Boschi, E. E., Fischbach, C. E. & Iorio, M. I. (1992): Catálogo ilustrado de los crustáceos estomatópodos y decápodos marinos de Argentina. Frente Maritimo 10, sec A: 7-94.

Garth, (1957): The Crustacea Decapoda Brachyura of Chile. Reports of the Lund University Chile Expedition 1948-49. Lunds Univ Arsskr, N F (2)53(7): 1-130.

Haig, J. (1955): The Crustacea Anomura of Chile. Reports of the Lund University Chile Expedition 1948-49. Lunds Univ Arsskr, N F (2)51(12): 1-68.

Retamal, M. A. (1981): Catálogo ilustrado de los crustáceos decápodos de Chile. Gayana 44: 110pp.

2.3.11 Species composition and geographical distribution of caridean shrimps (Decapoda: Caridea)

Ingo S. Wehrtmann and Marco A. Lardies
Institute of Zoology, Universidad Austral de Chile, Valdivia, Chile

Introduction

The taxonomic composition of the Chilean decapod fauna is fairly well known, mainly through the extensive surveys carried out by the Lund University Chile Expedition 1948-49. Results on caridean shrimps of that expedition have been published by Holthuis (1952). However, the material revised by Holthuis did not include specimens collected in southern Chile; most samples containing caridean shrimps were obtained around Chiloé Island. Retamal (1973, 1974) studied the material collected by RV "Hero" in the extreme south of Chile in September 1972; he provided a systematic account of the decapod fauna of the area which has been very useful in analysing the decapod material obtained by RV "Victor Hensen".
The analysis of the caridean shrimps is part of a bilaterial collaboration between the Institute of Zoology, Universidad Austral de Chile (UACH), and the Alfred Wegener Institute for Polar and Marine Research (AWI) in Bremerhaven, Germany.

Species composition and abundance

A total of 982 caridean shrimps have been analysed, representing species of the following 5 families: Pasiphaeidae, Pandalidae, Alpheidae, Hippolytidae and Campylonotidae. Eight species were identified, indicating that not all benthic species reported for the area have been captured (Table 7).

Just as in the material obtained by the RV "Hero" (Retamal, 1973, 1974), *Chorismus antarcticus* and *Notocrangon antarcticus* were absent in our material, too. However, Retamal (1981) reported the Strait of Magellan (*C. antarcticus*) and the area up to 54°S (*N. antarcticus*) as part of the geographical distribution of the 2 species.

Since samples were obtained by means of a bottom trawl, the presence of pelagic shrimps in the collected material has to be considered occasional. A revision of the pelagic shrimps in circum-Antarctic waters has been provided by Wasmer (1986, 1993).

Table 7: Caridean shrimps reported from southern Chile (according to Retamal 1973, 1974) and their presence/absence in the material collected by RV "Victor Hensen". If a species has not been reported by Retamal (1973, 1974), the southern distribution according to Retamal (1981) is indicated.

Species	Distribution in southern Chile according to Retamal (1974,1974)	Presence/ absence
Pasiphaeidae		
Pasiphaea acutifrons	Strait of Magellan, Seno Almirantazgo Seno Otway	present
P. dofleini	Canal Martínez (47°57S, 74°37W)	present
Pandalidae		
Austropandalus grayi	Bahía Inútil, Seno Otway	present
Alpheidae		
Betaeus truncatus	Picton Island (Retamal 1981)	present
Hippolytidae		
Nauticaris magellanica	Bahía Inútil, Bahía Sholl	present
Eualus dozei	Grevy Island (Retamal 1981)	present
Chorismus antarcticus	Strait of Magellan, circum-Antarctic (Retamal 1981)	absent
Campylonotidae		
Campylonotus semistriatus	Bahía Inútil, Seno Almirantazgo, Seno Otway, Gulf of Xaultegua, Seno Baker Canal Messier, Canal Sarmiento	present
C. vagans	Bahía Inútil	present
Crangonidae		
Notocrangon antarcticus	Antarctica; until 54°S (Retamal 1981)	absent

The majority of the individuals obtained were *Austropandalus grayi*, comprising 65.6 % of the total number of shrimps considered in the present study (Fig. 26). *Campylonotus semistriatus* was the second most abundant species (20.3 %), while the percentage of the other species varied between 0.2 and 5.7 % (cf. Fig. 26).

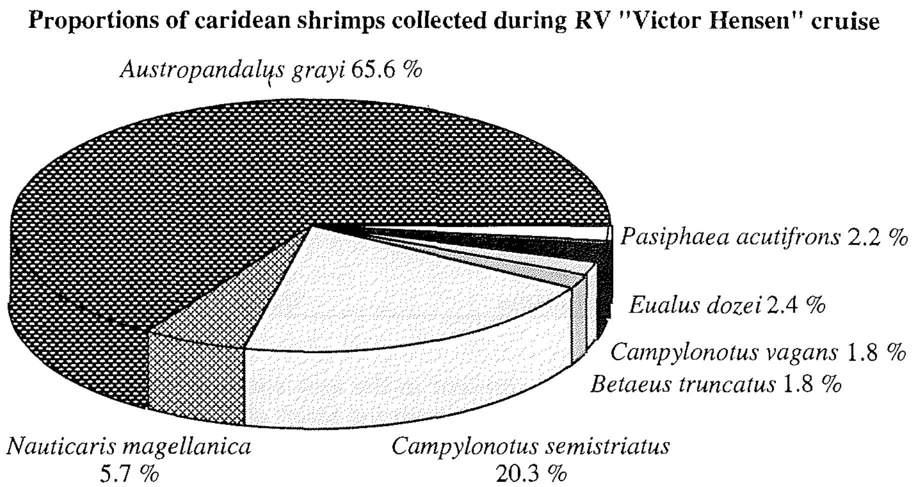


Figure 26: Percentage abundance of caridean decapods collected during the "Victor Hensen" Magellan Campaign.

Reproductive period
To analyse the reproductive state of the collected shrimps, ovigerous females were counted and separated for further studies concerning fecundity, reproductive output and gonad as well as embryonic development.

No individuals of *C. vagans* were carrying eggs, whereas the collections of all the other species contained egg-bearing females. The highest percentages of ovigerous females were encountered in *N. magellanica* (63.2 % of 57 individuals), followed by *B. truncatus* (27.8 % of 18 individuals), *A. gayi* (27.2 % of 685 individuals) and P. acutifrons (25.0 % of 12 individuals). The percentages of *E. dozei* and *C. semistriatus*, were considerably lower (12.5 % and 14.3 %, respectively); only one specimen of *P. dofleini* was ovigerous.

Bathymetric distribution
Table 8 provides data concerning the depth distribution of the collected shrimps. Two distinct groups can be identified: (1) shallow water forms, occurring typically in waters well above 100 m depth; this group includes the following species: *A. grayi, B. truncatus, N. magellanica and E. dozei.* (2) deep water forms, occurring typically well below 100 m depth; this group is comprised by *P. acutifrons, C. vagans* and *C. semistriatus.* However, the presence of the latter species at 70 m needs some further explanation: trawling was carried out close to the Romanche glaciar, where the temperatures of water column were considerably lower when compared to the other parts of the Beagle. The ice and melt water may have lowered the temperature to a degree that permitted the presence of *C. semistriatus* at such "shallow" depths.

Geographic distribution
Table 9 represents the abundance of caridean shrimps in the three principal areas of investigation, Strait of Magellan, Beagle Channel and south of Beagle.

Table 8: Range of depth distribution of caridean shrimps collected during the RV "Victor Hensen" cruise, 1994.

Species	Depth range		
Pasiphaea acutifrons	25	-	648 m
Pasiphaea dofleini		-	m
Austropandalus grayi	15	-	110 m
Betaeus truncatus	37	-	65 m
Nauticaris magellanica	15	-	65 m
Eualus dozei	15	-	100 m
Campylonotus vagans	35	-	320 m
Campylonotus semistriatus	113	-	653 m

Six of the collected species were present in the area south of Beagle, indicating a higher species richness compared with both the Strait of Magellan and the Beagle Channel. Sampling was particularly successful around Picton island, where most of the individuals were obtained. However, it should be mentioned that sampling was very intensive in this area. Thus, the geographical distribution of the shrimps and especially the abundance figures should be interpreted with caution, keeping in mind that the sampling effort in the subareas differed considerably.

Table 9: Abundance of 8 caridean shrimp species in the 3 principal research areas, Strait of Magellan (SM), Beagle Channel (B) and the area south of Beagle (SB).

Area	*P. acutifrons*	*P. dofleini*	*A. grayi*	*B. truncatus*	*N. magellanica*	*E. dozei*	*C. semistriatus*	*C. vagans*
SM	rare	absent	*rare*	*absent*	*absent*	*absent*	*rare*	*rare*
B	are	rare	*abundant*	*absent*	*absent*	*absent*	*abundant*	*rare*
SB	absent	absent	*very abundant*	*rare*	*rare*	*rare*	*rare*	*rare*

rare: <50 ind. abundant: 51-100 ind. very abundant: > 100 ind.

Concluding remarks

The caridean shrimp material collected by RV "Victor Hensen" makes an important contribution to the studies on the biology of these decapod crustaceans. To our knowledge, this is the most extensive collection of this crustacean group from waters around the southern tip of South America. The presence of ovigerous females in most of the species will allow for interesting intra- and interspecific comparisons concerning the size at first maturity, fecundity, reproductive output, and embryonic/gonad development. The bilateral cooperation between the Institute of Zoology, UACH, and the AWI facilitates and guarantees a thorough analysis of the obtained material.

Acknowledgements

Financial support for our participation in the "Victor Hensen" campaign was generously provided by the "German Academic Exchange Service" (DAAD) and the "Dirección de Investigación y Desarrollo" (DID), UACH, through project N° S-94-53.

Additional data for some species were generously provided by Matthias Gorny (AWI), and we greatly appreciate his cooperation.

References

Holthuis, L.B., 1952. The Crustacea Decapoda Macrura of Chile. - Lunds Univ. Arsskrift N.F. Avd. 2, 47 (19), p. 110.

Retamal R., M.A., 1973. Contribución al conocimiento de los decápodos de la región magallánica. - Gayana 29, 3-20.

Retamal R., M.A., 1974. Contribución al conocimiento de los crustáceos decápodos de la región magallanica. - Gayana 31, 3-23.

Retamal, M.A., 1981. Catálogo ilustrado de los crustáceo decápodos de Chile. - Gayana 44, 7-110.

Wasmer, R.A., 1985. Pelagic shrimps of the family Oplophoridae (Crustacea: Decapoda) from the Pacific sector of the Southern Ocean: USNS *Eltanin* cruises 10,11, 14-16, 19-21, 24, and 25. - In: Biology of the Antarctic Seas XVII (L.S. Kornicker, ed.), Antarctic Res. Ser 44, 29-68.

Wasmer, R.A., 1993. Pelagic shrimps (Crustacea: Decapoda) from six USNS *Eltanin* cruises in the southeastern Indian Ocean, Tasman Sea, and southwestern Pacific Ocean to the Ross Sea. - In: Biology of the Antarctic Seas XVII (L.S. Kornicker, ed.), Antarctic Res. Ser. 58, 49-91.

2.3.12 Echinodermata

(No final report received except for ophiuroids)

The objectives of the proposed studies on this group were to prepare an inventory of species, to analyse abundance, biomass and distribution of representatives of the principal taxa (asteroids, echinoids, ophiuroids and holothurians) and to study population dynamics of some common species in relation to their Antarctic relatives. In the case of sea urchins, comparisons were also to be made between species studying their ribosomal RNA. The material stems principally from AGT catches during all four legs.

Ophiuroids (Echinodermata) of the Magellan region

Corinna Dahm, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

The brittle star collection of the "Victor Hensen" Magellan Campaign contains euryalinid families such as Gorgonocephalidae as well as some families of the suborder Ophiurina (Ophiomyxidae, Ophiuridae and Ophiactidae). The great majority of the collected specimens belong to the species *Gorgonocephalus chilensis, Ophioscolex nutrix, Ophiuroglypha lymani* and *Ophiactis asperula.* An analysis of the geographical distribution of all ophiuroid species mentioned for the chilean litoral is given by Jaramillo (1981).

After finishing the taxonomic work the material will be used to analyse the growth and age of the dominant species. The determination of individual age is one of the key problems in studies on population dynamics. Worldwide only a few attempts have been made to age ophiuroids by interpreting the pattern of bands visible on the vertebral ossicles as annual variations in skeletal growth. During the past years a method has been developed to analyse the microstructure of the growth-banding by SEM (scanning electron microscopy) (Gage 1990a,b, Dahm 1993). The investigation of two common boreal species from the North Sea (Dahm 1991, 1993) and five Antarctic species from the Weddell Sea (Dahm 1995) showed the reliable applicability of the method. In both boreal species the oldest individuals examined were 9 yr old (*Ophiura albida*: at 9 mm disc diameter, *Ophiura ophiura*: at 15 mm disc diameter), whereas the maximum ages of the Antarctic species ranged between 19 yr (*Ophioceres incipiens*: at 12 mm disc diameter) and 91 yr (*Astrotoma agassizii*: at 45 mm disc diameter).

The material available from the "Victor Hensen" cruise offers a great opportunity to examine some common Magellanic ophiuroids and to compare their population dynamics with boreal and closely related Antarctic species.

Literature cited

Dahm, C. (1991). Populationsdynamik der Schlangensterne *Ophiura albida* und *Ophiura ophiura* in der Deutschen Bucht. Master thesis, University of Bremen, Germany.

Dahm, C. (1993). Growth, production and ecological significance of *Ophiura albida* and *O. ophiura* (Echinodermata: Ophiuroidea) in the German Bight. Mar. Biol. 116: 431-437.

Dahm, C. (1995). Ökologie und Populationsdynamik antarktischer Ophiuroiden (Echinodermata). Doctoral thesis, University of Bremen, Germany.

Gage, J. D. (1990a). Skeletal growth bands in brittle stars: Microstructure and significance as age markers. J. Mar. Biol. Ass. U.K. 70: 209-224.

Gage, J. D. (1990b). Skeletal growth markers in the deep-sea brittle stars *Ophiura ljungmani* and *Ophiomusium lymani*. Mar. Biol. 104: 427-435.

Jaramillo, E. (1981). Ofiuroideos de los archipiélagos de Chiloe y los Chonos. Stud. Neotrop. Fauna Env. 16: 113-136.

2.3.13 Preliminary report on the demersal fish material collected during the "Victor Hensen" Magellan Campaign

German Pequeño & Julio Lamilla
Zoological Institute, Universidad Austral de Chile, Valdivia, Chile

Introduction

The original idea of the Valdivian ichthyologists to study the potential association of juvenile fishes to drifting algae, as a way to explain some ichthyogeographical problems common to the Southern Ocean, had to be given up for various reasons. Also, the use of bottom trawls, which had been suggested in the first proposal, could not be realized due to lack of participation on the Chilean side. The only means of obtaining fishes during the cruise, although in a greatly restricted manner, was thus the Agassiz trawl (AGT) which is constructed for catching large amounts of benthos rather than fish. The AGT collection of demersal fishes from the areas of the Magellan Strait, the Beagle Channel and the area to the south of Puerto Williams comprises > 700 specimens which are the basis for this report.

It has been surprising to recognize that, despite the idea that the area should have been exhaustively studied in the past, very few publications are available in relation to marine fishes. There are some classical reports of the XIX century expeditions, e.g. HMS "Challenger", HMS "Erebus" and "Terror", BS "Travailleur" and "Talisman", HMS "Beagle", HMS "Nassau", HMS "Alert, and some from the beginning of the current century (Swedish South Polar Expedition, Hamburger Magalhaenische Sammelreise, HMS "Discovery", USS "Albatross"), among others. More recent research on the area includes participation of Chilean scientists (Ojeda, 1983; Moreno & Jara, 1984; and others).

A brief account of the samples

The total number of specimens collected was 732, 705 of which were preserved in the marine fishes collection of the Zoological Institute, Universidad Austral de Chile, whereas 25 specimens were discarded, although colour pictures of each one have been taken. A systematic list of the species preserved (with addition of data from two of the photographs) is presented in Table 16 of the annex.

Myxinoidea

The specimens collected include six cyclostomes, which although they do not belong to the fishes are considered for practical reasons. These specimens were not taxonomically determined, because there is a systematic publication coming up on Chilean hagfishes (Robert Wisner, SIO-USA, pers. comm.). We prefer to have at hand a modern consideration of the group, before attempting a definitive classification of the specimens.

Chondrichthyes

A total of 18 specimens were caught, 10 squaloids and 8 rajoids. Among the first, 9 juvenile specimens of common catfishes or small littoral sharks (Family Scyliorhinidae) previously known in the area, all belonging to the species *Schroederichthys bivius*. Other specimens include a small shark (*Centroscyllium granulatum*). Both species are poorly known, and the sample may well provide material for some comments, improving their biological knowledge.

Among the rajoids, three species,*Bathyraja macloviana, Sympterygia bonapartei* and *Raja chilensis*, made an interesting collection, which also contains some news (one specimen was within the egg capsule, another one seems to be a new geographical record, etc.). All specimens were very young stages.

Osteichthyes

The bony fishes were the largest group of the sample, with 673 specimens. The Order Perciformes, as expected, was the most abundant in number of specimens (615). Among the Perciformes, the Family Nototheniidae, with the genus*Patagonotothen* was most abundant, with 420 specimens. The species of the genus are known because of their high similarity, a reason which has delayed the individual taxonomical determination. This work will be developed during 1995, as well as the determination of a few specimens belonging to other groups.

The other abundant family of Perciformes was Bovichthyidae, represented by one species, *Cottoperca gobio*, with 194 specimens. The sample is represented by fishes of different sizes and also will provide fine material for some biological observations, to be included in a final report.

The Order Scorpaeniformes, although not so abundant in number of specimens, was represented by four species, being the agonid *Agonopsis chiloensis* the most numerous. Among the Gadiformes, the gadid *Physiculus marginatus* was the most abundant, with 26 specimens.

In summary, we have recognized 1 probable species of Myxinoidea, Family Myxinidae, 5 species of Chondrichthyes and 9 species of Osteichthyes. There are several species of Osteichthyes with numerous specimens to be determined, and we expect at least 4 more species to add. All the specimens of these species are preserved. The list of specimens discarded, and on which there are photographs, will be prepared in the future, to be included in the final report.

A more complete bibliography will be also prepared, according to the details of further studies.

SHALLOW-WATER BENTHOS

2.3.14 Distribution of macroalgae and invertebrate grazers in the Magellan Strait

Lisandro Benedetti-Cecchi, Dipartimento di Scienze dell'Ambiente e del Territorio, University of Pisa, Italy

Research focused on the distribution of macroalgae and invertebrate grazers in the Magellan area, providing a preliminary account of the spatial organization and structure of these assemblages in intertidal and subtidal habitats. Sampling was carried out at a number of coastal sites by non-destructive methods. Densities and percent cover values of species were estimated in plots of $0.5 \times 0.5 = 0.25\ m^2$. Spatial variability in the distribution of species was assessed by means of multifactorial sampling designs. Intertidal assemblages were sampled at 6 sites (spanning the range of habitat types typical of the area) distributed between Bahía Laredo (north of Punta Arenas) to Puerto Hambre (south of Punta Arenas). Three tidal levels were sampled at each site: high intertidal, intermediate zone, and low intertidal. Three areas, each representing a stretch of shore of about 20m, were randomly chosen for each tidal level and 3 replicate plots were sampled in each area. This design, consisting of a total of 162 plots, allowed comparisons of spatial patterns at scales of 2 - 10 m (variability between tidal levels and replicates), tens to hundreds of metres (variability between areas) and kilometres (variability between sites).

There were clear patterns of zonation for many of the species investigated, but these patterns were not consistent among sites. In general, the high intertidal was dominated by the green alga *Enteromorpha* sp. with peaks of abundance up to

80 % coverage. A representative analysis is illustrated in Table 10 for this species. Spatial variability was evident at different scales. The highly significant effect of areas indicated that the abundance of this alga could be very different 20 - 100m apart on the same shore. In addition, the significant interaction between level and site indicated that patterns of zonation were not consistent among shores. Unplanned comparisons will help to clarify these differences. Other algae, such as the brown *Adenocystis utricularis* and the red alga*Nothogenia fastigiata* showed similar patterns of distribution. *Enteromorpha* and*Adenocystis* could also extend down to intermediate levels, where they shared the substratum with mussels. Intermediate levels were also colonized by filamentous and turfing red algae, but this pattern was not consistent for all sites. Low-shore habitats were dominated by *Monostroma* sp. and*Iridea ciliata*. Herbivores were represented by the limpets *Nacella patagonica* and *Siphonaria lessonii*. Both were very patchy in distribution and could be found at mid and low-shore levels, respectively, at the base and on top of boulders.

A simpler design was used in the subtidal because of logistic constraints. Sampling was done in two forests of the kelp *Macrocystis pyrifera* distributed about 20km apart. Four areas were chosen at random in each forest, and 4 replicate plots were sampled in each area. The areas were 50 - 100 m apart, whereas replicate plots were 3 - 10 m apart. Inputs of fresh water were common at the northern site, where discontinuities in the distribution of the kelp forest were evident. These patterns were not evident at the southern site (Puerto Hambre). The general hypothesis that the inputs of fresh water might affect the spatial distribution of the kelps and related species is currently under investigation. Tests are made by contrasting the patterns occurring in the two forests with respect to the variability between the four areas in each forest.

The results of this investigation will be useful to formulate testable hypotheses concerning patterns of distribution of species in intertidal and subtidal habitats, thus providing a basis for future experimental studies in the Strait of Magellan.

Table 10: Spatial variability in the distribution of *Enteromorpha* sp. in the Strait of Magellan. Level on the shore is a fixed effect, whereas site and areas are random.

Source	df	MS	F	p	F-ratio versus
Level =L	2	2931	1.6	0.2515	Level x Site
Site = S	5	8293	20.1	0.0001	Areas (LxS)
LxS	10	1844	4.5	0.0004	Areas (LxS)
Areas (LxS)	36	414	4.1	0.0001	Error
Error	108	100			

2.3.15 Analysis of macroalgal communities in the Magellan region, and a comparison with the Antarctic

Heinz Klöser, Alfred Wegener Institut for Polar and Marine Research, Bremerhaven, Germany

Introduction

The Magellan region of South America is the nearest land mass to the Antarctic, and the southernmost coasts around Tierra del Fuego extend into truly Subantarctic conditions. Nevertheless, the macroalgal floras of the two continents are quite different. The Antarctic has a long development in isolation, resulting in a high degree of endemism of about 35-40% of algal species. Today, the vegetation in southern South America (Castilla 1985; Dayton 1985; Santelices & Ojeda 1984; Santelices 1989) exhibits a principally different structure compared to that of the Antarctic Peninsula (DeLaca & Lipps 1976), which is mainly induced by the dominance of *Macrocystis pyrifera* in the Magellan area. Especially, a number of effective herbivores is common in the Magellan area (Castilla 1985; Castilla & Moreno 1982; Dayton 1985), whereas the importance of grazing seems to be minor in the Antarctic. Despite these differences, a number of macroalgae are common in both areas, for example *Adenocystis utricularis, Ballia callitricha, Enteromorpha bulbosa, Gigartina skottsbergii, Picconiella plumosa*, and *Plocamium cartilagineum*, emphasizing the proximity of both continents. The question arises, in which way these species are integrated in the different ecosystems; respectively, why the other species are not. To cast some light on this problem, a study on the Magellan algal vegetation was performed. The intertidal and sublittoral communities were documented by video in the Magellan Strait during the first leg, and the physical conditions (light, temperature and salinity) were measured. During the third leg, only intertidal activities could be continued. During all legs, algae brought to the surface by the Agassiz trawl were also collected.

Preliminary results and discussion

In the intertidal, the most obvious difference between the Antarctic and the Magellan area lies in the diversity of macroalgae in the latter area. Antarctic tidepools frequently carry dense mats of diatoms, which were not found in the Magellan area, although the physical conditions were similar according to our measurements. Instead of diatoms, mats of filamentous brown and green algae were present. From the few Antarctic intertidal macroalgae, only *Adenocystis utricularis* and *Enteromorpha bulbosa* could be identified in our Magellan material.

Sublittoral kelp forests (*Macrocystis pyrifera*) form structures, which have no Antarctic equivalent. In the Magellan Strait and the Fuegonian fjords and channels, kelp hardly reaches lengths of 8 to 9m, whereas much larger specimens are reported from other parts of the Pacific coast of the Americas. Also, kelp forests seem to be confined to sheltered inshore areas. A reason for this may be the comparatively unstable bottom of mixed deposits. Kelp rhizoids were fixed to scattered stones and boulders interspersed with flats of sand and gravel. These stones may provide an insufficient anchorage for larger specimens. Solid rock, which would provide a better substratum, was found only in the uppermost few metres. Here, and even in tidepools, juvenile kelp was found, but no larger plants. Instead *Lessonia spec.* dominated. The lack of older kelp on these shallow rocks may be a result of mechanical destruction by waves smashing the thalli against the rocks.

Although the amount of available light is diminished considerably (to about 10% of the amount of light in comparable sites without the presence of kelp), a rich understory vegetation was found. Some of the algae may have ascended from greater depth and benefit from the shadowing by the kelp, but also species present in tidepools and the sublittoral fringe are growing below the kelp. Outside the kelp forests the algal vegetation in general is poor. This is partly due to sand and mud substrata which are inadequate for macroalgal colonization, but this does not explain all cases. A calming effect of the floating overstory may possibly be a crucial factor allowing species sensitive to turbulence to thrive in the shadow of the kelp. For example, the large rhodophyte *Gigartina skottsbergii* was an important understory species in the kelp forests already at 1 or 2 m depth, whereas in the Antarctic the same species prefers gaps in the macroalgal vegetation and is hardly ever found above 5m.

In the same way, animals may benefit from the presence of kelp. The animals most frequently encountered in the kelp forests were decapods of a variety of species, followed by different species of sessile and motile molluscs. Also some very large, violet-coloured jellyfish (diameter about 1m, species still unidentified) were repeatedly seen. Especially in the shallowest parts, sea anemones were abundant. On the algae themselves amphipods, hydrozoans and some bivalves dominated. The crustaceans frequently showed green, red or brown colours, depending on the type of algae they live on. Although in the Antarctic a diverse epiphytic fauna is also found, camouflaging colours are seldom found.

An open question are macroalgal temperature requirements. Antarctic algae seem to be adapted to the deep temperatures of their environment, as they grow only at temperatures around 5°C or less and hardly survive temperatures higher than 11 to 16°C. Cold-temperate species of the Magellan area, on contrast, grow best between 5 and 15°C and survive temperatures as high as 19 to 24 °C (Wiencke & tom Dieck 1990). This is also true for *Adenocystis utricularis* and *Enteromorpha bulbosa* of both the Antarctic and Magellan intertidal. Other Antarctic species, which also occur in the Magellan region (i.e.*Ballia callitricha, Pantoneura plocamioides, Picconiella plumosa*), but are sensitive to high temperatures (Bischoff & Wiencke, in prep.), were found only in greater depth, where they will hardly experience higher temperatures. However, some species do ascend to shallow waters which will warm up in summer (i.e. *Gigartina skottsbergii, Plocamium cartilagineum*), although Antarctic specimens of these species were found to be equally sensitive to higher temperatures (Bischoff & Wiencke, in prep.). This may be a hint to morphologically undistinguishable ecotypes in these species with regard to temperature tolerance. Unfortunately, comparable experiments with specimens of these species from the Magellan areas are lacking. Unless such experiments will be performed, we will hardly be able to explain the wide distribution and geographical limits of these species.

References

Castilla J.C. 1985. Food webs and functional aspects of the kelp, *Macrocystis pyrifera*, community in the Beagle Channel, Chile. In: Antarctic Nutrient Cycles and Food Webs (Siegfried, W.R., Condy, P.R. & Laws, R.M., Ed.). Springer, Heidelberg: 407-414.

Castilla J.C. & Moreno C. 1982. Sea urchins and *Macrocystis pyrifera*: Experimental test of their ecological relations in southern Chile. In: International Echinoderm Conference, Tampa Bay (Lawrence, J.M., Ed.). Balkema, Rotterdam: 257-263.

Dayton P.K. 1985. The structure and regulation of some South American kelp communities. Ecol. Monogr. 55 (4): 447-468.

DeLaca T.E. & Lipps, J.H. 1976. Shallow-water marine associations, Antarctic Peninsula. Antarct. J. U.S. 11 (1): 12-20.

Santelices B. 1989. Algas marinas de Chile. Distribución, ecología, utilización y diversidad. Ediciones de la Universidad Católica de Chile, Santiago.399 pp.

Santelices B. & Ojeda F.P. 1984b. Population dynamics of coastal forests of *Macrocystis pyrifera* in Puerto Toro, Isla Navarino, Southern Chile. Marine Ecology Progress Series 14: 175-183.

Wiencke C. & tom Dieck I. 1990. Temperature requirements for growth and survival of macroalgae from Antarctica and southern Chile. Mar. Ecol. Prog. Ser. 59: 157-170.

2.3.16 Benthic sampling to be used for studies on biometry, biomass and trophic relations

Giancarlo Albertelli, ICAM, University of Genova, Italy

Research was carried out collecting samples of benthic organisms either from the shore or from the central area of the Strait (to 80-100m depth) using RV "Victor Hensen".

The samples collected using the vessel in the Strait north of Punta Arenas on 17-19 October 1994 consisted of benthic organisms (in particular mollusks); in order to carry out studies on biometry, biomass and trophic relations.

These studies will be compared with those from similar communities in the Antarctic and with the samples which were collected during the Italian cruise in spring 1995. The samples collected along the shore in the intertidal zone included two areas placed to the north (Laredo Bay) and to the south (Rio Colorado) of Punta Arenas. The benthic community from the Laredo Bay intertidal zone in sand/gravel and pebble sediments resulted in being extremely poor; whereas community on boulder shores resulted to be very rich in organisms. However, the observations made during sampling suggest that the community might present low values in specific diversity.

The data obtained from the analysis of the samples will be compared with those available from the literature.

2.3.17 Plant-animal reationships in the intertidal and shallow subtidal benthic communities of the Magellan area (Chile)

Maria Cristina Gambi, Maria Beatrice Scipione & Gabriele Procaccini
Stazione Zoologica "A. Dohrn" di Napoli - Laboratorio di Ecologia del Benthos, Ischia, Italy

The research project was carried out from 17 to 28 October, 1994. The focus was on the determination of structural and trophic relationships at community level between seaweeds and associated zoobenthos of the intertidal and shallow subtidal hard bottoms, in relation to environmental conditions.

The sampling sites were located between the entrance of the "Segonda Angostura" and "Paso del Hambre", in particular along the Patagonian coast of the Strait of Magellan (cf. Fig. 6). Samples have been collected along different North-South transects, in a geographic area between 52° 41' and 53° 37' S. The sampling sites were characterized by differing local conditions, in terms of hydrodynamics (exposure to winds, water movement and currents), nature of substrate (granulometry, presence of rocks, *Macrocystis pyrifera* facies) and influence of fresh water (river) run-off.

51 quantitative samples were collected, each one by scraping a surface of 900 cm^2. Benthic populations were represented by macroalgae, epiphytes and associated motile fauna. In each transect the sampling stations were selected in relation to the nature of the substrate:

- The intertidal zone. Samples have been collected at low tide, from the upper limit to the lower limit of tide. In this area, characterized by macroalgal covering, different facies have been identified, mainly represented by laminar and filamentous Chlorophytes and Phaeophytes (e.g. *Chordaria*) or by a belt of *Mytilus* sp.
- The subtidal zone. Samples have been collected by SCUBA diving, between 2 and 5 meters depth, on scattered rocky substrates (partly with live or dead *Macrocystis* 'hold fasts'), on incoherent material (e.g. maerl), and on small vertical rocky cliffs.

The analysis of the samples will be carried out in the following way:

- Micro- and macroalgae:
  - Species identification
  - Biomass measurement
  - Percent cover
- Motile fauna:
  - Species identification
  - Abundance
  - Biomass
  - Gut content of key species of the most representative taxonomic groups

Our data will allow conclusions as to the variability in community structure along environmental gradients and to determine the plant-animal interrelations at structural and functional levels.

Further qualitative samples of the dominant species have been collected in the intertidal zone. The species collected belong to different groups of macroalgae, Polychaeta, Amphipoda (*Paramoera* spp.), and Isopoda (*Exosphaeroma gigas*). The material has been frozen at - 20°C to measure the organic carbon and nitrogen contents, in order to estimate a budget of these macronutrients in the studied systems. Moreover, an attempt will be made to determine at molecular level the phylogenetic distance between populations of some widely distributed species (e.g. *Macrocystis*).
All samples collected were stored, immediately after the cuise, at the Instituto de la Patagonia (Universidad de Magallanes) in Punta Arenas. The samples were loaded on the Italian Oceanographic vessel "ITALICA" on 4th April 1994 on occasion of its passage to Punta Arenas, during the second leg of the Italian Oceanographic expedition to the Strait of Magellan (23 March-14 April 1994). The samples arrived at the Napoli Laboratory by the end of May 1994.

2.3.18 Sponge ecology in the Strait of Magellan

Maurizio Pansini and Carlo Cerrano, Istituto de Zoologia, University of Genova, Italy

The objectives of our research unit within the "Victor Hensen" campaign were essentially two: a) to perform a faunistic study in different localities of the Strait of Magellan; b) to collect sponges of the family Chondrosiidae, in order to study the sediment uptake phenomenon. Considering the short duration of this leg (only 15 days in Punta Arenas) and the very windy early spring weather, the operations may be considered successful.

The different groups of shallow-water benthic researchers worked together, moving along the coast by a van hired by the Italians through EULA. Especially the diving team (two Germans and four Italians) had to work in close cooperation to conform to the strict safety rules. The use of an inflatable boat, and the occasional support by the "Victor Hensen", made it possible to operate at ten stations from Oazy Harbour to the North to Puerto del Hambre in the South. Most of the dives were performed among the *Macrocystis* kelp beds. Kelp are rather abundant close to the shore, where the rhizoids can fix to small boulders or other kind of hard substrate, which is needed also by most sponge species.

Most of the bottoms within the reach of the divers starting from the coast are sandy, muddy or detritic, along the northern side of the Strait, that is, they are too soft and unstable to allow sponge settlement. Beyond the scattered boulders among laminarians, sponges may theoretically settle also on the leaf and stem of the alga. However, due to the continuous movement and contact of the thalli among each other, theresulting friction makes this substrate unsuitable for sponges. Very few species manage to live on the algal stem and rhizoids, probably due also to the existence of an active antibiotic action performed by the *Macrocystis* against epibiotic organisms. On the other hand the heaps of closely intertwined dead rhizoids, which are abundant within kelp beds, offer an irregular substrate, rich of micro-cavities, and support a very diverse benthic life. This peculiar environment has been sampled qualitatively, but it is certainly worth of an "ad hoc" study on the fauna associated to dead laminarian rhizoids.

Four other stations (5,6,7,8) south of Punta Arenas are located in front of pebble beaches. However the weight of the stones and their mean diameter are too low to provide a complete stability, even in absence of very strong water movement (fetch is limited in the Straits). As a consequence fixed zoobenthos and sponges, in particular, are almost absent in the intertidal zone.

The situation was completely different at station 10 at Puerto del Hambre, where the stepped rocky coast slopes down to the sea and a band of rather big boulders marks the shore-line. The only sample of intertidal sponges during this leg has been collected among and under these boulders. Sampling was also performed by diving till 10 m depth around an isolated rock with almost vertical sides which arises from a more or less smooth rocky table just near shore. Sessile benthos (sponges, cnidarians, bryozoans) there was abundant, with bryozoan colonies reaching a height up to 60 cm.
At this station several specimens were collected of *Chondrosia* sp., a sponge without spicules that reinforces its collagen frame with sediment uptake. We have been studying this phenomenon in temperate and tropical waters, but this is the first time that a species belonging to this genus has been recorded south of Australia and South Africa. Several species of Demospongiae utilize for the construction of their skeleton foreign material such as sand grains, sponge spicules (both siliceous and calcareous), diatom oozes and other particles. Among Demospongiae this capability is characteristic of horny sponges. Generally the detritus is included into the spongin fibres which, in some cases (Dysidea), may be largely substituted by the sediment with the residual spongin acting as cementing agent. In other genera detritus forms only a thin sheet (*Chelonaplys illa*) or a thick protective coat (*Thorectandra*) on the sponge surface. *Chondrosia reniformis* is characterized by the lack of an organized skeleton of spicules and spongin fibres, thus representing a suitable basic model for studying the incorporation of foreign bodies. Its rubbery consistency is determined by the presence of collagenous fibres that are more concentrated in the cortex and around the main excurrent canals. Therefore the cortex is a compact structure only by-passed by the tree-like inhalant structures of the aquiferous system. The collected specimens are massive, cushion-shaped with a lobate contour and smooth surface. The external colour is dark grey on the part exposed to the light but fades near the base of the sponge. The inner colour (choanosome) is beige. Numerous small oscules, 3-5 mm in diameter, with slightly elevate drims are scattered on the surface. The ectosome is not clearly distinct from the choanosome because of the presence of a very thin cortex. The consistency of the specimens is soft (much more so than in other *Chondrosias* pecies from Mediterranean and Caribbean areas) but the sponge is difficult to tear off, due to the presence of the abundant collagen fibres which characterize the genus. The collected specimens - which probably belong to a new species - will be extensively studied and carefully compared, according to their capacity of incorporating

foreign material from the environment, with the temperate species already studied.

Further samplings of sponges and bryozoans (University of Catania research unit) for faunistic purposes were carried out during a two days cruise on the "Victor Hensen". Several stations along depth transects were sampled by the Agassiz trawl in the Paso del Hambre. The collected material was immediately sorted on deck in cooperation with other benthologists. The location of the stations was planned in order to repeat - as far as allowed by the Chilean authorities - the sampling operations in the same spots that were sampled by the previous Italian expedition in 1991.

Data from the two cruises, together with the shallow-water material collected by divers, should allow a taxonomic study of the sponge fauna of the Strait which is still lacking. All the material was alcohol preserved and taken to Italy by R/V "Italica" after the second leg of the research programme in March/April 1995.

2.3.19 Ecology of shallow-water bivalves

H.-Jörg Urban[1] & Bernardita Campos[2]

[1] Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany
[2] Instituto de Oceanología, Universidad de Valparaíso, Viña del Mar, Chile

Introduction
The shallow-water ecosystem of the South American Pacific coast is inhabited by several infaunal bivalve species with a broad latitudinal distribution range (Urban 1994a). In many cases these species, which normally are referred to as "almejas", are dominant members of the benthic community and therefore provide valuable resources which are exploited by small-scale fisheries. Besides their importance little is known about the ecology and population dynamics of these species, although this knowledge would be required for any attempt of fishery management.

In the past studies on shallow-water infaunal bivalves from Peru and Chile have been carried out (Urban 1992, Urban 1994b, Urban and Campos 1994). "Almeja" species are known to be distributed and exploited also in the very south of South America, however there was little information as to species composition and ecology of these bivalves. The "Victor Hensen" expedition to the Magellan Strait provided the opportunity to carry out studies with the following objectives:

- What is the species composition and distribution in the Magellan Strait?
- What is the ecology and population dynamics of the most dominant species?

Sampling was carried out between 17th October and 15th November 1994 at different sampling sites near Punta Arenas. Two stations were chosen: the Bay of

Laredo, aprox. 30 Km north of Punta Arenas, and the Bay of San Juan (near Puerto del Hambre), aprox. 60 Km south of Punta Arenas. Quantitative and qualitative samples were taken by SCUBA divers in the sublitoral depths of 10m, and hand-sampling was carried out in the intertidal during low tide.

Preliminary results and discussion

In Laredo, an area with high biomass of macroalgae, the seafloor principally consists of rocks with sandy patches. This may be a reason why the abundance of infaunal bivalve species was low. Only a few individuals of the species *Eurhomalea exalbida*, and in sandy patches, of *Tawera (Clausinella) gayi* were found, the latter with a considerable density. This type of substrate is more adequate for epifaunal mytilids, which are known to be distributed in the sampling area. However, only empty and old shells of the mytilid species *Aulacomya ater* and *Choromytilus chorus* were observed, occasionally in high densities. It is unknown what factors caused the extinction of the populations.

In the Bay of San Juan sediments consist of sand, which makes an area more suitable for infaunal species than Laredo. In San Juan an "exposed" outer site was compared with a more "protected" inner site. The exposed site has coarser sediments than the inner site. A sediment analysis showed that principally fine sand (2-3 F, Wentworth scale) prevailed at the inner site, whereas there was principally medium sand (1-2 F) at the outer site. At the outer site *Mulinia sp.* clearly dominated with approx. 100 ind./m^2, whereas only few *Eurhomalea exalbida* (aprox. 5 ind./m^2) were found. At the inner site *Mulinia sp.* also dominated, however with a density much lower than at the outer site. Besides *Eurhomalea exalbida* also the presence of *Venus antiqua* was noted at this site. Along the shore line of the outer site many valves of recently died *Ensis macha* were found. However, there were no live animals.

Preliminary results on the gonads of *Tawera (Clausinella) gayi, Gaimardia sp., Mulinia sp.* and *Eurhomalea exalbida* showed that these species were at an initial stage of their annual reproductive cycle. A plankton sample indicated high numbers of phytoplankton and of mollusk larvae. So far nine bivalve larvae (species?) and 27 gastropod larvae have been separated.

Most of the material collected during the cruise has not yet been analysed. It is expected to obtain results on the population dynamics (production, growth, mortality) of *Mulinia sp.*, and to perform a comparative study of the growth of all species sampled based on their growth rings, as well as a histological study of their gonads.

References

Urban, H.-J., 1992. Ökologie ökonomisch wichtiger Muschelarten im Auftriebssystem der Pazifikküste Lateinamerikas. Ph.D thesis, Universität Bremen, 136 p.

Urban, H.-J., 1994a. Upper temperature tolerance of ten bivalve species off Peru and Chile related to El Niño. Mar. Ecol. Prog. Ser. 107: 139-145.

Urban, H.-J., 1994b. Adaptation of six infaunal bivalve species off Chile: Coexistence resulting from differences in morphology, burrowing depths and substrate preference. Archive of Fishery and Marine Research, 42 (2): 183-193.

Urban, H.-J and B. Campos, 1994. Population dynamics of the bivalves *Gari solida, Semele solida* and *Protothaca thaca* from a small bay in Chile at 36°S. Mar. Ecol. Prog. Ser, 115: 93-102.

2.4 PALAEOCOMMUNITIES

2.4.1 Variations of palaeocommunites along gradients during the Quaternary

Sebastiano Italo Di Geronimo & Antonietta Rosso, Istituto Policattedra di Oceanologia e Paleoecologia, University of Catania, Italy

The Catania University Unit participated in the sampling campaign with two researchers together with Claudio Valdovinos of the Centro EULA-Chile of Concepción.

During the first phase of the expedition in the Magellan Strait (from 17 to 23 October 1994) the Catania Unit ensured the presence on board of the researchers to co-operate in the sampling activity on all the days that the vessel worked in programmes concerning the study of benthos.

Benthos samples have been taken by means of an Agassiz trawl, above all in the northern part of Paso Ancho, between Gente Grande and Laredo bays, at depths usually shallower than 100 m and, to a lesser degree, towards the South, near Paso Boquerón. The use of the Agassiz trawl with meshes of 10 mm allowed to trawl for a relatively long time and to sample an extensive collection of benthic organisms. Consequently, the analysis of these samples will enable the investigators to establish inventories of the species colonizing the bottoms, above all for the epibenthic organisms. From these samples, mollusks, bryozoans, Serpuloid polychaetes and foraminiferans were essentially taken. Their study will allow us to improve the data of the preceding Italian expedition in the Magellan Strait (carried out with RV "Cariboo" in 1991) and to define, in a better manner, the geographic distribution of some species.

Preliminary analysis of the samples (particularly of the systematic groups mentioned above) in combination with other observations carried out inland, allowed us to show the general reophilous character of the associations both in infra- and circalittoral areas.

The *Macrocystis pyrifera* epibiosis, very rich and diversified, appears particularly interesting because it seems different from those already known from other South American localities.

Where it was possible, also the corresponding thanatocoenoses were sampled by means of a multibox corer. This apparatus allows to sample the bottom sediment in parallel samples with a basal surface of 10x15 cm and a maximum height of about 50 cm. Moreover, this type of sampler, developed for the study of benthic communities, allows to sample not only the superficial bottom sediments but also the underlying levels the biogenic contents of which are extremely interesting to the knowledge of the palaeocommunities. One of the main objectives of the Catania Unit research is devoted to the knowledge of Recent communites and their relationship with bottom sediments, palaeocommunities and their variations during time. The final goal is the reconstruction of the evolution of the Magellan Strait faunas during the Quaternary till present with particular reference to palaeoecologic and palaeoclimatic analysis, in the more general context of the "global change" phenomenon.

The thanatocoenoses contained in the more superficial layers and the taphocoenoses buried in the underlying ones will be examined for this study. The analysis will be done on:

- the washed residue (< 500 µm) of the superficial part (10 - 15 cm) of at least 1 or 2 elements of the multibox corer;
- the washed residue (< 500 µm) of the lower part of at least 4 - 5 elements of the multibox corer,
  to define composition and structure of the thanatocoenoses and taphocoenoses, and on:
- 100 cm^3 of the superficial sediment;
- 100 cm^3 of the sediment of the lower part
  for granulometrical analysis to define the relationship of communities and palaeocommunities with sediments.

Moreover samples have been partially sorted at the Instituto de la Patagonia of the University of Magallanes in Punta Arenas. This work was carried out together with other researchers of the Instituto de la Patagonia and of the AWI.

The second part of the campaign was devoted to on-land activities to look for and sample both Recent infralittoral faunas and fossiliferous Quaternary sediment, paying particular attention to marine terraces. To do this, a car was rented between 23 and 28 October.

Sampling was executed in Patagonia to the north of Punta Arenas till Punta Dungeness, situated on the Atlantic entrance of the Magellan Strait. Several fossiliferous outcrops have been located and sampled. Most of them were located very close to the coast, often in correspondance with terraces or coastal dunes. In particular, the following localities have been sampled: Cabo Porpesse, to the North of Bahía Laredo; Cabo S. Gregorio; Punta Tandy, along Bahía Posesión; Punta Danien and Bahía S. Jago. Most of the shell beds outcropping in these localities are within palaeosoils and show some features such as the presence of big specimens of a few edible species (among them *Mytilus edulis chilensis*, *Nacella magellanica* and *Adelomelon* sp.), particular types of shell fractures, association with vertebrate bones and lithic manufacture, which allow us to refer them to "conchales" which represent meal remains of ancient local human populations.

One outcrop appeared particularly interesting owing to the presence of both typically marine to brackish and fresh water faunas. Its study would allow to reconstruct the evolution of some sectors of the coast, probably influenced by a general uplift. In such sectors the bildung up of coastal bars led to the formation of lagoons whose previous connections with the open sea were successively cut off to form brackish to fresh water basins which progressively rose to the present position (several metres above the sea level).

Samples were taken in all the outcrops, also from the "conchales", and their study (palaeoecological analysis and dating) will allow us a better definition of their meaning. From the same sites also samples of Recent faunas were taken essentially in the mesolittoral Zone. These samples will be used for comparisons to increase the knowledge of the evolution of coastal palaeocommunities during the Quaternary age in relation with the coastline evolution.

During the last days, the SW part of the Punta Arenas Basin was studied till Bahía San Juan, south of Puerto Hambre, co-operating with divers of the other Italian Units (Genova, Napoli, Pisa) and with German researchers. At several localities along the coast, some samples of mesolittoral and upper infralittoral benthos were collected, to 5 m depth, essentially for mollusks and calcareous algae. The latter seem to be particularly interesting and suggest a very rheophylous environment.

A more detailed analysis of the samples in the laboratory will allow us to arrive at more precise conclusions. Moreover, it will be important to integrate these data with new collections during the next expeditions, above all concerning both deeper communites and palaeocommunities, and coastal and fossil communites from Tierra del Fuego.

2.4.2 Evolutive stasis of a benthic community during the retraction of the Magellan Province: Analysis of an assemblage of organisms with hard skeletons from the Plio- Pleistocene and recent limits

Claudio Valdovinos Zarges, Centro EULA-Chile, University of Concepción, Chile

Summary of advanced work

The objective of this research has been to test the hypothesis of an evolutive stasis of a soft-bottom benthic community in southern Chile, through the comparative study of an assemblage of organisms with hard skeletons characterized mainly by *Eurhomalea exalbida, Tindariopsis elegans* and *Magellania (Neothyris) venosa*, existing in fossil state at the Tubul Formation, central Chile (36°S lat.; limit Plio-Pleistocene), with those of the same type from the Magellan Strait, southern Chile (43°S lat.; Recent).

The fossil collections of the Tubul Formation from the Palaeontology Museum of the University of Concepción, and samples obtained during the first leg of the "Victor Hensen" cruise in the Magellan Strait (track Laredo Bay - Gente Grande Bay), have been studied. Table 11 summarizes the principal characteristics of the studied areas, the sampling methods and the present location of the specimens.

Table 11: Summary of the principal characteristics of the studied areas, the sampling methods and the location of the specimens.

Geographic Area	TUBUL, Central Chile (36°S)	MAGELLAN STRAIT, Track Laredo Bay-Gente Grande Bay (53°S)
Stations	TUBUL/1	VHE/834, VHE/812, VHE/806
Geologic Age	Plio-Pleistocene	Recent
Campaigns	University of Concepción	Magellan "Victor Hensen" Campaign (Alfred Wegener Institute)
Date	1979-1995	October, 1994
Sampling Methods	Manual (macrofossils)	Agassiz trawl (macrofauna with hard parts)
Location of Samples	Geology Department, University of Concepción, Chile	Zoology Museum, Department of Zoology, University of Concepción, Chile

The comparative study of the two assemblages of morphospecies (Tubul Formation and Magellan Strait) is summarized in Table 12. Up to this moment, the results suggest the following: a) The structural characteristics of the species and the assemblage of species have been preserved constant despite their important spatial and temporal separation; b) From the biogeographic point of view, the Magellan Province retracted from 36°S to 43°S (ca. 2000 km to the south) from the Plio-Pleistocene to Recent. This reflects important global palaeoceanographic changes related to the last glaciation.

Table 12: Species composition and number of specimens studied by area. Without ( ) = number of specimens with soft parts; in ( ) = only skeletons.

CLASS	SPECIES	TUBUL/1	VHE/834	VHE/812	VHE/806
Polyplacophora	Lepidopleuridae indet.			5	2
	Chitonidae indet.			5	
Bivalvia	*Tindariopsis elegans* (Hupé, 1854)	(150)	(1)	15(25)	6(9)
	Ennucula araucana (Phillippi, 1887) (fossil)	(15)	24(42)		(1)
	Malletia patagonica Mabille & Rochebrune, 1889	(1)	(4)		
	Kennerlia patagonica Dall, 1915	(18)	(16)38	3(1)	3(5)
	Ensis macha Molina, 1782	(2)			
	Darina solenoides King, 1831	(3)			
	Mytius edulis chilensis Hupé, 1854	(1)	(4)		
	Chlamys patagonica (King & Broderip, 1832)	(25)	19(13)	16(5)	1(1)
	Eurhomalea exalbida (Chemnitz, 1795)	(43)	(5)	(22)	(1)
	Cyclocardia velutina (Smith, 1881)	(31)	6(57)	(2)	(2)

Table 12: continued

	Hyatella solida (Sowerby, 1834)		6	1	
	Montacutidae indet.			2(1)	
Scaphopoda	*Dentalium* sp.	(3)			
Gastropoda	*Puncturella conica* (d'Orbigny)			5	
	Calyptraea pileolus	(1)	4	1	
	Photinastoma taeniata (Wood, 1825)			6	1
	Oliva peruviana	(1)			
	Fusitriton magellanicus (Roeding, 1798)	(3)	1		
	Natica patagonica Phillippi	(12)		(8)	2
	Adelomelon ancilla (Solander, 1786)	(1)	1	3	2(1)
	Rapana (Chorus) giganteus	(1)			
	Bulla sp.	(1)			
	Trophon plicatus (Solander in Lightfoot, 1786)	(5)			(10)
	Nassarius vallentini (Melv. & Stand., 1907)	(2)			
	Pareuthria fuscata (Bruguière, 1789)	(1)			
	Bela paessieri	(1)			
	Epitorium sp.	(5)			
	Paraeuthria plumbea (Philippi, 1844)	(2)		1(3)	
	Muricidae incet. 1	(5)			
	Ademete sp.	(1)		(7)	
Crustacea	*Balanus psittacus*	(58)	(1)	(55)	(12)
	Brachyura sp. 1	(1)	10	1	
	Pagurus comptus White, 1847	(1)		14	1
	Eurypodius longirostris Miers, 1886				1
Ophiuroidea	Ophiuroidea indet.			(1)	
Echinoidea	*Pseudechinus magellanicus?*	(5)		1	
	Arbacia dufresni *Echinoidea indet.* (irregular)	(1)?	12		5
Brachiopoda	*Magellania (Neothyris) venosa* Solander, 1786 *Magellania sp.*	(45)	6(3)	14(5)	6(1) (3)
Polychaeta	Terebellidae indet.1	(1)	(1)		1
	Serpulidae indet. 2	(5)	8(45)	5(4)	(5)

3. Annexes

Abbreviations of the different gears

AGT	Agassiz trawl
BO	Bongo net
CM	Current meter
CTD	Hydrographic profiler
D	Small dredge
EBS	Epibenthic sled
FS	Underwater camera (Gutt)
LS	Light meter
MG	Multigrab (macrobenthos)
MN	Multinet
MUC	Multicorer (meiobenthos)
PN	Small phytoplankton net
T	Baited trap (small crustaceans)
UWC	Underwater camera (Rauschert)
WS	Niskin bottles (water samples)

Table 13: List of stations on board "Victor Hensen"

LEG	Station No.	Gear	Date 1994	Time from	Time on board	Location	Position from board Lat. S	Position from board Long. W	Position on board Lat. S	Position on board Long. W	Depth [m] from	Depth [m] on board	Weather	Failure
LEG 1	805	AGT	17.10.	14:53	15:08	Estrecho, Laredo	52°57,9	70°47,2	52°57,8	70°46,4	14	22	SSE 3	
LEG 1	806	AGT	17.10.	15:45	16:00	Estrecho, Laredo	52°58,2	70°42,3	52°58,0	70°04,2	123	111	S 4	
LEG 1	807	MG	18.10.	11:42		Estrecho, Laredo	52°57,9	70°47,2			14		S 4	
LEG 1	808	UWC	18.10.	12:26	13:02	Estrecho, Laredo	52°57,9	70°41,9	52°57,7	70°42,0	107	95	S 3	
LEG 1	809	CTD	18.10.	13:10	13:16	Estrecho, Laredo	52°57,9	70°41,8			104		S 3	
LEG 1	810	MUC	18.10.	13:25		Estrecho, Laredo	52°58,0	70°41,9			107		S 3	
LEG 1	811	MG	18.10.			Estrecho, Laredo								+
LEG 1	811	MG	18.10.	13:49		Estrecho, Laredo	52°58,4	70°42,2			122		S 3	
LEG 1	812	AGT	18.10.	14:19	14:34	Estrecho, Laredo	52°58,1	70°40,2	52°57,7	70°40,7	125	105	S 3	
LEG 1	813	D	18.10.	14:57	15:02	Estrecho, Laredo	52°57,5	70°41,0			90		S 3	
LEG 1	814	MUC	18.10.			Estrecho, Laredo								+
LEG 1	815	CTD	18.10.	16:16		Estrecho, Laredo	52°57,9	70°32,9			49		S 5	+
LEG 1	815	CTD	18.10.	16:22		Estrecho, Laredo	52°57,9	70°32,7			50		S 5	
LEG 1	816	AGT	18.10.	16:35	16:50	Estrecho, Laredo	52°57,8	70°32,3	52°58,0	70°31,9	54	60	S 4	
LEG 1	817	CTD	19.10.	12:29		Estrecho, Gente Grande	53°02,7	70°17,0			8		W 5	
LEG 1	818	MUC	19.10.	12:35		Estrecho, Gente Grande	53°02,6	70°17,2			8		W 5	
LEG 1	819	UWC	19.10.	12:44	13:20	Estrecho, Gente Grande	53°02,5	70°17,3			8		W 5	
LEG 1	820	MG	19.10.	14:06		Estrecho, Gente Grande	53°02,5	70°17,1			8		SW5	
LEG 1	821	AGT	19.10.	14:19	14:34	Estrecho, Gente Grande	53°01,4	70°17,1	53°01,9	70°17,1	9		SW5	
LEG 1	822	D	19.10.	14:55	15:00	Estrecho, Gente Grande	53°02,5	70°17,1	53°02,4	70°07,0	8		SW5	
LEG 1	823	UWC	19.10.	15:40		Estrecho, Gente Grande	53°12,9	70°17,4			9		SW5	
LEG 1	824	CTD	20.10.	10:55	11:00	Estrecho, P. Ancho St. 19	53°08,4	70°38,3			123		S5/6	
LEG 1	825	BO	20.10.	11:45	12:00	Estrecho, P. Ancho St. 19	53°08,4	70°38,3	53°09,9	70°39,3	139		S5/6	
LEG 1	826	CTD	21.10.	5:30	5:55	Estrecho, Bahía Voces	53°46,7	70°48,5			534		SSW 7	
LEG 1	827	BO	21.10.	6:12	7:10	Estrecho, Bahía Voces	53°47,2	70°49,1	53°48,5	70°51,0	534		SSW 7	
LEG 1	828	LS	21.10.	9:15	9:40	Estrecho, Bahía Voces	53°47,2	70°48,2			534		SSW 7	
LEG 1	829	CTD +WS	21.10.	10:29	11:25	Estrecho, Bahía Voces	53°46,7	70°48,6			532		SSW 7	
LEG 1	830	CTD	21.10.	14:23	14:35	Estrecho, Bahía Voces	53°42,6	70°48,7			540		SSW 7	
LEG 1	831	BO	21.10.	14:42	15:12	Estrecho, Bahía Voces	53°42,9	70°48,9	53°43,6	70°49,4	542		SSW 7	
LEG 1	832	WS	21.10.	15:15	15:33	Estrecho, Bahía Voces	53°43,7	70°49,5			519		SSW 7	
LEG 1	833	CTD	23.10.	9:00	9:14	Estrecho, P. Ancho St. 19	53°08,4	70°38,3			120		W 6	
LEG 1	834	AGT	23.10.	9:15	9:30	Estrecho, P. Ancho St. 19	53°08,3	70°38,7	53°08,2	70°39,0	120		W 6/7	
LEG 1	835	WS	23.10.	9:43	10:16	Estrecho, P. Ancho St. 19	53°08,4	70°38,3			120		W 6/7	
LEG 1	836	MG	23.10.	10:23		Estrecho, P. Ancho St. 19	53°08,4	70°38,4			120	120	W 6/7	
LEG 1	837	BO	23.10.	10:40	10:53	Estrecho, P. Ancho St. 19	53°08,3	70°38,7	53°08,2	70°39,0	120	120	W 6/7	
LEG 1	838	MN	23.10.	11:24	11:48	Estrecho, P. Ancho St. 19	53°08,2	70°39,2	53°07,9	70°40,3	115	122	W 6/7	
LEG 1	839	LS	23.10.	12:12	12:20	Estrecho, P. Ancho St. 19	53°08,5	70°38,4			120		W 6/7	
LEG 1	840	MUC	23.10.	12:26	12:34	Estrecho, P. Ancho St. 19	53°08,8	70°38,4			123		W 6/7	
LEG 1	841	UWC	23.10.	12:45	13:07	Estrecho, P. Ancho St. 19	53°08,5	70°38,4			120		W 6/7	
LEG 1	842	WS	23.10.	13:10	13:32	Estrecho, P. Ancho St. 19	53°08,9	70°38,8			122		W 6/7	
LEG 1	843	D	23.10.	13:38	13:43	Estrecho, P. Ancho St. 19	53°09,2	70°39,2	53°09,4	70°39,6	127		W 6/7	
LEG 1	844	CTD	23.10.	14:50	14:53	Estrecho, P. Ancho St. 18	53°21,0	70°42,8			202		W 6/7	+
LEG 1	845	AGT	23.10.	15:05	15:20	Estrecho, P. Ancho St. 18	53°21,3	70°43,2	53°21,6	70°43,6	201	190	W 6/7	+
LEG 1	846	AGT	23.10.	15:44	15:59	Estrecho, P. Ancho St. 18	53°21,3	70°43,3	53°21,6	70°43,7	200	190		
LEG 1	847	MUC	23.10.	16:23		Estrecho, P. Ancho St. 18	53°21,2	70°42,7			200		W 6/7	
LEG 1	848	MG	23.10.	16:45		Estrecho, P. Ancho St. 18	53°21,5	70°42,4			203		W 6/7	+
LEG 1	848	MG	23.10.	16:54		Estrecho, P. Ancho St. 18	53°21,6	70°42,9			205		W 6/7	+
LEG 1	848	MG	23.10.	17:03		Estrecho, P. Ancho St. 18	53°21,7	70°42,9			206		W 6/7	+
LEG 1	848	MG	23.10.	17:09		Estrecho, P. Ancho St. 18	53°21,8	70°43,0			205		W 6/7	+
LEG 1	849	D	23.10.	17:35	17:41	Estrecho, P. Ancho St. 18	53°22,3	70°43,9	53°22,4	70°44,0	189		SW 6	
LEG 1	850	BO	23.10.	21:23	21:36	Estrecho, P. Ancho St. 19	53°08,1	70°38,6	53°07,9	70°39,9	118		W 7/8	
LEG 1	851	WS	23.10.	21:52	22:25	Estrecho, P. Ancho St. 19	53°08,4	70°38,2			120		W 4/5	
LEG 1	852	MN	23.10.	23:40	0:35	Estrecho, P. Ancho St. 19	53°08,4	70°38,5			119	140	SW 5/6	
LEG 1	853	BO	24.10.	0:52	1:05	Estrecho, P. Ancho St. 19	53°08,5	70°38,8	53°08,4	70°39,5	118	119	W 5	
LEG 1	854	BO	24.10.	1:14	1:35	Estrecho, P. Ancho St. 19	53°08,5	70°40,0	53°08,5	70°40,3	119	128	W 5	
LEG 1	855	WS	24.10.	1:48	2:20	Estrecho, P. Ancho St. 19	53°08,5	70°38,4			121		W 7	
LEG 1	856	BO	24.10.	3:07	3:21	Estrecho, P. Ancho St. 19	53°08,6	70°38,6	53°08,7	70°39,3	121	124	W 7	
LEG 1	857	WS	24.10.	3:28	3:55	Estrecho, P. Ancho St. 19	53°08,4	70°38,6			121		W 7	
LEG 1	858	BO	24.10.	5:05	5:15	Estrecho, P. Ancho St. 19	53°08,4	70°38,4	53°08,4	70°39,1	123		W 6/7	
LEG 1	859	WS	24.10.	5:18	5:51	Estrecho, P. Ancho St. 19	53°08,4	70°38,3			122		W 7	
LEG 1	860	BO	24.10.	6:55	7:10	Estrecho, P. Ancho St. 19	53°08,3	70°38,1	53°08,3	70°38,6	120		W 6/7	
LEG 1	861	AGT	24.10.	14:40	14:52	Estrecho, off Pta Arenas	53°10,2	70°52,9	53°10,2	70°53,2	26	24	W 8/9	
LEG 1	862	MN	24.10.	16:55	17:02	Estrecho, off Pta Arenas	53°10,8	70°50,5			136		W 8	
LEG 1	863	AGT	25.10.	7:14	7:30	Estrecho, Bahía Voces	53°43,1	70°49,7	53°43,2	70°50,0	527		SW 7/8	
LEG 1	864	MUC	25.10.	8:30		Estrecho, Bahía Voces	53°42,6	70°48,7			550		SW 7/8	
LEG 1	865	AGT	25.10.	9:16	9:31	Estrecho, Bahía Voces	53°41,3	70°53,6	53°51,5	70°53,8	478		SW 6	
LEG 1	866	MUC	25.10.	10:05		Estrecho, Bahía Voces	53°41,8	70°54,6			440		SSW 4	
LEG 1	867	MG	25.10.	10:29		Estrecho, Bahía Voces	53°40,7	70°54,6			445		SW 5/6	
LEG 1	868	D	25.10.	11:02	11:17	Estrecho, Bahía Voces	53°42,3	70°54,4	53°42,5	70°54,5	470	465	SW 5/6	
LEG 1	869	AGT	25.10.	12:30	12:45	Estrecho, Bahía Voces	53°41,7	70°55,9	53°42,1	70°56,1	336	316	SW 6/7	
LEG 1	870	AGT	25.10.	13:23	13:38	Estrecho, Bahía Voces	53°41,7	70°55,7	53°42,1	70°46,0	338	332	SW 5	
LEG 1	871	FS	25.10.	14:05		Estrecho, Bahía Voces	53°42,8	70°56,1			310		SW 6	
LEG 1	872	MUC	25.10.	15:07		Estrecho, Bahía Voces	53°43,4	70°56,0			351		SW 6	
LEG 1	873	MG	25.10.	15:52		Estrecho, Bahía Voces	53°43,9	70°56,5			304		SW 8	+
LEG 1	874	D	25.10.	16:28	18:33	Estrecho, Bahía Voces	53°43,6	70°56,1	53°43,7	70°56,1	335	305	SW 7	
LEG 1	875	AGT	25.10.	17:15	17:30	Estrecho, Bahía Voces	53°42,1	70°56,5	53°42,6	70°56,5	240	249	WSW 3/4	
LEG 1	876	MG	25.10.	18:49		Estrecho, Bahía Voces	53°41,3	70°56,3			225		W 5/8	+
LEG 1	877	MUC	25.10.	19:08		Estrecho, Bahía Voces	53°41,5	70°56,5			227		W 5/8	
LEG 1	878	D	25.10.	19:28	19:33	Estrecho, Bahía Voces	53°41,7	70°56,4	53°41,9	70°56,5	260		W 5/8	
LEG 1	879	FS	26.10.	8:08	8:47	Estrecho, Bahía Voces	53°41,9	70°57,1	53°42,2	70°57,1	132	?	W 5/8	
LEG 1	880	FS	26.10.	8:58	9:45	Estrecho, Bahía Voces	53°42,6	70°57,4	53°43,0	70°57,5	56	46	W 5/8	
LEG 1	881	AGT	26.10.	10:02	10:17	Estrecho, Bahía Voces	53°42,0	70°57,4	53°42,4	70°57,5	60	53	W 5/8	
LEG 1	882	MG	26.10.	10:38		Estrecho, Bahía Voces	53°42,5	70°57,5			60		W 5/8	+
LEG 1	883	MUC	26.10.	10:55		Estrecho, Bahía Voces	53°42,6	70°57,5			52		W 5/8	
LEG 1	884	D	26.10.	11:07	12:00	Estrecho, Bahía Voces	53°42,6	70°57,5	53°42,7	70°57,6	51		W 5/8	
LEG 1	885	FS	26.10.	12:05	12:45	Estrecho, Bahía Voces	53°42,7	70°56,6			246		SW 9	
LEG 1	886	MUC	26.10.	13:05	13:20	Estrecho, Bahía Voces	53°41,8	70°57,2			103	118	SW 6	+
LEG 1	887	D	26.10.	13:20	13:26	Estrecho, Bahía Voces	53°42,2	70°57,2			100	105	SW 6	
LEG 1	888	AGT	26.10.	13:45	14:00	Estrecho, Bahía Voces	53°42,8	70°57,4	53°43,2	70°57,2	100	108	SW 7	
LEG 1	889	MG	26.10.	14:31	.	Estrecho, Bahía Voces	53°42,7	70°57,3			114		SW 7	
LEG 1	890	FS	26.10.	14:56	15:25	Estrecho, Bahía Voces	53°41,1	70°57,2			55 (85)	40	SW 9	
LEG 1	891	CTD	26.10.	23:30	23:55	Estrecho, P. Ancho St. 19	53°08,2	70°38,2			118		WSW 6	
LEG 1	892	WS	26.10.	23:56	23:59	Estrecho, P. Ancho St. 19	53°08,0	70°38,4			118		WSW 6	

Table 13: continued

LEG 1	893	BO	27.10.	0:36	0:55	Estrecho, P. Ancho St. 19	53°08,0	70°39,2			112		SW 6	
LEG 1	894	CTD	27.10.	2:00	2:07	Estrecho, P. Ancho St. 19	53°08,3	70°37,8			117		SW 5	
LEG 1	895	WS	27.10.	2:11	2:27	Estrecho, P. Ancho St. 19	53°08,4	70°37,9			118		SW 6	
LEG 1	896	BO	27.10.	2:47	3:00	Estrecho, P. Ancho St. 19	53°08,7	70°37,9			118		SW 6	
LEG 1	897	CM	27.10.	4:00	4:12	Estrecho, P. Ancho St. 19	53°08,3	70°38,3			118		SW 4/5	
LEG 1	898	CTD	27.10.	4:16	4:21	Estrecho, P. Ancho St. 19	53°08,5	70°38,4			117		SW 4/5	
LEG 1	899	WS	27.10.	4:24	4:45	Estrecho, P. Ancho St. 19	53°08,6	70°38,5			120		SW 4/5	
LEG 1	900	CTD	27.10.	4:46	4:51	Estrecho, P. Ancho St. 19	53°08,8	70°38,7			120		SW 6	
LEG 1	901	BO	27.1o	4:55	5:05	Estrecho, P. Ancho St. 19	53°08,9	70°38,8			120		SW 7	
LEG 1	902	CTD	27.10.	6:02	6:10	Estrecho, P. Ancho St. 19	53°08,3	70°38,4			119		SW 6	
LEG 1	903	WS	27.10.	6:18	6:45	Estrecho, P. Ancho St. 19	53°08,4	70°38,7			119		SW 6	
LEG 1	904	BO	27.10.	6:50	7:01	Estrecho, P. Ancho St. 19	53°08,6	70°39,1			121		SW 7	
LEG 1	905	CM	27.10.	9:00	9:17	Estrecho, P. Ancho St. 19	53°08,3	70°38,2			119		SSW 7	
LEG 1	906	CTD	27.10.	9:20	9:24	Estrecho, P. Ancho St. 19	53°08,3	70°38,2			119		SSW 7/8	
LEG 1	907	WS	27.10.	9:34	10:00	Estrecho, P. Ancho St. 19	53°08,2	70°38,3			119		SSW 7/8	
LEG 1	908	BO	27.10.	10:09	10:21	Estrecho, P. Ancho St. 19	53°08,2	70°38,7			118		SSW 7/8	
LEG 1	909	WS	27.10.	12:35	13:05	Estrecho, P. Ancho St. 19	53°08,3	70°38,1			120		SSW 7	
LEG 1	910	BO	27.10.	13:10	13:20	Estrecho, P. Ancho St. 19	53°08,3	70°38,0			118		SSW 6	
LEG 1	911	CTD	27.10.	13:24	13:30	Estrecho, P. Ancho St. 19	53°08,7	70°37,9			121		SSW 6/5	
LEG 1	912	LS	27.10.	13:35	13:42	Estrecho, P. Ancho St. 19	53°09,0	70°37,8			121		SSW 6/5	
LEG 1	913	CTD	27.10.	15:01	15:05	Estrecho, P. Ancho St. 19	53°08,5	70°38,2			120		SSW 7/8	
LEG 1	914	WS	27.10.	15:07	15:30	Estrecho, P. Ancho St. 19	53°08,6	70°38,2			120		SSW 7/8	
LEG 1	915	BO	27.10.	15:36	15:51	Estrecho, P. Ancho St. 19	53°09,1	70°38,4			122		SSW 7/8	
LEG 1	916	MG	28.10.	8:57		Estrecho, off Pta Arenas	53°10,2	70°52,3			26		var. 2	
LEG 1	917	FS	28.10.	9:09	9:50	Estrecho, off Pta Arenas	53°10,2	70°52,1			29		var. 2	
LEG 1	918	WS	28.10.	12:00	12:15	Estrecho, Gente Grande	52°56,5	70°17,9			22		var. 2	
LEG 1	919	BO	28.10.	12:20	12:30	Estrecho, Gente Grande	52°56,5	70°18,1			22		var. 2	
LEG 1	920	AGT	28.10.	12:38	12:53	Estrecho, Gente Grande	52°56,8	70°18,9	52°57,1	70°19,8	19	17	var. 2	
LEG 1	921	FS	28.10.	13:07		Estrecho, Gente Grande	52°56,9	70°19,2			19		var. 2	
LEG 1	922	MUC	28.10.	13:34		Estrecho, Gente Grande	52°56,8	70°18,3			21		var. 2	+
LEG 1	923	MG	28.10.	13:50		Estrecho, Gente Grande	52°56,7	70°18,4			21		var. 2	
LEG 1	924	D	28.10.	13:58	14:07	Estrecho, Gente Grande	52°56,8	70°18,6			17		var. 2	
LEG 1	925	LS	28.10.	14:02		Estrecho, Gente Grande	52°56,9	70°18,8			17		var. 2	
LEG 1	926	AGT	28.10.	15:22	15:37	Estrecho, Laredo	52°57,5	70°25,5	52°57,5	70°26,9	40	58	var. 2	
LEG 1	927	FS	28.10.	15:54	16:20	Estrecho, Laredo	52°57,3	70°25,3			40		SW 2	
LEG 1	928	MG	28.10.	16:30		Estrecho, Laredo	52°57,8	70°25,6			44		SW 2	
LEG 1	929	MUC	28.10.	16:38		Estrecho, Laredo	52°57,9	70°25,7			45		SW 2	+
LEG 1	930	D	28.10.	16:54	16:56	Estrecho, Laredo	52°57,5	70°25,8			45		SW 2	
LEG 1	931	WS	28.10.	18:25	18:47	Estrecho, P. Ancho St. 19	53°08,5	70°38,5			118		S 4	
LEG 1	932	BO	28.10.	18:52	19:02	Estrecho, P. Ancho St. 19	53°08,6	70°38,5	53°08,9	70°38,9	122		S 4	
LEG 1	933	LS	29.10.	10:50	10:55	Estrecho, P. Hambre St. 14	53°42,6	70°49,3			535		calm	
LEG 1	934	WS	29.10.	18:25	18:55	Estrecho, Cabo Notch	53°27,2	72°46,9			635		W/N 5/6	
LEG 1	935	CTD	29.10.	19:00	19:18	Estrecho, Cabo Notch	53°27,2	72°46,8			636		W/N 7	
LEG 1	936	WS	29.10.	19:22	19:28	Estrecho, Cabo Notch	53°27,3	72°46,8			636		W/N 7	
LEG 1	937	CM	29.10.	19:30	19:46	Estrecho, Cabo Notch	53°27,3	72°46,8			637		W/N 7	
LEG 1	938	BO	29.10.	19:53	20:02	Estrecho, Cabo Notch	53°27,3	72°47,0			637		W 6/7	
LEG 1	939	WS	29.10.	20:27	20:50	Estrecho, off Isla Cateret	53°29,7	72°41,9			512		NW 4	
LEG 1	940	CM	29.10.	20:53	21:12	Estrecho, off Isla Cateret	53°29,5	72°42,5			568		NW 4	
LEG 1	941	BO	29.10.	21:14	21:21	Estrecho, off Isla Cateret	53°29,4	72°42,9			568		NW 4	
LEG 1	942	CTD	29.10.	21:47		Estrecho, Bahía White	53°31,4	72°38,2			554		WNW 4	
LEG 1	943	WS	29.10.	21:58	22:14	Estrecho, Bahía White	53°31,4	72°38,3			558		WNW 4	
LEG 1	944	CTD	29.10.	23:10		Estrecho, Ra. Anson	53°32,8	72°23,7			115		WNW 4	
LEG 1	945	WS	29.10.		23:50	Estrecho, Ra. Anson	53°33,0	72°23,5			193		W 4	
LEG 1	946	BO	29.10.	23:50		Estrecho, Ra. Anson	53°33,0	72°23,6			193		W 4	
LEG 1	947	CTD	30.10.	1:48	1:54	Estrecho, Rocas Canoas	53°46,3	71°59,6			306		var. 3	
LEG 1	948	BO	30.10.	1:55	2:06	Estrecho, Rocas Canoas	53°46,2	71°59,5			300		var. 3	
LEG 1	949	AGT	30.10.	9:05	9:20	Estrecho, off Pta Arenas	53°10,5	70°53,5	53°10,2	70°52,8	24		W 2	
LEG 1	950	D	30.10.	9:36	9:39	Estrecho, off Pta Arenas	53°10,2	70°52,7	53°10,3	70°52,8	26		W 2	
LEG 1	951	FS	31.10.	11:41	12:20	Estrecho, P. Ancho St. 20	52°59,0	70°33,1			82		var. 1	
LEG 1	952	AGT	31.10.	12:36	12:51	Estrecho, P. Ancho St. 20	52°59,4	70°33,0	53°58,8	70°32,5	77	69	var. 1	
LEG 1	953	MG	31.10.	13:12		Estrecho, P. Ancho St. 20	52°59,8	70°33,0			80		var. 1	
LEG 1	954	MUC	31.10.	13:23		Estrecho, P. Ancho St. 20	52°59,7	70°33,0			79		var. 2	
LEG 1	955	D	31.10.	13:36	13:41	Estrecho, P. Ancho St. 20	52°59,7	70°32,8	53°59,8	70°32,9	70	80	WSW 2	
LEG 1	956	MUC	31.10.	13:49		Estrecho, P. Ancho St. 20	52°59,9	70°32,9			80		WSW 2	(+)
LEG 1	957	FS	31.10.	14:28	15:03	Estrecho, Laredo	52°58,0	70°41,6			107		SW 6	
LEG 1	958	D	31.10.	15:09	15:12	Estrecho, Laredo	52°58,0	70°41,1	52°58,0	70°40,8	111	110	SW 3/4	
LEG 1	959	FS	31.10.	15:35	16:06	Estrecho, Laredo	52°57,9	70°43,3			46		SW 3/4	
LEG 1	960	AGT	31.10.	16:12	16:27	Estrecho, Laredo	52°57,9	70°43,4	52°58,2	70°43,7	36	35	SW 4/5	
LEG 1	961	MG	31.10.	16:45		Estrecho, Laredo	52°57,9	70°43,5			38		SW 5	
LEG 1	962	MUC	31.10.	16:52		Estrecho, Laredo	52°57,9	70°43,3			41		SW 5	
LEG 1	963	D	31.10.	17:03	17:06	Estrecho, Laredo	52°57,9	70°43,5			38		SW 5	
LEG 1	964	FS	31.10.	17:33	18:00	Estrecho, Laredo	52°57,8	70°46,8			15		SW 5	
LEG 1	965	MUC	31.10.	18:03		Estrecho, Laredo	52°57,9	70°46,8			14		SW 5	+
LEG 1	966	D	31.10.	18:08		Estrecho, Laredo	52°57,9	70°46,9			13		SW 5	
LEG 1	967	MUC	31.10.	18:19		Estrecho, Laredo	52°57,9	70°47,1			13		SW 5/6	+
LEG 1	968	FS	01.11.	8:35	9:07	Estrecho, P. Ancho St. 16	53°29,0	70°22,0	53°28,9	70°21,4	91		N 4	
LEG 1	969	AGT	01.11.	9:14	9:29	Estrecho, P. Ancho St. 16	53°28,8	70°21,2	53°28,6	70°20,9	95		N 4	
LEG 1	970	MG	01.11.	9:38		Estrecho, P. Ancho St. 16	53°29,1	70°22,1			93		N 4	+
LEG 1	971	MUC	01.11.	10:01		Estrecho, P. Ancho St. 16	53°28,9	70°21,9			90		N 4	+
LEG 1	972	D	01.11..	10:11	10:13	Estrecho, P. Ancho St. 16	53°28,8	70°21,9			92		N 4	
LEG 1	973	MG	01.11.	10:24		Estrecho, P. Ancho St. 16	53°28,6	70°21,8			86		N 4	+
LEG 1	974	MUC	01.11.	10:33		Estrecho, P. Ancho St. 16	53°28,5	70°21,7			82		N 4	+
LEG 1	975	MG	01.11.	10:42		Estrecho, P. Ancho St. 16	53°28,4	70°21,6			86		N 4	
LEG 1	976	AGT	01.11.	12:15	12:30	Estrecho, P. Ancho St. 15	53°32,8	70°39,4			460		N 3	
LEG 1	977	MUC	01.11.	13:14		Estrecho, P. Ancho St. 15	53°33,0	70°39,2			459		N 3	
LEG 1	978	MG	01.11.	13:35		Estrecho, P. Ancho St. 15	53°32,7	70°39,3			459		N 3	
LEG 1	979	D	01.11.	14:08	14:13	Estrecho, P. Ancho St. 15	53°32,9	70°39,2	53°31,9	70°39,1	462		N 3	
LEG 1	980	D	01.11.	15:55	16:05	Estrecho, Bahía Voces	53°42,7	70°50,1	53°42,5	70°50,2	522	524	N 3	
LEG 1	981	BO	01.11.	21:28	21:35	Estrecho, P. Ancho St. 19	53°08,5	70°38,4	53°08,4	70°38,1	121		N 2	
LEG 1	982	WS	01.11.	21:39		Estrecho, P. Ancho St. 19	53°08,5	70°38,1			121		N 2	
LEG 1	983	BO	01.11.	22:21	22:32	Estrecho, P. Ancho St. 19	53°09,2	70°38,5	53°09,0	70°38,4	121		N 2	
LEG 1	984	T	01.11.	23:15		Estrecho, P. Ancho	53°09,2	70°27,4			22		N 2	
LEG 1	985	WS	02.11.	0:10		Estrecho, P. Ancho St. 19	53°08,3	70°38,3			120		NNW 2	
LEG 1	986	BO	02.11.	0:45	0:58	Estrecho, P. Ancho St. 19	53°07,9	70°38,6			112		NNW 2	
LEG 1	987	WS	02.11.	2:30	3:00	Estrecho, P. Ancho St. 19	53°08,3	70°38,2			119		calm	
LEG 1	988	BO	02.11.	3:04	3:15	Estrecho, P. Ancho St. 19	53°07,7	70°38,3			109		calm	
LEG 1	989	BO	02.11.	4:29	4:34	Estrecho, P. Ancho St. 19	53°08,5	70°38,2			121		N 2	

Table 13: continued

LEG 1	990	BO	02.11.	4:44	4:54	Estrecho, P. Ancho St. 19	53°08,1	70°38,5			113		N 2	
LEG 1	991	WS	02.11.	5:08	5:35	Estrecho, P. Ancho St. 19	53°08,3	70°38,5			116		N 2	
LEG 1	992	BO	02.11.	5:49		Estrecho, P. Ancho St. 19	53°08,2	70°38,3			117		N 2	
LEG 1	993	T	02.11.	6:40		Estrecho, P. Ancho	53°09,2	70°27,4			22		NE 2	
LEG 1	994	WS	02.11.	9:00		Estrecho, P. Ancho St. 19	53°08,5	70°38,4			120		NE 2	
LEG 1	995	BO	02.11.	9:41	9:50	Estrecho, P. Ancho St. 19	53°08,5	70°38,4			120		NE 2	
LEG 1	996	WS	02.11.	10:00		Estrecho, P. Ancho St. 19	53°08,3	70°38,3			120		NE 2	
LEG 1	997	LS	02.11.	10:40	10:48	Estrecho, P. Ancho St. 19	53°08,5	70°38,5			120		N 2	
LEG 1	998	WS	02.11.	11:00		Estrecho, P. Ancho St. 19	53°08,6	70°38,3			122		N 2	
LEG 1	999	WS	02.11.	12:08		Estrecho, P. Ancho St. 19	53°08,5	70°38,2			121		calm	
LEG 1	1000	LS	02.11.	12:50	12:58	Estrecho, P. Ancho St. 19	53°08,5	70°38,2			121		calm	
LEG 2	1001	CTD	3.11.	10:32	10:47	C. Magdalena (Entrance)	53°59,8	71°01,6			216		NE 3/4	
LEG 2	1002	WS	3.11.	11:12		C. Magdalena (Entrance)	53°59,8	71°01,2			225		NE 3/4	
LEG 2	1003	LS	3.11.	11:14		C. Magdalena (Entrance)	53°59,8	71°01,0			239		NE 3/4	
LEG 2	1004	BO	3.11.	11:22	11:31	C. Magdalena (Entrance)	53°59,8	71°01,0	53°59,6	71°01,1	234		NE 3/4	
LEG 2	1005	CTD	3.11.	12:25		C. Magdalena	54°08,8	70°56,9			494		SE 2	
LEG 2	1006	WS	3.11.	12:36		C. Magdalena	54°09,2	70°56,4			492		SE 2	
LEG 2	1007	LS	3.11.	13:00		C. Magdalena	54°09,8	70°56,3			524		SE 2	
LEG 2	1008	BO	3.11.	13:12	13:23	C. Magdalena	54°09,2	70°56,2			486		SE 2	
LEG 2	1009	CTD	3.11.	14:23		C. Cockburn (E), Isla Jane	54°21,7	70°58,9			278		ENE 6	
LEG 2	1010	WS	3.11.	14:32		C. Cockburn (E), Isla Jane	54°21,1	70°59,4			284		ENE 6	
LEG 2	1011	LS	3.11.	14:55		C. Cockburn (E), Isla Jane	54°22,3	70°59,5			319		ENE 6	
LEG 2	1012	BO	3.11.	15:04	15:12	C. Cockburn (E), Isla Jane	54°22,5	70°59,8			271		ENE 6	
LEG 2	1013	CTD	3.11.	16:21		C. Cockburn	54°20,9	71°21,7			359		ENE 6	
LEG 2	1014	WS	3.11.	16:31		C. Cockburn	54°20,7	71°22,0			359		var.3	
LEG 2	1015	LS	3.11.	16:44		C. Cockburn	54°20,6	71°22,5			350		var. 3	
LEG 2	1016	BO	3.11.	16:54	17:04	C. Cockburn	54°20,5	71°22,6			305		var. 3	
LEG 2	1017	CTD	3.11.	18:30		C. Cockburn	54°24,1	71°53,5			711		ENE 5/6	
LEG 2	1018	WS	3.11.	19:15		C. Cockburn	54°24,1	71°53,6			711		ENE 5/6	
LEG 2	1019	BO	3.11.	19:19	19:28	C. Cockburn	54°24,1	71°53,5			711		ENE 5/6	
LEG 2	1020	CTD	3.11.	21:13		C. Brecknock	54°24,1	71°53,2			711		ENE 5/6	
LEG 2	1021	WS	3.11.	21:25		C. Brecknock	54°39,2	71°55,3			170		NE 2	
LEG 2	1022	BO	3.11.	21:46	21:56	C. Brecknock	54°39,2	71°55,3			100		NE 2	
LEG 2	1023	CTD	4.11.	0:53		C. Ballenero	54°48,2	71°04,3			377		SE 1/2	
LEG 2	1024	WS	4.11.	1:03		C. Ballenero	54°48,1	71°04,0			363		SE 1/2	
LEG 2	1025	BO	4.11.	1:18	1:26	C. Ballenero	54°48,1	71°03,6			384		calm	
LEG 2	1026	CTD	4.11.	7:04		C. Beagle, Garibaldi	54°52,8	69°55,2			300		NE 2	
LEG 2	1027	LS	4.11.	7:28		C. Beagle, Garibaldi	54°52,8	69°55,2			300		NE 2	
LEG 2	1028	WS	4.11.	7:29		C. Beagle, Garibaldi	54°52,8	69°55,2			300		NE 2	
LEG 2	1029	BO	4.11.	7:53	8:05	C. Beagle, Garibaldi	54°52,8	69°55,2			300		NE 2	
LEG 2	1030	FS	4.11.	8:09	8:45	C. Beagle, Garibaldi	54°52,7	69°54,6			370		NE 2	
LEG 2	1031	AGT	4.11.	9:00	9:05	C. Beagle, Garibaldi	54°52,7	69°55,1	54°52,7	69°54,9	304	330	NE 2	
LEG 2	1032	MG	4.11.	9:34		C. Beagle, Garibaldi	54°52,7	69°54,5			330		NE 2	
LEG 2	1033	MUC	4.11.	9:59		C. Beagle, Garibaldi	54°52,7	69°55,2			309		calm	
LEG 2	1034	D	4.11.	10:16		C. Beagle, Garibaldi	54°52,7	69°55,0			309		calm	
LEG 2	1035	FS	4.11.	10:40	11:15	C. Beagle, Garibaldi	54°50,9	69°56,0					calm	
LEG 2	1036	AGT	4.11.	12:30	12:35	C. Beagle, Garibaldi	54°51,0	69°56,1					calm	
LEG 2	1037	MG	4.11.	12:46		C. Beagle, Garibaldi	54°50,9	69°56,0			14		calm	+
LEG 2	1038	MG	4.11.	12:55		C. Beagle, Garibaldi	54°50,9	69°55,7			38		calm	
LEG 2	1039	MUC	4.11.	13:05		C. Beagle, Garibaldi	54°51,0	69°55,7			38		calm	
LEG 2	1040	D	4.11.	13:10	13:14	C. Beagle, Garibaldi	54°51,0	69°55,7	54°41,1	69°55,7	30	136	var. 2	
LEG 2	1041	FS	4.11.	13:36	14:18	C. Beagle, Garibaldi	54°51,7	69°55,5			192		var.2	
LEG 2	1042	AGT	4.11.	14:47	14:52	C. Beagle, Garibaldi	54°51,8	69°55,5	54°51,9	69°55,3	190	190	var.2	
LEG 2	1043	MG	4.11.	15:19		C. Beagle, Garibaldi	54°51,9	69°55,2			216		var.2	
LEG 2	1044	MUC	4.11.	15:30		C. Beagle, Garibaldi	54°51,9	69°55,4			189		var.2	+
LEG 2	1045	D	4.11.	15:47	15:50	C. Beagle, Garibaldi	54°51,8	69°55,6	54°51,9	69°55,5	186	210	var.2	
LEG 2	1046	AGT	4.11.	16:20	16:25	C. Beagle, Garibaldi	54°50,1	69°56,6	54°50,3	69°56,4	100	55	var.2	
LEG 2	1047	MG	4.11.	16:45		C. Beagle, Garibaldi	54°50,1	69°56,6			101		var.2	
LEG 2	1048	MUC	4.11.	16:54		C. Beagle, Garibaldi	54°50,1	69°56,6			98		var.2	
LEG 2	1049	CTD	4.11.	17:05		C. Beagle, Garibaldi	54°49,6	69°57,0			144		var.2	
LEG 2	1050	LS	4.11.	17:17		C. Beagle, Garibaldi	54°49,6	69°57,0			144		var.2	
LEG 2	1051	WS	4.11.	17:24		C. Beagle, Garibaldi	54°49,5	69°57,0			144		var.2	
LEG 2	1052	BO	4.11.	17:57	18:06	C. Beagle, Garibaldi	54°49,2	69°57,1	54°49,5	69°57,0	141	141	var.2	
LEG 2	1053	LS	4.11.	18:40		C. Beagle, Garibaldi	54°52,7	69°54,9			367		var.1/2	
LEG 2	1054	CTD	4.11.	18:45		C. Beagle, Garibaldi	54°52,7	69°54,9			367		var.1/2	
LEG 2	1055	WS	4.11.	19:14		C. Beagle, Garibaldi	54°52,7	69°55,0			367		var.1/2	
LEG 2	1056	BO	4.11.	19:18	19:25	C. Beagle, Garibaldi	54°52,7	69°54,7			372		var.1/2	
LEG 2	1057	FS	4.11.	19:42	20:12	C. Beagle, Garibaldi	54°50,9	69°56,1			207		var.1/2	
LEG 2	1058	FS	4.11.	20:36	21:15	C. Beagle, Garibaldi	54°51,8	69°55,3			200		var.1/2	
LEG 2	1059	CTD	4.11.	22:06		C. Beagle, Garibaldi	54°52,8	69°54,9			302		calm	
LEG 2	1060	WS/PN	4.11.	22:14		C. Beagle, Garibaldi	54°52,7	69°54,8			308		calm	
LEG 2	1061	BO	4.11.	22:35	22:44	C. Beagle, Garibaldi	54°52,7	69°54,7			370		calm	
LEG 2	1062	CTD	5.11.	0:01		C. Beagle, Garibaldi	54°52,7	69°55,6			300		var.1	
LEG 2	1063	WS/PN	5.11.	0:09		C. Beagle, Garibaldi	54°52,7	69°55,6			282		var.1	
LEG 2	1064	BO	5.11.	0:28	0:39	C. Beagle, Garibaldi	54°52,7	69°55,7			299		var.1	
LEG 2	1065	CTD	5.11.	1:58		C. Beagle, Garibaldi	54°52,7	69°56,4			209		var.1	
LEG 2	1066	WS/PN	5.11.	2:07		C. Beagle, Garibaldi	54°52,8	69°56,4			212		var.1	
LEG 2	1067	BO	5.11.	2:25	2:35	C. Beagle, Garibaldi	54°52,8	69°55,9			247		W4/5	
LEG 2	1068	CTD	5.11.	7:07		C. Beagle, Italia	54°55,8	69°014,8			175		W 4	
LEG 2	1069	LS	5.11.	7:17		C. Beagle, Italia	54°55,9	69°014,0			182		W 4	
LEG 2	1070	WS/PN	5.11.	7:53		C. Beagle, Italia	54°56,0	69°013,9			196		W 4	
LEG 2	1071	BO	5.11.	7:55	8:05	C. Beagle, Italia	54°55,9	69°014,3			198		W 4	
LEG 2	1072	FS	5.11.	8:21	8:50	C. Beagle, Italia	54°55,8	69°013,6			170	90	W 4	
LEG 2	1073	FS	5.11.	9:50	10:20	C. Beagle, Romanche	54°53,8	69°28,4			314		W4/5	
LEG 2	1074	AGT	5.11.	10:33	10:38	C. Beagle, Romanche	54°53,7	69°29,5	54°53,7	69°29,9	336		W 4	
LEG 2	1075	MG	5.11.	11:07		C. Beagle, Romanche	54°53,8	69°30,3			345		NW4	+
LEG 2	1076	MUC	5.11.	11:28		C. Beagle, Romanche	54°53,6	69°30,3			346		NW4	
LEG 2	1077	D	5.11.	11:49	11:51	C. Beagle, Romanche	54°53,4	69°30,5	54°53,4	69°30,5	347		NW4	
LEG 2	1078	MG	5.11.	12:36		C. Beagle, Romanche	54°53,5	69°31,0			348		var.2	
LEG 2	1079	FS	5.11.	13:05	13:40	C. Beagle, Romanche	54°53,0	69°31,0			93		var.2	
LEG 2	1080	AGT	5.11.	13:54	13:59	C. Beagle, Romanche	54°53,1	69°30,6	54°53,1	69°30,4	70	82	var.2	
LEG 2	1081	MG	5.11.	14:21		C. Beagle, Romanche	54°53,1	69°30,6			73		var.2	+
LEG 2	1082	MUC	5.11.	14:31		C. Beagle, Romanche	54°53,1	69°30,5			76		var.2	+
LEG 2	1083	D	5.11.	14:40	14:42	C. Beagle, Romanche	54°53,1	69°30,5	54°53,1	69°30,5	62	61	var.2	
LEG 2	1084	LS	5.11.	15:24		C. Beagle, Francia	54°55,3	69°019,9			268		var.2/6	
LEG 2	1085	FS	5.11.	15:34	16:15	C. Beagle, Francia	54°55,5	69°019,6			268		var.2/6	
LEG 2	1086	AGT	5.11.	16:27	16:33	C. Beagle, Francia	54°55,3	69°019,5	54°55,3	69°19,6	268	268	var.2/6	
LEG 2	1087	MG	5.11.	16:54		C. Beagle, Francia	54°55,3	69°019,7			169		N8/9	

Table 13: continued

LEG 2	1088	MUC	5.11.	17:08		C. Beagle, Francia	54°55,3	69°019,6			270		N8/9	
LEG 2	1089	D	5.11.	17:23	17:25	C. Beagle, Francia	54°55,4	69°019,8	54°55,4	69°19,8	272	270	N8	
LEG 2	1090	FS	5.11.	17:55		C. Beagle, Italia	54°56,1	69°013,9			206		var.1/2	
LEG 2	1091	LS	5.11.	18:50		C. Beagle, Italia	54°56,1	69°014,0			200		NW5/6	
LEG 2	1092	WS/PN	5.11.	19:00		C. Beagle, Italia	54°56,2	69°013,5			200		NW5/6	
LEG 2	1093	BO	5.11.	19:25		C. Beagle, Italia	54°55,9	69°014,1			200		NW5/6	
LEG 2	1094	CTD	5.11.	22:05		C. Beagle, Italia	54°55,9	69°013,7			170		NW5/6	
LEG 2	1095	WS/PN	5.11.	22:12		C. Beagle, Italia	54°55,8	69°013,6			160		NW5/6	
LEG 2	1096	BO	5.11.	22:38		C. Beagle, Italia	54°55,8	69°014,1			165		NW5/6	
LEG 2	1097	WS	6.11.	1:01	1:15	C. Beagle, Italia	54°55,9	69°014,3			200		NNW 5/6	
LEG 2	1098	BO	6.11.	1:17	1:19	C. Beagle, Italia	54°55,9	69°014,3			204		NNW 5/6	
LEG 2	1099	CTD	6.11.	4:00	4:05	C. Beagle, Italia	54°56,0	69°013,7			195		W 3/4	
LEG 2	1100	WS/PN	6.11.	4:07		C. Beagle, Italia	54°56,0	69°013,6			201		W 3/4	
LEG 2	1101	BO	6.11.	4:22	4:25	C. Beagle, Italia	54°56,1	69°013,1			207		W 3/4	
LEG 2	1102	CTD	6.11.	7:11		C. Beagle, Romanche	54°54,1	69°27,5			290		W 5	
LEG 2	1103	WS	6.11.	7:25		C. Beagle, Romanche	54°54,1	69°27,2					W 4/6	
LEG 2	1104	MG	6.11.	8:25		C. Beagle, Romanche	54°53,1	69°30,3			91		W böig	
LEG 2	1105	MUC	6.11.	8:53		C. Beagle, Romanche	54°53,2	69°30,4			116		W böig	+
LEG 2	1106	FS	6.11.		10:18	C. Beagle, Francia	54°55,0	69°019,5			100		W 4/5	
LEG 2	1107	AGT	6.11.	10:43	10:48	C. Beagle, Francia	54°55,0	69°019,5			100		W 4/5	
LEG 2	1108	MG	6.11.	11:08		C. Beagle, Francia	54°55,0	69°019,5			100		W 4/5	
LEG 2	1109	MUC	6.11.	11:20		C. Beagle, Francia	54°55,0	69°019,5			100		W 4/5	+
LEG 2	1110	D	6.11.	11:45	11:47	C. Beagle, Francia	54°54,9	69°019,3			96		W 4/5	
LEG 2	1111	CTD	6.11.	12:05		C. Beagle, Francia	54°55,6	69°018,3			245		W 6/7	
LEG 2	1112	WS	6.11.	12:14		C. Beagle, Francia	54°55,6	69°018,3			245		W 6/7	
LEG 2	1113	LS/PN	6.11.	12:47		C. Beagle, Francia	54°55,6	69°018,5			246		W6/7	
LEG 2	1114	BO	6.11.	12:58	13:15	C. Beagle, Francia	54°55,5	69°018,4			245		W 6/7	
LEG 2	1115	AGT	6.11.	13:40	13:45	C. Beagle, Italia	54°56,1	69°014,5			210		W 6/7	
LEG 2	1116	MG	6.11.	14:08		C. Beagle, Italia	54°56,1	69°014,2			191		W 6/7	+
LEG 2	1117	MUC	6.11.	14:25		C. Beagle, Italia	54°55,9	69°014,2			179		W 6/7	+
LEG 2	1118	MG	6.11.	14:48		C. Beagle, Italia	54°56,2	69°014,1			213		W 6/7	+
LEG 2	1119	D	6.11.	15:02	15:04	C. Beagle, Italia	54°56,0	69°014,3			208		W 6/7	
LEG 2	1120	AGT	6.11.	15:32	15:37	C. Beagle, Italia	54°55,6	69°015,0			97		W 6/7	
LEG 2	1121	AGT	6.11.	16:42	16:47	C. Beagle, Pta Yámana	54°58,7	69°01,1			215		W 8/9	
LEG 2	1122	MG	6.11.	17:07		C. Beagle, Pta Yámana	54°58,7	69°01,9			218		W 5	
LEG 2	1123	MUC	6.11.	17:18		C. Beagle, Pta Yámana	54°58,7	69°01,9			219		W 5	
LEG 2	1124	D	6.11.	17:30	17:32	C. Beagle, Pta Yámana	54°58,9	69°02,1			202		W 5/7	
LEG 2	1125	FS	6.11.	18:20	18:55	C. Beagle, Pta Yámana	54°58,8	69°01,0			234		W 5/6	
LEG 2	1126	LS	6.11.	19:15		C. Beagle, Pta Yámana	54°58,7	69°01,1			185		W 6/8	
LEG 2	1127	CTD	6.11.	19:29		C. Beagle, Pta Yámana	54°58,6	69°0,7			157		W 6/8	
LEG 2	1128	WS/PN	6.11.	19:39		C. Beagle, Pta Yámana	54°58,6	69°0,7			75		W 6/8	
LEG 2	1129	BO	6.11.	20:12	20:21	C. Beagle, Pta Yámana	54°58,6	69°0,8			172		W 6	
LEG 2	1130	CTD	6.11.	21:57		C. Beagle, Pta Yámana	54°58,7	69°0,2			240		W 5	
LEG 2	1131	WS	6.11.	22:11		C. Beagle, Pta Yámana	54°58,8	69°0,8			233		W 5	
LEG 2	1132	BO	6.11.	22:48	22:55	C. Beagle, Pta Yámana	54°58,8	69°01,1			231		W 8	
LEG 2	1133	AGT	7.11.	8:28	8:33	C. Beagle	54°57,9	68°49,7			258		W 5/8	
LEG 2	1134	MG	7.11.	8:55		C. Beagle	54°57,9	68°49,4			255		W 5/8	
LEG 2	1135	MUC	7.11.	9:15		C. Beagle	54°58,1	68°49,9			257		W 5/8	
LEG 2	1136	D	7.11.	9:35	9:37	C. Beagle	54°58,1	68°50,3			256		W 5/8	
LEG 2	1137	AGT	7.11.	10:40	10:45	C. Beagle, Yendegaia	54°54,6	68°38,9			320		W 5/8	
LEG 2	1138	MUC	7.11.	11:25		C. Beagle, Yendegaia	54°54,5	68°38,7			320		W 5/8	
LEG 2	1139	MG	7.11.	11:50		C. Beagle, Yendegaia	54°55,0	68°39,2			322		W 5/8	+
LEG 2	1140	D	7.11.	12:10	12:14	C. Beagle, Yendegaia	54°54,9	68°39,1			310		W 5/8	
LEG 3	1141	AGT	08.11.	12:11	12:23	I. Picton	55°08,7	66°54,7	55°08'8	66°55'8	112	113	WNW 2	
LEG 3	1142	AGT	08.11.	12:45	13:00	I. Picton	55°08,8	66°56,2	55°08'6	66°54'8	113	112	WNW 2	
LEG 3	1143	MG	08.11.	13:23		I. Picton	55°08,4	66°54,5			110		WNW 2	
LEG 3	1144	MUC	08.11.	13:35		I. Picton	55°08,4	66°54,5			110		WNW 2	
LEG 3	1145	D	08.11.	13:46	13:51	I. Picton	55°08,5	66°54,9			110		WNW 2	
LEG 3	1146	FS	08.11.	14:15	14:32	I. Picton	55°08,5	66°56,2			114		E 2	
LEG 3	1147	T	08.11.	14:38		I. Picton	55°08,4	66°56,6			115		E 2	
LEG 3	1148	FS	08.11.	15:04	15:20	Bahía Oglander	55°09,1	67°01,6			15		ENE 4	
LEG 3	1149	AGT	08.11.	15:33	15:38	Bahía Oglander	55°09,2	67°01,6			15		ENE 4	
LEG 3	1150	MUC	08.11.	15:54		Bahía Oglander	55°09,1	67°01,8			13		ENE 4	
LEG 3		MUC	08.11.	15:58		Bahía Oglander	55°09,1	67°01,8			13		ENE 4	
LEG 3	1151	MG	08.11.	16:04		Bahía Oglander	55°09,1	67°01,8			14		ENE 4	
LEG 3	1152	D	08.11.	16:10	16:13	Bahía Oglander	55°09,1	67°01,7			15		ENE 4/5	
LEG 3	1153	AGT	10.11.	9:06	9:20	Rada Picton	55°05,7	66°44,6			37		NW 5	
LEG 3	1154	MG	10.11.	9:40		Rada Picton	55°05,5	66°45,5			27		NW 5	
LEG 3	1155	MUC	10.11.	9:50		Rada Picton	55°05,4	66°45,5			27		NW 5	
LEG 3	1156	D	10.11.	9:55		Rada Picton	55°05,3	66°45,4			27		NW 5	
LEG 3	1157	MG	10.11.	17:13		Bahía Oglander	55°08,3	67°01,5			34		NW 4/8	
LEG 3	1158	AGT	10.11.	17:20	17:30	Bahía Oglander	55°08,1	67°01,5	55°08'1	67°01'6	35	31	NW 4/8	
LEG 3	1159	MUC	10.11.	17:40		Bahía Oglander	55°08,0	67°01,9			32		NNW 6	
LEG 3	1160	D	10.11.	17:50		Bahía Oglander	55°07,8	67°01,8			33		NNW 6	
LEG 3	1161	MG	11.11.	9:50		Paso Goree	55°19,4	67°04,6			23		NNW 6	
LEG 3	1162	AGT	11.11.	10:05	10:15	Paso Goree	55°19,0	67°04,8			25		NNW 6	
LEG 3	1163	FS	11.11.	10:45		Paso Goree	55°19,3	67°04,8			24		NNW 6	
LEG 3	1164	D	11.11.	10:53		Paso Goree	55°18,8	67°05,0			24		NNW 6	
LEG 3	1165	MG	11.11.	11:20		Paso Goree	55°18,6	67°08,5			42		NNW 7/8	
LEG 3	1166	MUC	11.11.	11:33		Paso Goree	55°18,4	67°08,7			39		NNW 7/8	
LEG 3	1167	FS	11.11.	11:37	12:00	Paso Goree	55°18,3	67°08,8			30		NNW 7/8	
LEG 3	1168	T	11.11.	13:18		I. Picton	55°08,4	66°56,5			116		NNW 7/8	
LEG 3	1169	MUC	11.11.	14:00		I. Picton	55°08,5	66°52,1			37		NW 4/5	
LEG 3	1170	MG	11.11.	14:15		I. Picton	55°08,7	66°51,9			40		NW 4/5	
LEG 3	1171	T	11.11.	14:23		I. Picton	55°08,8	66°51,8			40		NW 4/5	
LEG 3	1172	CTD	12.11.	10:02		Pta Rico	55°07,2	66°52,6			25		NW 2/3	
LEG 3	1173	MG	12.11.	10:15		Pta Rico	55°07,3	66°52,6			25		NW 2/3	
LEG 3	1174	MUC	12.11.	10:28		Pta Rico	55°07,3	66°52,7			25		NW 2/3	
LEG 3	1175	AGT	12.11.	10:50	11:05	Pta Rico	55°07,3	66°53,0			25		NW 2/3	
LEG 3	1176	D	12.11.	11:12		Pta Rico	55°07,3	66°53,0			25		NW 2/3	
LEG 3	1177	FS	12.11.	11:20	11:44	Pta Rico	55°07,3	66°52,7			25		var. 1/2	
LEG 3	1178	EBS	12.11.	11:57	12:02	Pta Rico	55°07,3	66°52,8			25	28	var. 1/2	
LEG 3	1179	CTD	12.11.	12:36	12:53	I. Picton	55°07,1	66°55,6			111		var. 1/2	
LEG 3	1180	MG	12.11.	13:05		I. Picton	55°07,0	66°55,4			110		var. 1/2	
LEG 3	1181	MUC	12.11.	13:14		I. Picton	55°07,0	66°55,4			110		var. 1/2	
LEG 3	1182	AGT	12.11.	13:30	13:40	I. Picton	55°07,1	66°55,5			110		var. 1/2	
LEG 3	1183	D	12.11.	13:53	13:58	I. Picton	55°06,5	66°55,5			109		var. 1/2	
LEG 3	1184	EBS	12.11.	14:13	14:23	I. Picton	55°06,8	66°55,5			110		SE 2/3	

Table 13: continued

LEG 3	1185	MN	12.11.	14:45	15:02	I. Picton	55°07,3	66°55,4	110		SE 2/3	
LEG 3	1186	CTD	12.11.	15:31		I. Picton	55°06,7	67°02,0	42		SE 2/3	
LEG 3	1187	MG	12.11.	15:47		I. Picton	55°06,6	67°02,0	39		SE 2/3	+
LEG 3	1188	MG	12.11.	15:55		I. Picton	55°06,6	67°02,0	39		SE 2/3	
LEG 3	1189	MUC	12.11.	16:01		I. Picton	55°06,6	67°02,0	38		SE 2/3	
LEG 3	1190	MUC	13.11.	14:05		I. Picton	55°06´6	67°02,0	38		N5/6	
LEG 3	1190	MUC	13.11.	14:12		I. Picton	55°06´7	67°02´0	39		N5/6	
LEG 3	1191	AGT	13.11.	14:25	14:30	I. Picton	55°06´9	67°01´7	39	52	N5/6	
LEG 3	1192	D	13.11.	14:46	14:50	I. Picton	55°06´7	67°01´6	40	55	N5/6	
LEG 3	1193	FS	13.11.	14:57	15:26	I. Picton	55°06´4	67°01´9	64	42	N6	
LEG 3	1194	EBS	13.11.	17:04	17:14	I. Picton	55°08´4	66°57´8	118		var.4	
LEG 3	1195	MUC	13.11.	17:34		I. Picton	55°08´0	66°58´1	121		var.4	
LEG 3	1196	MN	13.11.	17:45		I. Picton	55°08´0	66°58´1	121		var.4	
LEG 3	1197	EBS	13.11.	18:00	18:20	I. Picton	55°07´9	66°58´3	117		var.4	
LEG 3	1198	T	13.11.	18:45	19:03	I. Picton	55°08´8	66°51´8	38		SW2/3	
LEG 3	1199	T	13.11.	19:52		SE I. Picton	55°07´5	66°43´3	58		SW2/3	
LEG 3	1200	EBS	14.11.	8:15	8:30	I. Wollaston	55°38´5	67°12´9	40		W6/8	
LEG 3	1201	MUC	14.11.	8:47		I. Wollaston	55°38´6	67°13´5	39		W 6	
LEG 3	1202	MN	14.11.	9:05		I. Wollaston	55°38´4	67°12´5	40		W 6	
LEG 3	1203	AGT	14.11.	9:15	9:30	I. Wollaston	55°38´5	67°12´9	40		W 6	
LEG 3	1204	D	14.11.	9:48		I. Wollaston	55°38´4	67°12´4	40		W 6	
LEG 3	1205	FS	14.11.	9:55		I. Wollaston	55°38´5	67°12´6	40		W 6	
LEG 3	1206	EBS	14.11.	12:04	12:14	off Islas Barnevelt	55°48´1	66°58´4	66		W 7	
LEG 3	1207	MUC	14.11.	12:33		off Islas Barnevelt	55°48´1	66°58´7	67		W 7	
LEG 3	1208	FS	14.11.	12:38	13:09	off Islas Barnevelt	55°48´1	67°58´8	67		W 7	
LEG 3	1209	AGT	14.11.	13:35	13:50	off Islas Barnevelt	55°47´9	66°57´7	65		W 7	
LEG 3	1210	D	14.11.	14:04	14:08	off Islas Barnevelt	55°48´0	66°58´6	66		W 4	
LEG 3	1211	MN	14.11.	14:12	14:20	off Islas Barnevelt	55°48´0	66°58´8	67		W3/4	
LEG 3	1212	MN	15.11.	6:00		SE I. Picton	55°07,2	66°40,0	68		NNW 4	
LEG 3	1213	EBS	15.11.	6:20	6:33	SE I. Picton	55°06,9	66°39,9	63		NNW 4	
LEG 3	1214	MG	15.11.	6:50		SE I. Picton	55°07,2	66°40.0	66		NNW 4	
LEG 3	1215	AGT	15.11.	7:05	7:20	SE I. Picton	55°06,7	66°40,3	65		NNW 4	
LEG 3	1216	D	15.11.	7:40		SE I. Picton	55°07,2	66°40,2	67		N 4	
LEG 3	1217	FS	15.11.	8:05	8:30	SE I. Picton	55°07,0	66°40,0	67		N 4	
LEG 3	1218	T	15.11.	8:40		SE I. Picton	55°07,5	66°43,3	60		N 4	
LEG 3	1219	FS	15.11.	9:20	9:40	SE I. Picton	55°07,5	66°45,0	33		N 4	
LEG 3	1220	MG	15.11.	10:12		SE I. Picton	55°07,5	66°44,6	33		N 4	
LEG 3	1221	D	15.11.	10:30		SE I. Picton	55°07,6	66°44,6	33		NW 3	
LEG 3	1222	MN	15.11.	10:40		SE I. Picton	55°07,4	66°44,7	33		NW 3	
LEG 3	1223	AGT	15.11.	11:10	11:15	SE I. Picton	55°07,4	66°44,6	35		NW 3	
LEG 3	1224	FS	15.11.	12:40	13:07	I. Lennox	55°14,3	67°01,4	29		NW 2	
LEG 3	1225	AGT	15.11.	13:06	13:11	I. Lennox	55°14,4	67°01,0	24		NNW 2	
LEG 3	1226	T	15.11.	13:34		I. Lennox	55°14,3	67°00,4	24		NNW 2	
LEG 3	1227	T	17.11.	14:30		I. Lennox	55°14,3	67°00,4	24		SW 7/8	
LEG 3	1228	AGT	17.11.	17:35	17:40	I. Gardiner	55°00,8	66°54,6	30		var. 2	
LEG 3	1229	FS	17.11.	17:53	18:12	I. Gardiner	55°00,6	66°54,7	18		var. 2	
LEG 3	1230	T	17.11.	20:50		Pta Aarón	55°07,4	67°01,2	55		var. 2	
LEG 3	1231	T	18.11.	6:00	6:45	Pta Aarón	55°07,4	67°01,2	55		var. 2	
LEG 3	1232	D	18.11.	8:20		I. Gardiner	55°00,7	66°54,8	13		var. 1/2	
LEG 3	1233	MG	18.11.	8:40		I. Gardiner	55°00,3	66°53,7	100		var. 1/2	
LEG 3	1234	MUC	18.11.	8:55		I. Gardiner	55°00,4	66°53,6	100		var. 1/2	
LEG 3	1235	AGT	18.11.	9:07		I. Gardiner	55°00,5	66°53,4	100		NW 2/3	
LEG 3	1236	D	18.11.	9:53		I. Gardiner	55°00,5	66°53,3	100		NW 2/3	
LEG 3	1237	EBS	18.11.	10:15	10:30	I. Gardiner	55°00,5	66°53,1	103		NW 2/3	
LEG 3	1238	MN	18.11.	10:40		I. Gardiner	55°00,5	66°53,5	100		NW 2/2	
LEG 3	1239	FS	18.11.	11:02		I. Gardiner	55°00,5	66°53,6	100		NW 2/2	
LEG 3	1240	MG	18.11.	12:22		Rada Picton	55°04,6	66°48,2	33		NW 2/3	
LEG 3	1241	MUC	18.11.	12:28		Rada Picton	55°04,6	66°48,2	38		var. 1/2	
LEG 3	1242	AGT	18.11.	12:38	12:53	Rada Picton	55°04,6	66°47,8	31		var. 172	+
LEG 3	1243	FS	18.11.	13:07	13:22	Rada Picton	55°04,5	66°47,3	37		var. 1/2	
LEG 3	1244	MN	18.11.	13:28	13:35	Rada Picton	55°04,4	66°47,5	34		var. 1/2	
LEG 4	1245	MUC	19.11.	10:30		C. Beagle	54°57,9	68°49,6	254		N 4/5	
LEG 4	1246	EBS	19.11.	10:55	11:20	C. Beagle	54°58,0	68°49,3	253		N 4/5	
LEG 4	1247	EBS	19.11.	12:37	12:47	C. Beagle	54°59,4	69°04,6	100		calm	
LEG 4	1248	EBS	19.11.	13.34	13:44	C. Beagle	54°58,8	69°01,8	217		calm	
LEG 4	1249	MN	19.11.	14:09	14:29	C. Beagle	54°58,7	69°01,9	218		SW 2/3	
LEG 4	1250	MN	19.11.	14:37	14:40	C. Beagle	54°58,7	69°01,9	218		SW 2/3	
LEG 4	1251	MUC	19.11.	14.49		C. Beagle	54°58,7	69°01,9	218		W 6/7	
LEG 4	1252	CTD	19.11.	14.56	15:03	C. Beagle	54°58,7	69°01,8	218		W 6/7	
LEG 4	1253	EBS	19.11.	16:52	17:02	C. Beagle	54°55,1	69°19,9	265		W 6/7	
LEG 4	1254	MN	19.11.	17:30	18.:03	C. Beagle	54°55,1	69°19,7	273		SW 6/7	
LEG 4	1255	MUC	19.11.	18:05	18:19	C. Beagle, Francia	54°55,2	69°19,9	271		WNW5	
LEG 4	1256	CTD	19.11.	18:20	18:26	C. Beagle, Francia	54°55,2	69°20,0	271		WNW 5	
LEG 4	1257	EBS	19.11.	19:00	19:45	C. Beagle, Romanche	54°53,4	69°31,0	350		WNW 4/5	
LEG 4	1258	MN	20.11.	6:00	6:47	C. Beagle, Romanche	54°53,6	69°30,5	349		NW 4/5	
LEG 4	1259	MUC	20.11.	7:10		C. Beagle, Romanche	54°53,5	69°30,7	350		NW 4	
LEG 4	1260	CTD	20.11.	7:12		C. Beagle, Romanche	54°53,4	69°30,8	350		NW 4	
LEG 4	1261	EBS	20.11.	9:05	9:30	C. Beagle, Romanche	54°53,7	69°59,1	120		SW 5	
LEG 4	1262	MUC	20.11.	10:35	11:10	C. Beagle, I. Timbal Chico	54°53,3	70°13,7	256		W 3	
LEG 4	1263	EBS	20.11.	11:59	12:07	C. Beagle, I. Timbal Chico	54°54,0	70°12,7	665		W 3	
LEG 4	1264	AGT	20.11.	13:18	13:33	C. Beagle, I. Timbal Chico	54°54,1	70°12,7	653		W 4	
LEG 4	1265	MN	20.11.	14:02	14:33	C. Beagle, I. Timbal Chico	54°54,2	70°12,7	665		WNW 5	
LEG 4	1266	MN	20.11.	14:38	14:49	C. Beagle, I. Timbal Chico	54°54,2	70°12,7	664		WNW 5	
LEG 4	1267	MUC	20.11.	15:03		C. Beagle, I. Timbal Chico	54°54,2	70°12,7	662		WNW 5	
LEG 4	1268	CTD	20.11.	15:15	15:18	C. Beagle, I. Timbal Chico	54°54,2	70°12,7	664		WNW 5	
LEG 4	1269	AGT	20.11.	15:43	16:08	C. Beagle, I. Timbal Chico	54°53,9	70°12,0	627	670	WNW 5	
LEG 4	1270	EBS	21.11.	6:25	6:50	C. Ballenero, Islas del Medio	54°55,2	70°45,0	135		W 3/4	
LEG 4	1271	MN	21.11.	6:57	7:05	C. Ballenero, Islas del Medio	54°55,2	70°45,0	135		W 3/4	

Table 13: continued

LEG 4	1272	MUC	21.11.	7:07	7:23	C. Ballenero, Islas del Medio	54°55,2	70°45,0	135		W 3/4	
LEG 4	1273	CTD	21.11.	7:26	7:29	C. Ballenero, Islas del Medio	54°55,2	70°45,0	135		W 3/4	
LEG 4	1274	AGT	21.11.	7:30	7:55	C. Ballenero, Islas del Medio	54°55,1	70°45,1	135		W 3/4	
LEG 4	1275	AGT	21.11.	8:50		C. Ballenero, Islas del Medio	54°56,7	70°45,9	20		NNW 3	
LEG 4	1276	FS	21.11.	9:12	9:35	C. Ballenero, Islas del Medio	54°56,7	70°45,9	20		NNW 3	
LEG 4	1277	AGT	21.11.	12:38	12:43	C. Ballenero, off Pta Baja	54°46,7	71°08,6	634		NNW 4	
LEG 4	1278	AGT	21.11.	13:20	13:25	C. Ballenero, off Pta Baja	54°46,7	71°08,6	640		NNW 4	
LEG 4	1279	EBS	21.11.	14:24	14.29	C. Ballenero, off Pta Baja	54°46,8	71°08,5	580		NNW 4	
LEG 4	1280	MN	21.11.	15:15	15:45	C. Ballenero, off Pta Baja	54°46,7	71°08,5	640		NNW 4	
LEG 4	1281	MN	21.11.	15:53		C. Ballenero, off Pta Baja	54°46,6	71°08,5	690		NNW 4	
LEG 4	1282	MUC	21.11.	16:18		C. Ballenero, off Pta Baja	54°46,6	71°08,2	655		WNW 3	
LEG 4	1283	CTD	21.11.	16:31		C. Ballenero, off Pta Baja	54°46,6	71°08,4	670		WNW 3	
LEG 4	1284	FS	21.11.	17:17	17:24	C. Ballenero, off Pta Baja	54°44,5	71°13,6	50		WNW 3	
LEG 4	1285	FS	22.11.	6:06	6:26	C. Brecknock (E), I. Sydney	54°45,5	71°44,3	36		N 2	
LEG 4	1286	AGT	22.11.	6:37		C. Brecknock (E), I. Sydney	54°45,5	71°44,4	33		N 2	
LEG 4	1287	D	22.11.	7:07		C. Brecknock (E), I. Sydney	54°45,5	71°44,4	33		N 2	
LEG 4	1288	MN	22.11.	9:20		C. Brecknock (W), I. Aguirre	54°31,3	72°05,7	400		NE 5	
LEG 4		MN	22.11.		10:07	C. Brecknock (W), I. Aguirre	54°31,3	72°05,7	400		NE 5	
LEG 4	1289	CTD	22.11.	10:09		C. Brecknock (W), I. Aguirre	54°31,7	72°06,1	400		NE 5	
LEG 4	1290	AGT	22.11.	10:45		C. Brecknock (W), I. Aguirre	54°31,5	72°06,0	480		NE 5	
LEG 4	1291	D	22.11.	11:38	11:41	C. Brecknock (W), I. Aguirre	54°31,4	72°05,9	484		NE 5	
LEG 4	1292	MUC	22.11.	12:36		C. Brecknock (W), I. Aguirre	54°31,4	72°06,0	484		N 4	
LEG 4	1293	FS	22.11.	13:13	13:40	C. Brecknock, Pta Rico	54°31,5	72°00,3	19	54	N 4	
LEG 4	1294	AGT	22.11.	16:41	16:56	C. Cockburn, Caleta Barrow	54°20,9	71°26,8	380	90	var. 2	
LEG 4	1295	D	22.11.	17:27	17:30	C. Cockburn, Caleta Barrow	54°20,8	71°29,4	371		W 6	
LEG 4	1296	FS	23.11.	6:30	7:00	C. Cockburn, Caleta Barrow	54°20,8	71°26,8	390		W 4/5	
LEG 4		FS		7:12	7:30	C. Cockburn, Caleta Barrow	54°20,7	71°30,1	370		W 4/5	
LEG 4	1297	MN	23.11.	7:45		C. Cockburn, Caleta Barrow	54°20,6	71°31,4	390		W 4/5	
LEG 4	1298	CTD	23.11.	8:36		C. Cockburn, Caleta Barrow	54°20,6	71°32,2	395		W 4/5	
LEG 4	1299	FS	23.11.	9:20	9:55	C. Cockburn, Caleta Barrow	54°20,4	71°26,5	40		W 4/5	
LEG 4	1300	AGT	23.11.	12:16	12:21	C. Cockburn (E), Isla Jane	54°22,1	71°00,7	360	340	W 3	
LEG 4	1301	D	23.11.	12:50	12:55	C. Cockburn (E), Isla Jane	54°21,9	71°00,8	360	340	W 4	+
LEG 4	1302	MN	23.11.	13:10		C. Cockburn (E), Isla Jane	54°21,5	71°00,5	359		W 2/3	
LEG 4		MN			13:40	C. Cockburn (E), Isla Jane	54°21,5	71°00,5	359		W 2/3	
LEG 4	1303	MUC	23.11.	14:00		C. Cockburn (E), Isla Jane	54°21,6	71°00,8	364		W 2/3	
LEG 4	1304	CTD	23.11.	14:10	14:14	C. Cockburn (E), Isla Jane	54°21,5	71°01,0	351		W 2/3	
LEG 4	1305	FS	23.11.	14:33		C. Cockburn (E), Isla Jane	54°21,5	70°59,0	312		W 2/3	
LEG 4	1306	AGT	23.11.	15:59	16:04	C. Magdalena, Pta Sánchez	54°17,2	70°53,9	274		var. 2	
LEG 4	1307	EBS	23.11.	16:33	16:38	C. Magdalena, Pta Sánchez	54°17,4	70°51,8	271		var 1/2	
LEG 4	1308	MUC	23.11.	17:05		C. Magdalena, Pta Sánchez	54°17,3	70°51,8	270		var 1/2	
LEG 4	1309	MN	23.11.	17:14		C. Magdalena, Pta Sánchez	54°17,3	70°51,9	276		var 1/2	
LEG 4	1310	CTD	23.11.	17:47		C. Magdalena, Pta Sánchez	54°17,4	70°51,9	276		var 1/2	
LEG 4	1311	FS	23.11.	18:18	18:47	C. Magdalena, Pta Sánchez	54°17,7	70°52,0	290		calm	
LEG 4	1312	FS	23.11.	19.30	19:53	C. Magdalena, Bahía Morris	54°15,5	70°59,9	43		calm	
LEG 4	1313	MN	24.11.	6:00		C. Magdalena (N)	54°04,8	70°58,6	344		SSE 3	
LEG 4	1314	CTD	24.11.	6:45	7:00	C. Magdalena (N)	54°05,5	70°57,9	360		SSE 3	
LEG 4	1315	AGT	24.11.	7:02	7:14	C. Magdalena (N)	54°05,5	70°57,9	360		SSE 3	+
LEG 4	1316	AGT	24.11.	7:44	8:30	C. Magdalena (N)	54°05,4	70°58,3	360		SSE 3	
LEG 4	1317	MN	24.11.	9:09	9:33	C. Magdalena (N)	53°59,8	71°01,0	236		SSE 3	
LEG 4	1318	CTD	24.11.	9:36	9:41	C. Magdalena (N)	54°00,0	71°00,8	211		SSE 3	
LEG 4	1319	AGT	24.11.	9:45	10:10	C. Magdalena (N)	54°00,0	71°00,8	214		SSE 3	
LEG 4	1320	CTD	24.11.	23:00		Estrecho, P. Ancho St. 19	53°08,4	70°38,3	120		SW 2	
LEG 4	1321	WS	24.11.	23:15		Estrecho, P. Ancho St. 19	53°08,4	70°38,3	120		SW 2	
LEG 4	1322	PN	24.11.	0:15		Estrecho, P. Ancho St. 19	53°08,4	70°38,3	120		SW 2	
LEG 4	1323	BO	25.11.	0:40	1:00	Estrecho, P. Ancho St. 19	53°08,4	70°38,3	120		SW 2	

Table 14: List of shallow-water stations in the Strait of Magellan.

St.	Name	General characteristics	Date	# of samples	Location of samples
St. 1	Bahía Laredo	Beach	17 Oct.	1	1 Subtidal
St. 2	Bahía Laredo	Rocky Shore	18 Oct.	6	4 Intertidal 2 Subtidal
St. 2	Bahía Laredo	Rocky Shore	23 Oct.	3	3 Subtidal
St. 4	Bahía Gente Grande	Pebble Beach	19 Oct.	3	3 Intertidal
St. 5	Near Río Colorado, Km 39.24	Pebble Beach N of a river plume	24 Oct.	7	3 Intertidal 4 Subtidal
St. 6	Near Río Colorado, Km 39.53	Pebble Beach S of a river plume	21 Oct.	6	3 Intertidal 3 Subtidal
St. 7	Near Bahía Rinconada, Km. 46.10	Pebble Beach	20 Oct.	5	3 Intertidal 2 Subtidal
St. 9	Bahía Manza	Rocky Shore North exposed	25 Oct.	3	3 Intertidal
St. 9	Bahía Manza	Rocky Shore South exposed	26 Oct.	6	3 Intertidal 3 Subtidal
St. 10	Puerto del Hambre	Rocky Shore	26 Oct.	6	3 Intertidal 3 Subtidal
St. 10	Puerto del Hambre	Rocky Shore Maerl	28 Oct.	6	2 Subtidal
St. 11	Oazy Harbour	Beach	27 Oct.	3	3 Intertidal

Table 15: Visual check of AGT catches on deck "Victor Hensen" by scientists picking samples from the trawl catches. The four categories are outlined below.

Magellan Strait																					
AGT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Station No.	805	806	812	816	821	834	846	861	863	865	870	875	881	888	920	926	949	952	960	969	976
Date	17 Oct	17 Oct	18 Oct	18 Oct	19 Oct	23 Oct	23 Oct	24 Oct	25 Oct	25 Oct	25 Oct	25 Oct	26 Oct	26 Oct	28 Oct	28 Oct	30 Oct	31 Oct	31 Oct	1 Nov	1 Nov
Location	Laredo	Laredo	Laredo	Laredo	Gente Grande	P. Ancho St. 19	P. Ancho St. 18	off Pta Arenas	Bahía Voces	Bahía Voces	Bahía Voces	Bahía Voces	Bahía Voces	Bahía Voces	Gente Grande	Laredo	off Pta Arenas	P. Ancho St. 20	Laredo	P. Ancho St. 16	P. Ancho St. 15
Average depth [m]	18	117	115	57	57	9	120	195	25	527	335	244	56	104	18	49	24	73	36	95	460
Duration of haul [min]	15	15	15	15	15	15	15	12	16	15	15	15	15	15	15	15	15	15	15	15	15
Porifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	+	-	-	0
Hydroidea	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	+	-	-	-	-	0
Actiniaria	-	-	0	0	0	-	+	-	0	-	-	+	-	-	-	-	+	-	0	0	++
Gorgonaria	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennatularia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleractinia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemertini	0	-	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	0
Bivalvia	-	++	++	++	-	+	++	-	++	+	-	-	-	+	-	-	-	-	+	++	+
Aplacophora	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosobranchia	-	+	-	-	-	-	-	-	0	0	0	0	-	-	-	+	-	-	-	-	0
Ophistobranchia	-	0	-	0	0	0	0	+	0	0	0	0	0	-	0	-	-	-	-	0	0
Polyplacophora	-	-	-	-	-	0	0	-	0	0	0	0	-	-	0	-	-	-	-	-	0
Cephalopoda Octopoda	0	0	0	-	-	0	0	-	0	0	0	0	0	0	0	-	-	0	0	0	0
Scaphopoda	0	0	0	0	0	0	+	0	++	++	++	++	0	-	0	0	0	0	0	0	+
Polychaeta Sedentaria	-	-	-	-	-	-	-	-	-	0	-	-	-	-	0	-	-	0	-	-	-
Polychaeta Errantia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	0	-	-
Pogonophora	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	+
Priapulida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipunculida	0	0	0	0	0	0	-	0	-	-	-	0	0	0	0	0	0	0	0	0	0
Echiurida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirripedia	+	0	-	++	-	0	0	-	0	0	0	-	-	-	-	+	-	0	-	0	0
Amphipoda	-	-	-	-	-	-	-	-	-	0	0	-	-	-	-	+	-	-	-	-	0
Isopoda	-	-	-	+	0	0	0	-	0	0	0	0	-	-	+	-	-	++	-	-	0
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Cumacea	0	0	0	0	0	0	0	0	0	0	0	-	0	-	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
Stomatopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda Natantia	0	0	0	0	0	-	-	-	-	-	-	-	-	-	0	0	-	0	0	0	-
Decapoda Reptantia	+	++	+	+	++	+	-	++	-	-	-	+	-	-	++	+	++	+	++	-	0
Pantopoda	-	0	-	0	0	0	-	-	-	-	0	0	0	0	0	-	0	0	0	0	-
Bryozoa	+	-	+	++	-	-	+	+	-	-	-	-	+	+	-	+	-	-	-	+	0
Brachiopoda	-	++	+	-	++	-	-	-	0	-	0	-	-	-	-	++	-	-	-	-	0
Pterobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enteropneusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	+	0	-	-	0	0	+	-	-	-	+	+	-	+	-	+	-	+	-	-	0
Asteroidea	+	-	-	0	-	-	-	+	++	++	++	++	+	-	-	+	++	-	+	+	++
Echinoidea	-	+	+	+	0	++	-	-	-	-	-	++	-	+	-	++	-	++	+	-	0
Crinoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuroidea	0	-	-	-	-	0	-	-	+	++	-	+	-	-	0	-	-	-	-	-	+
Ascidiacea	+	-	-	-	++	0	-	+	-	-	-	+	-	++	0	-	+	+	-	-	0
Pisces	-	-	-	-	++	0	0	-	0	-	-	0	-	-	+	-	+	+	-	-	-
Total amount [baskets]	2.0	3.0	2.0	0.5	3.0	0.3	3.0	3.0	0.2	0.2	0.3	3.0	4.0	4.0	1.0	2.5	3.0	1.0	0.7	3.0	0.2

0 absent - rare + regular occurrence ++ very abundant/dominant

Table 15: Continued

Channel System										
Gear No.	53	54	55, 56	57	58	59	60	61	62	63
Station No.	1274	1275	1277	1286	1290	1294	1300	1306	1316	1319
Date	21 Nov	21 Nov	21 Nov	22 Nov	22 Nov	22 Nov	23 Nov	23 Nov	24 Nov	24 Nov
Location	C. Ballenero, Islas del Medio	C. Ballenero, Islas del Medio	C. Ballenero, off Punta Baja	C. Brecknock (E), I. Sydney	C. Brecknock (W), I. Aguirre	C. Cockburn, Caleta Barrow	C. Cockburn (E), Isla Jane	C. Magdalena, Pta Sánchez	C. Magdalena	C. Magdalena
Average depth [m]	135	20	640	33	480	235	350	274	360	214
Duration of haul [min]	25	5	5	5	5	15	5	5	6	5
Porifera	-	-	0	+	0	-	++	-	+	+
Hydroidea	0	-	0	-	-	-	++	-	+	+
Actiniaria	0	-	0	0	+	-	-	+	+	-
Gorgonaria	+	0	0	0	0	+	-	0	0	-
Pennatularia	0	0	0	0	0	-	-	0	-	-
Scleractinia	0	0	0	0	0	-	0	0	0	-
Nemertini	0	0	-	0	0	0	0	0	-	0
Bivalvia	+	-	+	0	++	0	-	+	-	-
Aplacophora	0	0	0	0	0	0	0	0	0	-
Prosobranchia	0	-	0	-	-	0	-	-	-	-
Ophistobranchia	0	-	0	0	-	0	-	0	-	-
Polyplacophora	-	-	0	-	0	0	-	0	+	-
Cephalopoda Octopoda	0	0	0	0	0	0	0	0	0	0
Scaphopoda	0	0	+	0	0	0	-	+	0	-
Polychaeta: Sedentaria	-	+	0	0	-	-	+	-	+	-
Polychaeta: Errantia	-	-	-	-	-	+	-	-	-	-
Pogonophora	0	0	0	0	0	0	0	0	0	0
Priapulida	0	0	0	0	0	0	0	0	0	0
Sipunculida	0	0	-	0	0	0	0	-	-	0
Echiurida	0	0	0	0	0	0	0	0	0	0
Cirripedia	0	-	0	0	0	+	0	0	-	0
Amphipoda	-	-	-	-	-	+	0	0	-	0
Isopoda	0	0	0	-	0	0	0	0	0	0
Tanaidacea	0	0	0	0	0	0	0	0	0	0
Cumacea	0	0	0	0	0	0	0	0	-	0
Mysidacea	0	0	0	0	0	0	0	0	0	0
Stomatopoda	0	0	0	0	0	0	0	0	0	0
Decapoda Natantia	-	-	+	+	0	0	+	-	+	-
Decapoda Reptantia	-	-	0	+	+	0	-	-	-	-
Pantopoda	0	0	0	0	0	+	+	-	+	-
Bryozoa	-	0	0	-	-	-	-	-	-	-
Brachiopoda	-	-	0	0	-	-	-	-	+	-
Pterobranchia	0	0	0	0	0	0	-	0	-	+
Enteropneusta	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	+	-	0	-	-	+	++	+	+	-
Asteroidea	-	+	+	+	+	-	-	-	+	+
Echinoidea	0	-	+	++	-	-	-	++	+	-
Crinoidea	0	0	0	0	0	0	0	0	0	0
Holothuroidea	-	0	-	-	-	0	-	-	++	++
Ascidiacea	-	-	-	-	++	-	-	++	+	+
Pisces	0	-	-	-	-	0	0	-	-	-
Total amount [baskets]	<0.1	0.5	<0.1	0.2	0.3	<0.1	<0.1	1.5	1.0	4.0

0 absent - rare + regular occurrence ++ very abundant/dominant

Table 15: Continued

Beagle															
Gear No.	22	23	24	25	26	27	28	29	30	31	32	33	34	51	52
Station No.	1031	1036	1042	1046	1074	1080	1086	1107	1115	1120	1121	1133	1137	1264	1269
Date	4 Nov	4 Nov	4 Nov	4 Nov	5 Nov	5 Nov	5 Nov	6 Nov	6 Nov	6 Nov	6 Nov	7 Nov	7 Nov	18 Nov	20 Nov
Location	Garibaldi	Garibaldi	Garibaldi	Garibaldi	Romanche	Romanche	Francia	Francia	Italia	Italia	Pta Yámana	C. Beagle	Yendegaia	I. Timbal Chico	I. Timbal Chico
Average depth [m]	317	30	190	78	336	76	268	100	210	97	215	258	320	653	648
Duration of haul [min]	5	5	5	5	5	5	6	5	5	5	5	5	5	15	25
Porifera	-	-	-	-	0	-	0	-	0	0	-	-	0	-	-
Hydroidea	-	-	-	-	-	-	0	-	-	0	-	0	0	+	C
Actiniaria	0	-	0	0	++	-	0	-	-	-	+	+	+	-	-
Gorgonaria	+	-	0	-	0	-	0	-	-	-	++	-	0	0	0
Pennatularia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleractinia	-	-	0	0	0	+	0	0	0	0	-	0	0	0	0
Nemertini	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	-	-	+	-	-	-	0	-	++	-	-	++	++	-	++
Aplacophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosobranchia	0	-	-	+	-	-	0	0	0	0	0	-	-	+	-
Ophistobranchia	0	-	0	0	0	-	0	0	0	0	-	0	0	0	0
Polyplacophora	-	-	0	-	0	0	0	-	0	0	0	0	0	-	0
Cephalopoda Octopoda	0	0	0	0	0	-	0	0	0	0	0	0	0	-	0
Scaphopoda	0	0	-	0	-	-	0	-	-	0	-	+	+	0	+
Polychaeta: Sedentaria	0	-	0	+	-	-	0	0	0	0	-	-	-	-	0
Polychaeta: Errantia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pogonophora	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0
Priapulida	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Sipunculida	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0
Echiurida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirripedia	0	-	0	0	0	+	0	0	0	0	0	0	0	-	0
Amphipoda	0	-	0	0	0	0	0	0	0	0	0	0	0	-	0
Isopoda	0	-	0	0	0	0	0	0	0	0	0	0	0	-	-
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stomatopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda Natantia	+	-	+	-	+	-	-	-	0	-	0	-	+	-	-
Decapoda Reptantia	0	-	0	-	-	+	+	+	+	+	-	-	-	++	-
Pantopoda	0	-	-	-	0	-	0	-	0	0	0	0	0	0	0
Bryozoa	0	-	-	0	0	-	0	-	0	-	0	0	0	+	0
Brachiopoda	-	+	+	-	-	+	0	-	-	-	-	0	0	+	0
Pterobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enteropneusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	++	++	-	-	-	+	++	-	++	+	+	++	+	-	0
Asteroidea	0	++	-	+	++	+	++	+	+	0	-	++	++	+	+
Echinoidea	0	+	-	+	++	+	++	++	+	-	-	++	++	+	+
Crinoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuroidea	-	+	+	++	-	-	0	+	0	0	+	0	0	-	-
Ascidiacea	0	-	0	0	0	+	0	0	-	0	-	-	0	+	-
Pisces	0	-	-	0	-	-	0	-	-	0	0	0	-	+	-
Total amount [baskets]	<0.1	4.0	0.1	0.1	0.5	2.0	1.0	2.0	0.5	0.3	<0.1	0.5	2.0	0.1	0.1

0 absent - rare + regular occurrence ++ very abundant/dominant

Table 15: continued

South of Beagle

Gear No.	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Station No.	1141,1142	1149	1153	1158	1162	1175	1182	1191	1203	1209	1215	1223	1225	1228	1235	1242
Date	8 Nov	8 Nov	8 Nov	10 Nov	10 Nov	11 Nov	12 Nov	12 Nov	13 Nov	14 Nov	14 Nov	15 Nov	15 Nov	15 Nov	17 Nov	18 Nov
Location	I. Picton	Bahia Oglander	Rada Picton	Bahia Oglander	Paso Goree	Pta Rico	I. Picton	I. Picton	I. Wollaston	Ites Valderrama	SE I. Picton	SE I. Picton	I. Lennox	I. Gardiner	I. Gardiner	Rada Picton
Average depth [m]	112	15	37	33	25	25	110	46	40	65	65	35	24	30	100	31
Duration of haul [min]	15	5	14	10	10	15	10	5	15	15	15	5	5	5	15	15
Porifera	+	+	-	++	-	-	-	++	-	-	-	-	0	-	-	-
Hydroidea	+	-	-	0	-	+	0	0	-	-	+	+	-	-	0	+
Actiniaria	0	-	-	-	0	0	0	0	0	-	-	-	0	-	++	-
Gorgonaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pennatularia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scleractinia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemertini		0	0	0	0	-	0	0	0	0	-	0	0	0	0	0
Bivalvia	0	-	-	-	-	-	0	-	++	+	-	-	0	-	-	-
Aplacophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosobranchia	0	+	-	-	+	+	-	+	-	-	+	-	-	-	-	+
Ophistobranchia	-	-	-	-	-	+	0	+	+	-	+	++	0	-	0	0
Polyplacophora	0	0	-	0	-	-	0	-	-	0	-	-	0	-	0	-
Cephalopoda Octopoda	0	0	-	0	0	0	0	-	0	-	-	-	0	0	0	-
Scaphopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta: Sedentaria	0	-	-	+	-	-	0	+	+	-	+	-	0	0	-	-
Polychaeta: Errantia	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
Pogonophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Priapulida	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipunculida	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Echiurida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirripedia	0	+	+	++	++	+	0	+	-	-	-	-	0	0	0	-
Amphipoda	0	-	-	-	+	+	0	-	-	-	+	+	-	0	0	-
Isopoda	0	+	-	0	+	-	0	+	-	++	+	-	++	-	0	-
Tanaidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mysidacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stomatopoda	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Decapoda Natantia	-	+	+	-	-	+	-	+	-	-	+	-	-	+	0	-
Decapoda Reptantia	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++
Pantopoda	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0
Bryozoa	0	-	-	-	+	+	0	-	-	-	++	+	-	-	0	+
Brachiopoda	0	-	-	-	-	-	-	-	-	-	-	-	0	+	-	+
Pterobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enteropneusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	0	+	-	+	-	+	0	+	-	-	+	-	0	-	0	-
Asteroidea	0	-	+	-	-	+	-	-	-	+	+	+	-	-	0	+
Echinoidea	0	-	-	-	-	+	-	-	+	+	++	+	0	-	0	+
Crinoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuroidea	0	-	-	-	0	-	0	-	-	-	-	-	0	0	0	-
Ascidiacea	0	++	+	+	+	+	0	++	-	-	++	++	+	-	-	+
Pisces	+	+	-	+	+	+	-	+	+	+	+	+	+	+	-	+
Total amount [baskets]	0.1	3.0	4.0	4.0	3.0	5.0	0.3	2.0	2.0	5.0	5.0	2.0	1.0	0.5	0.5	3.5

0 absent - rare + regular occurrence ++ very abundant/dominant

Table 16a: Abundance of major taxa in the subsamples taken from AGT catches. Note that counts of some groups (e.g. colonial ascidians and actinians) are preliminary.

Magellan Strait																		
AGT No.	2	3	4	5	7	8	9	10	12	13	14	15	16	17	18	19	20	21
Station No.	806	812	816	821	846	861	863	865	875	881	888	920	926	949	952	960	969	976
Date	17 Oct	18 Oct	18 Oct	19 Oct	23 Oct	24 Oct	25 Oct	25 Oct	25 Oct	26 Oct	26 Oct	28 Oct	28 Oct	30 Oct	31 Oct	31 Oct	1 Nov	1 Nov
Location	Laredo	Laredo	Laredo	Gente Grande	P. Ancho St 18	off Pta Arenas	Bahía Voces	Bahía Voces	Bahía Voces	Bahía Voces	Bahía Voces	Gente Grande	Laredo	off Pta Arenas	P. Ancho St. 20	Laredo	P. Ancho St. 16	P. Ancho St 15
Average depth [m]	117	115	57	1	195	25	527	478	244	56	104	18	49	24	73	36	95	460
Duration of haul [min]	15	15	15	15	15	12	16	15	15	15	15	15	15	15	15	15	15	15
Porifera	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present
Hydroidea																		
Actiniaria				1	5						1							6
Gorgonaria																		
Pennatularia																		
Scleractinia																		
Nemertini																		
Bivalvia	16	20	14	8	104	1		9		4	16	1		1		1	10	14
Aplacophora																		
Gastropoda		1				2				3	2	1	2	6		11	4	
Polyplacophora		1								1	3			1				
Cephalopoda Octopoda			1											1				
Scaphopoda				31			193	111	9									
Polychaeta	1			8	1	1	4	2	1		3							23
Pogonophora																		
Priapulida																		
Sipunculida																		
Echiurida																		
Cirripedia																		
Amphipoda																		
Isopoda	1		1				1								8	1		
Tanaidacea																		
Cumacea																		
Mysidacea																		
Decapoda Natantia								1	1								1	
Decapoda Reptantia	8		4			2				2	1	61	5	15	3	3		
Pantopoda																		1
Bryozoa	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present	present
Brachiopoda	20									2	4		16	3				
Pterobranchia																		
Enteropneusta																		
Ophiuroidea				2			3	16	11		8		10			4	1	
Asteroidea	1	2	2	50	3	2	132	129	17		6			1	4	1	4	61
Echinoidea	7		2	1			1		4		8	1	4		40	16		
Holothuroidea		1		5	4		1	1	7		2							4
Ascidiacea													1					
Pisces	1		2	2				1				1			5			
Total number of indiv.	55	25	26	108	117	8	335	270	50	12	54	65	38	28	60	37	20	109

Table16a: Continued

Channel System									
Gear No.	53	54	55,56	57	58	60	61	62	63
Station No.	1274	1275	1277	1286	1290	1300	1306	1316	1319
Date	21 Nov	21 Nov	21 Nov	22 Nov	22 Nov	23 Nov	23 Nov	24 Nov	24 Nov
Location	C. Ballenero, Islas del Medio	C. Ballenero, Islas del Medio	C. Ballenero, Punta Baja	C. Brecknock (E), I. Sydney	C. Brecknock (W), I. Aguirre	C. Cockburn (E), I. Jane	C. Magdalena, Pta Sánchez	C. Magdalena	C. Magdalena
Average depth [m]	135	20	20	33	480	350	274	360	214
Duration of haul [min]	25	5	5	5	5	5	5	6	15
Porifera			present	present	present			present	
Hydroidea									
Actiniaria					14	1	11	5	1
Gorgonaria									
Pennatularia									
Scleractinia								present	
Nemertini									
Bivalvia	140	14	93	10	209		42	1	7
Aplacophora									
Gastropoda		1		2	17		2	1	
Polyplacophora				3	1	2		5	2
Cephalopoda Octopoda									
Scaphopoda									
Polychaeta		2	1	5	9	24		1	4
Pogonophora									
Priapulida									
Sipunculida									
Echiurida									
Cirripedia									
Amphipoda									
Isopoda				1					
Tanaidacea									
Cumacea									
Mysidacea									
Decapoda Natantia				1					
Decapoda Reptantia	2			1	3				
Pantopoda						16		6	
Bryozoa	present	present	present	present	present		present	present	present
Brachiopoda		1			10	4	3	2	1
Pterobranchia									
Enteropneusta									
Ophiuroidea	10			1	4	44	20	13	2
Asteroidea	1	11	36	11		3	5	8	5
Echinoidea		1	20	290	14	9	37	12	1
Holothuroidea	4		1	1	5	11		2	33
Ascidiacea		1							
Pisces		1							
Total number of indiv.	157	32	151	326	286	114	120	56	56

Table16a: Continued

Beagle														
Gear No.	22	23	24	25	26	27	28	29	30	31	32	33	34	51
Station No.	1031	1036	1042	1046	1074	1080	1066	1107	1115	1120	1121	1133	1137	1264
Date	4 Nov	4 Nov	4 Nov	4 Nov	5 Nov	5 Nov	5 Nov	6 Nov	6 Nov	6 Nov	6 Nov	7 Nov	7 Nov	20 Nov
Location	Garibaldi	Garibaldi	Garibaldi	Garibaldi	Romanche	Romanche	Francia	Francia	Italia	Italia	Pta Yámana	C. Beagle	Yendegaia	I. Timbal Chico
Average depth [m]	317	30	190	78	336	76	268	100	210	97	215	258	320	653
Duration of haul [min]	5	5	5	5	5	5	6	5	5	5	5	5	5	25
Porifera	present		present	present						present	present			
Hydroidea														
Actiniaria					5			1	2					1
Gorgonaria														
Pennatularia														
Scleractinia						present		present						
Nemertini														
Bivalvia	12	3	142	31					95	7	3	48	229	207
Aplacophora														
Gastropoda			1	1					1					
Polyplacophora	1			3										
Cephalopoda Octopoda						1								
Scaphopoda														17
Polychaeta	1		1			2			6		32	4		2
Pogonophora														
Priapulida														
Sipunculida														
Echiurida														
Cirripedia														
Amphipoda														
Isopoda														
Tanaidacea														
Cumacea														
Mysidacea														
Decapoda Natantia	10		10	3	15	present	1				1	2		2
Decapoda Reptantia				1	1	present		1		present			2	1
Pantopoda	1		1											
Bryozoa	present	present	present	present		present		present		present	present			present
Brachiopoda	1	1	19	2					3	10	1			
Pterobranchia														
Enteropneusta														
Ophiuroidea	105	16	17	1		4	30		70	9	24	79	9	
Asteroidea		2	14	4	14	2	96	5	1	1	2	187	14	18
Echinoidea		1	14		28	2	19	41	12	2	5	23	24	5
Holothuroidea	1	1	23	137				1			12			
Ascidiacea														
Pisces			1	5								1		
Total number of indiv.	132	24	243	188	63	11	146	49	190	29	80	344	278	253

Table16a: Continued

South of Beagle															
Gear No.	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Station No.	1149	1153	1158	1162	1175	1182	1191	1203	1209	1215	1223	1225	1228	1235	1242
Date	8 Nov	10 Nov	10 Nov	11 Nov	12 Nov	12 Nov	13 Nov	14 Nov	14 Nov	15 Nov	15 Nov	15 Nov	17 Nov	18 Nov	18 Nov
Location	Bahía Oglander	Rada Picton	Bahía Oglander	Paso Goree	Pta Rico	I. Picton	I. Picton	I. Wollaston	off Islas Barnevelt	SE I. Picton	SE I. Picton	I. Lennox	I. Picton	I. Gardiner	I. Gardiner
Average depth [m]	15	37	33	25	25	110	46	40	65	65	35	24	30	100	31
Duration of haul [min]	5	14	10	10	15	10	5	15	15	15	5	5	5	15	15
Porifera			present				present				present		present		
Hydroidea															
Actiniaria														7	
Gorgonaria															
Pennatularia															
Scleractinia															
Nemertini															
Bivalvia			1					5					1		
Aplacophora															
Gastropoda				2			1	1							
Polyplacophora	1						1								
Cephalopoda Octopoda									1	1					
Scaphopoda															
Polychaeta	1	1	2				3		1	3	4		1	1	
Pogonophora															
Priapulida															
Sipunculida															
Echiurida															
Cirripedia															
Amphipoda											7				
Isopoda	4	1					1		1			5	1	1	
Tanaidacea															
Cumacea															
Mysidacea															
Decapoda Natantia	1						2			1					
Decapoda Reptantia	150	82	13	25	10	115	9	133	108	112	78	125	169	24	88
Pantopoda															
Bryozoa										present	present		present		
Brachiopoda														2	
Pterobranchia															
Enteropneusta															
Ophiuroidea							6								
Asteroidea		4	2		4			2	4	2	1		2		1
Echinoidea					1			3	3	3	2		1		
Holothuroidea							4								
Ascidiacea			2				3	2	1			1			
Pisces	3		1					2		1	1				1
Total number of indiv.	160	88	21	27	15	115	30	148	119	123	93	131	175	35	90

Table 16b: Biomass (wetweight) of major taxa in the subsamples taken from AGT catches. Note that counts of some groups (e.g. colonial ascidians and actinians) are preliminary.

Magellan Strait																		
AGT No.	2	3	4	5	7	8	9	10	12	13	14	15	16	17	18	19	20	21
Station No.	806	812	816	821	846	861	863	865	875	881	888	920	926	949	952	960	969	976
Date	17 Oct	18 Oct	18 Oct	19 Oct	23 Oct	24 Oct	25 Oct	25 Oct	25 Oct	26 Oct	26 Oct	28 Oct	28 Oct	30 Oct	31 Oct	31 Oct	1 Nov	1 Nov
Location	Laredo	Laredo	Laredo	Gente Grande	P. Ancho St 18	off Pta Arenas	Bahia Voces	Bahia Voces	Bahia Voces	Bahia Voces	Bahia Voces	Gente Grande	Laredo	off Pta Arenas	P. Ancho St. 20	Laredo	P. Ancho St. 16	P. Ancho St 15
Average depth [m]	117	115	57	1	195	25	527	478	244	56	104	18	49	24	73	36	95	460
Duration of haul [min]	15	15	15	15	15	12	16	15	15	15	15	15	15	15	15	15	15	15
Porifera																		
Hydroidea																		
Actiniaria				51,2	188,9						14,9							327,8
Gorgonaria																		
Pennatularia																		
Scleractinia																		
Nemertini																		
Bivalvia	460,8	378,4	598,5	17,5	169,0	81,9		17,1		9,7	90,0	0,8		0,1		43,8	26,2	41,2
Aplacophora																		
Gastropoda		0,1				1,7	9,0			0,6	1,3	2,8	1,3	1,1		10,0		
Polyplacophora		0,1								0,2	0,1			0,1			0,3	
Cephalopoda Octopoda			8,3											2,6				
Scaphopoda				6,1			21,2	34,8	2,2									
Polychaeta	0,3			22,8	4,6	1,2	1,9		0,3		0,9						1,3	19,0
Pogonophora																		
Priapulida																		
Sipunculida																		
Echiurida																		
Cirripedia																		
Amphipoda																		
Isopoda	0,5		1,0				0,3								7,0	0,7		
Tanaidacea																		
Cumacea																		
Mysidacea																		
Decapoda Natantia								0,8	0,8									
Decapoda Reptantia	202,5		67,3			28,1				2,2	0,1	440,4	14,4	39,7	46,9	48,5		
Pantopoda																	0,4	0,2
Bryozoa																		
Brachiopoda	683,0									0,2	1,0		511,4	0,6			7,3	
Pterobranchia																		
Enteropneusta																		
Ophiuroidea				1,8			5,8	32,6	10,0		9,5		2,0			1,1	754,6	
Asteroidea	0,9	194,4	82,5	409,2	62,5	16,3	680,5	706,2	193,5		29,3			0,9	307,9	0,1		357,8
Echinoidea	62,2			51,6					150,9		189,6	347,0	20,7		225,4	87,0		
Holothuroidea		0,1		137,2	120,5		11,9	40,0	13,0		10,3						8,7	34,5
Ascidiacea													25,6					
Pisces	107,3		85,2	160,4				22,0				6,1			101,1			
Total biomass	1517,5	573,1	842,8	857,8	545,5	129,2	730,6	853,5	370,7	12,9	347,0	797,1	575,4	45,1	688,3	191,2	798,8	780,5

Table16b: Continued

Channel System									
Gear No.	53	54	55,56	57	58	60	61	62	63
Station No.	1274	1275	1277	1286	1290	1300	1306	1316	1319
Date	21 Nov	21 Nov	21 Nov	22 Nov	22 Nov	23 Nov	23 Nov	24 Nov	24 Nov
Location	C. Ballenero, Islas del Medio	C. Ballenero, Islas del Medio	C. Ballenero, Punta Baja	C. Brecknock (E), I. Sydney	C. Brecknock (W), I. Aguirre	C. Cockburn (E), I. Jane	C. Magdalena, Pta Sánchez	C. Magdalena	C. Magdalena
Average depth [m]	135	20	20	33	480	350	274	360	214
Duration of haul [min]	25	5	5	5	5	5	5	6	15
Porifera									
Hydroidea									
Actiniaria					257,0	13,7	28,6	14,1	32,3
Gorgonaria									
Pennatularia									
Scleractinia									
Nemertini									
Bivalvia	319,1	107,9	284,4	18,9	979,2		135,4	3,7	34,4
Aplacophora									
Gastropoda		0,2		41,5	260,6		236,2	184,1	
Polyplacophora				3,0	0,1	0,3		0,6	0,3
Cephalopoda Octopoda									
Scaphopoda									
Polychaeta: Sedentaria		29,9	12,7	1,4	1,6	26,9		0,6	0,6
Pogonophora									
Priapulida									
Sipunculida									
Echiurida									
Cirripedia									
Amphipoda									
Isopoda				0,8					
Tanaidacea									
Cumacea									
Mysidacea									
Decapoda Natantia				0,6					
Decapoda Reptantia				0,4	1,9				
Pantopoda						6,3		1,4	
Bryozoa									
Brachiopoda		5,3			52,8	14,0	46,2	1,3	0,8
Pterobranchia									
Enteropneusta									
Ophiuroidea	219,3			2,5	2,8	37,8	29,7	12,7	1,7
Asteroidea	2,3	586,3	185,6	368,8	135,2	58,9	103,6	38,5	21,5
Echinoidea		38,3	843,7	528,1	4,8	81,3	1260,9	50,9	5,1
Holothuroidea	129,6		25,2	2,3		45,7		6,9	199,3
Ascidiacea		86,1							
Pisces		18,4							
Total biomass	670,3	872,4	1351,6	968,3	1696,0	284,9	1840,6	314,8	296,0

Table16b: Continued

Beagle														
Gear No.	22	23	24	25	26	27	28	29	30	31	32	33	34	51
Station No.	1031	1036	1042	1046	1074	1080	1086	1107	1115	1120	1121	1133	1137	1264
Date	4 Nov	4 Nov	4 Nov	4 Nov	5 Nov	5 Nov	5 Nov	6 Nov	6 Nov	6 Nov	6 Nov	7 Nov	7 Nov	20 Nov
Location	Garibaldi	Garibaldi	Garibaldi	Garibaldi	Romanche	Romanche	Francia	Francia	Italia	Italia	Pta Yámana	C. Beagle	Yendegaia	I. Timbal Chico
Average depth [m]	317	30	190	78	336	76	268	100	210	97	215	258	320	653
Duration of haul [min]	5	5	5	5	5	5	6	5	5	5	5	5	5	25
Porifera														
Hydroidea														
Actiniaria					5,7			14,3	4,8					345,4
Gorgonaria														
Pennatularia														
Scleractinia														
Nemertini														
Bivalvia	26,2	10,8	310,3	26,7					234,3	8,3	6,0	44,7	306,9	449,2
Aplacophora														
Gastropoda			0,6	0,1					0,1					
Polyplacophora	0,3			0,8										
Cephalopoda Octopoda						7,9								
Scaphopoda														5,1
Polychaeta	1,3		0,8			9,3			2,2		9,8	35,6		18,8
Pogonophora														
Priapulida														
Sipunculida														
Echiurida														
Cirripedia														
Amphipoda														
Isopoda														
Tanaidacea														
Cumacea														
Mysidacea														
Decapoda Natantia							1,4				0,5	3,9		
Decapoda Reptantia								36,3						
Pantopoda	0,4		0,7											
Bryozoa														
Brachiopoda	7,3	1,4	10,2	0,3					3,6	254,0	1,2			
Pterobranchia														
Enteropneusta														
Ophiuroidea	754,6	2,5	36,9	0,8		4,2	80,9		12,8	2,6	29,5	109,1	16,9	
Asteroidea		39,7	94,3	304,0	250,5	9,0	484,7	177,6	122,1	0,3	58,0	583,0	169,9	259,8
Echinoidea		0,9	201,3		502,3	87,7	831,1	1047,8	232,9	67,0	54,2	872,2	1042,7	164,8
Holothuroidea	8,7	2,8	201,5	280,0				4,3			75,8			
Ascidiacea														
Pisces			91,5	63,4								6,5		
Total biomass	798,8	58,1	948,1	676,1	758,5	118,1	1398,1	1280,3	612,8	332,2	235,0	1655,0	1536,4	1243,1

Table16b: Continued

South of Beagle															
Gear No.	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Station No.	1149	1153	1158	1162	1175	1182	1191	1203	1209	1215	1223	1225	1228	1235	1242
Date	8 Nov	10 Nov	10 Nov	11 Nov	12 Nov	12 Nov	13 Nov	14 Nov	14 Nov	15 Nov	15 Nov	15 Nov	17 Nov	18 Nov	18 Nov
Location	Bahía Oglander	Rada Picton	Bahía Oglander	Paso Goree	Pta Rico	I. Picton	I. Picton	I. Wollaston	off Islas Barnevelt	SE I. Picton	SE I. Picton	I. Lennox	I. Picton	I. Gardiner	I. Gardiner
Average depth [m]	15	37	33	25	25	110	46	40	65	65	35	24	30	100	31
Duration of haul [min]	5	14	10	10	15	10	5	15	15	15	5	5	5	15	15
Porifera															
Hydroidea															
Actiniaria															
Gorgonaria														1288,6	
Pennatularia															
Scleractinia															
Nemertini															
Bivalvia			3,1					14,0					0,1		
Aplacophora															
Gastropoda				0,6			0,2	229,0							
Polyplacophora	0,2						0,2								
Cephalopoda Octopoda									4,8	4,7					
Scaphopoda															
Polychaeta: Sedentaria	0,2	13,1	0,6				0,1		4,8	20,6	0,2		0,1	0,1	
Pogonophora															
Priapulida															
Sipunculida															
Echiurida															
Cirripedia															
Amphipoda											0,2				
Isopoda	2,0	0,2					7,1					3,0	0,2	0,3	
Tanaidacea															
Cumacea															
Mysidacea															
Decapoda Natantia	1,0						1,4			0,4					
Decapoda Reptantia	1038,7	432,0	133,1	220,8	35,8	512,8	61,7	771,2	658,9	783,8	568,1	662,3	675,9	48,8	447,4
Pantopoda															
Bryozoa															
Brachiopoda														7,8	
Pterobranchia															
Enteropneusta															
Ophiuroidea							1,4								
Asteroidea		128,3	341,3		8,1			244,2	408,8	118,2	0,7		314,3		2,0
Echinoidea					43,9			56,3	96,2	106,4	2,4		61,1		
Holothuroidea							0,8								
Ascidiacea			433,7				67,7	247,0	323,0			53,2			
Pisces	10,0		2,2					6,5		3,7	7,7				3,7
Total biomass	1052,1	573,6	914,0	221,4	87,8	512,8	140,6	1568,2	1496,5	1037,8	579,3	718,5	1051,7	1345,6	453,1

Table 15: Systematic list of fishes collected by the RV "Victor Hensen" in Magallanes, 1994.

TAXA		*STATION*	*IZUA-PM*	*NUMBER*
Myxinoidea				
Myxinidae	Spec. Indet.			6
Chondrichthyes				
Squaloidei				
	Scyliorhinidae			
	Schroederichthys bivius	1239	1834	6
	Schroederichthys bivius	1149	1869	1
	Schroederichthys bivius	949	1880	2
	Squalidae			
	Centroscyllium granulatum	1080	1917	1
Rajoidei				
	Rajidae			
	Bathyraja macloviana	1239	1836	1
	Bathyraja macloviana (within egg-shell)	1175	1837	1
	Sympterygia bonapartei	952	1916	4
	Sympterygia bonapartei	1235	1898	1
	Raja chilensis	949	1915	1
Osteichthyes				
Gadiformes				
	Gadidae			
	Physiculus marginatus	806	1916	2
		865	1905	1
		952	1903	7
		952	1907	6
		1080	1918	5
		1115	1850	1
		1141-42	1851	3
		1235	1897	1
	Macrouridae			
	Coelorhynchus fasciatus	870	1857	1
		1264	1855	1
Ophidiiformes				
	Zoarcidae			
	Ilucoetes fimbriatus	1215	1913	1
	Ophthalmolycus macrops	1277	1912	1
Scorpaeniformes				
	Agonidae			
	Agonopsis chiloensis	805	1900	1
		1175	1839	3
		1191	1844	2
		1158	1849	1
		1163	1862	1
		1203	1889	1
		1215	1860	11
		1215	1892	3
		1222	1854	2
		1225	1885	1
		1228	1896	1
		1239	1832	4
		1242	1876	2
		1242	1878	1
	Congiopodidae			
	Congiopodus peruvianus (Fotografía)		1	
	Psychrolutidae			
	Neophrynichthys marmoratus (Fotografía)		1	
	Liparidae			
	Paraliparis sp. ?	865	1914	1

Table 17: Continued

Perciformes	Bovichthyidae			
	Cottoperca gobio	861	1827	2
		920	1824	3
		925	1865	2
		949	1881	5
		952	1826	1
		960	1829	12
		1149	1866	4
		1153	1887	9
		1158	1847	16
		1175	1840	32
		1191	1842	9
		1203	1856	26
		1215	1858	28
		1215	1873	1
		1215	1891	11
		1222	1852	8
		1228	1895	2
		1239	1833	8
		1242	1877	13
		1287	1845	1
		1290	1904	1
	Nototheniidae			
	Patagonotothen sp.	805	1908	5
		861	1899	7
		861	1901	2
		920	1825	9
		925	1864	7
		949	1879	60
		949	1882	1
		952	1828	3
		960	1830	6
		969	1902	2
		1141-42	1831	3
		1149	1867	13
		1149	1868	12
		1149	1870	22
		1153	1888	10
		1158	1846	61
		1158	1848	1
		1163	1861	34
		1175	1838	27
		1175	1841	15
		1182	1909	1
		1191	1843	11
		1215	1859	20
		1215	1872	2
		1215	1890	15
		1222	1853	14
		1225	1883	11
		1225	1884	2
		1225	1886	1
		1228	1893	7
		1228	1894	8
		1239	1835	6
		1242	1874	11
		1242	1875	4
		1278	1910	6
	Paranotothenia magellanica	1215	1871	1
Pleuronectiformes				
	Bothidae			
	Thysanopsetta naresi	925	1863	1

Table 18: Scientific institutes involved

Country	Institute	Fax number	Participants
Chile	Inst. de Invest. Oceanológicas, Univ. Antofagasta	0056-55-247 542	Escribano, Rubén
	Centro EULA-Chile, Univ. Concepción	0056-41-242 546	Valdovinos, Claudio
	Dpto. de Física, Atm. Océano, Univ. Concepción	0056-41-240 280	Figueroa, Dante
	Dpto. de Oceanografía, Univ. Concepción	0056-41-240 280	Antezana, Tarsicio
			Aracena, Olga
			Eissler, Yoanna
			Korterpeter, Serena
			Lépez, Irene
			Mahamé, Madeleine
			Stuardo, José *
			Yuras, Gabriel
	Dpto. de Zoología, Univ. Concepción	0056-41-240 280	Moyano, Hugo
			Larraín, Alberto *
			Riveros, Any
	Univ. de Chile, Santiago	0056-2-712983	Osorio, Cecilia *
	Inst. de Biología Marina, Univ. Austral de Chile, Valdivia	0056-63-212 953	George, Kai (now: 0049-441-7983250)
			Lardies, Marco Antonio
			Stead, Robert
			Valenzuela, Guillermo *
	Inst. de Ecología y Evolución, Univ. Austral de Chile, Valdivia	0056-63-212 953	Moreno, Carlos *
	Inst. de Zoología, Univ. Austral de Chile, Valdivia	0056-63-212 953	Wehrtmann, Ingo
	Inst. de Oceanología, Univ. Valparaíso	0056-32-833 214	Campos, Bernardita
	IFOP, Pta Arenas	0056-61-241 836	Jara, Sergio
	Inst. de la Patagonia, Univ. Magellanes, Pta Arenas	0056-61-212 973	Domínguez, Erwin
			Mutschke, Erika
			Oyarzún, Silvia
			Ríos, Carlos
			Uribe, Juan Carlos
Italy	Instituto Polic. Oceanol. Paleoecol., Univ. Catania	0039-95-7221385	Geronimo, S.I. di
			Rosso, Antonietta
	ISAM, Univ. Genova	0038-185-281089	Albertelli, Giancarlo
	Instituto di Zoologia, Univ. Genova	0039-10-2099323	Cerrano, Carlo

Table 18: Continued

			Pansini, Maurizio
	Staz. Zoologica "Anton Dohrn", Ischia (Napoli)	0039-81-984201	Procaccini, Gabriele
			Scipione, Beatrice
	Dip. Scienze dell'Ambiente e del Territorio, Univ. Pisa	0039-50-49694	Benedetti-Cecchi, Lisandro
Belgium	Inst. Royal des Sciences Naturelles de Belgique, Bruxelles	0032-2-6 46 44 33	DeBroyer, Claude
	Marine Biol. Section, Zool. Inst., Univ. Gent	0032-2-507-60 07	Herman, Rudy
Sweden	Kristineberg Mar. Res. Lab., Lysekil	0046-523-18502	Rosenberg, Rutger
Spain	Inst.Ciencias del Mar, Barcelona	0049-471-4831337	Pagès, Francesc
Germany	AWI, Bremerhaven	0049-471-4831149	Arntz, Wolf Brey, Thomas * Dahm, Corinna * Gerdes, Dieter Gorny, Matthias Gutt, Julian Klöser, Heinz Rauschert, Martin Riemann-Zürneck, Karin * Urban, Jörg Schickan, Thomas
	Inst. für Polarökologie, Univ. Kiel	0049-431-7208720	Brandt, Angelika
			Richter, Claudio (now: 0049-421-218 5170)
	GEOMAR, Univ. Kiel	0049-431-7202293	Witte, Ursula
	Universität München	0049-89-5902-461	Schrödl, Michael *

* not participating in the field work, but involved in laboratory work

Table 19: List of scientific participants

a) Leg 1 (17 Oct. - 02 Nov. 1994)

Albertelli, Giancarlo, Univ. Genova
Antezana, Tarsicio, Univ. Concepción
Arntz, Wolf, AWI Bremerhaven
Benedetti-Cecchi, Lisandro, Univ. Pisa
Campos, Bernardita, Univ. Valparaíso
Cerrano, Carlo, Univ. Genova
Domínguez, Erwin, Univ. Magallanes
Eissler, Yoanna, Univ. Concepción
Escribano, Rubén, Univ. Antofagasta
Figueroa, Dante, Univ. Concepción
George, Kai, Univ. Austral, Valdivia
Gerdes, Dieter, AWI Bremerhaven
Geronimo, S.I. di, Univ. Catania
Gorny, Matthias, AWI Bremerhaven
Gutt, Julian, AWI Bremerhaven
Jara, Sergio, IFOP Pta Arenas
Klöser, Heinz, AWI Bremerhaven
Korterpeter, Serena, Univ. Harvard/Concepción
Lardies, Marco Antonio, Univ. Austral, Valdivia
Mahamé, Madeleine, Univ. Concepción
Moyano, Hugo, Univ. Concepción
Mutschke, Erika, Univ. Magallanes
Oyarzún, Silvia, Univ. Magallanes
Pagès, Francesc, Inst. Ciencias del Mar, Barcelona
Pansini, Maurizio, Univ. Genova
Procaccini, Gabriele, Staz. Zool. "Anton Dohrn", Ischia
Rauschert, Martin, AWI Bremerhaven
Ríos, Carlos, Univ. Magallanes
Rosso, Antonietta, Univ. Catania
Scipione, Beatrice, Staz. Zool. "Anton Dohrn", Ischia
Stead, Robert, Univ. Austral, Valdivia
Tross, Sabine, Univ. Concepción
Urban, Jörg, AWI Bremerhaven
Uribe, Juan Carlos, Univ. Magallanes
Valdovinos, Claudio, Centro EULA-Chile, Univ. Concepción
Wehrtmann, Ingo, Universität Austral, Valdivia
Yuras, Gabriel, Univ. Concepción

Table 19: continued

b) Leg 2 (03 - 07 Nov. 1994)

Antezana, Tarsicio, Univ. Concepción
Arntz, Wolf, AWI Bremerhaven
Eissler, Yoanna, Univ. Concepción
George, Kai, Univ. Austral, Valdivia
Gerdes, Dieter, AWI Bremerhaven
Gutt, Julian, AWI Bremerhaven
Jara, Sergio, IFOP Pta Arenas
Lardies, Marco Antonio, Univ. Austral, Valdivia
Mahamé, Madeleine, Univ. Concepción
Rauschert, Martin, AWI Bremerhaven

c) Leg 3 (08 - 18 Nov. 1994)

Aracena, Olga, Univ. Concepción
Arntz, Wolf, AWI Bremerhaven
Brandt, Angelika, Univ. Kiel
Broyer, Claude de, Inst. Royal Sciences Nat., Bruxelles
George, Kai, Univ. Austral, Valdivia
Gerdes, Dieter, AWI Bremerhaven
Gorny, Matthias, AWI Bremerhaven
Herman, Rudy, Univ. Gent
Klöser, Heinz, AWI Bremerhaven
Lardies, Marco Antonio, Univ. Austral, Valdivia
Lépez, Irene, Univ. Concepción
Rauschert, Martin, AWI Bremerhaven
Richter, Claudio, Univ. Kiel
Riveros, Any, Univ. Concepción
Rosenberg, Rutger, Univ. Göteborg
Schickan, Thomas, AWI Bremerhaven
Stead, Robert, Univ. Austral, Valdivia
Witte, Ursula, Univ. Kiel

d) Leg 4 (19 - 25 Nov. 1994)

Arntz, Wolf, AWI Bremerhaven
Brandt, Angelika, Univ. Kiel
Gorny, Matthias, AWI Bremerhaven
Klöser, Heinz, AWI Bremerhaven
Lardies, Marco Antonio, Univ. Austral, Valdivia
Richter, Claudio, Univ. Kiel
Rosenberg, Rutger, Univ. Göteborg
Schickan, Thomas, AWI Bremerhaven
Witte, Ursula, Univ. Kiel

Table 20: List of crew members

LEG 1 - 4 (17 Oct. - 25 Nov. 1994)

Klaassen, Wolfgang, Captain
Nath, Dietrich, Chief Mate
Szymanski, Jürgen, Chief Engineer
Harting, Volker, 2nd Engineer
Huxol, Werner, Electrician
Jahns, Winfried, Boatswain
Tiemann, Frank, Cook
Lentzen, Peter, Deckshand
Mahlmann, Detlef, Deckshand

Table 21: Distribution of material

	Gear	Taxa	Name of specialist	Country	Affiliation
1. Benthic samples -Macrofauna					
	AGT	Hydroidea	Gili, J. M.	Spain	Inst. de Ciencias del Mar, Barcelona
			Moyano, Hugo	Chile	Dpto. de Zoologia, Univ. Concepción
			Pansini, Maurizio & Cerrano, Carlo	Itlay	Inst. de Zoologia, Genova
			Witte, Ursula	Germany	Geomar, Kiel
		Actinaria	Riemann-Zürnek, Karin	Germany	AWI, Bremerhaven
		Mollusca	Lépez, Irene, Aracena, Olga & Stuardo, José	Chile	Dpto. Oceanografía, Univ. Concepción
		Bivalvia (shallow water samples)	Campos, Bernadita	Chile	Inst. de Oceanografía, Univ. Valparaiso
			Stead, Robert	Chile	Inst. Biología Marina Univ. Austral de Chile, Valdivia
			Valdovinos, Claudio	Chile	Centro EULA-Chile, Univ. Concepción
			Urban, Jörg	Germany	AWI, Bremerhaven
		Pectinidae (large samples)	Urban, Jörg	Germany	AWI, Bremerhaven
		Limopsidae (large samples)	Brey, Thomas	Germany	AWI, Bremerhaven
		Prosobranchia	Osorio, Cecilia	Chile	Univ. de Chile, Santiago
			Schrödel, Michael	Germany	Univ. Munich
		Ophistobranchia			
			Rosso, Antonietta	Italy	Inst. Polic. Oceanol. Paleoecol. Univ. Catania
		Polyplacophora	for further distribution	Germany	AWI, Bremerhaven
		Cephalopoda Octopoda	for further distribution	Chile	Inst. de la Patagonia Univ. de Magallanes, Pta Arenas
		Scaphopoda	for further distribution	Germany	AWI, Bremerhaven
		Polychaeta	Mutschke, Erika & Ríos, Carlos	Chile	Inst. de la Patagonia Univ. de Magallanes, Pta Arenas
			Gambi, Maria C	Italy	Staz. Zool. "Anton Dohrn" Ischia, Napoli
		Decapoda Caridea	Lardies, Marco & Wehrtmann, Ingo	Chile	Inst. de Zoologia, Univ Austral de Chile, Valdivia
		Decapoda Anomura + Brachyura	Gorny, Matthias	Germany	AWI, Bremerhaven
			Soto Raúl	Chile	Dpto. de Ciencias del Mar Univ. Arturo Prat, Iquique

Table 21: continued

		Amphipoda	Rauschert, Martin	Germany	AWI, Außenstelle Potsdam
		Isopoda	Brandt, Angelika	Germany	Univ. Hamburg
		Pantopoda	Krapp	Germany	Museum König, Bonn
		Bryozoa	Moyano, Hugo	Chile	Dpto. de Zoologia, Univ. Concepción
			Rosso, Antonietta	Italy	Inst. Polic. Oceanol. Paleoecol. Univ. Catania
		Brachiopoda	Mutschke, Erika & Ríos, Carlos	Chile	Inst. de la Patagonia Univ. de Magallanes, Pta Arenas
		Ophiuroidea	Dahm, Corinna	Germany	AWI, Bremerhaven
		Asteroidea	Larraín, Alberto	Chile	Inst. de Zoología Univ Concepción
		Echinoidea			
		Holothuroidea			
		Ascidiacea	Monnoit	Belgium	
		Pices	Pequeno, German R	Chile	Inst. de Zoología Univ. Austral de Chile, Valdivia
- Meiofauna	MUC		Schminke, K. H.	Germany	FB 7 (Biologie) Univ. Oldenburg
			Herman, Rudy	Belgium	Mar. Biol. Section, Zool. Inst. Univ. Gent
		shallow water samples	George, Kai		Inst. de Biología Marina Univ. Austral de Chile, Valdivia
- Biodiversity & Community structures	MG		Gerdes, Dieter	Germany	AWI, Bremerhaven
			Mutschke, Erika & Ríos, Carlos	Chile	Inst. de la Patagonia Univ. de Magallanes, Pta Arenas
2. Plankton	MN, BO		Antezana, Tarsicio	Chile	Dpto. de Oceanografía, Univ. Concepción
				Germany	AWI, Bremerhaven