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Following a short break overnight from Christmas Eve to Christmas Day the by now routine station work resumed on Christmas morning.

Whenever the RMT net is brought on board the catch is spread out in trays in the wet lab and representatives of five different working groups gather round to divide it up into various types of organism. These include crustaceans such as krill, including both the Antarctic krill, Euphausia superba, and a second species which occurs in our area, Thysanoessa macrura, and other crustaceans such as amphipods and copepods. Another organism found is the salp, a virtually transparent organism with a tube-like form which moves by pumping water through itself and feeds by filtering phytoplankton by means of a net-like organ inside itself. There are also pteropods, which are a kind of snail whose foot has become adapted to enable them to fly through the water and which use their mucous to form a web to catch food such as phytoplankton or copepods. Arrow worms are another organism found; they are long and thin and largely transparent with claws on their heads and a fringe on their tails which indeed gives them an arrow-like appearance. Also in the catch there are usually polychaet worms, jellyfish, ctenophores and small fish.

For most of these zooplankton groups there are specialists amongst the biologists on board who immediately start their detailed investigations.

The krill are sorted into species, size classes and developmental stages such as larvae, juveniles and adults. Next, as the first stage of a quantitative analysis, the number of individuals in each class is determined.

For the salps, particularly the species Salpa thompsoni, apart from the numbers, the chlorophyll content of the digestive tract is determined by a fluorescence technique. From this, together with measurements of the chlorophyll concentration of the surrounding water, the feeding rates of these organisms can be determined. In parallel the developmental and reproductive stage of each individual is determined.

The catch of pteropods – the dominant species here are Limacina helicina and Clio sulcata – is evaluated quantitatively, as with the krill and salps, to gain basic information about the spatial distribution of these creatures in the Lazarev Sea. Later the pigment concentration of the gut will also be measured to work out their feeding rates. In addition there will be an analysis of their lipid and stabile isotope contents to determine their position in the food chain.

The jellyfish, ctenophores, polychaets and fish are simply being conserved. On our return they will be passed on to specialists ashore for taxonomic determination and other analyses.

Just like with the RMT, so it is when the CTD and rosette with filled water bottles comes on board. Now representatives of other groups gather round to take their samples. Here there is a strict set of priorities. First come samples for volatile gases such as oxygen, then samples for biologically active substances such as chlorophyll and finally come dissolved salts. The sample volume required is often very different. For some analyses ten millilitres are adequate, while others, for example particulate organic carbon, need 30 to 40 litres. Following the sampling comes filtration in the case of particulates, which can last for several hours.

When the multinet comes on board the containers from each of the five individual nets are removed and filtered. The catch, principally smaller zooplankton such as copepods, is preserved and will be analysed after the cruise in the laboratories of the Alfred Wegener Institute.

In addition to the station work there are experiments running continuously in the cool containers at 0°C using organisms caught alive.

In the case of Antarctic krill the main question is, what physiological mechanisms allow this creature to survive long periods without nourishment? A distinction has to be made between juveniles and adults. The oxygen consumption and growth of freshly caught individuals is determined. Through feeding experiments the role of various food sources, phytoplankton or zooplankton, is determined. At the end of the experiments the test animals will be analysed for their biochemical composition in terms of proteins, fats and carbohydrates.

In various feeding experiments the fatty acid composition of krill will be determined to see how it depends on the food source. In this way the con---cept of fatty acids as biomarkers for the food sources can be vali--dated to establish whether the fatty acid composition allows conclusions to be drawn as to the krill's source of nourishment. In addition starvation experiments are used to find out which energy reserves are used when food is scarce.

To determine the core parameters of the energy budget, in particular car---bo-hydrate and protein metabolism, tissue samples are taken from the test animals. From these samples the enzymes which regulate this metabolism will be measured after the cruise. Likewise the hormone melatonin will be determined; it is known from vertebrates that it carries information about daily and seasonal physiological cycles. The question is, whether this substance, known as the darkness or sleep hormone, plays a role in krill in reducing the metabolic rate during periods of low food availability. For later determinations of the melatonin content in AWI's laboratories, sam-ples of tissue fluid are taken and frozen and stored in liquid nitrogen at -84°C. In addition, tissue samples are being taken for the investigation of those proteins which are potential causes of foodstuff allergies. Such allergenic proteins are known to occur in other crustaceans. In the case of krill this should be investigated before it is used in significant amounts for human consumption.

The various species of arrow worms are subjected on board to the same kind of feeding experiments as the krill. They are, however, fed with copepods, which are their natural prey. Though arrow worms are relatively common, so far little is known about how much they eat and what grazing pressure they exert on their prey species. In the experiments their faecal pellets are also collected and investigated for volume, carbon content and sinking rate. From these measurements it is possible to estimate the influence of arrow worms on the vertical transport of carbon in the oceans.

In addition the experiments on creatures caught early in the cruise using the Agassiz bottom trawl net near Bouvet Island and off Neumayer Station are still being continued.

The sponges and horn corals, which in their natural environment on the bottom feed by filtering organic particles from the surrounding water, are subjected to experiments in incubation chambers for periods of six hours during which water samples at taken a various times. From the water samples the changes in concentration of dissolved inorganic and organic nutrients, particulate organic carbon, chlorophyll, microplankton community, bacterial numbers and also bacterial production can be followed. From these mea---sure--ments can be estimated to what extent these organisms influence the water in their natural habitat.

The studies of the captive bottom-living fish are concentrated on bio---chem-i-cal laboratory measurements. In the foreground stand comparative studies of energy generating and consuming processes in the gills and liver. Interest-ing differences between the different fish species are apparent relating to the function of the enzymes and their temperature-sensitivity to certain inhibiting substances.

An unplanned, welcome though, addition to our programme occurred in the middle of the week when we passed a green, or better greenish, iceberg. Such colouration is characteristic of marine ice, ice that forms by freez--ing of supercooled water when it flows along the underside of the iceshelf, which itself is rather white or bluish. The reason for this green coloura--tion is however a matter of ongoing scientific debate. Some argue that it is due to the enclosure of phytoplankton, others that it results from scattering of light by embedded mineral particles. So the ship was turned to the iceberg to take a sample. At the end we were successful, but in seas three metres high it was not an easy task to come close enough for the two men in the mummy chair hanging down swinging from the ships crane to knock out a pieces of ice from the berg by use of pick-axes. We are eagerly looking forward to the analysis of the taken samples in the labo--ra-tory ashore.

In the night to New Year we interrupted the station work for a few hours and we used this time to steam a pattern of courses for the purpose of checking the calibration of the acoustic Doppler current profiler mounted in the ship's keel to see whether it had changed since the last calibration at Christmas.

At New Year we were able to enjoy a spectacle of light without fireworks. As we gathered on the bridge at midnight to drink a glass of sparkling wine together to toast the New Year the sun shone low in the south during the endless polar day from a cloudless sky lighting up the ice floes scattered around the ship against the dark background of the water.

The New Year began well for our Italian colleagues. Being close to the position where they had deployed their measurement system MABEL on the sea bottom earlier in the cruise, they were able to use the opportunity on New Year's morning to communicate with the system using an acoustic modem. They were pleased to discover that the system had so far recorded data without interruption since its deployment.

All on board are well and send with me Best Wishes for the New Year.

Volker Strass