NZ IPY-CAML Voyage 2008

25-27 FEB Back through the ice barrier

Our survey of the inner Ross Sea shelf and slope has now been successfully completed, with a total of 29 stations and 143 separate gear deployments. At least 400 different invertebrate species have been collected and nearly 75 different fish species identified.

We finished our time on the inside of the ice barrier with a perfect Antarctic day – clear and sunny skies with great views of the distant Admiralty Ranges of Northern Victoria Land, including Mt Herschel (3335 m), Mt Sabine (3714 m) and Mt Minto (4163 m), along with great sunrises and sunsets.

Fig.1. View of Mt Herschel 45nm away.

Fig.2. Sunset

It is now time to leave the inner Ross Sea. The workable area is reducing as the end of the summer season arrives and the freeze starts. Water temperatures are down to -1.85°C and new ice is becoming common. We are now starting our steam northwards through the 120 mile wide ice barrier heading towards open water where we will continue our sampling programme on the Antarctic seamounts and the abyssal plain (3000-3500 m) in the outer reaches of the Ross Sea region.

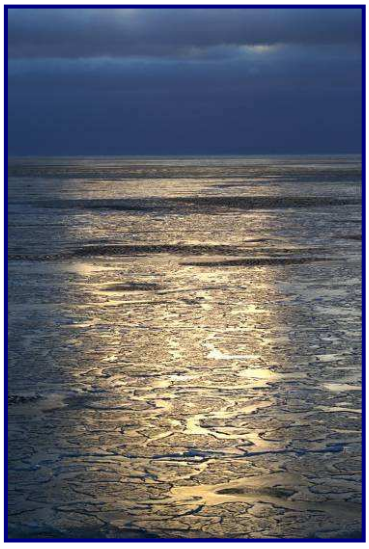

Fig 3. Newly forming ice
(Photos 1-4: John Mitchell)

Fig. 4. Old eroded berg surrounded by new plate ice with a flock of Antarctic Petrels resting on the ice.

SCIENCE REPORT

Zooplankton (Julie Hall)

Zooplankton (free-floating animals) are an important component of the marine food web, providing food for many fish species. During our voyage we have been using a Multiple Opening and Closing Net and Environmental Sensing System (MOCNESS, see Fig. 5 & 6) system to sample some of the larger zooplankton at specific depths from the surface to the seafloor. The plankton community changes with depth and this has implications for interpreting energy transfer through the food web. By using a MOCNESS rather than a more traditional simple plankton net that cannot be opened and closed off at a specific depth, the changes in plankton diversity and abundance through the water column can be more accurately estimated.

At the stations above the slope in the Ross Sea, we have found that the zooplankton populations are dominated by salps (planktonic relatives of sea squirts) in the surface waters and at deeper depths by crustaceans. We have collected several interesting types of zooplankton, including pteropod (Fig. 7) and ctenophore species many of us have not seen before (Fig. 8). The pteropods (planktonic snails) have a shell made of carbonate, which makes them particularly susceptible to the predicted decrease in pH (i.e. increasing acidity) in the ocean due to increasing atmospheric CO_2 . We have also caught larval fish and juvenile squid with the MOCNESS.

Fig. 5. MOCNESS system being deployed in the northern Ross Sea. (Photo: Peter Marriot)

Fig.6. MOCNESS in recovery mode (Photo: John Mitchell)

Fig.7. Pteropod collected in the northern Ross Sea (Photo: Darren Stevens)

Fig. 8. Ctenophore collected in the southern Ross Sea. (Photo: Stefano Schiaparelli)

Marine symbioses in Antarctica (Stefano Schiaparelli)

Feeding interactions between living organisms may be direct, as in the cases of herbivorous (eating plants) and predatory (eating other animals) relationships, or indirect, as in the case of symbiotic relationships. The word 'symbiosis' is often used to mean an association between organisms from which both gain an advantage but its proper definition includes parasitism (living in or on another organism and eating its tissues or its food). Direct feeding relationships are easier to account for than symbiotic or parasitic relationships when trying to understand or quantify the dynamics of feeding relationships.

We have just discovered two new parasites of the holothurian (a group of echinoderms with soft, cylindrical bodies, including sea cucumbers) known on the *Tangaroa* as 'sea pigs'. The first parasite is a small mollusc and, in Fig. 9, two of these snails can be seen happily embedded in the body wall of a sea pig. They live permanently in this position, feeding on the body fluids of their host using their long proboscis (bottom right). The second is a tiny crustacean which lives completely inside the sea pig and feeds on its internal tissues (Fig. 10).

Fig. 9. Parasitic association between *Stilapex* (snail) and *Scotoplanes* (holothurian 'sea pig'). The arrow points to a couple of snails deeply embedded in the holothurian skin, on its ventral side. The snails with only half of their shell visible live permanently in this position, under the protection of the host. They feed on body fluids of the holothurian, by using the long and extensible proboscis (bottom right).
(Photo: Stefano Schiaparelli)

Fig.10. Parasitic association between *Mirandotanais* sp. (a small crustacean of the Order Tanaidacea) and the sea pig *Scotoplanes*. Far left: Arrows indicate two specimens of the tanaid crustacean living inside the holothurian, seen through its transparent skin. Here, they use their claws to feed on the host skin and in some cases, the parasite excavates a 'tunnel' as it burrows through the holothurian (left).
(Photo: Stefano Schiaparelli)

Hydroids **(**Malcolm Clark & Stefano Schiaparelli)

Hydroids are coral-like animals, and many are soft-bodied forms that are difficult to catch and preserve. Last week in the southern Ross Sea, we obtained photographs and samples of a likely new species of hydroid. It is much larger than others known from the area, and also differs in colour and shape. Our first encounter was during a DTIS camera drop at 650 m. The figure below shows its bright orange colour and amazing flower-like structure where it sat on the seabed. Later, a specimen was caught in the trawl at about 400 m, and confirmed its large size, measuring about 6-7 cm across at the "head" and a stalk that was at least a metre long. This makes it 3-4 times larger than other species in this group that we know of in the Ross Sea. It also highlights the value of using different types of equipment during the survey, enabling both *in situ* observation and specimen collection.

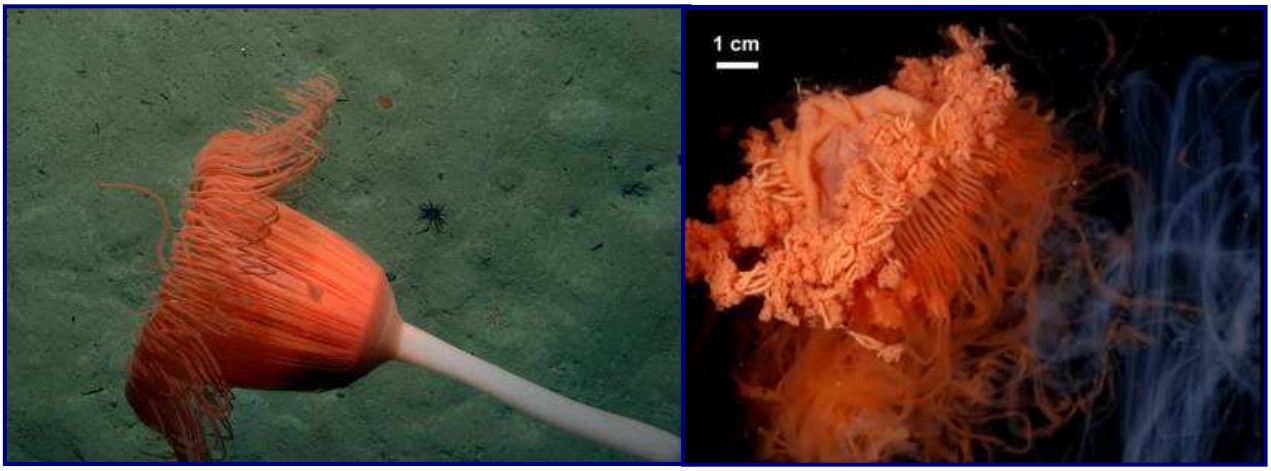

Fig.11. Athecate hydroid as first seen during a DTIS camera deployment. (Photo: DTIS/Dave Bowden) and then recovered from a bottom trawl (Photo: Stefano Schiaparelli).

Snailfish heaven (Stu Hanchet)

The Liparidae (snailfishes) is a very unusual and taxonomically challenging family of fishes. The different species are difficult to distinguish, and accurate identification generally requires sophisticated techniques such as X-ray counts of numbers of vertebrae and fin rays. However, by careful examination of the specimens, and comparing the high quality colour photographs, it is clear that we have already caught at least five different species from the shelf and slope of the Ross Sea. Most species of snailfishes are relatively small with a length of 15–20 cm, but we have caught several specimens of *Paraliparis* sp. of almost double the length at 30–35 cm. Two days ago we completed our deepest bottom trawl to date at almost 2000 m depth and caught eleven specimens representing at least three different species – a veritable snailfish heaven!

Fig. 12 One of the five varieties of snailfish collected to date (Photo: Peter Marriott).