

# News from the ASCLM

## 21st Century explorers return with unique data from Indian Ocean seamounts

by Sarah Gotheil and Claire Attwood

The ASCLME Project played a key role in funding and organising a pioneering survey of seamounts in the southern Indian Ocean which was carried out on the research ship *Dr Fridtjof Nansen* last year.

Over 40 days, a team of the world's leading marine biologists, paired with scientists from the region, travelled 6,000 miles to sample the rich marine life above six seamounts in the international waters of the western Indian Ocean. They returned to Port Elizabeth, South Africa, with nearly 7,000 specimens.

The species collection includes an impressive variety of fish, shrimps, squids and gelatinous marine creatures. Many more samples of phytoplankton and zooplankton - representing the base of the ocean food chain - nutrients, isotopes and particulate organic matter (POM), were also collected.

Two seabird and marine mammal observers recorded thousands of seabirds from as many as 36 species and 26 marine mammals over the course of the 40-day cruise.

Early indications are that the six seamounts that were surveyed are very different from each other.

A scientific workshop will soon be arranged to identify all the species collected, but the analysis of the thousands of samples collected on the voyage is expected to take many more years.

The survey of the seamounts of the Indian Ocean was organised by the International Union for Conservation of Nature (IUCN), in partnership with several other organisations, including the ASCLME Project. The aim of the survey is to improve knowledge of seamounts across the southwest Indian Ocean ridge.

The ASCLME Project participated in and supported the Seamounts Cruise because it will soon begin addressing the complex issue of managing the high seas, or Areas Beyond National Jurisdiction (ABNJ). Furthermore, the area in which the cruise took place represents the boundary of the Agulhas and Somali Current LME and the cruise presented a good opportunity to gather information about the Agulhas Return Current and the Subtropical Convergence. In time, this information will help to clearly define the southern boundary of the LME.

The research vessel *Dr Fridtjof Nansen* left on November 12 from Réunion Island, and travelled 6,000 miles in 40 days to study six seamounts on the southwest Indian Ocean Ridge, and one seamount on Walters Shoal, south of Madagascar, before docking in Port Elizabeth, South Africa on December 18.

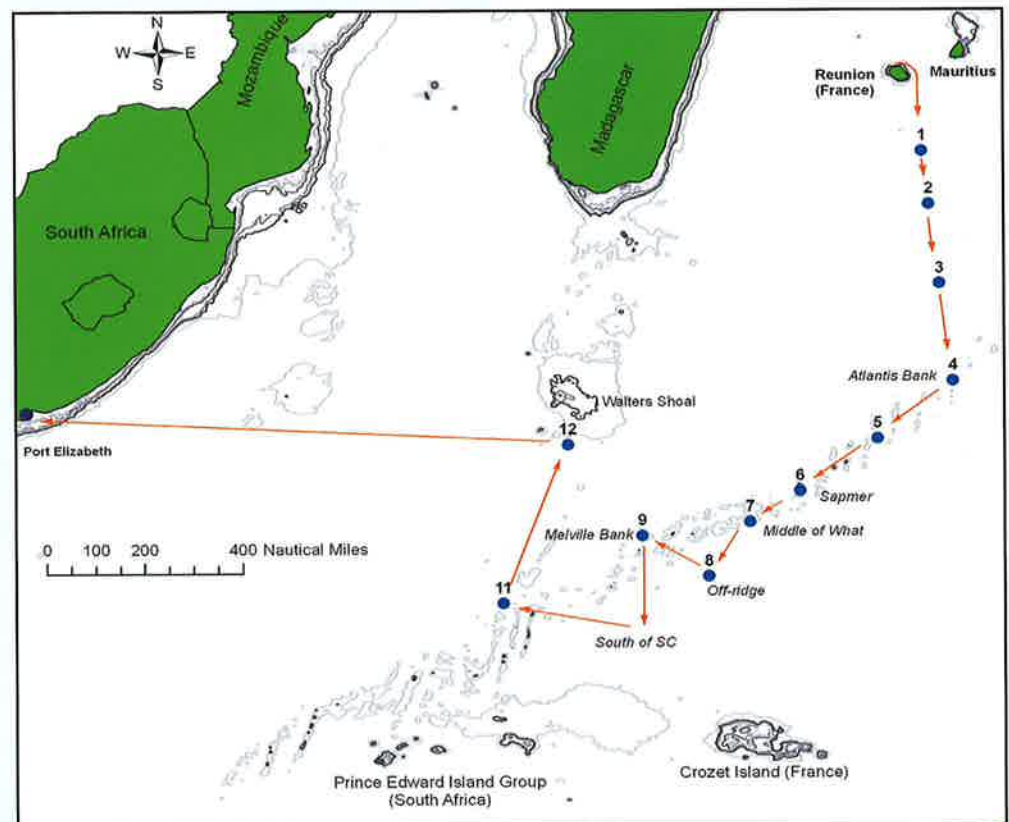
Seamounts - underwater mountains of volcanic and tectonic origin - are known to be "hotspots" of biodiversity and support a range of oceanic predators, including seabirds, whales and sharks. They also attract deepwater fisheries, as they host many species of commercial interest, most of which are very vulnerable to over-exploitation.

The results of the seamounts survey will not only have a scientific application, they will also help to improve conservation and management of Indian Ocean marine resources.

One of the primary goals of the survey is to assess the conservation benefits of protecting seamount features on the ridge. This will inform future management of deep-sea ecosystems in the high seas on a global scale.



Often working at night and in rough weather, the scientific team on the *Dr Fridtjof Nansen* collected and preserved almost 7,000 specimens.



## Exploradores do Século 21 regre picos submarinhos do Oceano Índico

Por Sarah Gotheil e Claire Attwood

O Projecto ASCLME desempenhou um papel chave no financiamento e organização de um levantamento pioneiro de picos submarinos do Oceano Índico, que foi realizado no navio de investigação *Dr Fridtjof Nansen* no ano passado.

Ao longo de 40 dias, uma equipa de biólogos marinhos líderes a nível mundial, em conjunto com cientistas da região, viajaram 6,000 milhas para amostrar a rica vida marinha sobre seis picos submarinos nas águas internacionais ao largo do Oceano Índico. Eles regressaram a Port Elizabeth, África do Sul, com perto de 7,000 espécimes.

A recolha de espécies inclui uma variedade impressionante de peixe, camarão, lulas e criaturas marinhas gelatinosas. Foram ainda recolhidas muitas mais amostras de fitoplâncton e zooplâncton - representando a base da cadeia alimentar oceânica - nutrientes, isótopos e matéria orgânica particulada (MOP).

Dois observadores de aves e mamíferos marinhos registaram milhares de aves marinhas de 36 espécies, e 26 mamíferos marinhos ao longo do cruzeiro de 40 dias.

As primeiras indicações apontam para grandes diferenças entre os seis picos submarinos que foram estudados.

# E Project

## Essam com dados únicos dos dico Oeste

Será em breve organizado um workshop para identificar todas as espécies recolhidas, mas a análise dos milhares de amostras recolhidas na viagem deverá levar muitos anos mais.

O levantamento dos picos submarinos do Oceano Índico foi organizado pela União Internacional para a Conservação da Natureza (IUCN), em parceria com várias outras organizações, incluindo o Projecto ASCLME. O objectivo do levantamento é melhorar o conhecimento de picos submarinos em toda a cadeia do Oceano Índico Sudoeste.

Os picos sumarinhos – montanhas submarinas de origem vulcânica e tectónica – são conhecidos como sendo *hotspots* de biodiversidade e pontos de atracção de uma gama de predadores oceânicos, incluindo aves marinhas, baleias e tubarões. Eles atraem igualmente pescarias de águas profundas, dado que acolhem muitas espécies de interesse comercial, a maioria das quais são muito vulneráveis à sobre-exploração.

## Les explorateurs du 21<sup>e</sup> siècle reviennent avec des données uniques sur les monts sous-marins de l'Océan indien

Par Sarah Gotheil et Claire Attwood

Le projet ASCLME a joué un rôle clé dans le financement et l'organisation d'une étude pionnière des monts sous-marins de l'Océan indien réalisée l'année dernière à partir du navire de recherche, le *Dr Fridtjof Nansen*.

Pendant 40 jours, une équipe internationale de biologistes marins de premier ordre, accompagnée de chercheurs de la région, a parcouru 6,000 miles pour échantillonner la riche vie marine sur six monts sous-marins dans les eaux internationales de l'Océan indien occidental. Ils sont revenus à Port Elizabeth, en Afrique du Sud, avec près de 7,000 spécimens.

La collection d'espèces inclut une variété impressionnante de poissons, de crevettes, de calmars et de créatures marines gélatineuses. De nombreux autres échantillons de phytoplancton et de zooplancton – représentant la base de la chaîne alimentaire océanique – de nutriments, d'isotopes et de particules organiques ont également été collectés.

Deux observateurs d'oiseaux marins et de mammifères marins ont enregistré des milliers d'oiseaux marins de 36 espèces et 26 mammifères marins au cours de la croisière de 40 jours.

Les premières indications montrent que les six monts sous-marins étudiés sont très différents les uns des autres.

Un atelier scientifique sera bientôt organisé pour identifier toutes les espèces collectées, mais l'analyse des milliers d'échantillons collectés au cours du voyage devrait encore prendre de nombreuses années.

L'étude des monts sous-marins de l'Océan indien a été organisée par l'Union internationale pour la conservation de la nature (IUCN), en partenariat avec plusieurs autres organisations, dont le Projet ASCLME. L'objectif de l'étude consiste à développer la connaissance des monts sous-marins sur la dorsale sud-ouest de l'Océan indien.

## Plankton studies reveal clear trends

Regular sampling of phytoplankton during the course of the Seamounts Cruise, revealed some clear but not unexpected trends.

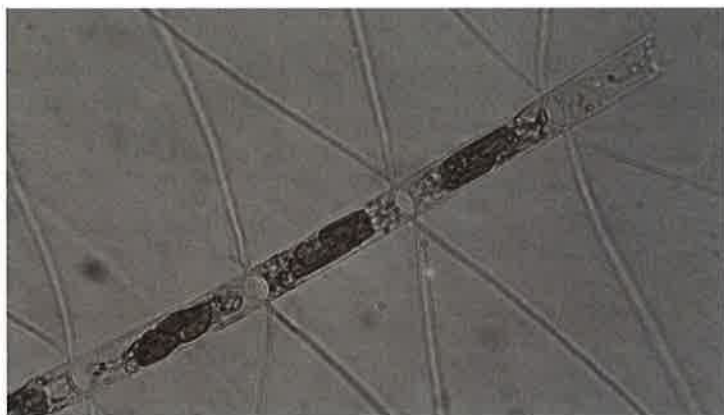
"We found that diatoms formed the dominant phytoplankton group south of 36°S, and that the stations north of Sapmer Seamount (including Atlantis Seamount) were characterised by low fluorescence, typical of tropical and subtropical water with low levels of nutrients," explains Dr Tommy Bornman, cruise coordinator of the ASCLME Project, who has a special interest in phytoplankton.

Common diatoms are the chain forming species belonging to the genus *Pseudonitzschia* and *Chaetocerus*, and large centrics such as *Planktoniella* and *Coscinodiscus*.

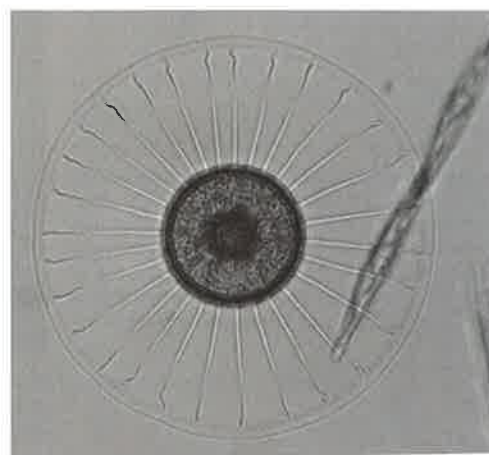
The highest levels of fluorescence were measured in the surface waters between the Sub-tropical Front and the Sub-Antarctic Front, around 40°S. In the sub-Antarctic, the high latitude flagellate, *Phaeocystis* sp. (probably *P. antarctica*) made an appearance in large numbers, although diatoms remained the dominant group.

Phytoplankton, nutrients and particulate organic matter (POM) were sampled at 110 environmental stations over the course of the Seamounts Cruise. Phytoplankton samples will be analysed by the South African Institute for Aquatic Biodiversity; nutrient samples will be analysed at the University of Cape Town; and isotope and POM samples will be analysed at Rhodes University.

A multinet, used for collecting plankton.



Two diatom species, *Planktoniella* sp. and *Chaetocerus* sp. were collected and photographed by Tommy Bornman.



## Why study seamounts?

By Dr Alex David Rogers

Most of the deep-sea is inhabited by a very sparse, but diverse, community of animals.

This is because most of them rely on particles of food raining down from the sea surface where photosynthesis takes place. As this food – known as marine snow – sinks, it gets consumed and only a small part reaches the seafloor.

Seamounts are different because some of them harbour striking communities of animals living on the seabed, as well as an abundance of fish. They also appear to be hotspots for ocean predators such as sharks, tuna, whales, seabirds and seals.

One of the reasons we are studying the South West Indian Ocean Ridge is that the seamounts along it occur at a variety of depths and in different currents and provide us with a range of environments to try and understand what makes seamounts biological hotspots.

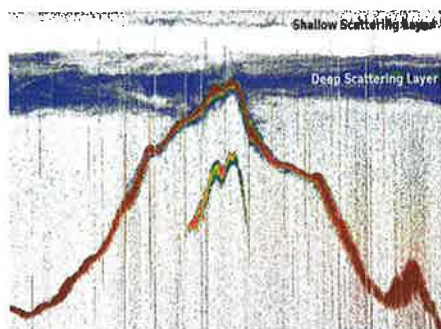
The other reason for studying seamounts is that fishers target seamounts for their abundant fish populations, including orange roughy, oreo dories and cardinal fish.

When exploitation of seamounts began there was very limited knowledge about the biology of the fish stocks that were being targeted. It turned out that many seamount fish stocks were extremely vulnerable to overfishing because they live for more than 100 years, grow extremely slowly and are very late to mature and reproduce. But, because many stocks were located in the high seas, where there was no control on fishing effort, many stocks crashed very rapidly.

In addition, it was discovered that bottom trawling was highly destructive to seabed communities which were formed by animals like corals on seamounts. Some of these have now been aged to more than 4,000 years old (although typical ages are tens to hundreds of years old), and are unlikely to recover from the impacts of fishing.

Thus we aim to identify why commercial stocks of fish are found on the South West Indian Ocean Ridge (and therefore elsewhere); how important the seamounts are to other marine life, including birds and whales; and to make our findings available to the fishing industry and managers of fisheries in the region, to help develop ecosystem-based precautionary management of high-seas seamount fisheries.

In 2011, we will return to the Indian Ocean to investigate whether vulnerable marine ecosystems, such as coral reefs, occur on the ridge.



A seamount echogram. The thick blue layer at the summit of the seamount represents the deep scattering layer. The DSL reflects sound and is visible on echosounders. The world's largest daily migration occurs in the DSL when animals rise to the sea surface at night to feed and then sink back into the dark depths by day to avoid being eaten themselves.



An unusual looking fish, this Bean's sawtoothed eel was caught at 500m.



The splendid alfonsino, *Beryx splendens*, is a deep-sea fish of commercial interest. It is typically caught at a depth of between 400 and 800m.



Caught at 500m was this deep sea angler fish, also known as a "sea toad".



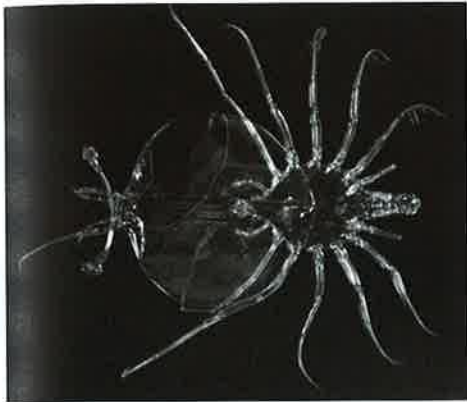
The only octopus caught during the 40 day cruise was this unidentified species, caught on Walter's Shoal south of Madagascar. A surprising diversity of squids were caught, however and it is believed that some will be new to science.

Pictures on this page courtesy of Sarah Gotheil and Oddgeir Alvheim.

# E Project

Os resultados do levantamento dos picos submarinos não só terão aplicação científica, como irão também ajudar a melhorar a conservação e gestão dos recursos marinhos do Oceano Índico.

Um dos principais objectivos do levantamento é avaliar os benefícios para a conservação da protecção de aspectos dos picos submarinos na cadeia. Isto irá informar a gestão futura dos ecossistemas do mar profundo nos mares altos a uma escala mundial.



A phyllosoma or rock lobster larva. Many seamounts host a large number of larvae because they seem to trap them. The transparency of the larva helps it to hide from predators.

Les monts sous-marins – montagnes sous-marines d'origine volcanique et tectonique – sont connus pour être les points névralgiques de la biodiversité et attirer une palette de prédateurs océaniques, dont des oiseaux marins, des baleines et des requins. Ils attirent également les sociétés de pêche en eau profonde, car ils hébergent de nombreuses espèces d'intérêt commercial, dont la plupart est très vulnérable à la surexploitation.

Les résultats de l'étude des monts sous-marins n'auront pas uniquement une application scientifique, ils aideront également à améliorer la conservation et la gestion des ressources marines de l'Océan indien.

L'un des objectifs premiers de l'étude consiste à évaluer les bénéfices en termes de conservation de la protection des caractéristiques des monts sous-marins sur la dorsale. Cela informera la gestion future des écosystèmes en eau profonde dans les hautes mers à l'échelle mondiale.

Pictures on this page courtesy of Sarah Gotheil and Oddgeir Alvheim.



Like a swan, the juvenile spiky oreo dory, *Neocyttus rhomboidalis*, (top) looks nothing like its parent (bottom).



## A feast for snot flower worms?

Are there any marine creatures with the wonderfully descriptive moniker of "snot flower worm" living on the seamounts of the Indian Ocean?

This is the question that biologist Kirsty Kemp of the Zoological Society of London is trying to answer. To tempt the little critters to reveal themselves, Kirsty delivered a few delectable whale bones and mango tree branches to the seabed of Atlantis and Coral seamounts. The bones and branches were attached to a transponder so that they can be located in 2011, when a second survey of the seamounts of the southern Indian Ocean is scheduled to take place.

Biologists know that whale carcasses are important mini ecosystems on the bottom of the sea. Each decomposition phase attracts different predators – the carcass mostly attracts bigger animals, while the bones are left to worms, bacteria and other tiny creatures. The unique community that colonises whale bones (and sometimes wood) is dominated by polychaete worms.

Kirsty is particularly interested in snot flower worms because they have been described in the Pacific Ocean, the North Atlantic and the North Sea but, so far, none have been described in the Indian Ocean.

Why are they called a snot flower worms?

"In water it looks like a flower, but out of water it looks like snot!" says Kirsty.

The snot flower worm, *Osedax mucofloris*. Photo courtesy of Adrian Glover, Natural History Museum, London.

