

Uncovering hidden sea life



The inspiration behind the Queen in the film *Aliens* - a small crustacean parasitising and laying its egg mass in gelatinous plankton.

The Tara Oceans expedition vessel briefly visited our islands last month as part of its three-year voyage around the world. But while many are acquainted with another epic marine voyage conceived thousands of years ago - Homer's *Odyssey* - only few heard about the arrival of Tara Oceans.

Having sailed from the port of Lorient along the French Atlantic coast in early September, the vessel hopped between several different legs in the Mediterranean and I was lucky enough to be invited to join the expedition briefly, along the Malta-Tripoli leg, and to get to grips with the cutting-edge technology on board the vessel.

The experience was to be savoured also in view of the fact that Malta is one of the few (if not the only) island nation in the world without a single marine research vessel.

The Tara Oceans expedition comes in the wake of similar epic marine journeys of discovery, notably the Challenger Expedition, which sailed the world's oceans in the late 19th century over four years, covering over 130,000 kilometres and cataloguing over 4,000 previously unknown marine species.

The Tara Oceans scientific entourage are pinning their hopes on yet another possible analogy between the Challenger and their expedition - the voluminous data generated by the expedition, which kept marine biologists and oceanographers engrossed for decades.

Tara Oceans is expected back in France in September 2012, after 60-odd stops in 50 different countries. Data collected by the expedition will be combed through by 50 different laboratories from 15 different countries, a truly multinational scientific endeavour.

This global expedition comes hot on the heels of a similar journey (Tara Arctic) conducted in the Arctic in 2006, in which the same vessel drifted in sea ice for a total of 507 days, skirting the North Pole and conducting research on sea ice thickness as part of the Damocles project. The conclusions will be presented next month in Copenhagen as part of the UN Conference on climate change.

The biggest challenge faced by marine biologists nowadays is to convince those bankrolling their activities and the public at large of the relevance of the microscopic component of marine life, often described in a reductionist fashion as 'the hidden side of the sea'. In fact, microbiology has been described as the latest 'El Dorado' for marine biologists, after recent interest was stirred in other fields, such as that of deep sea biology.

The numbers in the microbiological context are unwieldy to say the least - every millilitre of seawater contains on average one million bacteria and 10 million viruses. On the scale of a bathtub, which normally holds around 150 litres of water, that makes for 150 billion bacteria! Numbers aside, phytoplankton, or the plant component of plankton, is responsible for 50 per cent of the Earth's photosynthesis.

As a result, much effort is being dedicated to the study of the impact of climate change on plankton communities which are the foundations of all marine food chains.

Some of the cutting-edge scientific equipment being used by scientists on board include the Flowcam, designed at Bigelow Institute, Maine, US, which can quantify tiny organisms as viruses or bacteria in a high-pressure water flow. Through the use of a laser beam, which is triggered by the presence of the pigments chlorophyll A and phycoerythrin, it takes a snapshot, effectively compiling a visual database of the organisms present in the water poured in the equipment.

The conductivity-temperature-depth (CTD) profiler has become an indispensable oceanographic tool since it can measure a number of different parameters. It can be lowered to a depth of 2,000 metres and is loaded with a suite of Niskin bottles which can be prompted to open at different depths, effectively collecting water samples from different strata of the water column.

The CTD on board the Tara Oceans vessel comes with an added contraption - the Underwater Video Profiler - which takes snapshots of the plankton and produces 25 images per second.

Another laudable feature of the Tara Oceans initiative is that a lot of effort is being invested in educational programmes on marine aspects in the countries being visited by the vessel.

The Maltese participation in Tara Oceans was made possible through the Physical Oceanography Unit of the IOI-Malta Operational Centre at the University of Malta under the direction of Prof. Aldo Drago who is the local scientific contact on this expedition. The author of this article is an academic member of the PO-Unit and participated directly in the expedition's stopover in Malta and data collection in Maltese territorial waters.

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