

# Sailing south

Mark Moore and colleagues dressed up like surgeons while analysing seawater samples in the Atlantic Ocean.

## ■ What was the objective of the work?

We wanted to understand how the availability of different nutrients, including phosphorus and iron, influences the fixation of nitrogen by bacteria. To do this we examined rates of bacterial nitrogen fixation in the nutrient-poor Atlantic Ocean.

## ■ Why did you choose this particular location for the fieldwork?

Iron inputs to the North Atlantic Ocean are known to be significantly higher than those to the South Atlantic Ocean, owing to the transport of dust off the Sahara desert. Thus the Atlantic provided an ideal opportunity to investigate the distribution and activity of nitrogen-fixing bacteria across potentially contrasting nutrient systems.

## ■ What sorts of data were you after?

The starting point for all the measurements and experiments was the collection of upper-ocean water samples free of iron contamination from the ship. This presented a few challenges given that we were working on a steel ship! However, there was plenty of experience in the team, so we knew the kind of precautions needed; in particular, we performed much of the work in a dedicated clean containerized laboratory. Once we had the samples, we measured everything from dissolved nutrients and trace metals, to the abundance, diversity and activity of natural microbial populations.

## ■ Did you encounter any difficulties?

It's almost inevitable that things don't go completely to plan on a research cruise, and this one was no exception. After two weeks we had only made it as far as the Azores, where we had to make an unscheduled stop to collect spare parts. We seemed to be having a lot of problems with the ship, equipment and sampling, the weather had been rough and most of us were beginning to doubt that we would make it to the Equator,



Dave Suggett, Matt Mills, Mark Moore and Eric Achterberg wearing clean suits to work on their seawater samples while sailing across the Atlantic Ocean.

let alone South Africa. Luckily, things considerably improved from there on!

## ■ Did you have any encounters with dangerous animals?

The occasional flying fish landing on deck was the nearest we came to any non-planktonic life in these nutrient-deficient low-latitude waters.

## ■ Any low points?

Setting up one of the early experiments before we had developed our sea legs, during what was perhaps the worst weather of the trip, was particularly memorable; it's difficult to work when fighting the ship's motion and feeling sick. And if you start feeling unwell while working in a container laboratory in the middle of the night, on the back deck of a moving ship, you soon learn how to remove your clean suit, gloves and slippers quickly.

## ■ What was the highlight of the expedition?

The Equator-crossing ceremony, where those who have never crossed before have to 'pay their respects to King Neptune' and possibly pay a forfeit or two (several members of the team suffered a shaved head or leg).

## ■ Did you learn anything new about yourself or your team members?

When you work so closely with the same people at strange hours every day for six weeks you soon learn who to avoid before they have had their wake-up coffee. Also, those of us that hadn't crossed the Equator learnt that it doesn't pay to put up too much resistance, and it's certainly not worth being the last person caught during the 'crossing-the-line ceremony', as you will probably get the worst forfeit.

## ■ Was it straightforward to get the samples back to the lab?

Transportation of frozen samples back from cruises is often nerve-racking, and about a week before the end of the cruise the liquid nitrogen generator stopped working, which created even more headaches and anxiety than usual. In the end we had to leave our samples in a  $-80^{\circ}\text{C}$  freezer on the ship while it went off on another cruise. Our South African colleagues then had to arrange liquid nitrogen for onward transport to the UK from Cape Town, when the ship came in there over a month later. It was a long wait.

*This is the Backstory to the work by Mark Moore and colleagues, published on page 867 of this issue.*

