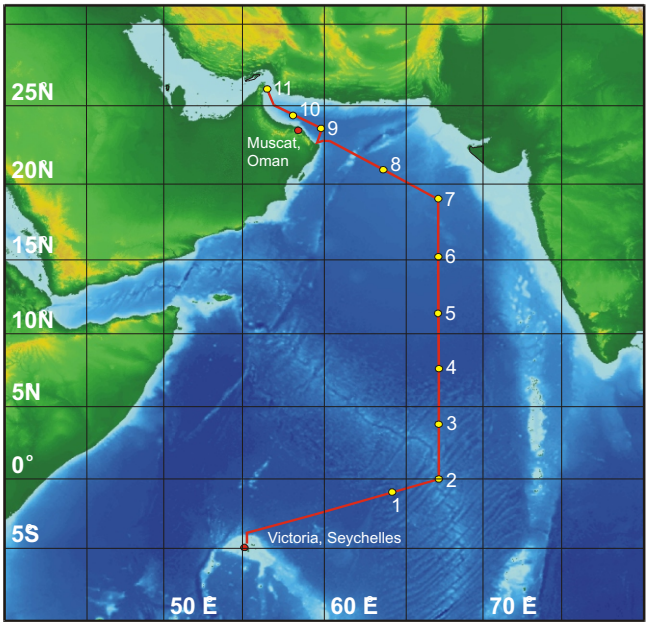
British Oceanographic Data Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

Marine and Freshwater Microbial Biodiversity

Marine and Freshwater Microbial Biodiversity (M&FMB) is a 5-year Thematic Programme funded by the Natural Environment Research Council (NERC). The programme's main objective is to improve our understanding of aquatic microbial biodiversity, with emphasis on community interactions, ecosystem functions (*e.g.* biogeochemical cycling of carbon and nutrients), and the potential for biotechnological exploitation.



AMBITION Cruise track including positions of the principal stations

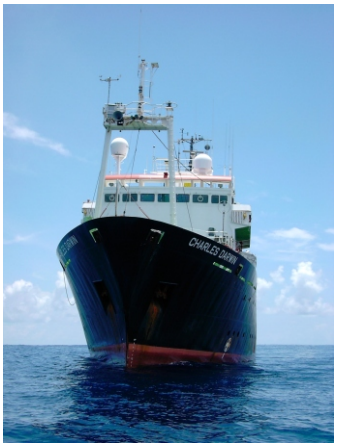
The programme involves two major fieldwork activities: the AMBITION research cruise in the Indian Ocean and a coordinated programme of studies at Priest Pot, a one-hectare, 3.5 m deep pond in the English Lake District. During both field activities, aquatic microbes (viruses, bacteria, microalgae and microzooplankton) are sampled and analysed using new molecular techniques and approaches as well as traditional methods, alongside a comprehensive suite of underpinning measurements of environmental variables and biogeochemical processes.

BODC has the responsibility for the management and long-term stewardship of marine environmental data arising from the M&FMB programme. In particular, its main role is to ensure the quality and completeness of the data collected during the AMBITION cruise, M&FMB's main oceanographic fieldwork, and to assemble a fully integrated, quality controlled and documented dataset.

The AMBITION (Analysing the Microbial Biodiversity of the Indian Ocean) cruise took place in September 2001 on *RRS Charles Darwin* in the Arabian Sea (North Indian Ocean). The Arabian Sea, at the end of the South West Monsoon season, provided a wide range of environmental conditions with strong horizontal and vertical gradients for co-ordinated fieldwork by five projects from the M&FMB programme.

Scientists from six UK research institutions (Cardiff University, Plymouth Marine Laboratory, Southampton Oceanographic Centre, University of Stirling, University of Warwick and University of Newcastle) were involved in the cruise.

11 stations were occupied along a south to north transect of 5500 km designed to follow an ecological gradient going from oligotrophic waters in the south to more eutrophic waters in the north.



RRS Charles Darwin on station

CTD rosette water sampling in the green eutrophic waters of the Gulf of Oman

A regular sampling pattern was followed at each station over a cycle of ca. 30 hours. Data collected included:

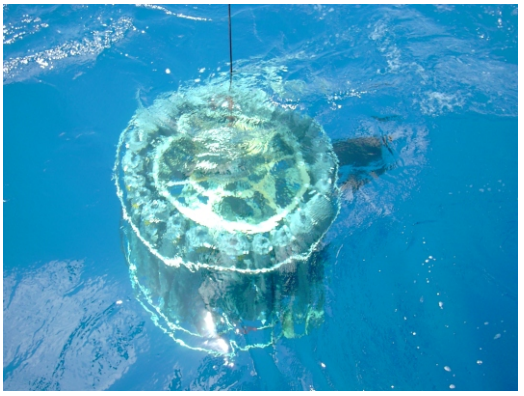
Continuous vertical profiles of salinity, temperature, fluorescence, attenuance, optical backscattering and oxygen from the upper 300 m and occasionally down to depth >3000 m using routine CTD deployments.

Collection of water samples using the CTD rosette water bottle sampler for the analyses of nutrients, phytoplankton pigment concentration and composition, phytoplankton community structure and abundance by automatic flow cytometry and microscopy, primary production and DOC production, new production and nitrogen cycling.

Collection of water samples using the CTD rosette water bottle sampler, stand-alone pumps and GoFlo hydrocasts for the molecular characterisation, community structure and function of bacterioplankton, eukaryote picophytoplankton, nitrogen-fixing bacteria, MeBr-utilising bacteria and for the isolation and characterisation of heterotrophic bacteria that cannot normally be cultured.

Collection of surface samples using plankton net tows for the molecular analyses of species distribution of Trichodesmium colonies.

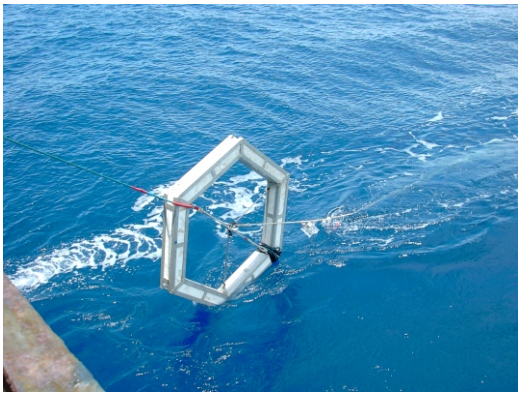
Plankton net surface tow



CTD rosette water sampling

In addition, underway measurements of meteorological parameters (air temperature, humidity, atmospheric pressure, wind speed and direction, incident PAR and total solar irradiance) and sea-surface hydrography (temperature, salinity, fluorescence and attenuance) were recorded throughout the cruise. A Moving Vehicle Profiler and a Fast Repetition Rate Fluorometer were occasionally deployed and provide additional data on the distribution of physical and biological variables. SST and SeaWIFS satellite data were processed by PML remote sensing group throughout the cruise.

The data from the cruise are being assembled in BODC's Research Project Database under the Oracle Relational Database Management System. In accordance with the programme data management policy, access to the data is restricted to members of the M&FMB scientific community until the end of the programme in 2005. The data will be published electronically on CD-ROM as part of the M&FMB Marine Dataset following completion of the programme.



Recovery of the *in situ* productivity rig

For more information about the M&FMB programme, see http://www.nerc.ac.uk/funding/thematics/mfmb/ and http://www.bodc.ac.uk/projects/mfmb.

Image credits : P. Burkill, Southampton Oceanography Centre