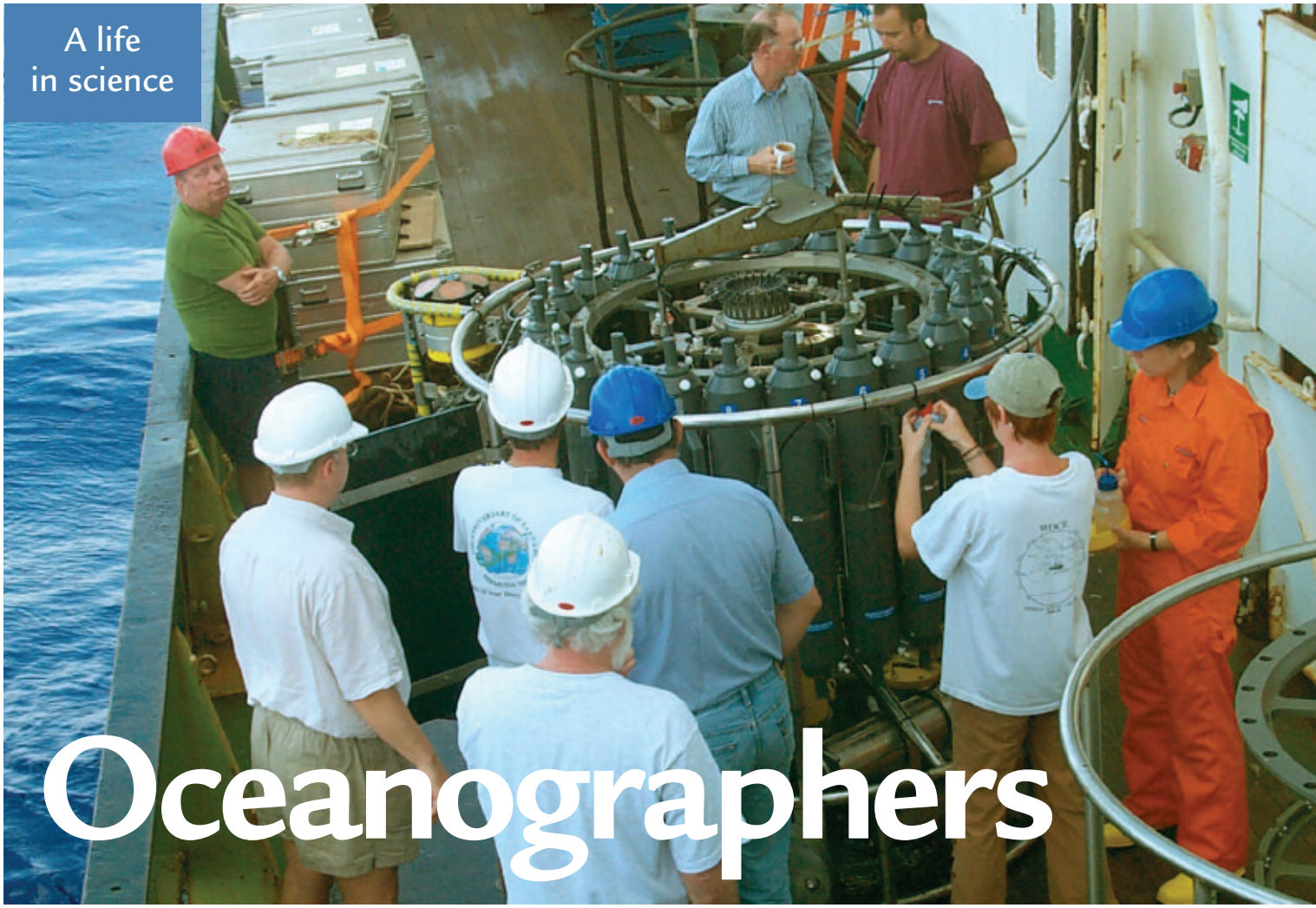
A life in science



Oceanographers

Above: *Professor Harry Bryden enjoys a mug of tea while an array of water samplers is prepared for lowering into the ocean*

The three oceanographic scientists — Harry Bryden, Stuart Cunningham and Hannah Longworth — who were involved in investigating the Gulf Stream (pages 6–7) relate something of their lives in science.

Scientific research often involves people working together on problems, either directly in teams or by maintaining close contact with each other. Scientists might work with engineers to create new instruments for a space probe or with mathematicians and software engineers as they model the workings of cells or climate change.

The Royal Society is the UK Academy of Sciences. When he was made a Fellow the citation said that 'Professor Harry Bryden is known internationally for the outstanding contributions he has made through careful observation and innovative analysis and interpretation of data to the study of the meridional transport of heat in the ocean.'

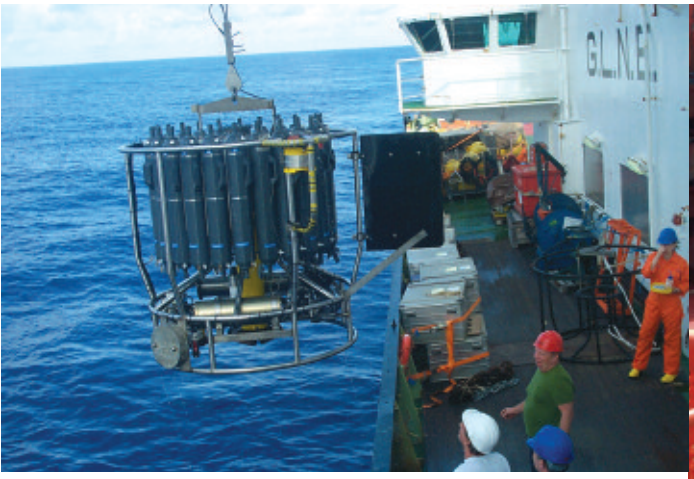
Box 1 Stuart Cunningham

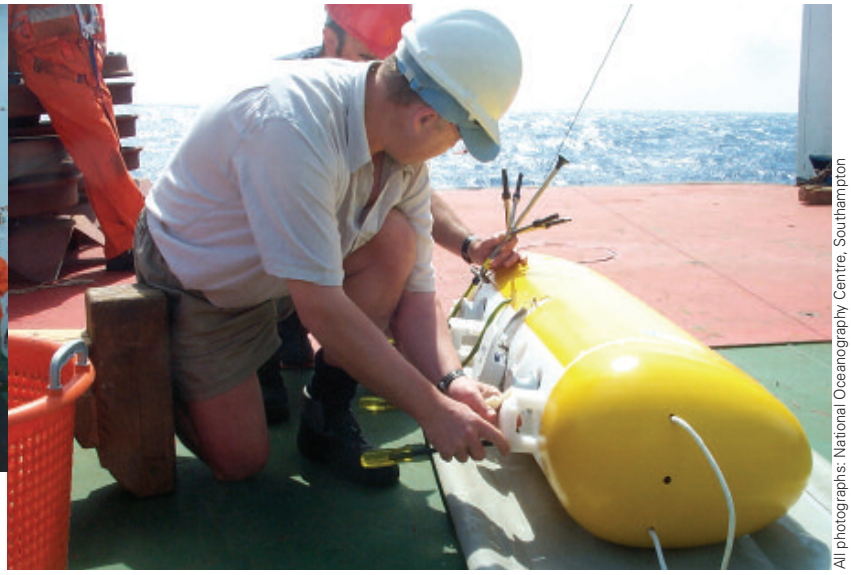
There is great debate about the relative importance of environment and genetics for determining what makes you you — nature versus nurture. My early life supports both sides. My father was an analytical chemist working in the steel industry; perhaps I inherited some 'science' genes from him. But I also grew up discussing science — mainly physics and astronomy — on a daily basis. My mother's side of the family were all boat builders. So there it is. Take one chemist and one boat builder's daughter to make one oceanographer!

After completing a BSc in astrophysics from the University of Edinburgh, I converted to physical oceanography by completing a MSc at Bangor, before joining the Institute of Oceanographic Sciences as a sea-going oceanographer. At first I worked with the UK team in the World Ocean Circulation Experiment. This was a grand project, involving tens of thousands of scientists from around the world, whose goal was to define the mean state of the ocean over a 7-year period.

I have spent about 2.5 years of my life at sea all over the world on this and subsequent projects, making measurements of ocean temperature, salinity and currents.

I completed my PhD at the University of Liverpool in 1997 and am now a principal investigator in an international programme to measure the role of the ocean in rapid climate change (www.noc.soton.ac.uk/rapidmoc).





All photographs: National Oceanography Centre, Southampton

Above: *The water samplers are lowered into the ocean*
Right: *Stuart Cunningham working on a profiler before it is attached to a mooring cable (see back page)*

The project studying the ocean currents in the north Atlantic, described on pages 6–7, involves a large international team of people. The principal investigator for the UK component is **Professor Harry Bryden**. He was born in the USA at Providence, Rhode Island, and went on from high school to do a degree in mathematics at Dartmouth College in 1968.

Following a summer spent at an oceanographic research institute called Woods Hole, Harry applied his mathematics to oceanography, first with the US Navy and then when he became involved in research at Woods Hole. He worked on to complete a PhD in 1975. During this time he was supported by a series of research grants, but by 1983 Harry had earned a permanent position as a Senior Scientist.

In 1993 Harry moved to England and in 1995 joined the Southampton Oceanography Centre. Last year he was elected to become a Fellow of the Royal Society. As Professor of Physical Oceanography at Southampton University, he teaches and conducts research with other scientists, including his fellow author Stuart Cunningham, and supervises the research of PhD students, such as Hannah Longworth. In Boxes 1 and 2 Stuart and Hannah tell their own stories about how they became involved in oceanography.

• You can read more about life and work on cruises to deploy moorings to monitor ocean currents, temperature and salinity at www.soc.soton.ac.uk/rapidmoc/home.html by clicking on 'News' and choosing a cruise.

Box 2 Hannah Longworth

I have always enjoyed problem solving — this fuelled my early interest in science. When I was doing my GCSEs I had a work experience placement at Merlewood, a research station on the southern edge of the Lake District. I met scientists studying climate change and had my first experience of fieldwork with a group studying soils.

I went on to study A-levels in mathematics, further mathematics, physics, chemistry and general studies. My degree choice of Oceanography with Mathematics (BSc) at the University of Southampton was determined by the potential to combine mathematical analysis of the dynamic ocean system with fieldwork at sea.

After graduating, I had the chance to stay on in Southampton at the National Oceanography Centre, to work for a PhD. I am analysing oceanographic observations made over the last 25 years at 26°N to try to build up a picture of the Atlantic Meridional Overturning Circulation (MOC) over that time.

Hannah Longworth working on a sampler at 26°N

The current MOC monitoring project, which is funded for 4 years, involves more frequent observations, so this will provide much more detail over the short term to complement the 25-year picture.

Both projects rely on cruises to deploy/recover moorings and measure *in situ* water properties. Going to sea provides invaluable insight into the limitations of the data but is an intense experience. For up to 6 weeks, scientists, technicians and the ship's crew work a shift system, allowing almost continuous data collection and processing of parameters, including water temperature, salinity, velocity, nutrient, carbon and oxygen content.

I am looking forward to seeing the results from the first year of monitoring and how they tie in with the five historical sections.

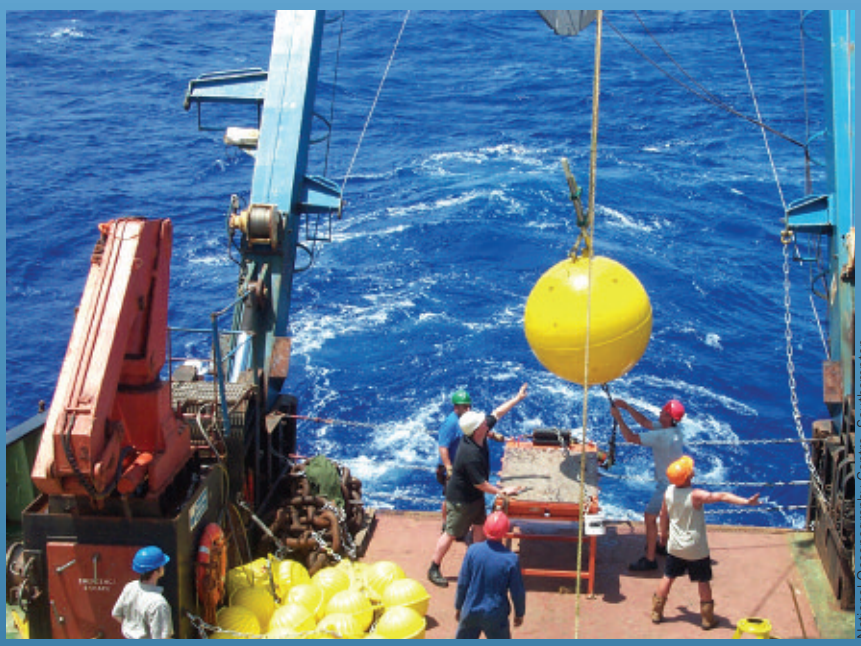
The Centre for Ecology and Hydrology which used to be based at Merlewood, Grange-over-Sands, Cumbria, is now based at Lancaster University.

Logging data from the world's oceans

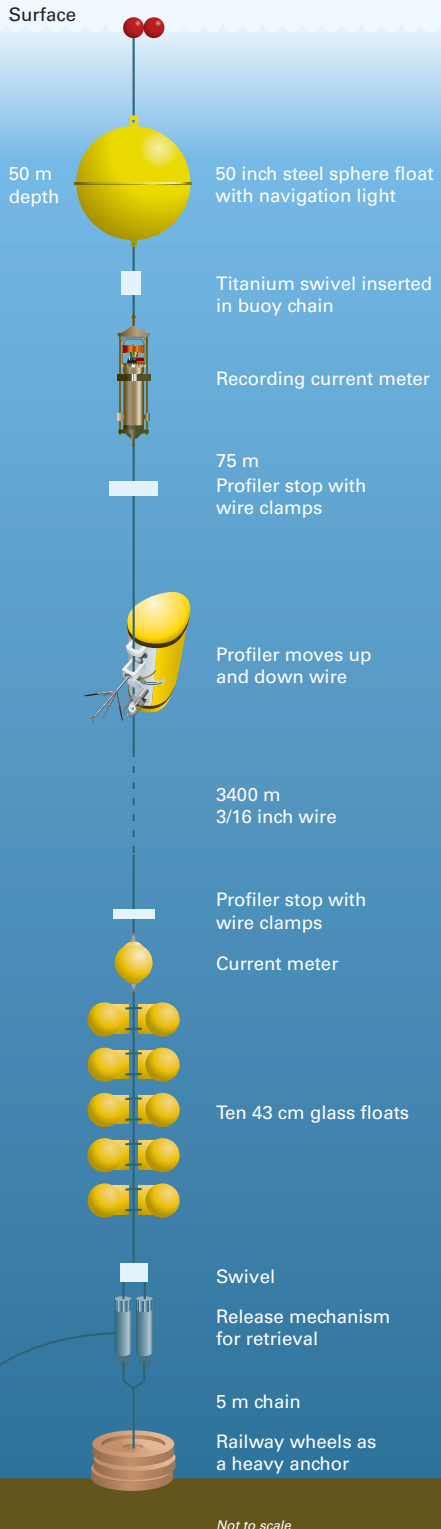
Scientists collect all sorts of information about the world's oceans. Temperature, salinity, currents, depth and other parameters, such as amounts of plankton, are all of interest to oceanographers and other scientists. Sometimes data are collected using devices towed behind ships; sometimes ships heave to and lower instruments on cables. Some data are collected by instruments attached to submerged buoys, floating with the ocean currents. These surface every so often and transmit the data they have logged to laboratories far away, via satellite.

The international project described on pages 6–7 involves instruments attached to wires up to 5000 metres long. The wires are anchored to the seabed and buoys at the top, just under the surface, hold them straight. Some instruments motor up and down the wires every 2 days, taking measurements.

In all there are 22 moorings on the continental slope off Africa, either side of the Mid-Atlantic Ridge, and on the continental slope of the USA.



National Oceanography Centre, Southampton



Activities

- You can watch a short film of the cruise to put out these moorings by clicking on www.noc.soton.ac.uk/rapid/sis/moc_monitor.php
- Plankton monitoring is described in CATALYST Vol. 15, No. 3.
- You can find out more about datalogging carried out by submerged buoys at www.noc.soton.ac.uk/JRD/HYDRO/argo/op_argo.php