

The Scottish Associatio

Dr Anuschka Miller

I recently returned from six months maternity leave and I am amazed at just how much has changed at SAMS and the wider marine science community. At a time of understaffing I am slowly getting to know the 10 or so new colleagues and their varied research portfolios but I am even more struck by how relevant to public debates and challenges our work is becoming.

Since society is coming up to the reality of climate change, reducing carbon emissions

and adapting to a changing climate are becoming priorities. Renewable energy is hailed as an important contribution and research into renewable energy sources is growing fast. Here at SAMS our interest focuses on marine biomass for the production of biofuels and on the environmental impacts of marine renewables. In page 10 Mae Kelly and Symon Kelly introduce their ongoing work with sea weeds to produce methane. As biofuel production from terrestrial sources has severe implications for food production and pricing, freshwater use and deforestation, marine biomass may offer a real alternative that remains under investigation.

Many uncertainties remain about the global carbon cycle and climate change that scientists are called upon to define further. In page 11 Jennifer Stahl explains on page 11 how we are investigating the critical role the deep seabed plays in elemental cycling and climate change. And Sam Wilson on page

### BSC (HONS) MARINE SCIENCE WITH ARCTIC STUDIES

In April this year the honours degree course in Marine Science is run on behalf of the Millennium Institute as re validated for another five years. The team used this opportunity to add new options into the course including an Arctic Studies strand. This allows students to study for one or two semesters during their third year at the world's northernmost higher education institution, the University Centre in Svalbard (UK) to learn about arctic biology, arctic geology or arctic technology.

For those staying in Scotland in their third year, the course now includes optional modules in marine conservation and in

diving science. The diving module allows students to gain the SCUBA professional diver qualification. This module is run by members of the National Facility for Scientific Diving that is hosted by SAMS.

### SCOTTISH ALLIANCE FOR GEOSCIENCE, ENVIRONMENT & SOCIETY

Over the past few months, our approach to developing partnerships across the academic community in Scotland has developed strongly. In the 2nd May, the Scottish Alliance for Geoscience, Environment and Society (SAGES) was launched in Edinburgh, attended by Stewart Stevenson MSP, Minister for Transport, Infrastructure and



## Professor Sir Eric Denton FRS

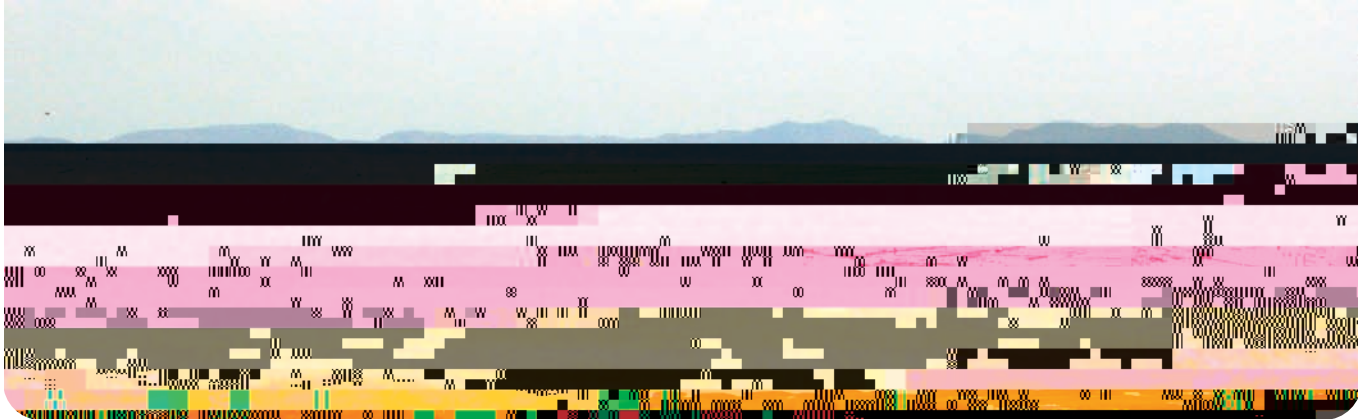
Eric first orbited on radar at Malvern before taking a degree and doctorate at Cambridge University. With a primary interest in biophysics he joined Avonhill the distinguished muscle physiologist at London University in 1959 before taking up a lectureship in physiology at Aberdeen University in 1961. He moved to the M.A. at Plymouth first as a member of staff then as a Royal Society Research Professor and finally as Director. He stayed on as an Honorary Research Fellow until 2000.

Eric's primary interest was research but he managed to combine this with the effective role of a laboratory director and many other commitments. He had a flair for identifying novel and exciting projects in marine biology and an extraordinary technical expertise for making ingenious yet simple apparatus for experiments. His research was highly original and always at the cutting edge of marine biology.

After working on the visual pigments of fish and other animals showing how their maximum sensitivity was linked to the dominant wavelength of light in the environment, he turned to somnolence. He

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SeaEMS



## AQUACULTURE PREDICTED TO OVERTAKE FISHERIES

Food and Agriculture Organisation statistics reveal a meteoric 9% per annum increase in global aquaculture production (including aquatic plants). Global







As marine scientists we have a view of the world that is quite out of the ordinary. The very nature of marine science and all the disciplines that fall within it determines that that is our field of work is other people's boundary. Too often, perhaps, that translates as an area of peripheral interest to many yet ours is the blue planet and the practical demands of going to sea require us to experience and interact across a wide spectrum of scientific disciplines. Biological oceanography is a prime example of interdisciplinary science.

That is not unique to marine science. Of course, the fantastic advances that have been made in science and technology in recent decades and the development of ever more sophisticated scientific concepts. The increasing reliance on computerized information can make it all too easy to overlook the body of knowledge and understanding built up over past years that still remains on the bookshelf and

in the minds and records of those who collected the samples, made the measurements and analysed the results. That is one reason why this is an important and timely book.

Tim Parsons's scientific career spanned these decades of development and transition. It is a highly successful career, as recognized in 2007 by the award of the Japan Prize for his great contribution to the development of biological oceanography. In his book, *The Seasenthral*, he writes of his life that took him geographically from Ceylon, as it then was, to England and its public school system, to academia and government institutions in Canada and the USA, and professionally from a boyhood fascination with natural history via biochemistry to biological oceanography. In the course of his book, he expands on the scientific concepts that he was instrumental in developing. Concepts that became fundamental in the study of ecosystems at all scales, from microcosm to mesocosm to natural systems in lakes and forests. He also delivers his verdict on some of the aspirations that became popular from time to time, in particular on the scientific principles that should underpin fisheries management – something that still seems not to be properly encompassed within existing political structures.

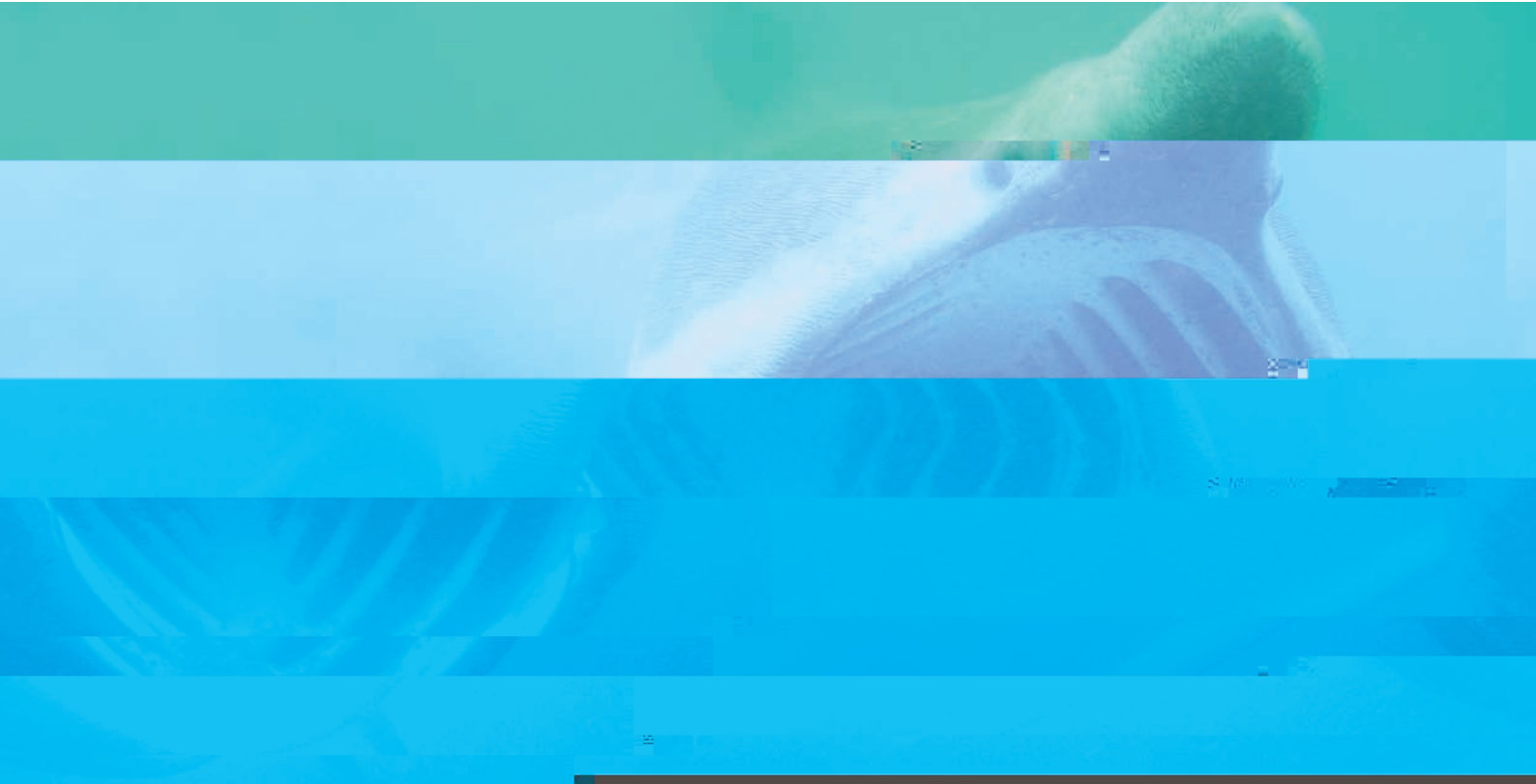
Tim tells us also of the ups and downs of his life and how these experiences caused him to question his received understanding of religion. At this time, helped by coincidence, as enjoying a sabbatical year working with him in Vancouver, Tim had met a kindred spirit in an elderly man, an impoverished Russian immigrant, whom he befriended. Together they discussed the purpose, divine or otherwise, that lies behind the evolution of human society.

Tim summarizes the choice that faces us with a quotation from Shakespeare's *Comedy of Errors*:

*Let us once lose our oaths to find ourselves,  
Or else lose ourselves to keep our oaths.*

This is a book for a lifetime.         





askling and hale

## FISH NURSERIES IN COASTAL HABITATS

- ▶ estuaries and shallow coastal areas are used for a diverse range of activities including recreation, transport, waste disposal and land claim. They are however threatened by sea level rise in the face of predicted climate change. The exploitation of coasts and estuaries places stresses on their ecological functioning and if not managed appropriately can imp



# MY PhD



ell in our temperate climate sea weed or macroalgae particularly the large brown species often referred to as kelp

The concept is not new. More than 10 years ago researchers in the US embarked on a marine biomass energy research programme and showed that sea weeds performed as well as many terrestrial crops in anaerobic digesters. Here naturally occurring microbial consortia converted the sea weeds to biogas containing around 60% methane. Methane can be combusted to produce electricity and heat and can also be used as a transport fuel in engines designed to run on compressed natural gas. Marine biomass can also be used to produce ethanol depending on chemical conditions and the make up of the bacterial community in the digester.

Using marine plants for biofuels circumvents the building conflict over the use of land for fuel as opposed to food production and also conserves precious freshwater resources.

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Whatever your opinion as to how we should meet our future energy needs, making good use of whatever renewable resources are locally available is only common sense.

In response to the threat of global climate change and dwindling oil reserves, EU and UK politicians have set bold targets to increase the energy supply from renewable sources.

As early as 2010, 5% of our transport fuel is to come from plants. Scottish targets for 40% of our electricity to come from renewable sources by 2020 are also ambitious. So in addition to the energy we might derive from water and wind on land, there are also hopes for emerging technologies to allow the generation of electrical energy from the sea, particularly from power-laden waves and tidal-streams. But what about our other marine resources?

### BIOFUEL FROM MARINE BIOMASS

In Scotland a cool climate, limited hours of sunshine and the relative scarcity of good agricultural land means that our options for growing terrestrial bioenergy crops for transport fuels such as bioethanol and biodiesel are very limited. However there is one form of biomass that grows abundantly