

MBA News



Sailing-in: some unusual strandings



By-the-wind sailors *Velella velella* coming ashore at Wembury on 5 June 2003. Images: Keith Hiscock.

The by-the-wind sailor *Velella velella* is frequently found stranded in Cornwall but events in May to June 2002 and 2003 brought in millions of individuals to locations where they are rarely seen. In 2002, they sailed up the Irish Sea to get as far north as the Clyde, the furthest north recorded through that route. In 2003, they arrived ashore on the Devonshire coast on 19 May and

great numbers were being washed ashore a few days later and in early June.

By-the-wind sailors have a triangular 'fin' or 'sail' that runs diagonally across the upper surface. The sail may be orientated 'north-west' so that individuals sail to the left of the wind or 'south-west' thus sailing to the right. In the North Atlantic, due to the prevailing westerly winds most of the strandings in the British Isles are of the left-sailing form.

Do these strandings tell us anything about ocean currents and seawater warming or are the *Velella* just driven by the winds blowing in the 'right' direction? And is there any significance in the large numbers seen two years running? Records of oceanic currents approaching south-western Britain in the two years indicate that seawater warming might have a role to play. Such ocean dwelling species may be occurring much further north than several years ago because of warming and therefore be much closer to Britain.

The *MarLIN* programme is collecting records of sightings of *Velella velella*. You can submit your own records/sightings via the 'recording' section of our 'LearningZone':

www.marlin.ac.uk/learningzone

We are particularly interested in the date of first arrival at a location so if you could include date/time and prevailing wind direction (if possible) that would be ideal. If you want to view more information on *Velella velella* look at our basic information page on:

www.marlin.ac.uk/species/velvel.htm

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Annual membership (without journal)			£350
Direct debit from a UK bank account	£23	Student membership	
Payment by cheque, credit card or cash	£28	(Subscriptions due on 1 November 2003)	
Annual membership (with journal)		(without journal)	£12
Direct debit from a UK bank account	£50	(with journal)	£25
Payment by cheque, credit card or cash	£55		
NOMINATIONS FOR COUNCIL			
Members of the MBA are invited to put forward nominations for Council members for election at the AGM on 23 April 2004. The prior consent of the candidate must be obtained in writing and the nomination signed by a proposer, seconder and ten other full members of the Association. All nominations must be received by the Secretary before 31 December 2003. The list of those proposed by Council for election will be circulated with the Annual Report and Notice of Annual General Meeting.			

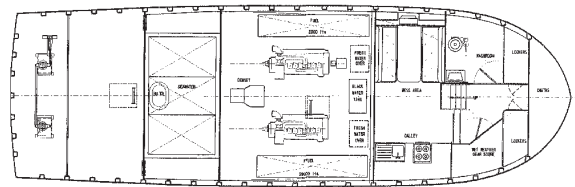
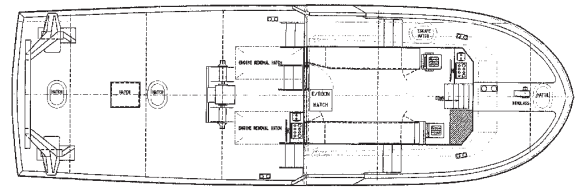
Subscriptions are due on **1 January 2004**. Please endeavour to pay promptly as this will help to keep our administrative costs down. If you have a UK Bank account and do not currently pay by direct debit, please contact Angela Newman: membership@mba.ac.uk as soon as possible to obtain a direct debit mandate and **save £5** per annum.

A new inshore research vessel for the MBA

When RV 'Sepia', the MBA's inshore research vessel was delivered in 1968 who would have imagined that she would still be in active service 35 years later! 'Sepia' and her crew have given long and valued service to the MBA and PML. It is now time to replace her with a modern, fully equipped research vessel, specifically designed for undertaking marine research in estuarine and inshore waters.

Given the bespoke nature of the specification for a new research vessel preliminary costings, looking at two different designs was undertaken by our agents Serco Denholm. After extensive consultation with staff it was felt that considerable extra value for money and capability was given by having a larger vessel, and a specification for a 50' vessel was finalized. After a tendering exercise the new vessel was ordered from Kingfisher, a Falmouth based yard. The new vessel will have excellent facilities for marine research including a laboratory, a seawater tank with 5000 litre capacity and hydraulic pivoting 'A' frame for gear deployment. The boat is powered by twin Cummins 6 cylinder 350 hp engines, giving an operational speed of 12 knots. The shallow draft of the vessel (1.35 m) will enable work that 'Sepia' carried out in estuaries to be continued. The boat will be used to support marine environmental research and biodiversity studies as well as collecting experimental material for the MBA's traditional strength in biomedical and basic bioscience research.

The total cost of the new vessel is around £480,000 including new sampling equipment. Over 25% of the cost has already been raised by the MBA from various sources. The MBA is now seeking funding for the remainder through donations and sponsorship from charities, companies and individuals and several applications have



Line drawing of the new research vessel.

already been submitted. An appeal for contributions is being launched to the membership.

So, what about the name of the new vessel? The MBA has a long history of naming boats after marine animals. In particular the inshore and offshore research vessels of the MBA have been named after local organisms beginning with an 'S' – 'Sarsia', 'Sabella', 'Salpa', 'Sepia', 'Sagitta' and 'Squilla'. Common room superstition has it that the name should be of a planktonic or nektonic organism. It should also be taxonomically correct at time of launch. In keeping with this fine tradition 'Sepia II' is the current provisional name of the new vessel reflecting the MBA's interest in cephalopods and honouring 'Sepia's fine service over the years. This name has yet to be finalized and no doubt lots of suggestions will be made!



RV 'Sepia'

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A small brain in a huge Megamouth shark: a personal view

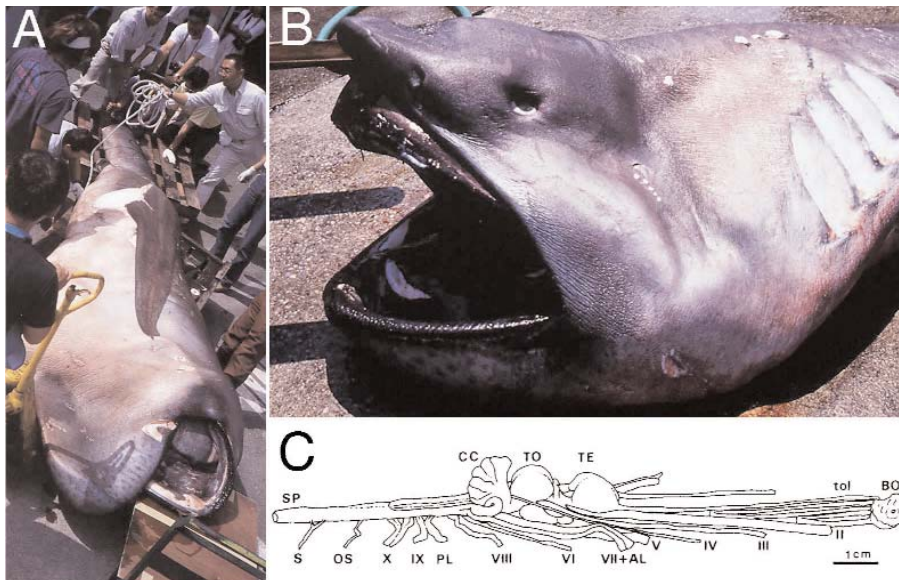


Figure C. Drawing of lateral view of the Megamouth brain. AL, anterior lateral line nerve; BO, olfactory bulb; CC, corpus cerebelli; OS, occipitospinal nerve; PL, posterior lateral line nerve; S, spinal nerve; SP, spinal cord; TE, telencephalon; TO, optic tectum; tol, olfactory tract.

Megamouth is a large, slow-swimming and filter feeding shark that was first discovered in 1976, only a few decades ago. In 1983 the shark was classified as a new family (Megachasmidae) and given a species name *Megachasma pelagios* in Laminiiformes (mackerel sharks). About six years ago, I had a chance to take part in the dissection of a defrosted Megamouth shark for observation of the brain. The shark was the 10th specimen and up to 2002, only seventeen Megamouth sharks were documented (see home page of the Florida Museum of Natural History). Here, I made a short essay on it.

On a fine day in May 1997, I went to Toba Aquarium (Mie prefecture) with my colleagues (Professor Hironobu Ito and Dr Masami Yoshimoto) to dissect the shark, which was a mature female, 5.44 m long and weighing 1040 kg (Figure A & B). The shark was captured 12 miles offshore of Owase city (Mie prefecture) at midnight, by a surrounding net. About 30 fish biologists came together to investigate the rare shark. The dissection started in the morning, but we had to wait until 4.00 pm to get the head. Dr Ito began to struggle with the huge head. Dr Yoshimoto recorded the process of dissection and I took photos. After 45 min of trial and error, we got a 20 g brain of the Megamouth shark and all of us surprised at its small size (Figure C). I said to myself “It’s terrific, a 20g brain in a ton of Megamouth body.” My body weight is 70 kg and my brain is hopefully 1.4 kg. Soon I remembered an epigram by Lewis Thomas (The Fragile Species, 1992) ‘We humans may be the cleverest of all animals, as we tell ourselves, but we haven’t really run away with the game, not yet anyway.’ From this observation, I have learned that

the 20 g brain is enough to manage the huge body in a certain life style in a certain environment. That is, the Megamouth’s small brain kindly taught me by showing itself to be the results of a ‘gigantic natural experiment’ for about 400 million years.

About 25 years ago, the slogan ‘the bigger the better’ was very popular in Japanese society and now ‘the slow is beautiful’ is becoming popular. One night, I met Ms Megamouth in a dream and I asked her “What is your philosophy for your life?” She kindly replied

laughing, ‘the small is reasonable, however, the game is not over yet.’ Almost immediately, I woke up, and imagined that 100 million years later, an energy-saving type animal such as the Megamouth with a small brain may be thriving, irrespective of whether human beings survive or not. Anyway it is a dreamful work to study fish brain. For the details of the Megamouth brain, see our paper: Ito, Yoshimoto & Somiya (1999), *Copeia*, **1**, 210–213.

I have a lot of happy memories during my stay (1983–1984) in Plymouth with my family, when the MBA celebrated the Centenary.



I also played Cricket for the first time and still keep a commemoration ball presented by the members of the MBA team. Since 1972, I have been getting key advice for my research from Eric Denton and Quentin Bone. I hope all members of the MBA will be happy.

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Professor Somiya is in Graduate School of Bioagricultural Sciences Nagoya University, teaching Fish Physiology and studying visual and sonic system in fish.



Diets of seals at Eynhallow, Orkney



Eynhallow, the holy island of Orkney is a tiny, low-lying, grassy island situated between the mainland of Orkney and Rousay. Eynhallow Sound is relatively narrow, but there are strong tidal surges and there is no jetty on the adjacent coast. Thus the usual approach route is from the south, almost an hour's journey by fishing boat from Tingwall pier. The island has a long history of human habitation, the chief remaining evidence of which is the ruined monastery, now maintained by Historic Scotland. However, the island's current inhabitants comprise sheep, seabirds and seals, and the calls of the latter may explain local belief that the island is haunted.

There is a wooden house by the southern shore, used by University of Aberdeen staff during study visits. Until the recent addition of a portable generator, work in the evening took place by tilly lamp next to the coal-burning stove. The well provides the barest trickle of running water. Until the advent of mobile phones, communication was tricky, contact with the outside world relying on a CB radio run off a car battery.

Since the mid-1980s, research has included harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), which are regular visitors, and some pups of both species are produced on the island. In the winter, grey seals use the island, with a few white-coated pups present towards the end of the year, and largish groups of adults during the subsequent moulting season. After Easter, harbour seals increasingly dominate the haul-out sites and the moulting groups present in August can number several hundred.

The western and northern coasts are rocky, with low but steep cliffs. The southern and eastern coasts offer easier access and greater shelter, with sloping rock slabs giving way to shingle beaches towards the south end of the island. The seals tend to concentrate at Grory to the south-east and Sheep Skerry at the south-west tip, although when numbers are high the haul-out groups can stretch around towards the house. The seals also use an intertidal skerry (Fint) to the east.

As the island is uninhabited and there are no scheduled ferry stops there, visitors arrive relatively infrequently and the seals are usually undisturbed. In summer 2002 we carried out our sampling with most of the seals still sitting on

the haul-out. At other times they flee into the water at the first sight of people arriving. Every so often there are stories in the press about fishermen in Orkney killing seals. However, the creel fishermen who work the waters around Eynhallow seem to be pretty relaxed about seals, which apparently find it less easy to rob the current generation of creels.

Studies on seals in Orkney include work on population size, reproduction, diet and behaviour. In 1986 the University of Aberdeen started a three-year study on diets of seals in Scotland, directed by Professor Peter Boyle, and Eynhallow was chosen as one of four study sites, with the aim of visiting quarterly over three years to collect seal faeces.

The haul-out sites are mainly intertidal so they must be visited around low tide – leaving the seals enough time to defecate but not waiting until the tide has come too far in. In this way, fresh samples can be obtained. If the seals are on the haul-out when we arrive, we make a rough count and identify which species are present – in summer grey seals tend to be present in small groups at the water's edge while harbour seals occupy the rest of the beach. In spring and autumn it is often difficult to be certain which species produced a particular sample. Older material, obviously of less certain provenance can sometimes be found above the high tide line.

We collect samples with spoons and polythene bags, subsequently packing everything within several layers of bin liners to minimize odour during the journey back to Aberdeen. Unsurprisingly, odour is the first important clue to identifying seal droppings. However, the biggest problem is often to decide what constitutes a single sample. Ideally, a 'sample' will represent the defecation of one seal. However, it may have been deposited 'on the run', dribbled between pieces of shingle, rolled in, or mixed with the droppings of other individuals – harbour seals on haul-outs don't maintain much in the way of personal space. In the end we often rely on proximity, colour and texture. As far as possible we pick up every sample available, until rising tide, darkness, bad weather or lack of bags brings sampling to a close – although plastic gloves can be used as makeshift sample containers! Experience suggests that seals rarely defecate on rocks with a rough surface or covered in seaweed, or on small shingle (or at least, we can rarely find anything on these substrates), which leaves us free to concentrate on more sampler-friendly surfaces such as smooth rock, larger pebbles or sand.

The question of what constitutes an independent sample is an issue when it comes to data analysis, and the problems with identifying samples in the field are only part of the story. The question of how input relates to output is the subject of much current thinking and discussion, supported by captive feeding experiments and



Diet and Beaked whales

Beaked whales remain one of the mysteries of the oceans. Several species have never been seen alive and one species is only known from three skulls. Studying beaked whales is, therefore, problematic. Although beaked whales are now being studied at sea in some parts of the world, most notably in the Bay of Biscay, most research still relies on information gathered from dead animals that wash up on beaches every now and then. However, to gather large sample sizes from stranded beaked whales can take many years.



Therefore, to get information on stomach contents from a sufficient number of individuals to build an overall picture of beaked whale diet, we need to look back at data gathered during more than a century of research. All beaked whales specialize in feeding on deep-water squid, fish and crustaceans, but beyond this there seems to be little preference for prey with any particular characteristics, such as bioluminescence. However, there are noticeable differences in diet between different beaked whales.

Data from species of three genera, *Mesoplodon*, *Hyperoodon* and *Ziphius*, make up the majority of records and show a clear pattern. Both overall, and at specific locations, stomachs of *Hyperoodon* and *Ziphius* species contain larger squid (up to several kilograms in weight) than *Mesoplodon* species, which rarely contain squid bigger than 600 grams. This difference probably reflects niche separation and it allows *Mesoplodon* species to co-exist with the other two genera without undue levels of competition for prey. However, *Ziphius* and *Hyperoodon* species have a diet that is similar enough that they would be expected to compete for prey. They appear to avoid this by geographic segregation. Of the two *Hyperoodon* species, one, the northern bottlenose whale, only occurs in the northern North Atlantic while the other, the southern bottlenose whale, only occurs at higher latitudes in the southern hemisphere. By contrast, the single *Ziphius* species, Cuvier's beaked whale, only occurs in warmer waters, being found in warm temperate to tropical waters throughout the

world.

At the moment, it is not clear where the other three genera of beaked whales fit into this pattern, as little is known about these other genera. One, *Tasmacetus*, may specialize in eating deep-water fish rather than squid, but this is based on a single specimen, while for another, *Indopacetus*, there are no stomach contents records at all. The last genus, *Berardius*, is better known but most of the data on stomach contents remains unpublished. There is also the question of how the 14 species in the genus *Mesoplodon* compare to each other, but again for many species there is little or no information available. Getting the answer to these questions will either take a very long time to gather a sufficient number of samples or will have to rely on alternative techniques, such as stable isotope analysis, which can show dietary differences without relying on the collection of stomach contents from occasional stranded animals.

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A more detailed study was published in the June issue (83:3, pp. 651–666) of the Journal of the Marine Biological Association



(p.4 continued).

computer simulations.

Ultimately, we probably have to recognize that a spoonful of faecal material on the beach is generally the best approximation we'll get to an independent sample of the diet of a seal.

Initial results from the faecal sampling on Eynhallow demonstrated that the most obvious trend was seasonal. The switch in occupation from harbour seals to grey seals being matched by a change in diet, with sandeels being of major importance in the summer (harbour seal) diet and gadoid fish becoming more prominent in winter (grey

seal) diets. The Eynhallow seal diet study has run on an opportunistic basis since 1993, providing material for a series of MSc and Honours student projects. We usually make at least one collecting visit each summer and, if possible do a winter visit as well. Our current interest is to see whether changes in the species and size composition of the diet of seals in summer since 1986 can be related to trends in fish stock abundance.

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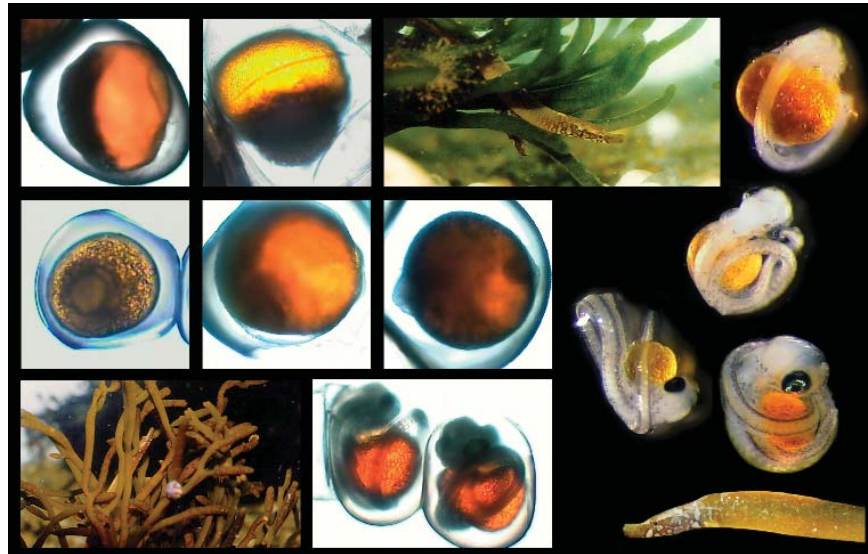
A more detailed study was published in the June issue (83:3, 647-650) of the Journal of the Marine Biological Association



Adult seahorses and newborn pipefish

There are striking similarities between adult seahorses and newborn pipefish. The worm pipefish, *Nerophis lumbriciformis*, is a small and slender syngnathid, commonly found in the rocky intertidal, underneath loose stones, in crevices or among algae. Completely adapted to the harsh conditions of the intertidal zone, it shows a clear rhythmicity in its locomotory activity of tidal and daily periodicity. Even the courtship ritual denotes specific adaptations to an environment where hydrodynamic conditions are constantly changing, since there is a suppression of the normal vertical swimming in the water column, typical of many syngnathid species. Besides all these interesting particularities, marsupium-lacking pipefish, such as *Nerophis*, provide a unique opportunity to investigate syngnathid phylogeny since they clearly represent one of the most primitive evolutionary branches.

The analyses of the specific morphology and behaviour of *Nerophis* embryos and newly-hatched larvae showed, interestingly, many similarities with a distinct syngnathid genus. Some of these particularities, absent in the adult pipefish, are present in mature seahorses (*Hippocampus*). These two genera, which markedly differ in morphology, were consistently recovered in different clades in a phylogenetic study that used different DNA mitochondrial fragments. One of the most striking similarities is the ability of the newborn larvae to move the head to a right angle to the trunk and the use of this posture when feeding, just before prey aspiration. Adult *N. lumbriciformis* are structurally incapable of bending the heads towards their ventral surface which forces them to lie down laterally or even turn upside down in order to



Developmental stages of the pipefish *Nerophis lumbriciformis*.

capture prey that is in close contact with the bottom substratum.

Also absent in adult individuals, pectoral fins seem to be present in *Nerophis* larvae. Capable of beating movements, these fin rudiments help the larvae to rotate along its major axis. If ongoing histological studies confirm the homology of these structures to adult seahorse pectoral fins, this character could fall in the same category as the mobility of the head. These and other findings suggest the hypothesis that some of the traits visible in seahorses may represent a persistence of larval characters, being eventually neotenic. In the particular case of the pectoral fin absence in *Nerophis*, it may be viewed as a secondary loss.

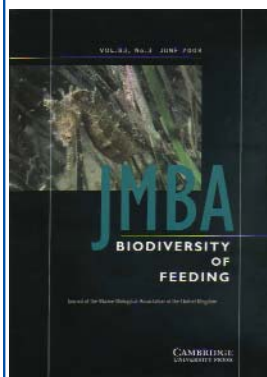
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A more detailed study of pipefish development will be published in the October issue of the Journal of the Marine Biological Association

83:5



Seahorse cover

The June 2003 JMBA issue 83.3 was a themed issue on Biodiversity of Feeding. The issue included over thirty papers from JMBA submissions on diet and feeding in a wide range of marine organisms. The cover picture of a seahorse was from a photograph provided by David Ritz (JMBA Editorial Board) and copyright Jonathan Clark Jones. A limited number of separate issues are available from Cambridge University Press at £48.00 per copy. E-mail Mike Adams madams@cup.cam.ac.uk

Pioneering SCUBA diving at the MBA



Bob Forster in the 1970s.

In the summer of 1953, MBA staff member Bob Forster undertook a series of pioneering dives using S C U B A

equipment at Hilsea Point Rock (then known as Stoke Point Rocks). The results of his observations were published in 1954 and were followed by a series of publications describing other locations in the Plymouth area. Such observations can help us to understand if and in what way seabed communities have changed with time. Bob, now retired and living just outside Plymouth, has been helping to plan a re-survey of the area fifty years on.

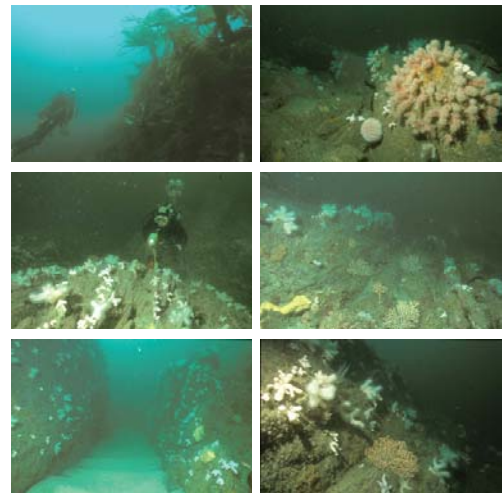
The area was revisited on 6 July as a part of the volunteer diver Seasearch programme (www.seasearch.org.uk). Together with other observations made by myself earlier in 2003, it is now possible to compare the descriptions from 1953 with the area today. The kelp forest and, deeper, foliose algae extend to about the same depth and the characteristic plant and animal species in the area are

much as described from 1953. However, in 2003, we could not find the large warty solitary sea squirt *Phallusia mammilata* (which is not now seen west of Salcombe) or football sea squirts (*Diazona violacea*) (which are, however, present in small numbers offshore of Plymouth). Feather stars, *Antedon bifida*, are another species recorded at Hilsea in 1953 but no longer seen on the open coast although plentiful in parts of Plymouth Sound. There appears to be a lower abundance of encrusting sponges in 2003 although large yellow colonies of the sponge *Cliona celata* are just as abundant as in 1953 despite being blackened and most likely dead following the 1962/1963 winter (Bob Forster, personal communication). In the re-survey, we found the southern hydroids *Gymnangium montagui*, a conspicuous species not noted in the 1950s. Careful targeted searches revealed some nationally rare or scarce species present today although not recorded in the 1950s. They include the nationally rare sea fan anemone *Amphianthus dohrnii*, the nationally scarce brown seaweed *Carpomitra costata*, pink

sea fingers *Parerythropodium hibernicum* and Weymouth carpet coral *Hoplangia durotrix* (first found, of course, off Weymouth). There are other differences between 2003 and 1953 which are most likely due to natural variability but the overall appearance of the area now is much as it was in 1953.

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Forster, G.R., 1954. Preliminary note on a survey of Stoke Point Rocks with self-contained diving apparatus. *Journal of the Marine Biological Association of the United Kingdom*, **33**, 341–344.



Hilsea Point Rocks area in 2003.

Characterization of European Marine Sites – Plymouth Sound and Estuaries cSAC, SPA

In the last newsletter we summarized results for the first of these sites –the Fal and Helford cSAC. Examples of the key findings from the second site – Plymouth Sound and Estuaries cSAC are outlined here:

Parts of the cSAC, principally the Tamar and Tavy Estuaries are influenced by past mining activities which continue to affect the area via mine drainage discharges, run-off from spoil heaps and remobilization of metals from sediments.

Organotin contamination is probably still of significance. The principal sources, from marinas and Devonport Dockyard were probably stemmed in the late 1980s, although sediments may now also contribute significantly to the overall burden.

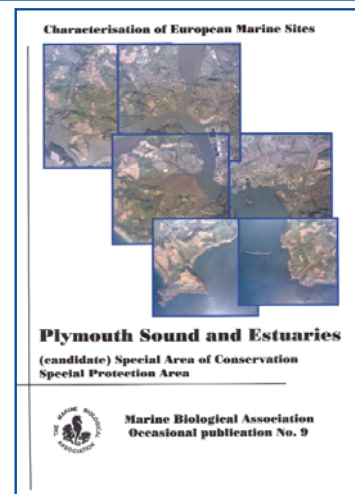
Parts of the system, notably the upper estuaries, are subject to nutrient enrichment. Although the majority of nutrient inputs in the system may be due to diffuse sources such as agricultural run-off, sewage discharges constitute additional loading and result in chronic contamination of the affected areas, and nutrient-associated water quality problems.

Polycyclic Aromatic Hydrocarbons (PAH), and certain pesticides are relatively high in parts of the system, notably in sediments. PAHs, principally from urban run-off, combustion and shipping activities, may occasionally exceed

probable effects levels. Concentrations of phthalates in Plymouth Sound are also relatively high, though at present the evidence for endocrine disruption is equivocal.

These findings are discussed in the context of implications for key habitats and species. The ecological significance of potential effects on major interest features of the site is also summarized.

A similar approach has been adopted for other European Marine sites in the South West, namely Poole Harbour SPA, Severn Estuary pSAC, SPA, Exe Estuary SPA and Chesil and the Fleet cSAC, SPA and summaries will appear in a future MBA Newsletter. Full reports for each site are being prepared for the 'Occasional Publication' series of the Marine Biological Association. For further information contact Dr W.J. Langston (wjl@mba.ac.uk)



Cetacean populations off north-west Scotland during summer



Common dolphin *Delphinus delphis*.
Photograph by Alex Carlisle.

The Atlantic Frontier is an area of the Atlantic Ocean to the west and north of Great Britain. The area has been of interest to the oil industry since the 1970s and in the last five years considerable exploration and development has been carried out there. Its biological wealth is also recognized and the area has a diverse and rich marine fauna and flora. The presence of whales, dolphins and porpoises (cetaceans) to the north-west of Scotland is known historically from whaling records but more recent information is limited. Concerns have been raised about the potential impacts of these activities on cetaceans, mainly from seismic surveys. Cetaceans are thought to be particularly sensitive to acoustic disturbance.

Opportunistic cetacean sightings have been recorded from land and sea

but few dedicated line transect surveys had been conducted to assess cetacean distribution and abundance in the Atlantic Frontier. To address this, a survey was conducted in July/August 1998 aboard the MV 'Neptun' to investigate the distribution and abundance of cetaceans off north-west Scotland. The survey area extended from the Faroe-Shetland Channel in the north, south to the southern Outer Hebrides. Over 2156.5 km of survey effort was achieved and 304 sightings were recorded of nine species. The Atlantic white-sided dolphin *Lagenorhynchus acutus* was the most frequently sighted species and had the highest relative abundance of all cetaceans. It occurs year-round in these waters and was particularly common in the Faroe-Shetland Channel beyond the continental shelf edge. This species is gregarious and was sighted in groups of up to 20 individuals, and often formed large aggregations of over 100 individuals. Other delphinids sighted included the long-finned pilot whale *Globicephala melas*, common dolphin *Delphinus delphis*, white beaked dolphin *Lagenorhynchus albirostris* and Risso's

dolphin *Grampus griseus*. The harbour porpoise *Phocoena phocoena*, the smallest cetacean in these waters, was sighted in offshore waters which further supports claims that this species is not restricted to coastal waters as previously thought. The fin whale *Balaenoptera physalus* and sei whale *Balaenoptera borealis* are two large migratory baleen whales. Both were hunted in these waters in the early 1900s and the survey included waters of the 'old whaling grounds'. Both species were only sighted in the Faroe-Shetland Channel in small groups of 1-3 individuals. The sperm whale *Physeter macrocephalus*, the largest of the toothed whales, was encountered less often than the baleen whales beyond the continental shelf. These waters are used year-round by cetaceans and probably provide important feeding and breeding grounds for many and a migration route for some of the large whales. A precautionary approach to further industrial development of this area is strongly recommended.

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M. Simmonds & E. Murray

A more detailed study will be published in the October issue of the Journal of the Marine Biological Association



Identification Guides for Selected Underwater and Seashore Species

Designed to support marine wildlife recording projects, two new waterproof guides have been published by the Marine Life Information Network (*MarLIN*), a part of the Marine Biological Association at Plymouth. The species in the guide have been selected for their ease of recognition, their importance as species which play a key role in maintaining particular communities, and as ones that are likely to be affected by global warming, or that are non-native. There are 45 species in the underwater guide and 42 in the seashore guide. You can obtain a copy of either of these guides for £3 each including post and packing by sending a cheque to *MarLIN*, Marine Biological Association, Citadel Hill, Plymouth, PL1 2PB. Cheques are to be made payable to 'Marine Biological Association'.

For further information visit www.marlin.ac.uk/learningzone



Zooplankton taxonomy workshop

The International Council for the Exploration of the Sea (ICES) Working Group on Zooplankton Ecology initiated a series of workshops to standardize and improve the quality of zooplankton analysis. The first workshop in the series was held in Wilhelmshaven in 2000 and, in response to an initiative from Chris Reid (Director, SAHFOS), the second was held in the Marine Life and Environmental Sciences Resource Centre at the Citadel Hill Laboratory from 10 to 14 June 2003. The workshop was attended by participants from Germany, Poland, Norway (2), Spain (2), Portugal (2), four from each of the Plymouth Marine Laboratory and the Marine Laboratory in Aberdeen, as well as SAHFOS staff.

We got off to an excellent start thanks to the lucid and authoritative presentations by Geoff Boxshall (Natural History) on copepod morphology and the classification of the pelagic non-calanoid copepods. The other visiting speaker was Nancy Copley who told the workshop about the Woods Hole Oceanographic Institution Silhouette Digitizer. Thanks to a lot of hard work, on the day before the start, by Darren Stevens (SAHFOS) and Nick Bloomer (MBA) to set up computers and install the appropriate software, the participants were able to try out and to appreciate the value and relative ease of use of the system. The other presentation on newer technologies was by Richard Kirby (MBA/SAHFOS) on genetic methods, particularly the methods that he has developed for dealing with formalin preserved material. Other talks were given by Dave Conway (MBA) on identification of Calanidae and the developmental stages of copepods, by myself (Alistair Lindley, SAHFOS) on identification of small calanoids and the pelagic stages of euphausiids, decapods, mysids and stomatopods.



A very important part of the programme was the practical sessions of the traditional techniques of examining specimens under microscopes. The success of this was made possible by the University of Plymouth, Olympus Optical Co. (UK) Ltd, the Plymouth Marine Laboratory and the Marine Laboratory, Aberdeen who made microscopes available for the workshops.

Many members of staff of SAHFOS contributed to the preparation and running of the workshop and thanks are due to the MBA staff responsible for the provision and maintenance of the Resource Centre at the Laboratory. The costs of using the Resource Centre were supported by the Marine Environmental Change network.

J.A. Lindley jal@mail.pml.ac.uk

SAHFOS Annual Report

The SAHFOS Annual Report is now available at www.sahfos.org and includes a recent ecological status report for the North Atlantic.



Seashore Safaris

As part of the educational and outreach activities of the MBA, a series of Seashore Safaris have been organized. The first, in May, involved members of the *MarLIN* team, Plymouth Young Peoples Agenda 21 (PYPA21) and the British Trust for Conservation Volunteers (BTCV), braving the winds and rain to show the public what plants and animals are found on the shore at Firestone Bay. About 20 hardy people turned-up of their own free will with about four others coaxed into attending.

Numerous velvet swimming crabs were seen, together with green sea urchins, squat lobsters and worm pipefish.

Despite the tent blowing away, the event was successful and participants were encouraged to attend the next safari at Batten Bay in June.

In sharp contrast, glorious sunshine and a good spring tide were the perfect excuse to go on a seashore safari

at Mount Batten Bay. More than 30 people investigated the large rockpools, looked in crevices and discovered what was underneath rocks. A new tent (pictured) was used for the seashore lab and was on hand to enable visitors to look at plants and animals in more detail.

Crabs, as always, were the children's favourite and many different sizes of shore crab were seen as well as hermit crabs and an edible crab.

Safari participants were joined by the Tamar Estuaries Consultative Forum beach cleaning group who stayed on to discover natural features of the shore.

More Seashore Safaris are planned and the MBA is running two days for primary schools, with assistance from PYPA21, during the summer. For details of future events contact Guy Baker (g.baker@mba.ac.uk) or visit *MarLIN* (www.marlin.ac.uk/learningzone) and click on 'Bulletin Board'.



Education and Outreach at the MBA

The MBA's new Marine Life & Environmental Sciences Resource Centre, developed in the space left by the old public aquarium, was completed in August 2002 and is now fully open for business. The Resource Centre consists of a seminar area and a fully equipped teaching laboratory, and since March 2003 was managed by the Education & Outreach Officer, Dr Simon Davy. The



During the National Science Week in March 2003.

Dr Richard Pipe was appointed as the new Education & Outreach Officer of the Resource Centre following the departure of Simon Davy. Richard has a research background in comparative immunology and teaching and research supervision experience. This will be put to good use in the organization of the MRes course to start this autumn. Richard will continue to act as a curator of the MBA Culture Collection.

Resource Centre has already been used for a variety of educational purposes, including National Science Week when we were visited by nearly 600 school children and members of the public, and various scientific workshops and conferences. External users have included English Nature, the British Trust for Conservation Volunteers, the Malacological Society of London, the Shark Trust and PRIMER-E Ltd. Moreover, the facility will be used extensively from September 2003 for the teaching of masters students on the new MRes course in Marine Biology. This course, which will be run jointly by the MBA and the University of Plymouth, will consist of two pathways: Marine Biodiversity, and Ecology and Cell & Molecular Biology. Furthermore, it will enable postgraduate students to carry out work in close collaboration with the Fellows, and others at the MBA and



Participants at Cell Physiology workshop.

SAHFOS. This exciting development in the MBA's education efforts will complement the other educational and outreach events held in the Resource Centre, and will play an important role in the strengthening of the Plymouth Marine Partnership. Clearly, therefore, the MBA is making significant contributions to the promotion and teaching of marine biology, and through the facilities offered by the Resource Centre and the guidance of the Education & Outreach Officer, will continue to do so in the future.

The following courses titles have been suggested:

- **Identification of phytoplankton in relation to harmful blooms** (Richard Pipe and Maria Jutson)
- **Comparative immunology of marine organisms** (Richard Pipe and Ann Pulsford)
- **History of Science** (John Bothwell and Ann Pulsford)
- **Art in Science** (Ann Pulsford)
- **Marine Parasitology** (Ann Pulsford)
- **Science and the Media** (Maria Donkin and Ann Pulsford)
- **History of Medicine** (Ann Pulsford and John Bothwell)
- **Oxidative stress** (Jan Knight course/ see website: www.knightscientific.com)
- **Scientific publishing** (Agnès Marhadour and Ann Pulsford)

If you are interested in any of these suggested courses as a student or a teacher or have any other course you would like to run please contact Ricard Pipe rkpi@mba.ac.uk

The Plymouth Culture Collection

Over the last few months, staff from the Culture Collection have taken advantage of the regular townet samples, from the L4 site off Plymouth, to isolate some new strains for the Collection. In particular, new strains of diatom including, *Odontella sinensis*, *Asterionellopsis glacialis* and *Nitzschia* sp., have been isolated from the early spring tows. In recent weeks we

have also been isolating more dinoflagellate species, which are currently abundant in the townet samples.

The staff have been busy sending out numerous strains, with recent new requests arriving from as far a field as China and Japan. With the increase in work for the Collection **Maria Jutson**, who manages the cultures, will be working full time from September 2003.

Donation to the MBA

The Marine Biological Association was very pleased to receive a donation of £130.00 from Mr Savvas Christofi, an amateur microscopist from Surrey.



Plymouth Optical Techniques Workshop 2-12 April 2003

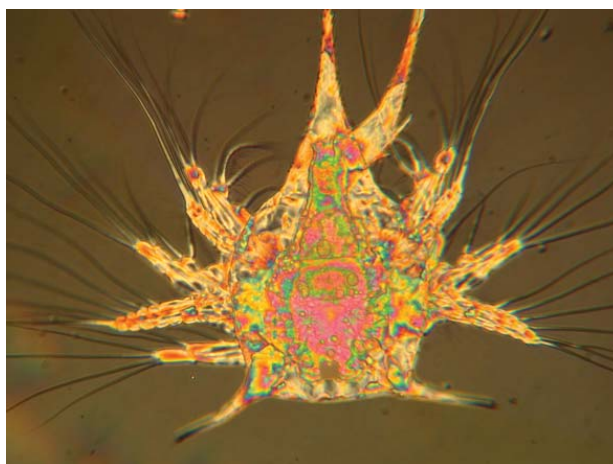
The search for a better microscope has been going on for some time. Called to the stand in the memorable trial of Bardell against Pickwick, and asked whether he had a pair of eyes, Sam Weller could only lament, *“Yes, I have a pair of eyes, and that’s just it. If they was a pair o’ patent double million magnifyin’ gas microscopes of hextra power, p’raps I might be able to see through a flight o’ stairs and a deal door; but bein’ only eyes, you see, my vision’s limited.”*

This heartfelt reply reminds us of the reasons why proper training in optical techniques is so important. First, our vision is limited. Second, as current optical techniques allow us to penetrate maybe a millimetre or so into tissue, the ability of ‘gas microscopes’ to see through a deal door shows us that we can improve those techniques still further. Third, the fact that Sam Weller obviously hasn’t a clue what he is talking about should caution us that, no matter how good the equipment may be, without an operator who knows how it works, it will be useless.

To counter this Pickwickian approach to microscopy, the MBA recently hosted the first of what is hoped will become annual Optical Techniques Workshops. Organized by Brad Amos at the Laboratory for Molecular Biology in Cambridge, Colin Brownlee here at the MBA, and

David Ogden at the National Institute for Medical Research in London, the Workshop ran for ten days in early April this year, starting with sample preparation and illumination, finishing with image analysis, and covering every aspect of image acquisition in between. Particular emphasis was given to the use of fluorescent methods in cell biology, which appreciably extend the range and power of conventional light microscopy.

The course was based on lectures given by many of the people who have developed modern optical technology, with both lecturers and students coming from Europe and the United States. Participants were then given the chance to put theory into practice on equipment loaned by all the major optical manufacturers. An early riser could fit in experiments on differential interference contrast, confocal, and multi-photon microscopes, CCD cameras, a total internal reflection system, optical tweezers,



One of the stars of the Optical Techniques Workshop: an image of a barnacle larva viewed through a differential interference contrast microscope.

and image analysis software. And if the same early riser had gone to bed pretty late, they could have learned a variety of techniques ranging from FRAP, FRET, and lifetime imaging, to image deconvolution, flash photolysis, and laser trapping. The lectures and demonstrations were world-class, and training as extensive as the students received can only stand them in good stead at such an early stage of their careers.

2004’s Workshop will be held just before Easter, and further details for anybody interested can be obtained from Colin Brownlee. (Optical@mba.ac.uk)

John Bothwell jhbot@mba.ac.uk



Brad Amos, co-developer of the confocal microscope, explains the principles of phase-contrast microscopy to students on the Optical Techniques Workshop.



Staff and students on the last day of the Optical Techniques Workshop.



Professor Roger Tsien, inventor of a range of fluorescent calcium-binding dyes, speaking in the MBA Common Room.



Library Website Redesigned

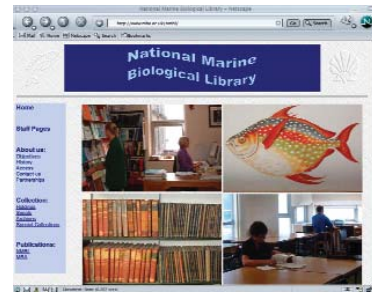
The National Marine Biological Library website has been updated and redesigned!

The new web pages (www.mba.ac.uk/nmbi) demonstrate some of the wide range of material held by the Library; serials, books, reprints, special collections, archives, expedition reports, conference proceedings, charts/maps and images.

The purpose of this website is to make information about the Library, its collections and publications more widely accessible (as well as acting as a gateway for staff and visiting researchers, providing access to all Library and Information Services). Hopefully, all MBA members will find something of interest. If you have any questions or comments, please e-mail Helen Powell hpow@mba.ac.uk

The navigation bar on the left provides easy access to the main sections of the website:

- **About the Library:** this includes information about the history of the Library, opening hours, contact details etc.
- **The Collection:** this is divided into
 - a summary of the holdings;
 - the list of serials held by the Library;
 - details of material held in the Archives. The Library has a large Archival collection which includes both documents relating to the early history and development of the Association and its Laboratory, and personal and scientific papers;
 - details of the five Special Collections held by the Library (e.g. the Bidder Library) which consist of volumes of reprints and/or monographs donated to the Library;
- **Publications of the NMBL and MBA:** NMBL publications are *Estuaries and Coastal Waters of the British Isles* (annual bibliography) and *Marine Pollution Research Titles* (monthly information bulletin). The Occasional Publications of the MBA are listed, with abstracts and cover photos to accompany them. Those publications that are available to purchase also have price and ordering details.



Staff News

'Prestige' oil pollution and ocean currents

On November 2002, the super-tanker 'Prestige' broke up off the coast of Galicia, Spain. It resulted in an oil spill which reached not only the northern coast of Spain but also the Atlantic coast of France up to Brittany.

Spanish scientists in a letter to the Editor of *Science* (no. 299, p. 511), cited Robin Pingree's work* on ocean currents wondered whether this research could have been used to predict the ocean currents which carried the oil to Brittany.

An MBA bursary has been awarded to **Agnès Marhadour** to study how this event and oil spills in general since the 'Torrey Canyon' in 1967 have been reported in the media and how scientific research is used and applied.

*Pingree, R.D. & Le Cann, B., 1990. Structure, strength and seasonality of the slope currents in the Bay of Biscay region. *Journal of the Marine Biological Association of the United Kingdom of the United Kingdom*, **70**, 857-885.

Clémence Gastaldi visited the MBA laboratories during June and July for a work placement in Colin Brownlee's laboratory. Clémence is currently preparing a Masters degree at the Institut National Agronomique de Paris Grignon in France. Clémence found the laboratory to be very friendly and the visit has helped to consolidate her career plans.

China-UK Science Network



Willie Wilson being interviewed by the Shanghai Broadcasting Network.

collective aspirations.

The event consisted of a two and a half day conference that covered the broad themes of genomics, bioinformatics and nanotechnology, where Willie presented a talk entitled 'Genomic analysis of a giant virus that infects the great engines of planetary control'. The conference was followed by visits to research centres, universities and institutes in Shanghai. The visits revealed extremely well equipped centres full of dedicated scientists, the whole UK delegation was impressed by the Chinese facilities. China is currently enjoying a period of major economic expansion and their science appears to be benefiting as a consequence.

The Royal Society is administering a scheme, which receives £100,000-a-year of funding from the Office of Science and Technology over the next three years, with equivalent funding provided by the Chinese Ministry of Science and Technology (see The Royal Society's web site). During the launch Willie was interviewed by Shanghai Broadcasting Network (SBN) on Chinese television and was asked for his views on the Think UK campaign and how he perceived Chinese scientists during the visit. Willie was also one of three scientists on a discussion panel which took part in a live web-cast on China's biggest website, sina.com.cn (China's equivalent to Yahoo) answering diverse questions (through an interpreter) from, what he thought about Stephen Hawkin's theories (from 'A brief history of time') to his views on GM crops. The complete transcript of the webcast can be found at: <http://sh.sina.com.cn/news/20030718/193314984.shtml>

Overall, Willie found the meeting extremely enjoyable, stimulating and it was certainly a memorable experience for him. Willie found it refreshing to view first hand their openness and willingness to collaborate with scientists outside China.

Willie Wilson whw@mba.ac.uk



NERC Grant*Alison Taylor*

MBA Research Fellow **Alison Taylor** has recently been awarded a NERC grant along with co-investigators Professor Richard J. Geider (University of Essex) and Dr Eric P. Achterberg (University of Plymouth) to work on the three-year project 'Phytoplankton plasma membrane redox activity; interaction with nutrient acquisition, photosynthesis and redox poise'. The research will be conducted by Dr Margaret Davey at the MBA and a joint PhD-MBA CASE student at the University of Plymouth. The outcomes of this research will contribute to our understanding of how specific membrane transport processes in phytoplankton underpin cellular energy balance and impact aquatic chemistry in the euphotic zone.

Alison Taylor arta@mba.ac.uk**Nanotechnology Undergraduate Degree at Leeds***Andrew Nelson*

Andrew Nelson has been appointed Course Director of the new nanotechnology degree course at Leeds University. Andrew pioneered nanotechnological research as an MBA Fellow in Plymouth. This field is now regarded as one of the major new developments of the 21st Century (see MBA News 29). Nanotechnology is firmly rooted in the physical sciences and involves any technology which operates at the nanoscale which is a billionth of a metre. It is currently predicted that nanotechnology will take over from microelectronics and biotechnology as the emerging new industry of the next two decades. The Centre for Self Organising Molecular Systems (SOMS) in the University of Leeds is very much aware of these developing trends. SOMS was set up in 1993 as a pioneering multi-disciplinary research centre to pursue major developments in nanoscience research. One of the reasons for this initiative is the gradual shift of students away from the traditional scientific disciplines. It was felt necessary to develop a broader based degree covering a range of sciences. Students are also feeling today a greater need for vocational degrees which provide good prospects of employment at the end. The proposed nanotechnology degree will meet these requirements. Leeds is the first University in the UK to run such a degree.

The degree is being taught by five departments of the

University:- Biophysics, Physics, Chemistry, Electronic Engineering and Materials Science and it is being administered by SOMS. Subjects include topics as diverse as nanoparticle science, molecular motors, self-assembly mechanisms, thin films and biomimetics which are all united by the application of nanoscale science to technology. Since most mechanisms in living organisms operate on the nanoscale whether they involve protein folding, nerve impulse transduction or DNA replication, biophysics is a strong element in the course. The degree relies heavily on a practical component and already a new laboratory is being furnished by Windsor Scientific with Atomic Force and Scanning Tunnelling Microscopes enabling the students to work for themselves at the nanoscale. If anyone is interested in further details of this new course please contact me at nano@leeds.ac.uk. We also have an Open Day where we shall be giving talks, demonstrations and laboratory tours.

Please visit the degree web site at:

www.nanotech.leeds.ac.uk

Dr Andrew Nelson, Director Nanotechnology Degree,
SOMS Centre, University of Leeds
L.A.Nelson@chemistry.leeds.ac.uk

Abergavenny Adventure*Andrew Pemberton*

Andrew Pemberton from the MBA is set to marry Katharine Woods from PML in September, 2003. Here we see a photo from Andy's stag 'do' in Abergavenny. Andy (top left) can be seen with his best man to his left (Mathew Goddard, a Research Fellow from NERC Centre for Population Biology, Imperial College who gave a seminar in the Spring series). To Mat's left is Steve Hill (an usher), Dan Lear (*MarLIN*) and John Scorer (the final usher).

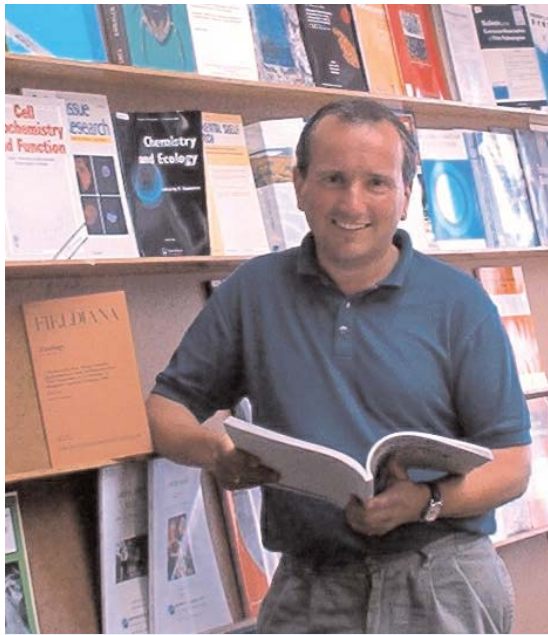
Andy Pemberton anp@mba.ac.uk

**Oxford Opportunity***Toby Collins*

After eight years in Plymouth **Toby Collins** departed the MBA in June for a post-doctoral position with Professor Susan Greenfield at the University of Oxford. Toby completed his undergraduate degree at the University of Plymouth before arriving at the MBA to study squid chromatophore physiology under the supervision of Quentin Bone and John Messenger (University of Sheffield). Toby was awarded his PhD in 2002, after which he joined Alison Taylor and Colin Brownlee at the MBA, where he applied his skills in electron microscopy to investigate calcium transport in the calcifying microalgae known as coccolithophores. After this brief foray into the world of plant cell physiology, Toby returns to neurophysiology with a post-doctoral position sponsored by Pfizer to study neuropathic pain at the Department of Pharmacology, University of Oxford. We wish Toby and family all the best in their new home and to Toby in his continuing research career.

Alison Taylor





Royal Society Fellowship Richard Kirby

Dr Richard Kirby, who became an Associate Fellow of the MBA in 2001, has been awarded a Royal Society University Research Fellowship. Richard's research career began in Plymouth in 1986 when he started his PhD, which was supervised by Professor B.L. Bayne at the Institute for Marine Environmental Research (IMER) and Professor R.J. (Sam) Berry at University College London. His PhD thesis entitled 'Adaptation in the dog-whelk, *Nucella lapillus*' described the relationship between genetic variations and habitat in this ubiquitous inter-tidal snail. Following his PhD, Richard became the NERC's committee secretary for its Special Topic 'GAMES', the Genetic Analysis of Marine Systems, which was concluded in 1995 by an international science meeting in Plymouth held jointly with the NERC, the University and the MBA as one of the MBA symposia. The meeting was entitled

'Advances in Marine Genetics' and incorporated the Leslie Cooper Memorial Lecture given by Professor B.C. Clarke on the Power of Ecological Genetics. After GAMES, Richard moved to Hopkins Marine Station, Stanford University for two years where he became part of a scientific team studying the conservation genetics of the northern Pacific pollock, a fish stock that was experiencing over-fishing. The US Department of Fisheries funded the pollock studies and when they were concluded Richard was invited to the Belle W Baruch Institute of Marine Science, University of South Carolina to investigate the conservation genetics of the Atlantic bluefin tuna.

Richard returned to Plymouth in 1997 and worked at the MBA on a NERC New Investigator grant; the results of this study revealed important genetic variations in marine gastropods that have existed for over 140 million years. During his time at the Laboratory, Richard's research collaborations have involved the cloning of GABA (Professor R. Williamson) and glutamate neuroreceptors (Dr E. Brown) and most recently, in conjunction with Professor A.S. Clare (University of Newcastle), the determination of the molecular identity and evolution of the pheromone involved in barnacle settlement, a quest that was begun over 50 years ago by Professor D.J. Crisp.

Richard plans to hold the Royal Society Research Fellowship at the University of Plymouth and his work will focus on a molecular study of the population genetics of the zooplankton. The project will study the northern Pacific copepod, *Neocalanus plumchrus* as a model species and will involve close collaboration with the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) for sample collection. The SAHFOS is based at the Laboratory on Citadel Hill from where it operates the Continuous Plankton Recorder (CPR) survey. Richard will therefore maintain collaborations with the MBA.

Richard Kirby rrk@mba.ac.uk



New Careers Down Under Simon and Jo Davy

After just over two years working as a Research Assistant for first the Wilson and most recently the Bishop Group, Jo Davy is leaving the MBA to start studying for a PhD at the University of Queensland in Brisbane. Husband Simon, who has been working at the MBA since March 2003 as the Education & Outreach Officer, is taking up a Senior Lectureship at Victoria University of Wellington in New Zealand. Simon has had close links with the MBA for the

last three years, whilst lecturing at the University of Plymouth, working in collaboration with Willie Wilson on a project investigating the potential role of viruses during coral bleaching episodes. The coral theme continues as Jo will be looking at the incidence of coral disease on the Great Barrier Reef, and Simon will be spending some time carrying out research on tropical symbioses at the University of Queensland.

Simon and Jo were married in October 2002, and have been trying to move 'Down Under' for a long time, so are very excited about these career opportunities, if perhaps not the commute between the two countries to see each other! They would like to thank all their friends and colleagues at the MBA for making their time here so enjoyable and look forward to visiting and working with them over the coming years.

Squid chromatophores

The large embryos of the eastern Atlantic squid *Loligo forbesi* Steenstrup 1856, provide excellent material for the study of development. Cephalopods are famed for their abilities in pattern generation and rapid pattern change - these abilities are mediated via a complex system of innervated pigment cells, chromatophores, located within the top few layers of the skin. As the pattern-forming chromatophores of *L. forbesi* form a bilaterally symmetrical arrangement about the long-axis of the body, they provide a model system for visualizing and quantifying developmental variability. By measuring levels of asymmetry in the chromatophore pattern of hatchlings reared at different temperatures, Gowland et al. investigated the potential for use of pattern asymmetry as a proxy for developmental instability.

Their work reveals strong correlation between thermal stress and dis-

ruption of embryonic chromatophore pattern in *L. forbesi*. Elevation of incubation temperature resulted in increased frequency and magnitude of pattern defects; hatchlings reared at a temperature 4°C above 'normal' displayed ~50% of expected mantle patterning. Incidence of *absolute* pattern asymmetry, one chromatophore absent from a typically bilaterally symmetrical pair, was also positively associated with developmental temperature. Measurement of *relative* asymmetry, chromatophore displacement, revealed that FA values along the body axis consistently exceeded those across it. Certain chromatophores were more susceptible to disruption and displacement than others. The chromatophore-specific variation observed in asymmetry levels may reflect hierarchical chromatophore importance and/or heritability.

On the premise that the longitudi-

nal mantle axis of *L. forbesi* represents the main growth axis of the body, it seems plausible that greater opportunity exists for asymmetry in this direction. Whilst no relationship was detected between temperature and FA across the body axis, FA along the body axis was significantly reduced at 8°C. This reduction may reflect suppression of growth rate at low temperature and hence a reduction in the opportunity for asymmetry.

Positive associations between developmental temperature and asymmetry in the embryonic chromatophore pattern of *L. forbesi* suggest pattern asymmetry as a potential proxy for developmental instability in this species.

Fiona Gowland
f.gowland@abdn.ac.uk

A more detailed study of squid chromatophores will be published in the October issue of the Journal of the Marine Biological Association 83:5.

MBA Seminar:

How squid control colour changes: from molecule to whole-animal

Pedro Lima gave a talk which focused on recent work on the structures responsible for colour changes in squid skin. These organs known as chromatophores consist of muscle fibres and pigment sacs controlled by nerves coming from the brain. The correspondent synapse is unique as its performance is visually displayed. Pedro presented data which showed that this glutamatergic synapse is mediated by two post-synaptic glutamatergic receptor types: an AMPA and NMDA-like receptors. Their activity and indeed the interaction between these receptors show striking resemblance to their 'counterparts' found in mammal brain (Lima et al., 2003. *European Journal of Neuroscience* 17, 507–516). Working with Dr Euan Brown, now at the Stazione Zoologica Naples, Pedro also demonstrated the existence of changes in synaptic plasticity. Because of the interrelation between the two types of glutamate receptor,

evidence was provided for long-term potentiation (LTP), a physiological phenomenon that is believed to underlie our learning and memory. Most interestingly, there is a marked heterogeneity in squid chromatophores. Areas of skin exhibited both receptors and others, like the squid belly, only has AMPA-like receptors and no LTP. Pedro has shown that this spatially irregular distribution of receptors and of chromatophores that are able to change their performance is used in the control of different colour displays. Therefore, the intricate control of thousands of chromatophores manifested in complex visual display is, at least in part, made locally and not centrally. Thus, this work represents a rare example where the use of cell physiology techniques (such as patch-clamp) can make a direct contribution to understanding an animal's behaviour.

Pedro Lima p.a.lima@bristol.ac.uk

Peter W.H. Holland, FRS and Andrew Watson, FRS

We are delighted that Professor Peter Holland (MBA Council) and Professor Andrew Watson (past MBA Fellow) were elected to the fellowship of the Royal Society in April this year.



Obituaries



David Carlisle, about 1954. Photo R.I. Smith.

David B. Carlisle at the MBA

David Brez Carlisle, who died on 9 February 2002, was a Demy, or scholar, at Magdalen College, Oxford University, from 1944–1947. His zoological research took him to the Stazione Zoologica at Naples and he then joined the staff of the MBA in 1951, as an Endocrinologist. He worked at Naples and Plymouth on the endocrinology of ascidians (sea squirts) and prawns, especially with regard to moulting and sex.

While at Plymouth he lived on a precipitous hillside in Compton and he and family were most hospitable to fellow scientists. We remember him as unconventional, accident prone, enthusiastic and highly productive during his decade here. His earliest publications were on ascidians and he kept up an interest in these throughout his career at Plymouth. His studies of moulting in prawns at Naples led to publications with Peter Dohrn, while an interest in the hormonal control of heart-beat in prawns led to an early collaboration with J.S. Alexandrowicz (Doctor Alex) at Plymouth, on the function of the pericardial organ in crustaceans. He completed his D.Phil. in 1954, by which time he was working with Sir Francis Knowles on crustacean eyestalk hormones and their effect on pigmentation. He also investigated water balance and kidney structure in the shore crab, *Carcinus*, and began to compare crustacean and insect hormones. At this point his research interests expanded to take in stick insects and honeybees. In 1957 David became Bursar, managing to combine the bursar's tasks with continued research. With Sir Francis Knowles he published a book entitled 'Endocrine Control in Crustaceans'. His interest in moulting in crabs led him to take up SCUBA diving, in order to watch the animals in their natural environment. He visited the Kristineberg Zoological Institute to work with L.H. Kleinholz on sex reversal in *Pandalus*, and continued to investigate differences in colour pattern and the effect of moulting hormones on *Leander serratus* from different local populations.

He found that there is a delicate balance between the hormones that accelerate and inhibit moulting. From moulting his interest spread to the chitin in the crustacean cuticle and methods for its detection, and from that to the enigmatic tubeworms called Pogonophora. In the 1950s it was thought that these worms were protochordates and related to ascidians, and that their tubes were made of cellulose, like the ascidian tunic. David took some tubes of pogonophore species collected in the Atlantic, and showed that they contained chitin rather than cellulose. This was a blow to the protochordate hypothesis. His interest aroused, David learned enough Russian to translate the entire monograph on 'Pogonophora' by A.V. Ivanov (1960) and produced a new English version, which included substantial new text by Ivanov himself. This ran to 479 pages and was published by Academic Press in 1963. It remains a definitive description of the anatomy and taxonomy of the smaller pogonophores, now known as frenulates, cousins of the spectacular giant vestimentiferans discovered some 30 years later at hydrothermal vents. Both are at present classified as Annelida. David had already widened his scope to comparative endocrinology of crustaceans and insects, particularly locusts, which he used to keep in his laboratory at the MBA. In 1962, he left the MBA and marine biology, to join the Anti-Locust Research Centre in London. In 1969 he moved to Canada, first to Trent University, then to Environment Canada in 1973. In 1993 he became Visiting Professor at the Department of Geology, University of Toronto. Having kept up his interest in environment and evolution, he published 'Dinosaurs, Diamonds and Things from Outer Space' (Stanford University Press) in 1995.

Eve and Alan Southward



The cephalothorax of live *Leander serratus*, showing the pattern of various types of chromatophores (from Knowles et al., 1955, plate 1, figure 1, *JMBA*, 34, 611-635).

Renée Corner

We are sad to report the death of Renée Corner (wife of Eric Corner) on 20 May 2003. The funeral was held at Efford Crematorium. Many past members of the laboratory staff attended.

Meetings

Marine Biotechnology Conference. 21-25 September 2003, Chiba, Japan. Combined meeting of the 6th International Marine Biotechnology Conference and the 5th Asia-Pacific Marine Biotechnology Conference. Satellite Symposia: **Marine Microbes and Extremophiles**, 25-26 September 2003 and **Aqua Genome**, 25-27 September 2003. Further information available at <http://www.tuat.ac.jp/~marine>

Behaviour & Neurophysiology of Molluscs. 16&17 April 2004, Kingston University, Surrey, UK. Contact Dr R.T. Cook/School of Life Sciences/Kingston

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