

# PORCUPINE MARINE NATURAL HISTORY SOCIETY

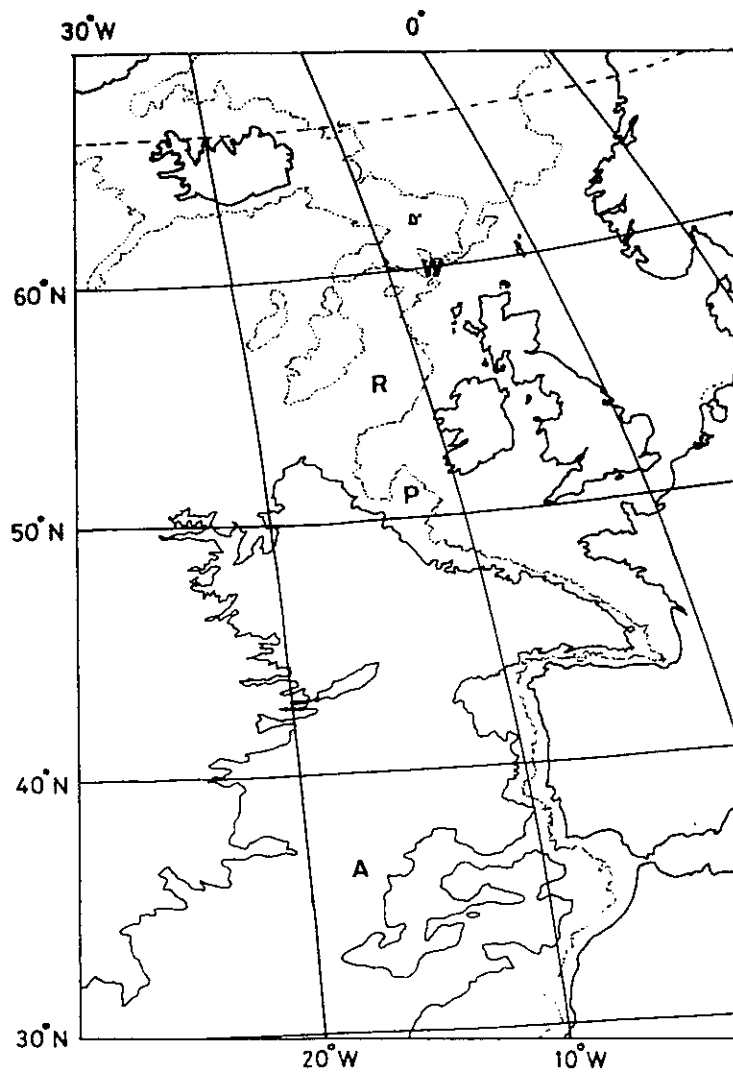
## NEWSLETTER



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# Porcupine Marine Natural History Society

## Newsletter

No. 12 May 2003

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Porcupine MNHS welcomes new members - scientists, students, divers, naturalists and lay people. We are an informal society interested in marine natural history and recording particularly in the North Atlantic and 'Porcupine Bight'. Members receive 3 newsletters a year which include proceedings from scientific meetings.

Individual £10    Student £5

☎ [www.pmnhs.co.uk](http://www.pmnhs.co.uk)

### COUNCIL MEMBERS

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## EDITORIAL

Porcupine has always been an informal, friendly and active Society. At least that's what I think. The annual meeting in March is open to all comers and anyone can present a paper or poster on (almost) any topic. Likewise the annual field trip is designed to appeal to "scientists, students, divers, naturalists and lay people" as it says in our membership blurb. However, is this the reality? Are we providing you with the outlet for your skills and knowledge that you would like? I would really like to hear what you, the membership, think of our Society. It is quite likely that at some point, we may ask you formally through a questionnaire. In the meantime, I would very much like to receive your comments. Send me a few lines – serious, funny, rude or polite. Did you enjoy the annual meeting? If so, why? Ditto field trips. What do you think of the newsletter? How can we improve any of these services? And so on.

In this issue there is a full report of the Aberthaw field trip that followed on from the Cardiff meeting in March this year. This includes a full species list and fascinating comments from Chris Mettam who has studied these shores for many years. The trip produced some really useful records – and recording is one of our main thrusts as a society. Accurate records of species and habitats, and changes occurring over time are the mainstay of conservation and management. Since the last (May) issue of the newsletter, Shelagh Smith has led a field trip off the NE coast. A small band went dredging in the Trink and off Blyth and visited shores at Boulmer, Newton-by-the-Sea and Lindisfarne. Hopefully at least some of this material will be published in future newsletters.

Plans are now well underway for next year's meeting in March. This will be in Bournemouth and the provisional title is 'Southern Seas and Species'. Whilst all papers will be welcome, the theme concentrates on individual species and groups – from whales to worms and in particular, those along the south coast of the UK. Could you contribute? Maybe you are involved in relevant scientific research? Or maybe you are a diver who makes notes on specific species or groups in the area? Or a student? Or a naturalist?

As a footnote to this editorial I would like to report that sometimes life is good to one. Members might like to share my good news. Last year I wrote a book for Dorling Kindersley called 'The DK Guide to the Oceans' – my 5<sup>th</sup> children's book (11<sup>th</sup> book in total). Unbeknown to me, DK entered the book for the 'Aventis Prizes for Science Books' in the junior books section. So I was very excited to learn that my book was one of 6 short-listed. This meant a posh presentation dinner for the short-listed authors in the Science museum in London last June, culminating in a nail-biting opening of an envelope with the winners name inside – me!!

Note: publication dates of the Newsletter are changing. Full details in the next issue.

Frances Dipper

**COPY DEADLINES**

December 15<sup>th</sup> for February issue

## PORCUPINE FIELD MEETING

5<sup>th</sup> – 9<sup>th</sup> May 2004

Organizer: Lin Baldock (01305 852585,  
[lin.baldock@virgin.net](mailto:lin.baldock@virgin.net))

A field meeting combined with the Conchological Society of the British Isles is to be held to visit sites along the Dorset coast. Dorset provides some of the most easterly records on the north side of the English Channel for a number of marine species, some of which are being monitored as indicators of possible climate change for example the top shell *Osilinus lineatus* and the brown alga *Bifurcaria bifurcata*.

The first site to visit on 5 May 2004 will be Osmington Mills (Grid Ref: SY735817) which has a shore with a variety of habitats: rocky ledges and deep intertidal pools, boulders on rock and gravel, freshwater input. The accessible shore is extensive to both the east and west and access is easy. There is a good pub at the end of the road for lunchtime refreshments.

Other possible locations for our itinerary are listed below.

**Durlston Bay** just to the south of Swanage. This is a boulder beach with low rock ledges. Access is Ref SZ034781, parking is a little limited. Participants might like to consider sharing transport into Swanage, leaving some cars in the (free) car park just outside Corfe Castle (Grid Ref: SY95958246).

**Chapman's Pool.** Access is via a rather steep walk down the cliff from the car park near Worth Matravers. The beach is varied: low flat ledges, in places interspersed with huge boulders. The whole area is subject to rapid cliff erosion and may therefore be rather muddy, depending on the impact of the winter storms.

A site on **Portland Bill.** Hawthorne's studies on *Osilinus lineatus* showed that an isolated population of this species survived the 1962/63 winter on the southwest side where it was sheltered from the easterly winds.

**Golden Cap.** An isolated stretch of rocky shore (huge boulders on flat bedrock with shallow intertidal pools) on a predominantly pebble coast. A walk of about 1km along the pebble

beach from the car park at Seatown (Grid Ref: SY421917).

**Lyme Regis** (Car Park Grid Ref SY338915) Easy access to a beach of coarse sand and boulders and broad rocky ledges with deep intertidal pools.

It is proposed that a dredging trip will be arranged from Lyme Regis using a local fishing boat on either Saturday and/or Sunday depending on interest. We hope to have at least a grab of some description and a pipe dredge. The skipper is very well informed about the variety of subtidal habitats in Lyme Bay. He has worked there for many years and has been closely involved with baseline studies in the area when the possibility of drilling for oil was being investigated. The boat will leave from the Cobb in Lyme Regis (Grid Ref: SY340916).

Lin Baldock will coordinate the records from this field meeting which will be passed on to either the Dorset Environmental Records Centre which has established a marine database for Dorset or the Devon Wildlife Trust as appropriate.

## PORCUPINE 2004 SCIENTIFIC MEETING AND AGM

March 21<sup>st</sup>-22<sup>nd</sup>

**Marine Species at the Limits of their Range**

This is the first announcement for the 2004 Porcupine meeting to be held at Bournemouth University on the weekend of 20<sup>th</sup> and 21<sup>st</sup> March 2004. General details of the venue may be found at [www.bournemouth.ac.uk](http://www.bournemouth.ac.uk). The theme for the conference talks and posters is 'Marine Species at the Limits of their Range' though suggestions for talks on other topics are welcome.

Because the conference is being held over a weekend it is proposed that Sunday 21<sup>st</sup> will be a half day of presentations with a field meeting in the afternoon. The conference dinner will be held on the Saturday evening.

Any one interested in giving a presentation or displaying a poster at the conference should contact Lin Baldock (conference organizer) e-mail - [lin.baldock@virgin.net](mailto:lin.baldock@virgin.net) Tel: 01305 852585.

## OTHER MEETINGS

### **October 30<sup>th</sup> 2003 Scottish Marine Group Meeting. Theme: Sea Lochs.**

Dr Hamish Mair, SMG Meetings Convenor, Centre for Marine Biodiversity and Biotechnology, School of Life Sciences, John Muir Building, Heriot-Watt University, Edinburgh, EH14 4AS. Tel: (+ 44) 131 451 3314, Fax: (+ 44) 131 451 3009 [J.M.Mair@hw.ac.uk](mailto:J.M.Mair@hw.ac.uk)

### **November 12<sup>th</sup> 2003 CIWEM Conference: The Water Framework Directive: The Ecological Implications - Costs and Environmental Benefits. SOAS London**

The programme for this conference raises issues that are fundamental to the way the Water Framework Directive will be applied across the aquatic environment.

Contact: [bob.earll@coastms.co.uk](mailto:bob.earll@coastms.co.uk)  
[www.coastms.co.uk](http://www.coastms.co.uk)

### **November 20<sup>th</sup> 2003 CIWEM Conference: Mitigation – Does it Measure Up? Steps to best practice. London.**

This important meeting will bring together policy makers, practitioners, regulators, developers and consultants to discuss the increasingly employed techniques of environmental mitigation.

Contact: [bob.earll@coastms.co.uk](mailto:bob.earll@coastms.co.uk)

### **December 6<sup>th</sup> 2003 Reef Conservation UK Annual symposium. Zoological Society, Regent's Park, London.**

For further information and submission of material please contact: RCUK 2003, c/o Coral Cay Conservation, 13th Floor, The Tower, 125 High Street, Colliers Wood, London, SW19 2JG. Tel: 020-8545-7720 Fax: 0870-750-066

Email: [rcuk@hotmail.com](mailto:rcuk@hotmail.com)  
(cc. to [sph@coralcay.org](mailto:sph@coralcay.org))  
[www.rcuk.org.uk](http://www.rcuk.org.uk)

### **January 21-22<sup>nd</sup> 2004 Coastal Futures 2004**

CMS' Coastal Futures 2004 conference will take place on January 21<sup>st</sup> and 22<sup>nd</sup> 2004. The conference will consider the usual diverse mix of topical issues and future developments in relation to the sustainable management of our coastal and marine waters.

If you have suggestions for topics or presentations for the conference would you please forward this to me now. Contact: [bob.earll@coastms.co.uk](mailto:bob.earll@coastms.co.uk), [www.coastms.co.uk](http://www.coastms.co.uk)

### **What do our coasts and seas mean to you?**

English Nature thinks our coasts and seas are special and worth looking after, but do you? This June (2003) English Nature launched its 'What do our coasts and seas mean to you?' websurvey ([www.english-nature.org.uk](http://www.english-nature.org.uk)). This has been designed to help develop a maritime strategy to halt biodiversity loss and promote recovery of our coasts and seas in support of the Government's Marine Stewardship initiative. We want to canvass your opinions and ideas to help us develop a challenging plan of action for making England's coasts and seas a better place for wildlife and a better place for today's and tomorrow's generations to live, work and play. This web survey is a first for English Nature. We recognise and appreciate that different people all have different needs and values. This is a real opportunity for you to tell us what matters to you and our challenge is to turn your ideas into positive action. Our challenge to you is to answer the four general knowledge questions!



## Glimpses of the Wonderful. The Life of Philip Henry Gosse.

By Ann Thwaite.

(Faber and Faber, 2002 ISBN 0-571-19328-5)

RRP £25.00

Available from the Pembroke Bookshop 01646 685144, and others.

### Review by Anne Bunker

The Bull pub in Beaumaris, Anglesey was the venue for a party with the Countryside Council for Wales Phase 1 intertidal team last year, celebrating my time working with them. After several glasses of wine I went in search of the loo. Upon the toilet wall hung a beautiful colour plate from Gosse's "Actinologica Britannica". Only a month before I had been lucky enough to borrow Dale Fort Field Centre's precious copy to look up an anemone rarely found in Wales (*Anthopleura thallia*). This species had first been described by Gosse from near Tenby, very close to the location where I found it again during a Phase 1 survey over 140 years later. Gosse's excellent description, observations of its behaviour and the colourful plates fascinated me at the time (I suspect my colleagues of thinking me a bit of an anorak, wanting to talk about sea anemones and Victorian naturalists during a party). However, when I saw "Glimpses of the Wonderful" in the Pembroke Bookshop I was determined to find out more.

In her book, Ann Thwaite described a man who devoted his life to studying, describing and illustrating details of natural history. Philip Henry Gosse is best known to marine biologists for his work on sea anemones ("Actinologica Britannica: A History of the British Sea-Anemones and corals", 1858-60) and his pioneering work on aquaria (he stocked the first aquaria at the London Zoo). It was not until I read his biography that I was aware of the incredible volume of work produced on other subjects including The birds of Jamaica, Fishes, Reptiles and Rotifera and even Australian tinned meats (!), many illustrated with his own detailed drawings and paintings.

It took a little while to get into this thick

hardback, but it was worth persevering. Much reference material must have been consulted to tell the story of how, as a boy Gosse was allowed the freedom to play on the shores around Poole, was taught to draw by his aunt and packed off to work in Newfoundland at the age of 17, so starting his observations on geographical variations. The story is chronological, following his travels from Dorset to Newfoundland, Quebec, Alabama, London, Jamaica, Pembrokeshire and finally to St. Marychurch in Devon. The detailed writing gives us an insight, not just into the man himself, but how it was to live and work during the 19<sup>th</sup> century. Many of Gosse's letters have been quoted in the book, revealing his thoughts on a variety of subjects. This one is topical: through the American Civil war he had remained convinced that it was in England's interest that the States of America should *not* be united, imagining that that "vast insolent republican Empire aims to domineer over the whole world".

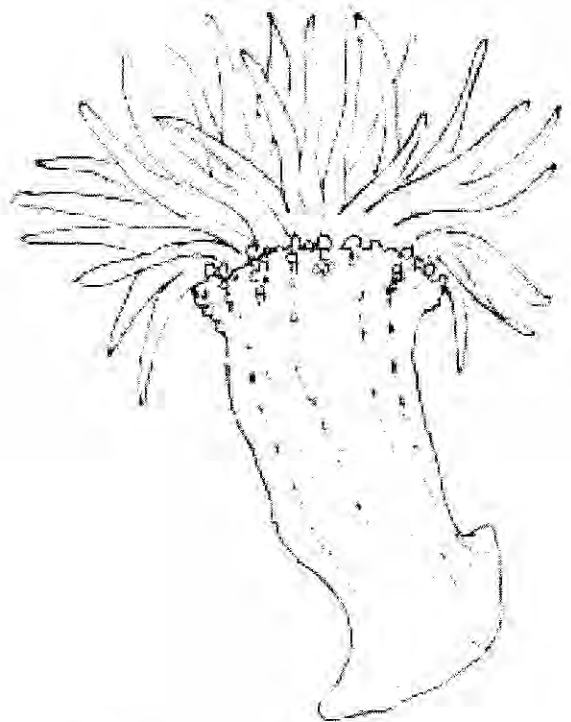
Religion played a large and important part in Gosse's life. The author constantly reminds her reader how his Christian beliefs sustained and inspired him throughout his life. For a man who corresponded with Charles Darwin and Alfred Wallace, often supplying Darwin with information, his determination to believe in the fixity of species is perhaps surprising. Although his assumption that the species were divinely created and immutable was still shared by many of his fellow scientists, it was at odds with his own work and observations. The chapter explaining his theories, along with a letter to him from Charles Kingsley about them, I found particularly interesting. Throughout his life he mentioned God in his scientific papers, until 1881 (he was 71 years old) when he was eventually persuaded to omit a contentious paragraph from a paper on "The prehensores of male butterflies of the genera Ornithoptera and Papilio". He had suggested that the very similar species he had described had not descended from a common parentage but were distinct creations of the Almighty God.

Repeated reference to misrepresentation in Gosse's son Edmund's memoir "Father and Son" I found a little irritating. Maybe it would have been less so if I had read it. Jumping

ahead to comments about the way characters would turn out in the future sometimes spoilt the flow for me and illustrations without titles left me guessing. None of this detracted from the pleasure of finding out about a brilliant artist and naturalist. Anyone lamenting the decline of modern day descriptive science, good observation and accurate illustrative art will be inspired by reading Ann Thwaites book on the life of Philip Henry Gosse.



*Porcupiners following in the footsteps of Gosse*



*Anthopleura*

## Information requests and observations



### Fishy records

From Doug Herdson, (4 April 2003),  
Information Officer, National Marine Aquarium,  
Rope Walk, Coxside, Plymouth PL4 0LF. Tel: 01752  
275216/01752 600301. Email:  
Douglas.Herdson@national-aquarium.co.uk

#### 1. First British Record of a European barracuda *Sphyraena sphyraena*

**CORRECTION to article by Doug Herdson in PMNHS Newsletter No. 10, April 2002, P.9**

When this specimen was examined at the Natural History Museum by Oliver Crimmen, it was found that the edge of the operculum was naked (not covered in scales as it is in *Sphyraena sphyraena*). This, along with a few other features, showed the specimen to be *Sphyraena viridensis*, known as the Yellowmouth Barracuda. I am afraid I was misled by the size of the specimen, as the FAO guide to the Mediterranean (1987), the UNESCO Fishes of North-eastern Atlantic and Mediterranean (1986) and Miller and Loates (1997) all given the maximum size of *Sphyraena viridensis* as 65 cm (probably standard length) and this specimen was 106 cm (total length). However FishBase does give *Sphyraena viridensis* as reaching 128 cm (fork length). FishBase does also say that the distribution of *Sphyraena viridensis* is uncertain as it is frequently misidentified as *Sphyraena sphyraena*.

#### 2. Skates in the Westcountry

All over the world large rays are declining drastically (Casey and Myers, 1998). The Common or Blue Skate *Dipturus batis* of the north east Atlantic is one of the largest rajid rays and one of the most threatened. Formerly the basis of a major fishery to supply the "fish and chip" trade, it has for the last thirty years been considered virtually extinct around much of Britain (Brander, 1981). A number of angling

groups no longer accept records for this species for conservation reasons. The capture of one off Hartlepool about eighteen months ago was worthy of a note in *Fishing News*.

In late April and early May 2002, two beam trawlers each landed four or five boxes of Common Skate on the Fish Market in Plymouth. Some of these fish were fairly large – four together weighing 37.4 kg, though this is middling to small by skate standards. They were recognised by their more pointed snouts, but especially by their grey undersides. Some of the market workers commented that the flesh on the wings is not as thick as on the commoner rays. It was not possible to find out where the catches were made. The first vessel was said to have been fishing in "deeper waters", but this could be anywhere from the Isle of Wight or Cherbourg to the Great Sole Bank north-west of Brittany or to South Wales. The second boat was known to have been fishing around the Channel Isles but the skate could have been caught anywhere on route. Dr Philip Vas occasionally sees common skate landed in Newlyn (*personal communication* 2002).

Four years ago a massive egg case 25 cm by 12 cm, trawled up off Newlyn, was sent to the Marine Biological Association. On opening it was found that the embryo inside was still alive. It was possible to maintain it for several weeks, but unfortunately it did not reach a free-living stage or become mature enough for a positive identification. The fisherman who sent in this specimen had caught a similar one about five years before. From the egg cases it seems probable that they were *Dipturus batis* eggs.

So it appears from this scant data, that a small population of the formerly common Common Skate still exists off the south-west or west of Britain.

Brander, K. (1981) Disappearance of the common skate *Raia batis* from the Irish Sea. *Nature*, **290** (5801), 48 – 49.

Casey, Jill M. and Ransom A. Myers. (1998) Near extinction of a large, widely distributed fish. *Science*. **281**: 690-692.



### 3. A Real Smoothie

A Smooth Pufferfish was caught off Falmouth on 22<sup>nd</sup> January 2003. Fisherman Andrew Green, who last November caught a large electric ray, got a different kind of shock last week when he hauled the trawl aboard his small trawler the "Girl Rachael". As the catch spilled out on to the deck he was astounded by a fish looking like a small partly deflated football.

When he landed his catch to the fish merchants "Fresh from the West" in Falmouth, the managing director, Sandy Ralph, recognised it as a pufferfish and knowing these were rare telephoned the National Marine Aquarium. Since less than fifty pufferfish have been recorded in Britain, the aquarium was delighted, when he kindly agreed to send it up to Plymouth for examination.

When it was carefully examined, it was realised that this was not the more usual Oceanic Pufferfish (*Lagocephalus lagocephalus*), which has small spines on its belly, but the completely prickly-free Smooth Pufferfish (*Sphoeroides pachygaster*). This is only the second one of its type to be found in the United Kingdom. The first was found recently dead on the beach at Whitsand Bay in southeast Cornwall in 1987, but the only record of it is a poor photograph.

The Smooth Pufferfish normally lives in tropical and warmer temperate seas around the world. It is getting commoner in the Mediterranean but is seldom encountered north of Portugal.

They live at depths of 20 to 480 metres and are thought to feed on squid.

There can always be odd stragglers that

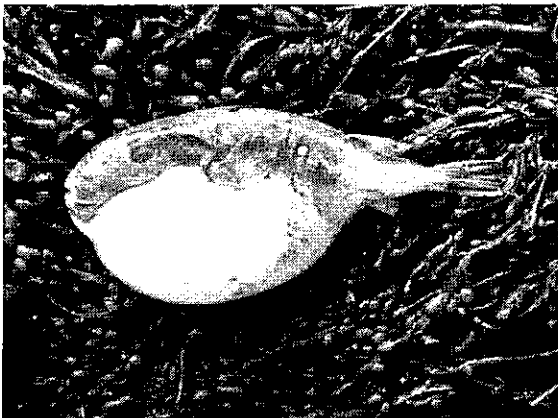
get caught in a current and carried away from their usual range, so a single fish like this cannot be treated as a sign of changes in the environment. However this is the third unusual fish to be found off Cornwall in recent months, the others being a Flying Gurnard and a Sailfin Dory, and as this follows the first Barracuda record for Britain in 2001, it could be related to the apparent warming of the seas around the south west.

The fish was held at the National Marine Aquarium and photographed before being sent to the collections of the Natural History Museum in London.

## ALERT!

*From Shelagh Smith*

I visited Loch Creran, adjacent to Dunstaffnage Marine laboratory near Oban a few months ago and got a distinct impression that the shores are deteriorating - rapidly. Loch Creran has been declared a Special Area of Conservation (SAC) under the EU Habitats Directive because of the living colonies or reefs of the tubeworm *Serpula vermicularis* that occurs at various locations in the main and inner basins of the loch, mostly below low water but also at low water. The deterioration appears to be due to a great increase in the populations of *Mytilus edulis*, which were always present in some numbers especially on the rocks at Creagan at the head of the main basin, and further up the loch. The increase is not here, however, but nearer the entrance to the loch around the rocky spur Sgeir Cailich, adjacent to a mussel farm that was set up a few years ago. The mussels have spread rapidly during the last two years (there were previously few in this area) and are obliterating the previous shore fauna and flora that was previously of exceptionally high diversity. The inference is that the extra spat produced by the farmed mussels are settling wherever they can. They do live permanently under water as well as on the shore and could be causing considerable mayhem out of sight. I consider that they could cause a disaster to the loch, certainly to the shores. I have discussed this possible problem with Robin Harvey who has not found any research into this aspect of shellfish culture



(usually regarded as benign, especially compared with finfish farming). No monitoring is being done on the shores of the loch. The shore population of *Modiolus modiolus* has also been bulldozed out to provide standing space for oyster bags.

One of my favourite (no longer!) shores in Northwest Scotland has been turned into a marina and is now much less than wonderful.

In Ireland, Julia Nunn has just discovered that one of the very few sites in Ireland where *Truncatella subcylindrica* occurs has been wiped out by the innocent building of a farm track along the shore.

These are just three examples of loss of habitat. We can't keep an eye on everywhere, but Porcupines should be alert to this sort of situation and where possible do something about it before it is too late.

Shelagh Smith has recently re-visited Loch Creran and reports the following:.....

*"Glad to discover that the bad news about mussels taking over in Loch Creran is in abeyance. Although too many mussels about, other things, not necessarily molluscs, seem to be holding their own and there was a lot of variety of life around. I couldn't have a good look as the tide, despite good weather, decided not to go out nearly as far as it should have done. However, the news for here is watch this space."*

## The Great Eggcase Hunt

Via Jon Moore

The Shark Trust have recently launched a new project - the Great Eggcase Hunt - aimed at the general public, schools and marine wildlife centres. Empty skate and ray eggcases - mermaid's purses - are to be collected from strandlines, soaked in water to rehydrate them and identified to species using a well designed series of information sheets. The launch was at Easter and there has already been a lot of interest in the project. The project information sheets are available on the



Shark Trust website ([www.sharktrust.org](http://www.sharktrust.org)) and includes information about the various species and their conservation. Because of over-fishing, the numbers of skate and rays around our coastline are declining dramatically and many are in danger of extinction. This project aims to collect information on the distribution of the various species and inform the public at the same time.

## Thorogobius ephippiatus

From Frances Dipper/Andy Toman



*Thorogobius ephippiatus* - drawing by Robert Irving from British Sea Fishes

I recently received the following letter and thought it, and my reply might be of interest to Porcupiners and might hopefully stimulate further records of this species:

Dear Dr Dipper,

Thank you for your excellent book on British fishes, which is an invaluable source of information for any fish-watcher. I note in the entry re. *Thorogobius ephippiatus* that this species has not been recorded on the east coast south of St Abbs. My eldest daughter and myself feel sure we have spotted this species in the Farne Islands, whilst diving on the south of Longstone. Unfortunately we did not realise that it had not been noted in area until we referred back to your text, so we did not attempt to photograph it (despite being set up to photograph seals). The fish was as you describe, skulking about under a large boulder in the company of a squat lobster, pale fawn with blackish-brown spots and about 8cm long (the length of my index finger) at 14m depth. We only saw one specimen. We cannot substantiate the sighting any further, but I hope it may be useful in conjunction with other sightings.

Regards Andy Toman

Dear Mr Toman,

This certainly sounds like a leopard spot! Recently I have found a reference to a couple of records on the east coast just north of the Humber. These are shown on a site called [www.marlin.ac.uk](http://www.marlin.ac.uk) that is run by the Plymouth marine lab. (go to Main menu, then Species and type in the name - it comes up with a distribution map but no details of the records). I am following these up to see if I can get details. May I submit your record to an organisation I help to run called Porcupine Marine Natural History Society? They run a recording scheme for collating miscellaneous marine records and would be interested in this possible record. I will also note it for future revisions of British Sea Fishes! There is also a Fish Recording scheme run by the Plymouth National Marine Aquarium and it would be useful to forward to them as well if that's OK.

Thank you very much for your interest and I hope you got good pics of the seals at the Farnes!

*(permission was given for passing on this record).*



## Creature feature

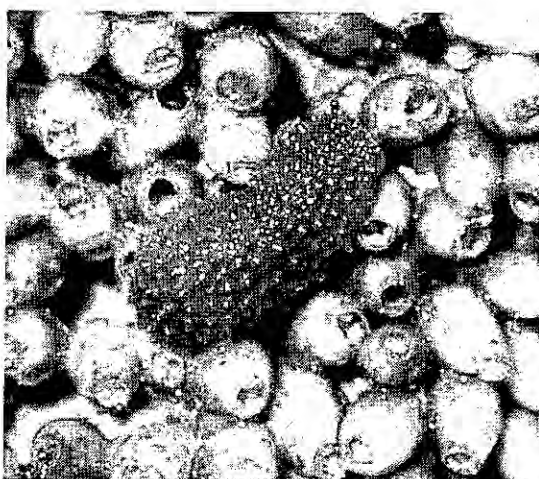
Notes on the natural history of the celtic sea-slug, *Onchidella celtica* (Cuvier, 1817).

Or: The sexed-up account of a small mollusc complete with reference to chemical weapons.

by Peter Barfield, *Sea-nature Studies*  
(website <http://www.seanature.co.uk/>;  
email [peter@seanature.co.uk](mailto:peter@seanature.co.uk))

### Names:

*Onchidella celtica* is commonly known as the celtic sea-slug and it was first identified and described (as *Oncidium celticum*) in 1817 by Cuvier, from the Brittany coast. This area of north France has celtic roots, as evidenced by the Breton language. The Latin adjective 'celticum' describes an inhabitant of northern Europe. However, 'Celt', may mean 'a warrior', and with it's dull grey armored appearance *O. celtica* might be mistaken for something of a warrior, though this little celt keeps a low profile and lives on a diet of small and microscopic algae.



### Classification:

*O. celtica*, like the other Onchidiidae, is classified as a marine pulmonate slug and lives intertidally. The pulmonates, as the name implies, have a lung and breath air ('pulmo' is Latin for lung). However, it's been argued in the past that the Onchidiidae might actually

be an early offshoot from another branch of molluscs, that is, the opisthobranchs (Fretter, 1943). This group includes the nudibranchia which are the true 'sea-slugs'.

### Distribution:

In Britain it's distribution is limited to southwest England, predominantly the south and north coasts of **Cornwall**, a county with it's own strong celtic roots. According to Tween (1987) it has also been found as far as Croyde Bay on the north coast of Devon. On the north coast of Cornwall it can be locally common, though you may not find it on every outcrop of rock on the shore. This agrees with early accounts in the literature.

### History:

F.S. Russell (1925), an assistant naturalist at the Plymouth Laboratory, gave an account of 'the Occurrence of *Onchidella celtica* (Cuvier) on the Cornish Coast' in the Journal of the Marine Biological Association of the UK. He noted that it had been seen by Couch at Westcomb and Lanivet Bay near Fowey and at Whitsand Bay, nr. Plymouth, by Spence Bate (places directly opposite the main area of distribution on the Brittany coast). Frederick Russell himself found it 'on the north coast, 'on an island rock in the Fistral Bay at Newquay, well provided with crevices and cracks for retreat'. He further noted that the animals occurred at mid-tide and that the whole island where he found them was submerged at high water.

### Respiration:

So hang on a minute then, we've got an air breathing mollusc that can live underwater? Does it have an olympic ability to hold it's breath until the tide falls again? Is it really covered by water or does it find little air-pockets to live in? Must it somehow swim to the surface to grab a breath? The answers are yes-no-and-no, but the 'yes' needs to be qualified because *O. celtica* can 'breath' through it's skin (or mantle). So although it's true that it shuts off its lung when submerged it can still take in some oxygen through the mantle. In this way it sits out its time underwater in a state of relative inactivity as it's not getting enough oxygen to do much else.



### Winter:

In my own visits to north Cornish beaches I don't begin to see *Onchidella* until April and come November they have disappeared again. So what happens to them? Where have they gone? Do they over-winter in some way? In January 2003 I was lucky enough to observe something that pointed to the answer. Tucked away in an empty barnacle shell at around the mid-tide level was the unmistakable form of a celtic sea-slug. In the cold winter months from November to March they rarely appear, becoming almost entirely inactive and passing through a period of hibernation.



### Environment:

Celtic sea-slugs live gregariously in the shelter of rock crevices protected from both strong wave action and sunlight. This helps explain it's apparently uneven distribution on a shore. The numbers usually vary from 2-3 to up to 60 individuals. You might find them a few feet below high water, down to rocks only exposed at low water. An hour or so after being uncovered by an ebbing tide they may emerge and travel for a little over a metre from their chosen shelter in search of food, or much shorter distances of just a few centimetres. During these excursions between tidal inundations they can move quite rapidly making full use of their lungs by maintaining an open airway. Well before the flood tide reaches them they will have found their way back to the same shelters they emerged from, or ones very nearby. This indicates an interesting homing ability as they do not follow the outward route back. They thrive in damp

conditions, requiring almost 100% relative humidity in laboratory studies. In reality they will happily cross areas exposed to direct sunlight but do have a tendency to avoid sunny or windswept areas.

### Food:

*Onchidella* forage for diatoms and small algae, though they lack the enzyme cellulase to properly digest algal filaments. Diatoms therefore form the major part of their diet and most are digested. Sheltering in their underwater refuge the sea-slugs digest what they have grazed, so that at emergence, with empty stomachs, they are ready to begin foraging again. Often they are to be found rasping algae off mussel beds or encrustations of barnacles. A lot of sand and detritus is also engulfed along with bits of sponges and foraminifera. The sand helps to grind the food and as such is a physical aid to digestion. Onchidiidae are also thought to consume another member of the organic bio-film population, that is, bacteria.

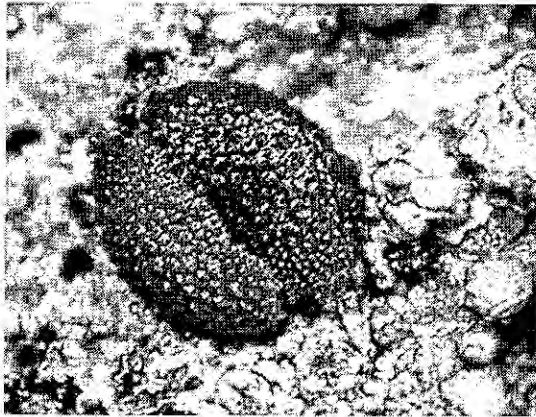
### Defence:

One of the most notable features of the celtic sea-slug are the papillae spread dorsally across the mantle. Around the rim of the mantle positioned equidistantly are larger papillae. Embedded at the base of each of these, hidden within the thick mantle, are large, flask-shaped, multicellular glands. Potent chemical factories, linked by a suitable duct to the tip of the larger papillae. When bothered, our unassuming *Onchidella* will squirt out a 'spirally coiled stream' of white matter said to be highly repugnant to crabs and anemones. In as much as it's possible I try to make my trips to the shore a non-contact sport so I've yet to witness this discharge myself. In addition I would guess that it may be an energetically expensive action for the animal to take and therefore to be avoided if possible.

### Reproduction:

These animals are hermaphrodites that practice reciprocal fertilisation and lay between 60 to 100 eggs. The individual eggs are laid in tubular capsules, the capsules connected by fine strands and coiling irregularly through a jelly mass, about 1cm in diameter and slightly

flattened. The eggs are laid in the same cracks that the adults take shelter in and will appear between July and early September. The veliger developmental stages are passed through within the capsule so that at hatching the young look like miniature adults. Development will be slowed by cold temperatures but in captivity those laid in the first week of July hatch at the end of August/early September. Cold temperatures may also increase the incidence of malformations. Newly hatched young are hardly longer than 1mm and are not found with the adults. The smallest recorded in adult clusters were 2.6mm and these were believed to be from the previous season. The question is, 'Where are the hatchlings?' Is there some sort of dispersal phase occurring here?



#### References:

- The following references were consulted in the production of much of the above material. Vera Fretter's paper from 1943 was the primary source, a truly rich and detailed study. Any mistakes, musings and misapprehensions are entirely my own.
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## Porcupine field excursion to Aberthaw 16 March 2003

### Comments on the list of species recorded at Aberthaw

by Chris Mettam

Ty'r Ysgol, Rhiwsaeson, Pontyclun, Mid Glam  
CF72 8NX

More than thirty-five people followed up the Cardiff Porcupine meeting with a visit to the shore just a short distance west of the city at the coastal village of Aberthaw. Was it the unbroken sunshine of a glorious spring day (we had May weather in March this year you may recall) that enticed them out after days of sitting in the lecture hall or were they seduced by the description I had conjured up for the programme notes? It read: "A round trip will take in a cliff and salt marsh nature reserve; a site for *Convoluta roscoffensis*; a boulder beach with sponges and bryozoans (instead of laminarians) in the laminarian zone; a rocky shore with warm water outfalls from the power station; tidal *Corallina* pools; an important brackish lagoon created on the site of the former estuary of the Thaw. And back to the pub."

What follows is a commentary on the list of species seen by Porcupine members and reported to Paul Brazier after the visit, or at least some remarks about some of the more interesting findings. The low tide was about 2m above CD for our visit, which would not be a low tide at all except on megatidal shores like those of the Bristol Channel. Nevertheless, we did not get down into the sublittoral fringe and this limited our survey. I have added some comments on species that I saw a few days later when the tide was lower.

Aberthaw lies on the northern shore of the Bristol Channel along the coast between

Cardiff and Swansea. East of Cardiff, the shore is typically estuarine. West from Swansea the shore is typically marine. The long stretch of coast in between these two ports mostly comprises a limestone, wave-cut platform with sandy beaches at intervals. It is neither one



thing nor the other, being influenced by the Severn estuary to a variable degree, and its biological condition has been rather unimaginatively described as "intermediate" (Mettam, 1994). At its western, seaward end the estuarine influence is naturally less: laminarians, for example, grow in pools where the muddy water has a chance to clear, although they cannot thrive on the exposed rock surface. Towards the eastern, estuarine end, particularly in Sully Bay, the more sheltered parts of the shore, where fucoids grow thickly, are usually covered in a film of mud. Semi-liquid blocks of mud, several metres across and several centimetres deep, are sometimes deposited there. The quantity of suspended sediment in the tidal water, which is always turbid, possibly affects the distribution of organisms more than does the variable salinity, which can be quite high even at low tide (Mettam, 1994). On this March day, my refractometer readings showed that the water lapping the lower shore and in all the shore pools and run-offs tested, was remarkably saline, exceeding 35‰. Only the lagoon, isolated from direct contact with the sea, contained low salinity (11‰) water.

Aberthaw was chosen to serve as a representative of the unusual "intermediate" type of shore but also, as suggested in the introductory description above, because many different coastal habitats occur in this one locality (contributing to its SSSI status). A management plan for the saltmarsh and lagoon and surroundings is underway thanks to cooperation between Innogy (owners of the power station and its environs) and the local Wildlife Trust (for more information contact Alex Coxhead [acoxhead@wtsw.co.uk](mailto:acoxhead@wtsw.co.uk)). Species records therefore may have special significance.

Purchon (1948) gave an early description of the shore and his species list has been incorporated into an inventory of the intertidal fauna of the wider Severn estuary (Boyden *et al.*, 1977). The latter provides the context for my comments on the Porcupine species list, which for the most part only refer to findings that differ from those of Boyden *et al.* (1977). I have not commented on the algae (Benson-Evans & Antoine, 1993, 1996 give a checklist and illustrated guide to species in South Wales).

A dramatic way to approach the shore is by the footpath across the railway line just west of Fontygari leisure park (caravan park). From the cliff top, you have a spectacular view across the salt marsh and shore to the coal-fired power station, with the lagoon partly hidden from view behind a concrete sea wall, before descending the steep steps to the beach. Out at sea lies the domed intake for power station cooling water and two defunct outfalls are visible on the lower shore.

Porcupine members gathered at the base of a pebble ridge edging the salt marsh to search for *Convoluta roscoffensis* and soon found lots. Although the individual acoel worms are only a few millimetres long, their massed bodies, coloured spinach green by their internal algal symbionts, show up clearly in the water trickling over sand and stones. The distribution of the worms has hardly shifted since its original discovery in 1977 (Mettam, 1979) but their spread along the base of the pebble ridge waxes and wanes. On this occasion, the whole of the visible colony was contained in an area of about one square metre. Only on one visit previously have I seen the colony more reduced. Or rather, *not* seen since there were none visible at that time although worms were cultured from a small sample of wet sand collected (C. Cook, pers. com.). Biology students know *C. roscoffensis* because it features in the classic text *Animals without Backbones* and its two revised versions: Pearse *et al* (1987) devote several illustrated pages to the worm, collected at Roscoff; Buchsbaum *et al* (1987) remark how difficult it is to follow a conversation in French concerning a green worm in a glass (try it). The Aberthaw colony has provided material for studies on molecular phylogeny and on the worm's interactions with more than one algal



"And I thought marine biology was exciting"

symbiont. An observation that I think is unpublished is that green worms from Aberthaw, not just the white hatchlings, continue to ingest diatoms and dinoflagellates, something that Channel Island and Breton specimens are not observed to do (A E Dorey, pers. com., 1977). Is Aberthaw really the only location in Britain outside the Channel Islands for this unusual worm? Now that Porcupine members know what to look for, can we expect other records to appear? Cornwall might be a good place to search.

Turning to face the sea from that point, we looked out upon a long, gently sloping bank of rounded boulders (the Leys Beach), mostly embedded so deeply that their lower halves are smooth and clean. The upper surfaces are colonised by winkles near the pebble bank then by barnacles farther down the beach, becoming pink with calcareous encrusting algae on the lower shore. A straggle of *Fucus serratus* provides a little cover, extending even into the sublittoral zone in the absence of laminarians. Two remarks stay with me: "it's not Wembury" and "typical *Monodonta* habitat". I have to admit that the scene did look bleak, especially if you are used to weedy, sheltered shores. You have to work hard, lifting boulders, to find many animals. *Osilinus lineatus*, however, is usually easy to spot as it likes to sit on top of boulders. Several were seen, both large and middle-sized specimens, scattered across the accessible shore. According to Boyden *et al* (1977) it (as *Monodonta lineata*) was formerly "very occasional at Fontygary Bay" (the adjacent bay) until the cold winter of 1962/3 when it was eliminated from "all shores east of the Gower Peninsula". It has taken a while to return.

In the last decade, *O. lineatus* has been recorded, first singly then in steadily increasing numbers at a more westerly site, Nash Point, during an annual 'winkle counting' practical class with students. There, full-sized specimens occupied a narrow vertical range near the base of the cliff. Grothers (1998) considered that winter cold limited the spread of *O. lineatus* (as *Trochocochlea lineata*) on the English side of the Bristol Channel. He looked for specimens on the Welsh side but failed to find any east of the Gower. He must have missed them. *Osilinus* can now be found on many beaches of the

"intermediate" shore but the Porcupine trip has provided the first records indicating its recovery at Aberthaw.

Another mollusc to suffer eradication in that cold winter was *Ocenebra erinacea*. For some years however it has been abundant at the Leys Beach, where it usually appears more common than *Nucella lapillus*. Nobody on the trip seems to have recorded *Crepidula fornicata*. Perhaps the tide was not low enough. It just creeps into the list of Boyden *et al* (1977) as "two .. in Fontygary Bay '74", but from the late 1970s, slipper limpets have colonised the full length of the rocky "intermediate" shoreline, being generally present at low water at a density of approximately one every few paces along the water's edge, usually as singletons or one piggy-backed on another, rarely in threes and never as a larger stack. Clearly *C. fornicata* invaded and established itself in the Bristol Channel longer ago than its sudden appearance in west Wales (Smith 1995) might suggest.

On a low tide, other gastropods show up on the weed-free rocks. *Calliostoma zizyphinum* is one that seems to reach an upstream limit at Aberthaw. We would have been lucky to record it on this visit considering the poor tide. It can be very common and conspicuous, its shell glossy and pristine in the muddy water, on the nearby beach at St Donats Bay and I have in recent years seen a group of more than ten per square metre at Breaksea Point, Aberthaw. This carnivorous topshell demonstrably extends into estuarine conditions of the Bristol Channel farther than indicated in recent maps (Earll and Moore 2000). In the late 1990s, *Diodora apertura* was quite common at the low tide level at the Leys Beach and Breaksea Point, surprisingly because it had not previously been recorded by Boyden *et al.* (1977) from the Welsh side of the Channel. I did not find it this time on the low springs but I did find one *Emarginula reticulata*.

Some of the group searched Fontygary Bay for living specimens of *Ostrea edulis*. Occasional full-sized specimens have been found there in recent years and photographed *in situ* (M. Hampton, pers com). Unfortunately oysters are the kind of animal that holiday makers are inclined to remove. None were found this time. The small whelk *Hinia incassata* seems to have

disappeared from Aberthaw shores where it was formerly 'fairly common' (Boyden *et al.*, 1977, as *Nassarius*). On the other hand, *Hinia reticulata*, another mollusc lost after the 1962/3 winter, has returned to Aberthaw (pers obs) although we did not find it.

What can we make of absences? It is obviously more difficult to make a point about not finding something than finding it. One real and significant absence however is the nereid *Platynereis dumerilii* which is abundant in tidal pools (and under stones) at Hinkley Point on the opposite side of the Bristol Channel (Bamber and Irving 1993). The features that distinguish Hinkley Point (warm water from a power station, cascading pools filled with *Corallina officinalis*) are replicated at Aberthaw but *P. dumerilii* has not been found, although it was "common" in the area prior to that notorious cold winter of 1962/3 (Boyden *et al.*, 1977). We have found *P. dumerilii* at other sites in south Wales where it was not previously recorded, including Sully Island at the eastern end of the "intermediate" shoreline, but never yet at Aberthaw. Porcupine members did not find it either but did find another, larger tube-dwelling nereid, *Neanthes irrorata*. This worm makes conspicuous mucous tubes under stones or in sediment and, being orange with white glandular spots, is readily recognised. Why is it so seldom recorded in the UK? It did not feature among the nereids of Scotland (Chambers and Garwood, 1992) yet it is certainly the most obvious nereid, if not the commonest, at Aberthaw. More information on its distribution is needed.

The record of *Gamarellus homari* is an interesting one. This pale, saw-backed gammarid is often seen scurrying about in clouds of mud at low water. Apparently it is unusual to find it on the shore and Lincoln (1979) implied that most intertidal records may be *G. angulosus*. Those I have examined were all as Lincoln described *G. homari* and presumably this record is correct. Perhaps this species moves into shallower habitats in extreme turbidity, like the pelagic shrimp *Pasiphaea sivado* which is common in the Bristol Channel but elsewhere inhabits deep water. I don't know whether a similar explanation accounts for the onshore presence of *Axius stirychnus*, a most attractive burrowing

shrimp, sometimes mistakenly identified by students as a baby lobster. It is quite commonly found under stones on this shore but apparently not often recorded elsewhere. I uncovered one specimen on the low tide after the main visit.

The expected cover on the sublittoral fringe of this "intermediate" shore, according to Boyden *et al.* (1977) would be *Balanus crenatus*, various sponges, notably the upright growth of *Haliclona oculata* and encrusting *Halichondria* sp, bryozoans especially *Alcyonidium* sp and various hydroids, including *Tubularia indivisa*, which frequently forms thick masses. The Porcupine list includes *Haliclona viscosa* (which may be the same as the unidentified *Haliclona* mentioned by Boyden *et al.* (1977)). *Alcyonidium* species need another close look in the light of recent clarification by J. S. Ryland and coworkers. Those who were disappointed not to have access to a "laminarian zone without laminarians" may be consoled to know that it was very sparsely colonised when visited on the following spring tide, although there were several clumps of a filigranine serpulid (not collected), not previously recorded at this site. Other small polychaetes noted from rocky crevices were *Kefersteinia cirrata*, *Lysidice ninetta*, *Thelepus setosus* and one specimen of the larger *Polynoe scolopendrina*.

Few people walked far enough across Breaksea Point to Limpert Bay to see the reef of *Sabellaria alveolata* there. It has had good settlement lately and is growing well (JM Mendelssohn, pers. com.). Susan Chambers and others had a dig in the *Arenicola* sand by the power station and produced some burrowing worms but apparently no *Nephtys*. Pity. There has been some dispute about what species may be present.

It was a long walk to accomplish in a short time with so many distractions. Some of the available habitats did not attract any inspection. I don't think anyone looked at the saltmarsh area. According to the SSSI declaration, *Limapontia* occurs there. The name has become mistakenly written *Lima pontia* and misinterpreted in some documents as a species of the fileshell genus *Lima*. The reference however is to the sacoglossan *Limapontia depressa*: a common inhabitant of Severn Estuary salt marshes but even so one I have

not personally recorded at this site. It would have been nice to check out its presence. I don't think anyone investigated the lagoon. Species recently recorded there include the lagoon specialists *Corophium insidiosum*, *Conopodeum seurati*, *Cerastoderma glaucum*, *Ventrosia ventrosa* and *Atherina boyeri* (Bamber & Bridgewater, 1991; Bamber *et al.*, 2001). It has changed greatly since I first observed it full of *Nereis diversicolor*, small *Carcinus maenas* and gobies, all of these now absent. It is a special habitat in South Wales, albeit artificially created, and needs protection. The only other local habitat for *Ventrosia ventrosa*, the Lamby saltmarsh, has long been lost beneath a municipal waste tip.

I have to conclude that, in a few hours even with our large complement of Porcupine members, we barely scratched the surface of what is present at the site (with boulders covered in barnacles, these are surfaces that are quite capable of scratching back). Enough was recorded however to show changes since the records of Boyden *et al.* (1977) and that a revised Fauna of the Severn Estuary, updating species distributions (and species names) would be timely. The further contribution of Porcupine members would be most appreciated so any time you are visiting south Wales, do make a note of what is living on the shore.

Note from editor:

*Perhaps there were so few Convoluta roscoffensis because Porcupiners have large feet! I have read that the worms are very sensitive to vibrations and that anyone approaching patches of the worms with a heavy tread is likely to see the patch suddenly disappear!!*

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## Aberthaw field visit species records, 16/03/ 2003

Compiled by **Paul Brazier**

The following list is composed of species identified by different recorders, although is not a complete and thorough species list from the area of Aberthaw. Extreme low shore was not reached. Key: CCW = recorders from CCW (Paul Brazier, Kathryn Baukham, Hazel Lindsay, Ian Saunders), TW = Tim Worsfold, SC = Sue Chambers, CM = Chris Mettam, HG = Helgi Gudmundsson, JM = Jon Moore, JN = Julia Nunn.

Any lists of additional species that may become available as others on the field trip work up their data, will be published as addenda in later issues of the newsletter.

### Upper shore cobbles and sand

*Convoluta roscoffensis* (all)

### Mid shore cobbles

*Littorina saxatilis* (CCW, JN)  
*Gibbula umbilicalis* (CCW, JN)  
*Fucus vesiculosus* (CCW, JN)

### Lower shore cobbles

*Halichondria panicea* (JM)  
*Haliclona viscousa* (CCW)  
*Halisarca dujardini* (JM)  
*Myxilla incrustans* (CCW)  
*Actinia equina* (JM, CCW)  
*Nereis irrorata* (SC, JM)  
*Harmothoe* sp. (JM, CCW)

*Harmothoe impar* (TW)  
*Harmothoe extenuata* (HG)  
*Melita palmata* (TW)  
*Pomatoceros* sp. (JM)  
*Pseudopotamilla reniformis* (JM)  
*Lanice conchilega* (JM)  
*Arenicola marina* (JM)  
*Phyllodoce ?maculata* (JM)  
*Gammarellus homari* (TW)  
*Axius stirhynchus* (CM)  
*Balanus crenatus* (JM)  
*Semibalanus balanoides* (JM, CCW)  
*Elminius modestus* (JM, CCW)  
*Pisidia longicornis* (JM)  
*Porcellana platycheles* (JM, CCW, JN)  
*Tectura virginea* (CCW)  
*Osilinus lineatus* (JM, JN)  
*Littorina littorea* (JM, CCW, JN)  
*Littorina saxatilis* (JM)  
*Hinia reticulata* (JM)  
*Ocenebra erinacea* (JM, JN)  
*Nucella lapillus* (JM, CCW, JN)  
*Calliostoma* sp. (CM)  
*Gibbula umbilicalis* (JM)  
*Gibbula cinerea* (CCW, JN)  
*Patella vulgata* (JM, CCW, JN)  
POLYPLACOPHORA indet. (CCW)  
*Leptochiton asellus* (JM)  
*Acanthodoris pilosa* (JM, JN)  
*Heteranomia squamula* (CCW)  
*Hiatella arctica* (JM, JN)  
*Alcyonidium ?mytili* (CCW)  
Cyclostome bryozoan indet. (CCW)  
ASCIDIACEA indet. (CCW)  
*Ascidia conchilega* (CCW)  
Bryozoa indet. (JM)  
*Electra pilosa* (JM, JN)  
*Plagioecia ?patina* (JM)  
*Ascidella scabra* (JM)  
*Hildenbrandia* sp. (JM)  
*Corallina officinalis* (JM, CCW)  
Coralline crusts indet. (JM, CCW)  
*Dumontia contorta* (CCW)  
*Fucus serratus* (CCW, JN)  
*Ceramium* spp. (JM, CCW)  
*Chondrus crispus* (CCW)  
*Cladophora rupestris* (CCW)  
*Ulva* sp. (CCW)  
*Verrucaria mucosa* (JM, CCW)

#### Midshore muddy sand

*Nereis diversicolor* (SC)  
*Pygospio elegans* (SC)  
*Arenicola marina* (CCW)

#### Rocky platforms below power station with lots of coralline pools.

*Actinia equina* (CCW, JN)  
*Gibbula umbilicalis* (CCW)  
*Littorina littorea* (CCW)  
*Nucella lapillus* (CCW)  
*Patella vulgata* (CCW)  
*Fucus serratus* (CCW)  
*Fucus vesiculosus* (CCW)  
*Dictyota dichotoma* (CCW)  
*Ascophyllum nodosum* (CCW)  
*Cladostephus spongiosus* (CCW)  
*Porphyra linearis* (CCW)  
*Dumontia contorta* (CCW)  
*Catenella caespitosa* (CCW)  
*Ceramium* spp. (CCW)  
*Polysiphonia lanosa* (CCW)  
*Polysiphonia* sp. (CCW)  
*Osmundea hybrida* (CCW)  
*Osmundea pinnatifida* (CCW)  
*Corallina officinalis* (CCW)  
Coralline crusts indet. (CCW)  
*Enteromorpha* sp. (CCW)  
*Cladophora rupestris* (CCW)  
*Ulva* sp. (CCW)

#### Tidal pool near outlet

*Jaera albifrons* agg. (TW)

#### Additional unallocated records

*Sabellaria alveolata* (JN)  
*Rissoa interrupta* (JN)  
*Rissoa parva* (JN)  
*Macoma balthica* (JN)  
*Mytilus edulis* (JN)  
*Lepidochitona cinerea* (JN)  
*Acanthochitona crinita* (JN)  
*Littorina obtusata* (JN)  
*Carcinus maenas* (JN)

## Intertidal Marine Invertebrate Samples from Connemara

by Susan Chambers

The following is a list of species recorded and collected from Connemara by Susan Chambers between 4-10th April 1997, from the lower shore (apart from Salt Lake) at the localities mentioned. Sampling involved removing algal holdfasts and sieving of some sediments. Samples from Salt Lake were obtained during a 5-10m dive. The samples were narcotised, fixed in formalin and later preserved in 74% IMS. Identification was made in situ where possible but the majority was completed at a later date by D B Harries. All the samples have been incorporated into the collection of the National Museums of Scotland and are available for further research. A large number of polychaete and other worm specimens, so far identified only to family level, have been omitted from the list.



<b>Taxon</b>	<b>Loc</b>	<b>ID</b>	<b>Coordinates</b>
<b>Ascideans</b>			
<i>Aplidium pallidum</i>	Droimin	DBH	
<i>Aplidium pallidum</i>	Droimin	DBH	
<i>Aplidium pallidum</i>	Droimin	DBH	
<i>Ascidella aspersa</i>	Droimin	DBH	
<i>Ascidella aspersa</i>	Inishbofin (East)	DBH	
<i>Botrylloides leachi</i>	Droimin	DBH	
<i>Botryllus schlosseri</i>	Killeikieron Point	DBH	
<i>Ciona intestinalis</i>	Inishbofin (East)	DBH	
<i>Didemnum candidum</i>	Droimin	DBH	
<i>Didemnum candidum</i>	Inishbofin (East)	DBH	
<i>Didemnum sp. (gelatinosum?)</i>	Inishbofin (East)	DBH	
<i>Morchellium argus</i>	Inishbofin (East)	DBH	
<i>Polyclinum aurantium</i>	Droimin	DBH	
<i>Pyura microcosmus</i>	Killeikieron Point	DBH	
<i>Sidnyum turbinatum</i>	Droimin	DBH	
<i>Sidnyum turbinatum</i>	Inishbofin	DBH	
<i>Sidnyum turbinatum</i>	Inishbofin (East)	DBH	
<b>Bryozoans</b>			
<i>Bowerbankia gracilis?</i>	Inishbofin (East)	DBH	
<i>Scrupocellaria reptans</i>	Droimin	DBH	
<b>Cnidaria</b>			
<i>Bunodactis?</i>	Inishbofin	SJC	
<b>Crustacea</b>			
<i>Ampithoe (Ampithoe) rubricata</i>	Inishbofin	DBH	
<i>Ampithoe (Pleonexes) neglecta</i>	Inishbofin	DBH	
<i>Ampithoe rubricata</i>	Droimin	DBH	
<i>Apseudes talpa</i>	Droimin	DBH	
<i>Apseudes talpa</i>	Droimin	DBH	
<i>Apseudes talpa</i>	Droimin	DBH	
<i>Apseudes talpa</i>	Droimin	DBH	
<i>Apseudes talpa</i>	Droimin	DBH	
<i>Corophium bonnellii</i>	Salt Lake	DBH	
<i>Crangon crangon</i>	Droimin	SJC?	53 28.5N 10 7.0W
<i>Crustacea (Lepas Pectinata)</i>	Inishbofin	DBH	
<i>Dynamene bidentata</i>	Killary	DBH	
<i>Galathea strigosa</i>	Drimmeen Bay	DBH	L610497
<i>Gnathia dentata</i>	Salt Lake (6m)	SJC?	53 28.5N 10 2.5W
<i>Gnathia dentata</i>	Salt Lake	DBH	
<i>Idotea chelipes</i>	Inishbofin	DBH	
<i>Idotea pelagica</i>	Droimin	FJW	
<i>Ischyrocerus anguipes</i>	Droimin	DBH	
<i>Jassa falcata</i>	Droimin	DBH	
<i>Jassa falcata</i>	Droimin	DBH	

<i>Lembos websteri</i>	Droimin	DBH
<i>Leptochelia savignyi</i>	Inishbofin (East)	DBH
<i>Lysianassa ceratina</i>	Droimin	DBH
<i>Microdeutopus anomalus</i>	Salt Lake	DBH
<i>Pilumnus hirtellus</i>	Droimin	DBH
<i>Pilumnus hirtellus</i>	Droimin	SJC? 53 28.5N 10 7.0W
<i>Pisidia longicornis</i>	Droimin	DBH
<i>Processa edulis crassipes</i>	Droimia, Zostera	DBH
<i>Pseudoparatanaïs batei</i>	Salt Lake	DBH
<i>Xantho incisus</i>	Drimmeen Bay	SJC? L610497
<b>Echinodermata</b>		
<i>Amphiopholis squamata</i>	Droimin	DBH
<i>Amphiopholis squamata</i>	Salt Lake	DBH
<i>Amphiopholis squamata</i>	Salt Lake	DBH
<i>Amphipholis squamata (juv)</i>	Droimin	DBH
<i>Asterias rubens</i>	Salt Lake	DBH
<i>Asterina gibbosa</i>	Drimmeen Bay	DBH L610497
<i>Asterina gibbosa</i>	Droimin	SJC? 53 28.5N 10 7.0W
<i>Asteroides indet.</i>	Salt Lake	DBH
<i>Holothurian (Leptosynapta inhaerens)</i>	Killary	DBH
<i>Leptosynapta inhaerens</i>	Lettermore	SJC?
<i>Marthasterias glacialis</i>	Droimin	DBH
<i>Ophiothrix fragilis</i>	Droimin	DBH
<i>Ophiothrix fragilis</i>	Salt Lake (6m)	SJC? 53 28.5N 10 2.5W
<i>Ophiothrix fragilis</i>	Salt Lake (5-10m)	DBH L660494
<i>Ophiuroidea (juv) (Amphiura??)</i>	Coral Beach	DBH
<i>Ophiuroidea (juv) (Amphiura??)</i>	Droimin	DBH
<i>Paracentrotus lividus</i>	Drimmeen Bay	SJC? L610497
<i>Paracentrotus lividus</i>	Drimmeen Bay	DBH L610497
<i>Psammechinus miliaris</i>	Salt Lake (6m)	SJC? 53 28.5N 10 2.5W
<i>Psammechinus miliaris</i>	Salt Lake (5-10m)	SJC? L660494
<i>Psammechinus miliaris</i>	Salt Lake	DBH
<i>Psammechinus miliaris</i>	Salt Lake	DBH
<b>Echiura</b>		
<i>Echiuran (Thalassema thalasseum?)</i>	Droimin	DBH
<b>Insecta</b>		
<i>Insecta (Chironomid larvae)</i>	Inishbofin (East)	DBH
<i>Insecta (Chironomid larvae)</i>	Salt Lake	DBH
<b>Nematoda</b>		
<i>Nematoda (Pontonema?)</i>	Droimin	DBH
<b>Nemertea</b>		
<i>Nemertea (Lineus sp?)</i>	Droimin	DBH
<i>Nemertea (Lineus sp?)</i>	Droimin	DBH
<i>Nemertea (Micrura lactea)</i>	Droimin	DBH

**Oligochaeta**

<i>Oligochaeta (Tubificoides)</i>	Droimia, Zostera	DBH
<i>Oligochaeta (Tubificoides)</i>	Droimin	DBH
<i>Oligochaeta (Tubificoides)</i>	Droimin	DBH
<i>Oligochaeta (Tubificoides)</i>	Droimin	DBH
<i>Oligochaeta (Tubificoides)</i>	Droimin	DBH
<i>Oligochaeta type2</i>	Droimia, Zostera	DBH
<i>Oligochaeta type3</i>	Droimia, Zostera	DBH

**Polychaeta**

<i>Ampharetidae (Ampharete lindstroemi)</i>	Killary	DBH
<i>Ampharetidae (Melinna palmata)</i>	Killary	DBH
<i>Ampharetidae (Melinna palmata)</i>	Killary	DBH
<i>Aphroditidae - Harmothoe</i>	Lettermore	SJC? L898277
<i>Aphroditidae - Phloe synopthalmica</i>	Salt Lake (5-10m)	SJC? L660494
<i>Eunicidae (Lumbrineris)</i>	Droimin	DBH
<i>Nereidae - Platynereis dumerilli</i>	Inishbofin	SJC? L553657
<i>Nereidae - Platynereis dumerilli</i>	Salt Lake (5-10m)	SJC? L660494
<i>Serpulidae - (Spirobis tridentatus)</i>	Droimin	DBH
<i>Serpulidae - Serpula vermicularis</i>	Salt Lake (5-10m)	SJC? L660494
<i>Serpulidae - Serpula vermicularis</i>	Salt Lake (5-10m)	SJC? L660494
<i>Serpulidae - Serpula vermicularis</i>	Salt Lake (5-10m)	SJC? L610494???
<i>Serpulidae - Spirobinae</i>	Inishbofin (East)	DBH
<i>Serpulidae (Pomatocerus triqueter)</i>	Droimin	DBH

**Porifera**

<i>Grantia compressa</i>	Inishbofin (East)	SJC? L553657
<i>Grantia compressa</i>	Lettermore	SJC? L898277
<i>Halichondria panicea</i>	Drimmeen Bay	SJC? L610497
<i>Halichondria panicea</i>	Drimmeen Bay	SJC? L610497
<i>Halichondria panicea</i>	Drimmeen Bay	SJC? L610497
<i>Halichondria panicea</i>	Inishbofin (East)	DBH
<i>Halichondria sp.</i>	Drimmeen Bay	DBH
<i>Halichondria sp.</i>	Droimin	DBH
<i>Halichondria sp.</i>	Droimin	DBH
<i>Halichondria sp.</i>	Inishbofin	DBH
<i>Halichondria sp.</i>	Lettermore	DBH
<i>Halichondria sp.?</i>	Drimmeen Bay	DBH
<i>Hymeniacidon perleve</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve?</i>	Inishbofin (East)	DBH
<i>Hymeniacidon perleve??</i>	Inishbofin (East)	DBH
<i>Hymeniacidon sp</i>	Inishbofin	DBH

*Hymeniacion sp*  
*Leuconia johnstoni*  
*Leucosolenia sp.*  
*Ophlitaspongia seriata*  
*Porifera indet.*  
*Scypha ciliata*  
*Scypha ciliata*  
*Scypha ciliata*  
*Suberites carnosus?*  
*Tethya aurantium*

**Sipunculans**

*Golfingiidae?*  
*Phascolosoma granulatum*

Lettermore SJC? L898277  
 Drimmeen Bay SJC? L610497  
 Lettermore SJC? L898277  
 Inishbofin (East) DBH  
 Inishbofin (East) DBH L553657  
 Drimmeen Bay SJC? L610497  
 Killeikieron Point DBH  
 Lettermore SJC? L898277  
 Salt Lake DBH  
 Lettermore SJC? L898277

Droimin DBH  
 Droimin DBH

# 'PORCUPINE 2003. ECOLOGY, TAXONOMY AND CONSERVATION'

Papers from the PMNHS meeting held at the National Museums and Galleries of Wales, Cardiff from 14<sup>th</sup>-15<sup>th</sup> March 2003.

## 140 years of the lagoon sand worm *Armandia cirrhosa* Filippi, 1862– the whole story, so far

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The small opheliid polychaete *Armandia cirrhosa*, was first described by Filippi in 1862, as the type of a new genus. The type material was collected from littoral seaweed on the shore at Cagliari, Sardinia. Unfortunately, the significance of his discovery of the new genus was not reflected in his figure of the species (Fig. 1A). Since that time, 140 years ago, the species has been remarkably under-recorded.

It was not until seven years later that Grube (1869) recorded the species in the Adriatic, although without presenting much information about habitat. Next, in 1874, Marenzeller found *Armandia cirrhosa* at Trieste, again in littoral weed, although he described his material as a new species, *A. oligops*, since synonymized. In 1880, Langerhans recorded *A. cirrhosa* in deep water off Madeira. As the species has only ever been recorded before or since in shallow water (to 8 m), this record is presumed to be of a different species entirely. Similarly, and much later, Hartman Schroder (1956) documented larvae of '*A. cirrhosa*', but these were in fact of another species, *A. polyophthalma* Kükenthal, 1887.

Mis-identifications may have in part resulted from the inadequacy of published illustration of the species; Fauvel (1927),

presumably redrawing from Filippi, produced the poor cartoon shown as Figure 1B. Even today, the illustration on the Marlin Website combines Fauvel's cartoon with a whole animal picture of *A. polyophthalma*, which occurred in the same plate in Fauvel (loc. cit.).

But to return to the history. It was 88 years after Marenzeller's record that Laubier and Paris (1962) found *A. cirrhosa* in weed in the Mediterranean, as shortly afterwards did Bellan (1964) in seagrass beds in a Mediterranean hypohaline lagoon. This worm rush in the Mediterranean continued with Guerin (1973) obtaining recruitment in laboratory culture, his specimens even reproducing successfully. And Sarda (1984) found *A. cirrhosa* in red weed in the Balearics.

In the same year a previous Porcupine Secretary, Martin Sheader, found *Armandia cirrhosa* for the first time in UK waters, living in Hampshire in a coastal saline lagoon, Eight-Acre Pond (Sheader & Sheader, 1985; Shabeer, 1985). Monitoring of the lagoon through the eighties documented a progressive decline in the population. Owing to its national rarity, the species became protected under Schedule 5 of the Wildlife and Countryside Act 1981 – whereby it was awarded a common name – the lagoon sand worm. *A. cirrhosa* is now listed as a priority species under the UK's Biodiversity Action Plan.

In the light of its sensitive status within the UK, English Nature developed a Species Recovery Plan, the aim of which was to spread the UK population to more than one dot on

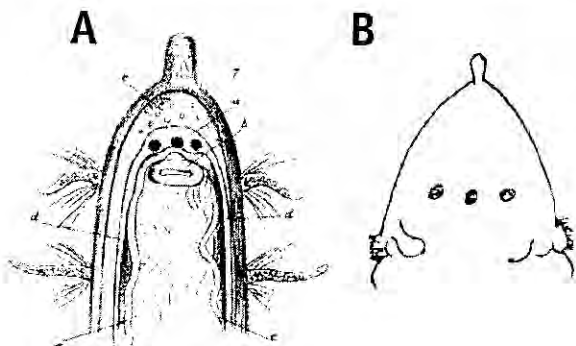


Figure 1. The definitive figures of *Armandia cirrhosa*, A, the original and only figure from Filippi (1862); B, the interpretation of Fauvel (1927).



the map; one potential site for translocation was the adjacent Normandy Farm Lagoon, a new lagoon site developed during the reconstruction of the sea-wall along the Keyhaven-Lymington shoreline. Both lagoons are now within the Solent and Isle-of-Wight Lagoons SAC. Surveys undertaken in 1991 and 1992, to determine the extent of the population and detail of its habitat preferences, unfortunately did not find a single individual in Eight-Acre Pond (Fowler & Sheader, 1992; 1993). This not only made translocation a little difficult, it even got the species a mention in the national press.

Then, unexpectedly, Sandy Downie found *Armandia cirrhosa* on the shores in Portland Harbour and the Lower Fleet during a littoral survey of that region in 1994 (Downie, 1995). A repeat survey the following year, specifically aimed at finding *A. cirrhosa*, recorded twelve specimens. In accord with its conservation priority, a draft Species Action Plan was formulated in 1996 (Downie, 1996), and further action instigated.

In 2000 we at the Natural History Museum went back to both 8-Acre Pond and Portland to look for it on the shores – and found 11 individuals at Portland (that's quite consistent really). Then, last year, a more comprehensive

survey was planned, aided by an EIA for a proposed marina development along the southern margins of Portland Harbour. We surmised that its main distribution was probably lower down than the littoral zone, and at the same time were interested in investigating an apparent persistent association with seaweeds or seagrasses from the older records from the Mediterranean. We undertook a SCUBA and grabbing survey of much of the nearshore sublittoral, and we found large numbers (comparatively) of *Armandia cirrhosa*, from 28 sampling stations and at densities up to 80 per 0.05 m<sup>2</sup>. From which, we can present a more accurate picture of the species (Fig. 2).

Analyses of the samples found no significant association with sediment granulometry, nor a significant association with superficial weed. We did find that, with a large proportion of the population subadult, a 250 µm mesh sieve retained much larger numbers of the worm.

As a result of the studies in 2002, we now have a better idea of what it looks like, and have found that there are enough in Portland Harbour to think again about translocation *sensu* Species Recovery – indeed, as part of the EIA it is most opportune. Maybe next year the history of this globally rare species will have taken a turn for the more populous.

### Postscript

A valid question was raised at the Cardiff Porcupine meeting apropos "would it not be rather nice to recollect from Sardinia, to confirm the identity of the UK species with topotypic material?" In July 2003, one of us (NJE) is visiting Sardinian shores in the hope of finding that topotypic, and even neotypic, material.

### Acknowledgements

We are indebted to Weymouth and Portland Sailing Academy and Posford Haskoning for permission to use their data and for supporting information, and to Marine Ecological Surveys Ltd for the specimens from the EIA survey, to those who assisted in the diving team, in sample sorting and in data analysis, to staff of English Nature who assisted both logistically



**Figure 2.** SEM of *Armandia cirrhosa* from Portland Harbour (courtesy of Susan Chambers).



and in the field, and to Sue Chambers for the SEM studies.

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# Turning-up the heat – consequences for seabed wildlife

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Current predictions from the UK Climate Impact Programme suggest that, by 2050, seawater temperatures will be about 2°C higher than in 2000 around Britain. Air temperatures will also have risen. In a project commissioned by Scottish Natural Heritage (SNH) in 2000/01 (Hiscock *et al.* 2001), the Marine Biological Association undertook to identify what changes might occur to seabed wildlife in and near to Scotland as a result of climate change. The authors of the report have recently completed a paper that addresses the likely outcome of seawater warming for seabed marine life throughout the coastal waters of Britain and Ireland. The following notes are highlights of the work and encourage Porcupine members to look out for distributional changes in species.

The project funded by SNH looked at historical evidence for climate change impacts and identified some fascinating (if far-fetched) evidence for higher temperatures in previous times. The following, which relates to a Viking settlement in southwest Greenland in the years between 985 and 1000 AD, is copied from Lamb (1988):

*"Of one of the leading original settlers, a cousin of Erik the Red, named Thorkel Farserk, who settled at Hvalseyjarfjord, it is related that: 'He was extremely strong. Erik the Red once visited him. As he wished to entertain his cousin well, but had no serviceable boat at hand, he had to swim out to Hvalsey to fetch a full-grown sheep, and carry it home ... it was a distance of well over 2 miles' .... 10°C would be a fair estimate of the lowest temperature at which a person not specifically trained in long-distance swimming could swim 2 miles, and even then he would have to be fat. .... As the average temperature in the fjords of that coast in August in the warm years around 1950 were +3°C to +6°C, it seems that the water must have been at least 4°C warmer in the years concerned in Viking times."*

Clearly such stories may exaggerate the physical prowess of the Vikings but it is a useful indicator that warmer conditions may not be a new phenomena.

The distribution of marine life on the basis of climate was put on a scientific basis by

Edward Forbes during the first half of the 19<sup>th</sup> century. His detailed maps of marine life were published posthumously (Forbes, 1858). Forbes recognized an east/west divide in the British Isles. The fauna of the west coasts of Britain, from the Isle of Wight around to the Orkney Islands, includes what Forbes calls "western elements", mostly species of warm water or southern character. In contrast, the eastern coasts of Britain have a more northern character. The British Isles coincides with a boundary between cold-water, northern forms and warmer water, southern species. However, the situation was, and still is, complicated by the occurrence of what Forbes called "outliers". For example "boreal outliers" are cold water species that he showed as present in deeper waters of the western Scottish sea lochs, off Galway and in the western Celtic Sea. Warmer water or "Lusitanian outliers" were shown in the western English Channel. Forbes drew a line across the British Isles, roughly from Beachy Head to Donegal, noted as the general northern and eastern limit of southern types. He also depicted the limited distribution of the warm-water sea urchin *Paracentrotus* (as *Echinus*) *lividus*, apparently restricted then to the coast of Ireland from south-west Cork to Donegal Bay.

The distributional limits of species described by Forbes are more-or-less correct today but may be changing rapidly. Recent work undertaken by the MarClim (Marine Biodiversity and Climate Change) programme ([www.mba.ac.uk/marclim](http://www.mba.ac.uk/marclim)) has identified range extensions of up to 100 km in some southern

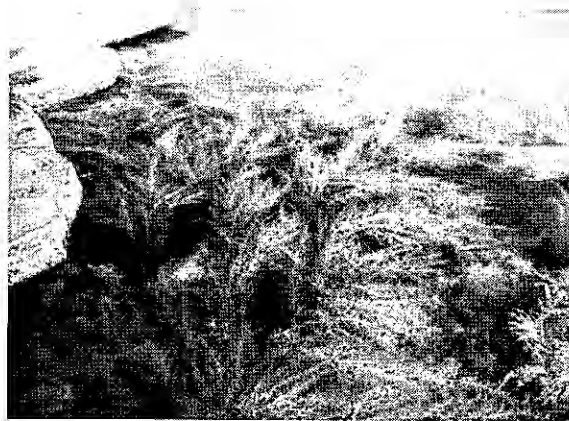
rocky shore species. Change is more dramatic in planktonic communities. Long-term data from the Continuous Plankton Recorder surveys (Beaugrand *et al.*, 2002) showed that in the 40 years prior to 2000 there was a 10° latitudinal shift northwards in the distribution of southern species of copepods in the eastern North Atlantic. Fish and other mobile species are likely to respond quickly.

Predicting change in the distribution of species will not be straightforward and the following factors are identified to take into account for seabed species:

1. Are suitable habitats present in the area to which spread (or retreat) will occur?
2. Does temperature affect:
  - development of eggs or other propagules;
  - triggering release of propagules
  - survival of larval stages of animals;
  - survival of post-larval settlement of juveniles;
  - survival of adults (heat or cold stress).
3. Are currents in a favourable direction to spread larvae?
4. What is the larval biology of the species (those with long-lived planktonic larvae are likely to move more rapidly into new areas than those with short-lived benthic larvae)?
5. How long-lived is the species?

All-in-all, southern species will benefit (increased abundance, range extension) and there may be some new species recorded from Britain (without the help of humans!). Northern species are likely to 'retreat' and become less abundant.

Change in some species as a result of climate change will be 'confused' by human activities. The fan mussel *Atrina fragilis* might have expanded in abundance but populations are being destroyed by mobile fishing gear. Non-native species such as wireweed/japweed *Sargassum muticum* may expand in distribution and occur more often in western Britain but spread may also be aided by human activities. Long-lived northern species may be capable of living-on for many years unless destroyed by human intervention in which case re-



*Dense Sargassum in a Dorset rockpool*

colonization may be unlikely (for instance, horse mussel beds in Strangford Lough). Warming events may cause unforeseen consequences such as the high mortality of benthic invertebrates that occurred in the Western Mediterranean in 1999 (Perez *et al.* 2000).

Uncertainties abound – not least the possibility that melting polar ice may be resulting in 'switching-off' or at least slowing of the 'Atlantic conveyor belt' which draws warm water northwards along the western seaboard of Europe.

Natural Historians look-on in fascination at what will happen to marine life as the sea warms. I look-on with some trepidation as I have made detailed predictions of likely change and the mechanisms of change. Whatever happens, recording the distribution of marine species and establishing edge-of-range locations in this current decade can give us an important baseline for the future. The *MarLIN* programme has produced two guides to encourage volunteer recorders to look out for climate change species as well as others. Do look at the *MarLIN* Web site ([www.marlin.ac.uk/learningzone](http://www.marlin.ac.uk/learningzone)) to find-out more – and do send in your observations to the Porcupine recording scheme, to *MarLIN* or to any other scheme that passes records to the UK National Biodiversity Network.

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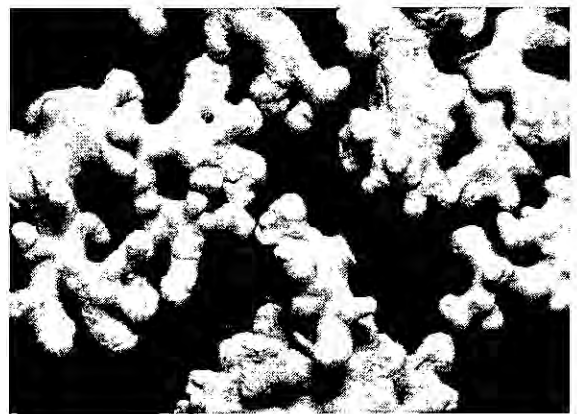
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## The distribution and composition of maerl beds in Northern Ireland

Samantha Vize, C. Blake, G. Hinojosa & C. A. Maggs, The Queen's University of Belfast.

Maerl is the collective term for several species of calcareous red algae (Corallinaceae), which grow as unattached nodules on the seabed and can form extensive beds in favourable conditions. Maerl beds are a unique subtidal biotope that support a highly diverse flora and fauna and are protected under EC and UK legislation. Gaps in our present knowledge of the biology and ecology of the maerl beds within UK waters have led to an increase in maerl studies. Surveys of Strangford Lough and the Antrim coast have been conducted using divers and acoustic survey techniques to provide more detailed distribution maps of the maerl beds of Northern Ireland. The biodiversity of the maerl beds in Strangford Lough is being investigated by ecological studies of the epiflora and epifauna of artificially stabilized maerl beds, and a seasonal comparison of the epiflora of maerl and cobbles. Growth rates of the two commonest species have been confirmed to be approximately 1 mm per tip per year.





# Eunicella verrucosa: investigating growth and reproduction from a population ecology perspective

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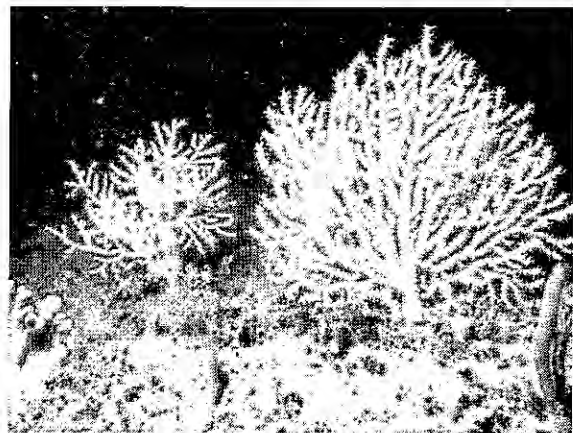
## Conservation policy and conservation research – not always a happy marriage.

We have been studying the pink seafan, *Eunicella verrucosa* for around eight years now. This study began initially when trying to source data on the ecology of this species. I assumed that a species with such a high profile and so frequently referred to in conservation literature would have been the subject of many published studies. To our surprise there were none. We know that species with strong popular appeal can be used to galvanise public support for broader conservation strategies. It's also true that conservation programmes based around photogenic species will have greater public appeal than those that are not (I've yet to see a Greenpeace *Save the slimemould* poster on anyone's wall). However, if conservation policy is to have a real effect on the species and communities that are potentially at risk, it is important that conservation programmes are *principally* designed to address ecological issues rather than to capture public interest. Consequently, when species or habitat protection measures are proposed, the underpinning data and a clearly elucidated rationale as to how this will have a beneficial effect on the target species or habitat are absolute prerequisites if we are to assess their likely effectiveness and measure their outcomes.

One illustration of this is the protection of seafans under the Wildlife and Countryside Act. This law, prohibiting the harming or killing of seafans, has been in place for many years. Whether this has had a measurable beneficial effect on seafan populations is not known. No data seems to exist to suggest it has. Far and away the biggest impact on seafans is by mobile fishing gear, however this impact is not – at least to date – addressed by this law. What one can say with certainty is

that the law makes scientific research on seafans much more problematic, particularly for undergraduates, and that it has been very useful in job creation in Government Agencies by generating much needed additional bureaucracy that has to be managed.

More recently, there have been a large number of Action Plans for pink seafans and associated habitats published, chiefly derived from the UK Biodiversity Action Plans. However, this suffers from some rather major drawbacks. There is no rationale explaining the aims or the benefits of the targets set, nor for many is there any explanation as to how these targets might be achieved or progress towards them measured. Equally troubling is that many of the issues of concern for seafans are, unfortunately, either vague, incorrect or have no scientific basis. While we fully understand that conservation policy cannot always wait for all the scientific answers, it is important that it uses the information available and always has a clearly identifiable aim against which it can be measured.



*Eunicella verrucosa*

### The Reef-Research Seafan Study

A central aim of this study is to better understand the population dynamics of this species, and how this is influenced by external factors, be they natural or anthropogenic. This presentation describes some of our recent work, looking at the factors that determine intrinsic population growth rates, and how we envisage this data being used to help inform people, and to provide an integrated conservation strategy.

The key aims of our study are to i) develop a better understanding of the reproductive ecology and population dynamics of *Eunicella verrucosa*, and ii) to better understand the interactions between *Eunicella* and human activities, in particular fishing. We hope that the information generated from the study can be used to help formulate beneficial and achievable conservation targets.

We concentrate on the reproductive ecology, colony growth and mortality for very practical reasons. These processes, to a large extent, determine a population's ability to withstand losses and replenish itself. If we accept that we are not going to ban all human activity around sublittoral reefs purely on the precautionary principle, then clearly we need to identify the level of impact activities are having and the level of damage that populations and communities can withstand without seriously declining in numbers or diversity.

One aspect of our study looks at levels of recruitment, and survivorship for newly recruited colonies. This data feeds in to the overall picture of reproductive capacity of the population, and survivorship through to reproductive maturity. In time this may allow us to generate upper and lower thresholds that "normal" recruitment rates lie within. Additionally, it should help us pick up on sudden drops in recruitment rates that may be due to subtle impacts (e.g. changes in sediment loading or water temperature) that are not otherwise immediately visible. To be of any real value, this has to be a long-term study: five years of data collection by us has shown that recruitment and survival rates can be highly variable.

The other aspects of this are establishing

colony growth rates. We do this by periodically photographing previously mapped colonies over a period of years. These time-series photographs are scanned, scaled and measured using image analysis software. We have selected total cumulative branch length as the most satisfactory method for comparative measurement. Slow growth rates of *Eunicella* have long been cited as a measure of their conservation importance, although the rationale for this is often rather muddy. We are interested in growth rates for two reasons. Firstly, to determine the age/size class at which colonies become sexually mature. The practical implications of this are quite clear. If most colonies in an area survive until they are around 25 years old (before being knocked off by a winter storm or a scallop dredge, for instance) but begin to spawn when they are around 5 years old, then they have quite a long reproductive life. If, on the other hand, they do not reach sexual maturity until they are 9 years old, and most are killed before they are 10 years, then the population is in big trouble.

Secondly, since *Eunicella* is a colonial organism, for some considerations total number of polyps can be a better measure of population size than total number of colonies. For example, 3 large colonies might be consuming the same amount of nutrients, supporting the same number of epibionts and releasing the same number of larvae as 10 smaller colonies. Colony size seems particularly important in determining the size of the reproducing population, a colony twice the height of its neighbour will have many more than twice the number of polyps.

### Reproduction study

The three main aspects of the species reproductive cycle that we are interested in are:

- The reproductive capacity of populations;
- The frequency of reproduction;
- The factors that trigger reproduction.

The study involves monthly sampling at Skomer MNR and the East Tennants Reef, Lyme Bay. We have been collecting between 4 and 6 branch clippings (1-2cm long) from up to six tagged colonies at each site. Five polyps from



each branch were dissected and the reproductive structures examined. We counted all reproductive bodies present, measured them (to the nearest 100 microns) and classified them by size and colour.

Female oocytes appear as red or orange spheres ranging in size from less than 0.1mm to 0.6mm. What we believe are male spermaries appear as discrete translucent or white spheres ranging in size from less than 0.1mm to 0.5mm. From our studies it would seem that the sexes are separate, each colony being either male or female.

We are still collecting and analysing data, however our findings to date suggest that the developmental period of eggs is slightly longer than one year, with separate cohorts present within single polyps at certain times of the year. Eggs remain very small (<0.1mm) through September until around March. The eggs and spermaries both then steadily increase in size through the spring and summer months. Spawning, we believe, occurs between late August and mid-September. This appears coincident with, and may be influenced by, peak water temperatures. The number of mature eggs within polyps appears quite variable, sometimes only 3 or 4, while up to 27 have been recorded in some.

There are still many aspects of this study for which we have no answers. We have still to determine the size/age at which colonies reach sexual maturity. We have yet to undertake extensive surveys to establish that the data we are getting from our small sample are truly representative of the populations we are studying. Another key piece of the jigsaw we have still to identify is the duration of the larval phase and survival rates during this period.

Our reproduction study has been made possible through 50% funding from CCW under their Species Challenge Scheme. The balance is self-funded by Reef Research.

More information can be found on the Reef Research webpage <http://www.reef-research.org>

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