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BULLETIN of the PORCUPINE MARINE NATURAL HISTORY SOCIETY

Autumn 2014 — Number 2

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Porcupine Marine Natural History Society

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Ordinary Council Members

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 2 Bulletins per year which include proceedings from scientific meetings, plus regular news bulletins.

Membership fees: Individual £18 Student £10

www.pmnhs.co.uk
http://www.facebook.com/groups/190053525989
@PorcupineMNHS

Cover Image: Participants in the Porcupine Conference field trip on the shore — Laura Bush

Editorial

On a recent trip to the Natural History Museum I noticed that a *Scyliorhinus canicula* (Linnaeus, 1758) was labelled as a "Common Dogfish". This is now known as the lesser or small spotted catshark. As a keen visitor to any museum with animal collections I enjoy reading about the displays and will always look at the labels for each specimen. I am always curious to know how each animal comes by its name and I am disappointed when there is no visible label - I have been known to go in search of a member of staff in order to find out the name of a pickled fish where the label in the jar is facing to the back of the display cabinet. I have always assumed that the information on display would be correct/up to date. When reading the out of date label for the *Scyliorhinus canicula* it made me wonder about the challenge of keeping up to date with name changes and how much information can be included within any display.

Advances in technology mean that smart phones can be used to access many sources of information. Museums have started to pick up on this and many now use QR codes as a way for visitors to find out more about displays and individual organisms. This clearly has great potential to provide detailed information for those visitors who want more and the information can easily be kept up to date with minimal disturbance to the displays. The only drawback for museums is that unless the QR code is just simple text then an internet connection is required and this isn't always easy to provide. Having recently discovered QR codes I am starting to notice that they are all over the place and in unexpected places. All that is required to scan these codes is a free app on your phone. We hope that the use of QR codes can add another dimension to the *Bulletin* and we welcome any suggestions you may have! Thank you.

Vicki Howe

Hon. Editor

http://www.marlin.ac.uk/speciesinformation.php?speciesID=4319

http://www.fishbase.org/summary/845

Photo: Teresa Darbyshire

ANNOUNCEMENTS

Porcupine Annual Conference 2015

Institute of Marine Sciences, Portsmouth University, March 2015

University of Portsmouth

The next Porcupine Marine Natural History Conference will take place at the Institute of Marine Sciences, Portsmouth University in March 2015. Precise dates are yet to be confirmed but details will be posted on the website as soon as they are released.

Recent announcements on Marine Protected Areas (MPAs)

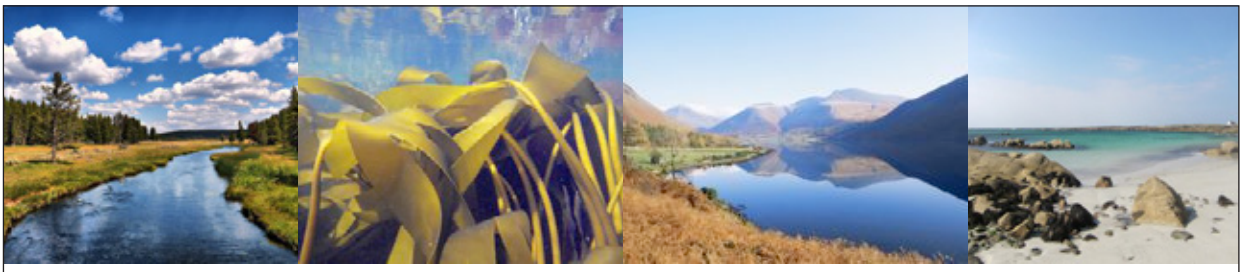
In England, the first 27 Marine Conservation Zones were announced by Defra in November 2013 with a further 37 MCZs being considered for designation in 2015. This still falls short, however, of the 127 sites originally recommended. The House of Commons Environmental Audit Committee's Marine Protected Area Inquiry Report, published in June 2014, called for more action and commitment by the Government if it was to remain true to its original intent to establish a world class network of marine protected areas around the UK. In its conclusions, the Committee stated that "the slow pace at which Marine Conservation Zones have so far been designated has been disappointing and suggests a lack of Government commitment to this intiative" (http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenvaud/221/221.pdf)

On July 24th 2014, the Scottish Government gave the go-ahead for 30 new MPAs (17 in Scottish territorial waters, 13 in offshore waters) which will protect an additional 12% of Scotland's seas (www.scotland.gov.uk/topics/marine/marine-environment/mpanetwork; www.mcsuk.org/scotland/scottish+wildlife/). The current MPA designations came into force on August 7th and double the size of Scotland's MPA network. The network includes what is thought to be Europe's largest MPA in the northeast Faroe-Shetland Channel, to conserve deep sea sponges, muds and geological features (The Guardian, 24 July 2014, http://www.theguardian.com/environment/2014/jul/24/scotland-announces-30-new-marine-protected-areas).

Porcupine History

Use the QR code below to access the first ever Porcupine Newsletter from November 1976! In this Newsletter, the origins of the Society were explained, the aims described and the inaugural meeting publicised.

The second code will take you to the report from the first ever Porcupine field trip, published in *Porcupine Newsletter* 1(4). The field trip, a week in Orkney from 27 August to 3 September 1977, was attended by 18 people and produced a list of 128 species. The Newsletter also included a rare report of a giant squid, *Architeuthis dux*, washed up in North Berwick!



Aquatic Biodiversity & Ecosystems:
interactions, evolution & global change

Dear friends & colleagues,

It is our pleasure to invite you to the Aquatic Biodiversity & Ecosystems Meeting which will be held at

University of Liverpool, UK
30 Aug – 4 Sept 2015
www.aquaticbiodiversityandecosystems.org

More information will be available during autumn 2014

Please email aquaticbiodiversity2015@gmail.com if you would like to be added to the mailing list

Facebook: Aquatic Biodiversity and Ecosystems
Email: aquaticbiodiversity2015@gmail.com

THE MARINE BIOLOGICAL ASSOCIATION

UNIVERSITY OF LIVERPOOL

Porcupine Marine Natural History Society

Minutes of the 37th Annual General Meeting Saturday 29th March 2014.

Galway

1. Apologies for absence were received from Roger Bamber, Peter Barfield, Sue Chambers, Angie Gall, Tammy Horton, Vicki Howe, Dawn Powell, Roni Robbins, and Séamus Whyte.

2. Matters arising from the Minutes of the 36th Annual General Meeting, as published in the PMNHS Newsletter No. 34.

There were no matters arising. The minutes were accepted unanimously by the floor with no corrections or additions.

3. Officers' Reports

The Hon. Treasurer's report was presented by Jon Moore.

A summary of the Porcupine receipts and payments accounts for 2013 was presented and explained (see Accounts summary on page 7).

Comparisons between 2012 and 2013 were made and a balance of £1969 noted. The decrease of £3101 from the previous year was due to the costs for producing the two 2013 Newsletters and payments associated with the *Porcupine Small Grants Scheme*. As the latter was fully up-to-date, receipts due from the 2014 membership fees determined that the Society was in a 'break-even' situation. It was therefore essential that all members update their subscriptions to £18 (for full membership) and £10 (for concessions) as revised in January 2013.

Acceptance of the report was proposed by Doug Herdson, seconded by Anne Bunker and carried unanimously.

The Hon. Membership Secretary's Report was presented by the Hon. Chairman in the absence of Séamus Whyte.

The current membership was given as 331, an increase of 21 from that reported at last year's AGM.

The membership database continues to be updated and improved, however, it was recognized that a number of members have not yet updated their payments to the new subscription rates. Members who haven't upgraded membership from old fees (Standing order) are urged to do so now. Other payment methods are detailed on the website (http://pmnhs.co.uk/why-not-join-us). Members remaining unaware of the new subscription rates will be contacted over the following months.

Acceptance of the report was proposed by Jon Moore, seconded by Liz Morris and carried unanimously.

The Hon. Editor's Report was presented by the Hon. Chairman in the absence of Vicki Howe.

Two newsletters (Spring and Autumn) of 87 and 83 pages were published in 2013. Each had more than 25 contributors. The newsletters contained a range of articles including field reports, taxonomic reports as well as research findings, book and website reviews. We thank all who have contributed copy, and reviewed or proof read members' submissions. Special thanks to Teresa Darbyshire for designing and preparing the *Newsletters* (and new *Bulletin*) for print.

In recognition of how the *Newsletter* has evolved and transformed over the years, the Council and attendees at last year's Conference in Swansea (see 2013 AGM Minutes: A.O.B) felt that a name-change to *Bulletin* would better reflect the content and where it sits as a scientific publication.

This name change does not represent any great change in what we will publish. Members are encouraged to continue to submit their papers, articles, notes, news and reviews as before. We particularly encourage contributions from those presenting at the conference! Please note that a new *Instructions to Authors* is provided in the new *Bulletin*.

Bulletin No. 1, was made available for collection by paid-up members at the Galway Conference; non-attending members would receive their copies by mail as usual. [Members are reminded

that they can also receive a pdf of the Bulletin if they wish. In addition, authors can have pdfs of their articles generated on request to Teresa Darbyshire.]

Acceptance of the report was proposed by Julia Nunn, seconded by Frank Evans and carried unanimously.

The Hon. Web-site Officer's Report was presented by the Hon. Chairman in the absence of Tammy Horton

The website continues to be useful for posting messages and instructions about upcoming meetings, particularly for those who do not use Facebook (www.facebook.com/groups/190053525989). From usage statistics, and compared with last year, there was little change between years, just some fluctuation from month to month depending on the timing of the annual conference.

The website is primarily used for downloading conference and field meeting information (126 and 45 hits for this year's conference information booklet and booking form respectively), and for accessing older Newsletters.

This year we have tried a new venture into payment by Paypal for both the Conference and the field trips. The Hon. Web-site Officer welcomes any feedback on this, and any suggestions for improvement or additions to the website.

Acceptance of the report was proposed by Anne Bunker, seconded by Kate Mortimer-Jones and carried unanimously.

The Hon. Records Convenor's Report. There was no Report this year, however, members can be assured that all records received by Porcupine MNHS are passed on for inclusion in the National Biodiversity Network (NBN) database.

The Hon. Chairman's Report was presented by Andy Mackie.

The Society had a good year in 2013 (with two Newsletters), and the last *Newsletter* published was the winter issue, No 34. As indicated above, we now have a *Bulletin*, which we believe is a more appropriate title for the content we publish. We hope members enjoy the new look publication and encourage them to continue submitting interesting and quality contributions.

Last year's conference was held in Swansea University was very well attended with over 90 attendees. Thanks were expressed once more to Ann Bunker, Victoria Hobson, Judith Oakley, and Charlie Vaughan for a highly enjoyable meeting.

One very successful field trip — The Strangford Lough Blitz 2013 — took place last summer and a very big thank you goes to Julia Nunn (CEDaR, National Museums Northern Ireland) for helping organize this joint venture with Seasearch NI. The meeting received sponsorship from Porcupine, the Conchological Society, the NI Environment Agency, and DOE Marine Division.

Finally we thank Louise Firth and her team (Aimee Walls, Annette Wilson, Sarah Cosgrove, Anne Marie Power, Majbritt Bolton-Warberg, Svenja Heesch & Liam Morrisson) for organising this excellent conference in Galway. We look forward to more inspiring talks, the conference dinner and the fieldwork!

Acceptance of the report was proposed by Jon Moore, seconded by Doug Herdson and carried unanimously.

4. Porcupine Small Grants Scheme & Newsletter Student Prize

We have run the Small Grants Scheme for the previous six years (http://pmnhs.co.uk/category/grant-scheme), offering support for small projects that further its aim of promoting an interest in the ecology, taxonomy, and distribution of marine fauna and flora in the N.E. Atlantic. The scheme is run on a year-by-year basis (dependent on available funds) and has been very successful to date. Last year, one grant was made to David Kipling for 'Improved resources for the *in situ* identification and recording of British ascidians'. Porcupine Council decided not to run the scheme this year, but will review the situation again in the autumn for 2015-16.

For the past three years, Porcupine has awarded a prize of £50 to the student, or

marine enthusiast, adjudged producing the best Newsletter/Bulletin article. In 2013 this was awarded to Cass Bromley for her account of '*Native oyster regeneration for commercial and environmental sustainability of stocks*' (*PMNHS Newsletter* **34**: 49-54). Students are encouraged to try for the prize and members asked to spread the word. Those eligible for the prize are reminded to inform the editor of their wish to be considered so on submission of their contribution to the Editor of the Bulletin.

5. Election of Officers and Council

This year two Council members (Julia Nunn and Angie Gall) stood down and indicated their availability for re-election. No other members stood for election to Council. All current Office-Bearers were prepared to continue in their posts for the coming year.

The re-election of Julia Nunn and Angie Gall to the Council was proposed by Frank Evans, seconded by Teresa Darbyshire. There were no dissenters. There was a mass re-election of the whole council, proposed by Doug Herdson, seconded by Katherine Birch, and carried by a unanimous show of hands.

6. Future meetings

There will be a field meeting on the Isle of Man this summer, from 1st to 5th August. Angie Gall will lead it in partnership with the Isle of Man Wildlife Trust. We congratulate Angie on her successful application to Sea Changers for support. The award of £500 will help engage volunteers and help collect data in support of Marine Protected Areas. Details were advertised in the last *Newsletter*, the new *Bulletin*, and on the Porcupine's website and Facebook pages. Divers and intertidal participants were most welcome to attend.

7. A.O.B

Following an expression of interest at last year's Swansea Conference, talks have already taken place with Dr Gordon Watson about holding next year's Porcupine Conference at the University of Portsmouth. There was also a tentative suggestion of Millport as a conference venue, but the feeling was that this could be at a later date. Doug Herdson thought Millport might be better for a field meeting.

Members can keep abreast of developments concerning this and other meetings via the Porcupine website, Facebook Group and the *Bulletin*.

Jon Moore ended the AGM by displaying a map showing the locations of all Porcupine Conferences, Local Meetings and Fieldtrips. There was good coverage, from Guernsey in the south to Orkney in the north and from Hull in the east to Galway in the west.

PORCUPINE MNHS

RECEIPTS AND PAYMENTS ACCOUNT

Year to 31 December 2013

Year to 31.12.12 £	£			Year to 31.12.13 £	£
		RECEIPTS			
470		Subscriptions	2011 & earlier	30	
1647			2012	22	
79			2013	2946	
0			2014 onwards	144	
	2196				3142
	0	Sales (Sweatshirts & books)			0
	5	Bank Interest (gross, both accounts)			0
	(0)	Tax deducted			(0)
	2201	Total Receipts			3142
		PAYMENTS			
(4668)		Newsletter-	Printing	(4037)	
(871)			Postage & other expenses	(306)	
(5539)		Total Newsletter Costs		(4343)	
(37)		Web site expenses		(144)	
(228)		Council meeting expenses (travel/catering)		(44)	
	(5804)				(4531)
	(3603)	**SURPLUS BEFORE MEETINGS & GRANTS**			(1389)
0		**Annual Conference** – Swansea (2013)		1031	
381		**Field meetings** – Guernsey (2012)		0	
219			– Cornwall (2012)	0	
0			– Isle of Man (2014)	(500)	
(933)		**Porcupine grants**		(2193)	
(50)		**Newsletter prize**		(50)	
	(383)				(1712)
	(3987)	**DEFICIT FOR THE YEAR (before tax)**			(3101)
	0	Corporation Tax			0
	(3987)	**DEFICIT FOR THE YEAR (after tax)**			(3101)
	9057	**BALANCE BROUGHT FORWARD**			5070
		BALANCE CARRIED FORWARD			
5070			Current Account	1969	
	5070				**1969**

Jon Moore, Hon Treasurer
24 March 2014

J. J. Moore

Nick Light, Hon Examiner
16th June 2014

Nick Light

CONFERENCE 2014

Report of Porcupine Conference, National University of Ireland Galway, 29-31 March 2014

Louise Firth

Ryan Institute, National University of Ireland Galway, University Road, Galway, Ireland

In 2014 the Porcupine Annual Meeting was held in the Republic of Ireland for the first time. 49 Porcupines from all across the UK and Ireland made the trip to the National University of Ireland Galway on the west coast. Roughly half of the delegates were non-members so it is anticipated that there will be new Irish members following the conference! The talks ran over the Saturday and Sunday and there was a choice of two fieldtrips on the Monday.

The Saturday talks kicked off with a natural history of Irish seaweeds by Professor Mike Guiry of the Irish Seaweed Research Group. The talks then ranged from Deep Sea Canyons (Louise Allcock), citizen science (Fiona Crouch), and sustained monitoring and assessment (Robert Wilkes), to broadscale changes in UK seaweeds (Laura Bush), *Nephrops* fishery management (Colm Lordan), The Clare Island Survey (Timothy Collins) and a talk about herring stocks in Ireland by Noirin Burke.

Talks were followed by a drinks reception and poster session in the atrium of the Martin Ryan Building. Many delegates made use of their token for a free pint from the Galway Bay Brewing Company at the Salthouse Bar before meeting up at the Radisson Hotel for the conference meal. Andy Mackie gave a lovely speech and a glass was raised to absent friends. Of course it wouldn't be a Porcupine conference without a few words by Frank Evans who gave a great performance as always.

The Sunday talks featured a sponge sandwich: Claire Goodwin and Christine Morrow started and ended the day with talks on sponges. The filling ranged from nepheloid layers in the deep sea (Annette Wilson), cryptic signs of life (Franki Perry) and harmful algal blooms (Sarah Cosgrove) to ross corals (Andrew Powell), cetaceans (Simon Berrow), oysters (Cass Bromley) and polychaetes of the Falkland Islands (Teresa Darbyshire). Frank Evans showed a movie called "Ocean waves"; Jon Moore talked about issues with consistency for benthic monitoring and Brendan O'Connor entertained everyone with a whirlwind trip through the history of research vessels in Galway.

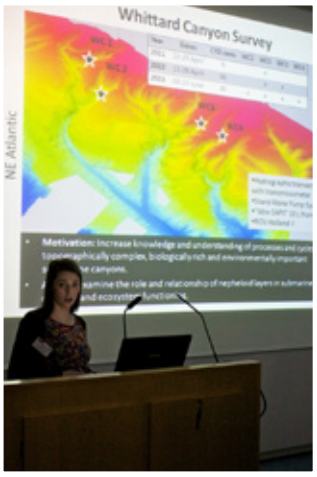
Again, talks were followed with a wine reception and another opportunity to check out the posters in the atrium of the Martin Ryan Building before retiring to the Salthouse Bar for more Irish craft beers.

On Monday groups went their separate ways for the field trip. Svenja Heesch took one group to Corranroo, in south Co. Galway. This shore overlooks the limestone terraces of the Burren in Co. Clare and is characterised by boulders and rapids supporting fantastic biodiversity. Louise Firth took another group to Dogs Bay in Connemara. After checking out the storm damage to the access road and sand dunes the group walked across the only beach of foraminiferans in the northern hemisphere to reach the granite rocky shore. This was the first time that many people from England and Wales had seen the purple sea urchin *Paracentrotus lividus*. There was also a training session for the launch of ShorTIE - or The Shore Thing Ireland" (www.mba.ac.uk/shore_thing), which enabled Fiona Crouch to say that the 'Shore Thing' project is going global!

It was a fantastic few days with some great talks and opportunities to discuss marine issues. Thank you to the Porcupine Committee for coming to Galway and a special thank you to the local committee (Svenja Heesch, Aimee Walls, Annette Wilson, Sarah Cosgrove and Anne Marie Power) who did a huge amount of work before, during and after the meeting. We look forward to the next one which will be held in Portsmouth in Spring 2015!

A.S.Y. Mackie




Whittard Canyon Survey
NE Atlantic

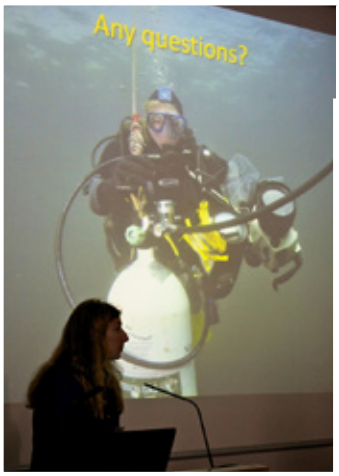

Polychaetes of the Falkland Islands



EGGS, TUBES, SIPHONS AND OTHER CRYPTIC MARINE SIGNS OF LIFE
Franki Perry






Any questions?

Ross Coral Mapping Project 1994–2009 A study of the distribution and abundance of Ross coral *Pentapora foliacea* off Handfast Point in Dorset.

Andrew Powell

Purbeck Marine Research Unit, Canford School, Canford Magna, Wimborne, Dorset BH21 3AD
Email: afup@canford.com

Introduction

Ross coral, *Pentapora foliacea* (Ellis & Solander 1786), is an easily identifiable, large, erect, orange bryozoan that occurs sublittorally on suitable hard substrates both natural and man made. It occurs in the north-eastern Atlantic coastline from St Kilda in the north to the coast of Morocco in the south (Lombardi *et al.* 2010). Colonies are prominent and long lasting making it a useful indicator species both for anthropogenic activites such as bottom trawling (Sheehan *et al.* 2013) and environmental change such as increasing sea temperature (Knowles *et al.* 2009, 2010). In addition, colonies provide an important habitat for other invertebrate species (Bradshaw *et al.* 2003), and work on similar erect bryozoan reefs in New Zealand has highlighted the importance of such organisms in maintaining and supporting high levels of habitat biodiversity (Bradstock *et al.* 1983). As well as its ecological importance as a shelter habitat for many invertebrate species, its increased spatial complexity favours fouling of its surfaces by a variety of sessile invertebrates (Sharp *et al.* 2008). This iconic species is important in providing shelter habitats from the strong tidal flows, characteristic of the areas in which it is found. It is an ideal species easily recognised during sublittoral surveys by amateur divers and for long term monitoring studies.

The colonies of the genus *Pentapora* have a bifolar honeycombed and domed calcareous structure that has been known to grow up to 1m in diameter in *P. foliacea* in UK waters (Hincks 1880). The calcification of the outer surface of the frontal wall of individual zooids gives the colonies a brittle foliaceous coral-like texture, hence it common name in the UK of ross coral (Ryland 1970).

The relationship between *P. foliacea*, which occurs in the Atlantic, and the very similar Mediterranean species *Pentapora fascialis* (Pallas, 1766) remains uncertain. While originally classified as two distinct species they were reclassified as a single species, *P. fascialis,* with two different growth forms *P. fascialis f. fascialis* and *P. fascialis f. foliacea* (Hastings & Ryland 1968; Hayward & Ryland 1999). However, they are now regarded once again as separate species on morphological grounds, with typical bifurcating branches in *P. fascialis* and the absence of giant avicularia in *P. foliacea*, while awaiting more detailed molecular analysis (Lombardi *et al.* 2010).

Attempts to age colonies morphologically using time series photography (Bullimore 1987) have suggested growth rates of 2cm per year while more recent attempts using comparative size of zooids (O'Dea 2005) and distribution oxygen isotopes (Patzold, Ristedt & Wefer 1987) all suggest that the age of the largest colonies is about twenty years. Further evidence of the speed and extent with which ross coral planktonic larvae may settle and grow on suitable hard surfaces is demonstrated by the early settlement of ross coral on HMS Scylla (Hiscock *et al.* 2010). Time-series monitoring indicates the importance of separating natural fluctuations from anthropogenic impacts (Hiscock & Kimmance 2003; Sheehan *et al.* 2013).

During a recreational ebb tide drift dive in 1993 between Ballard Point and Handfast Point, offshore Dorset, fifteen colonies of ross coral *P. foliacea* were discovered. The colonies were found on chalk rubble amongst a species rich animal turf just below the red seaweed zone in 12 – 18m depth offshore. The colonies ranged in size from 50 – 300mm in diameter. This coincided with the publication by English Nature of "Managing England's marine wildlife" (Laffoley 1993) which stated that " the reefs within the bay (Lyme Bay) form one of the most easterly locations for a number of Mediterranean-Atlantic species, such as the ross coral *Pentapora foliacea* and the sea fan *Eunicella verrucosa*, which are here near the limit of their eastern distribution."

The discovery suggested that ross coral occurred further east than previously recorded and provided the stimulus for the

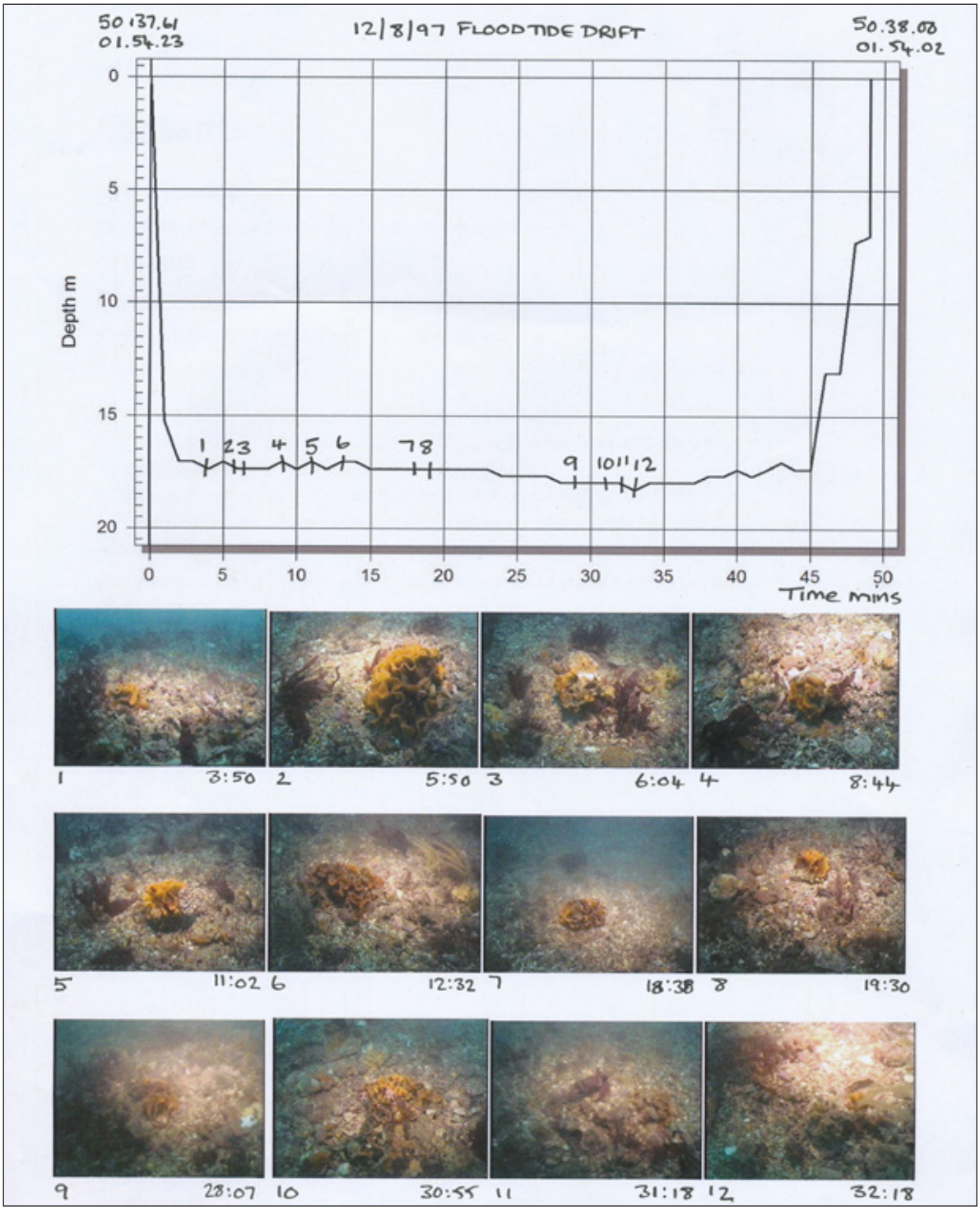


Fig. 1: Example of the data collected from a survey dive using dive computers to record the transect profile. Images: AFUP.

current study. Earlier records (Ellis 1755) suggest a more widespread distribution along the channel. It is now known that ross coral occurs in suitable areas further east and is now regarded as common along the south coast as far as Beachy Head (Jackson 2007).

In 1978, during a dive based sub-littoral survey of the Dorset coast, ross coral was recorded twelve times (Second Dorset Underwater Survey - "Habitat 6 - deep offshore bedrock and boulders 18 – 26 metres") although the furthest east it was found was in Kimmeridge (Dixon *et al.* 1978).

The marked geographic changes that occur in the English Channel, while better studied in intertidal organisms (Crisp & Southward

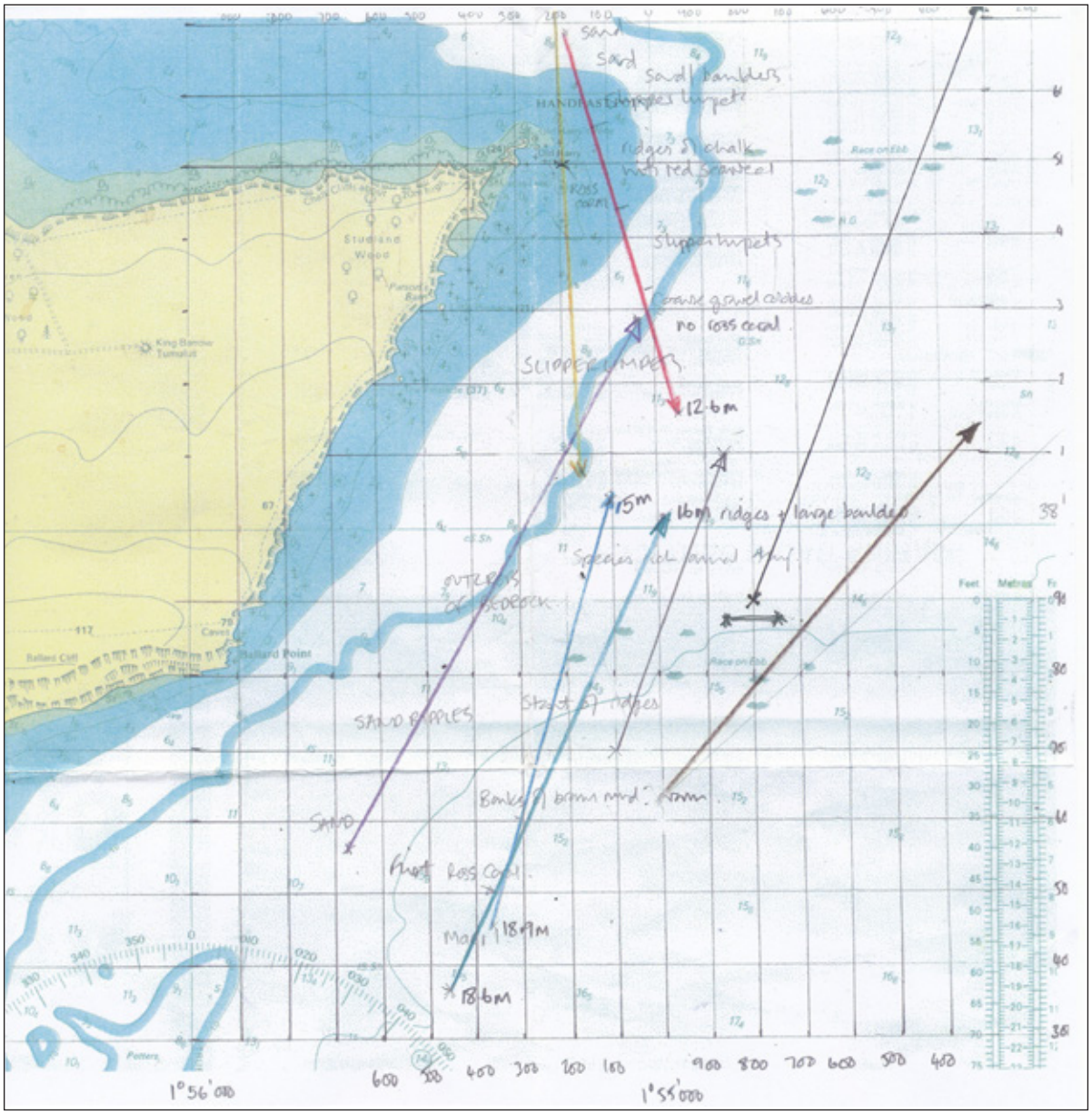


Fig. 2: Plot of the survey dives made in 2000.

1958) are also likely to occur in sub-littoral organisms (Covey *et al.* 1998).

Given the difficulties of reliable identification of many marine invertebrates the value of using a single, easily identifiable, prominent and long lasting species as an indicator is clear, with reliable quantitative data over a time-series, attainable by amateur divers.

Methods

The techniques used in monitoring ross coral colony growth rates, distribution and abundance in the Skomer Marine Reserve (Bullimore 1987; Bunker & Mercer 1988) were used in this project to survey the offshore area 15 – 29 m depth between Handfast Point and Ballard Point. The initial survey in 1994 was based on twelve drift dives, both on ebb and flood tide, with diver entry and exit points recorded by the diving vessel using GPS (Powell 1994). Counts of colonies were made a metre either side of the transect line and a photographic record made of colonies using a Nikonos III camera fitted with a wide angle lens. Ross coral colonies proved to occur at high densities but were localised with a range of sizes from small colonies just a few years old (50 – 100mm) to large colonies up to 500mm in diameter, (suggested to be up to twenty to thirty years old).

Fig.3_1: Close up showing zooids

Fig.3_2: Close up showing zooids

Fig.3_3: Medium colony with squat lobster

Fig.3_4: Medium colony on Valentine tank

Fig.3_5: Underwater video camera

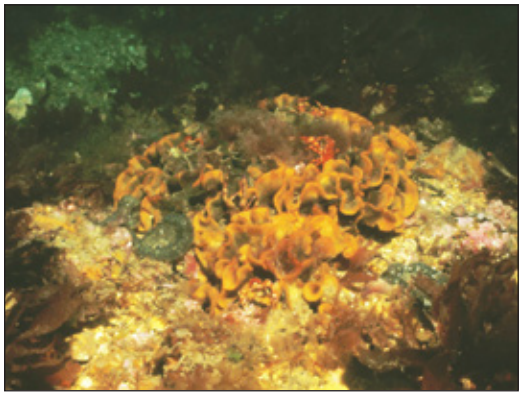


Fig.3_6: Large colony with five squat lobsters

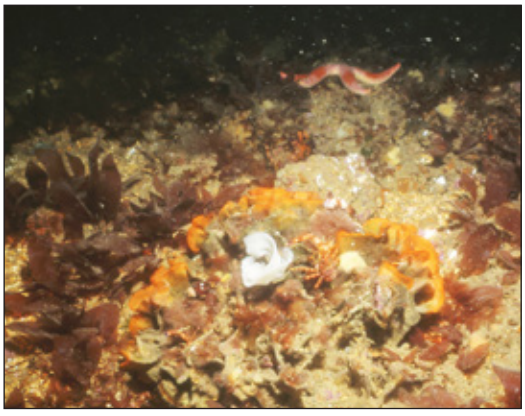


Fig.3_7: Medium colony with nudibranch eggs & squat lobster

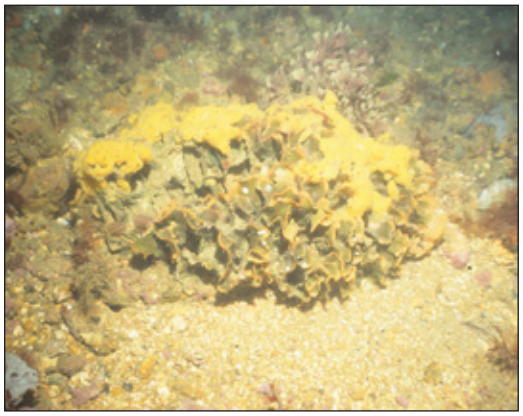


Fig.3_8: Large colony overgrown by sponge

Fig.4_1: Large colony with dead areas

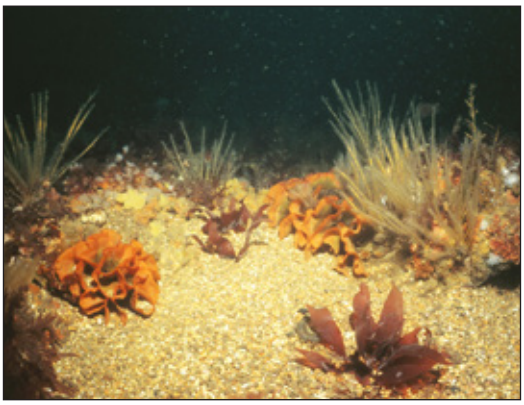


Fig.4_2: Two close medium colonies

Fig.4_3: Small colony with barnacles and hydroids

Fig.4_4: Small colony with cowrie and squat lobster

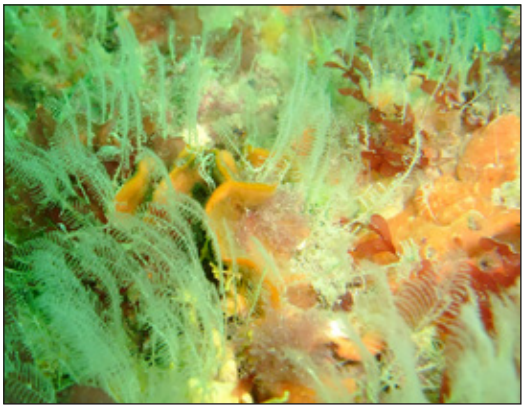


Fig.4_5: Small colony with hydroids

Fig.4_6: Medium colony with star sea squirt

Fig.4_7: Large healthy colony in 2009

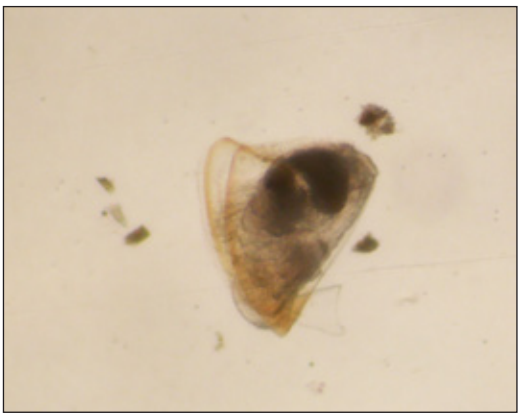


Fig.4_8: Bryozoan planktonic cyphonaute larva

An underwater video camera (Sony TR780 Hi8 camcorder in Seapro SP5 marine housing) was used from the summer of 1995 when thirteen drift survey dives were made (Powell 1995). The use of the underwater video camera allowed continuous recording of the sea bed for the duration of the drift dives. With a wide angle lens giving a two metre wide view along the transect the quantitative observations could be made for the whole transect. The recorded video tape was played back after the dive allowing the individual colonies to be counted and their approximate size recorded.

Following the acquisition in 1997 of a dive computer with a PC interface (Suunto solution alpha) the distribution and abundance of individual colonies could calibrated with the depth profile and the location of each colony could be located on an accurate profile of the transect. An example of data collected from such a survey dive is shown in Fig.1. In all, sixty four survey drift dives have been made between Handfast Point and Ballard Point from 1994 until 2009. The plots of the survey dives made in 2000 is shown in Fig.2.

The nearest suitable bedrock habitat further east of the survey area is on Christchurch ledges but so far no colonies have been recorded there.

Much of Poole Bay is unsuitable for growth of ross coral colonies being predominantly sand and gravel with little or no suitable hard bedrock for settlement. A single colony was discovered in Poole Bay in 1995 on one of the WWII Valentine tanks and was monitored photographically for two years. This small to medium colony several years in age appeared to suffer mechanical damage in 1996, possibly caused by divers or fishing nets and no evidence of it could be found in 1998.

Two attempts were made to monitor the growth of individual colonies. The first in 1994 using a permanently buoyed shot line and the second in 1998 setting a permanent 3m x 3m quadrat made from heavy steel scaffolding poles on the sea bed. The area is frequented by both divers and commercial fishermen and neither could be relocated one year later.

Conclusions

The video and photographic record of the colonies seen (Fig.2, Fig.3.1-8 and Fig.4.1-8) provides a baseline record and a potential long term time series of the distribution and abundance of ross coral in this local area of rich biodiversity against which future changes may be recorded.

Sixty four survey dives were made between 1994 and 2009, all supported with GPS coordinates and photographic and video records. It is hoped that the survey will be resumed in the near future and current distribution recorded and compared with earlier records.

Throughout the survey small colonies have always been found suggesting that there is ongoing successful recruitment. Larger colonies have sometimes been damaged or overgrown by sponges or hydroids, which suggests a maximum age for colonies in the area. The largest colony recorded was 0.5m in diameter suggesting an age in the region of twenty years.

The project established that reliable marine surveys may be carried out by amateur "citizen science"divers using an easily identifiable and long lived indicator species. The continuity provided by the same group of divers surveying a limited area of the sea bed over fifteen years suggests a potential for establishing time-series monitoring of the sub-littoral habitat against which future changes may be recorded.

"To record change is no problem. There is too much and it would be a remarkable investigation that showed none. The major need is to ensure that the change recorded is real and relevant." (Lewis 1976)

Acknowledgements

The 1994 survey was financially supported by the British Ecological Society (Small Ecological Projects Grant No. 1092).

The 1995 survey received grants to allow the purchase of a purpose built underwater video camera (Seapro SP5 marine housing and Sony TR780 Hi8 camcorder) made possible by grants from the British Ecological Society, Wessex Water (The Conservation Foundation), English Nature and WWF Nature UK.

In 2007 a Canford School Society grant allowed purchase of a Suunto Solution dive computer with a PC interface.

Francis Bunker (Marine Seen) gave much useful advice on all aspects of the project from the outset.

John Sturch (Diving Officer of Canford School BSAC Youth Branch and Skipper of "Big Dinghy") directed all survey dives.

Sarah Welton, Bere Regis, provided much useful local information on the sublittoral of the Dorset coast during the initial stages of the project.

Boat charter and air fills were paid for with proceeds of honey sales from the Canford School Apiary.

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Ocean Waves

Frank Evans

Video: 1971, 15 minutes

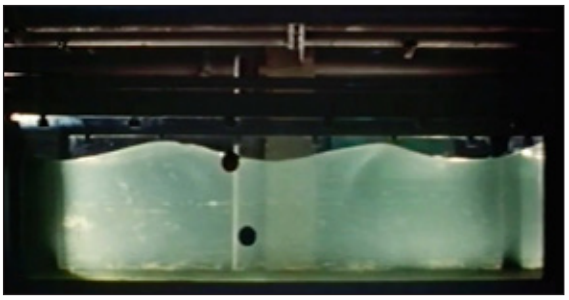
This is one of a number of short teaching films I made in Newcastle University about forty years ago. It was aimed at final year marine biology students. It was presented at the Galway meeting and consists of both live shots and animated diagrams. The film opens with illustrated definitions of the wave elements height, length, celerity and period. It shows how a complex of waves at sea can be resolved into a family of simple waves. The division of wave energy between dynamic and potential forms is shown graphically and also demonstrated by considering a floating buoy. The velocity of a wave train is proved to be half individual wave celerity.

The decrease in wave movement away from the surface is made visible in a wave tank where waves pass over two neutrally buoyant balls, one at the surface and the other at depth. The differing effects of a large and a small fetch is shown as gales sweep across the open sea and across a boating lake.

The effect of waves on exposed and sheltered shores is discussed and includes aerial shots of the damaging attack of waves on a headland.

Attention is given to shores of mud, sand, pebbles and rock with notes on erosion and accretion. The types of animals and plants to be found on these shores are noted. All the live shots, apart from those of the University wave tank were taken on the Northumbrian coast and the film concludes with a dramatic sequence of high waves breaking over Tynemouth Pier.

Waves 1. Wave tank with neutrally buoyant balls to show the differing amplitudes of water movement at surface and depth.



Waves 2. Wave attack concentrated on a headland with reduced effect in the bay.

Waves 3. Concluding shot of a gale at Tynemouth Pier, Northumberland.

A guide to the Signs of Life On the seabed of Britain and Ireland: An identification guide in production

Franki Perry

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Eggs, tubes, siphons, tracks and burrows are all signs that an animal is present. Unfortunately, many of these evidence features are left un-noted or unnoticed due to the lack of information on how to identify them. Providing marine scientists and enthusiasts with enough information to enable a confident identification of an evidence feature will mean that 'signs of life' will no longer be banished to the habitat description of Marine Recorder. Instead, 'signs of life' seen on seabed imagery, during dives or on the beach will be recorded to an appropriate taxon level and make a positive contribution to our knowledge of the biodiversity of British marine habitats.

I am working with Liz Morris (Marine EcoSol) and more than forty scientists (several Porcupines), taxonomists, divers and enthusiasts to create a useful and realistic guide to 'signs of life' on our seabed.

Fig. 1: Cuttlefish stain their egg capsules with ink. Whilst laying these eggs the female must have run out of ink. Image: Richard Yorke.

As many Porcupines are divers, or have had the opportunity to view images or video of subtidal habitats, they will know that 'signs of life' can be extremely abundant. For example, in muddy sediments it is very common to see burrows and siphons. The presence of a diver or a video sledge can cause the burrow's inhabitant to scuttle back in. This will leave the viewer with just the burrow entrance and a small plume of mud signalling the recent egress of the occupant as the only clues to the inhabitant's identity.

Fig. 2: The escape of a Fries Goby Lesuerigobius friesii *into the safe confines of a burrow. Image: Matt Doggett.*

Any further investigation of the burrow may now seem hopeless. Yet it can be surprising how much information can be gathered from the entrance of a burrow. Most importantly, note the angle of the entrance; this can help determine the Phylum of the species that created the burrow. In the British Isles there are four common species that inhabit large burrows in muddy sediments. These are; *Nephrops norvegicus* (Scampi, Dublin bay prawn, langoustine or Norwegian lobster), *Goneplax rhomboides* (Angular crab), *Cepola macrophthalma* (Red Band Fish), and *Lesueurigobius friesii* (Fries Goby).

Nephrops norvegicus is a species of crustacean that creates a burrow system with up to seven entrances. These burrows are characterised by: the crescent shaped arch over the entrance; track marks made by the individual as it moves back and forth excavating material; and, most importantly, the sloping angle of the tunnel entrance.

To confuse matters, *G. rhomboides* also creates burrows with angular sloping entrances. It is very difficult to tell *G. rhomboides* and *N. norvegicus* burrows apart without trapping the creature that created the burrow you're looking at! However, you can tell it's a crustacean burrow. On a side note, *G. rhomboides* and *N. norvegicus* burrows can

Fig. 3: Characteristic fin ray imprints around a C. macropthalma *burrow. Image: Lin Baldock.*

both be used in emergencies by Fries Goby. This little fish is extremely shy and if it is disturbed unexpectedly will seek the nearest form of shelter.

Lastly *C. macrophthalma* creates a burrow which plunges vertically down into the sediment. Usefully this species leaves another clue. *C. macrophthalma* has a pair of pectoral fins just below its gills. When resting at the top of its burrow it settles on these pectoral fins. This leaves the imprint of the fin rays at the top of the burrow; this feature is very distinctive and can allow a positive identification of the species.

You may be starting to realise that with evidence features such as these that the devil is in the detail!

Some species that create complex habitats can be missed by less experienced observers. One such example is the important habitat forming species *Modiolus modiolus* (Horse mussel). *M. modiolus* can be missed altogether when observers see only the dead shell and large epifauna associated with a *M. modiolus* reef rather than the live mantles hidden within.

Confidently identifying species by observing their features will reduce the need to carry out destructive sampling. It will also help increase our knowledge of marine biodiversity and therefore help us make more informed decisions about conserving the marine environment.

Acknowledgments and the future of the project

Since the beginning of this project there has been nothing but outstanding support from amateur enthusiasts to professional marine biologists. People have freely and willingly contributed many hours of time towards the project, and without their help the project would never have got as far as it has. So to those who have contributed, many of whom are Porcupine members, I am extremely grateful.

We are hoping to get the book to print before the end of 2014 (what an excellent stocking filler you may be thinking!). There is still a long way to go before the book is published. Of the 160 species included, 90 have been written up and most have accompanying photographs. However we are in need of a few more pictures, and further funding to complete the write up of all of these species. We are also looking for specialists to dedicate time to proof read appropriate sections and of course printing costs. If any readers would like to contribute anything to the project, be it time, photographs, knowledge, funding sources or winning lottery tickets then please do get in touch.

Photographs we would like to include are:

1. *Antalis entalis* (animal and tube)
2. *Apletodon dentatus* (animal and eggs)
3. *Calma glaucoides* (animal and eggs)
4. *Clymenella torquata* (animal and tube)
5. *Eulalia viridis* (animal)
6. *Ficopomatus enigmaticus* (animal and tube)
7. *Lacuna pallidula* (animal and eggs)
8. *Lacuna parva* (animal and eggs)
9. *Lagis koreni* (animal and tube)
10. *Lepadogaster lepadogaster* (animal and eggs)
11. *Littorina fabalis* (animal and eggs)
12. *Littorina obtusata* (animal and eggs)
13. *Loligo vulgaris* (animal and eggs)
14. *Neptunea antiqua* (animal and eggs)
15. *Okenia aspersa* (animal)
16. *Owenia fusiformis* (animal and tube)
17. *Placostegus tridentatus* (animal and tube)

Fig. 4: A Modiolus modiolus *reef of the North Llyn, North Wales*

18. *Raja alba* (animal)
19. *Raja batis* (animal)
20. *Raja brachyura* (animal)
21. *Raja microocellata* (animal)
22. *Raja radiata* (animal)
23. *Sacculina carcini* (animal and its effect on crabs)
24. *Scoloplos armiger* (animal)
25. *Spirorbis cuneatus* (animal and tube)
26. *Spirorbis inornatus* (animal and tube)
27. *Spirorbis rupestris* (animal and tube)
28. *Spirorbis tridentatus* (animal and tube)

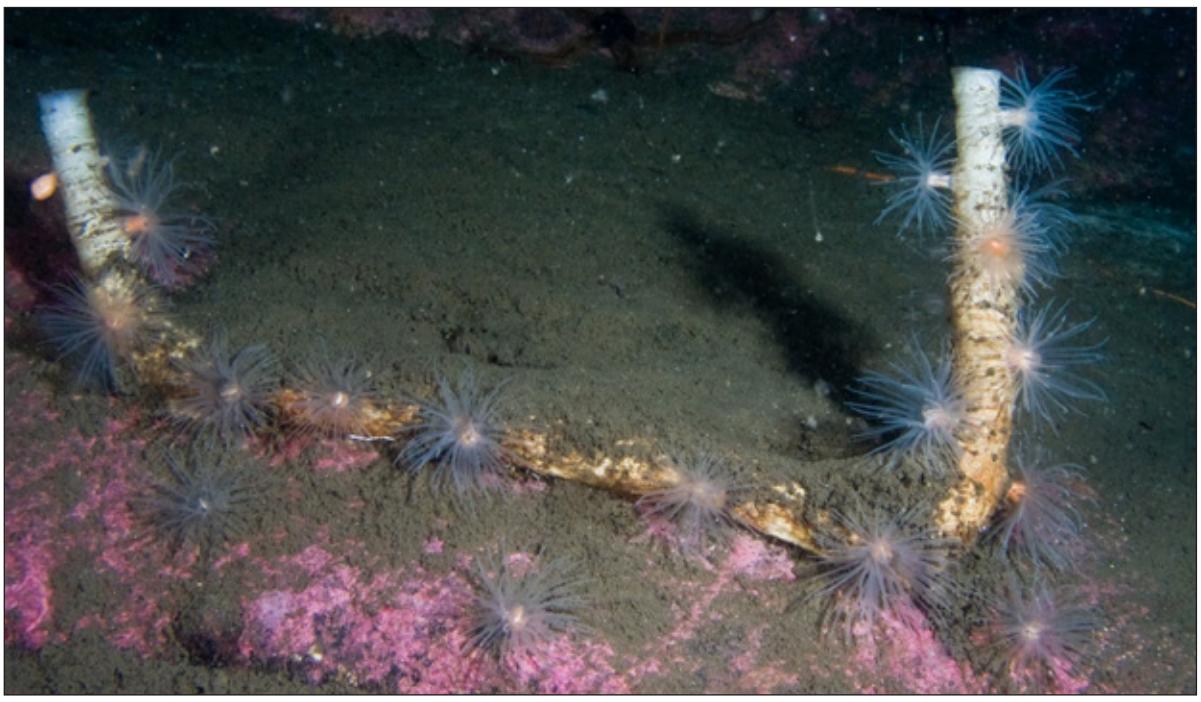

Fig. 5: A U-shaped Chaetopterus *tube attached to bedrock. Image: Mike Markey.*

Sponges, Squirts and Seasearch

Claire Goodwin[1], David Kipling[2], Sarah Bowen & Bernard Picton[1]

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Historically some groups of animals have been regarded by marine recorders as particularly difficult to identify – these include sponges and ascidians. Species from both groups often have a very distinctive appearance and are readily recognisable by form and colour. However, as many species are described from preserved specimens, and therefore living appearance is not given in the type description, it can be problematic to link the live appearance with the correct name. Recorders therefore often have to collect and examine specimens in the laboratory to confirm identification; examining the spicule skeleton of sponges and internal anatomy of ascidians. This can be very fiddly and time-consuming and not a task every recorder is willing or able to undertake. It is further complicated by a lack of identification resources and the fact that the taxonomy, particularly of sponges, is still fluid.

Records of sponges and ascidians are important as they are significant components of our marine biodiversity. They have an important ecological role, respectively filter and suspension feeding on small particles and consequently pass nutrients up the food chain. Both groups have both long and short lived species so can take advantage of a variety of ecological conditions. They can be dominant in hard substrate habitats and consequently often are used in determining the biotope habitat code (funding agencies are particularly keen that this is defined for marine records). Recently there has been great interest in sponges as a source of bioactive compounds for pharmaceutical use. Ascidians have hit the news too: there are several invasive ascidian species including the club sea-squirt *Styela clava* (Davis & Davis 2004) and the carpet seasquirt *Didemnum vexillum* (Griffith *et al.* 2009). Good identification resources are important for these invaders to be recognised and their spread monitored.

Fig. 1: Diver Jennifer Jones records sponge diversity in the Scilly Isles. Image: Claire Goodwin.

Fig. 2: David Kipling (seated in centre) and team surveying Scottish squirts. Image: Rob Spray.

Comparatively recently, aided by the growing popularity of SCUBA diving, it has been possible to link the microscopic and internal anatomical features used traditionally to identify sponges and ascidians with their living appearance in the field. Forerunners were the Underwater Conservation Society (now Marine Conservation Society) with their series of mini-print guides. The first incarnation of their sponge guide, 'Sponge 1', co-ordinated by David Guiterman listed just 26 species and this has now been developed into 'Sponge V' (Ackers *et al.* 2007) which has 105 species with microscopic spicule characteristics listed alongside information on external form and ecology. Ascidians haven't had so much focus on them: the current published resources for British and Irish Ascidians are the Underwater Conservation Society mini-print guide (Picton 1985) and the Linnaean Society Synopsis of British Ascidians (Millar 1970) which mainly provides information on internal anatomy. Of course now there are also many online resources available – e.g. the 'Encyclopaedia of Marine Life of Britain and Ireland' (Picton & Morrow 2010) and The Marine Life Information Network (www.marlin.ac.uk). Social media such as Facebook can be helpful as well and there are several Facebook groups which focus on identification of different marine groups.

To produce photographic guides significant 'ground-truthing' sampling is required where species are photographed *in situ*, collected, preserved, and examined in the laboratory. This links the original type description with *in situ* appearance and provides information on the range of external forms a species can take. Sponges can be particularly difficult to identify as they often develop different forms depending on environmental conditions such as current exposure. For sponges several ground-truthing projects have been carried out including collecting expeditions for the Sponge I-V series. Recently the 'Sponge Biodiversity of the United Kingdom' project sampled sponges from four areas (Goodwin & Picton 2011) (Figure 1); building on a similar project which sampled Rathlin Island in Northern Ireland (Picton & Goodwin 2007). Ground-truthing on ascidians is currently being co-ordinated by David Kipling and has involved sampling trips to north and south Wales and Scotland, the Pembrokeshire trip being funded by the Porcupine Society (Figure 2).

With both of these diverse groups being under studied surveys often discover species new to science. One example of this is the 'pin-head' sea-squirt (Figure 3) which was first recorded in 1984 during the Marine Nature Conservation Review baseline surveys. Improvements in underwater photography (specifically the development of digital photography) enabled its distribution to be more fully understood and better information on its external appearance

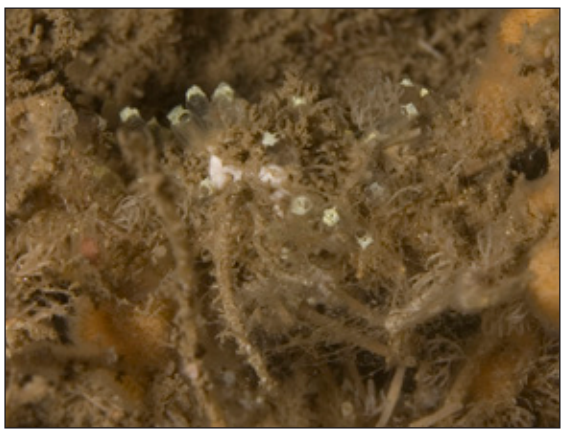

Fig. 3: The recently described 'pin head' squirt. Image: Claire Goodwin.

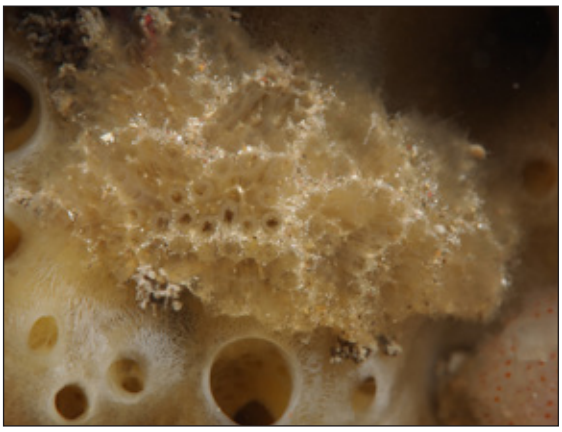

Fig. 4: Surveys reveal potential new species such as the 'honeycomb' ascidian. Image: David Kipling.

to be collected. This, combined with the development of molecular techniques for taxonomy, enabled a revision of its genus and its description as *Pycnoclavella stolonialis* Pérez-Portela *et al.*, 2010. Now that the species can be readily identified and named by recorders many additional records are being made. Several more potential new species of Ascidian have been highlighted including the 'Honeycomb squirt' (Figure 4) and 'Strawberry aplidium' (Figure 5). Work on sponges using the ground-truthing approach has also resulted in the description of several new species (e.g. Picton & Goodwin 2007) and the recognition that even some encrusting sponges, formerly regarded as impossible to identify in the field, may have characteristics which make them identifiable.

Seasearch is a project that involves volunteer divers in the survey of marine species and habitats. Part of the project's remit is developing identification guides, specifically aimed at divers, on the marine life of Britain and Ireland: so far the series includes Marine Life, Bryozoans and Hydroids, Seaweeds, and Sea Anemones and Corals. The guides are aimed at amateur divers and include species which can be identified *in situ*. We are currently working on a guide to sponges and ascidians which will be the next one in the series.

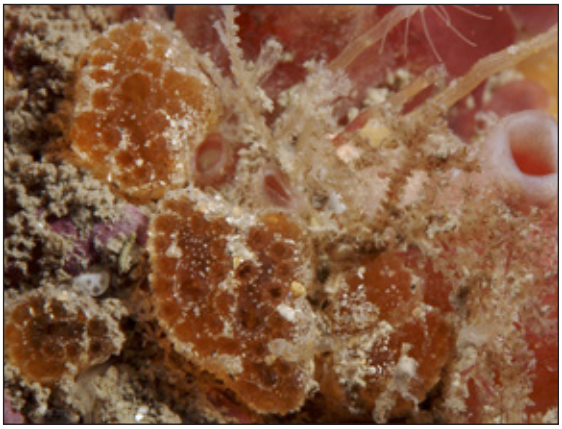

Fig. 5: Another undescribed species - the 'strawberry aplidium'. Image: David Kipling.

We are interested in photographic contributions for the book from recorders. We are looking for photos of the species to be featured in the book as we are keen to get images from a wide geographical range of sites (a list of species required can be provided on request). We would also like photographs of other marine organisms that could be confused with sponges or ascidians. Please get in touch if you can help – contact Claire.goodwin@nmni.com.

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Atlantic Herring *Clupea harengus* in the Irish and Celtic Sea: tracing populations past and present

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Introduction

In March 2004, I started my Ph.D. studies with the Commercial Fisheries Research Centre (CFRC) at the Galway Mayo Institute of Technology, under the supervision of Dr Deirdre Brophy and Dr Pauline King. My mission was to study Atlantic herring *Clupea harengus* (L.) and identify methods for tracing populations of the past and present.

Herring are distributed throughout the Northern Hemisphere, with populations occurring in the northeast and northwest, Pacific herring *C. pallasii* (V.) and Atlantic herring *C. harengus* (L.). Within the northeast Atlantic, there are numerous stocks, each with their own spawning time and location, and migratory patterns, which are generally subject to their own distinct fisheries (reviewed by Parrish & Savile 1965).

Review on herring ecology and distribution

In 2004, global capture production was over two million tonnes, with Norway and Iceland being the countries with the largest catches (FAO 2004). Their widespread commercial importance has led to extensive research during the last century, which has provided much information on their biology and ecology.

While these advancements have resulted in better knowledge of the fisheries, traditionally herring are better known for cycles of "boom and bust". In his book "The Herring Fisheries of Ireland (1900-2005)", Molloy (2006) outlines the up and downs of the herring fisheries around Ireland and the research and assessment of the stocks. Over the centuries, battles have been fought, numerous poems and songs written and countless man hours laboured fishing and researching these silver darlings. As John Molloy puts it - "*Down the ages, herring have evoked excitement and controversy like no other species, sometimes to the point where violence has erupted in the most peaceful communities*" (Molloy 2006)

Female herring lay their eggs on the seabed, usually in water 10 to 80 m deep, on hard ground covered with small shells, stones or seaweed. The eggs are fertilised in the water by the male herring, which discharge their sperm at the same time as the females lay their eggs. The eggs incubate for between 10 to 30 days depending on water temperature until they hatch. By the time they reach about 40 mm in length they are found at inshore nursery grounds. They can remain as larvae for between three and eleven months (typically seven). The metamorphosis to juvenile includes the development of scales and adult pigmentation. They remain at nursery grounds until they move out to more offshore feeding grounds when mature, usually around three years of age (Parrish & Saville, 1965) although this can vary depending on the stock. Adults migrate between feeding and spawning grounds throughout their lifecycle. These migratory patterns cause uncertainty for the assessment of the associated herring fisheries when fish from different management areas mix.

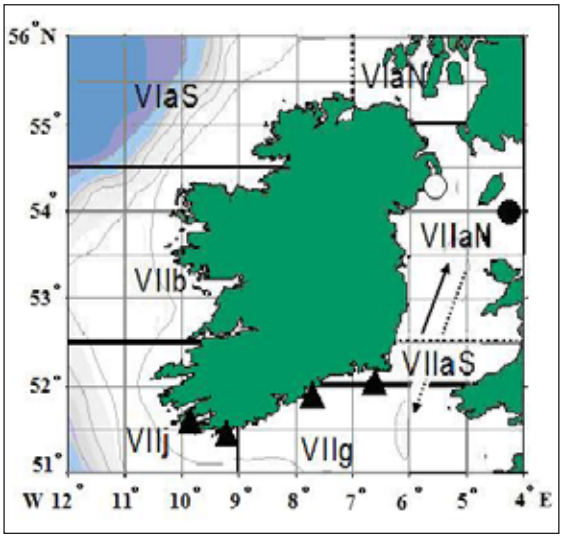

Fig. 1: Map showing the management units and main spawning locations of herring in the Irish and Celtic Sea. Solid circle; Isle of Man autumn spawners. Open circle; Mourne autumn spawners. Solid triangles; Celtic Sea autumn and winter spawners. The movement of larvae/juveniles from the Celtic Sea into the Irish Sea is indicated by solid arrow. Proposed return route indicated by dashed arrow. The solid and dashed lines mark the boundaries of ICES divisions and subdivisions respectively.

Herring around Ireland are divided into four different stocks for management and assessment purposes and are considered to be biologically separate (Marine 2007). These stocks are as follows and are their ranges are shown in Figure 1:

- West of Scotland – ICES Div. VIa (North)
- Irish Sea – ICES Div. VIIa (North)
- West and North of Ireland - ICES Div. VIa (South) and Div. VIIb
- Celtic Sea and South West of Ireland - ICES Div. VIIa (South); Div. VIIg and Div. VIIj

While these areas are managed separately, it is now widely accepted that a proportion of juveniles from the Celtic Sea area are found at nursery grounds in the Irish Sea due to dispersal during the first year of life. Evidence from larval drift studies (Özcan 1974), length and vertebral count distributions (Bowers 1964), tagging studies (Molloy *et al.* 1993) and otolith increment widths (Brophy & Danilowicz 2002) all show mixing of the two stocks in the Irish Sea during the early (larval/juvenile) life stages.

Using otolith microstructure, Brophy & Danilowicz (2002) successfully separated juvenile herring collected from the Irish Sea, into autumn (Irish Sea in origin) and winter spawned (Celtic sea in origin) fish. This verified that there are two components in the Celtic Sea stock, the juveniles that remain in the Celtic Sea (resident) and those that move into nursery grounds in the Irish Sea during the first year of life (migrant). Indirect evidence of this migrant component returning to join the Celtic Sea winter spawning stock as adults has been provided by tagging experiments (Molloy *et al.* 1993) and by the absence of winter spawned fish from spawning assemblages in the Irish Sea (Brophy *et al.* 2006). The coincidence of low recruitment in the Celtic Sea during the 1970's with the industrial fishery, which targeted juvenile herring in the Irish Sea from 1967 to1978, also suggests that the Irish Sea is an important source of Celtic Sea recruits (ICES 2001).

Methodology and Results

My objective was to trace this migrant group of Celtic sea juveniles, but why was this important? Accurate juvenile abundance estimates play an important role in stock assessments. Stock assessments are used to identify the current state of stock, to examine the future outcome for the stock given a number of alternative management strategies, to determine whether a stock is under- or over-exploited, or if its status will change in the future if subject to different levels of exploitation. Its ultimate goal is to provide reliable management advice to avoid long term economic or social problems associated with population crashes.

The abundance estimates for age-1 fish (defined as individuals with one winter ring) provided by the Northern Ireland acoustic survey includes an unknown proportion of fish of Celtic Sea origin. Without the removal of this Celtic Sea fraction, juvenile abundance estimates from the Irish Sea are not appropriate for the calculation of Irish Sea recruitment indices, as they will include fish in the assessment that do not recruit to the Irish Sea spawning stock as adults. Similarly, if these adult fish return to join the Celtic Sea spawning stock, they may provide an appropriate recruitment index for that stock. My postgraduate studies looked at methods for tracing this group of migrant fish using otoliths.

Otoliths are ear stones which are found in the semi-circular canals of teleost fish from freshwater and marine habitats, from polar to tropical regions. They assist in detecting sound and are used for balance and orientation (Popper *et al.* 2005; Campana & Neilson 1985). Otoliths consist of layers of protein and calcium carbonate, which are deposited throughout the life of the fish. These depositions form microscopic increments, which are visually similar to the growth rings of a tree and provide a permanent record of daily and annual growth rates. Daily increments were first discovered in 1971 (Panella 1971). When growing conditions are less favourable, the rate of deposition slows and a protein poor translucent ring is laid down on the otolith. In temperate regions, this period of slower growth usually occurs in winter. These macroscopic

annual structures can be used to age a fish and have been used since 1899 when Reibisch first observed annual ring formation in plaice *Pleuronectes platessa* (L.) (Ricker 1975).

Otolith microstructure (using daily growth increments) has been used to differentiate between seasonal herring populations in the Irish and Celtic Seas (Brophy & Danilowicz 2002), the Norwegian Sea (Moksness & Fossum 1992), and the North Sea (Mosegaard & Madsen 1996). Autumn spawned fish generally experience slower growth than winter and spring spawned fish resulting in narrower increment widths and smaller fish sizes. However, while this method was successful for classifying individuals as autumn or winter spawned, it would not be useful for identifying which Celtic Sea winter spawned adults had spent their juvenile phase in the Celtic Sea (resident) from those who had spent their juvenile phase in the Irish Sea (migrant).

Otolith shape analysis was then investigated. Otolith shape would appear to be an ideal marker for fish populations. It is distinctly species specific (L'Abee-Lund 1988) and less variable than fish growth patterns, most probably due to the dual function of the otolith as an organ of balance and hearing (Campana & Casselman 1993).

Basic methods of otolith shape analysis include manual distance measurements that can be used to calculate size parameters such as area and perimeter. These in turn can be used in a series of mathematical equations to calculate shape indices such as circularity and roundness which are used to characterise the shape of the otolith (Tuset *et al*. 2003; Russ 1990). More complex methods look at the overall shape and use image analysis software to describe the shape of the otolith. Outline methods use trigonometric functions (e.g. polynomials, Fourier series) or other empirical functions (e.g. eigenshape analysis, median axis) to analyse outlines of otolith silhouettes. Many of these methods are incorporated into software packages. Generally, mathematical functions (usually Fourier transforms) are used to generate a set of shape variables from digitised outlines. Each successive shape variable adds increasing detail to the description of the overall shape. These shape variables can be analysed using multivariate analysis such as discriminate function analysis.

This study uses elliptic Fourier analysis (EFA) to describe otolith shape in Atlantic herring. EFA uses Cartesian (x,y) coordinates along the outline of an object to characterise its shape.

For our study, otoliths were collected from herring from the 2003 cohort over a three year period. Samples were taken onboard the RV *Celtic Explorer* in the Celtic Sea and the RV *Corystes* in the Irish Sea. Individuals were taken from both areas in 2004 (age-0, no winter ring) and 2005 (age-1, one winter ring), and in the Celtic Sea in 2006 (age-2, two winter rings). Otolith microstructure analysis was used to classify all samples as autumn or winter spawned, and autumn spawned individuals were removed from further analysis.

To begin with, otolith shape analysis was carried out on the otolith edge of age-0 2004 samples (Figure 2) to identify if shape differences existed between the Celtic Sea resident winter spawned group and the Irish Sea migrant winter spawned group. Discriminate function analysis (DFA) gave an overall classification success of 84% and a jack-knifed classification of 83%.

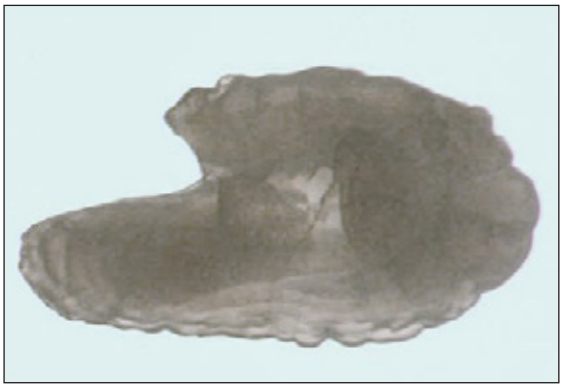

Fig. 2: Image of age-0 herring otolith taken using transmitted light

Next we traced the first winter ring in age-1 winter spawned samples from the Celtic and Irish Sea from 2005 (Figure 3). Using results from the shape analysis of this trace, age-1 individuals were cross-validated using the DFA developed for the age-0 samples.

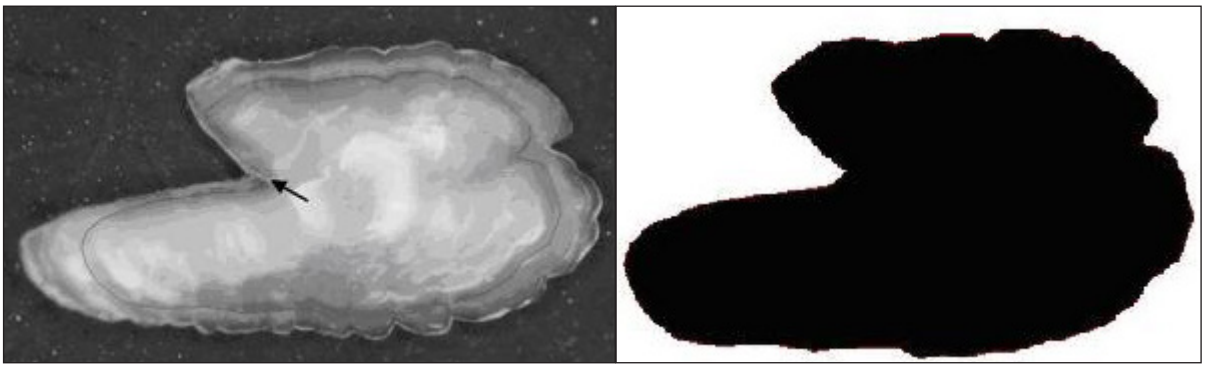

Fig. 3: (left) Image of age-1 herring otolith with trace of the first winter ring marked by black line. Outline traces started at excisura major marked by arrow; and (right) age-1 herring otolith trace filled in black in preparation for elliptic Fourier analysis.

Results found that 97% of individuals were classified correctly to nursery ground. Of the age-1 fish, 93% of Celtic Sea fish and 100% of Irish Sea fish were successfully classified to the correct region (Table 1).

Finally we tested 2006 age-2 samples collected in the Celtic Sea. Once again the first winter ring was traced and used for otolith shape analysis. Integrated Stock Mixture Analysis (ISMA) was used to determine the proportion of migrant and resident individuals present in the sample using the juvenile otoliths (age-0) as the reference sample. A series of ISMA simulation tests were carried out to determine our margin of error (±7). Using ISMA analysis the estimated proportions of the resident and migrant components in the samples of spawning age-2 adults ranged between 51-65% (resident) and 35%-49% (migrant) when margins of error were considered.

Discussion

The levels of classification success achieved in this study (81 to 100%) show that otolith shape is useful for discriminating between juvenile herring from different nursery areas and spawning components, and in particular, for tracing nursery ground of origin in winter spawned Celtic Sea fish using the shape of the first winter ring.

Actual origin	**Age**	**Classified to**		
		Celtic Sea	Irish Sea	% Correct
Celtic Sea	0	55	13	81
	1	28	2	93
Irish Sea	0	14	73	84
	1	0	29	100
Total	0	69	83	83
	1	28	31	97

Table 1: Jackknifed classification matrix for discriminate function analysis of the age-0 juveniles and cross validation of age-1 fish from the Irish and Celtic Seas. All fish sampled from the 2003 cohort.

The method could be applicable to other herring that show movement of juveniles outside their natal area. In particular, the North Sea autumn spawners and Downs herring display a similar pattern of mixing. Juveniles have been shown to migrate into the Skagerrak where they mix with Western Baltic spring spawners until they migrate back at age 2/3 (Rosenberg & Palmen 1982). While the juveniles are currently identified in the western Baltic using otolith microstructure and vertebral counts (Clausen *et al*. 2007; ICES 2007), the proportion of adults in the North Sea who spent their nursery period in the western Baltic is not known. Shape analysis of otolith annuli could be investigated as a method of tracing this migrant component, and to identify if a similar stock structure is evident. Shape analysis of internal annuli may also prove useful for tracing nursery origin in mixed feeding stocks. There is much potential for the method to be applied to questions of herring stock structure and migration patterns in the northeast Atlantic, as many stocks cannot be classified using genetic analysis (Mariani *et al*. 2005; Bekkevold *et al*. 2007; Hatfield *et al*. 2007).

The study of juvenile and adult Celtic Sea winter spawned fish also provided strong evidence that Celtic Sea herring that disperse into the Irish Sea return to their natal area to spawn. While previous studies provided

indirect evidence of natal homing (Molloy *et al*. 1993; Brophy *et al*. 2006), this was the first study to trace the movement of a cohort from juvenile to adult stage and show direct evidence of natal homing. Exciting results for all involved.

This work was carried out as part of a Ph.D. awarded by the Galway Mayo Institute of Technology in November 2004.

Dedicated to the memory of John Molloy, 19 September 1940 - 29 May 2013. A passionate fisheries scientist whose knowledge and pioneering work for herring fisheries is an inspiration.

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In situ recording of epibenthic communities: issues with consistency

Jon Moore & Francis Bunker

Aquatic Survey & Monitoring Ltd.

Introduction

The EU Habitats Directive requires member states to regularly report on the condition of designated Special Areas of Conservation (SAC), thereby requiring some form of standardised monitoring framework. The UK conservation agencies have developed a framework that includes Conservation Objectives, Site Condition Monitoring, Attributes and Targets, with the strongly evidence based approach that is now expected by interested parties.

A number of UK marine SACs have been designated for intertidal and/or subtidal Reef features, with species rich epibenthic communities dominated by sessile species (sponges, hydroids, anemones, bryozoans, sea-squirts, and red, brown & green algae etc.) that are not easily sampled. *In situ* recording of conspicuous species, or photography/ video followed by recording from the images, is therefore preferred. Selection of the designated sites was often based on data collected with so called Phase 2 style *in situ* methods that had been developed through the Marine Nature Conservation Review (MNCR) and that work has produced many marine biological surveyors with good *in situ* identification skills.

Monitoring, however, requires standards of data collection that are greater than those required for the Phase 2 descriptive surveys. Some epibenthic marine monitoring focuses on particular species of conservation interest (e.g. sea fans) and is well developed for that species; but there are few good indicators of reef site condition, so much site condition monitoring is still based on whole community composition, with species richness as the key attribute (see guidance in JNCC 2004). To provide quantitative data that can be analysed statistically most monitoring methods have used quadrats as the standard survey unit, with multiple replicates to describe the usually considerable patchiness, typically limiting or stratifying the recording by depth and other habitat features (Murray 2001).

The potential for surveyor error and biases in marine biological recording is well known (e.g. Baker & Little 1989), but the level of such errors and biases in epibenthic community monitoring is not well described. Moore (2000) described the results of quadrat methodology trials, but down-played the issues of consistency, as long as monitoring from a checklist of characteristic species was carried out by experienced surveyors. Many SAC monitoring programmes using *in situ* recording have been established since then, but recent results have suggested that the issues of consistency need further attention, in both intertidal and subtidal habitats.

Studies at Portrush, 2013

In 2013 a team of divers from the Joint Nature Conservation Committee (JNCC) and Aquatic Survey and Monitoring Ltd. (ASML) assessed the consistency of *in situ* recording at two sites within the Skerries and Causeway SAC, near Portrush on the north coast of Northern Ireland. Site 1 was a vertical bedrock wall (1 to 1.5m high) at 4m bcd, overhung by dense kelp and dominated by red algae (particularly *Delesseria sanguinea*), plus a variety of sponges, anthozoa, bryozoa, ascidians and other typical shallow infralittoral cliff fauna. Site 2 was on tide-swept upward facing bedrock at 20 m bcd, dominated by a dense bed of ascidians (numerous species), plus various anthozoa and erect bryozoans. Site 3, a shallow seagrass bed, was surveyed when rough seas made the other sites inaccessible. Transects, marked and labelled at 0.5m intervals, were fixed in place at each site. Quadrats, 25cm x 25cm, were placed at the marked positions and surveyed by the divers, who were categorised by their survey experience as either experienced (two surveyors) or less experienced (eight surveyors). Using recording forms with species checklists, the surveyors recorded species composition and abundance of either the full community (experienced surveyors only) or a defined subset of taxa (less-experienced surveyors). Poor weather and other logistical issues limited the

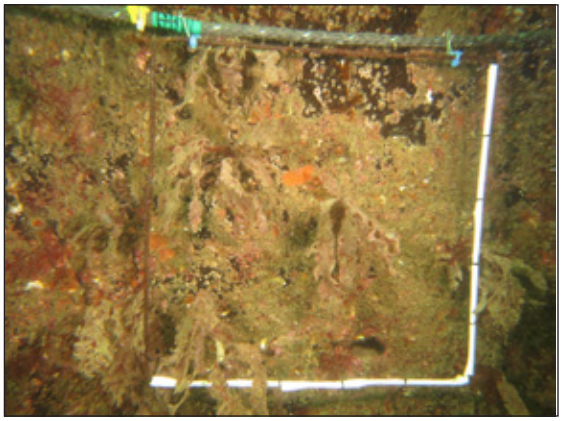

Fig. 1: Quadrat (25cm x 25cm) in position on Site 1, Portrush. Image: C Neil Golding JNCC 05/08/2013

amount of data collected, but a large number of quadrats were surveyed with many quadrat positions being visited by multiple surveyors, allowing many comparisons to be made.

Each quadrat position was also photographed by a diver with a digital SLR camera and frame (same size as the quadrats). These photographs were later analysed by six of the same surveyors to record species composition and abundance in the same way as the *in situ* recording. The results from the photograph analyses are described in the survey report (Moore *et al.* 2014).

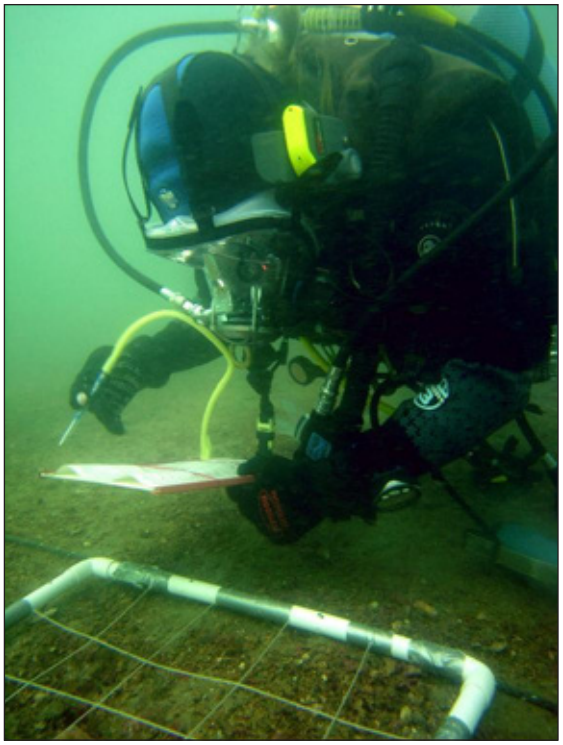

Fig. 2: Survey diver recording from quadrat (50cm x 50cm). Image: C Francis Bunker

Results and conclusions

The study showed that consistency between surveyors was often low for most of the taxa recorded from the three sites, both qualitatively (i.e. in terms of the simple presence / absence of taxa in surveyors records) and quantitatively (i.e. in estimates of abundance). High levels of consistency were only achieved for a small number of taxa that are easily identified and stand-out from the substrata they live upon and from the other epibiota that surrounds them.

At Site 1, the chosen subset of taxonomic groups for all surveyors to record were the anthozoa, the red algae and encrusting bryozoa (the latter as an aggregate group). A total of 22 species/taxa were recorded by 7 surveyors from 23 fixed quadrat positions along the transect (160 samples). The cup coral *Caryophyllia smithii* and the anemone *Actinothoe sphyrodeta* were recorded relatively consistently and without any signs of bias between surveyors, as expected for such distinctive species. The same could not be said for any of the red algae. Only the most abundant, *Delesseria sanguinea*, was recorded qualitatively (i.e. presence/absence) with high consistency because it was present in almost all quadrats and distinctive; but estimates of its abundance showed large differences (Figure 3, top) between some surveyors, and some clear biases. Other less abundant red algae (e.g. *Hypoglossum hypoglossoides*, Figure 3) were less consistently recorded, both qualitatively and quantitatively. Encrusting bryozoa were also recorded by most surveyors from most quadrats, but two surveyors missed them in a few quadrats and abundance estimates were also very variable (Figure 3). The number of species/taxa recorded from each quadrat also varied considerably between surveyors (Figure 3, bottom), at least partly correlated to experience and identification skills but also to the amount of time taken to survey each quadrat.

Ascidians were the chosen taxonomic group of interest for recording by all surveyors at Site 2, due to their dominance at the site. A total of 27 ascidian species/described entities were recorded by 8 surveyors from 39 fixed quadrat positions along the transect (99

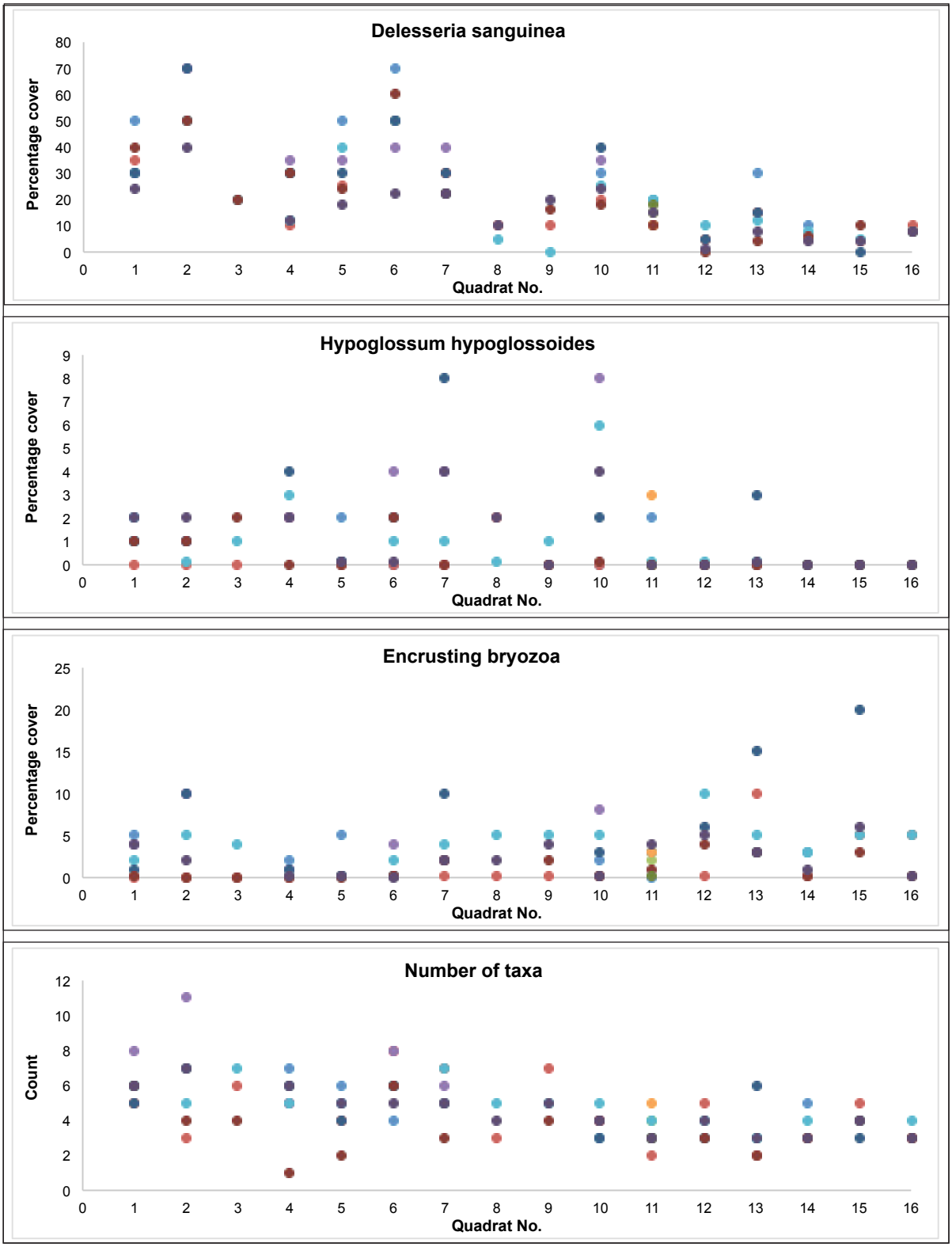

Fig. 3: Recorded abundances of three species/taxa and counts of all recorded taxa (selected groups only) by seven surveyors from sixteen fixed quadrats on vertical bedrock at Site 1

samples), though a number of those entities may have been different descriptions of the same species. Consistency of identification was very poor for many of the ascidians present, with good consistency only for the distinctive lightbulb seasquirt *Clavelina lepadiformis*. It was soon clear that an *in situ* recording methodology was inappropriate

for that ascidian community, though there was greater consistency of recording of the wider community (particularly anthozoans and bryozoans) by the experienced surveyors.

Similar trends and issues were found in the data from the seagrass bed (Site 3) where 5 surveyors recorded from 18 quadrats, but only 7 quadrats repeated by multiple surveyors.

Surveyor experience was a significant factor affecting the consistency of recording, primarily with recognition of the less well known taxa. The red algae at Site 1 and ascidians at Site 2 were both difficult groups to identify to species level and the more experienced surveyors showed significantly greater consistency. The identification training provided to the less-experienced surveyors was insufficient to prepare them for such detailed recording. However, for many of the red algae and ascidians consistency of identification was also poor between the experienced surveyors.

Surveyor experience was less of a factor in the consistency of abundance estimates. For species that were identified consistently, estimates of percentage cover by experienced surveyors appeared to range as widely as estimates by less-experienced surveyors. For the algae it is likely that some of the inconsistency was due to movement of the fronds, but that does not account for inconsistency in records of short turf and encrusting species.

The small size and cryptic nature of many epibiota was obviously a major factor affecting consistency of recording and often resulted in bias between surveyors. Some surveyors rarely recorded certain species that other surveyors recorded from many quadrats (e.g. the red algae *Pterosiphonia parasitica*). Surveyor's eyesight (and use of magnifying glasses by some surveyors on some days) was a related factor, but was not tested.

Absence of a species from an *in situ* survey record was therefore unreliable, which therefore makes the species richness values unreliable.

Discussion

When we started monitoring epibenthic communities in marine SACs it seemed a natural progression to use quadrats, recording all the species we recorded in Phase 2 style surveys and taking multiple replicates for statistical analysis. Rocky shore biologists had been using quadrats to study limpet / barnacle / fucoid communities for many decades. However, looking back at those studies one realises that they didn't often attempt those methods in species rich lower shore overhangs or pools or under-boulders. Much of the problem is that when recording quantitatively from a quadrat you can't just record and count the obvious well developed individuals / colonies / plants; you have to include the silty poorly formed ones that can take up a notable proportion of the community. Useful comparison can also be made with other fields of biological monitoring, e.g. in terrestrial habitats, where *in situ* surveyors are skilled in particular taxonomic groups and would not attempt to record the wide range of biota that we attempt in some epibenthic programmes. But they don't have sessile animals that look like plants, or many relatively slow moving and conspicuous animals like our crustaceans, gastropods and echinoderms that can be recorded in quadrats. They also have very different site characteristics, access and surveying constraints.

If we continue to monitor communities of epibiota with these *in situ* methods we must invest greater effort to improve consistency. A certain level of between-surveyor variability is inevitable and can be acceptable if it is unbiased. An accurate mean abundance can still be acquired if enough replicates are taken. Some bias between surveyors is also inevitable, but is much less easily compensated for, so needs to be minimised through training. However, it is considered likely that consistency will remain poor for many species and must be taken into account when interpreting recorded abundance changes over time. We have to accept that one may not be able to detect even some moderately large changes in epibenthic communities without destructive sampling. Further, it is considered an unachievable ambition to reliably monitor species richness of whole epibenthic communities using *in situ* recording (or photographic techniques), without setting

severe limitations to the monitoring targets (i.e. accepting a relatively very low number of species as the target).

A number of recommendations have been prepared for development and improvement of monitoring programmes that use *in situ* recording and for further studies of these issues. They include the need for pilot studies, testing for recording biases, voucher specimens and photo collections, training and QA procedures. More details are given in the study report (Moore *et al*. 2014). Further studies of these issues are being developed.

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Didemnum vexillum in south Galway Bay

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The highly invasive species known as the carpet sea squirt, *Didemnum vexillum* Kott, 2002, was first recorded in Ireland from Carlingford and Malahide marinas in 2005 and 2006 (Minchin & Sides 2006; Minchin 2007). It was recorded subsequently in Carlingford Marina in 2008, 2009 (author), 2012 (Minchin & Nunn 2013) and by others (unpublished records). The species may have disappeared from Malahide due to a freshwater influx.

On 28th September 2007 while on holiday (leading a Porcupine MNHS field trip!), I found the first record of *Didemnum vexillum* from the west coast of Ireland. This was a single clump on an oyster trestle at Parknahallagh 53° 10.65' N, 008° 57.38' W), near Ballindereen, north of Kinvarra, Co. Galway (south Galway Bay). This was reported by me at the time to National Parks & Wildlife Service. I subsequently also saw the species at Carrowmore, south Galway Bay 2 days later, again on oyster trestles. A photograph of the species featured on the Invasives Ireland web site at http://invasivespeciesireland.com/most-unwanted-species/established/marine/didemnum-spp.

A second recording of the species was then identified in late 2007, in Clew Bay on oyster trestles. An additional record associated with the upper couple of metres of a long-line mussel facility was reported in 2009 (J. Kelly pers. comm.). This site is currently being investigated by Martina O'Brien, Ph.D. student with Tasman Crowe, UCD.

Didemnum vexillum was first recorded in Northern Ireland from Ballydorn Lightship in Strangford Lough on 5th September 2012 (Minchin & Nunn 2013). It was subsequently recorded from several sites in the immediate vicinity of the Lightship. It was confirmed to still be present nearby on Sketrick pontoon during the Marine Blitz in Strangford Lough in August 2013, and on Ballydorn Lightship (2013/14, H. Edwards pers. comm).

On Tuesday 1st April 2014, I returned to the site at Parknahallagh, south Galway Bay (during the PMNHS field trip, post-Galway conference) to see if the *Didemnum vexillum* had disappeared or expanded during the 7 years since my last visit.

Fig. 1: Boulder at Parknallagh covered in Didemnum vexillum

Fig. 2: Didemnum vexillum *smothering other epifaunal life on a boulder*

The number of oyster trestles present had expanded considerably since 2007. Of these, a significant proportion (perhaps 60%) had some *D. vexillum* present as an encrusting squirt on the wire of the oyster bags; and in places the squirt was all over every piece of algae hanging down from the trestles. Some oyster trestles were free of the squirt, but these were ones that were clearly cleaned regularly.

That was not the most disturbing part of the observation. Walking from the oyster trestles, I discovered that the entire local lower shore was smothered in *D. vexillum*. Every boulder had some sea squirt on it (Figure 1). In places, it was smothering algae and other marine life (Figure 2). The boulders included those sitting on and in maerl and *Zostera marina* beds present at the site; although thankfully none directly on those two habitats. I walked for about an hour around the lower shore in the vicinity of the trestles at low water - the species was everywhere, covering boulders.

Both Paul Brazier and Kathryn Birch (Natural Resources Wales) were also present to observe the species on the lower shore. All three of us took appropriate precautions to ensure that our clothes and gear were either not subsequently used during that trip, or were soaked in fresh water to prevent any spread on further sites. However, the site is well visited, and it is unlikely that any decontamination regime is in place. National Parks & Wildlife Service have been informed.

Didemnum vexillum normally dies back during the winter, and the extent observed would reflect this. The extent in August/September later this year, when in full summer growth and able to reproduce, may well be substantially greater.

It is possible that the intertidal coverage is due to pieces of the species being cleaned off the trestles and carried by the local current which runs over the trestles, maerl and *Zostera*. However, this should not be read as a criticism of the oyster farmers in any way whatsoever, who may be unaware of the species and its significance.

I am very concerned for the marine life in this whole area, which is a Special Area of Conservation. Spread from this source will be very easy with the strong currents, and there is considerable suitable habitat. The species does not 'integrate' with what is already present – just smothers and kills it.

The spread looks very similar to that observed in Kent, England http://www.kentonline.co.uk/canterbury/news/invasive-carpet-seasquirt-spread-a69212/. A number of PMNHS members would be familiar with the Kent discovery which occurred during a PMNHS field trip.

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Blitz the Lough! 2013

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Introduction

In 2012, a combined survey by Seasearch volunteer divers and the Porcupine Marine Natural History Society (PMNHS) was proposed for Strangford Lough in late summer 2013. A field survey week was envisaged, rather than a more recent style 24-hour Bioblitz event, which would be too limited for recording. This proposal was revised to an organisational partnership between Seasearch NI and the Centre for Environmental Data and Recording (CEDaR), National Museums Northern Ireland, with sponsorship for the cost for the Marine Laboratory at Portaferry (Figure 1) from PMNHS, the Conchological Society of GB & Ireland, and CEDaR. Additional support was provided by Marine Division, DoE and Northern Ireland Environment Agency.

Strangford Lough, Co. Down was selected as the study area for this project as it is a Special Area of Conservation, and one of only three Marine Nature Reserves in the United Kingdom. The Lough has important sublittoral habitats, and there is on-going conservation concern over the decline of *Modiolus* beds and associated species. It also has a wide range of intertidal habitats. Historically, Strangford

Fig. 1: Marine Station, Queen's University, Portaferry

Fig. 2: Participants in the Marine Laboratory during the Blitz

Lough has been an important research area for marine biologists, with around 1500 marine species recorded over more than 150 years. More recent detailed recording of marine life including non-native taxa from visiting and local scientists was considered to be a welcome addition to the knowledge base for the Lough.

The goals of the project were:

- To collect a large number of species records from a range of intertidal and subtidal sites around the lough.
- To record the presence and distribution of non-native species.
- To target historical recording sites such as 'The Dorn'.
- To target priority habitats (maerl beds and seagrass beds) and priority species.
- To raise awareness of the importance of collection of records of marine life for conservation.
- To provide species records to the Centre for

Fig. 3: Seasearch divers at Portaferry

Environmental Data & Recording (CEDaR) at the National Museums Northern Ireland, who then makes the data available to other users.

• To provide an informal forum for the exchange of knowledge concerning identification of marine species and habitats (Figure 2).

Boats for diving were supplied by DV Diving (Wednesday 21st - Friday 23rd August); and by Dolphins Sub-Aqua Club (Saturday 24th/ Sunday 25th August). Costs for the hire of these boats was on a 'break-even' basis and paid for by the participating divers. All diving from these boats was organised and managed by Seasearch NI. Particular thanks should go to Dolphins SAC for making their club boats available (Figure 3).

Marine Division (DoE) independently carried out 4 dives in the designated Restricted Zone (*Modiolus modiolus* zone); and also carried out 4 grabs within the main body of the Lough.

Results

Participants

46 scientists (amateur and professional) from Northern Ireland, Republic of Ireland, Scotland, England, Ohio (USA). This included staff and students from CEDaR; National Museums Northern Ireland; Marine Division (DoE); National Museums of Scotland; Trinity College Dublin, Queen's University Belfast; and members of SEASEARCH, PMNHS, Conchological Society of GB & Ireland and Ulster Wildlife.

Expertise

Particular expertise was available in tunicates, molluscs, sponges, hydroids, bryozoans, anemones, lichens.

Sites

Intertidal: 9; Marina: 1; Pontoon: 1; Grabs: 4; Seasearch dives: 34; Marine Division (DoE) dives: 4

Cetacean & Seal Watch

1 full day

Shore Thing & Big Seaweed Search

Evening of 20th August

Evening talk

The Modiolus *story so far* by Joe Breen, Marine Division

Records compiled

4512

Unique taxa found during the seven fieldwork days

More than 500 live taxa at the end of the week.

Figure 4: (left) The Dorn & (right) Julia Nunn on the shore at The Dorn

Taxon	ALL	BLITZ	NEW
Protozoa	2	1	1
Porifera	83	37	2
Cnidaria	94	46	1
Ctenophora	2	0	0
Sipuncula	6	0	0
Platyhelminthes	2	1	0
Annelida: Polychaeta	322	21	0
Annelida: Oligochaeta	8	1	0
Arthropoda: Pycnogonida	11	4	0
Arthropoda: Collembola	1	0	0
Arthropoda: Insecta	1	0	0
Arthropoda: Cirripedia	7	5	0
Arthropoda: Amphipoda	156	15	2
Arthropoda: Decapoda	51	22	0
Arthropoda: all remaining crustaceans	65	9	1
Mollusca: Gastropoda	233	152	18
Mollusca: Bivalvia	104	75	3
Mollusca: all remaining groups	16	7	0
Bryozoa	78	37	4
Phoronida	3	1	0
Echinodermata	53	24	0
Hemichordata	1	0	0
Chordata: Tunicata	49	35	3
Chordata: Cephalochordata	1	0	0
Chordata: Fish	61	35	0
Chordata: Mammals	7	4	0
Algae: Chlorophyta	50	9	0
Algae: Ochrophyta	73	33	0
Algae: Rhodophyta	153	62	5
Tracheophyta	4	3	0
Fungi: Lichens	54	53	45
TOTAL TAXA (excluding lichens)	**1717**	**642**	**40**

*ALL = total number of taxa known (on CEDaR & DoE databases) from Strangford Lough including any new taxa from the Blitz

Table 1: Numbers of taxa found for each group of species

To date (from samples subsequently identified): 564 live taxa, 79 shell records, 53 lichen species.

No *Modiolus* beds or individual live large mature *Modiolus modiolus* were observed during the Marine Division dives in the Restricted Zone or on any other dive. The *Modiolus modiolus* live record listed was for a juvenile specimen found on the shore (Granagh Bay) by the author.

Non-native taxa

Two, new to Strangford Lough, non-native species were recorded - *Bugula neritina* (S of Abbey Rock, dive) & *Gracilaria vermiculophylla* (Granagh Bay, intertidal, det. J. Nunn) (Figure 5).

Didemnum vexillum was confirmed as still present in the Lough in August 2013 on Sketrick pontoon, but there were no records from any other site.

The non-native species *Aplidium glabrum, Austrominius modestus, Calyptraea chinensis, Caprella mutica, Codium fragile* ssp. *fragile*, *Colpomenia peregrina, Corella eumyota, Diadumene lineata, Perophora japonica* and *Sargassum muticum* were all recorded during this survey.

There were no records for *Styela clava, Undaria pinnatifida* or *Watersipora* spp. (present elsewhere in Northern Ireland's waters).

Fig. 5: Gracilaria vermiculophylla

Potential non-native species *Chondracanthus acicularis* was recorded again from Mahee Island gravel spit (below).

Bryozoan samples were sent to and were identified by Jo Porter (Heriot-Watt University). Small crustaceans and polychaetes were not sampled extensively due to lack of taxonomic expertise during the survey.

The numbers of species found for each taxon group is given below in Table 1. Further, detailed analysis of the species and habitats found is not discussed within this brief report.

Exploring new sites resulted in some unusual finds. Seasearch diver David Kipling said "One of my best dives of the week involved rummaging around at 20m on a featureless muddy bottom - you could probably hear the squeaks of excitement on the surface!" The animal which caused such a stir was *Armina loveni* (Figure 6). This flattened leaf-like sea slug feeds on the slender sea pen *Virgularia mirabilis* which is found in muddy areas, not often frequented by divers. This nudibranch hasn't been seen in Northern Ireland since 1990, and is only rarely recorded in the UK.

Conclusion

Over seven days, 46 scientists generated more than 4500 records from the subtidal and intertidal for 696 taxa (living/dead) in Strangford Lough. 41 of these taxa were newly recorded from the Lough (excluding lichens) together with two new non-native species. Many of the priority habitats and species were sampled including maerl, seagrass, '*Modiolus*', intertidal rapids. Several of those participating in the SEASEARCH diving programme were new

Fig. 6: Nudibranch Armina loveni

to the project, thus raising awareness of the importance of collection of records of marine life for conservation. The Cetacean Watch and the Shore Thing events engaged with the public. The lively exchanges of information and identification in the Laboratory each day and evening attested to the success of the informal forum for the exchange of knowledge.

A copy of this report in pdf format which includes the full species list, programme and list of participants may be obtained by emailing the author.

Acknowledgements

The organisers gratefully thank PMNHS, Conchological Society of GB & Ireland and CEDaR for financial support; the staff of the Marine Laboratory, QUB for facilitating our week at the Lab; and all the many scientists for their time and enthusiasm which made this project such a success!

SHORT ARTICLES

Further records of the bivalve *Microgloma pusilla* (Jeffreys, 1879) from Ireland

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Introduction

The minute protobranch bivalve, *Microgloma pusilla* (Jeffreys, 1879), is typically found at outer shelf and slope depths from 200m to 1200m and occurs from Norway and Iceland southwards and into the Mediterranean (Ockelmann & Warén, 1998). Subsequently it was reported from beach drift on the west coast of Ireland and northwest coast of Scotland (Keukelvaar-Van Der Berge, Phorson & Hoeksema, 2005). In the latter work, mention was made of a very early record, from a shallow water locality in Co. Antrim, Northern Ireland, made by Chaster (1897), but this could not be confirmed due to possible confusion with *Microgloma guilonardi* (Hoeksema, 1993).

Specimens collected recently, from Strangford Lough, Northern Ireland, in shallow water were sent to the second author for confirmation. Not only were these specimens confirmed as *M. pusilla*, it is now possible to report on the Chaster specimens, which have been located in the National Museum of Wales.

Material examined

1 shell and 1 valve, Ballycastle Bay, approximately 55°12'52" N 06°13'46" W, Co. Antrim, Northern Ireland. 26.5 fathoms (48.5m). Coll. GW Chaster. NMW.1910.29 (Chaster, 1897)

2 shells Strangford Lough, 54°26.001' N 05°36.729' W, Co. Down, Northern Ireland. 27.5m. Coll. J. Fisher, August 2013.

Identification

The current material (Figure 1A-D) is compared with other species of *Microgloma* and juvenile protobranchs that are all well illustrated in Ockelmann & Warén (1998). The relatively large number of teeth for the size of the shell, the lack of any resilifer and distinct commarginal ridges are all characteristic of

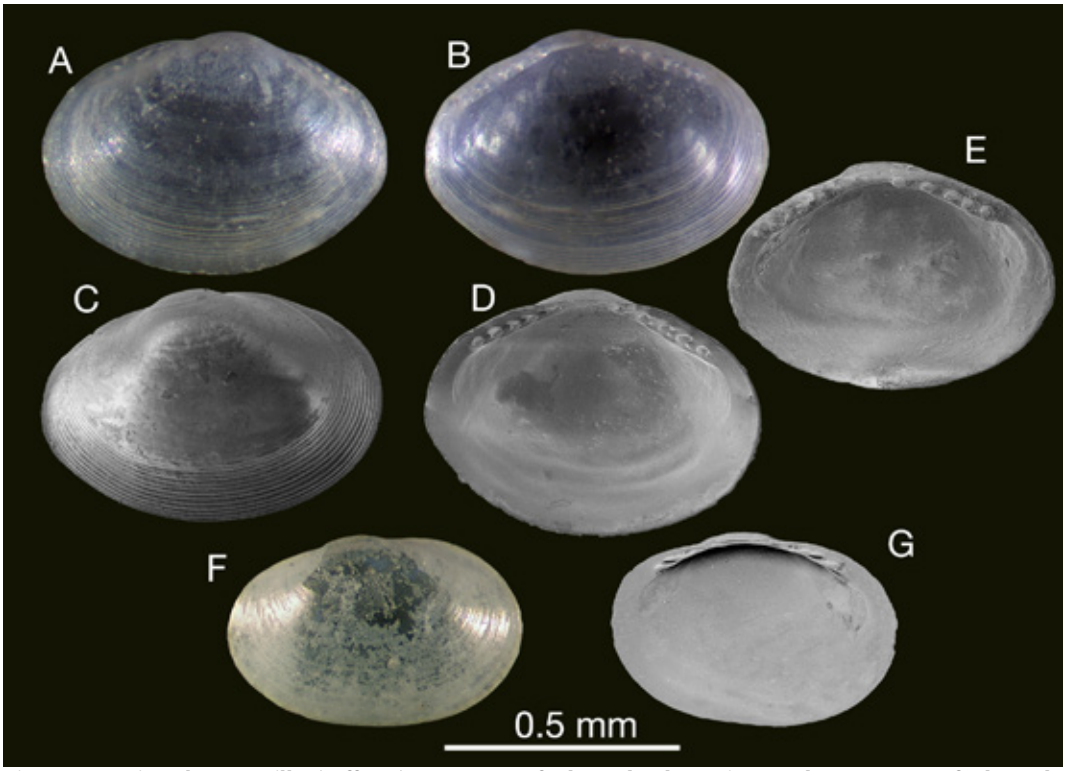

Fig. 1: A–E. Microgloma pusilla *(Jeffreys). A–B: Strangford Lough, photomicrographs; C–D: Strangford Lough, scanning electron micrographs; E: Ballycastle, Chaster coll. scanning electron micrograph; G–H.* Microgloma guilonardi *(Hoeksema), Northumberland, England, Phorson coll. in National Museum of Wales.*

Microgloma pusilla. *Microgloma guilonardi* (Figure 1F-G) is the only other congener that has been recorded from shallow water, but that species has a roundly oblong outline, lacks commarginal ridges and the teeth are fewer and sub-parallel to the hinge plate. Illustrations of all *Microgloma* species recorded from waters around the UK and Ireland can be found at http://naturalhistory.museumwales.ac.uk/britishbivalves/home.php?

The shells from Ballycastle Bay (Fig. 1E) collected by Chaster are in poor condition, but in all respects match the Strangford Lough shells, and are *M. pusilla*.

Discussion

The first shallow water records were made from valves isolated from beach sand, thus giving little indication of their origin. Both records here are from dredged samples taken at 27.5m and 40m. The Strangford shells are well preserved, both collected as paired valves and are probably close to, if not in, their life habitat. Strangford Lough is enclosed except for a narrow strait, its entrance some 12km distant from the collection site, further suggesting that these shells originate from within the Lough.

The bathyal habitat is described by Ockelmann & Warén (1998) as current swept, unconsolidated sediments with a high proportion of sponge spicules and supporting a diverse fauna. The molluscan fauna at the Strangford Lough location is diverse, with one hundred species of gastropod and bivalve identified by John Fisher. This list includes both live and dead shells, and indicates heterogeneous sediment with a high proportion of shell gravel. Given the small size of *Microgloma*, it is likely to be interstitial, and a loose, muddy gravel sediment would appear appropriate.

The bathymetric range of *M. pusilla* is enigmatic, ranging from the shallow subtidal to mid-bathyal depths. Very few bivalves display a similar distribution, and within the NE Atlantic protobranchs it is unique. Comparable are the thyasirids *Mendicula ferruginosa* and *Axinulus croulinensis* both found living in Scottish sea lochs at depths as shallow as 20m, but being found down to abyssal depths for the former and upper bathyal for the latter. Such occurrences are explained as post-glacial relicts surviving in the deep and cold fjord-like sea lochs. Strangford Lough is not a fjord, but is a post-glacial drowned valley and relatively shallow (Carter, 1982; Stephens & McCabe, 1977). This suggests that *Microgloma* has colonized Strangford Lough in the last 10,000 years.

The very few shells of shallow water *Microgloma pusilla* and the complete absence of living specimens renders a taxonomic review untenable, leaving the status of the shallow and bathyal populations unresolved and uncertain. Further investigation of these shallow water populations is warranted.

Acknowledgments

We wish to thank Julia Nunn and Marine Division (Department of the Environment) for facilitating the collection of the grab samples from Strangford Lough, and Harriet Wood for access to the collections in Amgueddfa Cymru-National Museum Wales.

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Exceptionally large Crawfish *Palinurus elephas* (Fabricius, 1787) from Irish, UK and French Atlantic waters

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On 24 January 2013, the MFV *Catherine Alice* (DA47) [Skipper: Mr Mark Francis, Loughshinny, Co Dublin] captured an exceptionally large male Crawfish *Palinurus elephas* (Fabricius, 1787) weighing 3.8 kg (Figure 1, above) while demersal trawling for Dublin Bay Prawns (*Nephrops norvegicus* L.) at a depth of 108 m on the Smalls Bank, Celtic Sea (51°31.5' N, 06°02.63' W). The carapace length (CL) measured in a straight line from the tip of the rostrum to the posterior mid line edge of the cephalothorax was 185 mm and the total body length measured in a straight line from the tip of the rostrum to the end of the outstretched telson (TL) was 470mm. The specimen was landed into Howth, Co Dublin on 25 January and transferred to Galway Atlantaquaria (www.nationalaquarium.ie) where it is currently on live display (Figure 2).

During the 19th century, Thompson (1856) noted that exceptionally large specimens of *P. elephas* weighing up to 3.6 kg had occasionally been taken off the south coast, including specimens measuring between 457 and 508 mm (TL) from Youghal, Co Cork. A number of studies carried out in both Irish and UK waters between 1967 and 2011, encompassing the period both prior to and after the introduction of tangle nets, indicated that males with CLs >185 mm were exceptionally rare and represented <2% of commercial landings (Gibson & O'Riordan 1965; Molloy 1970; Hepper 1971; Mercer 1973; Anon 2011). Indeed, during 1970 the estimated mean weight of commercially caught *P. elephas* was only 1.2 kg (Anon 2011). An exceptionally large specimen, weighing c.5 kg, was reported to have been captured off Inishshark Island (53.60°N, 10.30°W), Co Galway during September 2012 (Anon 2012a) (Figure 2, below). One of the largest known authenticated males, measuring 203 mm CL and weighing c.5 kg, was captured off Brittany during the mid-1990s (Latrouite & Noel 1997). The largest known authenticated female, measuring 495 mm TL, was captured off Cornwall during the mid-1970s (Hepper 1977; Hunter 1999).

Historically, *P. elephas* was regarded as relatively common off the S, SW, W and NW coasts, but uncommon or rare off the N, NE and E coasts of Ireland (Thompson 1856; O'Ceidigh 1963; Bruce *et al.* 1963; O'Riordan 1964; Gibson 1969, Boyd 1973). A commercial fishery for *P. elephas* evolved gradually during the 1930s, initially as a by-catch in the European Lobster (*Homarus gammarus* L.) fishery. Between the 1930s and 1970s, there was a gradual increase in the use of top entrance French barrel pots which increasingly targeted *P. elephas* as well

as *H. gammarus*. With the exception of the early 1940s (WW2), there was a corresponding increase in landings during this period, peaking during the 1950s-1970s at c.150 tonnes per annum. A total of 271,610 individual crawfish were landed during 1959 (Gibson 1969). However, following the introduction of tangle nets during the early 1970s, landings began to decline thereafter. From the point of view of sustainable exploitation and conservation strategies, Goni *et al*. (2003) demonstrated that traps (pots) are preferable to trammel (tangle) nets because they allow for the escape of a certain fraction of immature *P. elephas* and they also protect the largest males. Following a brief increase in landings during the late 1980s and early 1990s, landings have since continued to decline at an alarming rate. Indeed, current annual landings now amount to only about 20-30 tonnes (Anon 2011). Over the same period, a dramatic decline was also noted off the coast of North Pembrokeshire where the species was previously regarded as relatively common (Jones 2013). During 2011, it was estimated that about 112 Irish inshore vessels had targeted *P. elephas*, albeit only 30% of these appeared to rely heavily on the species. The estimated total value of crawfish landings during 2011 was c. €1 million, equivalent to 2-2.5% of the total value of Irish inshore landings (Anon 2012a).

The Irish crawfish fishery is currently regulated by two main Statutory Instruments (SIs):

(a) A minimum carapace length (CL) of 110 mm [Crawfish (Conservation of Stocks) Regulations 2006] S.I. No. 232 of 2006

(b) A prohibition on the use of nets to fish for Crawfish in certain specified areas off the coasts of Kerry and Galway [Crawfish (Fisheries Management and Conservation) Regulations 2006] S.I. No. 233 of 2006.

However, on foot of increasing concerns about the negative and declining state of Irish crawfish stocks, including undesirable by-catch of non-target and protected elasmobranch species in tangle nets (Anon 2012b; Coelho *et al*. 2005) as well as the apparent market preference for smaller size crawfish (i.e. <110 mm CL), the Irish Sea Fisheries Board (Bord Iascaigh Mhara) [BIM] carried out a review of existing technical conservation measures (TCMs) operated both by Irish and other EU member states (Anon 2012b). Following a public consultation process, a number of alternative TCM options were examined, including, *inter alia*, a prohibition on the landing of berried females, a reduction in the minimum landing size (from 110 to 95 mm CL), the introduction of a maximum landing size (120 mm CL), and the introduction of closed seasons and closed areas (Anon 2012a). However, as of today, the above mentioned SIs still remain in force.

Although several studies have shown that most marine protected areas (MPAs) are effective in increasing the mean size and biomass of *P. elephas*, there are also conflicting reports about the efficacy of some MPAs. For example, Follesa *et al*. (2008) and Bevacqua *et al*. (2010) highlighted the effectiveness of fishing restrictions in rebuilding *P. elephas* populations within a small MPA off Sardinia whereas Diaz *et al*. (2005) discovered that juvenile predation was significantly higher in an MPA of NE Spain (Western Mediterranean). The latter study concluded that the decline or absence of fish predators in the area outside the MPA (due to greater fishing pressure) may have led to lower predation on juvenile *P. elephas*. Indeed, a recent study discovered that fish parasite densities were greater within a MPA off the coast of Chile than in nearby open-access areas (Wood *et al*. 2013). In selecting MPAs, Giacalone *et al*. (2006) emphasised that the success of conservation and restocking initiatives depends heavily upon knowledge of *P. elephas* ecology and behaviour such as habitat selection, home range and site fidelity. In particular, movement patterns deserve major attention because they have an effect on the permanency and distribution of *P. elephas* both inside and outside designated MPAs. Most studies suggest that *P. elephas* migrate from relatively shallow inshore to deeper offshore areas during the winter months (Gibson 1972; Hunter 1999). Ingle & Christiansen (2004) remarked that although *P. elephas* has been found at depths ranging from 5 m to 160 m, it is chiefly found at depths between 10 m and 70 m. Indeed, it is interesting to note that the current exceptionally large male from the Smalls Bank was captured during January in relatively deep water (108 m), approximately 75 km from the nearest UK coast.

Acknowledgements

We are grateful to Mr Mark Francis for bringing the current specimen to our attention and for donating it to Galway Atlantaquaria. We also wish to thank the following experts for their advice: Dr Raquel Goni (Instituto Espaganol de Oceanographia, Palma de Mallorca, Spain), Mr Gary Hannon (Sea Fisheries Protection Authority, Clonakilty, Co. Cork); Dr Richard Fitzgerald (Shellfish Research Laboratory, University College Galway, Carna, Co Galway), Dr John Mercer (Inishbofin, Co Galway), Dr David Roberts (Queen's University, Belfast), Mr Richard Lord and Mr Andy Le Prevost (Guernsey, Channel Islands).

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After the storms

Keith Hiscock

Fig. 1: The Mewstone from above Wembury Point in South Devon on 8th February 2014

Introduction

From mid December 2013 to the end of February 2014, the coast of south-west and southern England and Wales were battered by a succession of severe gales, introducing a new category of sea state to my vocabulary: "Phenomenal". Furthermore, there was exceptionally heavy and prolonged rainfall (the highest since 1760 apparently). The significant damage to coastal properties and infrastructure, and the wrecks of seabirds (almost all auks) were widely reported and a great deal of litter was washed-up. So, what of shore and seabed marine life? The following is an account of findings that I have gleaned from my own and your observations. Not every sighting of washed-up or broken wildlife is necessarily the result of storms but many are. For observations that are not mine, the source is indicated.

Overall, it seemed that there had been some extremely large movements of sediments including very coarse material such as the cobbles especially on Chesil Beach[1]. Pebbles and cobbles being thrown at intertidal reefs had smashed barnacles and no doubt there were mussels either ripped-off by wave action or smashed off by mobile large sediments. Many limpets attached to rocks in Whitsand Bay showed signs of shell abrasion and thinness. In North Devon, some areas of large mussels had been devastated[2] and, in the Torridge Estuary, about 90% of mussels had been lost from some intertidal areas[3]. The level of sediments on sandy beaches had dropped by over a metre in many places and, by the end of May, had not returned, or only a little had returned. At Wembury Beach, the sediment had not returned by the end of June and was reported as dumped on shallow reefs just offshore. At Crackington Haven in North Cornwall, sand had been stripped away revealing long-dead *Sabellaria alveolata* – doubtless settled after a previous major storm event[4]. Early colonization of bare rock, mainly by *Ulva* (tubular) sp(p) and *Porphyra* sp(p) and, at Hell's Gates on Lundy, *Alaria esculenta*, was occurring during and after April. At Kimmeridge, probably because of loss

Fig. 2: Tregantle Beach, Whitsand Bay, 30 March: (left) Isolated area of scoured rock, most rocks were little affected; (right) colonisation on rocks exposed by sand level reduction but otherwise not subject to damaging scour. Mussels and barnacles seem largely intact.

Fig. 3: Boulder displaced from a rockpool at Wembury Point, 3 March 2014.

of limpets from some areas of very soft friable rock, there was a bloom of green algae[5]. Young limpets (8-10mm across) were common in the areas of uncovered rock at the end of June at Wembury. On many rocky shores, friable rocks had been broken in places and boulders displaced out of rockpools so that the fauna and flora was subject to desiccation and died. At Long Rock in Mounts Bay near Penzance, reefs had been broken-up and an eel-grass, *Zostera marina*, bed largely (more than 50%) destroyed. Although there were signs of damage to eel grass off Marazion, the beds there were almost all intact[6]. There was also an unusually high abundance of stalked jellyfish at Marazion after the storms and the possibility they had been displaced from elsewhere and deposited in the shelter there[7]. Movement of sediments (presumably suspension and re-settlement elsewhere) also occurred in deeper subtidal areas with fishermen observing that they were trawling-up rocks where previously there had been level sediment[8]. In Plymouth Sound, divers observed bare rocks in places where previously there had been sediment. Any species living in the sediments must have been displaced and many may not have been able to re-

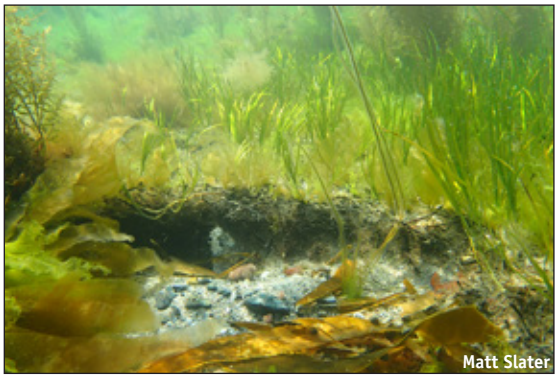

Fig. 4: A damaged eel grass bed at Marazion.

burrow. The stranding of otter shells (*Lutraria lutraria*) at Whitsand Bay[9] on 20 February was spectacular. A stranding of *Lutraria* was also reported on 12 February at Marazion and it was noted that such had also been observed on 19 February 2001 by Nick Tregenza[7]. Mantis shrimp, *Rissoides desmaresti*, were washed-up following storms at Dungeness in Kent and at Felpham in west Sussex[10]. Razor shells, *Ensis ensis*, were also washed out of sediments providing a feast for the gulls. 'Policeman anemones', *Mesacmaea mitchelli*, that normally live buried in sediments, were being picked-up

*Fig. 5: A spectacular 'wash-out'of otter shells (*Lutraria lutraria*) stranded in Whitsand Bay.*

in MBA trawls in Bigbury Bay and at station L4 halfway between the Plymouth breakwater and the Eddystone including in mid-June[11]. There was even the shell of a fan mussel, *Atrina fragilis*, washed-up at Sand Bay, Exmouth[12]. It seems that scallop populations may have been adversely affected on the open coast and a fisherman working out of Polperro, working grounds between Rame Head and Mevagissey reports not being able to find any scallops[13]. Some pink sea fans, *Eunicella verrucosa*, had been detached and there were many washed-up at some locations on the strandline (at Chesil Beach, Wembury Point and in Whitsand Bay[14]), although almost all popular diving sites on rock reefs with sea fans looked much as always. On ex-HMS *Scylla* in Whitsand Bay, comparisons of photographs taken in October 2013 and in April 2014 revealed eight fans in one location where there had been nine and the same seven fans in another. However, on the nearby wreck of the *Rosehill*, seafans, with their sea fan anemones

Fig. 6: Specimens of the burrowing anemone Mesacmaea mitchelli *caught from the surface of sediments in a MBA trawl in Bigbury Bay, South Devon. They were still being caught in mid-June.*

and all else had been stripped from many of the plates and some plates overturned leaving bare metal. Similar observations were made on the *Persier* in Bigbury Bay. Some rocks were scoured in the intertidal and most likely in the subtidal no doubt by sand blasting. However, they were not typical and it seems most likely that they were facing in the 'wrong' direction and received isolated damage. Many rockpool algal communities looked much as always in springtime during the seaweed identification course at the MBA and the comment was made that those rockpools that had been scoured may well develop very rich communities[15].

Some subtidal reef habitats may have been significantly damaged. In particular, the studies monitoring recovery of Lyme Bay reefs suggested that massive amounts of sand have been dumped on the reefs and that a lot of recovering benthic fauna had been scoured away[16]. At one location outside of Plymouth Sound, shale reefs had been broken-up in places or at least pre-existing

Fig. 7: Scoured-out sediment and a 'new' rockpool at Lundy with rockfall in the foreground, 17 May 2014.

Fig. 8: Seafans were found on the strandline at several locations, although populations on the seabed surveyed after the storms seemed normal except that the lower parts of some individuals were scoured. Renney Rocks near Plymouth on 19 March.

slabs of rock moved-around and pink sea fans, *Eunicella verrucosa*, displaced[17]. Many seafans near to sediment had bare skeleton near the base where the coenenchyme had most likely been scoured off, although regrowth of tissue may be occurring[5]. Although many large colonies persist, there is a suspicion that the very fragile colonies of ross coral, *Pentapora fascialis*, may have been destroyed in places. At Firestone Bay in Plymouth Sound, the abundance of filigree worm, *Filograna implexa*, colonies (which are often loosely attached to other organisms) appeared much less in spring and early summer than usual although seemingly 'as always' by the end of June. Also, although difficult to link to storms, abundance of *Tubularia indivisa* in Firestone Bay was much reduced this spring.

What has been remarkable is the apparently small amount of 'damage' to subtidal reef habitats. Dives at the Eddystone reefs, at Hand Deeps and Hatt Rock as well as further inshore at the Plymouth Dropoff (2nm south of the Plymouth Sound Breakwater) and along the coast near Wembury, have shown the marine life to look much as always including shallow *Laminaria hyperborea* forests intact. Sediments between the reefs also looked much as always. There were a very few detached *Eunicella verrucosa* but no other detached species observed (although the *Diazona violacea* caught in trawls in Bigbury Bay[11] had most likely been swept off reefs). Nevertheless, there was the

currently high abundance of *Diazona* at the Plymouth Sound Dropoff still present in late May. Rock surfaces at the Dropoff at depths in excess of 30m were very silty in March as were some attached species such as hydroids and this may have been the result of the very large amounts of silt being transported down rivers and out to sea as well as local sediment disturbance. The storms had uncovered 'artefacts' (mainly glassware and chinaware) at the Dropoff, no doubt from long-ago rubbish disposal, suggesting considerable disturbance of sediments. High levels of silt were also observed in Lyme Bay and may have blocked algal growth including settlement of seasonal algae[5].

'Other' effects

There were difficult-to-explain changes during and after the period of storms and heavy rain. A great deal of silt was no doubt washed-out from the land and muddy sediments were disturbed from sediment flats and even deep subtidal areas. This sediment would have been expected to settle-out within a few days or weeks. The high turbidity meant that diving was not possible before the second week of March when, for the rest of the month, underwater horizontal visibility was less than 3m off Plymouth and was reported as very low elsewhere in the south-west. Much of that turbidity had a 'milky' appearance after the storms had abated. An early interpretation of the milky water was that the waves had penetrated deeply into sediments, mobilizing very fine particles which did not sink. An inspection of such milky water near Penzance by David Fenwick revealed very fine quartz particles and mica. Another explanation (Gerald Boalch, pers. comm.) might be that the incursion of freshwater into the open sea caused flocculation of dissolved substances (e.g. phosphates, heavy metals). Turbidity measurements at station L4 approximately 5nm offshore of Plymouth Sound remained high until at least early May but underwater visibility was back to normal after that. Nevertheless, high turbidity may have affected spring algal growth which seemed delayed in subtidal areas at inshore locations. The 'milky water' that persisted after the storms only started to disperse by about mid-April.

There were other effects of the storms on marine life including 'interesting' drift material washed-up on strandlines with goose barnacles, Columbus crabs etc. – others can write that up.

So what?

It is important to understand which species are susceptible to natural events such as storms and which species are not to help interpret changes in abundance of species detected in surveillance programmes and to separate natural from man-made influences. What we have discovered from the storms (in broad terms) is that sediment-living species are highly susceptible when the wave action is so strong that it penetrates to depths where sediments can be mobilized and the species in them displaced. However, species attached to or living on hard substratum habitats will most likely survive with local 'hotspots' of damage especially where pebbles, cobbles and boulders are moved.

The trouble is, where do those observations of which species were and were not (significantly) affected get recorded and remain accessible for many years to come? It is about time that question was answered and a structure produced!

What now?

I have reported only the selection of observations that have been given to me and my own observations. Perhaps there should be a follow-on note assembled by the newsletter editor for the next edition. Send yours in.

Reports by:

[1] Lin Baldock; Steve Trewhella
[2] Paula Ferris, Coastwise North Devon
[3] Sarah Clark, Devon & Severn IFCA
[4] Chrissy Robinson
[5] Lin Baldock
[6] David Fenwick; Matt Slater
[7] David Fenwick
[8] [Noted as observation by Matt Norman but confirmation not obtained. Beshlie Pool[13] confirms beam trawlers report picking-up boulders where they had been catching flat fish]
[9] Darren Newton/Rame Beach Care
[10] Records from DASSH via Becky Seeley
[11] Aisling Smith, Marine Biological Association
[12] David Horne
[13] Beshlie Pool, Marine Management Organisation
[14] Lin Baldock, Esther Hughes, Sam Naylor
[15] Juliet Brodie, Francis Bunker, Christine Maggs
[16] Emma Sheehan, University of Plymouth
[17] Peter Rowlands

Obituary: Patrick James Sandilands Boaden - Addendum

Julia Nunn

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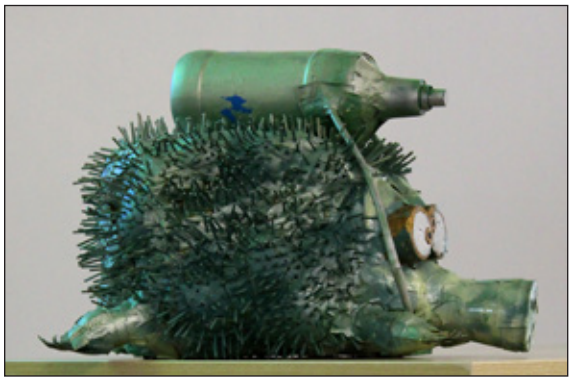

Fig. 1: Scubahystrix boadeni

There was one important omission from the obituary for Pat Boaden, published in the most recent Bulletin (Brown, 2014), and one which is particularly close to the heart of PMNHS members. This is the central role that Pat played in the development of our mascot!

In June (23rd-25th) 1978, PMNHS held a meeting in Portaferry, Co. Down, in conjunction with Pat Boaden and Queen's University Belfast, with the main topic being meiofauna – a subject in which Pat was an expert. Shelagh Smith then reported on a new species, named after Pat, discovered during this meeting (Smith, 1978). See PN1, 6, p.93 in the pieces Frank Evans has abstracted about the little sea porcupine.

This has passed into taxonomic literature as Scubahystrix boadeni Smith, 1978 (Figure 1) with the type locality being Portaferry.

Scubahystrix has travelled since then to almost every conference that has been held by the Society, although sadly it failed to reach the island of Ireland on the two occasions that meetings were held here since 1978. No other examples have ever been observed.

This species should not be confused with Thalassiohystrix scuba Smith & Heppell, 1982 (type locality: Porcupine Bank) which is thought to have been introduced to these islands in 1976. Smith, however, denies authorship of this species (Smith pers. comm.), and its taxonomic position remains to be resolved, particularly with regard to authorship.

However, in what was then the definitive position, Heppell (1983) stated: 'The first published description of T. scuba appeared in March 1982, cleverly incorporated into an accompanying illustration (Figure 2).

The wonderful drawings that appear throughout the Newsletter (and now the Bulletin) are of T. scuba; the first one being published in Porcupine Newsletter volume 2 (2) p. 29, July 1981 illustrating Notes & News by Sue Evans.

Are there are any members of the Society who can shed further light on the origins and history of both S. boadeni and T. scuba…….?

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Brown, R. 2014. Obituary. Patrick James Sandilands Boaden (1936-2013) *Bulletin of the Porcupine Marine Natural History Society* **1**: 4-5

Smith, S.M. 1978. Meeting at Portaferry, Co. Down, 23rd-25th June 1978. *Porcupine Newsletter* **1(6)**: 93

Heppell, D. 1983. Letters to the Editor. *Porcupine Newsletter* **2(7)**: 208

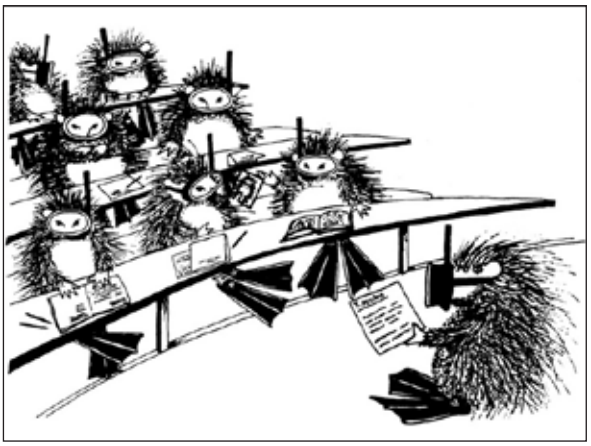

Fig. 2: Thalassiohystrix scuba

Scubahystrix boadeni

Frank Evans

In this article I have abstracted information about the little sea porcupine (attached), practically all items are from my time as PN editor (Vol. 2 and up to Vol. 3,3). All unsigned items are mine. I think the pieces by David Heppell and C. T. Canon (Roger Bamber) are great and might stand reproduction. Alas, no editor continued the joke. Of course, some of the remarks refer to the drawings in the Newsletter (T. scuba's trident, etc.)

PN1, 6, p.93

We have been presented with Scubahystrix boadeni sp. nov. This remarkable 'creature' of which only one example is known, appeared at Portaferry last year. It is bluish green in colour, with a hollow subspherical papyraceous body covered in short blunt spines. It has four stout splayed legs, about 10cm long set low on the body, each with four flattened triangular digits; a cylindrical snout of about the same length widening slightly to a truncated termination 7cm in diameter containing a pair of olfactory organs, above which is a pair of gold coloured cylindrical eyes about 5cm in diameter and protruding 4cm. There is no clear demarkation between the head region and the body. On top of the body is a bottle-shaped apparatus with tubes passing to a circular disc-like mouth lying beneath and at the base of the snout. This may be a respiratory or buoyancy aid. The animal is 42cm long and 97cm in girth. It is rather fragile and has poor resistance to desiccation. It has been suggested that the spines provide a habitat for its own commensal interstitial meiofauna.

Shelagh Smith

PN2, 4, p.86

SYMPOSIA OF THE ZOO. SOC., NUMBER 34 – A SERIOUS OMISION. In "The biology of the Hystricomorph Rodents", ed. I.W. Rowlands and B.J. Weir, 1975, xx + 482 pp. £27.20, which claims to be a comprehensive account of the world's porcupines, the contributors have signally failed to mention Thalassiohystrix scuba Smith & Heppell, the type specimen of which, complete with its red holotype spot, is currently eating a dish of whiting and sea lettuce at your editor's feet. More details of this remarkable beast in the next issue.

PN2, 5, p.111

GENDER OF THALASSIOHYSTRIX SCUBA Smith & Heppell. It was hoped in this issue to reveal the sex of the holotype of this species but its discovery has so far proved too difficult. While it is usually possible, by the judicious inversion of a small mammal, for instance a cat, to read the fine print beneath the tail it is certainly not so in the present case without serious risk to the investigator. Furthermore, direct verbal interrogation of the normally voluble subject has consistently been met by a prudish pursing of the lips. Any help in procuring a second specimen of Thalassiohystrix for breeding and the consequent resolution of this problem would be appreciated.

PN2, 6, p.135

THALASSIOHYSTRIX SCUBA Smith & Heppell - Problems in Nomenclature. Members will recall that in the last issue we sought further specimens of this species for breeding purposes and for the consequent elucidation of the sex of the holotype, currently lodged in the editorial office. The numerous offers we have received indicate that the animal is not as rare as was first thought; however, we have now recollected the correspondence initiated by C.T. Canon in PN1, 5 and further letters from D. Heppell and R.V. Melville in PN1, 7.

Rereading these letters, we have decided that there is no way in which we are going to permit a pregnant holotype; the nomenclatural problems regarding the status of the offspring are too dreadful to contemplate. We thank all who responded to our request for assistance, nonetheless.

On the same subject, it seems that Thalassiohystrix scuba lacks an agreed vernacular name. Our specimen responds most readily to the word "dinner", but this may not be an acceptable sobriquet.

Any suggestions?

PN2, 7, p.176

From Member P. S . Davis , The Hancock

Museum, Newcastle on Tyne.

Dear Editor,

Regarding a vernacular name for Thalassiohystrix scuba, 'tis really quite shrimple, your holotype must be called SQUILLA.

Hystrixically yours, P.S.D,

PN2, 8, p.202

A COLONY OF WILD PORCUPINES (Hystrix sp.) originating from eastern India has been discovered living in a Devonshire wood. Perhaps our own Thalassiohystrix scuba in turn has a wider distribution than its currently known range in "Porcupine" seas. Would overseas Members in particular please be alert to the possibility.

PN2, 8, p.208

From Treasurer David Heppell, The Royal Scottish Museum, Edinburgh.

Dear Editor,

Although the taxonomy of the scubarhine Anatipodia is still in its infancy I should like to "make a few points" concerning the best-known species, Thalassiohystrix scuba. Confusion has arisen since the original specimen of Scubahystrix boadeni (see PNl, p. 93) was exhibited by our Secretary at the recent AGM at Menai Bridge. As no other example of that remarkable creature has yet been found its systematic position remains conjectural. While its lack of the posterior flipperpods so characteristic of T. scuba may be due to an accident of preservation, the shorter dorsal spines and the scubal organ in the form of paired dorsal bottellae do rather suggest an animal which has adapted the primitive acanthotrophic feeding behaviour (noted by Pliny in fructivorous echini) to an infaunal habitat and a specialized diet of epizoic meiofauna. T. scuba on the other hand seems to be very much a generalist, and has been observed using a variety of tools (see for example PN2, pp.134, 148, 182). The variation in size and configuration of these is not thought to be a useful taxonomic character, however, unlike in certain marine gastropods. I would also like to "point out" a variation in the handedness and coloration of the scubiform apparatus, which in T. scuba is cephalic (compare figures at PN2, pp.70 and 111). Again this is probably not significant; sinistrality/dextrality is known in a number of marine organisms and the loss of pigmentation can be attributed to a diet of whiting reported for the holotype specimen (PN2, p.86)

Some members have enquired about the original description of T. scuba, while others may perhaps have wondered whether, in the words of Prince Charles "her talents are so unique and unusual that comment would be utterly superfluous" (describing not Diana, apparently, but Dame Edna). In fact the first published description appears on p.70 of PN2, cleverly incorporated into the accompanying illustration. As students of the ICZN Code will know, so long as the name itself is Latin or Latinised the description may be in any language whatever. Here appropriately it is written in the Porpentine tongue (and aquillic paint) and is roughly equivalent to "Thalassiohystrix nosce Te ipsum", recalling Linnaeus's succinct description of *H. sapiens* in the Systema Naturae

Other matters of "acute" interest are whether the accessory trident organ (ATO) so well adapted for spearing whiting may have a secondary function for defence, and the nature of the symbiont shown on PN2, p.175. The latter is neither a catfish nor a sea-lion cub, but a porpuss. As to the ATO I make a "sharp" distinction between taxonomy and toxophily and prefer to leave experience of venomous attacks to our Secretary (PN2, p.135). For all I know Thalassiohystrix may be able to shoot every quill in its body if sufficiently provoked.

PN2, 10, p.288

PROFESSOR THOMAS HENRY HUXLEY whom we have adumbrated above would never remove the household cat from his favourite chair when he wished to sit down, rather calling one of his daughters to perform the task, in case the animal should take a dislike to him. No such inhibitions deter your Editor when repossessing himself of the editorial chair so frequently occupied by the office Thalassiohystrix. Prickles or not, the brute has to shift. However the wet spot left on the seat cushion causes the beast considerable

amusement which we find intensely irritating. We are considering placing a "good home wanted" notice in "Porcupine Ads".

PN3, 1, p.19

ON THE VERNACULAR VARIETIES OF THALASSIOHYSTRIX, WITH NOTES ON FABLED RELATIVES.

C. T. Canon

Peripheral Elecricity Generating Board, PO Box 999.

Since records of Thalassiohystrix are particularly rare in litt., probably due to the world's population being only 150 or so (PN2, p.215), it has proven particularly difficult to clarify the vernacular taxonomy of this animal. In response to the request for such information (PN,2, p.135), we discovered the Geordie appellation of ! Squilla' (PN2, p.176), but it 'was unclear whether this was an all-embracing term, or referred only to the Bernician variety. We have to date collated seven valid patois synonyms, deriving from what we assume to be local varieties, but which are now deemed to be all the same species, variety, race, or even individual if it were particularly porcupitinerant. Particularly useful was a battered copy of Sars (1917) "Crustacea of Norway", a much neglected document which details the work of this great porcupioneer, who was the first to recognise that the "midwife hystrix", or storkupine, was a mere flight of fancy. It is pertinent at this point to establish once and for all that the new-world form, described from a single specimen found porcupining away in a Caribbean zoo, and showing a veritable cocktail of morphological characteristics - the so-called Porcupinacolada was in fact a sheep-goat-hystrix chimera.

1. Hystrix couchant (see Fig. on p.202 of PN2) … **Porcsupine**

Passant, rampant, etc., but not couchant when sober … **2**

2. Obligate carnivore, a wolf in hystrix clothing … **Porclupine**

Not an obligate carnivore, more a gourmand … **3**

3. Restricted to calcareous downland and Dover, white … **Chalkupine**

Less conservative in habitat, less white… **4**

4. Inbuilt flotation, found bobbing off the S. coast of Ireland …**Corkupine**

Capable of submersion, often in the drink … **5**

5. Ears long, often heard to rabbit on at meetings … **Porclapine**

Less than four, or, if larger, then no white tail … **6**

6. Arboreal, endemic to Caledonian forests … **Porcscotspine**

Endemic, branching out more than the above … **Porcyewpine**

[The senior synonym, now emended, being preoccupied (with something) and due to a spelling error when carving the name on a conjectured submarine bank.]

Reference

Sars, Alberto. 1917. *Crustacea of Norway, including particularly those forms with vertebrae and spines strangely neglected in previous volumes, with a similar title.* Unattributed Press, 2.5p. (=6 old pence).

Scottish adventures, above and below the water

Becky Hitchin

Ongoing cast

Me: marine habitats monitoring person, dive team person, would rather be underwater or in water.

The dog: Loki, 6 month old cocker spaniel who is new to all the joys of rockpooling

The usual partner in crime: Simon Exley, skipper of the *Fyne Pioneer*

The other accomplices: George Brown, Jim Anderson, Fiona Crouch, Ross Bullimore, Bernard Picton, Claire Goodwin, Jon Chamberlain and others

Rockpooling with dogs

Over the last few months I've been remembering the joys of having a canine companion when out on the shore. The last cocker spaniel I had went everywhere with me - shore surveys, marine life ID days, *D. vexillum* surveys in calf deep mud. Every time I went to the beach, she would be there too, sniffing serenely at shore crabs and amusing herself for hours on end. So I thought Loki would instantly be the same. But I forgot that there is a huge difference between a relatively sedate, relatively mature cocker and a 6 month old bouncy pup.

I expect a lot of people will recognise my current sequence of actions when trying to take a photo of something small and interesting. It goes something like this:

1) Find something interesting on a rock

2) Look around furtively to see how far away the dog is. Consider whether you can take a quick photo before he notices something Interesting is happening

3) Fire off a few too-hurried out of focus shots, the last one always containing half a rock and half a dog's head as the canine nose connects with the Interesting object in question

4) Drag the dog off the rock in question, hoping he hasn't stepped on, squashed, or knocked off the Interesting thing

5) Repeat steps 3 and 4 a few times

6) Try and distract the dog by pointing out a crab that he could play with instead of flopping around on the one rock you don't want him to

7) Fire off another few too-hurried shots and then give up and find another Interesting Thing

My intertidal photography has gone distinctly downhill since Loki started coming out on the beach.

Shore diving

Nearly all my shore diving in the last few months has been at Scotnish, an area of tidal narrows at the top of Loch Sween, with Simon and a few others that have been persuaded up to the area. It's a completely amazing place, from the first step you take into the water. Actually, it's amazing even before that because it's possibly the easiest place to park, kit up and get into the water that I've ever come across. From car to water in a few metres, plus, at one site, a wall at perfect height to rest your kit on while you're getting ready and boulders on which to sit while getting your fins on.

There are two main sites that we dive at – the first on the main maerl bed, and the second, on mud.

So. The maerl bed. As you slide into the water, you look immediately down onto a mass of *Ophiocomina nigra* wriggling around on a fine muddy sandy sediment, parting occasionally to show flashes of pink *Ascidia virginea* and the red and yellow gas mantle of *Corella parallelogramma*. Other larger echinoderms creep across the smaller brittlestars – mainly *Astropecten irregularis* and orange and red *Crossaster papposus*. A few metres further on and the black brittlestars give way to larger metallic blue *Ophiothrix fragilis*, first in patches, then in areas of almost solid seabed cover. The rest of the seabed starts to be taken up with deep deposits of maerl, the pink of the alga bright against the brittlestars. Scotnish almost looks like a painter's palette, bright splashes of so many colours.

At a grand depth of about 2 or 3m, you then come to a stand of *Halidrys siliqua*. In January, February and March, these *Halidrys* strands

were covered in small lumps of bright orange *Amphilectus fucorum, Facelina bostoniensis* and small clumps of hydroids that were, in turn, covered with tiny *Doto* species.

The rest of the dive - which can easily last 90 or 100 minutes due to the shallowness – is a mix of these habitats of maerl, brittlestars and nudibranch-filled *Halidrys*, in varying amounts depending on where you end up. So far we've managed to dive the maerl site every month, though at the moment, it's rather overrun with green algae, especially *Codium* sp. and *Mesogloia* sp. It really will be interesting to see how the site changes and grows through the rest of the year.

And then if the maerl isn't enough, there's the muddy end of the narrows, which I actually think is even more fascinating than the maerl, though I know others may disagree. It really is good proper mud, elbow-deep fine, fine mud. It's a moonscape full of large mounds dotted around with numerous *Cerianthus lloydi*. Scallops, spider crabs and shore crabs meander across the mud, and *Facelina bosteniensis* glide more serenely across it. The swathes of mud are interspersed with small patches of rock covered with coralline pink algae and hosting a fauna and flora similar to the maerl-y end of the narrows. It's amazing how much abundance and diversity can fit onto one small area of rock.

Boat diving

My second home seems to be wherever the *Fyne Pioneer* – Simon's really rather lovely large and speedy RIB - is, whether that's the Sound of Jura, Loch Fyne, Lochaline or Strangford Lough. Our biggest adventure this year (so far) has been going over to Strangford Lough for the First Irish Nudibranch Safari, taking the RIB from Loch Fyne across the Irish Sea. The story of that week will have to wait till the next edition of the journal, as escapades involving whisky, hot tubs, limpets, chitons and chronic lateness for dives are far too much fun to just summarise here. But just to say that we found a total of 54 nudibranchs and 6 other sea slugs, 2 species new to Strangford Lough, 2 species that may not be described and 5 *Doto* species which need studying with DNA to see if they are separate species too.

But as I said, that's for a later issue. Over the last few months, we've also been up and down Scotland, mainly around the Sound of Jura and Sound of Mull, though at the moment Simon is out leading an expedition based at the Ross of Mull, and next week, we're heading out to Lochmaddy to dive St Kilda and the Monach Isles. Again, stories for the next issue. The highlight of this half of the year has, for me, been discovering Sailor's Grave, a 24-27m deep wall at Ardnoe Point, just south of Crinan. Every time people go there, something impressive seems to turn up. The latest was George Brown and Jim Anderson finding *Arachnanthus sarsi* on the sandy sea floor at the base of the wall. Last week, we went back out there to try and find this rare anemone for ourselves. We failed at that – though I blame the levels of silt rather than our anemone-finding abilities.

It's a lovely wall. Below about 13m, *Swiftia pallida* becomes abundant, ghost-white shapes twisting out from the rock at uncomfortable angles. There's also huge balloons of *Diazona violacea*, and all the way up to the kelp forest fringing the rocks of Ardnoe Point, a great abundance and diversity of other squirts, sponges and red algae. Last week's best encounter was actually in the kelp forest, while pootling along on a safety stop. On the edges of some of the vast *Laminaria saccharina* blades, bright red and dark red *Aplysia* were mating. I'd never seen that colour scheme before, and they really were beautiful.

Adventures of a rockpooling dog

So that's my adventures over the last few months, and the start of Loki's adventures in the world of intertidal fun. By the next issue, he'll have grown and maybe got a bit braver. I'll have hopefully been to St Kilda, Cape Wrath, Orkney and been part of the JNCC summer surveys at Lochaline. Watch this space …

Intertidal Fishes: Life in Two Worlds – Michael H. Horn, Karen L. M. Martin & Michael A. Chotkowski (Editors)

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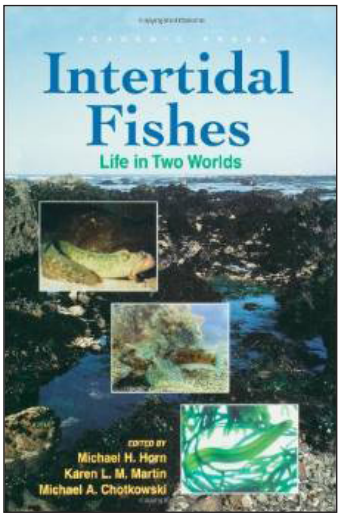
Book Review by Andrew Rapson



I'm always on the lookout for a high-quality book. I already own just about every seashore guide ever written and although they vary in quality none are very in-depth. Most have a diagram or photo along with a little general information that allows you to be able to identify your finds in most cases but little more. So when I saw this book and read the preview (downloaded for free on Kindle) I could see that it stood out as being very different indeed.

I have always been interested in the marine environment of Britain and the fishes found there. *Intertidal Fishes: Life in Two Worlds* isn't a guide to the British Sea shore; it covers the intertidal zone worldwide, focusing on the fishes that are permanent residents. It tells how the fish manage to live in this hostile environment, their relationships with each other, how they cope with predation, the adaptations which allow them to cope with the sometimes extreme conditions, their biology and ecology.

Each chapter is about a different subject within the context of the title and is written by a total of twenty one international experts on intertidal fish biology. Therefore each chapter is almost a separate volume in its own right that together surely make *Intertidal Fishes: Life in Two Worlds* the most comprehensive book on the subject.

Introduction: by M. H. Horn. K. L. M. Martin and M. A. Chotkowski.

Section 1: Background, Methods and Basic Patterns

Chapter 1: Introduction by R. N. Gibson.

Chapter 2: Methods for Studying Intertidal Fishes by R. N. Gibson.

Chapter 3: Vertical Distribution Patterns by Claus. Dieter. Zander. Jurgen Nieder and Karen Martin.

Section 2: Physiological Specialisations

Chapter 4: Terrestrial and Aquatic Respiration by Karen. L. Martin and Christopher R. Bridges.

Chapter 5: Osmoregulation, Acid and Base Regulation and Nitrogen Excretion by David H. Evans. J. B. Claiborne. Gregg. A. Kormanik. J. B. Claiborne and Gregg. A. Kormanik.

Section 3: Behaviour and the Sensory World

Chapter 6: Movement and Homing by R. N. Gibson.

Chapter 7: Sensory Systems by Kurt Kotrschal.

Section 4: Reproduction

Chapter 8: Intertidal Spawning by Edward E. DeMartini.

Chapter 9: Parental Care in Intertidal Fishes by Ronald M. Coleman.

Chapter 10: Recruitment of Intertidal Fishes by Catherine A. Pfister.

Section 5: Trophic Relationships and Community Structure

Chapter 11: Herbivory by Michael H. Horn and F. Patricio Ojeda.

Chapter 12: Predation by fishes in the Intertidal by Stephen F. Norton and Amy E. Cook.

Chapter 13: Intertidal Fish Communities by R. N. Gibson and R. M. Yoshiyama.

Section 6: Systematics and Evolution

Chapter 14: Systematics of Intertidal Fishes by Michael A. Chotkowski, Donald G. Buth and Kim Prochazca.

Chapter 15: Biogeography of Intertidal Fishes by

Kim Prochazca, Michael A. Chotkowski and Donald G. Buth.

Chapter 16: Convergent Evolution, Community Convergence: Research Potential using Intertidal Fishes by Michael H. Horn.

Chapter 17: The Fossil Record of the Intertidal zone by Hans-Peter Shultze.

The main objectives of editors and authors is to provide an up-to-date survey of what is known about intertidal fishes and to stimulate further study, greater appreciation, and stronger protection of this fascinating array of fishes that have generally received far less attention than intertidal plants and invertebrates.

Opening by describing its aims, the book goes on to define the intertidal zone as a fish habitat before explaining how the ebb and flow and fortnightly and monthly lunar cycles of the tide affects the rhythm of intertidal life. Early knowledge of these fishes goes as far back as Neolithic times when intertidal fishes were used as food. We know this because, although poorly documented, fish pharyngeal bones have been found in large numbers in Neolithic middens. The conservation of intertidal fishes in today's climate is discussed. The major threats to the fishes and the intertidal zone itself are listed along with some possible solutions and tried and tested methods already used around the globe. Although written in 1998 the topical subject of using marine reserves is advocated as a proven method of conservation.

This book is a scientific reference book targeted at scientists, students and researchers. As an amateur naturalist with no scientific training in this field I did find some areas of the book to be quite heavy going and a little beyond my understanding but the majority is written in such a way that makes it accessible to anyone with a keen interest in the subject. I would not let being a non-scientist deter you from purchasing it.

There are a few photos but not many; this book isn't written for identification of fishes. There are however lots of diagrams, charts and graphs used to illustrate the different chapters.

The intertidal zone is often battered when conditions at sea are rough. Strong currents and breakers make surviving in this environment difficult but resident intertidal fishes have managed to cope in a number of different ways. Some are bottom living and have reduced swim bladders which means they don't get swept away. Some have modified fins they can use to cling to rocks while others keep out of harm's way by tunnelling or living in tight gaps between rocks. For the fishes which live near the high tide mark there is a discussion about the various methods used to avoid desiccation. Other changes the fish have to cope with daily include changes in salinity after rain, evaporation under the summer sun, changes in pH due to CO_2 from respiration or from fresh water runoff, rapid changes of temperature and most challenging for any fish; being left high and dry for several hours each day. Despite this some fish have developed coping mechanisms and adaptations allowing them to make the intertidal niche their permanent home. This book concentrates on the seven hundred or so species of fish from around the world that are resident in the intertidal zone rather than the many transient visitors occasionally found there.

The chapter covering fish physiology is my favourite section of the book, perhaps because of the engineer in me that loves to know how things work. Something which I found to be of great interest and a little unexpected is that no intertidal fishes have developed any of the ancillary breathing adaptations found in many air breathing fresh water teleosts such as a labyrinth organ. The authors place fish that emerge from the water into three groups: 1) the skippers which are as much at home on land as they are in their aquatic environment; 2) the tide pool emergents that remain on land or in very shallow water which doesn't fully cover them at low tide but usually remain fairly inactive and concealed under stones or weed and 3) the rest which do not deliberately emerge but may be subject to stranding. There is a full explanation about how each group copes with their different lifestyles.

There is a very useful passage about capturing and transporting live fishes that are intended for study. This is something I wish I had read a long time ago because I had assumed that newly caught specimens would be suffering at least mildly from shock and off their food. This

isn't always the case! I once collected a Short spined Sea Scorpion, *Myxocephalus scorpius* in the same container as a freshly caught Worm Pipefish, *Nerophis lumbriciformis* and on the short journey home the sea scorpion attempted to prey on the pipefish which as luck would have it turned out not to be as defenceless as first appeared. The pipefish behaved like a constrictor and looped itself around the sea scorpion preventing the sea scorpion from getting its meal until I was able to separate them.

Different methods of capture can be used depending upon the situation and the target species, including simple hand catching, chemical methods, netting, trapping and even baited hooks. The book gives good examples of the different results obtained with different methods of capture as follows; trapping caught 14 species, 56% of which were gobies; angling caught 15 species, 81% of which were wrasse; and hand netting produced 7 species, 71% of which were blennies.

Intertidal Fishes: Life in Two Worlds really does contain everything about everything to do with these fishes. If I was going to be a little picky then I must point out that some of the information may be a little dated. The authors mention several times in different chapters that some areas of the book are data deficient due to lack of research. But keep in mind that this book was published in 1998 and so some of these blank areas will almost certainly have been filled by now and some other parts of the published research may have been superseded. Having said that I now have a much greater understanding and better appreciation about how the whole system works thanks to this book.

This really is one of the most complete volumes about intertidal fishes available. If you are interested in this field and want more than just a guide then I have no hesitation in recommending it.

How I became a Marine Biologist

Ellie Feuerhelm

I first fell in love with the ocean and its inhabitants when I completed my first SCUBA diving qualification in 2005. Even at the age of 13 it occurred to me that I was seeing things that many people would never see with their own eyes in their lifetime. I wanted to know more about it. Any time my parents suggested a day out I would beg them to take me to an aquarium, any aquarium. I could (and did) spend hours watching the ways the fish moved around the tanks and how they interacted with each other. I developed a love for anything that lived under the sea (apart from jellyfish, they freak me out!). As I spent more time getting more diving qualifications and putting more and more hours in to exploring this fascinating environment I knew that this is what I wanted to spend my life doing. The only thing I can think of to compare how I felt with each dive is how astronauts feel going into space. In my mind I was exploring the unknown and it felt great. When we had careers "lessons" at school I would explain that I wanted to study the oceans and was asked why, and informed that studying dolphins and whales was hugely competitive and was I really sure. I have never had an interest in studying the big organisms of the sea, it was always about

the little things; the small organisms that feed the big things, the corals, the fish, the crabs. I wanted to know how they interacted and how the ecosystems managed to survive with divers, fishermen, oil rigs and any human interaction affecting what has so often been referred to as a fragile environment. Any time I was asked what I wanted to study at university I would go on about how much I loved the oceans and how there was so much more left to discover, the fact that more was known about space than our own oceans was something I wanted to rectify.

When I started my university degree in marine biology I was astounded at how little I knew. There was so much more to the oceans than I ever could have imagined and while I didn't necessarily love every single topic that we covered (benthic worms but don't tell my old tutor) I was hooked. When it came time to choose an area to research for my undergraduate research topic I was lost. There were so many things that I wanted to study and learn more about. I went from wanting to look at the deep oceans to bioluminescence to colour change to the effect of everyday compounds that we as humans use that end up in the environment on species that are exposed. The possibilities were endless. In the end I looked at the effect of pharmaceuticals on shrimp and loved every second. On second thoughts maybe I didn't necessarily love every second, statistical analysis left me tearing my hair out and praying to the god of biology to help me cope but seeing the results more than made up for it.

This is why I now find myself about to start a Master of Research in Science in the hope that I can make a difference. I think that's what we all want, to find something we love and make it into a job – hopefully that's what's on the horizon for me but we shall see. As long as I can still feel the awe and excitement that I felt on that initial dive when I was 13 years old when I talk about the oceans then I think that's enough for me.

Instructions to authors

Although we can deal with most methods and styles of presentation, it would make our editorial lives easier and speed up publication if contributions to the *Bulletin* could follow these simple guidelines. Please submit material in electronic format where possible either by e-mail or CD.

Title, Author(s) & Address(es)

Title should be concise, informative and in bold type. Include author(s) names each with one full Christian name. In multiauthored contributions, the last name is separated by an ampersand, e.g., John Smith, David G. Jones & Susan White.

Include any institution/place of residence & contact details to appear with your name at the beginning of your article. Multiple author addresses can be linked to authors by superscript numerals.

Text

- Times New Roman font, 12pt, single line spacing, saved as a Word document (.doc/.docx)
- Use bold to highlight headings but do not use any Word 'styles' to format text. Avoid using headers and/or footers where possible.
- Reference tables & figures in the text as Figure 1, Table 1 etc. and in legends as Table 1: , Fig. 1: (individual parts A, B etc should be described also).
- Indicate where figures should be placed e.g. Insert Fig.1 here (send image files separately to text)

Illustrations (Figures and Plates)

- Photographs: greyscale or colour (RGB) JPGs or TIFs with a resolution of 300 pixels per inch and maximum width of 16 cm. Save at **high quality** (very important).
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Scientific names

Latin names should be italicized. The entire scientific name should be given in full the first time it is mentioned, but thereafter the genus can be abbreviated — except at the beginning of a sentence. Authorities for taxa follow standard taxonomic guidelines, with a comma before the date; e.g., *Zeuxo holdichi* Bamber, 1990; *Melinna albicincta* Mackie & Pleijel, 1995; *Neanthes irrorata* (Malmgren, 1867).

References

- Do not leave a line space between references. Journal titles should be cited in full.
- Citations in text: ….Brown & Lamare (1994)…or… (Brown & Lamare 1994)…, Dipper (2001)… or…(Dipper 2001).
- The main reference styles are as follows:

Brown, M.T. & Lamare, M.D. 1994. The distribution of *Undaria pinnatifida* (Harvey) Suringar within Timaru Harbour, New Zealand. *Japanese Journal of Phycology* **42**: 63–70.

Dipper, F.A. 2001. *Extraordinary Fish*. BBC Worldwide Ltd, London. 96pp.

Ellis, J.R., Lancaster, J.E., Cadman, P.S. & Rogers, S.I. 2002. The marine fauna of the Celtic Sea. In J.D. Nunn (Ed) *Marine Biodiversity in Ireland and adjacent waters*. *Proceedings of the ECSA Conference, 26-27 April 2001*. Ulster Museum, Belfast. pp. 83-82.

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