The Phycologist

The Newsletter of the British Phycological Society

Editor: Dr Amanda Burson
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Call for nominations to council

Hilda Canter-Lund photo competition winners

History of the Seaweed Field Meetings

Number 101- Autumn 2021

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2021
British Phycological Society

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Editorial

Please find included important announcements about calls for nominations of several positions on the BPS council and information about the 70th annual BPS meeting hosted by Swansea University! Don't forget that the funding deadline for BPS bursaries is fast approaching (1st Nov); now that more future conferences and courses are occurring at least partly in-person be sure to get your applications in soon. Also, a feast for the eyes with the Hilda Canter-Lund photography finalists, some interesting new discoveries in phycology, and a look back at one of BPS's most defining activities; the seaweed field meetings. Please enjoy!

Very best,

Amanda Burson

Remember - do keep sending in your contributions. Write to us with your phycological views, news, work events, or any matter you wish to share with readers of The Phycologist*. YOUR input is required; all relevant material will be considered (job adverts, science reports, book reviews, news items of topical interest, meeting announcements, research news, and suggestions for future articles are always welcome). Without YOU the newsletter would not exist.*

As a reminder, previous issues of *The Phycologist* can be downloaded at https://brphycsoc.org/the-phycologist-back-issues/

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Call for nominations for Membership of BPS Council

Come join this lovely group!

In accordance with our constitution (https://brphycsoc.org/constitution/), Council position are open for nominations with successful candidates taking up office after the AGM in Swansea in January 2022.

President Elect

Jason Hall-Spencer's tenure as BPS President ends at the end of 2021 and his position will be taken by President-Elect, Jane Lewis in 2022. Accordingly we are seeking nominations for a new President-Elect.

Overseas Vice-President

Mariana Olivera will be stepping down as Overseas Vice President at the end of 2021, so Council requires nominations for this position.

Ordinary Members

Joe Taylor and Mahasweta Saha will end their current 3-years term as ordinary members of council and so there will be vacant positions for two ordinary Council members from January 2022 for a period of 3 years. This is a good opportunity to get involved in the life of our society, and gain experience in how a "learned society" works. The duties are not onerous, as Ordinary Members you would be asked to be involved in one of the societies sub-committees, attend the two full Council meetings a year (one in the summer, one at the Annual meeting), and partake in discussions and decision-making by electronic means. Reasonable travel and other expenses are met by the Society. We would welcome applications from any of our members. Council is particularly keen to encourage early career researchers or people working in algal-related industries to consider this opportunity. If you are interested in serving and would wish to know more, please feel free to contact the President, Jason Hall-Spencer, jason.hall-spencer@plymouth.ac.uk, who will be happy to have a conversation.

In 2021, probably due to the pandemic and lockdown, no nominations were put forward for Council. However, three BPS members were co-opted onto Council; Jessica Adams, Esther Hughes and Pippa Moore. Council hopes the membership would be happy to ratify these co-opted members as full ordinary Council members for another two years. However according the constitution, these posts must be open as opportunities for other members.

If you are interested in standing, the process is to put yourself forward as a candidate, stating the position for which you wish to apply and send your nominations to the BPS Secretary (secretary@ brphycsoc.org) with your name and the name of a seconder (who needs to be a BPS member too). You will need to send in your nomination to be received by midnight on November 5th 2021 (two months before the next Annual General Meeting). If we receive more than valid nominations than there are positions, there will be a ballot of members, and the Secretary will circulate details to all members of the BPS one month before the AGM. All completed ballot papers shall be returned to the Secretary before the AGM, and the results declared during the meeting, which will be held at Swansea University on Wednesday, 5th January 2022.

70th Annual Meeting at Swansea University

We are pleased to announce that the 70th annual meeting of the British Phycological Society will be held at **Swansea University, Wales**, from **Jan 4th to Jan 7th, 2022**.

The call for abstracts and registration will open at the beginning of October, with a deadline for abstract submission expected in late November.

The meeting will feature sessions covering a broad range of topics, including the traditional general phycology sessions and a plenary student session with prizes for best talk and best poster, named after Irene Manton.

As action on the climate and biodiversity crises grows ever more critical, and with the UN Climate change Conference (COP26) being held at Glasgow this Autumn, the meeting will include the theme of ***Harnessing algal solutions for a sustainable future, highlighted across three special symposia.***

Due to the pandemic, we have been working hard to make the conference accessible to everyone. The meeting will be a 'blended' format, supporting both online and in person attendance. Registration fees, accommodation deals and travel advice will also be announced when registration opens.

All necessary information can be accessed from:

https://www.bps-conf2022.org/

Enquiries can be sent to: bps22swansea@gmail.com

We are looking forward to welcoming you in Wales!

Hilda Canter Lund Competition

This award was established by the British Phycological Society in recognition of Hilda Canter-Lund, whose stunning photographs will be known to many members. Her photomicrographs of freshwater algae combined high technical and aesthetic qualities whilst still capturing the quintessence of the organisms she was studying.

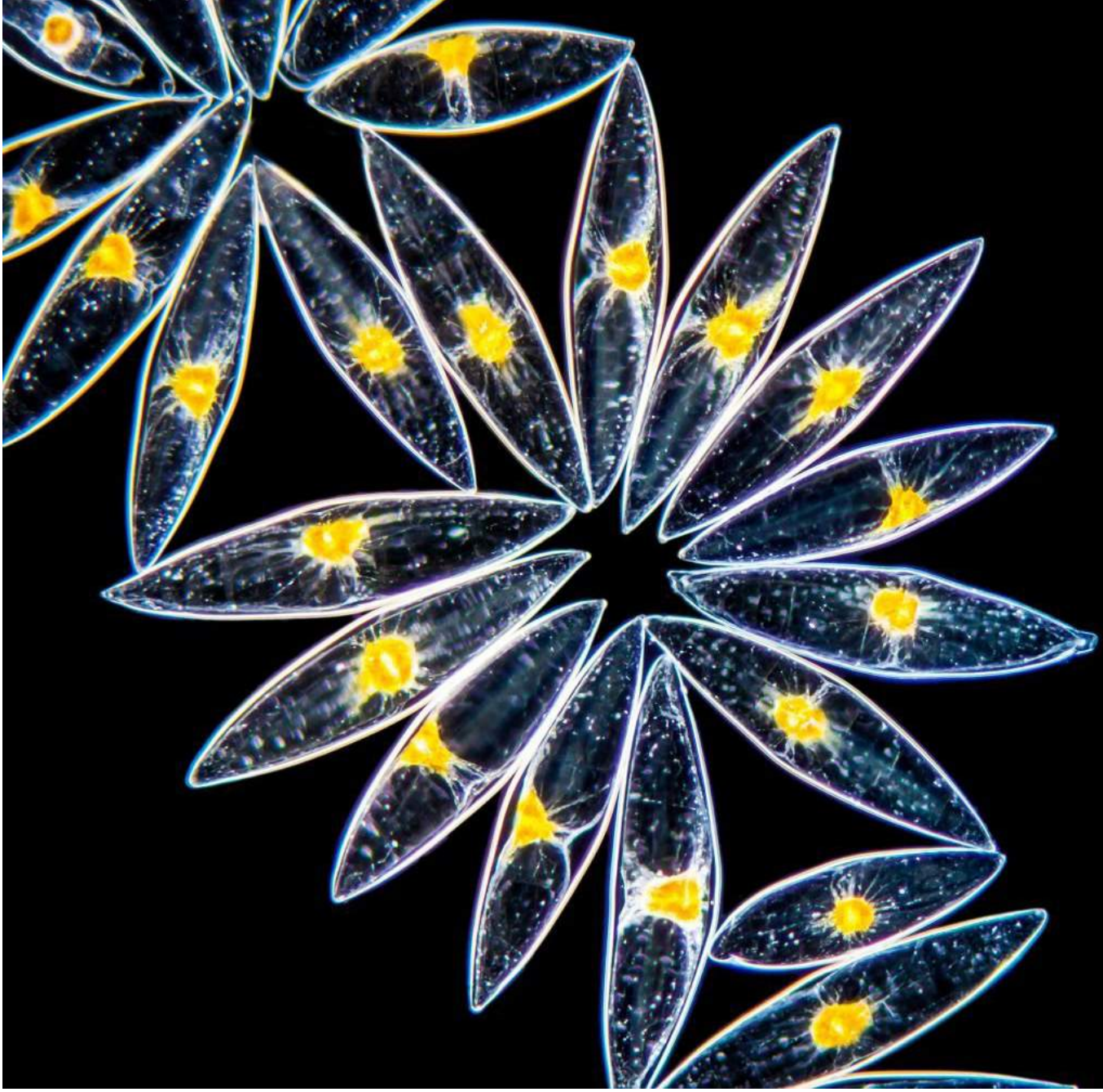
Congratulations to all that made the shortlist, the competition was strong this year, and the BPS thanks everyone who submitted images and voted for their favorites.

Winners

Sophie Steinhagen with "Forestal"

This image displays the stunning beauty of the typical Swedish flora above and below the surface. It gives a complementary picture of the oceanic forests dominated by Fucus *spp. and the dense terrestrial Pine forests. Both ecosystems not only contribute important oxygen to the atmosphere, but also provide invaluable habitats for vertebrates, invertebrates and millions of microorganisms. The picture was taken at a shallow beach located in the Koster archipelago, Sweden in May 2021 using a GoPro HERO9. The water is about a meter deep.*

Sophie is a researcher at the Tjärnö Marine Laboratory of the University of Gothenburg (Sweden) dedicated to investigating the marine biodiversity of macrophytes and supporting a sustainable seaweed aquaculture in the Northern Hemisphere. During her PhD at the GEOMAR Helmholtz Centre for Ocean Research Kiel (Germany), Sophie investigated the taxonomy of different genera of marine green algae and the impact of environmental factors on their distribution and potential to form blooms. In addition to her work, she has a passion for communicating phycology to a broader audience by showing the beauty and importance of seaweeds and raising awareness for a sustainable seaweed industry.

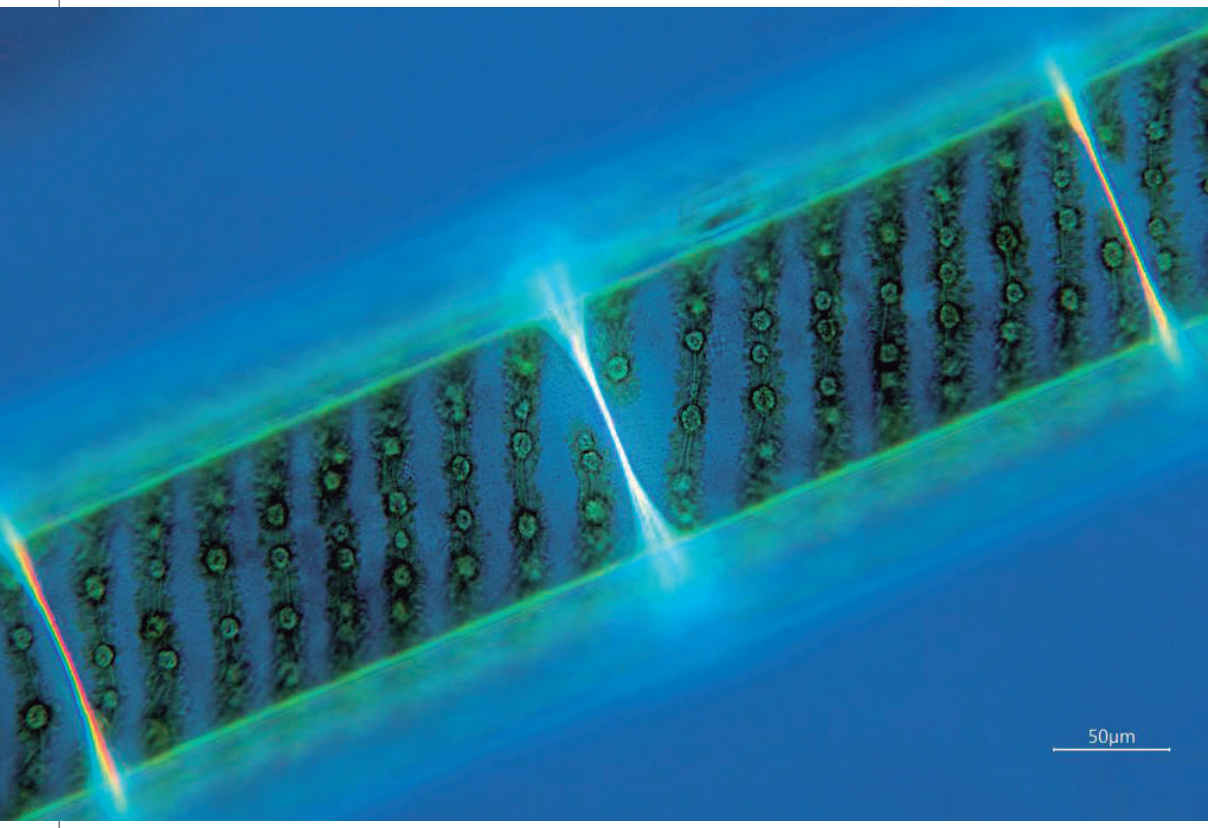


Gerd Guenther with *“Pyrocystis fusiformis”*

Cultured cells of the marine alga Pyrocystis *fusiformis.* Pyrocystis *is a non-motile marine Dinoflagellate living in the tropical oceans. Just like a firefly,* Pyrocystis fusiformis *is bioluminescent, the cells emitting a blue light when disturbed. The cells often arrange themselves on the surface of the culture medium and form wonderful patterns. The culture was obtained from CCAC, Cologne and the micrograph was taken with a Leica DMLB microscope, using darkfield illumination and a 5x microscope objective, magnification about 40x. A Canon EOS5D MK2 camera was used to take the image together with an electronic flash.*

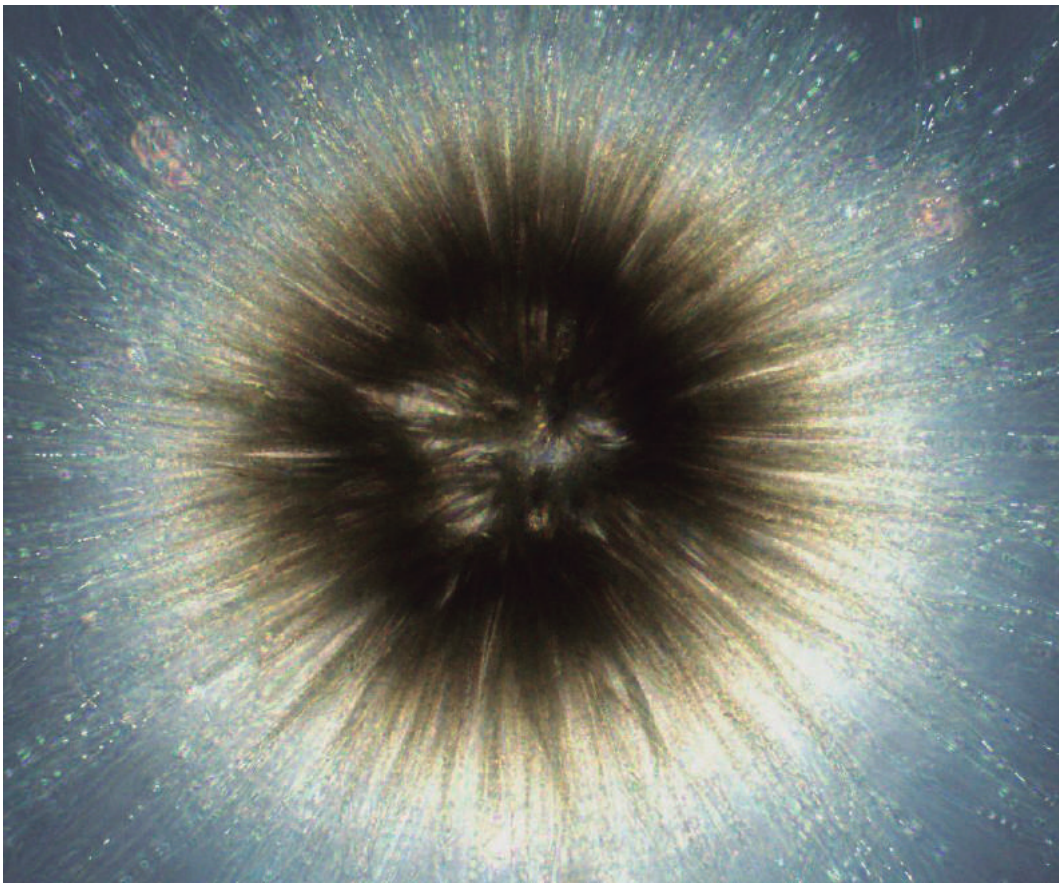
" For 34 years I have been working as a farmer and passionate photomicrographer in Düsseldorf, Germany. My special interest lies in researching the biodiversity of aquatic and terrestrial habitats, with a particular interest in phycology. Algae play an essential role in the metabolic cycle of aquatic habitats and the soils that produce our food. For more than 10 years I have worked with the algae collection of the University of Cologne (now at the University of Duisburg-Essen), photographing the microalgae cultures. I am particularly grateful to Prof. Barbara Melkonian and Prof. Michael Melkonian, who made this collaboration possible and continue to support me to this day.

Shortlisted



Derek Christie with *"Spirogyra"*

This unusual image of the beautiful filamentous algae, Spirogyra*, which thrives in a local boggy pond, was created using crossed polarisation filters and darkfield illumination. The cell dimensions are approximately 250 X 100 microns. This particular specimen was collected from Holyrood Park, Edinburgh during a basic algae survey of the various waterbodies in the park. The photograph was taken using a Leitz Ortholux II microscope with dark-field condenser, polarisation filters and a ToupTek E3CMOS20000KPA camera. A Leitz X40 apochromatic objective was used for this image.*



Alex Lai Man Chun with "Crown of thorns (*Gloeotrichia* sp.)"

Gloeotrichia *sp. The image was taken using the 10x objective (100x magnification) on an Olympus CKX53 inverted microscope with a Micropix mounted camera and phase contrast illumnation. The colony was found in a lake water sample (Black Swan Lake at Dinton Pastures Country Park, Berkshire, UK) taken as part of a routine algae analysis for a customer in June 2021. The image is a composite image of four stacks taken at different focus levels, combined using the free image software ImageJ. The overall diameter of the colony is approximately 800 µm (= 0.8 millimetre).*

Robin Fales with "*Nereocystis* in the Salish Sea"

*Bull kelp (*Nereocystis luetkeana*) is the only large canopy forming kelp in the Salish Sea. As seen in this image, the long stipe and pneumatocyst (gas filled float) lay on the surface of the calm water during low tide. This foundation species provides important habitat for fish and invertebrates but is declining in abundance in the Salish Sea. Robin captured this image from a research boat on June 17th, 2021 in the San Juan Islands during a scouting trip to find kelp beds for her dissertation research.*

Alisa Mihaila with "*Asparagopsis* pacman"

This image captures a cystocarp (female reproductive structure, i.e. the 'Pac-man') of Asparagopsis armata *releasing its carpospores (i.e. the 'Pellets'). The cystocarps can be seen with the naked eye and are approximately 1 mm in diameter. Each of the pellets contain hundreds of individual carpospores that grow into the next stage of the seaweed's life cycle. Image taken under an Olympus BX53 microscope affixed with an Olympus DP27 camera. The photo was taken as part of a collaboration between the University of Waikato (NZ) and SeaForest (Australia), researching the life history of* Asparagopsis *for aqua-culture purposes.*

“Tidal Records” - a seaweed-based installation at the Royal Botanic Gardens Edinburgh (RBGE)

Submitted by Clare Scanlan

“Cooking Sections”, the artistic partnership of Daniel Fernandez Pascual and Alon Schwabe were invited by RBGE to create an exhibition for the Botanic Cottage at the gardens. This was to coincide with the Edinburgh Science Festival, and focus on the subject of seaweeds. Cooking Sections examines the systems that organise the world through food. Using site-responsive installation, performance and video, they explore the overlapping boundaries between art, architecture, ecology and geopolitics. They have a long-running project called Climavore, which includes a tidal installation on the Isle of Skye (see at http://www.cooking-sections.com/info). Cooking Sections was recently nominated for the Turner Prize.

RBGE holds some important algal collections, and Cooking Sections were interested not just in the ecology of marine algae, but in the social history of seaweed use and collection (focusing on Scotland) and also the role of women in phycology. Having been a volunteer in the RBGE herbarium, working on a marine algae collection, I was happy to provide as much useful information as I could, as did Martin Wilkinson.

The result is a fascinating look at various aspects of seaweeds and their place in society over time, for example as food for humans and livestock, for fuel, fertiliser, extraction of iodine & alginates, and as monitoring tools. Sir Robert Sibbald, one of the founders of the Edinburgh Botanic Gardens in the 17th century, called Scottish seaweeds ‘famine foods’, such was their importance to marginal coastal communities. It is interesting that they were often important to many poor people, yet seaweed collecting and identification became quite a genteel occupation for Victorian ladies.

Cooking Sections were able to access the RBGE collections to help tell a story of seaweeds, and various specimens from RBGE’s collection were on display, mingled with photographs and overlays to provide a multi-layered exhibition. The Botanic Cottage display area is a fairly confined space, which was cleverly exploited with multi-height display cases and surrounded by impressive wall-hangings printed with images of seaweeds. The exhibition also focused on the contributions of women in phycology, including Lily Newton and Kathleen Drew. The displays were accompanied by printed material. The exhibition, with further photographs, is covered in the RBGE Botanic Stories blog at https://stories.rbge.org.uk/archives/35720. There are no plans currently to show this in other locations.

For the Edinburgh Science Festival, there were also linked workshops, with Greg Kenicer of RGBE leading a shore outing to North Berwick. I ran a small workshop on pressing seaweeds. Most participants were interested in the art or craft aspects of creating pressed specimens, with a number keen to go home and introduce their children to the wonders of marine algae. It might not be the way many of us look routinely at algae, but this sort of outreach activity generated quite a lot of interest.

Photographs attribution: Cooking Sections, Tidal Records, 2021. Installation view in the Botanic Cottage, Royal Botanic Garden Edinburgh. Photo: Lynsey Wilson, RBGE.

BURSARIES & STUDENTSHIPS

BPS Funding - Deadlines approaching!

The next deadline for applications for BPS funding is approaching (1st November 2021).

BPS Council has widened the eligibility criteria for our "student bursaries". This scheme is now accessible to both bona fide students in full or part-time education, BUT IN ADDITION, also to members within a period of time no longer than 3 years since their last graduation. This is to allow members who are between career choices to still access BPS funds to support their activities. See our new guidelines at brphycsoc.org for details.

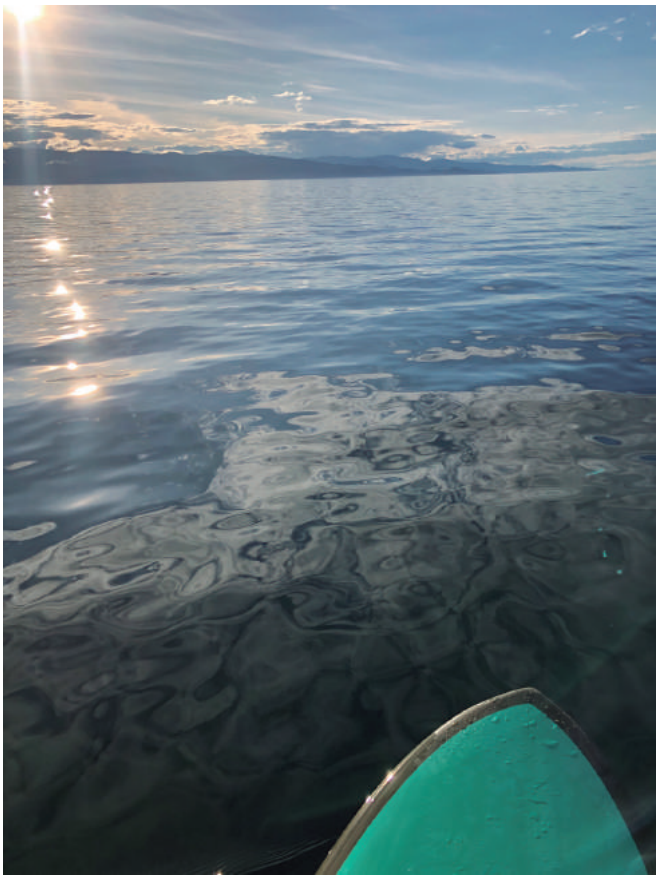
All applications must be submitted using our NEW online submission portal using the application forms available on the Awards and Training pages of the website (https://brphycsoc.org/award-submission-portal/).

Society for Freshwater Science Annual Meeting - 2021

Submitted by Arley Muth; arley.muth@utexas.edu

From May 23rd-27th, folks at the Flathead Lake Bio Station (https://flbs.umt.edu/newflbs) in northwest Montana organized a watch party for local freshwater scientists to enjoy the annual Society for Freshwater Science (SFS) virtual conference. The Flathead Lake Bio Station (FLBS), University of Montana is one of the oldest active biological stations in the United States and was established in 1899.

Research groups from the University of Montana, Montana State University, Idaho State University, and Washington State University gathered at FLBS for the week to watch SFS plenary talks in the main lecture hall, spread out over the campus to take in contributed talks and poster sessions, came together in the evenings for dinner and social hour, and stayed in the rustic cabins that line the shore of Flathead Lake.



This was my first experience attending SFS, mostly because I am a marine ecologist and have focused my career on studying kelp systems in California, Chile and Alaska. However, over the past few years I have been looking at freshwater algae in rivers around my hometown of Missoula, Montana with a focus on diatoms associated with *Cladophora* sp. blooms. While I learned so much about river biogeochemistry, algal bloom dynamics and benthic macroinvertebrates, what I took away from this meeting was connections with other scientists that have been hard to develop during these pandemic times and plans for future collaborations and joint projects working with algal species in freshwater systems.

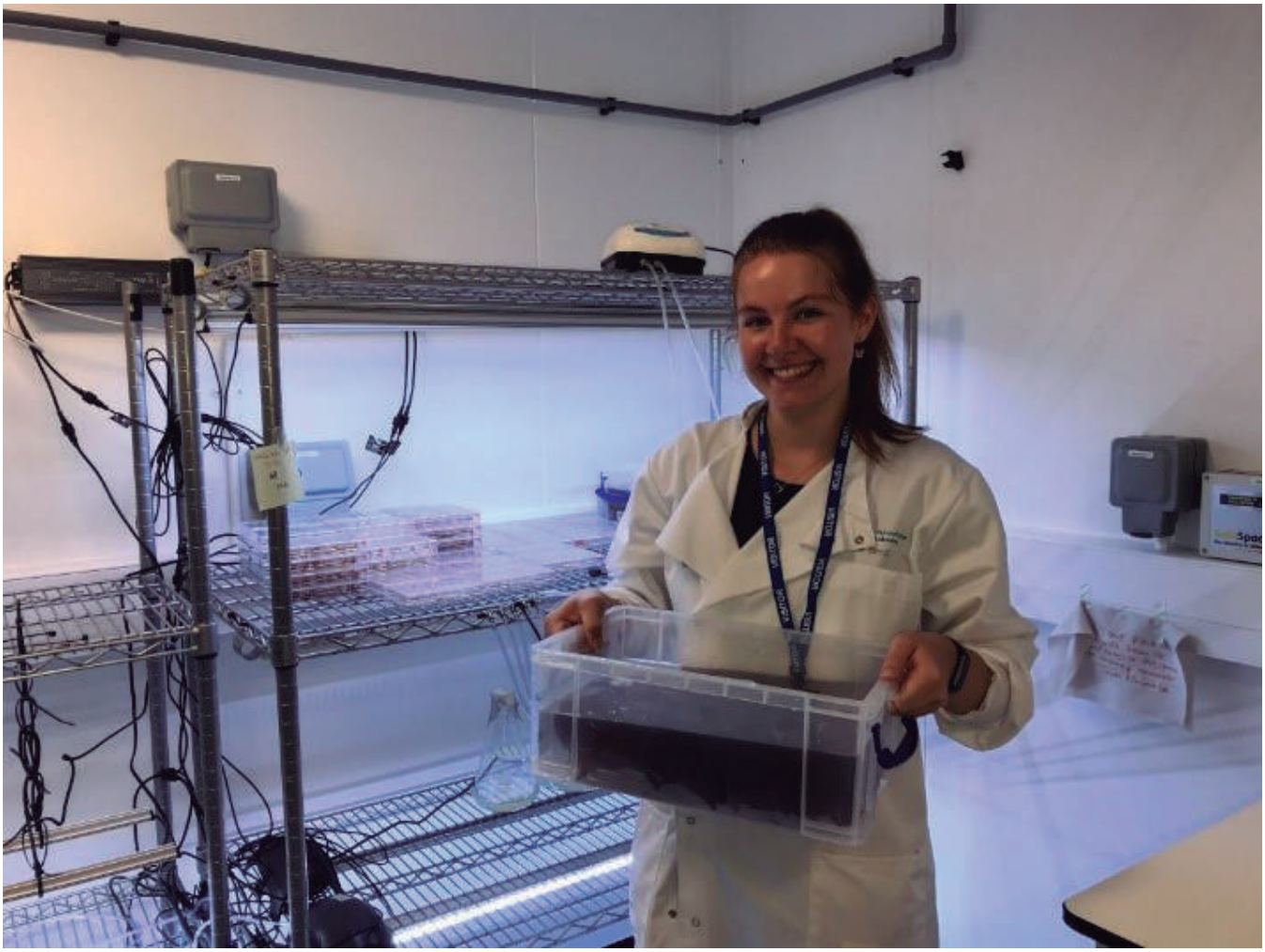
PhD Post at Plymouth Marine Laboratory!

"Investigating 'crosstalk' between pathogenic Vibrio and phytoplankton, and implications for human health under climate change" a NERC GW4+ PhD studentship opportunity!
The closing date for applications is 1600 hours GMT Friday 10 January 2022. Interviews will be held between 28 February and 4 March 2022.
For more information about the NERC GW4+ DPT please visit https://nercgw4plus.ac.uk
For any informal discussion, feel free to contact Dr Mahasweta Saha at msa@pml.ac.uk

Summer Studentship Project: Jess Turfery

Submitted by Jess Turfery

University of St Andrews, Scotland / Plymouth Marine Laboratory (PML) jet26@st-andrews.ac.uk / jetu@pml.ac.uk

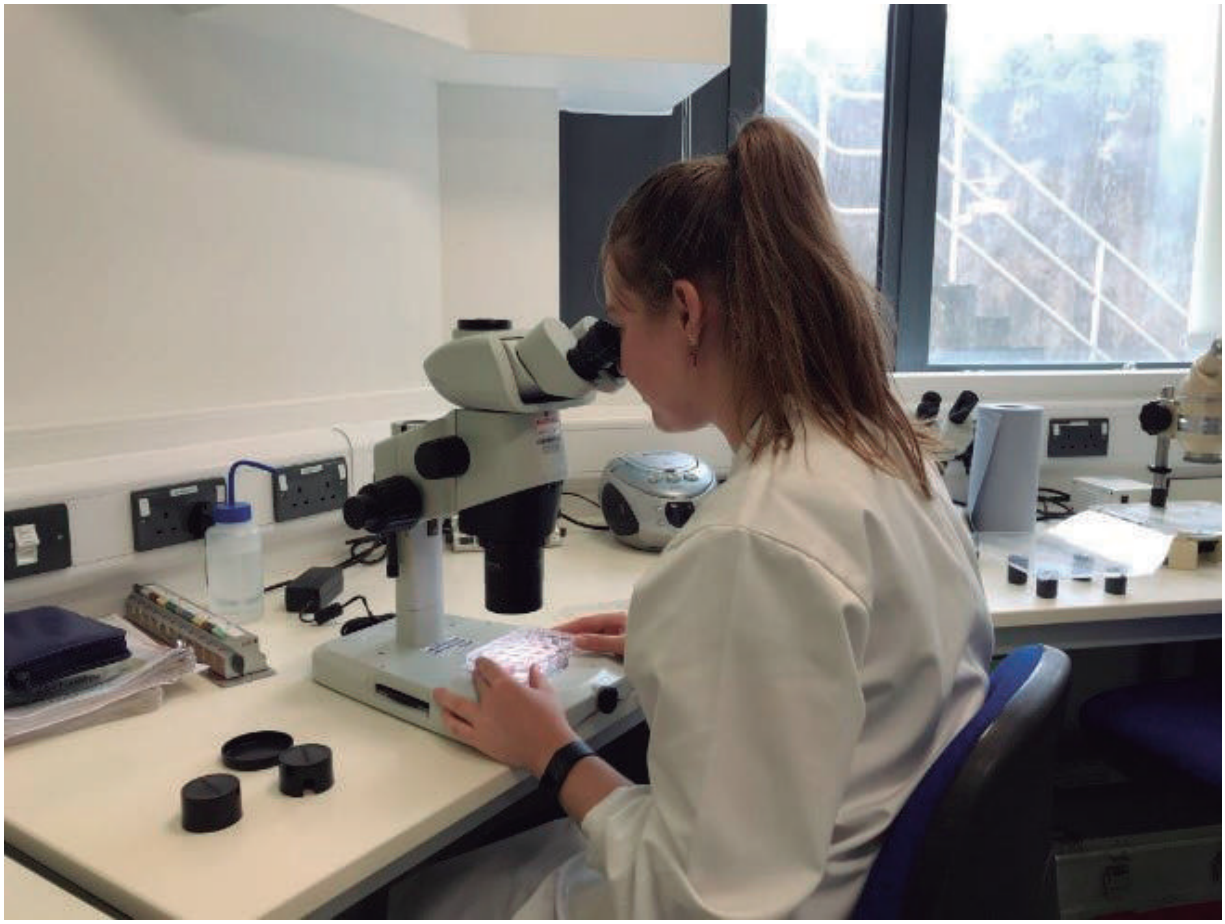


As an Environmental Geoscience student, I am extremely interested in pressing environmental issues, particularly those regarding our oceans in a warming climate. Having only touched on biological oceanography during my undergraduate studies so far, I wanted to get more involved in marine biology and improve both my knowledge and practical skills in this field of study. Before the pandemic hit, I got in touch with Dr. Mahasweta Saha, a chemical ecologist at Plymouth Marine Laboratory (PML), to see if there was any way I could gain some lab experience over the summer break. Fortunately, I was offered a project based on seaweed diseases and the impact of climate change. Although my studentship was supposed to take place in the summer of 2020, I was lucky enough to be allowed to perform the project a year later due to the impact of Covid-19.

The overarching aim of the project was to look at the bleaching response of an economically and ecologically important red seaweed *Palmaria palmata* to different strains of bacteria. To do this I ran *Palmaria* tip bleaching bioassays at two different temperature conditions with a variety of bacteria strains and monitored the degree of bleaching.

I began my studentship by shadowing a postgraduate student working on a similar area of research for her master's dissertation and a placement student. It was extremely helpful being able to dive straight into lab work and have them and Dr. Saha guide me through applying my theoretical knowledge to practical work.

After a few days of shadowing in the lab I was able to begin my internship project. We collected *Palmaria palmata* samples from the Plymouth Sound, selecting seaweed that was undamaged and as healthy-looking as possible to ensure the experiment wasn't compromised. The seaweed was cleaned and separated into individual aquaria containing seawater. Throughout my time in the lab, regular water exchanges were performed to ensure the seaweed was kept in fresh seawater as they produce nutrients that could attract microbes compromising the experiment by encoura-



ging deterioration and susceptibility to disease. Over three weeks, 20 different bacteria strains that were previously isolated and cryopreserved were inoculated and incubated for growth. Once the strains had grown, I learned how to use a flow cytometer to obtain information on the characteristics of the growing cell population, notably the cell density.

Palmaria tips from four aquaria were cut and placed into 24-well plates before adding the required volume of bacterial mix to the treatment wells. The plates were placed into two different controlled temperature labs, one at 16ºC and the other at 21ºC, to compare the seaweed's response to disease under different temperature conditions. We hypothesised that under higher temperature conditions (21ºC) the seaweed would be more susceptible to disease and therefore bleaching; highlighting important links to ongoing climate change and increasing ocean temperatures. Five days after the launch of the bioassays, the *Palmaria* tips were analysed under the microscope to test the extent of bleaching. This meant I furthered my microscopy skills and learned how to identify if the seaweed has bleached or not. I was able to utilise my IT skills during the data analysis portion of the project which included using the ratio of bleached to healthy tips for treated and control tips to calculate the relative risk of bleaching for each of the bacteria treatments at 16 and 21ºC.

Overall, participating in this project has been such a beneficial and enjoyable opportunity. I have obtained some invaluable skills that I didn't have from my undergraduate studies, and I feel far more confident with microbiological lab techniques than I did at the beginning of the project. It has been fantastic to work with fellow students, both undergraduate and postgraduate, and to be in a world-class research facility surrounded by so many brilliant scientists who are more than happy to chat about their respective fields of study. I also hope to present my findings as part of a poster presentation at the BPS Annual Winter Meeting in 2022.

I would like to thank my supervisor Dr. Mahasweta Saha for allowing me this opportunity, designing the project so well, and for making the time to explain and teach me everything I was unsure of prior to starting at PML. As a young female scientist, it has been great to have a successful female role model like Dr. Saha who is very hardworking and cares deeply about the academic development of students such as myself. I would also like to thank PML for facilitating the experience and for the ongoing support from all staff and students throughout my time there. Finally, thank you to the BPS for supporting this opportunity to experience undertaking scientific research with Dr. Saha's supervision. I have learnt so much and will carry these important skills with me into my future endeavours.

The Seaweed Field Meetings of the BPS

Submitted by Martin Wilkinson; m.wilkinson@hw.ac.uk

Dunbar meeting 1973. We used a laboratory at Dunbar High School. Left to right we see Colin Pybus, Trevor Norton, Pat Sims, Barry Paddock, unknown, David Irvine, and Ian Tittley.

Our society started with a seaweed field meeting. In September 1951, seventy years ago, nine British phycologists organised a field meeting to collect seaweeds in Anglesey. They discussed setting up a society for phycologists and became an interim committee to set up the British Phycological Society which was launched ten months later with its first meeting in Edinburgh in July 1952, which was timed to coincide with the First International Seaweed Symposium, also in Edinburgh.

They were all seaweed specialists and seven were women: Kathleen Drew, Helen Blackler, Elsie Burrows (PhD supervisor of current author), Elsie Conway, Sheila Lodge, Margaret Martin, Mary Parke, Harry Powell and FT Walker.

Next year, in July 2022, our society will reach its 70th birthday. How fitting it is that just before this, in April 2022, we expect the publication of *Brown Seaweeds of Britain and Ireland* by Robert Fletcher which will finally complete the last one of the initial aims set out by the seaweed ladies starting at that field meeting in Bangor, which was to publish a biological flora of all British seaweeds.

Although the initial founders of the society were almost all seaweed workers, within a year the society had grown and rightly embraced freshwater as well as marine, and ultrastructural, biochemical and physiological aspects of algae, and the practical utilization of algae. Nonetheless the initial approach of BPS had a strong seaweed influence including these four initial aims:

- Compilation of a check list of all British seaweeds
- Production of a new flora of British seaweeds which would have specialist volumes for each colour group
- A recording scheme to map the distribution of British seaweeds
- All this to be backed by a regular series of field meetings to help with work to support these aims

As early as 1953 Mary Parke had already published a preliminary check list of British seaweeds. It had many updates with Peter Dixon and was succeeded by lists from Ian Tittley, Mike Guiry and Juliet Brodie (with co-workers) so that we always have a taxonomically up to date reference listing of the British seaweeds, the envy of other marine taxonomists.

Between 1977 and 2003 eight volumes of the flora were published in the *Seaweeds of the British Isles* series, with the BM (NH) (now the Natural History Museum). Only part of the brown seaweeds was left unfinished. That gap in our initial aim will finally be plugged by Bob Fletcher's book next Spring. Recording of seaweeds resulted in *A Checklist and Atlas of the Seaweeds of Britain and Ireland* by Gavin Hardy and Mike Guiry, published by the Society in 2003.

This was all helped a series of field meetings started by the seaweed-based, founding members of the BPS. The society also held freshwater field meetings, not considered here, and also seaweed identification training courses, such as the one which has been run very successfully for some years in Plymouth by our secretary, Francis Bunker with Chris Maggs and Juliet Brodie.

The seaweed field meetings considered here compiled authoritative lists of species present on a range of shores in an area where the flora may not be well known. They brought together seaweed experts, less experienced workers, students and local workers and some visiting overseas phycologists to discuss and learn from each other. They were not primarily training courses although they were enjoyed by less- experienced workers who learnt from the experts. A list of the meetings is given in Table I.

A few of them were organized jointly with other societies or meetings so did not follow the general pattern described below. The usual arrangement was that an area lacking seaweed distribution knowledge was chosen. Experts and novices would visit for up to a week. At least one different shore was visited each day and thoroughly sampled for the full species list. Samples were worked up in local laboratories of which one would be arranged for each meeting. These were usually in schools or colleges or field centres. Sometimes laboratories were provided for us in anticipation of the field centre getting an authoritative seaweed species list for its area as happened at Dale Fort in 1956 and latterly at Millport in 2015 where the FSC gave us a discount on accommodation in anticipation of an authoritative species list which, surprisingly, did not exist for the Isle of Great Cumbrae.

By 1967 the organisation of the meetings had become sufficiently onerous for BPS to appoint a Field Meeting Secretary. George Russell did this from 1967 to 1970,

British and French phycologists bound for the Island of Sark during the joint field meeting with the Société Phycologique de France in 1960. We don't normally have this many at a field meeting!

Table 1. British Phycological Society Marine Field Meetings

(Only meetings to collect records are listed - meetings where are solely training courses are not included)Dorset field meeting - as Bill Farnham was already compiling a species list we merely contributed records to him. The meeting was more varied than the normal seaweed type with freshwater, estuary and lagoon visits.

Year	Area	Centre		# of sites visited	Epilithic taxa recorded	Total species records	Dino-flagellate records	Publication of species list
1951	Menai Straits and Anglesey	Bangor	preliminary to BPS formation	5				
1953	Plymouth	Marine Lab	Visits to 4 shores plus dredging					
1954	Aberystwyth	University	Joint meeting with British Ecological Society with shore visits					
1955	St Bees Head	Ferry House	freshwater meeting with a marine day	1	90	90		Powell HT, 1956, Br.Phycol.Bull. 1(4)18-25
1956	Pembokeshire	Dale Fort		6	179	440		Anon, 1957. Br.Phycol. Bull. 1(5),21-31
1958	Mayo, Clare, Kerry	Galway	Internat. Seaweed Symp.	15	209	787		Burrows EM, Dixon PS 1959, Br.Phycol.Bull. 1(7) 47-60
1959	Northumberland	Seahouses		8	112	352		Jones WE, 1959. Br.Phycol.Bull. 2, 20-22
1960	Guernsey		joint with SPF	21	267	1222		Dixon, PS, 1961. Br.Phycol.Bull. 2,71-80
1962	Shetland	Lerwick		34	156	1077		Dixon PS, 1963. Br.Phycol. Bull. 2,236-244
1965	Normandy		joint with SPF					
1967	Scilly Isles			34	241	1201		Russell G. 1968 Br.Phycol. Bull. 3,579-584
1969	Wexford	Wexford		8	234	630		Norton TA, 1970 Br.Phycol.J. 5, 257-266
1971	Lewis & Harris	Stornoway		12	204	635	62	Norton TA, 1972. Br.Phycol.J. 7, 375-385
1972	Eastern border counties Scotland	Dunbar		9	207	716		Norton TA, 1976. Br.Phycol.J. 10,
1973	Orkney	Kirkwall		10	210	621	145	Wilkinson M, 1975. Br.Phycol.J. 10,387-397.
1975	Grampian	Aberdeen		20	183	748	103	Wilkinson M, 1979. Br.Phycol.J. 14, 33-41
1976	Galloway	Stranraer		12	192	698		Wilkinson M, 1980. Br.Phycol.J. 15, 265-273
1977	Dorset	Weymouth	Many varied shores visited – see note at foot of this table					not published (see note below)
1978	Glamorgan	Swansea		8	146	408		Wilkinson M, 1982. Br.Phycol.J. 17,101-106
In the 1990s there were some meetings with a teaching role which also collected and published species records								
1992	Anglesey	Bangor		3	82	142		Brodie J & Jones E 1993. The Phycologist 34, 5-8
1993	Isle of Wight			7	133	259		Farnham WF, 1994. The Phycologist 39, 24-28
1994	Yorkshire	Scarborough		3	90	161		Hardy FG, Scott GW,1994. The Phycologist 38,22-25
1995	Isle of Man	Port Erin	No further details available					
We have resurrected the traditional meetings in the last eight years								
2013	Northumberland & Durham	Cullercoats		3	86	161		
2015	Great Cumbrae	Millport		3	147	300		
2017	Orkney	Stromness		3	140	281		

Isle of Lewis 1971 meeting. A French phycologist shows how to eat raw sea urchins to Tyge Christensen, Ian Tittley, David and Linda Irvine.

Trevor Norton 1970 to 1973 and Martin Wilkinson 1973 to 1978. During this period the organisation of the meetings was strongly directed towards the accumulation of new seaweed records and full lists from these meetings were usually published in the Society's journal.

Table 1 shows we have held few meetings in Ireland. It was intended that the 1972 meeting would be in County Donegal but the onset of the troubles in Northern Ireland worried the Society and the meeting was quickly relocated to Dunbar in East Lothian.

The meetings were really friendly occasions where novices and experts mixed freely, staying together in the lab until late at night, and maybe ending the day together in a local hostelry. Each meeting usually had at least one well-known phycologist from overseas whom it was good to work with and learn from. The list of centres in Table 1 shows that many meetings were in remote scenic areas. We had to hire coaches to transport the party to field sites in remote areas – this was before the time of people taking their cars everywhere with them. I still remember, 50 years on, the old coach that Trevor hired for the Lewis and Harris meeting, thundering along single track, remote Hebridean roads at breakneck speed, emitting loud banging noises, causing us to think we were distributing coach parts along the 40 miles of road from Harris to Stornoway. As well as seaweeds some meetings were joined by workers interested in other algae. For example John Dodge, an expert on British marine dinoflagellates, would join us with a research assistant who would wade off into the sea to make planktonic collections at each place where we collected seaweeds. Barry Paddock and Pat Sims from the Natural History Museum joined some meetings to collect diatoms.

The recent sad death of long-standing BPS member, Julian Clokie, a devotee of the field meetings, reminds some of us of his many eccentricities. At the Aberdeen field meeting his aged motor caravan was used to transport to each field site his amazing tea making device which was powered by burning lots of compacted newspapers and had some of us worried that his van might catch fire!

Why did the meetings stop after 1978? It was becoming increasingly hard for participants to find the sums of money needed to travel to a remote area and stay there for a week and to find laboratories that we could use for nothing or for low cost. By then the meetings had collected a vast number of records and had established a culture of serious seaweed species recording that would contribute to an atlas.

Let's look at how this recording developed. In the 1950s a record card was designed by Elsie Burrows, for the Society's Marine Algal Checklist and Flora Committee (one of the predecessors of our current Biodiversity & Conservation Committee) which were to be filled in by hand with all necessary details of species name, place, habitat etc. These were sold by the BPS for three shillings

Orkney meeting 1973. The great treat of Orkney can be seeing the Arctic fucoid, *Fucus distichus*. But this lives only on the most wave-exposed shores, most of which are dangerous and inaccessible. Willem Prud'homme van Reine (who sadly died last year) contemplates how to get down a dangerous cliff to see it.

(15p) per 100 cards. They were filled in by hand and sent to Dorothy Hepper at the Fisheries Experiment Station at Conwy in North Wales. In these early days, records were expected to be backed up by herbarium specimens of which the location was recorded on the card. This scheme was rather slow so from 1971 the recording scheme was massively expanded under Trevor Norton, jointly with the Biological Records Centre, who printed thousands of standard recording cards based on the seaweed checklist. These were distributed widely not just to BPS members but through an advertising campaign to other societies and conservation bodies. Panel of referees were set up to advise on records since the wide spread of recorders meant there were records that would need to be verified. A *Provisional Atlas of the Marine Algae of Britain and Ireland* with distribution maps of 155 species was published in 1985 by the Biological Records Centre, on behalf of the BPS, to foster enthusiasm to get sufficient records for publication of a substantive atlas. Gavin Hardy took over the collation of the records from 1994 and with Mike Guiry the final atlas, with 629 species maps and a revised checklist, was published in 2003. BPS members can download a copy of the first edition of this very useful atlas from the BPS website.

Let's summarise what have we achieved with the field meetings from 1951 to 1978.

- Refereed published recordings for the BPS mapping scheme contributing to the Atlas of Seaweeds of Britain and Ireland
- Authoritative full species lists for individual shores giving an idea of the expected species richness on healthy shores in different situations
- Database of seaweed distribution, unrivalled in many countries, that can be used as a baseline for assessing future change or devising conservation and quality assessments of shores
- Younger members learning from more experienced ones
- Sharing taxonomic expertise with visiting overseas workers

Orkney meeting 2017. After many years of taking students on the shore in Orkney I had found a safe and accessible place to get to *Fucus distichus*. Two students from Swansea are taking advantage of it to sample this fascinating seaweed for their research.

The future of seaweed field meetings

The field meetings were resurrected in the last decade with three meetings at Newcastle University's Dove Marine Lab in 2013, Millport on the Isle of Great Cumbrae in the Firth of Clyde in 2015 and Orkney in 2017. There are new challenges to which these field meetings can respond:

- An increased emphasis on seaweeds for monitoring and conservation assessment (EC Water Framework Directive and Marine Framework Directive)
- Changing distributions owing to climate change
- Increased public interest in biological recording
- Suspected decline of some of our major seaweed species e.g. fucoids
- To check non-native species (now 6% of our flora).
- Poor knowledge of long-term stability of our seaweed populations
- Massive improvement in electronic recording and mapping possibilities

There are various schemes running now to tap into public enthusiasm for biological recording such as the Big Seaweed Search, run from the NHM by Juliet Brodie, which homes in on key species to tell us about possible change in the dominant species on our shores. The BPS has an online portal for collectors to enter algal records (www.bpsalgalrecords.com). It is getting populated with freshwater records but we need to encourage more workers to enter marine ones.

There is an opening for our new series of seaweed field meetings to provide a new generation of workers with the skills for detailed seaweed identification and to examine those shores for which good past data exist in order to study change in the flora. This is different than visiting places for first time as in the original field meetings.

An example of the possibilities is the seaweed flora of Orkney, an unspoilt area off the north coast of the Scottish mainland, which was visited by a BPS seaweed field meeting in 1973 which compiled a detailed, authoritative species list. On the 25th anniversary of this meeting some of the shores visited were privately resurveyed by Martin Wilkinson, Ian Tittley and Clare Scanlan, and in 2017 the BPS field meeting revisited some of these shores 44 years later. Although there were differences in the ephemeral species present, the richness of the flora had remained. The rise in public interest in such activities was illustrated in the 2017 visit when BBC Radio Orkney joined us walking around the shore sampling the seaweeds and interviewed the present author and Clare Scanlan about what

Dorset meeting 1977. Sampling a different environment - the Fleet saline lagoon. George Lawson, Rob Huxley and Dave Garbary.

we were doing, why we were doing it and the importance of Orkney's seaweeds.

The next seaweed field meeting had been planned for summer 2020 at St Andrews on the east coast of Scotland, organised by Martin Wilkinson and Clare Scanlan. This has been twice postponed because of Covid and is now expected to take place in summer 2022.

This is a rather special place to be holding the meeting. The long standing Gatty Marine Laboratory of St. Andrews University, for decades the home of Helen Blackler, one of the BPS founders, has been completely rebuilt on a much larger scale as the Scottish Oceans Institute, opened in 2019. The university has offered the use of an extremely impressive new laboratory as a base and reduced rate accommodation in university residences.

Helen Blackler worked at the Gatty Marine Laboratory from 1947 until her death in 1981 and she accumulated vast knowledge of the seaweed flora of East Fife. In her retirement she published a very detailed account of the seaweed records of St Andrews (Laverack, M.S. & Blackler, M. (editors) 1974. *Fauna and Flora of St Andrews Bay*. Scottish Academic Press, Edinburgh & London). The nearby Fife village of Elie also has very detailed seaweed recordings from several respected workers in the 19th century. These sources provide a tremendous baseline against which our next seaweed field meeting can examine the constancy of a very rich flora. It is too soon in the recovery from Covid to have precise arrangements for this next field meeting but we hope to be able to make arrangements in early 2022. Watch BPS sources and Algaebase for announcements and do consider if you might like to join us for this very appropriate field meeting for the BPS 70th anniversary. Feel free to contact the author of this article, Martin Wilkinson, if you would like to ask about it now.

New WHO Guidelines for the Health Risk Management of Cyanobacterial Blooms and Cyanotoxins: a Likely Continuing Influence on National Policy Development and Implementation

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The World Health Organization (WHO) does not formulate legislation, but it does issue voluntary guidelines for the protection of human health. For over 20 years, these guidelines have included qualitative and quantitative advice for the protection of public health from the waterborne harmful impacts of cyanobacterial blooms and cyanotoxins (WHO, 1998; Chorus and Bartram, 1999; Codd et al., 1999, 2020). Based on: (a) quantitative cyanotoxin oral dosing of experimental animals with extracts of cyanotoxin (microcystin, MC)-containing cyanobacteria and with the purified cyanotoxin MC-LR ; (b) estimates of daily drinking water consumption per human of defined body weight; (c) the estimated daily proportion of potential intake via drinking water, versus other exposure routes and media (e.g. via inhalation and food consumption); (d) the addition of standard epidemiological default uncertainty factors: a provisional Guideline Value (GV) of 1µg MC-LR per litre of water was derived to provide protection from potential lifetime exposure via drinking. Further WHO advice for health protection from recreational water exposure was provided: the avoidance of cyanobacterial scums and of water containing defined concentrations of cyanobacterial cells or of chlorophyll *a* (with cyanobacteria dominating) to avoid short-term and long-term health effects, and appropriate monitoring and reporting schemes (Chorus and Bartram, 1999). Although with some variations between countries, the WHO recommendations have been widely adopted over the past two decades in the developed world, with modifications according national experience of health incidents and differences in monitoring and analytical capacities (e.g. Scottish Government, 2012; Ibelings et al., 2014).

The increasing recognition of the environmental occurrence, molecular diversity, toxinology and toxicology of cyanotoxins in water resources, plus the continuing association of exposure to cyanotoxins with human and animal health incidents have merited a recent revision of the WHO guidelines (Chorus and Welker, 2021). The new guidelines have been expanded to include GVs for health protection versus lifetime and short-term exposure, via drinking water, to MCs, and to additional cyanotoxins namely cylindrospermopsin (CYN) and saxitoxin (STX), and to short-term exposure to anatoxin-a (ANTX-a). No GV for lifetime protection versus exposure to ANTX-a could be derived due to the absence of chronic exposure data. GVs for protection versus the members of these 4 classes of cyanotoxins via recreational water exposure are also given. The WHO revision also includes expanded and updated schemes for environmental monitoring, reporting, decision-making and the management of cyanobacterial mass populations in waterbodies and in water abstraction and drinking water treatment plants. An overview of advances in cyanotoxin analysis methods is also given. Detailed practical protocols, including validated methods and standard operating procedures (SOPs) for cyanobacterial and pigment monitoring and for the extraction and quantitative analysis of MCs, CYN, STX, ANTX-a and additional cyanotoxins are given in Meriluoto et al. (2017). Complementary molecular biology methods (including PCR, and next-generation sequencing techniques) are detailed in Kurmayer et al. (2017).

In this rapidly developing field of environmental phycology and toxicology, gaps in knowledge and research needs continue to be identified (Codd et al., 2020). However, based on the adoption, or adaptation, of the previous WHO guidelines over the previous two decades into national and local policies for health protection, it seems most likely that the new WHO guidelines (Chorus and Welker, 2021) will make a valuable contribution to the continuing need to protect public health from the harmful effects of toxigenic cyanobacteria.

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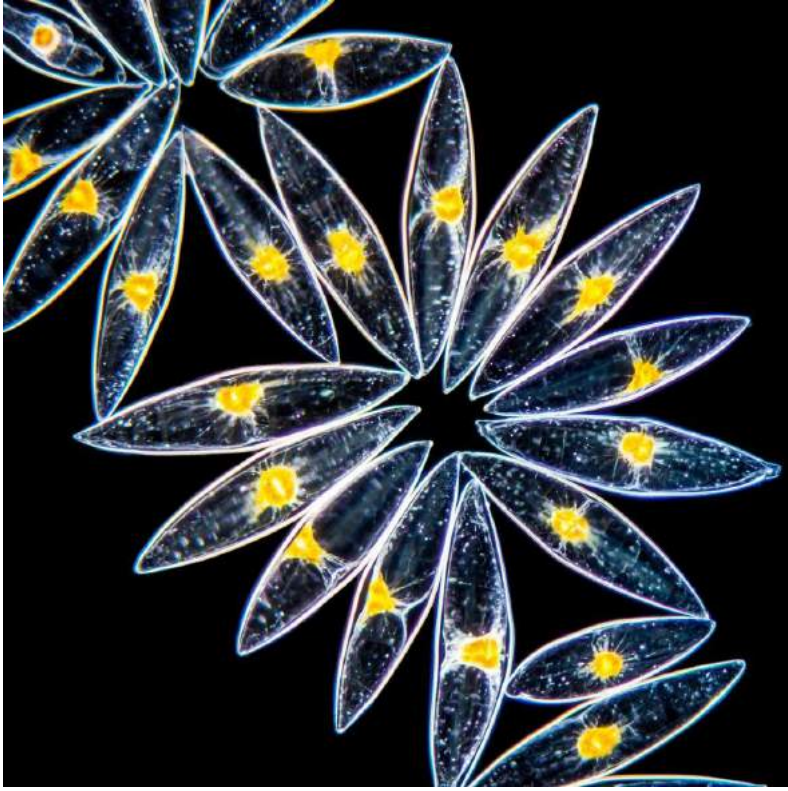

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