The Phycologist

The Newsletter of the British Phycological Society
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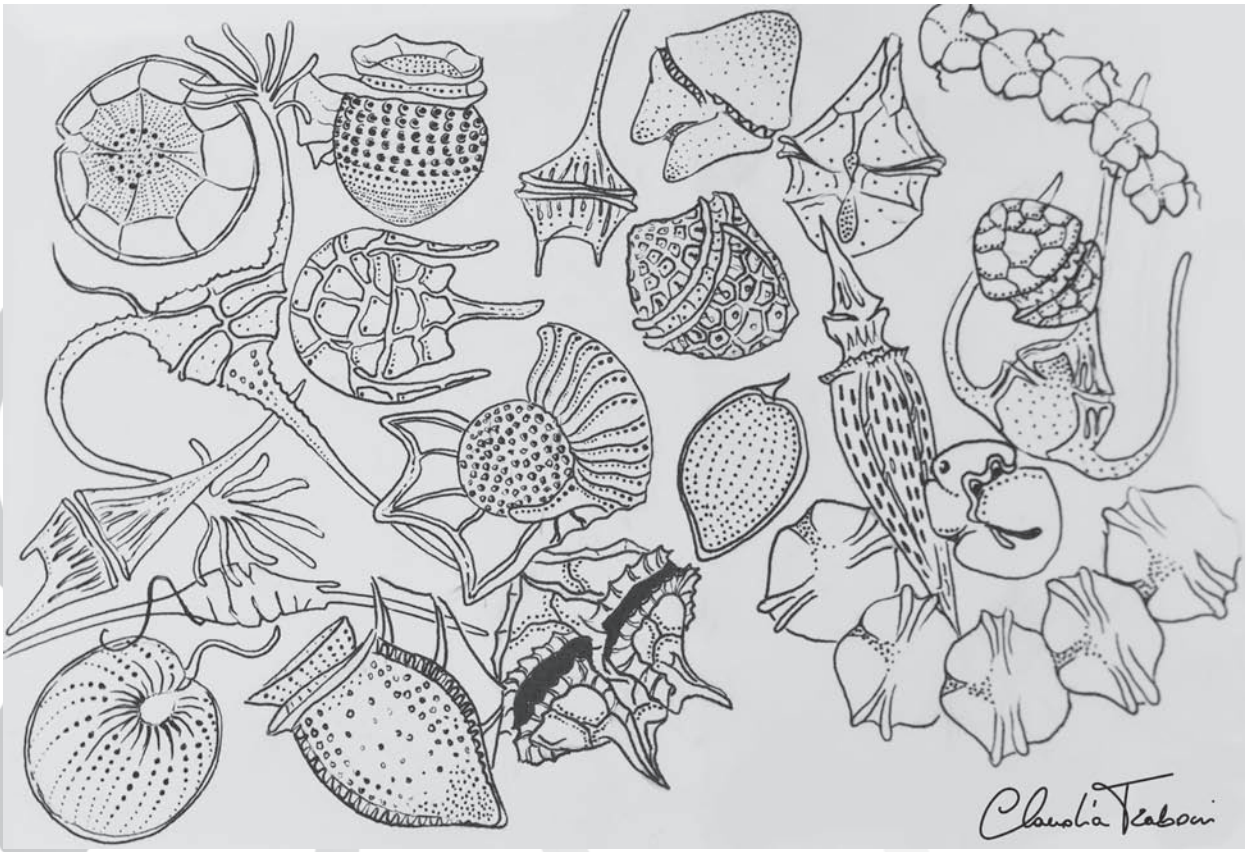

67th Annual General Meeting

Microscopic marine drifters

Rare freshwater algae

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2019
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Editorial

You may have noticed a different name as the editor of this issue of *The Phycologist*. This is because after several years of stirling service, Jan Krokowski was ready to hand off the editor batton. I'm confident I speak for all when I say that we are very grateful for his efforts and dedication to *The Phycologist* and hope he enjoys the new bit of time he has now to endeavour on other phycological pursuits; like some microscopy!

Which brings me to introducing myself as the new editor. My name is Amanda Burson and I am an avid phytoplankton ecologist. I have worked in New York, Ireland, Amsterdam and now here in the UK on several projects all with a focus on the diverse and intriguingly complicated world of algae. Whether it was growing my first culture from an individual isolate collected in Killary Harbor, Ireland or trying to get the best representation of the local *Laminaria* species' for my phycology course in Montauk, NY I have spent many happy hours and days interacting with all things phycological. I hope to continue this by highlighting the field in this newsletter and I greatly appreciate everyone's continued support with new articles and images! I hope to meet you all in future British Phycological Society events and please don't hesitat to reach out in the meantime.

In this issue we highlight the 67th British Phycological Society Meeting which took place this January at the Scottish Association for Marine Sciences in Oban, Scotlland. This includes the minutes of the annual general meeting as well as reports from bursury recipients and Manton prize winners. There's also some interesting discoveries and taxonomic updates as well. I hope you enjoy!

Very best,

Dr. 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 http://www.brphycsoc.org/phycologist.lasso.

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Front cover picture: *Dinoflagellate soup by Cláudia Traboni*

BPS Winter Meeting, Oban, January 2019

Harry Powell Exhibition

Hands up! How many of you stopped to really look at the exhibition celebrating the life and works of the late Harry Powell at January's winter meeting in Oban? Will you merit such a tribute some time? Phycologists do seem to be quite long-lived as a number of very prominent phycologists have shown, so a long career could be something for many of us to look forward to. Harry of course worked for many years at Oban following his move from Millport, and he was still interested and active until his death in 2016 at the age of 90. I'm grateful to SAMS staff who helped put together the exhibition, in particular Christine Campbell, Gail Twigg and Peter Lamont, who put a lot of effort into compiling a presentation of old photos of various shores and surveys, along with other documentation and items. They also helped me put together a couple of posters, one on Harry's career in phycology and the other specifically on some of the algae in which he was particularly interested and made important contributions. For example, going through the materials that he left (now at the Royal Botanic Gardens Edinburgh (RBGE)), I have come across samples or records of *Fucus distichus* subsp. *edentatus* from a couple of previously unrecorded mainland Scotland locations, plus confirmation of the two locations of the rare *Codium adhaerens* in Scotland. SAMS staff revisited these with Harry in 2010/11, and there is a culture of *C. adhaerens* in the CCAP (Culture Collection of Algae & Protozoa). A conducted tour around this facility was a highlight of the week for me.

Why does all this matter? Well, I think it shows that one individual can touch many lives in many ways, and leave a legacy of useful materials and records. Some things have changed, not least health and safety on fieldwork, but what hasn't changed is the value of making field observations and collections. Harry was a prolific note-taker and keeper, with also a large collection of shore photographs (many currently being catalogued by Peter Lamont). The more than 600 algal samples which have been added to the RBGE's herbarium collection so far are now available for other workers to access, and provide biodiversity information. Herbarium collections are being used more and more for taxonomic investigations and historical biodiversity assessments. I would encourage anyone carrying out field surveys to keep voucher specimens. These can be useful for your own benefit, tracking any differences in your identifications or looking at morphological variations in species. Samples can also assist in assessments of genetic variation, as we are now becoming more aware of the importance of genetic diversity within species, never mind the identification of cryptic species. So do please consider collecting and preserving samples.

Many thanks to all the people who contributed to the Oban meeting being well-organised, well-attended and successful. As usual the talks were varied and interesting, and SAMS was very welcoming.

BPS President-elect Jason Hall-Spencer and Mike Burrows of SAMS perusing the exhibition

Exhibition

Landing on North Rona

Dr Clare Scanlan clare.scanlan55@btinternet.com

British Phycological Society
67th Annual General Meeting
William Speirs Bruce (WSB) Room
Scottish Association of Marine Science, Oban
5 – 6pm Tuesday 8th January 2019

Present: Jessica Adams, Emma Beaton, Juliet Brodie, Noah Bruderer, Francis Bunker, Mike Burrows, Amanda Burson, Christine Campbell, Laurence Carvalho, Michelle Casanova, Edgley Cesar, Geoffry A. Codd, Joost D Vries, John Day, Paul Dees, Anne Jo Dobel, Maeve Edwards, Dan Franklin, Claire Gachon, Suzana Gonçalves Leles, Jason Hall-Spencer, Per Juel Hansen, Elizabeth Y. Haworth, C. J. Howe, Alison Hughes, Anne D. Jungblut, Hiroshi Kawai, Alexandra Kinnby, Regina Kolzenborg, Jan Krokowski, Frithjof Kuepper, Keelan Lawlor, Peter Leavitt, Jane Lewis, Adam Lewis, Jiasui Li, Jack Lunz, Gill Malin, Dónal McGee, Suzanne McGowan, Jean-Luc Mouget, Rob Mrowicki, Pedro Murúa, Alasdair O'Dell, Temilola Olanrewaju, Amie Parris, Alexandra Paulton, Joel Penhaul Smith, Federica Ragazzola, Hilary Redden, Paolo Ruggeri, Mahasweta Saha, Clare Scanlan, Daniella Schatz, Kate Schoenrock, Alastair Skeffington, Michele Stanley, Seth Thomas, Graham Underwood, Joel White, Martin Wilkinson and Chris Yesson.

1. Apologies

Andy Davies, Paul Hayes, Martyn Kelly, Christine Maggs, Brenda Parker, Rupert Perkins, Joe Taylor and Jo Wilbraham.

2. Announcements

None to report.

3. Minutes of the 66th AGM January 2018

Proposal to accept minutes: Claire Gachon

Seconded: Martin Wilkinson

The minutes were accepted.

4. Matters arising

None.

5. Reports from Elected Officers

Proposal to accept the following reports: Jane Lewis

Seconded: Martin Wilkinson

a. Secretary (Francis Bunker)

A steady stream of correspondence has arrived with all (except from one individual) being email. Most of this has been information from the Royal Society of Biology, which I have forwarded to Graham. Various events, particularly those by FEMS and FEPS I've passed on to the web master for consideration as to whether or not to post on the BPS web site. There have been requests from conference organisers wondering whether we want to avail ourselves of their services to which I reply to say that we do it ourselves to cut down costs. If Council want to look into such services in the future, I can dig out contacts. There have also been various emails from firms selling conferencing software. There have been enquiries from students who want to know about funding for attending conferences or courses. To these I explain the benefits of joining BPS and explain the rules of having to have been a member for at least 3 months before they are eligible to apply for funding. Other correspondence I have forwarded to the relevant members of Council or the sub-committees. I have had two emails requesting psychological assistance and have replied politely to both. The society had a lovely Christmas email from Natural Resources Wales wishing us seasons greetings and explaining all about the organisation and its functions. The email was in Welsh and it is beyond my skills to translate it but I can forward to any who are interested.

b. Treasurer (Maeve Edwards)

BPS finances are in good health, with a balance as of the 8/1/19 of £186,619.84. Accounts for 2016/2017 (see below) have been prepared for submission to the external examiner after the winter meeting, and the approved accounts will be posted on the BPS website for consultation with the membership when completed. 2017/2018 accounts preparation are in an advanced state and should also be submitted to the external examiner shortly. The financial year runs between the 1st October to the 30th September. Currently, Society expenditure is matching income, however, reserve levels are a little too large and need to be reduced in line with Charity Commission recommendations. Increased expenditure in 2019/2020 on grants and loans is anticipated, as well as investment in the new Society Journal, Applied Phycology. For further

queries on any detail within the accounts please email treasurer@brphycsoc.org. *Full table of accounts available at brphycsoc.org/annual-general-meeting*

c. Membership Secretary (Hilary Redden)

The current Honorary Life Members are: Dr G.T. Boalch, Prof. Prof. J.A. Brodie, Prof. J. Dodge, Prof. M.D. Guiry, Mrs L.M. Irvine, Prof. D. M. John, Prof C. Maggs, Prof L. Medlin, Prof. J. Raven, Sir W. Stewart and Prof. M Wilkinson. During the website downtime there was a hiatus when I had no access to either the old or new websites to check on member status. So my apologies to those members who had trouble with membership queries and renewals at that time. These have been resolved now. Before the website downtime, I took a snapshot of the member database to use to contact members and you will have been aware of a number of emails from me regarding events and membership renewal. Now we are in the new payment setup with the new website email lists should be generated automatically and I am confident that contact with members will become a smoother operation. Members are also encouraged to check into the new website regularly as it much more dynamic now e.g. check out our twitter feed for news about the conference. The General Data Protection Regulation (GDPR) came into force on May 25, 2018, and modernised the laws that protect the personal information of individuals. The BPS, as do all societies which hold data about their members, has to comply with these regulations and to this end we have made sure that the member's data collected is the minimum we need for contact and to process applications e.g. for grants and membership payments. Be assured your data is held securely and we comply with the right for lapsed members to be removed from any database we hold. As of writing (2nd Jan 2019), the active membership of the Society is 228 this includes our 11 Honorary Life Members. Fourteen lapsed members re-joined this year. One member resigned their membership during 2018, due to retirement but I also know of one member who has retained their interest in phycology and has been a member for 50+ years, since the society started. Now 84 yrs. old they are still going strong. Of our 228 members in 2019, 59 (26%) members opt to receive the EJP by post. Renewal notices for 2019 membership were circulated in conjunction with information about the AGM and Oban meeting in December 2018. Members that still had not used the new website and logged on using the token generated by the webmaster during the summer were sent information on the 31st Dec 2018 and told to use the 'Join Here' link on the front page of the new website. Payments made by the new direct debit system have been going through. There have been a few slight issues with a small group of members (about 8) so far and Andy our webmaster and myself have been dealing with them. If you have any issues about your membership or have noticed a mistake on the new website please get in touch with myself, Andy our webmaster or any of the council members so that we can resolve the issue. T*able of membership available online at brphycsoc.org/annual-general-meeting*

d. Student Representative (Amie Parris)

In 2018, BPS_algae reached 1000 followers! Currently 1065*.

Top tweet for 2018 was in June for the shortlist of the Hilda Canter-Lund competition.

BPS Twitter student members were polled on how they would like to receive BPS correspondence. 13 people voted, the results: 38% Email, 62% Twitter, 0% Facebook, 0% Post. As of September, I am now posting to both Twitter and Facebook as we have members who prefer one platform to the other. BPS Facebook student members were polled on how they would like to receive BPS correspondence and the one reply stated by email. Upcoming initiatives for 2019 are to: reinvigorate career posters (as identified at the summer council meeting), increase social media posts, create a Student Newsletter (if decided upon to meet certain student's preference). No emails from students were received in 2018. *Table of 2018 Twitter analytics for BPS Twitter account available at brphycsoc.org/annual-general-meeting*

e. Meetings Secretary (Claire Gachon)

There have been offers from Plymouth University to host the 2020 meeting with the possibility of Sheffield University. It was decided during the 2018 Summer Meeting to take up the offer of Plymouth unless another concrete offer comes up soon. No such offer has been made (at least to CG).

The 67th Annual meeting of the Phycological Society was held in Oban, on Jan 7th-10th, 2019. The adopted format (2.5 days) was virtually identical to the successful one adopted in 2018 in Southend. The conference attracted a very healthy number of delegates (108 registrants). In total, the scientific programme featured 58 oral presentations (including 6 longer talks by invited speakers, and a plenary by the Overseas President) and 29 poster presentations. Alongside classic BPS events (Manton prize, Annual General Assembly), the conference also included exhibitors, a retrospective about Harry Powell's legacy, T&F workshop aimed at early-stage researcher about "getting published"., the launch of Applied Phycology, and of the BBSRC-funded ALGAE-UK NIBB. The conference was organised frugally in order to favour student attendance, and the all-inclusive registration fee was set to £115 (for BPS members) and £140 for non-members. The budget will be finalised shortly after the conference; provisionally, SAMS expect to return a profit of £1,500-£2,000 to the Society.It is worth noting that: (1) despite the financial penalty imposed on non-members to register, roughly 25% of conference registrants decided to not become BPS members, (2) the oral programme was slightly oversubscribed.

Whereas this was not perceived as problematic, due consideration should be given to the length and format of the conference, especially if future editions aimed at growing the number of delegates.

6. Reports from the Editors and Webmaster

a. Joint Editors of the *European Journal of Phycology* (Christine Maggs and Juliet Brodie)

Christine Maggs and Juliet Brodie have been joint Editors-in-Chief for the period. Caroline Magill continues as Editorial Assistant. We were joined by new Associate Editors: Pilar Diaz-Tapia in April replacing Heroen Verbruggen in Evolutionary Biology; Katrin Geisler in December, replacing Matthew Davey in Applied Phycology and Biotechnology. Klaus Valentin stepped down in July. The last 12 months have been very busy with 132 new submissions to the journal. Adding revised papers coming back to that figure, there was a turnover of 228 papers handled in the last 12 months. *EJP*'s 2017 Impact Factor increased to 2.481 from its 2016 Impact Factor which had increased to 2.412 from its 2015 value of 2.205. *Phycologia* rose from 1.628 to 1.826, *Harmful Algae* rose from 2.664 to 3.087, *Journal of Applied Phycology* dropped from 2.559 to 2.372, and *Journal of Phycology* rose slightly from 2.536 to 2.608. The *EJP* five-year impact factor has increased from 2.371 to 2.476. We have risen by rank in both lists, and EJP is Q1 in Marine & Freshwater Biology but only Q2 in Plant Sciences. *Further details of journal analytics available at brphycsoc.org/annual-general-meeting*

b. Editor of *The Phycologist* (Jan Krokowski)

Copies of were Phycologist newsletters year ending 2018: issues # 94 (spring) and #95 (autumn) produced and dispatched on time. As always - big thank you to Agnès Marhadour for typesetting, Monument Press for printing, and Scottish Environment Protection Agency Admin staff for posting the newsletters. A number of members have requested to download *The Phycologist* on-line, so numbers being posted out have reduced – which accounts for decline in overall costs since 2016*. The autumn edition was printed in full colour and I will gauge whether future editions could be printed in full colour – dependent on costs to the Society. Thanks to all the members for their contributions – with student reports accounting for the bulk of them. I am always open to suggestions for new articles. Please continue sending articles in – happy to include any phycological views, news, work events, or any matter you wish to share. YOUR input is essential. Without YOU the newsletter would not exist. Deadline for submission of articles for Spring is March 1st, and for Autumn edition is September 1st. *Table of recent costs available at brphycsoc.org/annual-general-meeting*

c. Webmaster (Andy Davies)

A formal vote of thanks to Andy Davies for all the work he had put into the new web site in 2018 was proposed by Geoff Codd. Seconded: Liz Haworth

The new website has now fully replaced the site that was developed by Prof Mike Guiry and has been running successfully since August 2018, with only two small periods of downtime (each less than 1 minute due to larger scale internet disruption, nothing to do with the site or hosting provider). Since the site went live, we have had 11,027 unique visitors, with the most visiting in November. We currently have 206 active registrations as of December 22, and the whole process of moving the membership across has run rather smoothly, albeit at a rather slow conversion rate. I am hopeful that once January 1 passes, those members who have held off renewing will do so on the new site without fear of being charged twice. Of course, the big event will be in several days when the automatic renewal period begins, and I am confident that this will occur without issue. Plans for 2019 include improving the content, in terms of more regular news items, better linkage with social networks (e.g. Facebook and Twitter) and revision of content that was transferred across. Minor design changes are planned for the front page to improve engagement by adding more eye catching visuals. *Figure of site statistics at brphycsoc.org/annual-general-meeting*

7. Changes to the Constitution (Graham Underwood)

Acceptance of changes to the constitution outlined below were proposed by Anne Jungblut

Seconded: Jane Lewis, and accepted by the meeting.

The following changes were proposed:

1. Changes to the membership renewal process (details in constitution)

2. The need to incorporate the new journal Applied Phycology into the constitution

3. The need to specify a 3-year renewable term for journal editors

8. Approval of nomination for Honorary Membership of the British Phycological Society

Due to the sad passing away of Yvonne Chamberlain in January 2018, there became a vacancy for another Honorary Member of the society.

Wytze Stam was put forward to the meeting for Honorary Membership due to his hard work over many years to make the European Journal of Phycology a success.

The proposal was formally put forward by Claire Gauchon

Seconded: Jane Lewis

The proposal to bestow Honorary Membership on Wytze Stam was carried. Graham Underwood read out a state-

ment of thanks written by Wytze Stam in the event of his Honorary Membership being granted.

9. Elections to Council Membership

a. Election of Ordinary Members of Council 2019

There were two vacancies for Council from January 2019 following Rupert Perkins and Martyn Kelly coming to the end of their terms as ordinary members. Following an announcement of elections in autumn 2018 issue of the Phycologist, two nominations were received for the two vacancies:

Mahasweta Saha: proposed Graham Underwood, seconded Gill Malin

Joe Taylor: proposed Jane Lewis, seconded Graham Underwood

Mahasweta Saha and Joe Taylor were duly confirmed as ordinary members of council from January 2019 for three years.

b. Ratification of election of Ordinary Members of Council 2018

Following the election by society members that closed on 6th February 2018, the following are ratified as Ordinary members of Council for the period Jan 2019 to Jan 2021, having been co-opted members of Council during 2018: Christine Campbell, Jean-Luc Mouget, Brenda Parker

10. Subcommittee reports

a. Awards and Training Committee (Gill Malin)

For those who are not aware, the BPS Immediate Past President takes on the role of Chair of the BPS Awards and Training Committee. A revised version of the BPS Funding Guidelines has been approved by BPS Council and this and refreshed application forms will be uploaded to the BPS website with an email alert to the membership as soon as possible. The main aims of the revision are to increase clarity to reduce the potential for queries and ineligible applications. Summer Undergraduate Project have been renamed Summer Undergraduate Internships and academic and corporate members will be eligible to apply. For all schemes applicants must have been a member of the BPS for at least 3 months before the application date and successful applicants should be prepared to renew their membership where the project or meeting falls in the following calendar year. So please do encourage your students and colleagues to join or renew their BPS membership at the earliest opportunity! For future Internships and Project Award applications from members who do not have an independent position (e.g. a short-term postdoctoral scientist), a letter from the line manager will be required to assure the BPS Council that the applicant has the time and access to the general facilities and materials required for the project. PhD student members should note that they are not eligible to apply for Summer Undergraduate Internships and Project awards. The BPS Council sets aside an annual budget for our various awards. In 2018 just under £22,000 was awarded for 1 Summer Undergraduate Project, 2 Project Awards and 21 student Bursaries for attendance at conferences in the UK and abroad. Over 50% of the monies awarded were for student activities. BPS members are also reminded that we are an active member of the Federation of European Microbiological Societies and this gives BPS members access to the FEMS funding schemes https://fems-microbiology.org/fems-activities/.

b. Biodiversity and Conservation Committee (Martin Wilkinson)

This committee promotes recognition of algal biodiversity by promoting identification courses, field meetings, running an algal distribution recording website and promoting identification publications. It engages in protection of this biodiversity by proposing and supporting conservation initiatives and responding to threats to algal habitats. In 2018 we have been particularly concerned with kelp forests in the British Isles. These are one of the world's major ecosystem types of great importance in coastal productivity, providing the habitat for massive biodiversity at all trophic levels and in coastal protection. With increased sea temperatures some kelp species are declining in southern Britain. We believe that they should be added to the OSPAR list of threatened habitats and are delighted to hear that OSPAR is about to review their case. Debate in Scotland about possible mechanised kelp harvesting has exposed how little that the immense importance of the kelp ecosystem is appreciated. Development of a sustainable seaweed industry has to take this into account and we are asking the Scottish Government and Marine Scotland to include BPS in their list of standard consultees concerning seaweed harvesting and seaweed farming applications. There is an opportunity for us to collaborate here with the BPS Outreach and Education Committee on improving public knowledge of algae and their ecosystems. We propose a special session for the next BPS meeting to discuss algae as indicators for the EC Marine Strategy Framework Directive (MSFD). Phytoplankton indicators are being developed but we wish also to promote macroalgal indicators. The final volume of Seaweeds of the British Isles series on brown seaweeds is at last in sight of completion. BPS is thanked for a grant to expedite this and committee member Juliet Brodie is acknowledged for tremendous efforts to bring this about. See BPS website for announcements regarding identification courses and field meetings for 2019.

c. Outreach and Education Committee (Anne Jungblut)

It was discussed that an academic and general public au-

dience would be interested in different type of information, and therefore two flyers should be created. The flyer for the general public would include a list of key facts on algae. The winner of the 2018 Hilder Canter-Lund competition is Rafael Martín-Ledo with the images titled "Drifting diatoms", and the second prize was awarded to John Huisman for the image titled "A New Ganonema". Videos on algae were invited for the first time as part of the Hilder Canter-Lund competition in 2018 in addition to macroalgae and microalgae category. There was only one video submission which was not of sufficient quality to be put forward for an award. The category will also be included for the 2019 round to see if there is any improvement of the quality of the entries and increase in number of entries. It has been proposed to include a new category for applied phycology for the Hilder Canter-Lund competition to acknowledge the increase in applied research. The winner of the 2019 round would be used as cover for the new journal. Science events for the general public: It was discussed that the BPS could hold more events together with other scientific and amateur societies. It could enable us to reach new audiences and reach audiences with an already general interest in science and the natural world. The committee discussed potential new ways to do public outreach events, for example activities such as pond dipping activities as part of music festivals that are popular with families. There will be a Quekett Microscopy event in 2019 (contact Martyn Kelly for more details).

d. Algal Applications Committee (Gill Malin)

The Algal Applications Committee (AAC) did not meet in 2018 but a meeting will be arranged in the first half of 2019. Priorities will be to: discuss a special session for the BPS annual meeting in January 2020 on an aspect of applied phycology and/or a separate satellite meeting; establish a mechanism for BPS Corporate Membership, consider what BPS can offer Corporate members; progress the idea of a print on demand handbook or special issue on applied algal biotechnology aimed at industry. AAC member Saul Purton is congratulated on the success of a bid for a BBSRC phase II Network in Industrial Biotechnology and Bioenergy (NIBB) "Algae-UK: Exploiting the algal treasure trove". This will continue the work of the very successful NIBB PHYCONET, but it is broader in scope in covering microalgae and seaweeds and so closer than ever to the BPS remit.

e. Natural History Museum Representative (Juliet Brodie)

The Natural History Museum, London is the official address of the British Phycological Society which appears on Charity Commission documentation. The Society archives are also lodged at the NHM.

11. Federation Reports

a. Federation of European Phycological Societies (FEPS) (Geoff Codd)

For the FEPS website, including announcements of conferences, training workshops for 2019, newsletters etc. see https://www.facebook.com/FEPSalgae/. A new database on invasive seaweeds in Europe is being developed on the website. The latest issue of FEPS Journal: *Perspectives in Phycology* [Vol. 5 (1) June 2018] consists of 5 review papers. See www.schweizerbart.de/journals/pip.

The FEPS Council members were guests of Algal Biosciences and the National University of Ireland, Galway, during the iARC: Irish Algal Researchers' Conference. This conference included 28 oral presentations and 13 posters, largely presented by Irish phycologists. Professor Olivier De Clerck (Belgium) completed his term as FEPS President and began his appointment as immediate Past President. The new FEPS President is Professor Cecilia Totti (Italy) and new President-elect is Professor Zrinka, ZL (Croatia and local organiser of the next EPC). In addition to the main membership made up of the established European phycological societies, personal membership of FEPS is possible for phycologists in countries throughout Europe and neighbouring countries which have no national phycological society. The new President is developing an initiative to identify and encourage personal membership from the latter countries.

IPC7: 7th European Phycological Congress, Zagreb, Croatia, 25-30 August, 2019.

ZL presented a progress report on the organization of EPC7. The main congress venue and accommodation will be at the Esplanade Zagreb Hotel (5*). A range of other accommodation (4*, 3* and hostels) is also being arranged. Registration fees before 1st March 2019 (Euros), are: 400 (FEPS member); 480 (non-FEPS member); 250 (student); 150 (accompanying person). After 1st March, fees will increase to (Euros): 550, 600, 380 and 200, respectively. See website for deadlines and format for abstracts etc: EPC7 Zagreb - or – epcseven.biol.pmf.hr/. Discussions are in progress with Taylor and Frances on publishing the book of abstracts. FEPS is not planning to sponsor individual speakers but limited student support is being sought including from the Croatian Phycological Society.

b. Federation of European Microbiological Societies (FEMS) (Paul Hayes)

I attended the FEMS Council/Delegate meeting in Warsaw between the 7th and 9th September 2018.

FEMS have requested that we send them our annual report and membership numbers "at the beginning of 2019". The membership numbers will be used to calculate our membership fee for 2019.

FEMS continues to be a valuable source of funding. Our members continue to be successful when they apply for Research and Training Grants or Meeting Attendance Grants. FEMS are experiencing some problems in recruiting to key roles within the Executive and their new Election Committee has yet to achieve what was expected of it in identifying suitable candidates for election. There continues to be an imbalance in terms of the geographical spread of Executive Team members, which needs to be overcome: the UK remains over-represented on the Executive. The FEMS Chief Executive, Dr Cath Cotton has resigned from her role and will need to be replaced. Cath has been instrumental in driving modernisation within FEMS. BPS volunteered to organisation a session on algal biotechnology for the upcoming FEMS Congress in Glasgow, but this was not taken forward by the Congress organisers.

c) Royal Society of Biology (Graham Underwood)

The BPS is a member organisation of the Royal Society of Biology (RSB http://www.rsb.org.uk). The BPS membership fee for 2019 was £620 per annum. The overarching aim of the RSB is to act as a single unified voice for biology in the UK e.g. advising government, influencing policy and advancing education and professional development. BPS members can get RSB membership at 50% the normal rate for their first 2 years. This brings additional benefits such as the RSB Continuing Professional Development programme and professional awards. RSB courses and workshops are also discounted at a rate of up to 50%. See the RSB website for full details. We are keen to see how we can increase the BPS profile within RSB and would welcome any ideas for this.

12. Future meetings

BPS Annual Meeting 2020 will be held at the University of Plymouth 6th to 9th January 2020

8th Congress of European Microbiologists - FEMS 2019 to be held in Glasgow 7-11 July 2019

Meeting ended at 6.00pm.

Highlights of the 67th Annual Meeting Oban, Scotland

7th-10th January 2019

The 67th Annual Meeting was hosted by the Scottish Association for Marine Sciences in the beautiful town of Oban, Scotland. I knew I was going to enjoy this conference for the asesthetics of Scotland as much for the scientific quality! The drive along the lochs allowed time for the mind switch over from post-Christmas malaise to inquisitive phycological exploration.

The meeting kicked off with a welcome reception in the Royal Hotel in Oban on the evening of the 7th after the council members meeting. The reception was convivial and well attended by both seasoned academics and students alike. I think it really set a tone of support and mutual interest which carried on throughout the meeting.

As is the case with any event, there were a few minor hiccups (traffic issues, water mains down) but I must say fair play to organisers for keeping us informed while ensuring everything ran on schedule regardless.

Due to the popularity of these meetings, dual symposiums are required to give everyone a chance to present their work. It was a tough decision to chose which rooms for the symposiums and it did not surprise me at all when speaking to others at the coffee breaks that both sessions were very interesting. One of my favorite aspects of the BPS meetings is that the Manton prize presentations stand alone, so they can be attended by all. This really gives the students an opportunity to showcase their research and many not only rose to the occasion but exceeded it with with their presentations.

The poster sessions during lunch and coffee breaks were great and I personally learned and imparted knowledge in equal measure speaking with some of those presenting their work. It also helped that the food was being served in the same room as the posters so those presenting had a captive audience.

The first day ended with the announcements of the launch British Phycological Society's second peer-reviewed journal *Applied Phycology*. Carrying the theme of applied research a bit further, the announcement was followed by the launch of Algae UK, a BBSRC Network in Industrial Biotechnology and Bioenergy initiative. These are two very exciting opportunities to explore the realm of applied phycology, something which played a major part in this year's meeting.

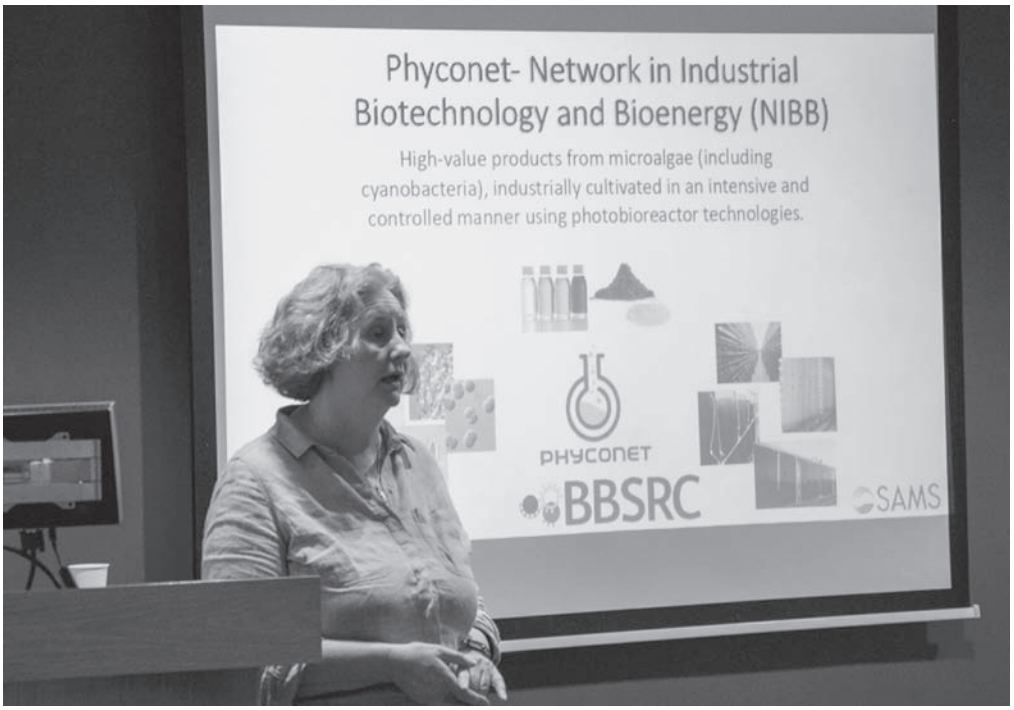
In the afternoon of the third day we were invited for tours of the facilities at SAMS and I particularly enjoyed the culture rooms, both for the micro- and macroalgae. The lectures were finished off with Hiroshi Kawai's presidential address about a career in kelp research. Professor Kawai's research on kelp is nearly overwhelmingly impressive and I got the sense that despite presenting for the hour we only received the very tip of the iceberg of his understanding of phycology and kelp taxonomy.

After this we all gathered back at the Royal Hotel in Oban for the conference dinner. During this time BPS president Graham Underwood took a moment to thank the organisers of this year's conference, especially Claire Gachon and Christine Campbell. Also the worthy winners of the Manton presentation and poster prizes were announced. The presentation winner was Suzana Gonçalves Leles and the poster winner was Carla Greco.

The evening was finished off with a prize draw, sadly I was two numbers away from the lovely bottle of Oban Whisky. However no one could stay disappointed long as the dance floor remained packed with the ceilidh in full swing. I look forward to seeing everyone again at the next meeting in Plymouth!

Submitted by Amanda Burson, Editor *The Phycologist*, editor_phycologist@brphycsoc.org

Photos: credit SAMS



Student reports

Alison Hughes,

University of Strathclyde, Glasgow. a.hughes@strath.ac.uk

This was my first British Phycological Society meeting to attend and I was nervous about how discuss my research with a community of such varied expertise. It is remarkable that such a society exists to bring ecologists, oceanographers, molecular biologists, and many more together, all equally passionate about their role in contributing to this scientific field. Within minutes of attending the welcome reception, I had struck up conversation with PhD students, committee members, and others working in the microalgae field like myself.

The programme was packed with interesting talks on all branches of phycology from kelp forests to microalgal blooms. It was genuinely difficult to choose which sessions to attend. I particularly enjoyed talks about exploring the biodiversity of niche environments and the chemical ecology stories were truly fascinating. Scheduling the Manton Prize Session as a plenary session was really beneficial for the student speakers, as we got a great audience full of questions and feedback needed at this early stage of our research careers. I was impressed (and more than a little intimidated) by the standard of these talks. It is so encouraging to see other young people so enthusiastic and committed to science in today's political and social climate. Suzana Gonçalves Leles was a worthy winner and she is definitely one to watch as she moves forward with her career!

My own talk was entitled "The Big Blue – influence of 405 nm light on marine microalgae" in which I spoke about coupling microalgal culturing within photobioreactors to comparative metabolomics approaches to study the effect of light stress on the production of specialised metabolites. The IBioIC, which funds my PhD, set up a Collaborative Training Partnership in which each student has an academic and industrial supervisor for their project. I work at the University of Strathclyde, under the supervision of Dr. Katherine Duncan, and have a partnership with Xanthella Ltd., also based in Oban, with Douglas McKenzie as their CEO. Xanthella Ltd. have provided me with a 1 L benchtop photobioreactor (MicroPharos™) within which to culture my panel of diverse marine microalgal species. They are particularly interested in the use of 405 nm light for growing microalgae as it significantly reduces bacterial contamination within the system without affecting the growth rates of microalgae. I am testing this wavelength on 13 strains of phylogenetically diverse microalgae as well as investigating the effect on the production of specialised metabolites using a molecular networking approach and bioactivity-guided prioritisation of samples.

The 67th Annual Meeting of the British Phycological Society was an enjoyable and educational experience for me. Delegates were very willing to discuss my research and provide advice and expertise that will greatly help me as I move forward with this project. It genuinely is a friendly, open-minded, and collaborative community, which was evident in the teamwork skills illustrated during the ceilidh! A sincere thank you to the British Phycological Society for funding my attendance and giving me the opportunity to present my work. I look forward to next year!

Annabel Higgins Hoare,

Waterford Institute of Technology, Department of Science, Waterford, Ireland.

annabel.higginshoare@postgrad.wit.ie

On the 7th of January, the 67th British Phycological Society Meeting had begun in Oban, Scotland, United Kingdom. This, being the society's annual meeting, was something that I've been looking forward to attending since first joining in 2016. I myself, am a final year PhD student working on a project entitled, ''Development of a Novel Wound Dressing Formulation Using Seaweed Derived Antimicrobial Compounds'' from Waterford Institute of Technology, which is situated in the south-east of Ireland.

As you can imagine, this was an exciting space in which I could share my research which is based on the extraction of antimicrobial compounds from seaweeds and the incorporation of these compounds into wound dressings. The opening meeting began with a warm welcome into SAMS by Dr. Claire Gachon who organised the meeting, followed by an exciting symposium presentations, I particularly enjoyed Dr. Patrick Fink speaking about the impact that herbivorous behaviour has on the production of secondary metabolites in seaweeds. I found this particularly interesting as the production of secondary metabolites in macroalgae is something that effects my research and therefore, something that I can potentially look

into in the future with regards manipulating the seaweed to produce more bioactive compounds.

Networking is obviously a huge part of these events, and I got an ideal opportunity to make contacts both during the meeting, and a dinner event in the Royal Hotel. I've made contacts who I intend to keep in touch with, as it gives an opportunity for future collaborations between like minded labs and myself. I got a chance to view interesting posters, this is a nice way to see the most similar and even just interesting projects so that they can be compared to my own research and it's nice to be able to ask the author about specific methods that were used as part of their study. As this was meeting with over 100 delegates, there were two different talk sessions being carried out simultaneously, which led to more than a few difficult decisions!

As part of my own oral presentation, I was give a forum in which to disseminate and defend my own research. I cannot stress how important these skills are, as without the proper share of knowledge and ideas, it's very difficult for your research to actually benefit anyone. I do feel like people were genuinely interested in my research, as well as in the fact that it was on seaweed used in a clinical application. In this way, I think that we, as phycologists can raise interest and encourage more people to engage with the sea, a fact which will in turn help lead to a thriving maritime economy and healthier marine ecosystems.

I am so grateful that I could attend such a meeting with the help of the British Phycological Society, and I would like to thank BPS for helping me to have such a great experience, which will benefit my career. I would also like to thank and congratulate Dr. Claire Gachon and Prof. Christine Maggs for doing such an amazing job in organising this event.

Temilola Olanrewaju,

Ulster University, Northern Ireland. olanrewaju-to@ulster.ac.u

The 67th Annual Conference of the British Phycological Society was held in Oban, Scotland between Monday 7th and Thursday 10th January 2019. This was my second visit to Oban in four months as I was one of 12 delegates on a PHYCONET-funded Algaculture for Biotechnology course in October 2018. As an environmental scientist, this was my first phycology conference and my very first opportunity to present my work in applied phycology. I arrived Oban a day before the meeting began and had the chance to explore the town a bit.

The meeting kicked off on the evening of Monday the 7th with registration after which delegates were warmly welcomed during an icebreaker session at the Royal Hotel, Oban. Tuesday morning started at the Scottish Association of Marine Sciences (SAMS) with a welcome address by the BPS President Prof. Graham Underwood and SAMS Director Prof. Nicholas Owen. The plenary sessions began afterwards with delegates having a choice between two concurrently run symposia. Symposium 1 covered talks on interactions of algae with microbes and grazers in present and future oceans, and symposium 2 was themed 'Algal Physiology in the limelight'. I was drawn to talks in symposium 1 as these were focused on the chemical ecology of algal interactions – one of my areas of research interest. The first talk by Daniela Schatz titled 'Message in a bubble – communication via extracellular vesicles shapes algal bloom dynamics' set the tone for a good afternoon. I also had the chance to listen in on selected talks in the second symposium

A Manton Prize session for PhD researchers was filled with very interesting presentations. This session was held on both days of the conference. Between talks were coffee and lunch breaks during which poster presentations were held in a friendly informal setting. I presented a poster on my ongoing PhD research titled, 'Microalgae-bacteria piggybacking facilitates antimicrobial resistance gene transfer in Daphnia'. These poster sessions afforded me the opportunity to address questions from phycologists with great depths of experience particularly on my microalgae of interest.

The third day of the conference followed the same structure with the focus of the two symposia shifting to talks on general phycology and blue carbon respectively. I was especially delighted to attend Professor Peter Leavitt's talk on 'factors regulating the role of phytoplankton as vectors of carbon sequestration in lake sediments'. I have been an ardent follower of Professor Leavitt's research right from my time as an environmental monitoring master's student. The evening ended with a conference dinner coloured by prize draws, award presentations and a treat to the traditional Scottish Ceilidh dance. I stayed an extra day in Oban after the conference ended for some sight-seeing and a tour of the Oban Distillery before travelling back to Northern Ireland.

I want to thank the organising committee for a well-planned annual meeting. I am equally thankful to the British Phycological Society for granting me a travel award to attend the conference and present my research

Regina Kolzenburg,
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regina.kolzenburg@port.ac.uk

This year's 67th scenery for the Annual Meeting of the British Phycological Society from the 7th – 10th January 2019 was set perfectly at SAMS (the Scottish Association for Marine Science). Beautiful sunrises and sunny Highland scenery welcomed the nearly 110 delegates every day. Organised by a lovely and helpful committee around Claire Gachon the annual meeting started with a wine reception in the Royal Hotel in Oban so everyone who had arrived by then could gather and have a first mingle before the sessions would start on Tuesday.

The first full day of the meeting started with a warm welcome of the President of the BPS Prof. Graham Underwood and lead directly into parallel symposia of "Interactions of algae with microbes and grazers in present and future oceans", "Algal Physiology in the limelight" and "General Phycology" which were taking turns throughout the day. Very diverse and interesting talks from kelp productivity on Irelands west coast (Kathryn Schoenrock) and mixotroph plankton physiology (several talks) to effects of ocean acidification on algae-grazer interaction (Alexandra Kinnby) and very interesting information about seaweed farming in the Philippines (Anicia Hurtado). The talks were accompanied by poster presentations on both days, that were held in coffee and lunch breaks throughout the meeting. Here delegates had the opportunity to talk to the presenters in more detail and give feedback or develop research ideas together.

In the morning of both days the traditional Manton Prize sessions took place with 10 candidates presenting their excellent research in oral presentations. The Irène Manton Prize awards the best student oral presentation as well as poster. Participants are judged by a jury from within the BPS regarding their scientific content and presentation style. Again, the combination of topics was very diverse and hard to judge due to the high quality of presentations and posters. The winner of the best oral presentation Suzana Gonçalves Leles (Swansea University) convinced with her brilliant talk about global patterns, sampling bias and the role of diversity in mixotrophic plankton. The winner of the best poster category was Carla Greco (University of Bristol) who presented her work about the characterisation of polar cyanobacterial diversity and adaptations to cold environments in an easy to read, clearly structured and well explained way.

In the afternoon, the BPS launched a new high quality peer-reviewed journal: "Applied Phycology", which will focus more on the applied and practical aspects of research in algae. Following the journal, Algae UK, a BBSRC Network in Industrial Biotechnology and Bioenergy, was launched at this annual meeting as well. Both launches were received with great support and excitement from the audience.

The first day closed with a wine reception sponsored by Taylor & Francis publishers which offered another opportunity to network and discuss further questions that came up during the sessions.

On the second day, the parallel symposia of the first day were rounded up with the introduction of another symposium regarding "Blue Carbon: The role of phytoplankton in long-term carbon burial" which completed the overall very interesting and diverse meeting agenda. As a highlight of the meeting the conference dinner was held on the evening of the second day with a live band, excellent food and Ceilidh-dancing. The relaxed atmosphere soon got the majority of participants on the dance floor and dancing as well as conversations held on until the early morning hours.

The last day of the meeting attendees could choose between the "Blue Carbon" and the "Algal physiology in the limelight" symposia, and could exchange final thoughts during a last poster session and lunch before making their way home.

The overall atmosphere of the meeting was welcoming, familial and convivial with plenty of opportunities to network and casual conversations. I would like to thank the BPS for their financial support that made it possible for me to go to the meeting where I was able to discuss my research with international experts, made new contacts and was even able to form new collaborations for future research opportunities. Overall, it has been a great meeting and experience and I am looking forward to next year's 68th Annual Meeting in Plymouth.

Amie Parris

University of Essex, School of Biological Science, Colchester, Essex

https://ecoevoenviro.wordpress.com/people/amie-parris-phd-student/

Wow! Another January has come and gone, and with it, another fantastic annual meeting of the British Phycological Society. BPS 2019 was my second meeting and I have to say, it was one of my favourite conferences to date. From student oral and poster competitions to networking, mingling, a wine social, and of course great food. Oh! We cannot forget the dancing. That's right, I experienced my first Scottish ceilidh and I have to say, it was wonderful.

For me, a great conference has just the right balance of social networking and learning and this year's conference was exactly that. I had the opportunity to meet fellow Ph.D. students in my field and senior researchers who studied similar work to me 30 years ago. Being able to discuss their experiences and projects really gave a new perspective to my work and offered new contacts for collaboration.

Another highlight to BPS 2019 in Oban was the Manton Prize session for student research. Ten students presented over the course of 2-days in a relaxed and stress free session. Topics included green algae pathogens, the biogeography of mixotrophs, bioreactors for cultivation, predicting harmful algal blooms, microalgae for biotechnology, lipid extraction, the margin squeeze of Corallina, carbonite chemistry in Alaska, microalgal mixotrophy of mussels, and seaweed wound dressings.

The symposium presentations were equally exciting with researchers visiting from across the globe. Some of my favourites included microbial complexity (Germany), effects of vibrio on marine invertebrates (France), iridescence in red algae (London), algae for biomass (Scotland), grazing stress on Dunaliella tertiolecta (India), the importance of kelp (Ireland), and disease prevention in macroalgae (Australia).

On the evening of the last day, we had a truly unique presentation from Hiroshi Kawai. Dr. Kawai gave the presidential address to a packed room of eager listeners, myself included. He spoke about his career in phycology, discoveries that progressed his field, and his journey of being a researcher and algae enthusiast.

Overall, BPS 2019 in Scotland was a great conference. I am grateful for the opportunity to attend and present my work thanks to the support of the Society. See you next year phycologists!

Honorary member (2019)—Wytze T. Stam

From the President, Professor Graham Underwood

The Society offers up to 12 Honorary memberships, to individuals who have made a significant contribution to phycology, and to the life of our Society. At the Annual General Meeting in Oban, January 2019, Hon. Life membership was awarded to Professor Wytze Stam.

Professor Stam has served as the Chair of the European Journal of Phycology management committee for 25 years. In this role, he has made a very significant contribution to the success of the Journal. I know from speaking to many of our Editors, that his guidance and wisdom has been invaluable. It is one of those contributions that are not necessarily terribly visible, but never-the-less essential. In recognition of this work, and his international reputation as a phycologist, the BPS are very pleased that Prof Stam has accepted our offer to become an Hon. Life Member

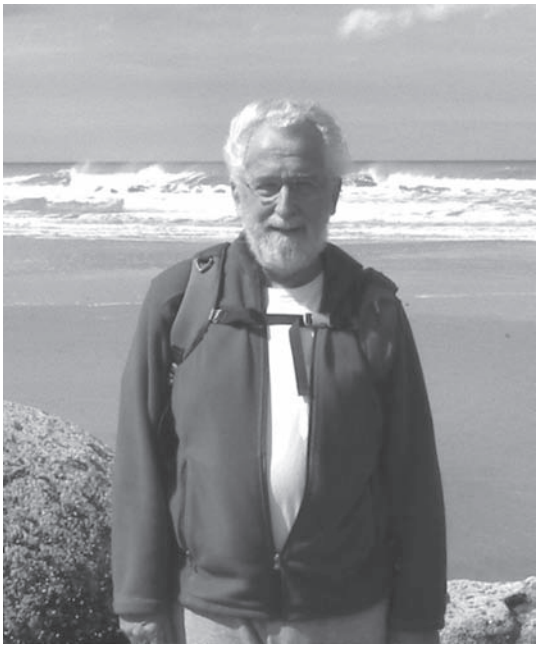
In 1968 I started my PhD research at the University of Groningen under Prof. Chris Van den Hoek (Dept. of Plant Systematics) and Prof. Gerard Venema, (Dept. of Molecular Genetics) on the molecular taxonomy of blue green algae—there were no cyanobacteria yet—using DNA-DNA hybridization (genomics avant la lettre).

In January 1970, I attended my first of more than a dozen meetings of the British Phycological Society at Bredford College, now Regent's University London (See "First Time", published in the 60th BPS an niversary issue of The Phycologist in 2012). My first publication in the British Phycological Journal was in 1984 describing genotypic relationships within the genus Anabaena. From 1995-1997 I acted as overseas Vice-President of the BPS.

In the mid-1980s, the Department of Systematics was transformed into the Department of Marine Biology and I began to try out the scDNA-DNA hybridization method on eukaryotic algae, i.e., Laminaria, Cladophora and Dictyosphaeria species. This proved much more challenging but was ultimately successful. By the late 1980s, restriction enzymes, DNA cloning and sequencing were coming of age, as was the entirely new, polymerase chain reaction (PCR).

In 1990, I ordered the first PCR machine in the university and the lab took off. Jeanine Olsen joined the lab from the Smithsonian and with our PhDs and post-docs, we began developing molecular phylogenies based on rbcL, rDNA-18S and ITS, and mitochondrial genes. This resulted in >50 publications covering Cladophoropsis, Struvea, Acrosiphonia, Phycodrys, Postelsia, Ascophyllum, Caulerpa, Symbiodinium and members of the Dasycladales, Demarestiaceae, Sphacelariales, and Fucales. As molecular methods developed further, along with continually improving analysis software, the lab shifted to population genetics and phylogeography of algae (mainly fucoids) but also flatfish, rays, invertebrates and later, seagrasses. Adding up to a total of over 120 publications

In 1993 I accepted two positions relevant to publication of phycological research. One as Associate Editor of the Journal of Phycology (1993-2004) and the other as Member of the European Journal of Phycology Management Committee (EJPMC), EJP being the successor to the British Phycological Journal.



My first meeting took place at Cambridge University Press (CUP) in Cambridge. Frankly, this first meeting was a complete discovery trip for me with many new terms: Production, cover design, online publication, marketing & advertising, circulation & subscription, financial report, turnaround time and so on. Luckily the other committee members were more knowledgeable. But I learned quickly and became more and more enthusiastic about this very interesting job at the interface between science and management.

An important issue in 2001 was the desire to change to another publisher. This involved reading tenders, extended meetings and substantial frustration. Taylor & Francis won out and two contract renewals later, is still our publisher.

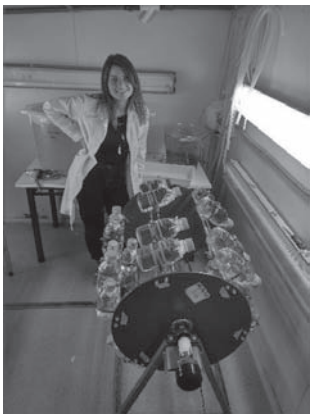
In 2010 I became acting as chairperson of the EJPMC. The new issue was and remains Open Access, and what sort of business model would work for a small, society-based journal dependent on publication income. The final answer is still not clear, but progress is being made.

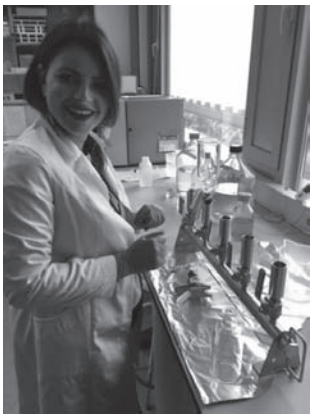
In 2018—after 25 years—it was time to step down. The journal is healthy with an impact factor of almost 2.5! It's been a pleasurable journey.

Professor Emeritus, University of Groningen,
The Netherlands (wytze.stam@gmail.com)

Capturing the beauty of the microscopic marine drifters

Claudia Traboni, MixITiN Researcher





Ever since I put my head under water at the age of four I realized that I would have a strong connection with the sea. Today, two decades older, I am pursuing a research career in plankton ecology. My journey started in Naples, my hometown, where I studied marine biology and ecology at the University "Federico II". My first oceanography lecture was enough to give me a dream to follow. I am profoundly fascinated by diversity of marine systems and intrigued by their complexity. This is the reason that has driven me to start investigating relationships occurring within plankton communities through research and has also fuelled my artistic passion about drawing.

I am a Marie Skłodowska-Curie early stage researcher (ESR) based at the Institute of Marine Science of the National Council of Scientific Research (ICM-CSIC) in Barcelona. My project is part of the International MSCA Innovative Training Network "MixITiN" (www.mixotroph.org). MixITiN is training 11 ESRs in a multicultural context and relying on multi- and cross-disciplinary expertise. Our focus is on mixotrophic plankton which are defined as protists that are able to perform photosynthesis and actively ingest prey in the same single cell (alias mixoplankton). For years mixoplankton have been neglected and erroneously associated with classical autotrophic phytoplankton or phagotrophic microzooplankton, food for metazoan zooplankton. However, now we know that mixoplankton play very important roles in marine ecosystems. MixITiN's overarching goal is to bring this new paradigm in ecology to the forefront of marine research and to train the next-generation scientists such that they can incorporate this paradigm into different disciplines. Thus, the idea is to promote the integration of protist mixotrophs into mainstream marine ecology and policy making through laboratory and modelling simulation-based research and dissemination.

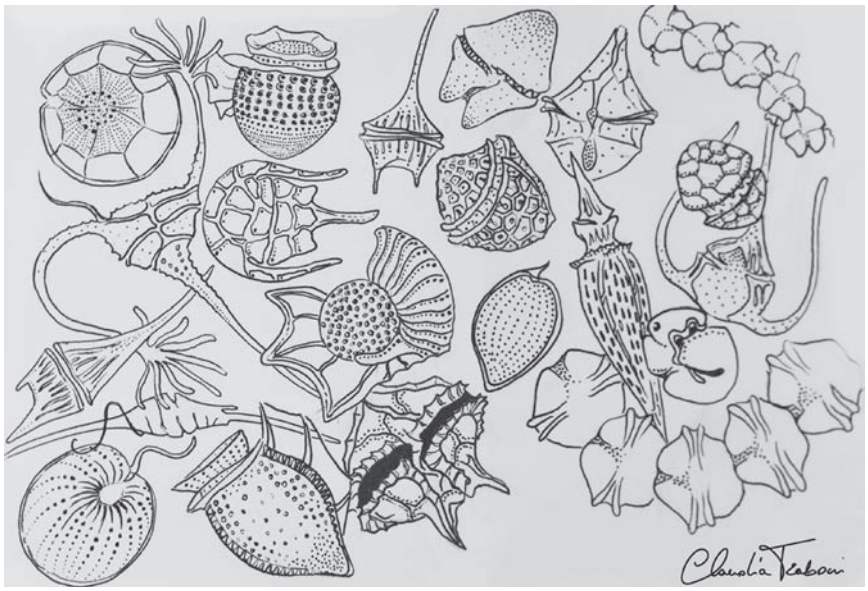


Fig. 1. Dinoflagellate soup. A selection of fascinating thecate and naked dinoflagellates. Illustrations are based on Scanning Electron or light Microscope images. Figures of organisms not to scale.'

I am studying interactions involving copepods as zooplankton predators and mixotrophic protists as their prey. Mixotrophic diet may provide fitness attributes to copepods, or it may collapse trophic linkages due to release of toxins often associated with mixotrophic blooms. Thus, I am investigating how these microscopic versatile life forms can shape nutrient flows up to copepods, with impacts on fish stocks. The findings from my studies will help to better understand ecosystem functioning and foresee the effects of natural fluctuations and/or anthropogenic disturbance.

My skills in the laboratory encompass handling and culturing of both types of plankton and I spend around 2-3 hours every day (sometimes over weekends) looking at my planktonic cultures. Observing the live samples is always a magical moment of the day. In just one millilitre of seawater I can see thousands of dancing cells and elegant copepods interacting in diverse ways. Each organism with its own swimming pattern and morphology. I would never tire of looking at this chaos under the microscope. Through my "Plankton chaos" artwork I have attempted to illustrate the complexity and diversity of the charming crazy world of plankton (Fig 1). The beauty amazes me, inspires my creativity. With

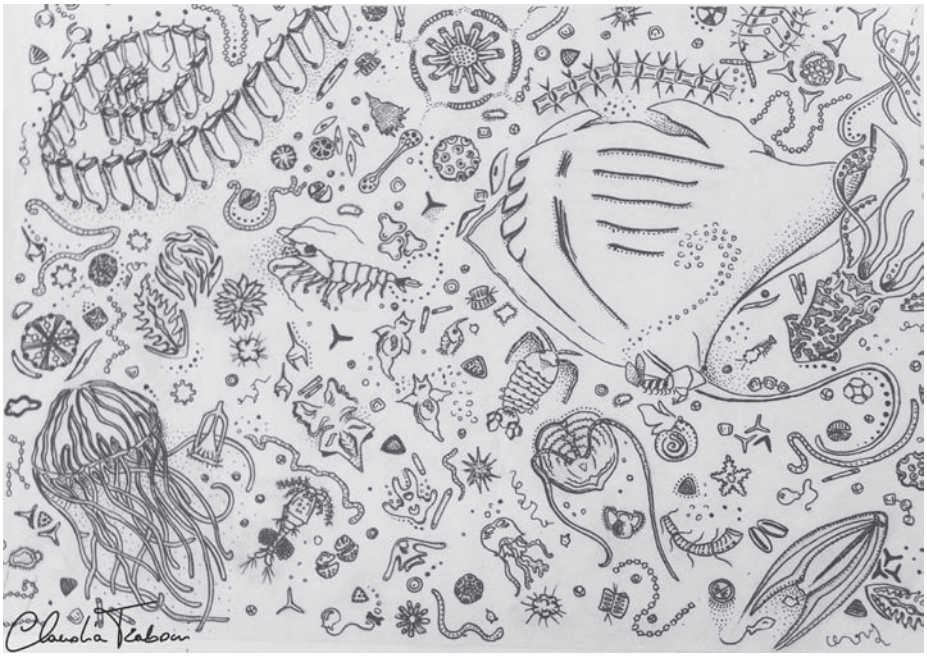


Fig 2. Plankton chaos. Complexity of shapes in the marine world from unicellular diatoms to gelatinous macrozooplankton. Manta rays are nocturnalplankton feeders. Figures of organisms not to scale

Fig. 3. Race at low Reynold's number. Common zooplanktonic taxa undertaking active vertical migration under the moonlight in response to food availability or due to phototactic behaviour. Illustrations are based on Scanning Electron or light Microscope images. Figures of organisms not to scale.

my drawings I aim to transmit what I feel when I dive into the plankton world with my eyes and my mind. Wonderful drifters whose beauty is accessible only to those who are lucky enough to look through the lenses of a microscope.

Among protist mixotrophic plankton, dinoflagellates are my favourites. They remind me of the small fraction that is responsible for fundamental biogeochemical processes in the world. Hence the origin of my "Dinoflagellate soup" (Fig 2). Plankton produce half of the oxygen we breathe and remove carbon from the atmosphere as well as they form the basis of food web we depend on for our diet. Metazoan zooplanktonic predators undertake vertical migrations daily to eat their protist soup (food) and simultaneously avoid predation by visual predators. This massive colourful swimming biomass, illustrated in my "Race at low Reynold's number" (Fig. 3), gives rise to one of the largest animal displacement on Earth. I am grateful to the plankton as they allow me to survive in a liveable planet. Through my job and art, I want to open other people's eyes to how important and extraordinary plankton are, regardless of their size or their position along the evolutionary scale.

Remembering Professor Colin. S. Reynolds

An obituary for former FBA Director, and Research Fellow, Colin Reynolds, by Dr. Bill Brierley

Text and images provided from the Freshwater Biological Association (FBA)

Colin joined the FBA after completing his doctorate in 1970 and worked for over 35 years, retiring finally in 2002. In his later years in employment he became the Director of the FBA. He continued to be involved as an Honorary Research Fellow, as a trustee and as editor of The FBA's scientific journal Freshwater Reviews up until his death.

In his retirement, Colin continued to build international links and together with other FBA fellows promoted and was one of the founders of the European Federation of Freshwater Sciences (EFFS). The aims of EFFS are to promote freshwater sciences throughout Europe, by improving communication and collaboration among scientists and by organising scientific meetings, encouraging young scientists to attend and present their findings.

Colin was an internationally renowned scientist, studying microscopic plants (phytoplankton) in rivers and lakes, and built strong collaborations with other researchers in Brazil, Chile, France, Holland, South Africa and New Zealand to name a few. He published prolifically, even in his retirement – writing over 150scientific papers and three text books.

Colin received many honours during his scientific career. Some of the prestigious ones include the winner of the International Ecological Institute (ECI) prize in 1994, which is awarded annually to an ecologist distinguished by outstanding and sustained scientific achievements. He was awarded an MBE in 2000 for his "Services to customers of the Water Industry" which resulted from him sitting on and advising OFWATs consumer committee for over 10 years. Colin was awarded the Naumann – Thienemann Medal for his outstanding achievements in "limnology (studying lakes) of the highest merit". This award was presented to him at the International Limnological Society convention in Australia in 2001.

Colin also had a passion for teaching. Many students and others benefitted from his very generous giving of time and energy in encouraging people to learn more – he had a great skill in making very complicated science sound very simple! We have received numerous emails of condolence from around the world in the last 2 weeks and will produce a more detailed celebration of Colin's life and work in the next issue of FBA News.

Colin did outstanding work for the FBA for over 35 years, and kept a close relationship with us until his recent passing

Colin Panto, caption 'Colin (4th from left) performing in the FBA panto!

Colin had a passion for teaching, and was revered by students'

Freshwater Algal Flora of the British Isles - Update 7

David M John and Brian A. Whitton

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The current update deals with new records and nomenclatural/taxonomic changes since publication of the 2nd edition of *The Freshwater Algal Flora of the British Isles* (John et al. 2011) and not mentioned in earlier updates. We are indebted to Professor Michael Guiry for providing us with information concerning many of these changes with further background often given in Algaebase (Guiry & Guiry 2019) website along with publication sources. Cyanobacteria, diatoms and doubtful taxa in other groups are not included here. Many of the changes are the result of studies of DNA-sequence data although those relating to desmids are only solely on morphological studies.

Batrachospermum atrum (Hudson) Harvey (= *Atrophycus ater* (Hudson) Necchi *et* Rossignolo) now *Torularia atra* (Hudson) M.J.Wynne

Batrachospermum helminthosum Bory now *Virescentia helminthosa* (Bory) Necchi, D.C. Agostinho *e*t M.L.Vis

Chlamydomonas clathrata Pascher now *Chloromonas reticulata* (Goroschankin) Gobi

Chlamydomonas coccifera Goroschankin [Gorozhankin] now *Microglena coccifera* (Goroschankin) Demchenko, Mikhailyuk *et* Pröschold

Chlamydomonas debaryana Goroschankin now *Edaphochlamys debaryana* (Goroschankin) Pröschold *et* Darienko

Chlamydomonas depauperata Pascher now *Chloromonas depauperata* (Pascher) Gerloff *et* Ettl

Chlamydomonas gigantea O.Dill now *Oogamochlamys gigantea* (O.Dill) Pröschold, B.Marin, U.W.Schlösser *et* Melkonian

Chlamydomonas grovei G.S.West now *Chloromonas grovei* (G.S.West) Gerloff *et* Ettl

Chlamydomonas korschikoffii Pascher now *Chloromonas korschikoffii* (Pascher) P.C.Silva

Chlamydomonas media Klebs now *Microglena media* (Klebs) Nakada

Chlamydomonas mexicana R.A.Lewin now *Chlamydomonas oblonga* Pringsheim

Chlamydomonas mirabilis Pascher now *Chloromonas mirabilis* (Pascher) Korshikov ex Ettl

Chlamydomonas pseudogloeogama F.E.Fritsch *et* R.P.John now *Chlamydomonas gloeogama* Korshikov

Chlamydomonas pseudomacrostigma Péterfi now *Microglena opisthopyren* (Skuja) Demchenko, Mikhailyuk *et* Pröschold

Chlamydomonas pseudopertusa Ettl now *Dangeardinia pseudopertusa* (Ettl) Nakada

Chlamydomonas rapida Brabez now *Chloromonas rapida* (Brabez) Gerloff *et* Ettl

Chlamydomonas reticulata Goroschankin now *Chloromonas reticulata* (Goroschankin) Gobi

Chlamydomonas similis Korschikov now *Rhysamphichloris similis* (Korshikov) Nakada

Chlamydomonas similis var. *curta* J.H.Belcher now *Rhysamphichloris curta* (J.H.Belcher) Nakada

This variety was overlooked in the 2edn of the Flora (John *et al*. 2011) although had been reported by Belcher (Belcher 1964) from Ghyll Head Reservoir, Westmoreland in September 1963.

Chlamydomonas variabilis Dangeard now *Chloromonas variabilis* (Dangeard) Wille

Chlamydomonas velata Korshikov (=*Sphaerellopsis velata* (Korshikov) Gerloff) now *Vitreochlamys velata* (Korshikov) H.Ettl

Chlamydomonas vulgaris J.K.Anakhin now *Chloromonas vulgaris* (J.K.Anakhin) Gerloff *et* Ettl

Chlamydomonas westiana Pascher now *Chloromonas westiana* (Pascher) Gerloff *et* Ettl

Chlorella emersonii Shihira *et* R.W.Krauss now *Graesiella emersonii* (Shihara *et* R.W.Krauss) H.Nozaki, M.Katagiri, M.Nakagawa, K.Aizawa *et* M.M.Watanabe

Chlorella minutissima Fott *et* Nováková now *Mychonastes homosphaera* (Skuja) Kalina *et* Puncochárová

Chlorochytrium bristoliae (G.M.Smith) D.M.John *et* Tsarenko now *Scotinosphaera paradoxa* Klebs

Chlorochytrium facciolae (Borzì) Bristol now *Scotinosphaera paradoxa* Klebs

Chlorochytrium grande Bristol now *Scotinosphaera grandis* (Bristol) Wujek *et* R.H.Thompson

Chloromonas cryophila Hoham *et* Mullet now *Chloromonas nivalis* (Chodat) Hoham *et* Mullet

Chrysolykos skujae (Nauwerck) Bourrelly now *Chrysoikos skujae* (Nauwerck) Willén

Chrysosphaerella coronacircumspina Wujek *et* Kristiansen now *Spiniferomonas coronacircumspina* (Wujek *et* Kristiansen) K.H.Nicholls

Chroomonas acuta Utermöhl now *Komma caudata* (L.Geitler) D.R.A.Hill

Chroomonas rosenbergii Huber-Pestalozzi now *Chroomonas coerulea* (Geitler) Skuja

Closterium ehrenbergii var. *malinvernianum* (De Notaris) Rabenhorst now *Closterium submoniliferum* var. *malinvernianum* (De Notaris) Coesel

Colacium vesiculosum f. *cyclopicola* (Gicklhorn) T.G.Popova ex Wolowski now *Colacium cyclopicola*

(J.Gicklhorn) Woronichin *et* Popova
Cosmarium arctoum var. *tatricum* Raciborski now *Cosmarium bicuneatum* (F.Gay) Nordedt
Cosmarium botrytis var. *depressum* West *et* G.S.West now *Cosmarium botrytis* var. *hyacinthii* (Gutwinski) Petlovany
Cosmarium candianum Delponte now *Cosmarium circulare* Reinsch
Cosmarium corribense West *et* G.S.West now *Cosmarium asphaerosporum* var. *corribense* (West *et* G.S.West) Willi Krieger *et* Gerlof
Cosmarium crenulatum Nägeli now *Cosmarium impressulum* var. *crenulatum* (Nägeli) Willi Krieger *et* Gerloff
Cosmarium isthmium var. *horizontale* Schmidle now *Cosmarium horizontale* (Schmidle) Kouwets
Cosmarium klebsii Gutwinski now *Cosmarium subtumidum* var. *klebsii* (Gutwinski) West *et* G.S.West
Cosmarium laeve var. *cymatium* West *et* G.S.West now *Cosmarium cymatium* (West *et* G.S.West) Willi Krieger *et* Gerloff
Cosmarium plicatum var. *hibernicum* West now *Cosmarium holmiense* var. *hibernicum* (West) Schmidle
Cosmarium punctulatum var. *granulusculum* (Roy *et* Bisset) West *et* G.S.West now
Cosmarium punctulatum Brébisson
Cosmarium regnesi var. *montanum* Schmidle now *Cosmarium regnesi var*. *polonicum* (Eichler *et* Gutwinski) Compère
Cosmarium subnotabile Wille now *Cosmarium notabile* var. *subnotabile* (Wille) Coesel
Cosmarium taxichondriforme Eichler *et* Gutwinski not *Pachyphorium taxichondriforme* (Eichler *et* Gutwinski) Palamar-Mordvintseva
Cosmarium taxichondrum P.Lundell now *Pachyphorium taxichondrum* (P.Lundell) Palamar-Mordvintseva
Cosmarium tetragonum var. *heterocrenatum* West *et* G.S.West now *Cosmarium levinotabile* var. *heterocrenatum* (West *et* G.S.West) Croasdale
Cosmarium venustum var. majus Wittrock now *Cosmarium trilobulatum* var. *maius* (Wille) Willi Krieger *et* Gerloff
Cosmarium viride Joshua not *Actinotaenium colpopelta* (Brébisson ex W.Archer) Compère
Dilabifilum printzii (Vischer) Tschermak-Woess (= *Ctenocladus printzii* (Vischer) Darienko *et* Pröschold) now *Pseudopleurococcus printzii* Vischer
Entocladia cladophorae (Hornby) Starmach now *Ulvella cladophorae* (Hornby) A.C.Mathieson *et* Dawes
Entocladia endophytum (M.Möbius) D.M.John now *Phaeophila endophyta* (M.Möbius) R.Nielsen
Euastrum crassum var. *taturnii* West *et* G.S.West now *Euastrum crassum* Ralfs
Euastrum denticulatum F.Gay now *Euastrum amoenum* F.Gay
Euastrum elegans var. *pseudelegans* (W.B.Turner) West *et* G.S.West now *Euastrum pseudelegans* W.B.Turner
Euastrum groenbladii (Messikommer) Coesel now *Euastrum coeselii* Kouwets
Euastrum verrucosum var. *alatum* Wolle now *Cosmarium verrucosum* var. *alatum* (Wolle) J.D.Hall *et* K.Karol
Fernandinella alpina var. *semiglobosa* F.E.Fritsch *et* R.P.John now *Fernandinella semiglobosa* (F.E.Fritsch *et* R.P.John) Škaloud *et* Leliaert
Dilabifilum printzii (Vischer) Tschermak-Woess (= *Ctenocladus printzii* (Vischer) Darienko *et* Pröschold) now *Pseudopleurococcus printzii* Vischer
Glenodinium oculatum F.Stein now *Durinskia oculata* (F.Stein) Gert Hansen *et* G.Flaim
Gloeocystis polydermatica (Kützing) Hindák now *Sporotetras polydermatica* (Kützing) I.Kostikov, T.Darienko, A.Lukesová *et* L.Hoffmann
Gonatozygon pilosum Wolle now *Genicularia spirotaenia* (De Bary) De Bary
Gongrosira fluminensis F.E.Fritsch now *Lithotrichon fluminensis* (Fritsch) B.W. Liu, Q.H. Wang, S.Y. Li, J. Fang, G.X. Liu *et* Z.Y.Hu
Gymnodinium aeruginosum F.Stein now *Nusuttodinium aeruginosum* (F.Stein) Y.Takano et T.Horiguchi
Heteronema scaphurum Skuja now *Teloprocta scaphurum* (Skuja) Cavalier-Smith
Katodinium fungiforme (Anisimova) A.R.Loeblich III now *Speroidium fungiforme* (Anisimova) Moestrup *et* Calado
Katodinium hyperxanthum (T.M.Harris) A.R.Loeblich III now *Gymnodinium hyperxanthum* (T.M.Harris) Moestrup
Katodinium molopicum (T.M.Harris) A.R.Loeblich III now *Gyrodinium molopicum* (T.H.Harris) Moestrup *et* Calado
Kirchneriella contorta (Schmidle) Bohlin now *Raphidocelis danubiana* (Hindák) Marvan, Komárek *et* Comas
Kirchneriella danubiana Hindák now *Raphidocelis danubiana* (Hindák) Marvan, Komárek *et* Comas
Kirchneriella rotunda (Korshikov) Hindák now *Raphidocelis rotunda* (Korshikov) Marvan, Komárek *et* Comas
Kirchneriella subcapitata Korshikov now *Raphidocelis subcapitata* (Korshikov) Nygaard, Komárek, J.Kristiansen *et* O.M.Skulberg
Klebsormidium crenulatum (Kützing) Lokhorst now *Hormidiopsis crenulata* (Kützing) Heering
Mallomonas pumilio var. *silvicola* K.Harris *et* D.E.Bradley now *Mallomonas silvicola* (Harris *et* Bradley) Nemková
Mononraphidium arcuatum (Korshikov) Hindak now *Ankistrodesmus arcuatus* Korshikov
Monostroma oxyspermum (Kützing) Doty now *Gayralia oxysperma* (Kützing) K.L.Vinogradova ex Scagel
Netrium digitus var. *parvum* Borge now *Netrium parvum* (Borge) Petlovany
Netrium interruptum var. *minus* (=*minor*)(Borge) Willi Krieger now *Planotaenium interruptum* var. *minus* (Borge) Petlovany *et* Palamar-Mordvintseva
Nitella spanioclema J.Groves *et* Bullock-Webster ex Bullock-Webster now *Nitella flexilis* var. [*flexilis*] f. *spanioclema* (J.Groves *et* Bullock-Webster) J.C.van Raam
Oedogonium undulatum var. *moebiusii* Schmidle now *Oedogonium moebiusii* Skinner *et* Entwisle

Onychonema laeve Nordstedt now *Sphaerozosma laeve* (Nordstedt) Thomasson

Onychonema laeve var. *latum* West *et* G.S.West now *Sphaerozosma laeve* var. *latum* (West *et* G.S.West) Kurt Förster

Pandorina charkowiensis Korshikov now *Colemanosphaera charkowiensis* (Korshikov) Nozaki, T.K.Yamada, F.Takahashi, Matsuzaki *et* Nakada

Pediastrum duplex var. *gracillimum* West *et* G.S.West now *Lacunastrum gracillimum* (West *et* G.S.West) H.McManus

Peridiniopsis oculata (F.Stein) Bourrelly now *Durinskia oculata* (F.Stein) Gert Hansen *et* G.Flaim

Peridinium aciculiferum Lemmermann now *Apocalathium aciculiferum* (Lemmermann) Craveiro, Daugbjerg, Moestrup *et* Calado

Peridinium anglicum G.S.West now *Palatinus apiculatus* (Ehrenberg) Craveiro, Calado, Daugbjerg *et* Moestrup

Peridinium inconspicuum Lemmermann now *Parvodinium inconspicuum* (Lemmermann) Carty

Peridinium lomnickii var. *wierzejskii* (Woloszyńska) Lindemann now *Chimonodinium* l*omnickii* var. *wierzejskii* (Woloszyńska) S.C.Craveiro, A.J.Calado, Daugbjerg, G.Hansen *et* Moestrup

Planctonema lauterbornii Schmidle now *Binuclearia lauterbornii* (Schmidle) Proschkina-Lavrenko

Pleurotaenium hutchinsonii (W.B.Turner) West *et* G.S.West now *Pleurotaenium trabecula* var. *hutchinsonii* (W.B.Turner) Croasdale

Pleurotaenium truncatum var*. granulatum* West *et* G.S.West now *Pleurotaenium truncatum* (Brébisson ex Ralfs) Nägeli

Poterioochromonas malhamensis (Pringsheim) L.S.Péterfi change to *P. malhamensis* (Pringsheim) R.A.Andersen

The original combination was invalid.

Pseudendoclonium prostratum Tupa now *Hazenia prostrata* (Tupa) Škaloud *et* Leliaert

Radiosphaera dissecta (Korshikov) Starr now *Macrochloris dissecta* Korshikov

Roya obtusa var. *montana* West *et* G.S.West now *Roya obtusa* (Brébisson) West *et* G.S.West

Selenastrum gracile Reinsch now *Messastrum gracile* (Reinsch) T.S.Garcia

Sphaerellopsis fluviatilis (Stein) Pascher now *Vitreochlamys fluviatilis* (Stein) Batko

Sphaerellopsis gloeocystiformis (O.Dill) Gerloff now *Vitreochlamys gloeocystiformis* (O.Dill) A.Nakazawa

Spirogyra calospora f. *gracilio*r Cleve now *Spirogyra protecta* H.C.Wood

Spirotaenia acuta Hilse now *Tortitaenia acuta* (Hilse) Palamar-Mordvinsteva

Spirotaenia parvula W.Archer now *Elakatothrix parvula* (W.Archer) Hindák

Woloszynskia neglecta A.J. Schilling now *Jadwigia neglecta* (A.J.Schilling) Moestrup

Staurastrum armigerum Brébisson now *Staurastrum furcigerum* f. *armigerum* (Brébisson) Nordstedt

Staurastrum armigerum var. *furcigerum* (Brébisson) Teiling now *Staurastrum furcigerum* (Brébisson) W.Archer

Staurastrum bieneanum var. *ellipticum* Wille now *Staurastrum lapponicum* var. *ellipticum* (Wille) Grönblad

Staurastrum brachycerum Brébisson now *Staurastrum cyrtocerum* var. *brachycerum* (Brébisson) Coesel *et* Meesters

Staurastrum capitulum var. *spetsbergense* (Nordstedt) Cooke now *Staurastrum spetsbergense* (Nordstedt) Coesel *et* Meesters

Staurastrum cingulum var. *affine* (West *et* G.S.West) A.J.Brook now *Staurastrum affine* West *et* G.S.West

Staurastrum furcatum var. *subsenarium* West *et* G.S.West now *Staurastrum forficulatum* var. *subsenarium* (West *et* G.S.West) Coesel *et* Meesters

Staurastrum gladiosum W.B.Turner now *Staurastrum teliferum* var. *gladiosum* (W.B.Turner) Coesel *et* Meesters

Staurastrum gracile var. *nanum* Wille now Staurastrum asteroideum var. *nanum* (Wille) Grönblad

Staurastrum hexacerum var. *semiciculare* Wittrock now *Staurastrum dispar* var. *semicirculare* (Wittrock) Coesel

Staurastrum inflatum West *et* G.S.West now *Staurastrum punctulatoides* Coesel *et* Meesters

Staurastrum kaiseri Ružicka *now Staurastrum crassangulatum* Coesel

Staurastrum longispinum (Bailey) W.Archer now *Staurodesmus longispinus* (West *et* G.S.West) Coesel *et* Meesters

Staurastrum orbiculare var. *extensum* Nordstedt now *Staurastrum extensum* (Nordstedt) Coesel *et* Meesters

Staurastrum orbiculare var. *ralfsii* West *et* G.S.West now *Staurastrum ralfsii* (West *et* G.S.West) Coesel *et* Meesters

Staurastrum planctonicum var. *ornatum* (Grönblad) Teiling now *Staurastrum pingue* var. *planctonicu*m (Teiling) Coesel *et* Meersters

Staurastrum pseudosebaldi Wille now *Staurastrum manfeldtii* var. *pseudosebald*i (Wille) Coesel *et* Meester

Staurastrum punctulatum var. *striatum* West *et* G.S.West now *Staurastrum striatum* (West *et* G.S.West) Ruzicka

Staurastrum sebaldi var. *ornatum* Nordstedt now *Staurastrum manfeldtii* Delponte

Staurastrum sebaldi var*. productum* West *et* G.S.West now *Staurastrum manfeldtii* var. *productum* (West *et* G.S.West) Coesel *et* Meesters

Staurastrum subscabrum Nordstedt now *Staurastrum scabrum* Brébisson

Staurodesmus angulatus (West) Teiling now *Staurastrum angulatum* West

Staurodesmus angulatus var*. planctonicum* (West *et* G.S.West) Teiling now *Staurastrum angulatum* var. *planctonicum* West *et* G.S.West

Staurodesmus aversus (P.Lundell) S.Lillieroth now *Staurastrum aversum* P.Lundell

Staurodesmus brevispina (Brébisson) Croasdale now

Staurastrum brevispina Brébisson
Staurodesmus bulnheimii var. *subincus* (West *et* G.S.West) Thomasson now *Staurodesmus validus* var. *subincus* (West *et* G.S.West) Coesel *et* Meesters
Staurodesmus conspicuus (West *et* G.S.West) Teiling now *Staurastrum conspicuum* West *et* G.S.West
Staurodesmus extensus var. *longispinus* (West *et* G.S.West) Teiling now *Staurodesmus longispinus* (West *et* G.S.West) Coesel *et* Meesters
Staurodesmus incus var. *ralfsii* (West) Teiling now *Staurodesmus ralfsii* (West) Tomaszewicz
Staurodesmus indentatus (West *et* G.S.West) Teiling now *Staurodesmus incus* var. *indentatus* (West *et* G.S.West) Coesel
Staurodesmus incus var. *indentatus* (West *et* G.S.West) Coesel now *Staurastrum inelegans* West *et* G.S.West
Staurodesmus jaculiferus (West) Teiling now *Staurodesmus incus* var. *jaculiferus* (West) Coesel *et* Meesters
Staurodesmus lanceolatus (W.Archer) Croasdale now *Staurastrum lanceolatum* W.Archer
Staurodesmus minutissimus (Averswald) Teiling now *Staurastrum minutissimum* Averswald
Staurodesmus pachyrhynchus (Nordstedt) Teiling now *Staurastrum pachyrhynchum* Nordstedt
Staurodesmus phimus var. *hebridarus* (West *et* G.S.West) Teiling now *Staurodesmus hebridarus* (West *et* G.S.West) Kurt Förster
Staurodesmus sibiricus (O.Borge) Croasdale now *Staurastrum sibiricum* O.Borge
Staurodesmus subpygmaeus var. *subangulatus* (West *et* G.S.West) Teiling now *Staurastrum subpygmaeum* var. *subangulatum* West *et* G.S.West
Staurodesmus tumidus (Brébisson ex Ralfs) Teiling now *Xanthidium tumidum* (Ralfs) Stastny, Skaloud *et* Neustupa
Stichococcus contortus (Lemmermann) Hindák now *Planktolyngbya contorta* (Lemmermann) Anagnostidis *et* Komárek
Stylochrysalis aurea (Chodat) Bachmann now *Epipyxis aurea* (Chodat) D.K.Hilliard
Tetraëdron incus (Teiling) G.M.Smith now *Chlorotetraëdron incus* (Teiling) Komárek *et* Kovácik
Tetrastrum triangulare (Chodat) Komárek now *Lemmermannia triangularis* (Chodat) C.Bock *et* Krienitz
Trachelomonas bernardinensis Vischer now *Trachelomonas caudata* (Ehrenberg) F.Stein
Uroglenopsis europaea Pascher now *Uroglena europaea* (Pascher) Skuja
Woloszynskia neglecta (A.J.Schilling) R.H.Thompson now *Jadwigia neglecta* (A.J.Schilling) Moestrup

New Records

Parachlorococcum turfosum S.Watanabe *et* L.A.Lewis
Collected from a peaty ditch near Salen, Mull, Scotland (Watanabe & Lewis 2017).
Vaucheria schleicheri De Wildeman
Collected in a ditch near Whittlesea, Cambridgeshire in July 2018 by Dr C. F. Carter and identified by Roy Merritt.
Cosmarium pseudoinsigne Prescott
Collected in a disused quarry near Baston, Lincolnshire in July 2018 by Dr C. F. Carter and identified by David Williamson.
Cosmarium blacklochense D.B.Williamson
Collected from Black Loch, Dumfries and Galloway, Scotland in June 2018 by Dr C. F. Carter (Williamson 2018a).
Cosmarium tuddalense K.Strom
Collected in a boggy pool and small pond in Little Assynt, Sutherland, Scotland, in March 2018 by Ian Evans and Gwen Richards (Williamson 2018b).

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Williamson DB (2018a) *Cosmarium blacklochense* spec. nov. A new desmid species from Scotland. *Quekett Journal of Microscopy* 43: 301-303.
Williamson DB (2018b) *Cosmarium tuddalense* K.Strom. A new desmid record for the British Isles. *Quekett Journal of Microscopy* 43: 305-306.

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Thanks go to Prof. Michael Guiry for once again providing us with a wealth of information on recent taxonomic and nomenclatural changes, Dr C.F.Carter for sending new records and David B.Williamson for recent publications and records.

Rare freshwater algae in ephemeral puddles and winterbourne pools near Chichester, West Sussex

Howard W. Matcham FLS

Primarily a bryologist I had not studied freshwater phycology until April 2010: when walking past a former World War II bomb crater near the village of Tangmere that had only been partially filled and subsequently grassed, I was surprised to see it filled with bright orange filaments. When an exceptionally high water table occurs as the winter of 2009-10, low lying areas such as the above crater are occasionally filled with water.

At the time I was a volunteer research bryologist at The Natural History Museum and had access to the expertise of Professor David John. I left a collection of filaments on his desk; a subsequent e-mail informed me that I had found filaments containing oospores of *Sphaeroplea soleirolii*; at the time this species was only known from dunes in North Wales, (John *et al*, 2011), following David's suggestion I sent further material to Chris Carter for photomicrograph imagery. Chris asked me if I would send other algal collections to him and I began to study the discipline with more than a passing interest. The species mentioned in this note were all found by me in an area south of my house at Strettington, near Chichester, within an arc four hundred metres south, east and west of my home.

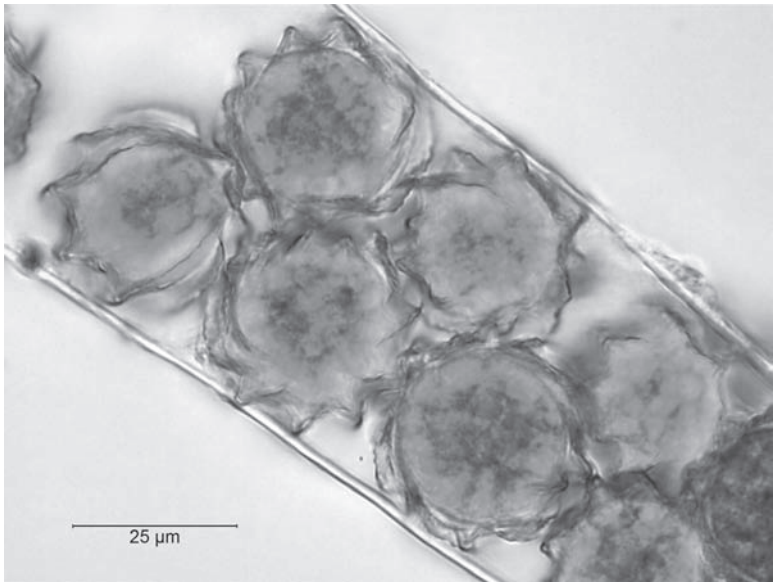
Exceptional rainfall during the winters of 2012-13-14 meant that many low lying areas contained water for a considerable time and the above crater still contained some water in July 2013 with immense quantities of orange *S. soleirolii*. I was not able to find any on my next visit in April 2014 but the water contained other filamentous species including an *Oedogonium* species with distinctive oogonia that I sent on to Chris who in turn sent it to DJ for identification as it did not appear in (John *et al*, 2011): David identified this species as *O. pachydermum* (see images at www.algaebase.org as *O.pachydermum* and images on http://www.nhm.ac.uk/our-science/data/algaevision.html as *O.*aff. *pachydermum*. Possibly new to Europe.

Also during April of 2014 an ancient gravel-bottomed winterbourne ditch separating two farms c.300m west of my home, ingresses when the water table is high, into an adjacent hollow approximately 1.5m deep which is surrounded by willows (*Salix fragilis*). When filled, the pool egresses to the south into a continuation of the gravel-bottomed ditch. This pool despite being dry for at least nine months of the year, occasionally all year, has a remarkable algal flora with three species of *Oedogonium* which are rarely found with oogonia; *O. cardiacum*; *O. vaucherii* and most remarkably *O. idioandrosporum*, (syn. *O. crassiusculum* var. *idioandrosporum*) only recorded once previously in Britain, John *et al*., (2011) and references therein. When the pool overflowed into an adjacent arable field as in April 2014 two additional rare filamentous species were discovered; *Spirogyra singularis* and *S. suesicum*, in addition to these species *Monostroma bullosum* frequent as small thalli in the gravel-bottomed ingress ditch and pool had 'floated' into the arable field where large areas were established.

A visit to the pool during April 2018 to collect more *O. idioandrosporum*, revealed under the microscope numerous small filaments of *Sphaeroplea soleirolii* entwined within the three *Oedogonium* species, this was a tremendous discovery as all aspects of its morphology were present enabling Chris to image spermatozoids, developing oospores, spermatozoids in oogonium, immature oospores and mature spores, all of which can be viewed on the above websites. All of the above have a limited distribution in the British Isles, (John *et al*, 2011), very rare and exceptionally rare and it is extraordinary that they have been discovered so close to my home.

During the early part of December 2017 I walked along an ancient bridleway some 400m west of my home; seldom used by vehicular traffic decades of human and equine movement has left ruts which fill with rainwater and I noticed that green patches were on the soil surface under just a few centimetres of water. I always carry a pipette and collecting jar and was able to pipette material for subsequent microscopic examination; two *Closterium* species were in the sample, the exceptionally frequent *C. ehrenbergii* and an unfamiliar species that Chris determined as *C. sublaterale* subsequently confirmed by David Williamson.

Another puddle looked at along this bridleway had an enigmatic collection of a *Closterium* species the identity of which is not fully resolved, David having perused the literature going back as far as 1867 looked critically at ten cells before reaching a conclusion: measurements and cell morphology were reminiscent of four taxa; *C. lanceolatum* and its *var. parvum*; *C. acerosum* and its var. *minus*; some cells were ornamented with spiral striae and puncta and David suggested that var. *minus* could in fact be a var. of *C. lanceolatum*! David remarked, *pers. comm.* "However there seems to be no mention in the literature of puncta in descriptions of *C. lanceolatum*." Without additional collections from elsewhere and DNA sequencing this collection will remain enigmatic.



***Sphaeroplea soleirolii* pond and micro crediting Chris Carter**

During June of 2018 an archeological dig began 300m south of my home followed by a geological survey; when the topsoil was replaced it left shallow depressions which filled with rainwater from mid-September onwards. During October I noticed large patches of a mucilaginous alga floating on the surface which microscopic examination proved to be a desmid in the genus *Cosmarium.* I sent material to Chris who identified it as *C. pericymatium* subsequently confirmed by David Williamson; there are approximately five previous records for this species all recorded from England most of which have been collected by DW.

In early January 2019 I revisited these ephemeral puddles and water collected contained a few specimens of a *Penium* species, further collections from damp mud resolved that the species in question was *P. margaritaceum* and although not a rare species with a widespread distribution the normal habitat is peaty *Sphagnum* dominated pools; after hard frosts during the middle of January submerged pure large colonies of this species had lifted from the soil and were static just under the surface of the water. A sample looked at by David Williamson *pers. comm.* included a single zygospore.

All of the species mentioned in this note can be viewed on the above websites with the exception of *C. lanceolatum* and its *var. parvum*; *C. acerosum* and its var. *minus*.

Acknowledgements: I thank David John for his identification of *Sphaeroplea soleirolii* and *Oedogonium* aff. *pachydermum*; David Williamson for desmid identifications, those above and other rare desmids collected from galvanized water tanks and I thank Chris Carter for his identifications, superb photomicrographs and constant encouragement.

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BPS Project Award Final Report

Fucus guiryi on the northern edge: morphology, distribution and citizen science

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Introduction

Among seaweeds, the fucoids are some of the most extensively studied groups of algae, due to their abundance, ease of study and complex life histories. Fucoid species are also important bioengineers, modifying habitats and increase spatial complexity. Associated with high biodiversity on rocky shores, they provide shelter for high-shore sub-canopy algae and the settling of barnacles. They also offer a fascinating insight into maintenance of sympatric species, as they exhibit between species gene flow but also maintain distinct species across shore gradients.

The three most common species on most intertidal areas of the European eastern Atlantic are *Fucus spiralis* (L.), *Fucus vesiculosis* (L.) and *F. serratus* (L.). On many shores, these closely related species from the *Fucus* genus of brown macroalgae coexist, separated mainly by their ability to withstand emersion. Laboratory experiments have shown that interspecific competition also plays a role in determining vertical extent in the intertidal zone. Typically, *F. spiralis* will extend to the highest point of the shore, followed by *F. vesiculosis* in the mid shore, with a band of *F. serratus* in the zone of lowest emersion.

The three species were differentiated morphologically over a century ago, with intraspecific variation in morphology identified across the range. However, genetic studies of *F. spiralis* suggested that there may be hidden genetic divergence within the species (Billard 2010). In 2011, Zardi et al. proposed that a variant of *F. spiralis*, "platycarpus", be elevated to species level based on distributional, genetic, physiological and morphological differences. This new species, *Fucus guiryi*, can be differentiated in the field through the presence of a receptacle sterile rim and monopodial branching. In Portugal where it was originally described, it is also found to be longer and less bushy than *F. spiralis* (Zardi et al. 2011).

Laboratory studies show that *F. guriyi* is less resistant to emersion than *F. spiralis*, and is correspondingly predicted to be found lower down the shore. *F. guiryi* and spiralis exist in sympatry as far south as Morocco, through France and northwards to the UK. South of Portugal, *F. guiryi* is the only *Fucus* species present, however studies suggest that it is contracting in range at this southern limit due to warming waters (Lorencao 2016). This species may therefore rely on climate refugia at the lower latitudes, and become more abundant at higher latitudes. However, there are currently no records of *F. guiryi* on the Atlas of Living Scotland, and so we have little understanding of this species and how it differs from *F. spiralis* in distribution, morphology and ecology in its northern range.

One of the methods available for collecting ecological data across large geographical scales is to expand the number of people collecting data through citizen science. Citizen science is the involvement of members of the public in scientific research, and is a growing field especially within the environmental sciences. Engaging the public with hands-on research has a number of benefits, from increasing the reach and quality of data collection, to improving general scientific literacy. Projects such as the Big Seaweed Survey, run the by the Natural History Museum, London, since 2009, have already given members of the public the opportunity to map a small number of macroalgal species across UK shores. However, projects need to be carefully selected and designed to be interesting and able to provide robust scientific data by untrained volunteers. This study provided an ideal opportunity to study the possibility of using citizen science for simple algal identification data collection over a large geographical range.

Our initial aims in this study were therefore to determine whether *F. guiryi* and *F. spiralis* exhibit similar differences in morphology as described in Zardi et al. (2011) at these northernmost points of the range, and could therefore be differentiated clearly in the field. We also aimed to undertake a pilot study to determine the suitability of mapping *F. guiryi* as a citizen science data collection project. Finally, we aimed to map the distribution of *F. guiryi* across Scotland, both to validate any citizen science records, and to provide an initial dataset on the distribution of this species in the northern latitudes.

Figure 1. *Fucus guiryi* (yellow box) and *Fucus spiralis* growing side by side.

Method

This project aimed to undertake initial scoping fieldwork across Scotland to determine the distribution, abundance and morphology of *F. guiryi* in the area, and pilot the possibility of using citizen science to map distribution.

Surveys by student field staff were conducted along the east and west coasts of Scotland during June - December 2018. Overall, surveys were conducted at 22 shores across Scotland, selected to cover a latitudinal range. Each shore was levelled to create a shore profile, and two vertical transects laid from the High Water Mark to the Low Water Mark. 50 x 50cm quadrats were laid every 50cm vertical height drop from the top of the transect to the lowest point *F. vesiculosis* was present.

In each quadrat, each fucoid species was identified using morphological features, and the percentage cover recorded. Any fucoids with vesicles present in pairs along the fronds was categorised as *F. vesiculosus*. Both *F. guiryi* and *F. spiralis* were identified by smaller and curled fronds, and *F. guiryi* was distinguished from *F. spiralis* by receptacle sterile rims, monopodial branching, and a generally straighter appearance of the fronds (Fig 1).

Two adult individuals from each fucoid species within each quadrat were selected at random. The overall length of the individual was measured from the beginning of the holdfast to the tip of the longest frond. The circumference of the individual was measured by holding the individual in a bunch and measuring the thickest part loosely. These measurements were converted into overall "bushiness" by dividing the circumference by the length. The width of the thallus was measured at the widest part.

In order to test the possibility of using citizen science to map *F. guiryi*, a call was placed out to volunteers via the Capturing our Coast (CoCoast) network, an established marine citizen science project, to send in records of presence/absence. These remote volunteers were asked to use a guide provided to identify whether *F. guiryi* was present on a local shore in a two-week period in August 2018, and submit the record to the CoCoast team. The guide contained photos of both species and a list of identifying characteristics explained in non-technical language. In addition, a small number of local volunteers were taken on to a shore on Scotland and trained during a 30 minute session to identify the difference between the species in the field. Structured feedback was requested from all volunteers, both remote and local, to determine the possible success of the training and photo ID guides.

Results

Morphology

Students reported that it was possible to differentiate between *F. guiryi* and *F. spiralis* in the field using the described morphological characteristics. The mean length of adult individuals of *F. guiryi* was longer than *F. spiralis*, (Fig. 2; 320mm; 230mm; F = 101, p <0.01). Of the three species, *F. spiralis* were bushiest, e.g. had the greatest circumference to length ratio (Fig. 3; F = 32, p <0.01). There was no significant difference in thallus width between the three species. (Fig. 4;F = 3, p=0.2).

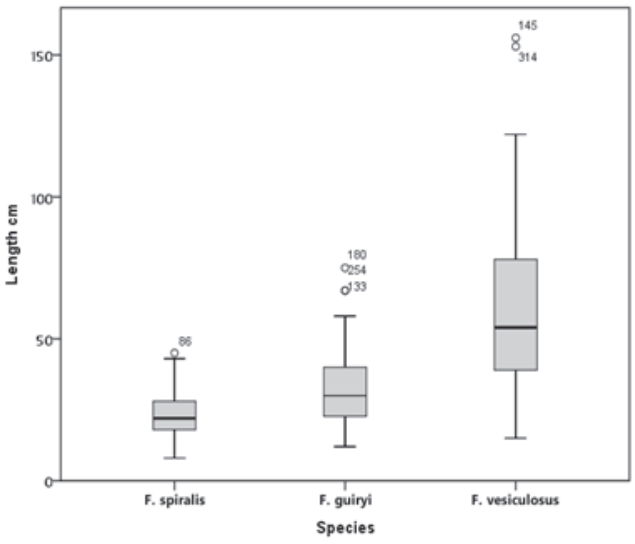

Figure 2. Length of individuals of each fucoid species sampled during surveys on the coast of Scotland during June – December 2018. Box indicates the interquartile range.

Distribution

Overall, 22 shores were surveyed across Scotland by student field staff. Of those shores, *F. guiryi* was identified on ten. The remainder only had *F. spiralis* and *F. vesiculosis* in the areas sampled. The shores containing *F. guiryi* were distributed across the full range of latitudes, and on both the east and west coasts (Fig. 5).

On shores with both *F. spiralis* and *F. guiryi* present, *F. guiryi* was on average lower on the shore (1.23m

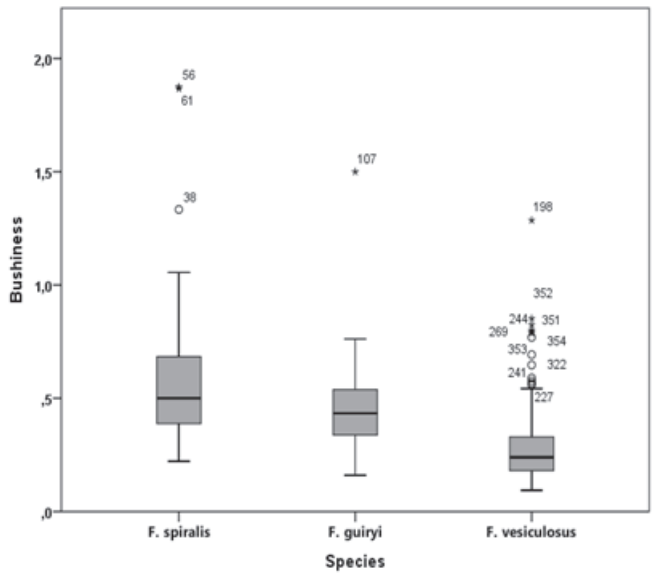

Figure 3. Bushiness of individuals of each fucoid species sampled during surveys on the coast of Scotland during June – December 2018. Box indicates the interquartile range.

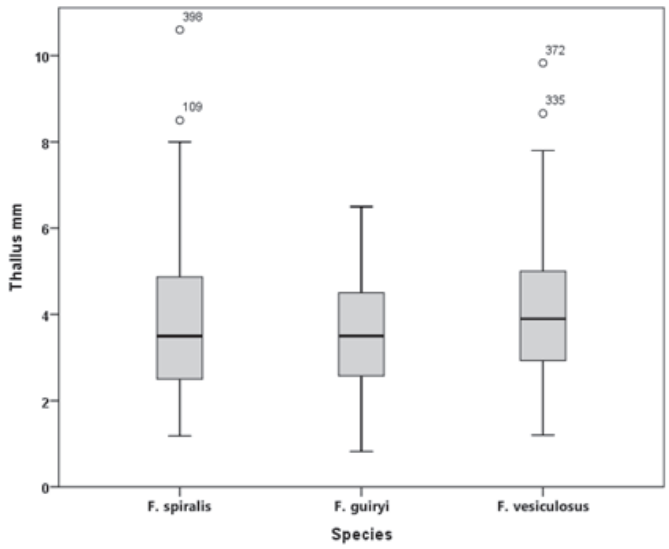

Figure 4. Thallus width of individuals of each fucoid species sampled during surveys on the coast of Scotland during June – December 2018. Box indicates the interquartile range.

Figure 5. Map of Scotland showing surveys undertaking between June 2018 and December 2018 for *F. guiryi*. Marks indicate shores where surveys were undertaken, crosses highlight shores where *F. guiryi* was identified.

below HWM; *F. spiralis* = 1.10m), although there was substantial overlap between the vertical distributions of the two species.

Citizen science

Overall, eleven remote volunteers submitted records on *F. guiryi* presence/absence via the online call. Of these, only two identified *F. guiryi* on local shores (Fig. 6). Both shores were subsequently surveyed by student field staff and were confirmed to have *F. guiryi* present. A further four shores where remote volunteers had reported no *F. guiryi* present were surveyed by student field staff, where no *F. guiryi* were recorded. The remaining five volunteer records were not surveyed by student field staff.

Of the eleven remote volunteers who participated, nine provided feedback on the survey. Eight of those who responded found the photographic guide easy to use, and felt the instructions were clear. One suggested that diagrams or drawings would have been clearer for identification purposes. Another comment on the guide was that providing photographs of a "typical" individual did not accurately represent the intraspecific morphological diversity.

Prior to undertaking the survey, none of the volunteers had previously identified *F. guiryi*. Only three of the remote volunteers who provided feedback rated themselves as "very confident" in their identification of *F. guiryi* after undertaking the survey. Five rated themselves as "not confident", and the remaining one as "reasonably confident".

Of the five local volunteers, none had previously identified *F. guiryi.* After the training, four of the volunteers rated themselves as "very confident" in identifying *F. guiryi*, and one rated themselves "reasonably confident".

Figure 6. Map of Scotland showing volunteer records of *F. guiryi* in August 2018. Marks indicate shores where surveys were undertaken, crosses highlight shores where *F. guiryi* was identified.

Discussion

Intertidal algae are exposed to a substantial environmental variation across their range, and exhibit diverse morphologies in response. Fucoids show high phenotypic plasticity, and in particular, several forms of *F. spiralis* have been described over the years (Scott *et al.* 2001). Recently, Zardi *et al.* (2001) elevated one of the morphotypes, *F. spiralis* var. *platycarpus*, to a separate species, *F. guiryi,* based on genetic and morphological variation in populations in Portugal. However, the morphology and distribution of *F. guiryi* at the northern edge of the range is unknown. In this study, we aimed to determine whether the described morphology of *F. guiryi* enabled field identification at the higher latitudes across Scotland, map the distribution, and determine whether citizen science could be a tool for mapping the species further.

We showed that *F. guiryi* and *F. spiralis* were able to be distinguished in the field by student recorders at northern latitudes. *F. guiryi* in Scotland was found to have a sterile rim on the receptacle and monopodial branching of the fronds, as defined by Zardi *et al.* (2001). The individuals of *F. guiryi* were also longer and less busy than the individuals of *F. spiralis* on the same shores. *F. guiry*i was also found to be lower on the shore on average than *F. spiralis*, as predicted by the reduced capacity to withstand emersion. However, there was substantial overlap between the two species in vertical distribution on the shore. Overall, *F. guiryi* was found on nearly half the shores surveyed across Scotland on both the east and west coasts. There was no clear latitudinal gradient of distribution.

We also piloted using a citizen science approach to map *F. guiryi* across Scotland. The response to the call was minimal, and only eleven remote volunteers participated by sending in data. Citizen science projects typically do not generate a large response rate to single requests, and ongoing project support would be required to generate sufficient data. Comparisons between remote volunteer data and student recorder data suggests that volunteer were accurate in their assessment in the presence and absence of *F. guiryi.* However, remote volunteers fed back that they were not confident overall in identifying the difference between *F. guiryi* and *F. spiralis* in the field from field guides alone. This is likely due to volunteers unfamiliar with algal identification. Positive feedback from correct identification has been shown to improve skills and confidence of remote volunteers in other citizen science projects, but would require further support. The pilot of local volunteers also showed that training in the field can improve volunteer confidence and skills, but is a substantial time and resource commitment.

Overall, we have provided evidence that *F. guiryi* can be distinguished in the field from *F. spiralis* at the northern parts of the range, and have provided an initial dataset on distribution across Scotland that can prove useful for future study. We demonstrated that *F. guiryi* can be mapped using a citizen science approach, but the unfamiliarity of seaweed identification for inexperienced volunteers could require additional support and feedback to ensure robust data is collected.

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Pictures from BPS 67th Annual Meeting Oban, Scotland

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