



The Phycologist

The Newsletter of the British Phycological Society

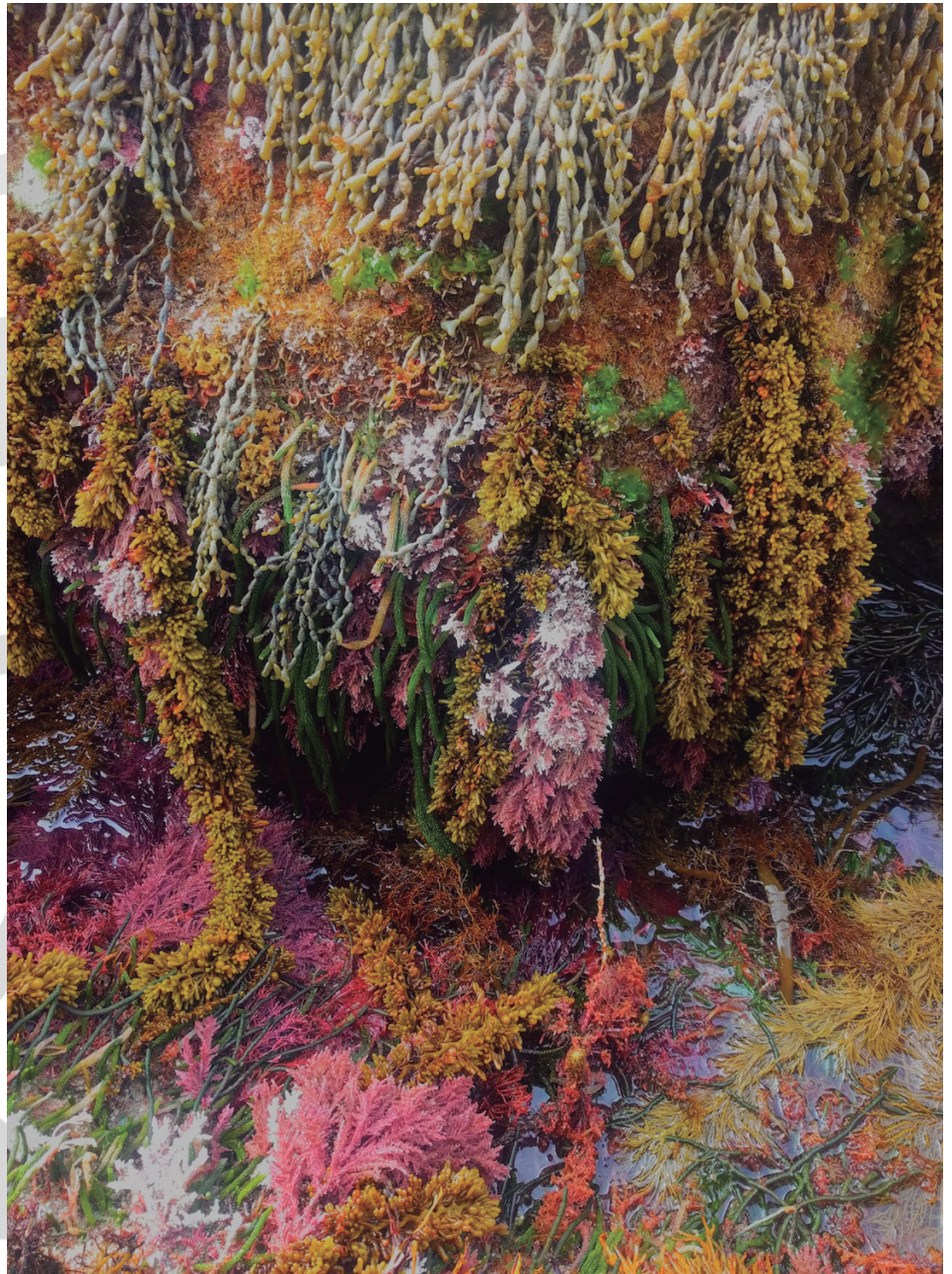
Editor: Dr Amanda Burson

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Call for Nominations
to Council

Hilda Canter-Lund
Prize

Field Microscope
Review



Number 97 - Autumn 2019

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2019

British Phycological Society

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Some important announcements in this issue. Firstly, we need nominations for several BPS council positions! Please send your nominations to the BPS secretary (secretary@brphycsoc.org) by November 6th.

Second, the 68th Annual British Phycological Society Meeting will be hosted at the University of Plymouth, Marine Biological Association and Plymouth Marine Laboratory from the 6-9th of January, 2020. Hope to see many of you there!

There's also some striking images from the Hilda Canter-Lund competition to enjoy. As well as some travel and student project reports, some new discoveries to read about and a review of a nice bit of field kit we'll all be adding to our lab Christmas lists!

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/the-phycologist-back-issues/>

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Meeting Announcement!

The 68th Annual British Phycological Society Meeting will be hosted by the University of Plymouth, Marine Biological Association and Plymouth Marine Laboratory from the 6-9th of January, 2020. Registration is open and abstracts for posters and oral presentations are currently being accepted. Final day for abstract submission is Monday the 25th of November and final day for general registration is Monday the 16th of December. There will be four special sessions to participate in:

1. Hidden forests: the structure and function of macrophyte-dominated habitats and communities under natural variability and anthropogenic stress

2. Algal interactions across the tree of life - from the open ocean to industrial applications.

3. Impact of climate change on marine and freshwater algae

4. Algae as environmental indicators

Go to <https://brphycsoc.org/meetings/> for links to the conference website and be sure to use #BPS2020 in your social media coverage at the meeting!

Hope to see you there and don't forget there is a discount greater than the annual membership fee for BPS-member registration, so it makes perfect sense to join the society!

Call for nominations for membership of BPS Council

In accordance with our constitution (<https://brphycsoc.org/constitution/>), the following Council positions are open for nominations, for successful candidates to take up office after the AGM in Plymouth in January 2020.

President Elect (2020-22, then serves as President 2022-24, and Immediate-Past President 2024-26)

Overseas Vice-President (2020-2022, 2 years)

Treasurer, Secretary, Membership Secretary (2020-2023, with options to re-stand after this period)

Student representative (2020-2022, 2 years)

Ordinary member of Council (2020-2023) 1 vacancy

This is a good opportunity to get involved in the life of our society, and gain experience in how a "learned society" works. The duties include attending the two full Council meetings a year (one in the summer, one at the Annual meeting), and partake in discussions and decision-making by electronic means. Ordinary Members would be asked to be involved in one of the society's sub-committees.

Reasonable travel and other expenses are met by the Society. We would welcome applications from any of our members. Council is particularly keen to encourage

early career researchers or people working in algal-related industries to consider this opportunity.

If you are interested in any of these posts, and would wish to know more, please feel free to contact the President, Professor Graham Underwood, gjcu@essex.ac.uk, who will be happy to have a conversation.

The formal process is for a nomination for a named post to be submitted to the BPS Secretary (secretary@brphycsoc.org). A valid nomination needs (i) the name and consent of the nominee, and the support of (ii) a Proposer and (iii) a Secunder (who both need to be members of the Society). Email is an acceptable form of communication. Nominations must be received by the Secretary by midnight on November 6th 2019 (two months before the next Annual General Meeting).

If we receive more valid nominations than vacancies for each post, candidates will be asked to provide a short paragraph in support of their nomination and there will be a ballot of members. The Membership Secretary will circulate details to all members of the BPS one month before the AGM. All completed ballot papers shall be returned to the Secretary before the AGM, and the results declared during the AGM, which will be held in Plymouth, Devon on Tuesday January 7th, 2020.

Report on Algal Culture Collection Meeting, Zagreb August 2019



Submitted by: Christine Campbell

Scottish Association for Marine Science, Scottish Marine Institute, Argyll

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Across the world there are a small number of algal culture collections of a significant size. Together, they offer well documented strains of known provenance (with associated products and information) to the phycological community: reference strains for taxonomy, cultures for teaching and training, starter cultures for marine hatcheries, test strains for biotechnology and much more. The collections are widely dispersed across the planet but face common issues so, once in a while, it's highly beneficial for curators to meet to explore problems and plan joint solutions.

Previous meetings were held in 1998 (USA), 2002 (Germany) and in 2008 (UK), so curators, Maike Lorenz from the SAG Collection (Sammlung für Algenkulturen) in Germany and Christine Campbell from CCAP (Culture Collection of Algae and Protozoa) in the UK, decided it would be timely to organise a meeting satellite to the 7th European Phycological Congress in Zagreb, Croatia in August 2019. The Croatian EPC7 organisers were exceedingly co-operative and so planning went ahead.

On a very warm Wednesday 28th August 2019 at the Esplanade Hotel in Zagreb, 40 algal culture collection folk from USA, Canada, Japan, Australia, China, Malaysia, Norway, France, Belgium, Germany, Italy, Czech Republic, Poland, Algeria, Israel, Russia got together and discussed common challenges. These included talks on: how we can sustain collection's funding in the decades ahead; new applications like seaweed bio-banking and widening the biodiversity to include things such as aquatic viruses; maintenance and cryopreservation methods; genome sequencing projects; collections as an educational resource; and the Nagoya Protocol and Quality Assurance.

We ensured there was plenty of social time for discussion and getting to know one another. By the end of the day all had bonded and were planning future meeting locations.

It is hoped that in the coming months related articles will be published in the new *Applied Phycology** journal, sister to the BPS' *European Journal of Phycology*, and we thank managing Editors, Juliet Brodie and Christine Maggs for supporting this and joining our meeting.

Both SAG and CCAP provided some financial support, but the meeting could not have gone ahead without grant funding from both the British Phycological Society and Algae-UK for which we are very grateful. Funds provided catering and will also cover some publications costs for the *Applied Phycology* articles.

*<https://www.tandfonline.com/loi/tapy20>



Hilda Canter-Lund Photograph Award

Congratulations to the Canter-Lund competition winning images for 2019: “Symphony of Seaweed” by Zoe Loffler and “Blue Haze” by Damien Sirjacobs!

(cf front and back cover and middle pages for full colour)



Symphony of Seaweed; Zoe Loffler

The amazing variety and wonderful colours of seaweeds are no surprise to seaweed lovers! This is a photo to show those unfamiliar with seaweeds that they are not just brown and smelly...! The variety of colours, shapes and textures of seaweed in this small area is just astonishing. Zoe took this photo while wandering around the shoreline at low tide while on a summer family camping trip in Victoria, Australia. The photo was taken with an old Google Nexus 5x smartphone, which goes to show that sometimes the subject matter does all the work!



Blue Haze; Damien Sirjacobs

*The image “Blue Haze” shows a bloom of benthic blue diatoms of the genus *Haslea* (*H. ostrearia*, *H. provincialis*) covering macroalgae communities (*Padina pavonica*, *Acetabularia acetabulum*, *Halopteris scoparia*, *Dictyota* sp.) in the shallow water of Calvi Bay (Corsica, France). There, these diatoms regularly develop at a depth of 0.5 to 8 meters in Spring, particularly amongst these algae but also within the community of filamentous and mucilaginous epiphytes (*Nematochrysopsis marina*, *Acinetospora crinita*, *Chrysonephos lewisii*, *Chrysoreinhardia giraudii*) that appears seasonally in these habitats. For scale, the circular caps on the end of the *Acetabularia* stalks are 5 – 10 mm in diameter. Blue diatoms of the *Haslea* genus produce blue pigments called marennine and marennine-like pigments, which have allelopathic, antibacterial and other properties. The demand for blue pigments is high, hence marennine could have application in food or*

*cosmetic industry. However, industrial culture of *Haslea* is an issue, turning marennine production at an industrial scale into a real challenge. Nonetheless, the bloom dynamics of these blue *Haslea* in coastal environments as well as their potential interactions with macroalgal-epiphytic communities are little understood. More information on the bloom dynamics in natural environment are required to give clues to improve large-scale cultivation of *Haslea* strains.*



*The image was taken at a depth of four metres in May 2018 with a LUMIX TZ10 in a DMW-MCTZ10 marine housing, under natural light conditions, whilst scuba-diving along rocky shores of the Revellatta peninsula (Calvi Bay). The site was investigated in the framework of the PhD research project of Julie Séveno, supervised by Prof. J-L. Mouget (UMans, France) within the context of two research projects, H2020 GHaNA and STARE-CAPMED, in collaboration with STARE-SO (Calvi, France) and ULiege (Belgium). The first objective of this PhD is to understand the spatio-temporal dynamics and environmental factors that lead to the bloom. The second objective is to determine to which extent the epiphytic communities of representative macroalgae (*Padina pavonica* and *Halopteris scoparia*) are affected by the development of blue *Haslea* populations and the release of marennine-like pigments. An additional part will consist on the molecular identification of *Haslea* species collected in Corsica and North Carolina to allow the establishment of *H. ostrearia*'s phylogeographic network.*

Also, many thanks for the contributions of the other short-listed images (cf next page):

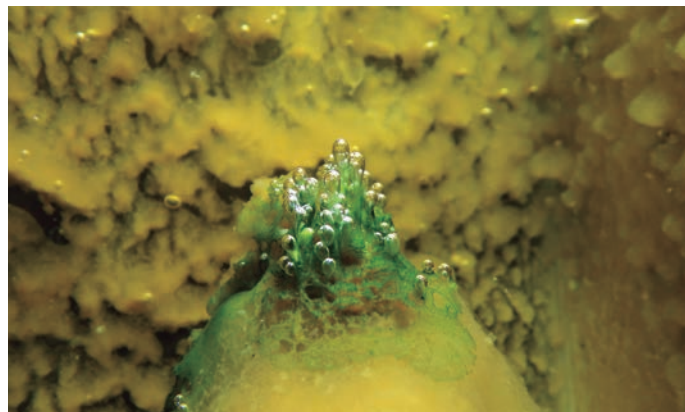


The Next Generation; John Huisman

The image was taken in-situ at Caper Peron, Western Australia and shows a specimen of net-like *M. denticulata* with numerous pale pink, globular cystocarps (the phase produced after fertilization). Equipment used was a Sony RXIII camera in a Nauticam housing with twin Inon strobes. A macro lens was added to enable the close focus. For scale, each of the cystocarps is approximately 1 mm in diameter.

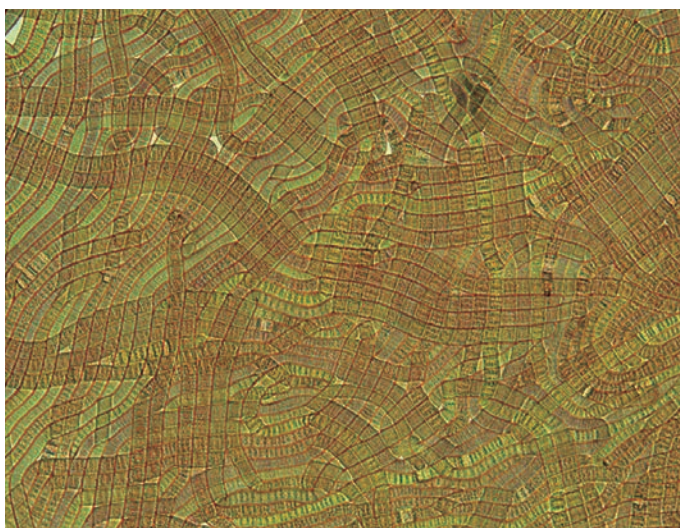
Pedestal of Productivity; Leon Katona

I captured this algaescape in an aquarium mesocosm at the end of a long-term photophysiology experiment. Color has been corrected to better reflect natural tones. The image shows a column of very productive cyanobacteria (*Phormidium* sp. and *Oscillatoria* sp.) and golden algae (mostly small diatoms) in a thick matrix of extracellular material. Attached algae were grown on ceramic tiles under a light gradient. This column was grown under high irradiance and inorganic nutrients, and responded quite positively to those conditions! Plentiful resources allowed these algae to supersaturate the water with air bubbles due to high rates of photosynthesis.



Cyanobacterial Entanglement; Forest Lefler

Culture of cyanobacteria photographed under 400x magnification.



Majestic Micrasterias; William Murray

Phase contrast of *Micrasterias furcata* at 400x magnification using an inverted Leica DMi1 microscope and utermohl chambers. An isolated freshwater *Desmid* lurking in the lakes of Delaware. The beautiful symmetry of this *Desmid* showing off the intricacies of every characteristic of the individual cell; the isthmus, apical and lateral lobes all in perfect harmony, along with help from the striking color of the chloroplast from the phase contrast.



Penium margaritaceum Brébisson with zygospores

Submitted by: Howard W. Matcham

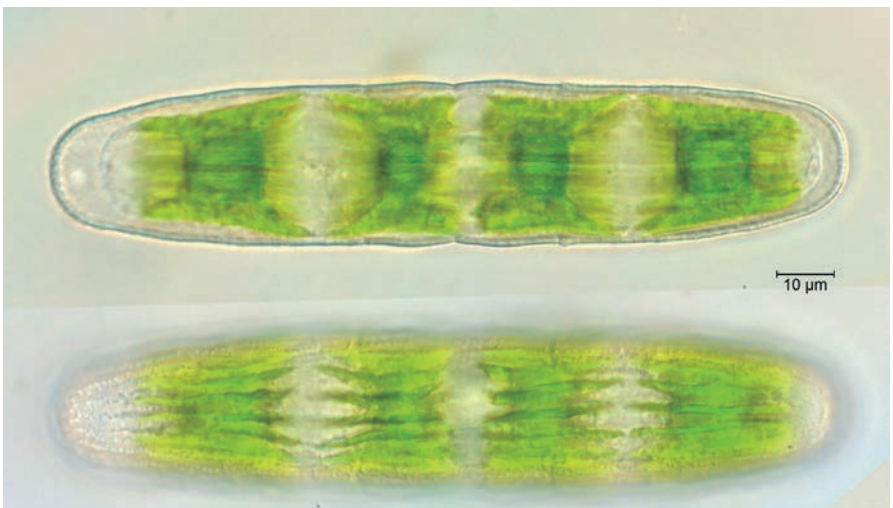
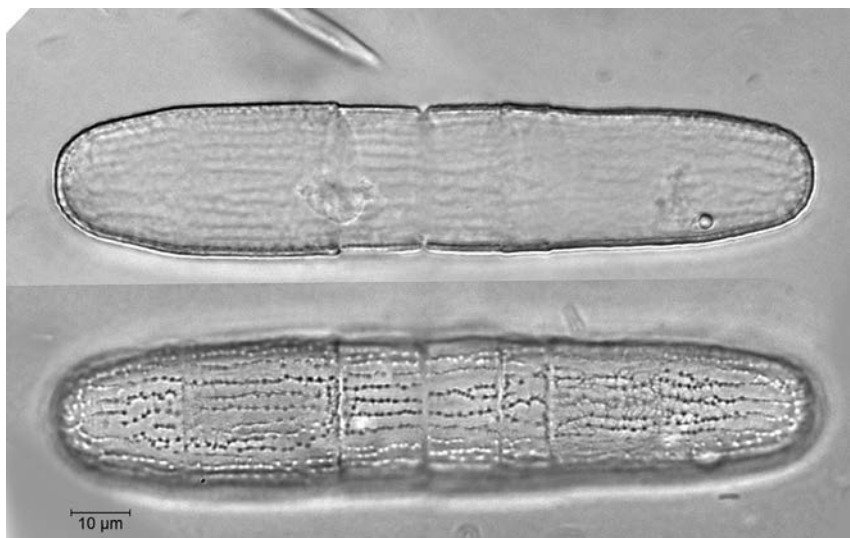
In *The Phycologist* Number 96 – Spring 2019, pp.25-6, I mentioned that a collection of the desmid *Penium margaritaceum* Brébisson from an ephemeral pool in the Chichester area of West Sussex, vc13, sent to Chris Carter and forwarded by him to David Williamson had contained a single zygospore which David subsequently illustrated.

On 10 February 2019 I revisited the site at Maudlin and collected more material which proved to contain an extraordinary number of individuals with zygospores: as far as I can ascertain zygospores have not been seen from this species in Britain since mentioned by Ralfs (1848), *British Desmidiaceae*, p., 150, [sporangia] in a collection by the author from Dolgelley and a further collection by a Mr. Thwaites, from Bristol. Unfortunately, dates of these collections are not given but obviously before 1848, the date of publication. Therefore it is possible that zygospores of *Penium margaritaceum* were last seen in Britain over 171 years ago.

This species and *Cosmarium pericymatium* Norstedt, were collected from rainwater that had filled shallow depressions left when topsoil had been replaced after a geoarcheological dig carried out prior to the laying of a sewer. The substrate exposed may derive from local Aldingbourne Raised Beach, "This is a marine formation from between c. 400,000 and c. 200,000 years ago - a complex formation which may relate to many different marine incursions. The sand is likely either intertidal, or more likely marine proper." (E. Blinkhorn, pers. comm.)

Chris Carter's chemical analysis of the water content gave the following readings: "about 4mg/l phosphate, <5mg/l nitrate, pH 6.9 and conductivity about 570 uS/cm."

Acknowledgements: I thank Dr Ed Blinkhorn, Senior Geoarchaeologist, Archaeology South-East,



Portslade, Sussex for explaining the geology at the site; Chris Carter for the chemical analysis and superb photomicrographs; David Williamson for a copy of his excellent

illustration of a *Penium margaritaceum* zygospore and David John for his encouragement towards continuous study of my local environs.

EPC7 – Cocktails, Brussel sprouts and Strukli



Submitted by: Sabrina Heiser

Department of Biology, University of Alabama at Birmingham, USA

heiser@uab.edu; @SabrinaHeiser

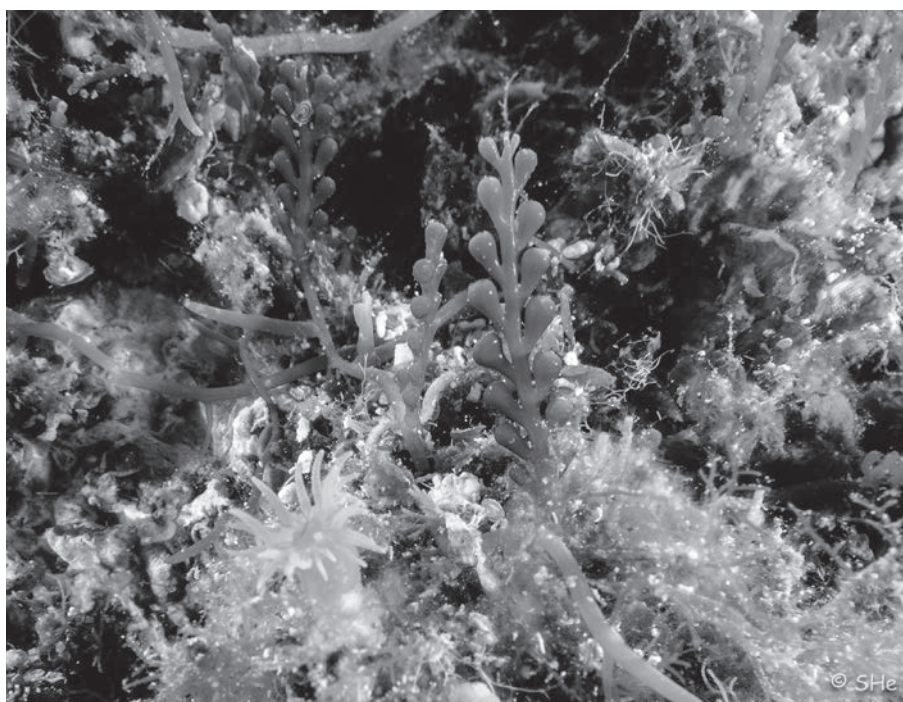
The 7th European Phycological Congress took place in Zagreb (Croatia). As I had never been to Croatia before, I was lucky enough to arrive a little earlier and explore the beautiful underwater world around Trogir (near Split). Being spoiled by charismatic kelp forests, it was a fun game to look for seaweeds whilst being distracted by invertebrates. I managed to find plenty of things I was not accustomed to, such as species of *Acetabularia* and *Caulerpa*, but also others, like *Plocamium* (the same genus as my study organism) that I was very familiar with.

At the conference, I presented a poster and gave an oral presentation about my PhD project. I study the chemical ecology of *Plocamium* “*cartilagineum*” at Palmer Station (Western Antarctic Peninsula). I like to compare *Plocamium* to Brussels Sprouts as those are also chemically defended (which some people can taste through a bitter taste and do not like them). It

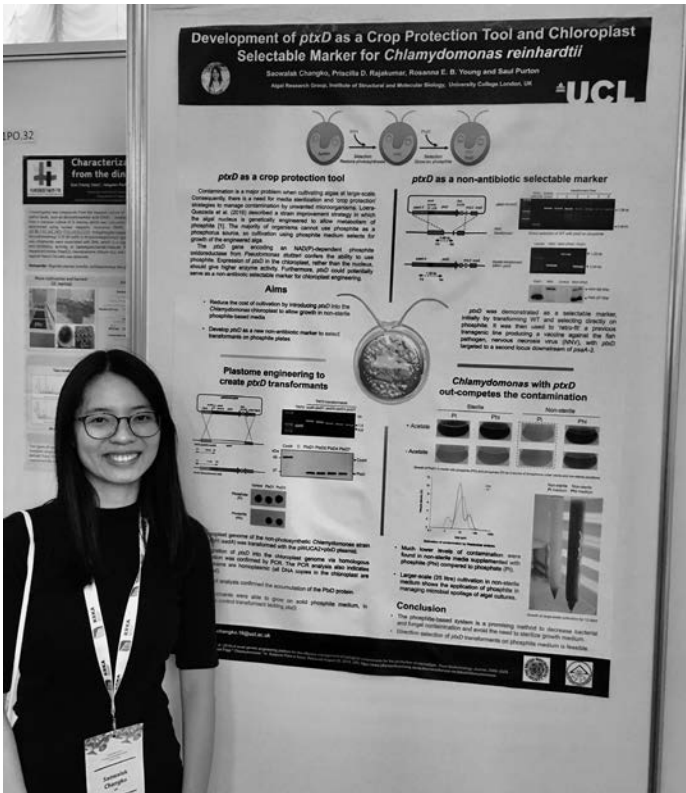
was a great way to draw attention to my poster. However, *Plocamium* does not only produce one defensive chemical, but a mixture. And these mixtures differ between individuals, just like different signature cocktails. I am interested in the evolutionary drivers maintaining this diversity of chemical cocktails within populations.

Whilst I am earning my PhD at the University of Alabama at Birmingham (USA), it was great to refresh my European network that I had started building towards the end of my undergraduate degree which I did in Plymouth (UK). The conference was well organized with many interesting topics and incredible food (Strukli – a traditional Croatian dish consisting of dough, filled with cream and cheese, was one of my favorites!). Zagreb itself was a very beautiful city to visit and the venue was within walking distance of the city center, historic attractions and plenty of restaurants. Attending

conferences provide unique opportunities to learn about the current research, potential post doc advisors, and network with scientists in the field as well as fellow PhD students. Without the support of my mentor (Dr. Charles D. Amsler) and funding sources (such as BPS), it would not be possible for me to attend. Experiences like this one, always leave me incredibly motivated to gather more data in order to establish myself as a researcher. Thank you so much to the British Phycological Society, the International Phycological Society and the Graduate Student Government (University of Alabama at Birmingham) for financial support in order to attend EPC7.



The 7th European Phycological Congress



Saowalak Changko,
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On Sunday the 25th of August it was time for the 7th European Phycological Congress started in the evening, this conference was held in a friendly city Zagreb, Croatia. I arrived in beautiful clear skies, sunshine in hot summer time. This reminded me how the weather like back home in Thailand. It was a good idea to have some fresh orange juice, enjoy the sun while sitting in King Tomislav Square.

First day at the spectacular conference taken place in Es-

planade Zagreb Hotel, all delegate were chatting together in a welcome reception. Some people I recognized with familiar names and faces, and also had a chance to make friends with other PhD, expanding my connection! This conference not only brought microalgal scientists but also diatoms and macroalgal researchers around the world. Therefore, a big variety of presentation went along the conference from Algae in Ecology, Cell structure, Tools and its application.

After a warm welcome in the opening ceremony, there was an exciting plenary lecture led by Prof. Assaf Vardi who beautifully described signalling pathways of how phytoplankton response to microbial interaction with pathogen. Some other talks were also from industrial representatives Freddy Guihéneuf and Michael Lakatos who inspired me of applying terrestrial microalgae in a new scale-up photobioreactor.

A presentation that is standout from most biotechnological session was the work by Julie A. Z. Zedler at Friedrich Schiller University Jena, generating protein scaffolding for cyanobacterial as a cell factory. This was a fascinating use of synthetic biology to create the scaffold for enzyme and substrate transportation.

To my important role as a poster presenter, it gave me an opportunity to talk to other delegates about my PhD and gain interesting advice from other perspectives. I unexpectedly met a potential collaborator from Thailand who works on developing pigment from *Leptolyngbya* sp. for hair dye application. All presenters also chat about each other projects and the joy of attending this conference with a wide range of algal field.

Overall, I am thankful to the British Phycological Society for contributing so generously through student bursary and idea-sharing in the student symposium. This rewarding experience will enrich my professional and interpersonal skills for the future career path.

19th International Seaweed Symposium in South Korea



Submitted by: Leslie Gager

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I am in the 3rd year of my PhD on the valorization of algae for the cosmetics industry. Thanks to a financial support from the BPS, I had the opportunity to participate from April 28th to May 3rd 2019 in the 19th International Seaweed Symposium in South Korea, on the beautiful Jeju Island. I presented my work during an oral presentation and participated in the competition between students for the best presentation. My presentation was entitled "Key factors to test before formulating a cosmetic emulsion using active phenolic compounds from a brown macroalgae: seasonal variability and stability

of compounds". It was a chance to share my results during this 3rd year of PhD. I met other PhD students during my oral session where we were able to exchange about our different PhD experiences. I also met with international PhD students at a special evening in a restaurant. The atmosphere was great and all the students were happy to meet each other. Attending a congress of this magnitude is very interesting and enriching in both terms of meetings and scientific content. The theme of this 19th edition was "Seaweeds: from tradition to innovation". The congress began with an interesting plenary lecture about the "beautiful and familiar seaweeds in Jeju islands, diversity and distribution" by Sung Min Boo. Many sessions were taking place in parallel, and as many were interesting conferences, it was sometimes difficult to choose! I have followed many presentations by Academic researchers but also industrial researchers. I am actually working with researchers at the university but in collaboration with three private companies, two from the cosmetic sector and an aquaculture SME; so I found interesting to be able to meet these two "different worlds" at the congress. I really appreciated the oral sessions called "Algal natural products, functional food and pharmacology" that were held every day. Another oral that I appreciated was about the seaweed legislation and standards in Europe by Susan Løvstad Holdt from

the Technical University of Denmark. I also really enjoyed the session about "Algae-microbe interaction" and especially the talk of Erwan Le Gélébart from SEPPIC company about the microbiota interactions with Laminariales gametophytes and the impact on phytochemistry and thus valorization in cosmetic. I also followed the various interesting presentations of the Algaia company on the valorization of algae. Another interesting session was a special session for women in algae science and especially a talk for women with Korean prospective by Jin Ae Lee from Inje University. I also made contacts with researchers who I could contact when I finished my PhD. This symposium was also an opportunity to discover Korean culture. For example, the opening ceremony was incredible with a play in the form of a musical comedy about Haenyeo, the Korean women divers. During each lunch, we had the chance to taste local culinary specialties, especially seaweeds! And of course, we tasted the famous "kimchi", side dishes of salted and fermented vegetables. The evening banquet was also a very good time for exchanges and discoveries with performance of Korean shows and music. I would like to conclude by warmly thanking the BPS for giving me this funding and thus the opportunity to participate to this international congress.

BPS Summer Studentship Project Summary

Submitted by: Dain Son

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My interests in environmental issues grew during my first year studies as a Biochemistry student, I became more interested in Ecology and working with microorganisms. During my summer break I got in touch with Prof. Jane Lewis asking if there was anything I could do in her lab to gain some more lab experience. Fortuitously I had got in touch with her just as she was starting a collaborative science and art project looking at the microphytobenthos from the Thames mudflat by St. Saviour's dock in Central London with filmmaker Dr. Susi Arnott to be exhibited as a part of the 2019 Totally Thames, previously known as Thames Festival.

Initially, I was involved with algal culturing and species identification of the microorganisms we had collected from our sampling site. A couple of months into doing some lab work, I was given the opportunity of making this into a summer research project through the BPS Summer Undergraduate Research Project scheme. After some thought, I realized that this was a great opportunity for me to gain first hand experience of carrying out a short term research project during my undergraduate studies. I would also be building on the work that I had already been doing in the lab so it was a great way for me to continue working in the lab and also gain extra skills for example using the SEM as well as communicating science to the public.

The aim of the project from the science perspective was to identify the proportion of euglenids and diatoms with relation to varying colour patches of algae seen in the Thames



mudflat. Timelapse films of the mudflat during a full tidal cycle had already been taken several times at varying times of the year prior to the start of the project which helped us to understand the intertidal changes of the microphytobenthos appearance in the same habitat. The most commonly seen colour patches of algae were dark green, light green, and brown and the organisms we found were mainly euglenids and diatoms. From this we hypothesised that as the proportion of euglenids and diatoms varied this would change the colour and its intensity as seen by eye, as well as in the images captured by a camera.

We carried out two sampling trips, over complete tidal cycles, to collect samples by laying down lens tissues directly onto the mudflat and leaving them for an hour. Three different colour patches of dark green, light green, and brown

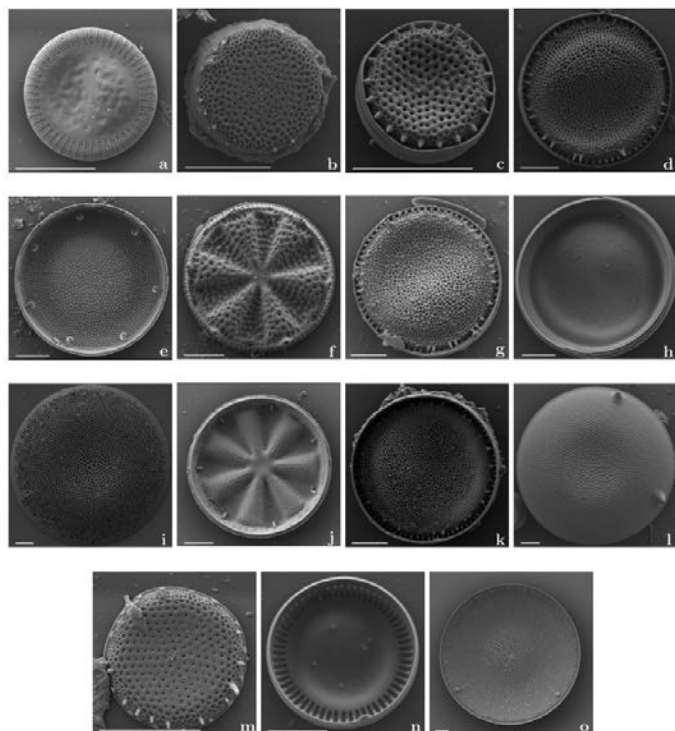


Figure 1. SEM images of centric diatoms in inner and outer valve view. Scale bars = 10µm

were chosen on site, with the main goal being to collect samples from distinctively green and brown patches of algae. We collected samples to represent colours from a full tidal cycle. The mud was exposed for just over 5 hours which meant 5 samples were collected for each site. The sampling days were very eventful with uncooperative weather at times as well as some surprise appearances from local mallards that decided to walk across our sampling sites and step on our lens tissues! It was a great way to gain hands on experience of field work, especially for a Biochemistry student.

To analyse the proportion of euglenids and diatoms from our collected samples we had to first determine the variation in species in our samples. In doing so, I had to learn and become comfortable with using the light microscope as well as the imaging program that was connected to a camera attached to the microscope. Images were required both for identifying species but also the exhibition. Taking photographs and videos of the live euglenids and diatoms was an amazing experience, getting to see the movements and interactions of the microphytobenthos in real time. I then counted the number of euglenids and diatoms in our samples. This process took up most of the 8 week project as I counted over 60 samples but I got some very interesting data to compare with the colour analysis work that Susi had been doing with the time lapse films of the mudflat she had taken on the days we went to collect the samples.

To help with identifying the species of some of the most commonly seen species of diatoms, I was able to visit the Natural History Museum to use their Scanning Electron Microscope to take detailed photographs of the diatom samples. This was by far one of the most interesting experiences I have ever had in my life - getting to see the diatoms in extreme detail. It was definitely the highlight of my project. Alongside the SEM work and producing a quantitative data set of the samples from counting, using that data to compare with the colour analysis results was a very unique part of my project, where the science and art collaboration really came into pla-

ce. We are currently preparing the material for the exhibition which will include some of the microphotographs of the MPB I took on the light microscope and SEM. I am very much looking forward to seeing the images I took of the MPB as one of the pieces for the exhibition as well as communicating our work to the visitors.

Overall, carrying out this project has been an extremely valuable and enjoyable experience and I would like to thank my supervisor Prof. Jane Lewis for offering me this opportunity to work on this project as well as taking the time to patiently explain and teach me everything I did not know prior to the start of the project. Thank you to Dr. Susi Arnott who kindly welcomed me into the project when I got in touch with Jane and a big thanks to Dr. Alex Ball who taught me how to use the SEM at the NHM and Dr. Eileen Cox for assisting with diatom identification. Finally, I would like to thank the BPS for this wonderful opportunity to experience carrying out research alongside Jane during my final summer as an undergraduate student.



Product Review: ioLight Microscope

Submitted by: Francis Bunker
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As secretary of the BPS, I receive all sorts of sales pitches. Some I send on to relevant people, others are irrelevant to the society and go into the trash. I recently had an email from Ian Aycliffe of Marketing in Science, who helps start-up companies promote their products and, in this case, the ioLight microscope.

The ioLight is as pocket-sized instrument (the size of a small book) which claims to have a 'similar resolution to a lab microscope' and which links to a mobile phone or tablet. As a field biologist, this product caught my eye as I often have the need to lug heavy and delicate microscopes around with me. During a trip to Shetland this year I took a binocular microscope as hand luggage and it caused all sorts of inconvenience going through security and caring for it in general. I didn't take a compound microscope as that would have been too much trouble, but I could have done with one. Could the ioLight be the answer? Does this readily transportable instrument have the necessary resolution to show key identification characteristics of filamentous algae?

I contacted Ian Aycliffe who passed me on to Andrew Monk. He developed the ioLight with Richard Williams. Andrew explained to me that there are two versions of the ioLight, a 1mm model (£840) which magnifies to x400 with a resolution of 1 μm . This is similar to a x40 objective and a x10 eyepiece on a conventional microscope. The second model is the 2 mm model (£780) which magnifies to x150, has a wider field of view but is of a lower resolution. The differences between the models is explained on the ioLight web site (<https://iolight.co.uk>).

After a discussion, I decided to try the 2 mm model on the basis that it has as wider field of view and would hopefully show most of the characters that I need to identify filamentous



macro algae.

The ioLight arrived just in time to test during fieldwork I was undertaking for Natural Resources Wales; rocky shore monitoring in Pembrokeshire Marine Special Area of Conservation. The unit arrived with a simple set of instructions and was readily charged via a mini-USB cable. In order to use the instrument, one first has to download the (free) ioLight app onto a smart phone or tablet. The phone or tablet becomes the device on which images can be viewed, finely focused and then captured. Focusing is straightforward but there is as a right and a wrong way to do this and Andrew Monk directed me to a YouTube video which gives a good 'how to focus' demonstration (https://youtu.be/Q9HHkjvd_g).

I took the ioLight out to a rocky shore at Hazelbeach in Milford Haven and soon found a small filamentous red alga that I couldn't identify. I could tell that the specimen was a *Ceramium* but did it have spines? Was it fully corticated? What was the branching interval? Determining the species required a microscope so this was

going to be a good test for the ioLight.

As with a conventional microscope, one has to prepare the specimen for viewing using a glass slide, a drop of water and a coverslip. The day was sunny with harsh light and also windy so not ideal for handling slides and coverslips nor viewing images on mobile phones. Not to be deterred, I found myself a sheltered spot and set about preparing a slide for the ioLight. I put the specimen on a glass slide and using a pipette, added a drop of water from a rock pool and deftly placed a cover slip on top. Next, I got the ioLight ready, fired up the app on my iPhone and remembered Andrew Monk's tutorial video on how to focus. In a short time, I had a good and clear image of *Ceramium gaditanum* on my phone. I carried out a fine focus and captured an image.

It took me 10 minutes from finding the specimen to walk up the (tricky underfoot) shore, get the ioLight out of my rucksack, prepare a slide and view the specimen on my phone. With practice this operation would get quicker and slicker but that's not bad timing.



The team also tried the ioLight when back at our survey base and obtained several good diagnostic photographs of fine filamentous algae. Evenly lit photographs appearing instantly on your mobile phone ready to post on social media or send off for verification is very appealing. The ioLight got a big thumbs up from the team and is a great little travel microscope to act as a stand-in when a conventional microscope is not available or appropriate. I would like to see the 1 mm model in action to see if the better resolution allows me to see details of cellular organelles e.g. plastids and nuclei; essential for the identification of some algae.

Whereas the ioLight can be used successfully in the field, in practice most of the time it is easier to take specimens back to base to deal with.

Rain, waves, slippery rocks, mud and dirty fingers all conspire against using any electronic instruments in the field, let alone the fiddle of preparing microscope slides.

My wish list for improvements to the ioLight would be some sort of graticule (either on the instrument or the app) to enable the measuring of structures. It would also be good if a neatly packaged field kit consisting of slides, cover slips and a pipette could be included with the purchase.

For use in remote locations and where microscopes and lab facilities are not available, the ioLight is a fantastic development. In my line of work, I can see the ioLight becoming an essential part of my field kit.



INSTRUCTIONS FOR CONTRIBUTORS

Copy which is submitted for publication in *The Phycologist* should be concise and informative. Articles should be scientifically sound, as jargon free as possible and written in a readable scientific magazine style. Unless absolutely essential references should not be included. All types of relevant material will be considered, these include job advertisements, scientific reports, book reviews, news items of topical interest, meeting announcements, grant awards, promotions, appointments, profiles of eminent phycologists and obituaries. If you are interested in submitting material that does not fall within any of these broad categories, or you are unsure of the appropriateness of a potential article, then contact the editor. Suggestions for future articles or a series of articles are welcomed.

Copy should be submitted, preferably as attachments to email or on disc (MS Word for Windows or Rich Text Format). **Illustrations and photos to accompany copy are welcomed and should be supplied as JPEG or TIFF file-format no less than 600 dpi resolution.** The editor reserves the right to edit the material before final publication.

Submission of Copy and Deadlines

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