

The Phycologist

The Newsletter of the British Phycological Society

Editor: Dr Amanda Burson

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Hilda Canter-Lund
winners

Motility in diatoms

Council membership
positions

Number 105 - Autumn 2023

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2023

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This issue includes several travel bursary reports highlighting the many opportunities the BPS has supported for early phycologists. Each report conveys the enthusiasm and inspiration attending these events instilled within each recipient and we, as a society, are thrilled to see this! I hope this leads to longterm membership of the early career researchers in our society and perhaps even participation in the society's council. Please note that we are looking for nominations for several positions, so if you are interested, please let it be known to the secretary as soon as possible (11th Nov. deadline). Finally, happy to announce the 72nd Annual Meeting of the BPS to be held in Reading. Again, this will be in an in-person meeting, so I am very much looking forward to seeing you all there and hearing about the great work being done in the field. Please remember to look out for deadlines on abstract submissions and registration at the conference website: <https://reading.brphycsoc.org>

Very best,

Amanda Burson

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

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

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Call for nominations for membership of BPS Council

In accordance with our constitution (<https://brphyc-soc.org/constitution/>), Council positions are open for nominations with successful candidates to taking up office after the AGM in Reading University in January 2024:

The following council positions are now open:

- **Vice President, Overseas** (2024-2026) a two-year post ending at the AGM of January 2026
- **Secretary** (2024-2027) a three-year post ending at the AGM of January 2027 with the option to re-stand after this period
- **Ordinary member of Council** (2024-2027) a three-year post ending at the AGM of January 2027 - 5 vacancies

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 societies 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, Jane Lewis, jane.lewis@uhi.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@brphyc-soc.org). A valid nomination needs (i) the name and consent of the nominee, and the support of (ii) a Proposer and (iii) a Seconder (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 10th, 2023 (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 at Reading University on Wednesday January 10th, 2024.

72nd Annual Meeting of the British Psychological Society 8th-11th January 2024 University of Reading



University of Reading

The 72nd Annual BPS Meeting will be held at the University of Reading's Whitenights Campus. Please check the meeting website at <https://reading.brphyc-soc.org> where all the pertinent information regarding special sessions, registration and abstract submission will be available.

This is an in-person only meeting so I look forward to seeing everyone there!

BPS Funded Project Reports

Gene expression and the role of light and photosynthesis on the motility behaviour of benthic diatoms

Submitted by Graham J.C. Underwood

University of Essex, and Zukunftscolleg, University of Konstanz

gjcu@essex.ac.uk

Biofilms of benthic diatoms (single-celled photosynthetic algae) are incredibly abundant in freshwater and marine environments. Many species of pennate diatoms are motile, moving to control their position within the biofilm matrix. This behaviour allows cells to avoid potentially damaging high light intensities (Waring et al 2007) at the sediment surface, while disturbance and sediment mobilisation by waves and water flow can bury cells, taking them out of the photic zone (Redzuan and Underwood 2020). The ability to sense their light environment and move to reposition themselves in zones of favourable condition is a key adaption underpinning the success of benthic diatoms. Motile diatoms respond to light through a combination of positive and negative phototaxis (directional movement) and photokinesis (changing speed), and these responses differ between species and with the colour of light (McLachlan et al. 2009, Cohn et al. 2016). Light sensing may occur the apices of the cell, and

can result in reversal of the direction of movement (McLachlan et al. 2012). The chloroplasts may also sense low and high light levels and communicate this to the rest of the cell. It is known that diatoms possess genes that code for phytochromes, cryptochromes and aureochromes that respond to red and far red and blue light (Mann et al. 2020).

During a 12 month Senior fellowship at the Zukunftscolleg, University of Konstanz, working with colleagues Prof. Dr. Peter Kroth, Dr Bernard Lepetit, Dr Nicola Slee, and Levi M Jacob, we examined the motility behaviour of the pennate diatom *Nitzschia captiva* across a range of light spectra and intensities. This species demonstrated positive and negative phototactic behaviours to a range of blue, blue-green, red and far-red light conditions and intensities in both species of diatoms (examples, see Fig. 1), and a range of differential photophysiological acclimations associated with these conditions and behaviours (Fig. 2).

We found that inhibiting photosynthesis damped phototactic high light responses (particularly under parts of the blue light, and far-red light spectrum), but had little effect on low light-induced phototaxis, suggesting differential roles for photoreceptors and chloroplast-sensing of light across a range of spectral conditions.

With support from the BPS (BPS project grant 2022_BPS_0118) we then investigated if there are distinct patterns of gene expression linked to phototactic and photokinetic behaviour in *Nitzschia captiva* which may indicate key mechanisms involved in regulation or induction of motility. Cultures of *Nitzschia captiva* were exposed to defined blue, red and white light spectral conditions (and dark controls) at intensities designed to maximise behavioural responses, but not induce physiological or photosynthetic stress. Cells were harvested 0, 30 and 180 minutes of light exposure (corresponding to time frames for significant cell movement, e.g. Fig. 1, and changed photophysiology, Fig. 2.) during the morning phase of their circadian cycle. We isolated RNA from *N. captiva* cells under these conditions, have sequenced this material (using funding provided by the BPS) and constructed transcriptomes for *N. captiva* under these different treatments.

Over 82,500 transcripts and their isoforms have been identified. Patterns of gene expression were strongly influenced by the light treatments, with significant differences in overall gene expression after 30 minutes and 180 minutes of exposure to blue, red, white light and darkness, and change over the 180 minute time course (Fig. 3).

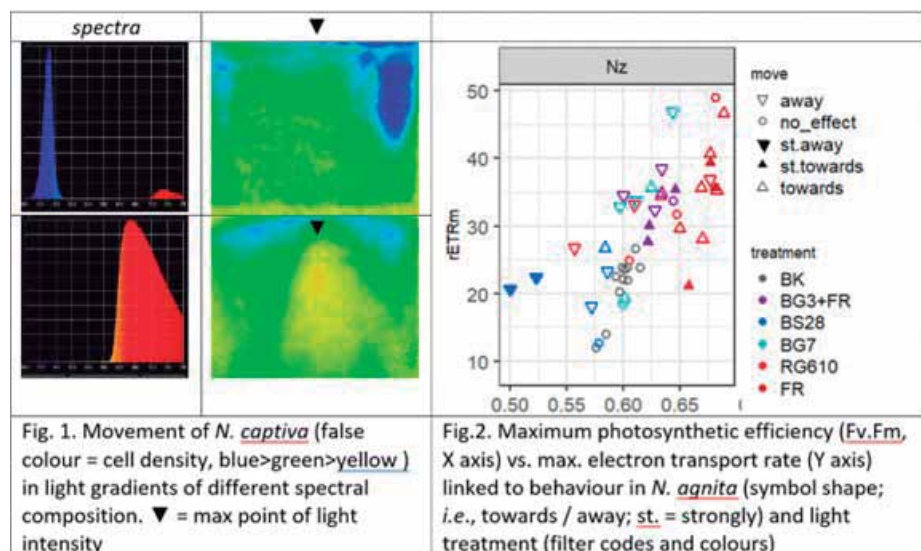


Fig. 1. Movement of *N. captiva* (false colour = cell density, blue>green>yellow) in light gradients of different spectral composition. ▼ = max point of light intensity

Fig.2. Maximum photosynthetic efficiency (Fv/Fm, X axis) vs. max. electron transport rate (Y axis) linked to behaviour in *N. agnita* (symbol shape; i.e., towards / away; st. = strongly) and light treatment (filter codes and colours)

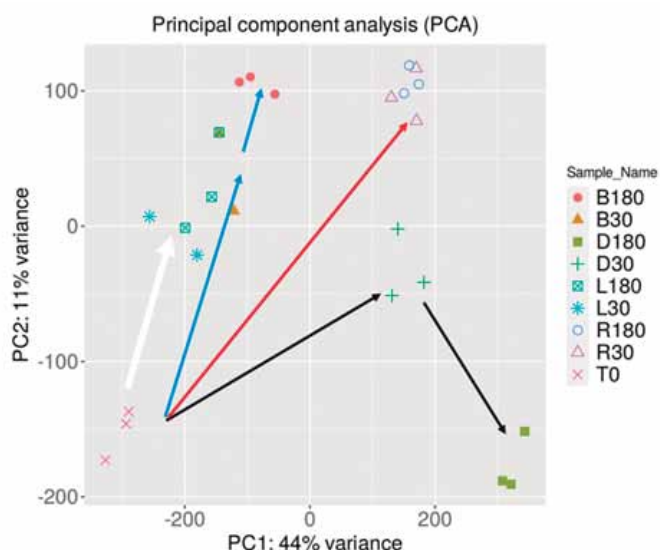


Figure 3. Principal components analysis of *N. capitva* transcriptomes under different light conditions for 30 and 180 minutes (n=3 for each condition). T0 = starting condition. White arrow = response to white light (L), blue arrow = response to blue light (B), red arrow = response to Red light (R), black arrow = response to darkness (D)

Diatom movement may show a rhythmic pattern, correlating with the tides and induced by blue light. Here, clock components as well as blue light photoreceptors could be involved. With RITMO (a diatom clock compound (Annunziata et al. 2019)) and Aureochrome 1a (a blue light photoreceptor serving as a regulatory master switch (Mann et al. 2020)), we already have very good candidates that might be involved in regulating this rhythmic pattern. We have also identified genes within the EPS pathway (Aslam et al. 2018) that is involved in diatom motility, and genes involved in photosynthetic responses (e.g. Light harvesting complexes, Lepetit et al. 2017). We are currently analysing the transcriptome data set, identifying the differential expression of genes linked to photoreceptors for light sensing (aureochromes, cryptochromes, phytochromes), photosynthesis regulation (Light Harvesting Complex genes) and extracellular polymeric substances synthesis (part of the known motility mechanism of diatoms), the circadian clock ((Hornlein et al., 2018)), and motility mechanisms (including calcium regulation and actin-myosin regulation). These data will indicate the extent to which the expression of these genes responds to various light stimuli and motility behaviour. This is something that is as yet completely unknown. The transcriptomes we have generated will provide a wealth of clues as to the metabolic and physiological plasticity of *Nitzschia capitva* as it responds to changing light spectra.

There is unresolved scientific debate, ongoing at least since Perkins (1960), about what are the key environmental controls of diatoms motility and the extent to which behaviours are controlled by gene activity. Thanks to support from the BPS grant 2022_BPS_0118, this research will hopefully shed further light on this fascinating area of algal biology.

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Characterization and distribution of native and non-native *Eucheuma* and *Kappaphycus* species collected in selected sites along the coast of Tanzania

Submitted by Rusekwa S. B¹, (and written with) Buriyo A.S¹ Msuya F.E¹, Mvungi E. F¹, Brakel J.^{3,4,5} and Brodie J.²

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Introduction

Eucheumatoids are a group of seaweed species with high economic interest pertaining the family Solieriaceae and include the genera *Kappaphycus*, and *Eucheuma* (Oliveira et al. 2005). They are source of carrageenan, a valuable polysaccharide which has many uses in industrial applications, manufacturing of snacks (Msuya 2006) and used as food for animal and human consumption (Silva et al. 2012). In Tanzania populations of *Kappaphycus* and *Eucheuma* spp. have harvested by local fishermen to be sold to carrageenan extracting companies since 1930s (Oliveira et al. 2005).

After natural stocks declined 1970s in Tanzania, non-native seaweed strains *Eucheuma denticulatum* (trade name: spinosum) and *Kappaphycus alvarezii* (trade name: cottonii) were imported from the Philippines for commercial farming in 1989 (Msuya 2006). It is unclear which effect diverse stressors such as introduction of non-native eucheumatoids, past over-harvest and global warming have on native eucheumatoid populations in Tanzania. Given this uncertainty, there is the urgent need to explore eucheumatoid populations, their distribution and genetic diversity. Identifying species and to differentiate between introduced and native individuals using morphological classification of eucheumatoid species based on features such as color, shape, structure/pattern and size has been a challenge due to a high morphological plasticity of these species (Zuccarello et al. 2006).

The main objectives were:

- To assess native eucheumatoid species presence in selected sites based on past descriptions
- Mapping eucheumatoid populations
- To combine molecular identification with morphological description for native and non-native eucheumatoid species to provide guidance for their identification.

Collections of eucheumatoids for both native and introduced species were made from fifteen sites.

Methods

Sampling:

- At each site an opportunistic sampling technique was used. Eucheumatoids were collected from the upper intertidal zone to the upper subtidal perpendicular and parallel to the shore.

Molecular characterization:

- DNA was extracted from silica gel dried eucheumatoid samples and purified as described in Brakel et al. (in preparation).

The plastid marker *rbcl* was used in two separate PCR reactions with the primer pair F7/R753 (Freshwater and Rueness 1994) and *rbcl*-F645 (Lin, Fredericq, and Hommersand 2001)/R1464 (Díaz-Tapia et al. 2018).

Morphological identification:

- The morphological identification of collected specimens was made based on color, shape, structure/pattern, size, original descriptions of the species and comparisons with algal specimens deposited in DSM and field guide books (Jaasund 1976, Oliveira et al. 2005).

A total of 28 specimens were molecularly characterized, of which 25 were assigned to the genus *Eucheuma* and three to the genus *Kappaphycus*. Within the genus *Eucheuma*, two species were identified from Tanzania, *E. denticulatum* and *E. platycladum*. All 13 specimens of *E. denticulatum* collected were identified as the same haplotype as the four specimens collected from the seaweed farms (*cox1* EDA (sensu Lim et al. 2014), *cox2-3* spacer E13 (sensu Zuccarello et al. 2006). For *E. platycladum*, four haplotypes were identified, of which two specimens, PIN_1 and PIN_2 had identical *cox2-3* spacer sequences as E65 (sensu Zuccarello et al. 2006), forming a monophyletic clade within the genus *Eucheuma* (Fig. 2).

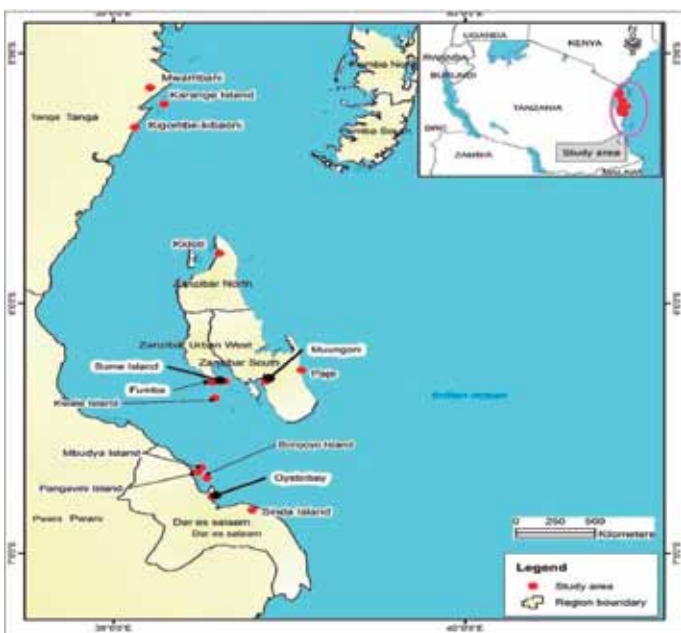


Fig. 1. Map of the coastal region of Tanzania showing the study sites.

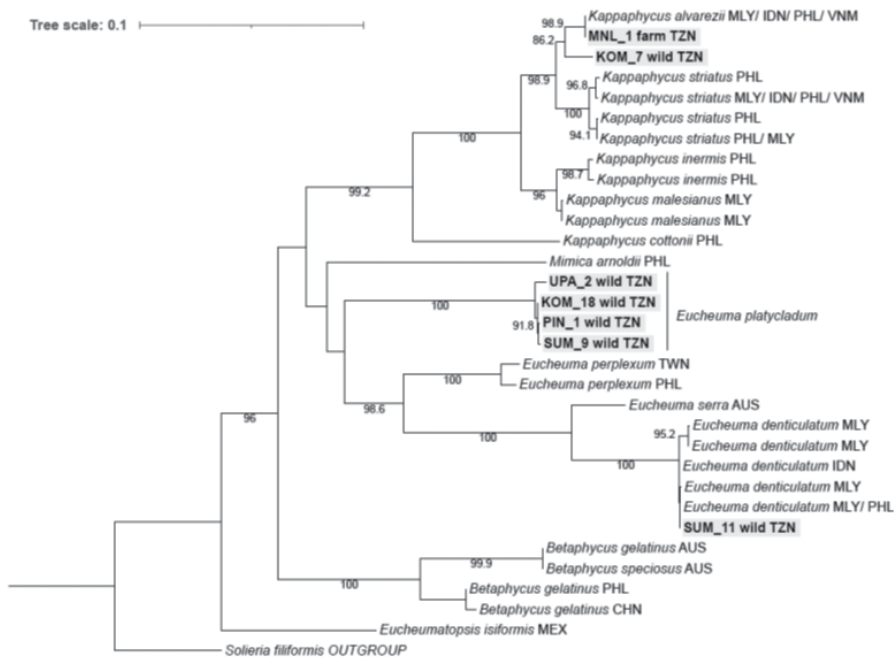


Figure 2. Phylogenetic tree relationship of Identified Eucheumatoids

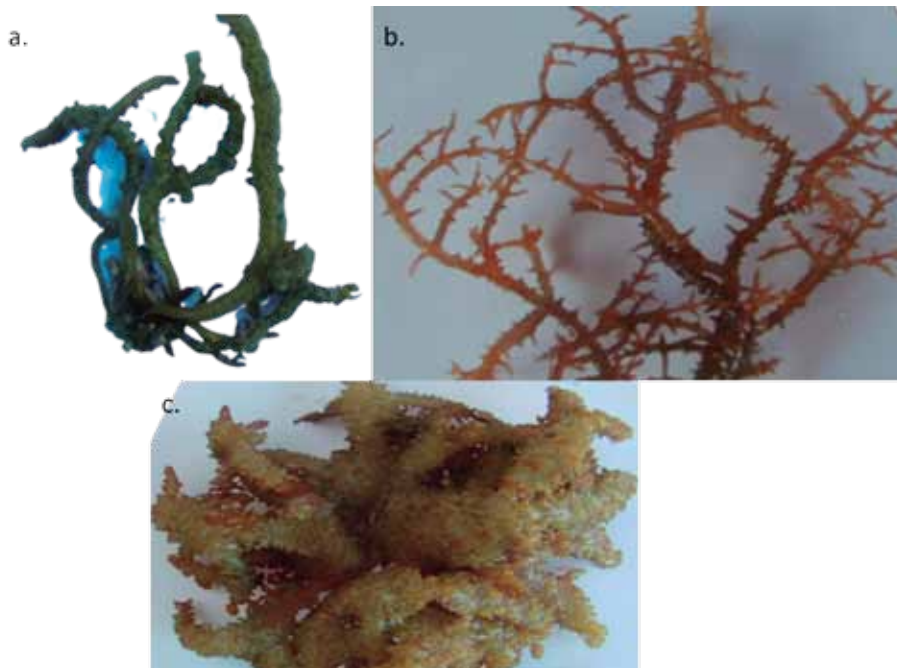


Figure 3. Eucheumatoid species collected; *Kappaphycus alvarezii* (a), *Eucheuma denticulatum* (b), *Eucheuma platycladum* (c).

Conclusion

- Using molecular identification tools, we concluded that all collected *E. denticulatum* were not native at sites where native haplotypes had been encountered in previous years.
- We confirmed the presence of native *Kappaphycus alvarezii* and *Eucheuma platycladum*.
- As a potential source for more resistant strains against adverse environmental conditions for seaweed farming, we highly recommend to protect these populations.

- We suggest the exploration of additional sites where eucheumatoids have been reported before and to start trail runs on exploring wild specimen for farming and carrageenan production.

Acknowledgements

This work is funded and facilitation for travel and accommodation, meals to attend the WIOMSA 12Th Scientific Symposium by the British Phycological Society (BPS) (2022_BPS_0156), GlobalSeaweed-STAR project under the Global Challenges Research Fund, United Kingdom, Research and Innovation (UKRI) 2017-2021, and Sustainable Seas Trust (SST), the Western Indian Ocean Marine Science Association (WIOMSA), and the Nairobi Convention.

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Hilda Canter-Lund Competition

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

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

2023 Winners

Macro category

Shannon Moran with “Golden Kelp in Evening Light”

Shannon Moran is an award-winning underwater photographer based in Cornwall, UK. After graduating from Marine and Natural History Photography in 2020, she has continued to photograph the incredible marine life found in our oceans.

Twitter (X) @Shannon_Photo, Instagram @ShannonMoranPhoto



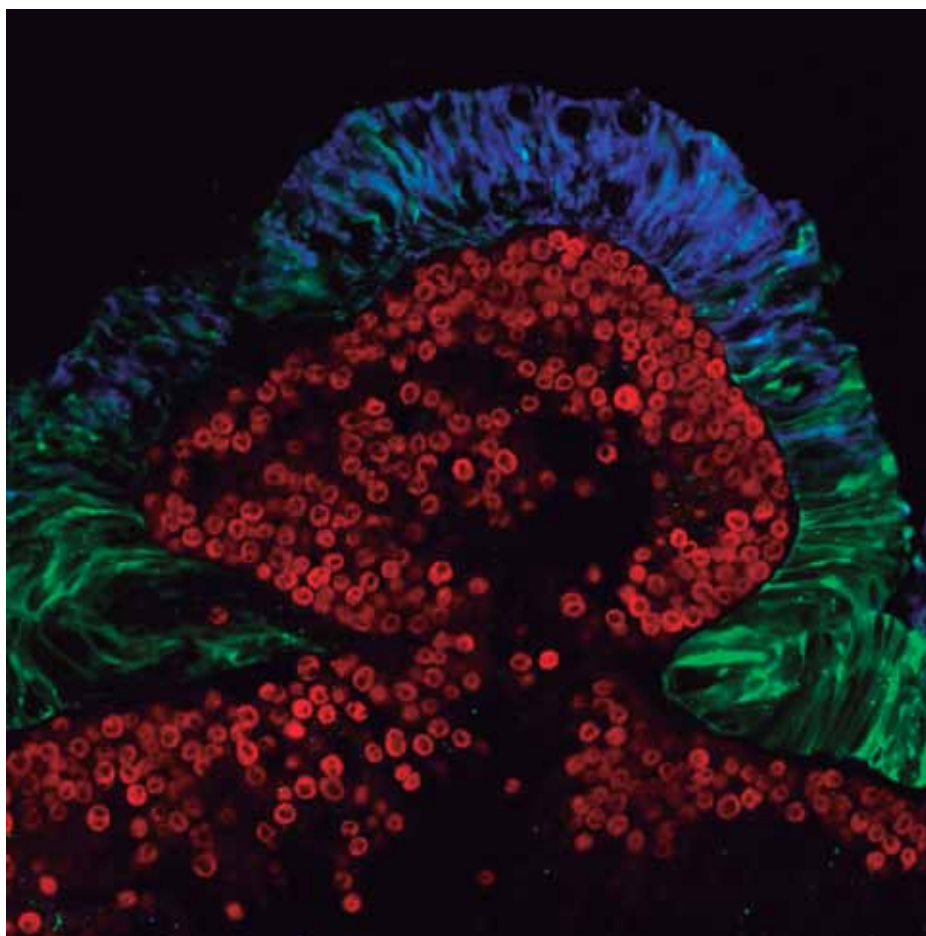
Golden Kelp (*Laminaria ochroleuca*), aptly named due to its rich gold colour. This image was captured just a few meters below the surface in Falmouth, Cornwall. Photographed in the early evening light using an Olympus EM1ii in a Nauticam underwater housing, with a Lumix 8mm Fisheye lens and two Inon strobes providing fill-in flash, illuminating the kelp in the foreground.

Micro category

Giulia Marchioro with “Zooxanthellae and the fluorescent chamber”

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Giulia Marchioro is a Ph.D. candidate at the Vienna Doctoral School of Ecology and Evolution and the Natural History Museum Vienna, in Austria, funded by FCT, Portugal. Her collaborative project with the Adameyko lab at the Medical University of Vienna and the Haus des Meeres focuses on the investigation of the distribution patterns and expression profiles of fluorescent proteins (FPs) in mesophotic corals and how FPs can modulate light use by the coral's photoautotrophic endosymbionts (zooxanthellae). Giulia has always been fascinated by marine life and diving, but it was during an internship at HIMB (USA) in 2015, she became passionate about coral reefs and in exploring and understanding the wonders of this environment.



Zooxanthellae is the informal term for golden-brown algae (dinoflagellates) living in symbiosis with corals. Corals produce a variety of green fluorescent protein (GFP)-like compounds to protect the zooxanthellae from harmful radiation in shallow-water environments, thus preserving their relationship. The image was taken using confocal microscopy (Zeiss LSM 780 at 64x) that allows for capturing natural fluorescence from both host proteins (in green/blue in the coral epidermis) and the chlorophyll (in red) present in the zooxanthellae. Coral species: *Echinopora lamellosa* from Haus des Meeres: Aqua Terra Zoo, Vienna, Austria.

Macro category

Samantha Clements with “San Clemente Island Giant Kelp”



Giant Kelp (*Macrocystis pyrifera*) grows abundantly at San Clemente Island in the Channel Islands off of the coast of Southern California, despite statewide declines along the coast. This is a close up of a giant kelp scimitar (the growing tip) captured in June of 2022 while conducting research in the Channel Islands. The image was captured using a Canon G16 point-and-shoot camera in an underwater housing with natural sunlight as the sole light source, highlighting the natural beauty of this species that is so special to the Golden State.

Alex Thomson with “Painted ceiling”

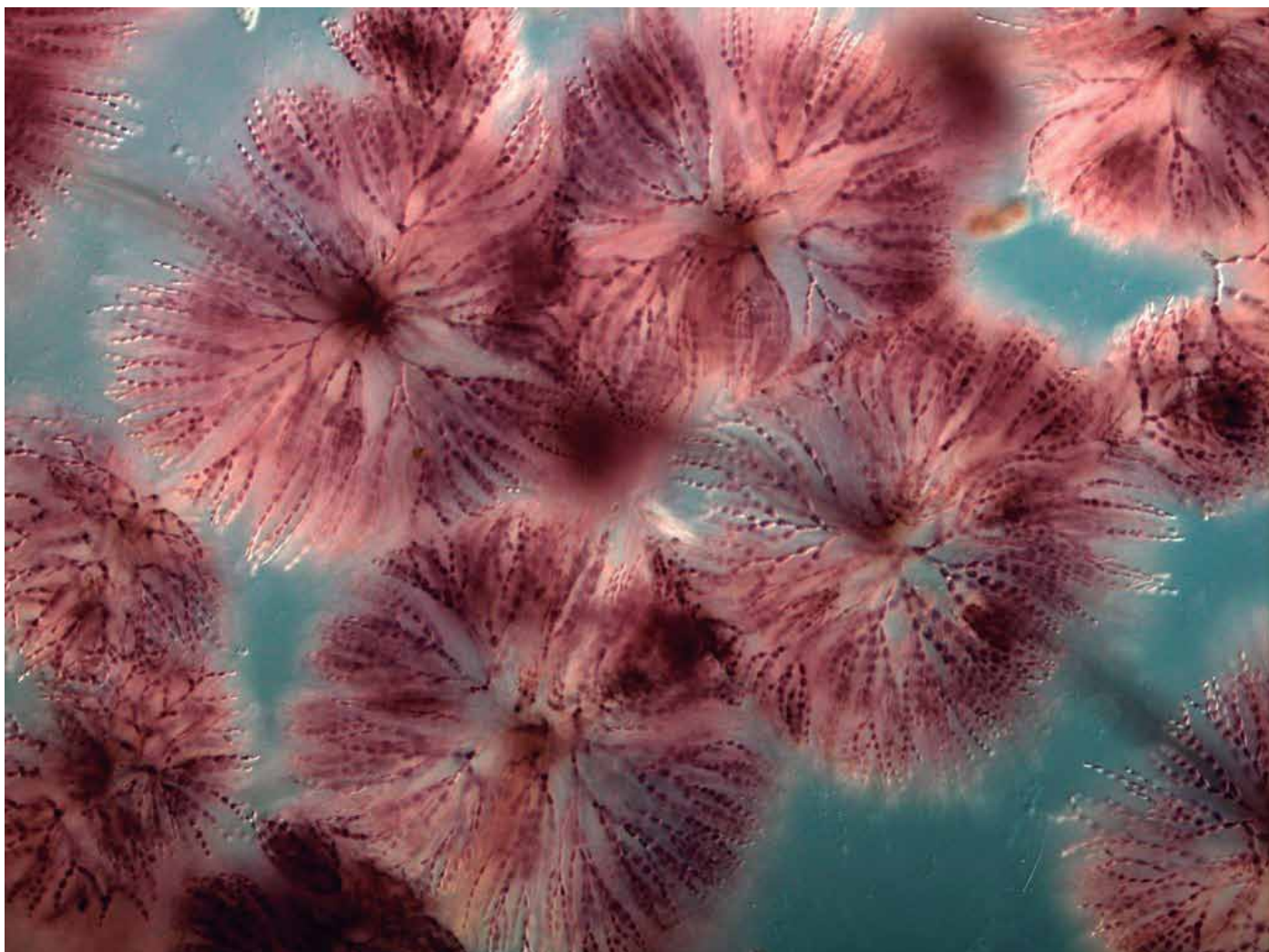


The snow algae *Sanguina* sp. paints the ceiling of a summer snow tunnel blood red. The algae likely bloomed on the surface of the snow-pack above, forming the characteristic blood-red pigment to protect themselves from UV stress. Rain and snowmelt will then have deposited the cells on the icy roof of the snow tunnel. This patch, covering about 15 x 20 m, was found in August on the flanks of Ben Macdui in the Cairngorms. Similar blooms occur on summer snows throughout Scotland from June to September. Sadly, patches like these, and the habitat they provide for snow algae, are predicted to become a rare sight in Scotland in the summer. (Camera settings: Fujifilm XT-20, 26.5 mm, f/3.6, 1/160s, ISO 400, no flash)

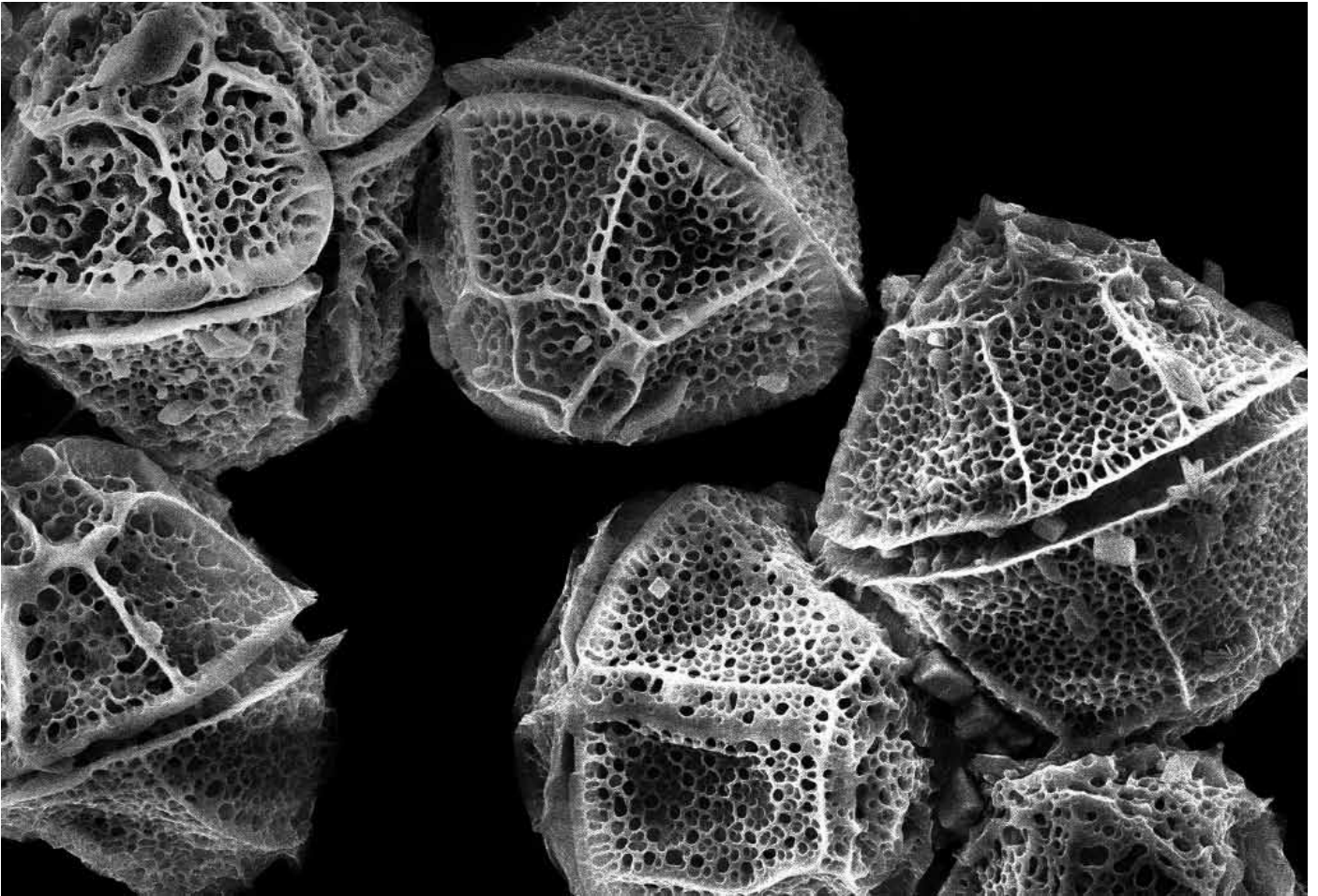
Micro category

Ana Knezevic with “Red beauty”

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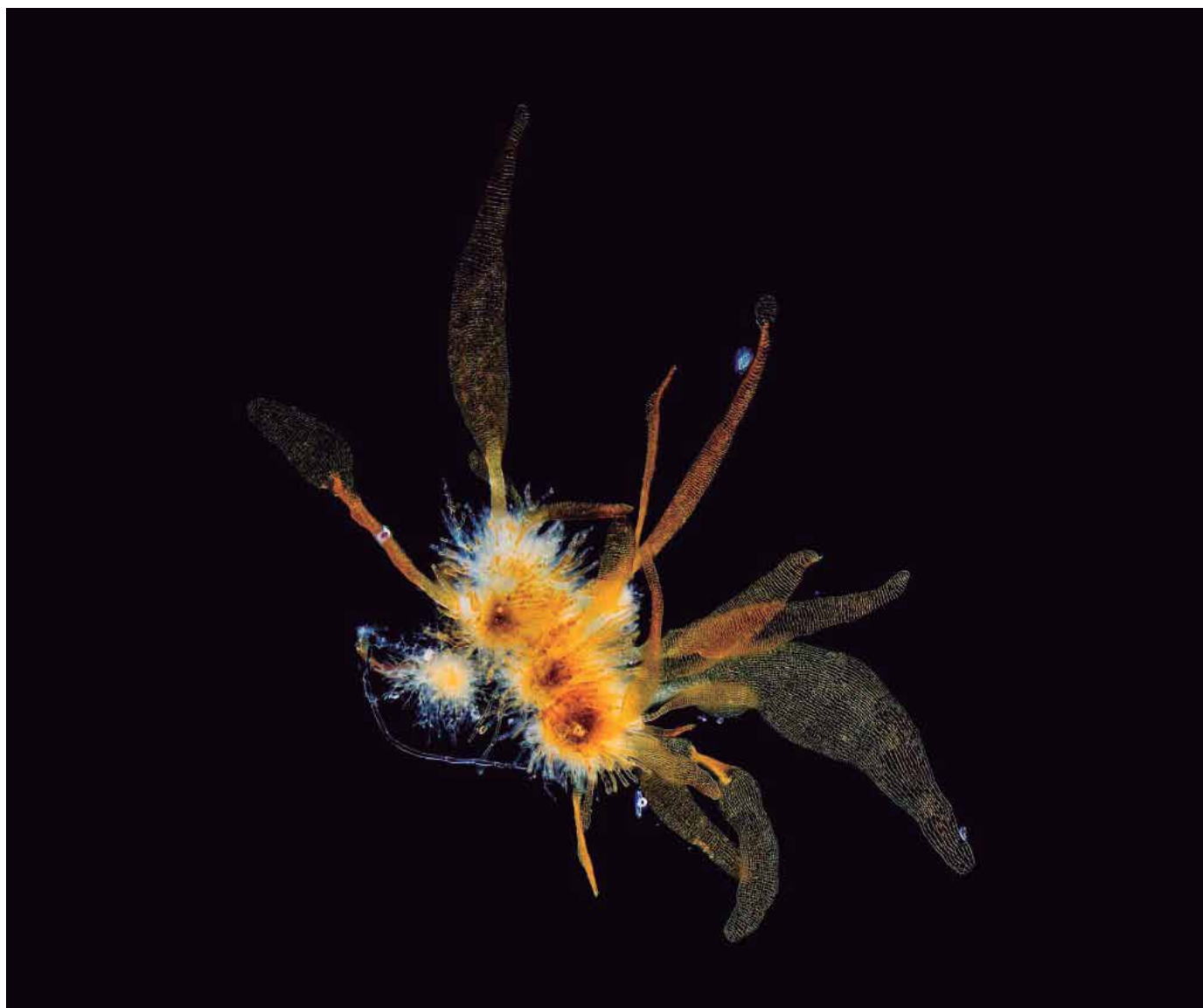
This is a photomicrograph of a fascinating species of *Batrachospermum*, a freshwater red alga. This remarkable species lives on stones or rocks, especially in cool, clean, slightly alkaline and well-oxygenated water habitats. During the spring of 2022, an expedition was carried out to the Buna River in the south part of Bosnia and Herzegovina, where samples of this *Batrachospermum* species were collected. The expedition aimed to study and document the biodiversity of these amazing organisms in their natural environment. The micrograph was captured using a Zeiss AxioImager M.1 microscope equipped with an AxioCam MR5 – DIC optic at 40X magnification. The image shows the delicate structure and vivid pigmentation characteristic of this freshwater red alga. It is important to note that the distribution and abundance of *Batrachospermum*, as well as many other species, can be significantly affected by anthropogenic activities. Strong human impacts on their habitats, such as pollution or changes in water conditions, pose a serious threat to the survival and reproduction of these beautiful organisms. By raising awareness and promoting responsible environmental practices, we can help preserve the biodiversity and ecological balance of our freshwater ecosystems.



A group of *Lingulodinium polyedra* cells taken on a JEOL JSM 6390LV Scanning electron microscope at 1200 x magnification. The cells were grown in culture at the Culture Collection of Algae and Protozoa, hosted by the Scottish Association for Marine Science. The filter paper in the image background was darkened using the shading tool in Photoshop CC to make it less distracting. *Lingulodinium polyedra* is a bioluminescent dinoflagellate and was isolated from a sample taken in Loch Creran, Scotland.

Pichaya Lertvilai with “*Macrocystis pyrifera*”

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This image captures the embryonic stage of a giant kelp (*Macrocystis pyrifera*) sporophyte following fertilization (~5mm across). Despite its small size at this stage, this sporophyte has the potential to grow into a towering giant kelp (over 30m), serving as the cornerstone of the kelp forest ecosystem. Specimens were cultivated by Mohammad Sedarat, PhD student at Scripps Institution of Oceanography, whose research explores thermal tolerance in giant kelp. This entry highlights a multidisciplinary collaboration to catalogue morphological differences of *M. pyrifera* across a range of environmental stress regimes using high resolution imagery. This image was taken with a darkfield microscopy technique with a 5x magnification and with focal stacking to enhance depth of field.

BPS Funded Travel Bursary Reports

Presenting my research at the Symposium of European Freshwater Science 13

Submitted by Katrina Woodfield

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In May 2022 I took the first step towards completing my undergraduate dissertation, a training course in Ireland, which was made possible by the BPS. Now, over a year later, with support from the BPS I was able to present that same research project at the Symposium of European Freshwater Sciences 13 (SEFS 13). As my first international conference, this was a formative experience and perfect way to conclude a fantastic project which has shaped my future.

At the start of 2023 I handed in my undergraduate dissertation project titled: *“Developing a field-based, rapid assessment of macroalgae for use by citizen scientists to describe eutrophication risk in rivers.”* After discussions with the BPS, it was agreed that the remaining funding from the project could be put towards presenting my results at SEFS 13 later that year. I was excited to hear back from the SEFS organisational committee that I would

be presenting my project in the special session titled “Monitoring, managing and protecting/restoring freshwaters – the role and power of citizen science”. The second half of my final undergraduate year flew by and before long it was time to travel across to Newcastle Upon Tyne for the conference.

Upon arrival, the first event I attended was the early careers welcome and introduction. I was amazed to see the lecture theatre filling up with young researchers from across Europe and beyond. This first session highlighted the emphasis SEFS puts on encouraging early career researchers to attend the conference, but also settled the nerves of many, who like me, were attending their first international conference. The warm welcome was extended during the conference opening, where I got to meet many of my supervisors’ peers and chat to different PhD students. It was refreshing to be surrounded by so many likeminded and passionate people,

hearing about everyone’s current research made me excited for the week ahead.

During the conference I had two opportunities to talk about my dissertation project. The first was my allotted time in the citizen science special session. My talk described the development of a citizen science monitoring method which utilises macroalgae to assign eutrophication risk to small rivers and streams. Additionally, I discussed the results from field trials and areas for further development. It was great to engage with others involved in citizen science research and projects, and I was very grateful for, and encouraged by, the positive response to my presentation. Later in the week, the early careers researchers were invited to a free field demonstration of core freshwater monitoring methods used by the Environment agency. As an extension of the discussion on macrophytes, I was invited to discuss freshwater macroal-





gae and the methods involved in my dissertation project. This was a great opportunity to talk to my peers about my research and it led to interesting conversations later in the day.

The remaining time at the conference was jam packed with insightful talks on a wide variety of topics from the impacts of climate change to the soundscapes of ponds. I attended a number of talks focused on algae which widened my existing knowledge base. I also participated in an insightful discussion session focused on identifying training needs for freshwater biology and ecology. I thoroughly enjoyed listening to the inspiring plenary speakers, in particular Cayelan Carley's talk on near-term forecasting in freshwaters and Núria Catalán's talk on carbon cycling and discussion of gender bias. Over the week I got to know several PhD students from across Europe, and it was fascinating to learn more about their research and culture.

I would like to massively thank the BPS for the student grant which made this whole project possible. In May I secured a studentship with Envision doctoral training programme on a project investigating how organic pollution is affecting benthic algae productivity within rivers. My dissertation project undoubtedly helped me to gain this position and I am thrilled to be continuing research into algae in the future. Attending SEFS13 was eye-opening and inspiring; I am incredibly grateful that I was able to attend, and I am sure the knowledge, connections, and motivation I gained from the conference will be instrumental as I begin my PhD.

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2022_BPS_0098b



Seaweeds bring the world together

or

Why an in-person conference is worth a hundred virtual ones

Submitted by Margot Minju Arnould-Petre

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An incredible opportunity to see the diversity of seaweed research, from fundamental to applied phycology, the 24th International Seaweed Symposium in Hobart, Tasmania (Australia) was all I could ask for and more. It was the occasion to meet phycologists from around the world, to hear about exciting seaweed related projects, and to meet the people behind some of the

core books and resources I have used in my own research. A chance to become acquainted with other young scientists and to obtain wisdom from the experienced veterans in the field. After a year and a half of the difficulties of online conferences and failed attempts at networking, a week in Tasmania was enough to make more connections than during all those previous endea-

vours. The case has been made times and times again: an in-person meeting is worth a hundred virtual ones. This year's International Seaweed Symposium was another proof of that.

Each day opened with a plenary session, and I especially enjoyed the keynote talks on William Harvey and his Australian Seaweeds, on the Seaweeds of Aotearoa New Zealand, and on Coralline algal ecology and evolution. I was so glad to personally meet so many fascinating experts in phycology, for example John Huisman, who wrote Marine Plants of Australia, one of the most beautiful seaweed guides I have read!

I enjoyed giving an oral presentation of my work on the photophysiology of structurally coloured *Chondria* (Ceramiales). Although nerve-wracking, it was a nice experience to share my studies in front of a group of real people. The feeling when someone comes up



Presenting my talk on the photophysiology of two *Chondria* species, in the 'Physiology and Omics' session on the first day of the symposium.



Beautiful tiny rock pools with some coralline algae and the famous Neptune's necklace, *Hormosira banksia*.

to you the next day to tell you they enjoyed your talk is so gratifying! Such exchanges led to interesting conversations and insights.

Some of the most memorable session talks and posters I saw touched on different topics: impact of acidification on non-calcifying seaweeds, mapping photosynthetic pigments in coralline algae, seaweed-based food products, ethical seaweed farming and harvesting and more. It was noteworthy to see many presentations on projects involving aboriginal people and local communities in the seaweed industry. The subject was particularly relevant in the location of the symposium, on aboriginal land. The symposium was even opened with an official 'Welcome to Country' by an aboriginal woman. There seems to be more and more recognition toward the original inhabitants of the lands in Oceania, which is not something we usually hear on the side of the world I live in. I also really appreciated the international diversity among attendees, and meeting researchers I would not have met in Europe.

Networking is this big word that has been haunting me every time I was in an online conference: "the most important thing is networking". But trying to network virtually as an early-stage researcher is a fruitless nightmare. In-person, it becomes as easy as attending a presentation, standing in front of a poster, going on a guided tour of the city, or even

just queuing at coffee breaks. Approaching someone just to greet them for the first time is normal behaviour at an in-person conference. Not to mention, the symposium organised several networking opportunities, and I also had the chance to participate in a workshop where I met taxonomy experts from around the world.

I also learned many interesting elements of history about Hobart, saw beautiful Australian seaweeds, hiked 1270 m from sea to summit going up Kunanyi/Mount Wellington, the mountain protecting Hobart from rain most of the year. Saw pademelons, wombats, wallabies and even a lyre bird in the wild! I tried a 'Spider', a drink that sounds like a children's dream: ice cream floating in a glass of bright green lime soda (I will not renew the experience). I visited the Mawson's Huts Replica Museum, inside which is recounted the incredible 1911-1914 Australasian Antarctic Expedition – the first expedition to Antarctica that was designed purely to advance scientific knowledge!

Grateful and delighted was how I felt throughout the 24th International Seaweed Symposium. Thanks to this symposium, I enhanced both my cultural and scientific knowledge and I was able to do proper networking. I consider this event a milestone in my PhD, and I thank the British Phycological Society for awarding me the travel bursary (#2022_BPS_0180) to help me fund this trip.



View of sea in front of Hobart in between the gigantic rocks from the top of Kunanyi.

24th International Seaweed Symposium in Hobart, Tasmania

Submitted by Sophie Corrigan

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I am a PhD student at the University of Exeter, the Marine Biological Association and Cefas and my work focuses on assessing the environmental impacts and potential habitat provided by seaweed farms in the UK. This February I was lucky enough to attend and present at the “24th International Seaweed Symposium” in Hobart, Tasmania, which was hosted by Prof. Catriona Hurd and Prof. Michael A. Borowitzka and held at the very impressive Hotel Grand Chancellor on the harbour front. The theme for the conference was ‘Seaweeds in a changing world’, which was fitting given the increasing effects of climate change we are experiencing globally and our increasing understanding of seaweeds and the developing usages for seaweed products.

I arrived in Hobart the day before the conference began, so I was fortunate to do some exploring of the beautiful city and get my bearings before the conference started. I headed straight to Salamanca Market, which takes place every Saturday morning and hosts local sellers with goods ranging from locally produced foods, to arts and crafts and clothing. I then headed to the Tasmanian Museum and Art Gallery, where I learnt more about the history of Tasmania, the hugely damaging effects of colonialism, and some of Tasmania’s beautiful natural history. I particularly liked learning about the water vessels that were made using dried bull kelp by Aboriginal peoples as a method to transport drinking water. These vessels were beautiful and ingenious and demonstrated one of the many ways humans have been using seaweeds to our advantage for hundreds of years.

The conference began on Sunday evening, with a welcome from Catriona Hurd and Prof. Michael A. Borowitzka, and some evening drinks so we could get familiar with the venue and meet some of the other attendees and delegates. The conference was attended by approximately 500 people in person and 300 people virtually, so it was a wonderful opportunity to meet with and learn from researchers from all over the world. The first day of talks started on Monday and covered themes ranging from kelp restoration projects, innovations in seaweed farming, and taxonomy, diversity and evolution of seaweeds. I presented a talk on the research from my PhD on Tuesday in the “Ecology” session. My talk was titled “Habitat provisioning by a UK seaweed farm” and covered some of the recent findings and publications from



my PhD, where I monitored the development and diversity of epibiont assemblages on sugar kelp (*Saccharina latissima*) from a farm in southwest UK and compared these assemblages to those found on wild kelps. The talk was well attended and received, and I had many interesting questions from the audience, which followed into discussions in the lunch break afterwards. This was the first international conference I had attended in person, so it was great to have such a positive and supportive experience.

On Wednesday, the organisers had scheduled a day off from the talks to allow us to experience more of Tasmania. Some colleagues and I took this opportunity to explore Maria Island for the day, where we went snorkelling to find some of the local seaweed species. We found a healthy kelp bed that was home to catsharks, groupers, beautiful anemones and nudibranchs in stunning clear waters. On land, we also saw more of Tasmania's incredible biodiversity including Cape Barron geese, pademelons, forester kangaroos, wallabies and wombats.

On Thursday and Friday, the conference resumed, and I attended particularly interesting and relevant talks on the potential biodiversity benefits of kelp farming in Australia. It was great to see parallels with my own research being conducted on the other side of the world, and I met and discussed this with the Australian researchers afterwards, gaining new insights and perspectives I had not considered before. On Thursday night, we also had the conference dinner, which was a nice opportunity to meet other researchers in a fun and more informal setting, followed by dancing to a live band afterwards, which was great fun. This was the perfect way to end the conference and I would like to thank the organisers for a wonderfully organised week. I would also like to thank the British Phycological Society for my graduate bursary (award number: 2022_BPS_0178) which enabled me to attend.

Young Alganeers Symposium, Faro 2023

Submitted by Katie Driver
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I'm a biology student currently in my 3rd year of an integrated master's course in Biology (MBiol) at the University of Oxford. Facilitated by the BPS's generous support I successfully applied to present my poster on the "Conservation of freshwater biodiversity under stress from intensive agriculture during a climate crisis" at this year's Young Alganeers Symposium in Faro, Portugal, hosted at the university of Algarve. On arrival in sunny Portugal I was surprised to be the only undergraduate attending the conference, so feeling suitably underqualified I got talking with some of the young algae researchers and my eyes were opened even wider to the incredible potential of algae for application in pharmaceuticals, carbon capture, agriculture, food and more.

I attended a wide range of talks covering topics from the difficulties of linking scientific research and industry to the use of random mutagenesis to develop more palatable and attractive algae for use in commercial foods. I even got to try my first algae cookie, an experience I would recommend highly. The area of the field of that



Photo of the circular economy slide developed during brainstorm session.

particularly sparked my interest was the potential of algae to promote and create a circular economy, with loops avoiding the typical linear approach of take, make and dispose. There were several sessions in which allocated working groups could work to solve a problem in their focus area and brainstorm innovative solutions which were presented in 10 minute presentation in the 3rd day to all other attendees. I chose the LCA (Life Cycle Assessment) and Circular Economy working group,

in which we explored the potential of algae to increase the circularity of Portugal's iconic Pastel de Nata production, with particular focus on eggs as a local commodity. Innovations such as supplementing chicken feed with spirulina algae, for higher protein and lipid content, whilst also using agricultural wastewater nutrients as a growth medium for the algae, were some of the solutions thought of to close the production loop.



Photos of algae in photobioreactors at Necton, image on right taken by Makeda Davis.



We also had the opportunity to visit the Green CoLab and Necton sites. A highlight for me was seeing the infamous algae bioreactors in action I'd learnt so much about during the conference, and additionally the set-up of a promising demo project at Necton. The set up included using CO₂ obtained via direct air capture to feed into growing algae cultures, whilst using agricultural wastewater to fertilise the algae, a real-life example of the solution from the working group session. Other interesting applications of the algae included the cleaning of swine wastewater. I believe an interesting next step would be to close the loop of using nutrient from other forms of waste such as sewage to be used safely as fertilisers for algae whilst simultaneously cleaning the water.

Lastly the poster session was an amazing opportunity for me to talk with many other young researchers, hearing about their journeys to get where they are now, gaining inspiration for my own hopefully pending career in research and academia. I attended with the intention of learning as much as I could about this new and exciting field, soaking up new inspiration like a sponge, and wasn't disappointed by the huge diversity of new research and the air of excitement among young researchers entering the field. I received some great feedback on my poster which I hope to integrate into my upcoming masters project investigating the interaction of multiple stressors on benthic community recruitment in intertidal systems.

I'd like to thank the British Phycological Society for awarding me a student bursary (2023_BPS_0215) providing me with the opportunity to attend such a unique and vibrant conference, and in such a beautiful setting. I'm excited for the future of algae research and the enormous potential this new field holds for solving so many of our world's problems.

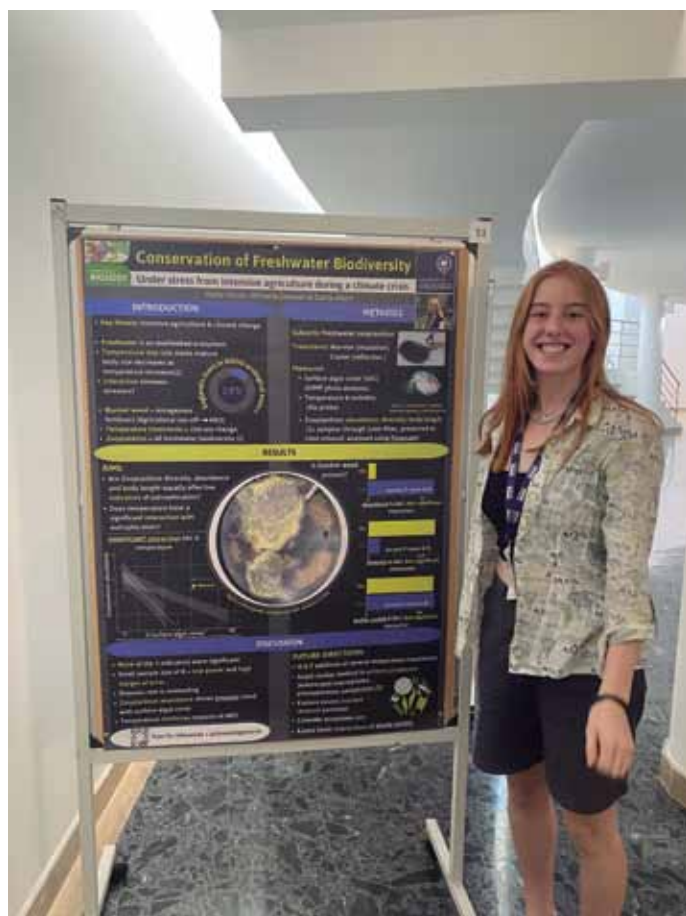


Photo taken by Christopher Pollard.



European Phycological Congress in Brest, France

Submitted by Cristina Galobart

Centre d'Estudis Avançats de Blanes (CEAB-CSIC), Blanes

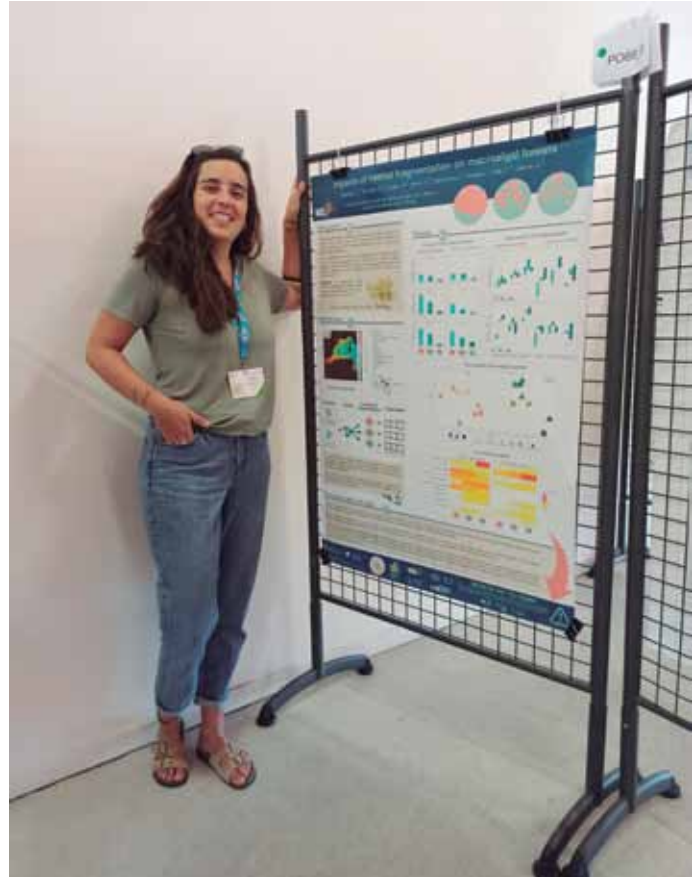
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On August 20th 2023, I flew to Brest (France) to attend my first European Phycological Congress (EPC8), organised by the Federation of European Phycological Societies council and the French Phycological Society. The following day kicked off with the opening ceremony, bringing together phycologists from around the world and giving way to five days of all sorts of talks, covering everything from algal taxonomy and ecology to the latest industrial advances.

For me, one of the highlights was presenting our preliminary results during the "Ecology of algal systems" symposium, with a poster presentation titled "*Impacts of habitat fragmentation on macroalgal forests*". This study is part of the COASTFRAG project (), which aims to understand how breaking up larger areas into smaller pieces, often before complete habitat loss, can modify marine macroalgal forests. I personally believe that poster sessions are a great place to meet fellow early career researchers in a friendly and tension-free atmosphere, so I really enjoyed the session. Moreover, the EPC8 gave me the chance to see again other PhD colleagues who I had not seen in a while.

Aside from science, we took advantage of the visit and rented a car to drive through nearby villages such as Porspoder and the beautiful headland Pointe Saint-Mathieu in Le Conquet. And, of course, we found a spot during low tide to enjoy the incredible Atlantic intertidal zone (something that always surprises us, the Mediterranean folks!). Thanks Jana and Luisa for those nice days. We are looking forward to the 9th EPC.

I would like to thank the BPS for their financial support (under the award number 2023_BPS_0223) and all other colleagues who contributed and continue contributing to this work.



Western Indian Ocean Marine Science Association 12th Scientific Symposium

Submitted by Sadock Rusekwa

Department of Botany, University of Dar es Salaam

The symposium was held at The Boardwalk Convention Centre, Nelson Mandela Bay, South Africa on 10th-15th October 2022. Therefore, I travelled from Kigoma on 7/10/2022 to Dar es Salaam, then on 8/10/2022 from Dar es Salaam to Nelson Mandela Bay, South Africa on 9/10/2022. Over 800 participants attended and 150 presented in online sessions. The cost for travel especially international travel from Dar es Salaam (Airport) to the Boardwalk Convention Centre were covered by WIOMSA, the rest of costs were covered by British Phycological Society under the BPS Awards for travel Ref: _2022_BPS_0156. I'd like to thank BPS for the help.

The main objective of this travel was to attend the Western Indian Ocean Marine Science Association (WIOMSA)

12TH SCIENTIFIC SYMPOSIUM. Different topics presented included: Covid-19 impact and responses, marine protected areas, mariculture (seaweed and tilapia farming), systematic spatial planning, source of knowledge, blue economy and challenges, climate change and variability, food security, safety and nutrition, coastal ecosystems and associated organisms. Under the theme of coastal ecosystems and associated organisms, I presented poster presentation on 13/10/2022 about *Characterization and distribution of native and non-native Eucheuma and Kappaphycus species collected in selected sites along the coast of Tanzania*.

From this scientific symposium I learnt a lot on how to prepare a good oral and poster presentation and the way



Tanzania team attending the symposium



During poster presentation.

to present different ideas correctly. We also learnt different uses for seaweed e.g the manufacture of bioplastics from seaweed species *Kappaphycus alvarezii* (Cottonii) and *Eucheuma denticulatum* (Spinosum). Apart from knowledge on seaweed we had discussion on the 'New Dawn' for the Western Indian Ocean Mangrove network. During the presentation of my poster, five minutes were provided for presentation, then questions were asked for clarification on

what was presented. Participation to this WIOMSA 12TH Scientific Symposium is essential to me to develop my career as a young researcher and a PhD student for the stage of data collection, manuscript and thesis development.



2023 ASLO Aquatic Sciences Meeting in Palma de Mallorca

Submitted by Daniela Sturm

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In June 2023 I travelled to the beautiful island of Mallorca to attend the ASLO Aquatic Sciences Meeting in Palma and to present the results from my PhD to a large audience.

This was the first conference I attended during my heavily pandemic-impacted PhD, and I was really looking

forward to meeting marine scientists working on a broad spectrum of disciplines. ASLO is one of the largest conferences for aquatic scientists with over 3000 attendees, more than a 100 sessions, and over 800 posters. This can be quite overwhelming and certainly requires a thorough study of the conference schedule prior to the event.

My favorite talk was the Plenary on the first day, held by Katherine McMahon, who is trying to improve predictions on the timing of cyanobacteria blooms in large north-American lakes. She found that the introduction of invasive species into the lake can substantially impact the onset of the blooms as well as change the type of toxins cyanobacteria can produce. I particularly love how applicable her research is to the local community.

During break times I would often go to speak to the conference exhibitors, where I met several interesting people who had developed or were promoting some of the equipment I had used in the field or in the lab. Savannah Judge was representing the company FlowCam which develop a fantastic "microscope", with which thousands of phyto – and zooplankton cells can be counted, measured, and identified. I was using the FlowCam on a research cruise during my PhD and could never stop staring at all the beautiful plankton images the equipment would generate. The other encounter that stuck in my





mind was with Dr. Todd Kana from Bay Instruments, who developed the PAM fluorimeter together with the company WALZ. There are several types of PAM fluorimeter, but the ones I have used in the lab can measure exceptionally low chlorophyll fluorescence values from natural phytoplankton populations, as well as measuring fluorescence for individual phytoplankton cells while identifying them with microscopy. It was fantastic to meet the person responsible for these inventions.

The slightly unfortunate part of my time at ASLO was that my presentation was taking place on the last day of the conference. I was therefore really pleased that many people attended my talk despite the late hour on the final day. Many people seemed very interested in my research, and I found that getting input on my methods from other researchers was very helpful and inspiring.

One of my favorite aspects of a conference is the ability to catch up with old friends and colleagues. I was thrilled to unexpectedly run into a good friend from my undergraduate studies, and to have regular breakfasts with a colleague from the beginning of my PhD, who introduced me to several other nanoplankton enthusiasts.

I really want to thank the British Phycological Society for their generous contribution to my travels through the student bursary #2023_BPS_0230. I would not have been able to attend this conference without their help.



ASLO conference in sunny Palma de Mallorca

Inge Elfferich

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At the beginning of June 2023, I travelled to the ASLO (Association for the Sciences of Limnology and Oceanography) conference in Palma de Mallorca (Spain), on a plane with lots of retired and/or partying Brits. When I arrived, I had to acclimatise to the hot weather first, but I quickly started to really like the city. The city centre is a labyrinth of small streets with cute houses and there are lots of amazing restaurants and bars. Tapas and paella were on the menu several times. There is a beautiful cathedral, which is well worth a visit.

The ASLO conference was in a brand-new building, right next to the beach. Apparently, this conference was the biggest that Mallorca ever hosted, with approximately 3000 attendees. The conference centre had many rooms, which sometimes made it hard to find the right presentation. Some of the rooms were really big and quite intimidating for the speakers.

I attended lots of interesting talks, ranging from cyanobacteria toxin production to citizen science with seagrass in Australia and robotics based on jellyfish movements. I met a few people at the conference who I knew from a long time ago, so it was great to catch-up again. Moreover, I finally met a lot of colleagues from GLEON (Global Lake Ecological Observatory Network). I've published a collaborative paper with some of them, but this was the first opportunity to meet up in real-life.

I presented a poster on the influence of nutrient ratios on a realistic phytoplankton community and its taste and odour production.

I did this experimental work last year and I was hoping to get some feedback on the preliminary results and findings. The poster sessions were very hectic and way too short, but I managed to get some good feedback. It was also very useful for me to visit other posters, because of my broad interests that were not necessarily related to what I presented on my poster this time.

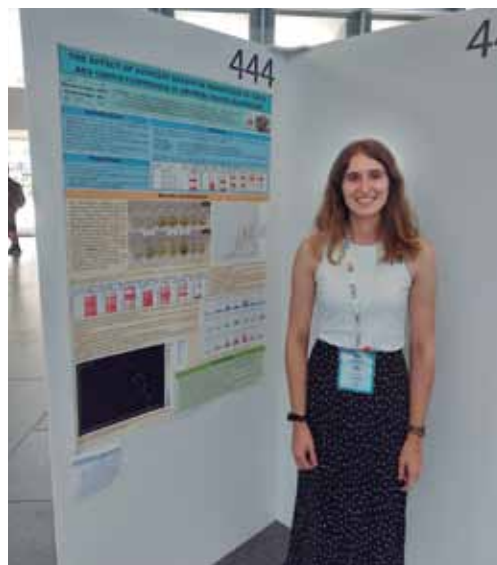
I made lots of amazing new contacts and discussed many different aspects of science. It was especially exciting to hear from a PhD student from The State University of New York that she also works on benthic cyanobacteria. Moreover, it was great to hear that in Germany at the UFZ (Helmholtz-Zentrum für Umweltforschung) they are using high resolution in situ monitoring of nutrients in shallow lakes. This is another part of my PhD that I work on extensively, so it was great to hear about this project.

Another interesting thing I spoke about with fellow researchers, was different types of creative outreach that can be done with science. For example, someone mentioned that, for an exhibition in Berlin in 2018, a local artist filled big tanks with water and introduced different coloured lights to it. Not only did it look very nice, it was also some kind of growth experiment, linking science with art. It reminded me of a sculpture of a giant water beetle, with a soundscape responding to the environment, which was placed in a pond on the campus of Wageningen University, where I studied. This artwork was created as a collaboration between a Danish sculptor and prof. dr. Marten Scheffer; who received the Spinoza Prize in 2009 for his research on tipping points in complex systems. His work started on aquatic ecosystems, especially shallow lakes that shift from macrophyte to cyanobacteria dominated state, and its related hysteresis effect.



They created this artwork together, to make students more aware of aquatic life and the effect the environment has on them.

The ASLO conference gave me a lot of food for thought and I've met so many interesting scientists from all over the world. I wholeheartedly thank the British Phycological Society for the travel funding (award number 2023_BPS_0214), so that I could take part in my first in-person conference.



Surviving and thriving at the 'Survivors Guide to Stable Isotope Ecology' training course

Emma A. Ward

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I was recently able to attend a specialist training course, hosted by the Exedra Mediterranean Center, the aptly named 'Survivors Guide to Stable Isotope Ecology'. My attendance was possible due to the fantastic support of the British Phycology Society via their student bursary scheme (Award number: 2022_BPS_0184). It was an intense but fun week, where we covered a broad range of applications for stable isotope analysis within ecology, ranging from the marine to terrestrial realm and also its application in paleoecology. I was interested in attending the course to gain a better understanding of how to integrate isotope ecology into my current PhD thesis.

In particular, I have a keen interest in how algal communities (macroalgal and epiphytic) influence the carbon sequestration capacity of intertidal seagrass habitat, mixed in situ amongst seagrass and adjacent, which may contribute to seagrass carbon stocks from an allochthonous perspective. The course itself covered a broad range of applications within the isotope ecology field, and in fact I believe I came away from this experience with far more knowledge of the field and technique than I could have anticipated.

A day in the life of a 'survivor' consisted of various lecturers and R data workshops given from across the instructor



Figure 1. A snapshot from some of our initial lectures on 'What are isotopes?' and 'Terrestrial $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ Baselines'. (Photos by Lucy Goodwin).

team which included; Dr Chris Harrod, Dr Tamsin O’Connel, Dr Alexia Massas-Gallucci, Dr Seth Newsome, Dr Sarah Magozzi, Dr Jose Canseco and Dr Clive Trueman. In this way we learnt the concepts behind isotope ecology applications, whilst also getting to grapple with the analysis of isotope data. We also had a rather more practical session on sample preparation, including several fish dissections. Further to this we had guest speakers; Dr Maura Pellegrini from Fisher Scientific on the latest developments in Mass Spectrometry and Prof. Christian Mulder on the perhaps sometimes overlooked food web within soil and its relation to soil nutrient retention. Outside of these talks and practical session we had the chance to explore the Island of Ortiga and further afield in Sicily with visits to the Saline di Prolo Nature Reserve to glimpse flamingos and hear about the reserve management plan for invasive Acacia trees, as well as a visit to the Plemmirio Marine Reserve Centre to hear from the director about the implementation and success of this marine protected area in Sicily.

The course finished with student presentations, a chance for each of us to showcase our own research and how we’d like to apply what we’ve learnt during the week at the Survivor’s Guide to Isotope Ecology Course to our research

context. The breadth of student projects ranged as much as the course itself, from archaeological findings to exploration of extant habitats both tropical and temperate, which ranged from those focused on the vegetative aspects of a habitat (like myself) to those focused on larger animals such as fish, reindeer and polar bears. It was a great opportunity to present my ongoing PhD work on the carbon storage capacity of UK intertidal seagrass and discuss how I would like to integrate stable isotope analysis into my work. Without a doubt, we survived the course and moreover thrived in such an engaging environment. I walk away with an abundance of new knowledge, but also a community to continue to engage with. Therefore, I would thoroughly recommend that any PhD student considering using the analysis of stable isotopes within their thesis consider attending this course. As such, I would again like to take the opportunity to thank the British Phycology Society whose financial support made my attendance possible. I believe this field course has been invaluable in improving my understanding of the use of stable isotopes, and as such will directly enhance my PhD thesis write up.



Figure 2. The invasive Acaia trees growing within Saline di Prolo Nature Reserve (left). Plemmirio Marine Reserve Director, Cartarrasa, showing us around the reserve’s education area.



Figure 3. Presenting my current PhD work ‘Assessing the capacity of intertidal seagrass meadows for blue carbon sequestration (left) (Photo by Alexandra Langwieder); The students and instructors from SGSIE aka ‘The survivors!’ (right) (Photo by Alexia M-G).

Elizabeth Hill (1758 - 1843)

Submitted by David C. Rayment, FLS

Editor's note: Mr. David Rayment has sent several histories of British female phycologists for potential inclusion in The Phycologist. They are detailed descriptions of their life and work, written in a style that takes you into their time in history with studious detail. I will include these in The Phycologist when appropriate. I asked Mr. Rayment, what brought him to this particular subject? He said it all started with a tour of the Cryptogamic Herbarium at the Natural His-

tory Museum given by Jenny Bryant which included a specimen collect by Mrs. Mary Wyatt in the nineteenth century. Little was known about Mary Wyatt so Mr. Rayment decided it an interesting project to find out; which he did (see the Autumn, 2007 edition of The Phycologist). He has since researched several other early phycologists who were oftentimes simply mentioned as a name and place in most records of the time. I hope you enjoy these articles from Mr. Ray-

ment as much as I have and begin to recognise a much fuller picture of the long-standing and significant contributions of women to the phycological catalogue in Britain and beyond.

Nothing of note has ever been written about the phycologist, Elizabeth Hill, of Pilton in Devon, apart from a few lines acknowledging her specimen contributions to others. Her year of death is sometimes misleadingly written as 1850, even though William Henry Harvey (1811-1866) refers to Elizabeth as the "late Miss Hill" in *A Manual of British Algae* which was published in 1849. The purpose of this article, therefore, is to introduce Miss Hill to the reader for the first time; to briefly celebrate her achievements in several areas of Natural History collecting; to take a brief look at her family's association with the family of another phycologist, Amelia Warren Griffiths; and to hopefully give a little insight into the character of a lady who must surely be regarded as a pioneer among women seaweed collectors.

We begin on the south bank of the river Taw, within the neighbourhood of Barnstaple in the county of Devon, where there sits the parish of Fremington. The manor there, in days of old, was held by John Sloley. On his death the manor and advowson were inherited by his daughter, Thomazin, who was married to Richard Hawkins. On Richard's death the manor was sold, but the advowson, being independent of the manor, remained in the Hawkins family and on the death of Dorothy Hawkins, it was

bequeathed to the Reverend Charles Hill junior who was the rector of Tawstock. He had previously assisted his father, Reverend Charles Hill senior, who was the rector at Fremington.

Fremington is a short distance from the parish of Pilton where there lived for several generations the Rogers family from which the phycologist Amelia Warren Griffiths (1768-1858) was descended.

On September 29, 1756, at nearby Tawstock, the Reverend Charles Hill junior married by license, Elizabeth Kingwell. The witnesses were John Rogers and Elizabeth Rogers. Nearly two years later, on July 30, 1758, Mrs Elizabeth Hill gave birth to a daughter. She was named after her mother and baptized on September 6 at Tawstock. The newborn Elizabeth Hill was to make a name for herself in the world of Natural History collecting, perhaps assisted by her father's connections. Charles Hill junior was at one time appointed to be the domestic chaplain to Sir Thomas Sewell, Master of the Roles. He was later domestic chaplain to Thomas James (1752-1822), 7th Viscount Bulkeley. Thomas Sewell's second wife was Mary Elizabeth Sibthorpe. She was the daughter of Humphrey Sibthorpe (1713-1797), a Sherardian Professor of Botany in Oxford, as was his son John Sibthorpe (1758-1796), who was

born in the same year as Elizabeth. Humphrey Sibthorpe's second wife, however, was the daughter of John Gibbs, a London merchant who held the manor and advowson at Instow which is west of Tawstock and by the east bank of the river Torridge, near where it meets the Taw. Elizabeth's brother, another Reverend Charles Hill, and the eldest son of her parents, was the rector. On July 2, 1782, Charles was presented to the vicarage at Trentishoe by Emily Rogers, the mother of Amelia Warren Griffiths. In addition to his duties at Trentishoe, Charles continued at Instow, where he died in 1822. He is buried at Tawstock.

On Charles' death he was succeeded by his and Elizabeth's nephew, the Reverend William Charles Hill, who was the son of their brother, William Hill. William Charles Hill was presented to Trentishoe by Amelia Warren Griffiths and her sister Mary Studdy (1769-1824), both of whom had inherited the advowson on the death of their parents. Mary was accompanied by her husband, the merchant Henry Studdy of Watton Court, whom she had married at Otterton in 1788. Elizabeth had visited the home of Amelia's sister at Watton, as is evidenced by the notes of Dr William Turton (1762-1835) on *Bulimus decollates* which was published in *The Zoological Journal*, Volume 2 (1826):

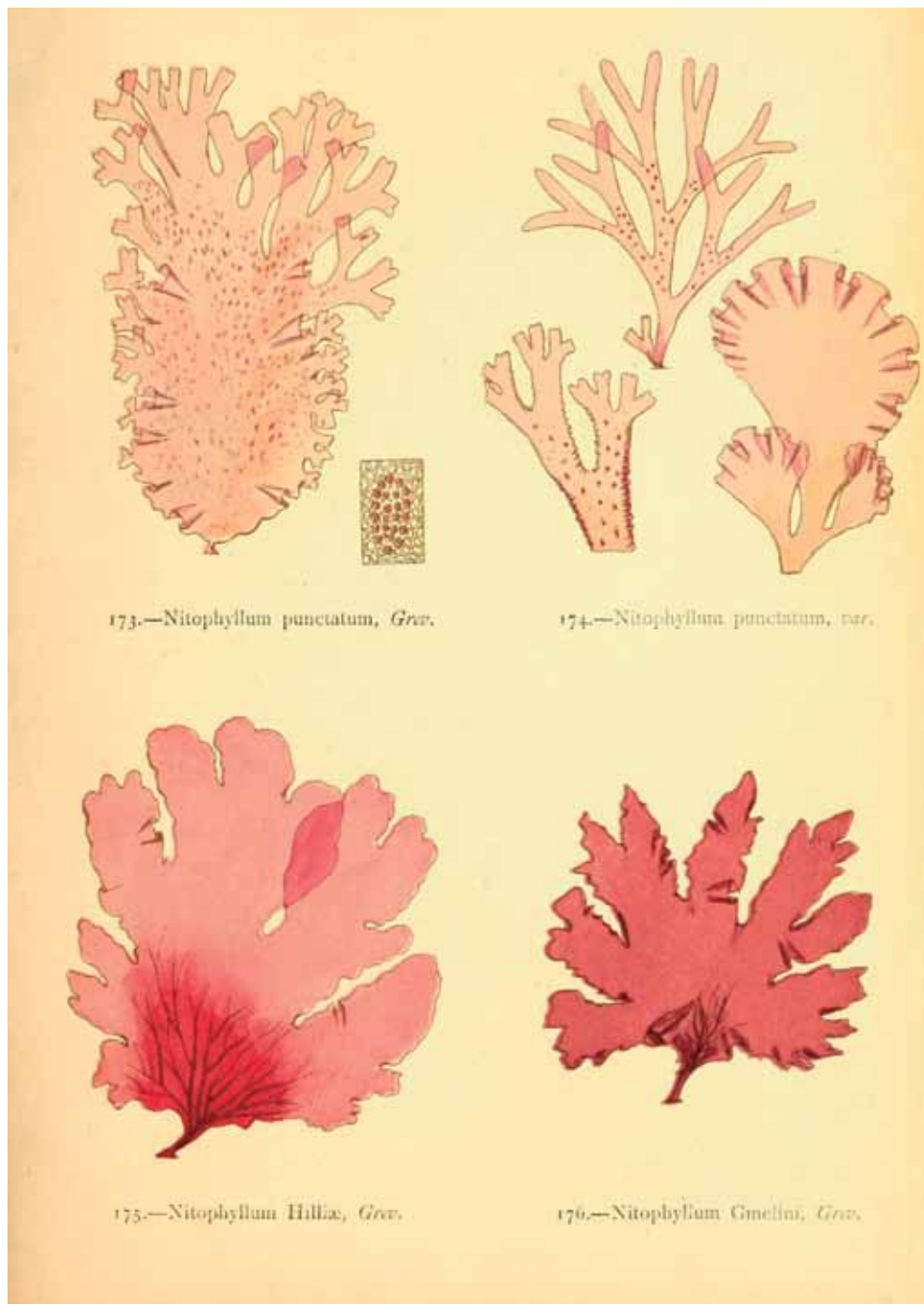


Image of *Nitophyllum hilliae* (bottom left) in British sea-weeds: drawn from Professor Harvey's "Phycologia Britannica" v.2 London: Bell and Daldy, <https://biodiversitylibrary.org/page/44218594>, included by editor.

"*Bulimus decollatus* was observed to breed in great abundance for many successive years, in the green house at Watton, in the south of Devon, the seat of H Studly, Esq. lodged in the earth, under the wood-work, whence they wondered abroad in the summer. This wood-work, and the earth, were removed and replaced with stone, by which the colony was lost, and all that were preserved we owe

to the care of Mrs Griffith and Miss Hill".

William Charles Hill, however, for whatever reason, resigned the living at Instow in 1824 and he was succeeded by Charles Griffiths, the son of Amelia Warren Griffiths. Charles Griffiths, now the rector at Tren-tishoe, had been a curate there from 1823. In 1873 the church at Tren-

tishoe was restored largely at the expense of Amelia's daughter, Caroline Mary Griffiths, the lady of the manor, who lived at Rhydel Bank.

In 1829, however, William Charles Hill, by his own petition as patron, became the rector of Fremington on the death of the previous incumbent. He also held the curacy of Buckland Brewer, south of Bideford, from 1821

to 1828. On June 25, 1833 at Melksham in Wiltshire, William Charles Hill married his cousin, Frances Erwing Hill, who was Elizabeth's favourite niece. She was the daughter of John Hill, by his first wife, Frances (Erwing), whom John married at St. Stephen, Exeter on April 27, 1785. John was a surgeon and a member of the Royal College of Physicians. He was also the author of *The Means of Reforming the Morals of the Poor by Preventing Poverty* (1801). John died in 1807 at the age of 47 and is buried at Tawstock.

Elizabeth, however, had spent most of her early years with her parents at Tawstock, but we learn from her will that she had at some time returned from Exeter School before which she was presented with a gift from her mother, so it would appear she had a formal education and her 'return' perhaps indicates a stay at a boarding school. It is not known who or what inspired her interest in the natural world. Exeter school may have sown the seeds of interest, or perhaps they were always there, ready to germinate, fertilised by the encouragement of Dr Sibthorpe; but it was not only botany she was interested in, for she sent insect specimens to Thomas Marsham (1748-1819) and is acknowledged in his *Entomologia Britannica* published in 1802: "Postremas, at non minimas gratias habeo Dominae Hill, ex Tawstock in agro Devonienſi, foemina, ſexus ſui ornamēto" which translates: "Last, but not least, I owe thanks to Miss Hill, of Tawstock in the Devonshire countryside, a woman who is an ornament of her sex", a comment which nowadays may be viewed as a little patronising.

By 1804 Elizabeth, having already built herself a good reputation as an entomologist, began her study of algae, as is evidenced by a letter from Samuel Goodenough (1743-1827) which he wrote to Sir James Edward Smith (1759-1828) on April 1, 1804. The letter is published in the *Memoir and Correspondence of the late Sir James Edward Smith*, edited by

his widow, Lady Pleasance Smith, in 1831. Goodenough writes: "An acquaintance of mine, whom you formerly saw at my house, a good entomologist, and a friend of Dr Sibthorpe's, Miss Hill, has lately turned her very acute mind to the study of marine plants. I have encouraged her to proceed, and I think she will produce some valuable observations". Proceed she did. Elizabeth went on to collect algae specimens at Plymouth, Padstow, Ilfracombe, an unknown place near Southampton, and at Saunton Sands near Braunton. In *Algae Britannicae* (1831), Robert Kaye Greville (1794-1866) writes: "In my Cryptogamic Flora I have dedicated this plant to its discoverer, Miss Hill of Plymouth, a lady who for many years devoted much time and acute observation to the study and collecting of our marine algae" - *Nitophyllum Hilliae*.

Another interest of Elizabeth's was fossilised shells. A piece published in *The Philosophical Magazine and Journal* (1815) states she had forwarded eleven fossilised shells to James Sowerby (1757-1822).

James Sowerby himself mentions Elizabeth when referring to *Cardium hillanum*, in *Mineral Conchology of Great Britain* (1812): "A remarkable elegant species, with fine specimens, of which I have been favoured by Miss E Hill, of Tawstock, a Lady well known for her great attention to Fuci, &c. who desirous of seeing everything figured from as good specimens as possible, presented me with her very best. Finding Mr Parkinson at a loss for a name, and that the shell was sufficiently distinct from *Cardium discors* of Lamarck, I call it *Hillanum* thinking Miss Hill's attention and assiduity highly deserves to be remembered".

Sowerby also mentions her in *A short Catalogue of British Minerals According to a New Arrangement* (1811) with reference to Hydragarlitte, found near Barnstaple by Dr William Wavell (1750-1829) after whom the mineral Wavellite was named.

Sowerby notes that Miss Hill of Tawstock says her brother (the aforementioned John Hill) "discovered this substance before Dr Wavell went into Devonshire, and sometime before the year 1785". It would therefore appear that at least one of Elizabeth's brothers had an interest in the natural world, but not, one would guess, to the same extent as Elizabeth.

Elizabeth, however, does not appear to have collected specimens of any kind after 1830, but she was then in her early seventies. In 1841, having exceeded the age of eighty, Elizabeth is recorded on the census return as living at Pilton with her two servants, Hannah Tanner (age 70) and Frances Tanner (age 25).

Hannah Tanner is mentioned in Elizabeth's will where she is said to be a long and faithful servant. The will was first drawn on June 24, 1804. Elizabeth was in good health, but wrote her will with life's uncertainties in mind. Two codicils followed, on 10 May 1812 and 21 April 1828, so she appears to have been a lady who thought ahead and liked to keep her personal affairs in order.

Elizabeth died at Pilton on 18 August 1843. The death certificate shows she was a spinster who died of old age (85) and the signature of the informant is the mark of Susanna Sanders who was present at the death. A short obituary appeared in the *North Devon Journal* of August 24 where she is referred to as Mrs Hill: "On Friday 18th at Pilton, in the 86th year of her age, highly esteemed and respected, Mrs Elizabeth Hill, daughter of the Reverend Charles Hill, for many years rector of Tawstock in this county, remarkable for her love of science, proficiency in several branches of Natural History, and particularly for some valuable additions to English botany".

In her will Elizabeth bequeathed to William Charles Hill a large picture of their father and a morning ring which contained a piece of their father's hair. William was also be-

queathed her collection of fossils and minerals, except for the polished specimens contained in the shell cabinet. The shell cabinet was bequeathed to Frances who, since the “death of her excellent mother”, Elizabeth had treated as her own daughter. Elizabeth was buried at Fremington on 22 August 1843, where her nephew was now the rector, and where her grandfather, the Reverend Charles Hill senior, is also buried.

In summary, Elizabeth Hill, who was born on 30 July 1758 and died on 18 August 1843, achieved much in the field of Phycology, Entomology and Conchology through her undoubted enthusiasm for those subjects and the energy she must have applied in pursuit of her specimen collections. Her approach was an unselfish one, sending some of her best specimens to others in order to assist the growth of scientific knowledge. In Phycology she will be forever remembered for having the species *Nitophyllum hilliae* named after her.

N.B. Elizabeth Hill’s will is filed in the Prerogative Court of Canterbury. It was proved on November 7, 1846, so will not be found under the year of her death. Reference: PROB 11. Piece 2045. Vol 17. Quire 801. Year 1846.

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