

The Phycologist

The Newsletter of the British Phycological Society

Editor: Dr Amanda Burson

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69th Annual Meeting
Registration

Hilda Canter-Lund
winners

Seaweeds increasing
range

Number 99- Autumn 2020

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British Phycological Society
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It is time to start registering for BPS annual meeting number 69, hosted online by the University of Nottingham! Check the announcement in this issue for further details on registration. I've also started what I hope will be a re-occurring segment called "Phycologists in the Spotlight" where we highlight the contributions to the field of phycology from individuals who may be normally overlooked in the annals of scientific history. This issue features a piece about Dr Margery Knight. While the BPS has a foundational legacy of female researchers (see: tribute to Linda Irvine), which I'm sure will continue, I especially welcome articles featuring the scientific contributions of under-represented phycologists such as individuals from black and minority ethnic groups. These can be past or present and aim to show-case the diversity of contributors in the science of phycology, so please put your ideas forward! We also have some contributions reporting on current fieldwork in phycology, which should peak everyone's interests! Hope to see you all, virtually, at the Nottingham meeting!

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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Annual Meeting Announcement

The 69th Annual British Phycological Society Meeting will be hosted online by the University of Nottingham from the 4th-8th of January, 2021. This will feature a joint session with Protistology-UK.

Registration is free for BPS and Protistology-UK members and abstracts for posters and oral presentations are currently being accepted. The Manton prize for student presentations and posters is going ahead so students please submit! The final day for abstract submission is Friday the 13th of November and the final day for general registration is Tuesday the 15th of December. There will be several new activities to engage with in this online format!

For early career researchers: *Ahead of the meeting, we're teaming up with infohackit to offer 20 places to ECRs on their online training programme. You will develop an infographic that can be used to publicise your oral or poster presentation. Space is limited and this occurs prior to the general meeting so sign up soon!*

For all participants: *'Phyco-thon' session showcasing images taken by Foldscopes provided to first 200 registrants and 'scientific break-off chats' with participants sharing common research interests to encourage networking.*

There will also be four special sessions to participate in:

1. Applied Phycology
2. Phycology in palaeoenvironmental research: insights into the past
3. Algae in the cold
4. Protist parasites of freshwater microalgae (Protistology UK-BPS joint session)



On top of this there is a new outdoor photograph exhibition entitled *The hidden world of algae* which can be toured in person in Highfields Park at the University of Nottingham and virtually online during the conference. Images will include a collection of Hilda Canter-Lund winners from the past!

Go to brphycsoc.org/meetings for links to the conference website and be sure to use #BPS2021 in your social media coverage at the meeting!

For queries, please email conference organisers at BPS2021@nottingham.ac.uk

Call for nominations for membership of BPS Council

In accordance with our constitution (<https://brphycsoc.org/constitution/>), Council positions are open for nominations with successful candidates taking up office after the AGM in Nottingham in January 2021:

Following the resignation of Dr Maeve Edwards from the position of Treasurer in 2020, Dr Nicky Slee was co-opted by Council at the summer Council meeting on Thursday 9th July 2020 to act as Acting Treasurer until the AGM in January 2021, when there will be an election for Treasurer.

Dr Nicky Slee has expressed her willingness to stand, but if any other member would wish to be considered, they are encouraged to contact the President, Professor Jason Hall-Spencer.

The following council positions are therefore now open for nominations:

Treasurer (2021-2023) a three-year post ending at the AGM of January 2024 with option to re-stand after this period – 1 vacancy.

Ordinary member of Council (2021-2023) a three-year post ending at the AGM of January 2024 - 3 vacancies

Being an Ordinary member of Council 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 Jason Hall-Spencer, jason.hall-spencer@plymouth.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 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 5th 2020** (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 Nottinghamshire on Tuesday January 5th, 2021.

Phycologists in the spotlight

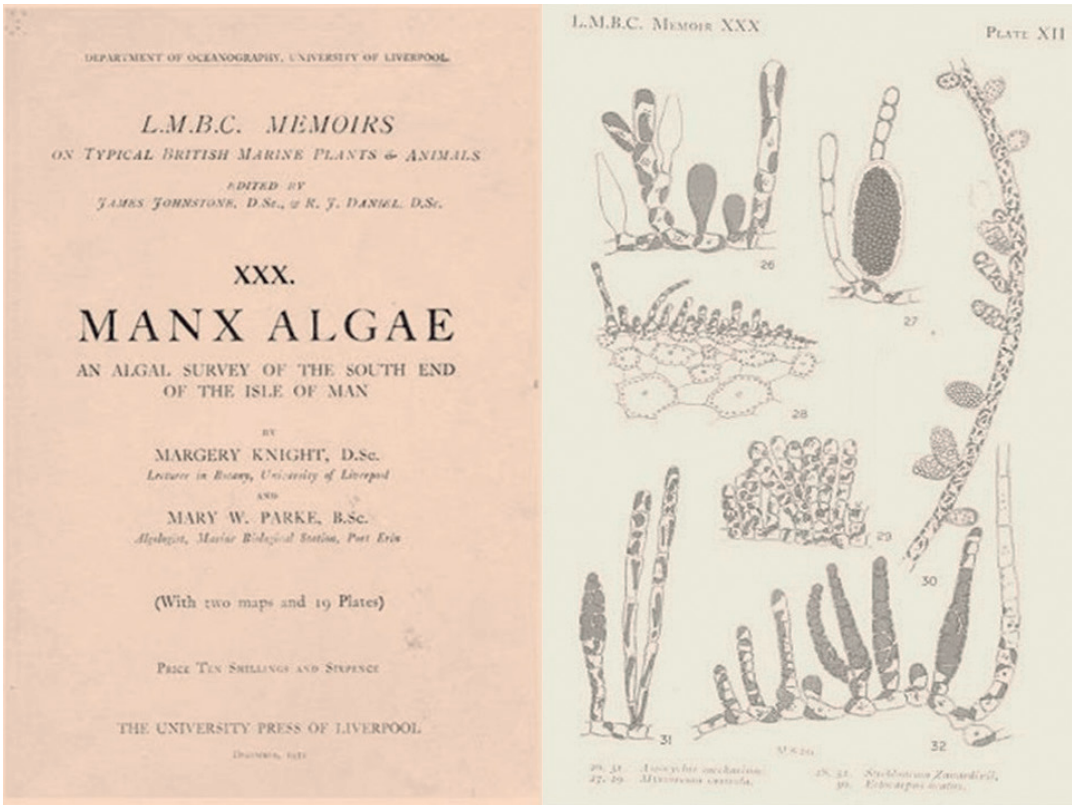


Figure 1: KNIGHT, M. & PARKE, M. (1931) Manx Algae; an algal survey of the south end of the Isle of Man; ©Liverpool University Press and by courtesy of. Artist initials on the botanical illustration read M.K.

Dr Margery Knight 1889 - 1973

Submitted by Louise Ashcroft

A woman of influence whose world straddled the scientific and artistic, this is Margery Knight remembered: Phycologist, botany lecturer, painter, and a life study in the art of resilience.

In 1931, Manx Algae was published. Co-written by Margery Knight and her protégée, Mary Parke, it is both a major study of local seaweeds and an excellent essay on the biology of *Fucus*. It became a classic work of reference that is still of value today.

Knight the esteemed phycologist (Fig. 1) was not my entry point into her world. My first experience of her was via five of her landscape paintings held in the collection of the Victoria Gallery and Museum, University of Liverpool (VG&M). Each landscape inviting you to stop and stare, like Black Rocks Bay (Fig. 2).



I came across Knight because I was commissioned by the VG&M to create an audio-visual experience of Knight's paintings using film, song and poetry entitled, Time was away and somewhere else. As I set about my research, I discovered that there isn't a wealth of biographical evidence. In this respect, Knight is similar to the composer, Franz Schubert; you have to find her in her work.

Beginnings

Born on 5 March 1889 in Accrington, Lancashire, and educated at the Brighthelmstone School in Birkdale, Southport, Knight showed an early interest and talent in art. Aged thirteen, Knight had to choose between science and the classics. In an interview with the Liverpool Daily Post in 1943, she confesses to choosing science because she did not like the Latin mistress's nose. Despite this haphazard start, Knight went on to attend the University of Liverpool, graduating with a BSc in 1911. She took up the post of botany lecturer at the University from 1912 until her retirement in 1954.

Figure 2. Black Rocks Bay, Margery Knight, oil on board, date unknown. ©The Artist's Estate, courtesy of VG&M.



Figure 3. Dr Knight and her students in August 1942 (A301/2/120) Courtesy of the University of Liverpool Library.

Phycologist

Knight's research base was at the Port Erin Marine Laboratory on the Isle of Man. Although Catherine Herdman had previously carried out her pioneering studies on sand-dwelling dinoflagellates, it was Knight and Parke who led the inauguration of the phycological tradition at the laboratory. Knight and her students (fig. 3) were a familiar sight in Port Erin as they scrambled over rocks in pursuit of seaweed, even after Knight lost her leg in a tragic car accident in 1936.

In the interwar years (1918 – 1939) and the post-war years (1945 – 1960s), there was a surge in phycology research of which the University of Liverpool was at the forefront. Knight's work on chromosome numbers and life histories of algae inspired and directed a group of pioneering female algologists who would come to dominate and shape the field of phycology in post-war Britain. Doctoral students like Mary Parke, Elsie May Burrows and Helen Blackler, founding members of the British Phycology Society.

During World War II, valuable research was undertaken at the Port Erin Marine Laboratory investigating the exploitation of marine resources. This research was mainly conducted by female scientists with much work being carried out on agar-agar substitutes following Japan's entry into the war affecting world supply. Knight was involved in this research and organised field trips

to Port Erin with nine female students to ascertain how quickly seaweed grew. This caught the imagination of the local press. In 1943, the Liverpool Evening Express wrote:

“As some of the seaweed grew beneath the sea, the students turned into mermaids, and dived to submerged rocks to tie on labels.”

Academic life

At the University of Liverpool, Knight built and directed a community of learners and fostered the exchange of ideas. She was considered as one of the University's elder stateswomen and was a warden of Rankin Hall and University Hall. Alongside her scientific contributions, she was also known for her generosity; supporting many students in hardship from her own personal funds. When on the Isle of Man, she leaned into local life. Manx newspapers from the 1930s to the 1950s give a sense of her lively intelligence and sociability with reports on her scientific talks and her opening of local events.

Figure 4. Coastal View with Cottage, Margery Knight, oil on board, date unknown. ©The Artist's Estate, courtesy of VG&M.



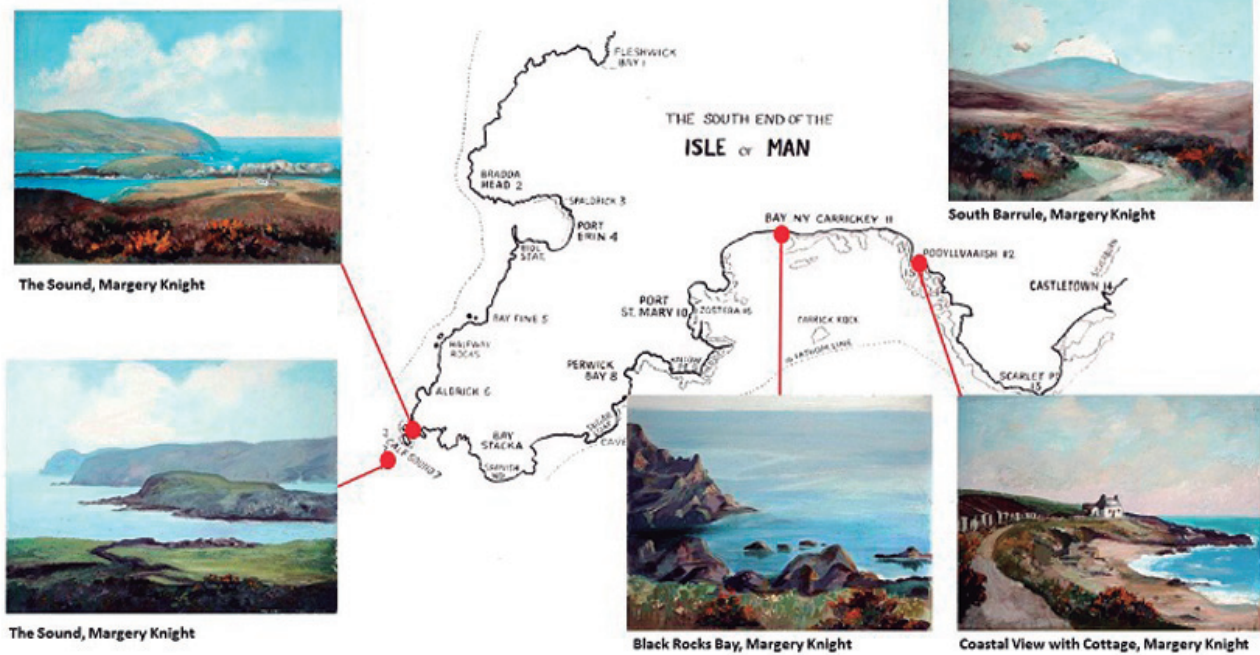


Figure 5. Research document from *Time was away and somewhere else*, Louise Ashcroft, mixed media (2020). Map II from *Manx Algae*; Knight & Parke (1931) ©Liverpool University Press, superimposed with Knight's paintings in the VG&M Collection ©The Artist's Estate. By courtesy of VG&M. Locations are best estimates.

Artist

This sense of leaning into community continued into her retirement. Knight retired to the Isle of Man in 1954 to the cottage, Shee-dy-vea, in Darragh, Port Erin. From this point, she made the Isle of Man her home, producing souvenirs of Manx cats in pottery and concentrating on her art.

The VG&M were bequeathed five of Knight's landscapes in 2003 by Knight's companion, Miss Rose McKenna. As is evident in *Coastal View with Cottage* (Fig. 4), Knight's painting style emerged from the clear and accurate style of her earlier botanical illustrations.

Knight's paintings in the VG&M collection capture some of the natural wonders of the Isle of Man, like the Sound and South Barrule. Each landscape is picture postcard perfect, but before we start writing the words, 'wish you were here', let's return to where we began, with Manx Algae. At the back of the book is Map II, a treasure map of sorts indicating the best locations to study seaweed. Hold Map II against the paintings in the VG&M collection - and it's a match (Fig. 5).

A highly interpretative approach has been taken with the landscape, South Barrule, the highest hill in the south of the island. Whilst not a location listed on Knight and Parke's map, it offers a bird's eye view of them. For from its summit on a clear day, the south end of the Isle of Man stretches out below you like a map. Knight's paintings in the VG&M collection might be picture postcard perfect, but beneath the surface they serve as shadow boxes, capturing the sacred spaces where Knight communed with her thoughts and ideas.

Inner landscape

Knight lived in a time when the concept of 'gracious living' was a reality. NA Burge (University of Ulster) observed that Knight did not have time for self-pity, embracing:

"not only the material things of life but manners, thoughts and actions. All who entered her thrall were immediately aware of this."

This sense of her formidable presence is captured further in an interview with the *Liverpool Daily Post* when Knight, with a wry diplomacy, responds to those who hold the opinion that botany is a ladylike subject. In 1944, Knight delivers a prize day speech to the Girls' High School, Isle of Man. She talks about gratitude and awareness and offers a tool of resilience. Form an art gallery of mental pictures and fill it with "the amusing incidents of your life". When life gets tough - visit the art gallery.

Present day

It's possible to draw a line between this prize day speech and the VG&M piece, *Time was away and somewhere else* (2020). Answering the call to adventure of Map II in *Manx Algae*, the audience picks up the trail and steps into Knight's paintings. Created to connect to the VG&M community during lockdown, the experience soothes and inspires. At 0:29, time converges and we find Knight in her work (Fig. 6). She looks back at us through her painting, *Black Rocks Bay*, united as artist, phycologist, lecturer. On the 4 April 1973, Knight died on the Isle of Man. Her cottage has become a holiday home. The world has changed. Her scientific legacy and story continue to inspire.



Figure 6. Two stills taken from *Time was away and somewhere else*, Louise Ashcroft, mixed media, (2020), ©VG&M and by courtesy of .

Publications and art work include:

1. Knight, M. *Earth Environ. Sci. Trans. R. Soc. Edinb.* 53, 343-360 (1924).
2. Knight, M. *Earth Environ. Sci. Trans. R. Soc. Edinb.* 56, 307-332 (1930).
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4. Bruce et al. *J. Mar. Biol. Ass. U.K.* 24, 337-374 (1940).
5. Knight, M. & Parke, M. *J. Mar. Biol. Ass. U.K.* 29, 439-515 (1950).
6. Margery Knight's Gallery; ArtUK: <https://artuk.org/discover/artists/knight-margery-18891973>
7. VG&M audio-visual work, *Time was away and somewhere else*: <https://youtu.be/gzFx2mg6Aac>

About the author

Louise Ashcroft is a singer, actor, and writer. Born in Liverpool, brought up on the Isle of Man, algae and song have naturally occurred in her body of work, twice.

PhycoMExUK

Finding solutions to the *Sargassum* crisis in the Caribbean

Professor Mike Allen^{1,3}, Professor Chris Chuck², Dr Sophie Parsons², Dr Eleni Karamerou², Ed Jones², Professor Julio Enrique Valencia Suárez⁴, Dr Leopoldo Herrera Rodriguez⁵, Amy Pilsbury¹

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The Caribbean experiences a huge annual influx of free-floating seaweed, which decimates local shorelines every summer. Since 2011, a huge raft of oceanic *Sargassum* has branched off annually from the aptly named 'Sargasso Sea', a region of the Atlantic Ocean where currents meet. Named the Great Atlantic Sargassum Belt (GASB), the raft is over 8500km long, stretching from Mexico to the west coast of Africa, and is made of over 20 million tons of biomass. The vast increase in growth is fuelled by run-off from agricultural land in North America and the Amazon basin, as well as seasonal upwellings from Africa, bringing nutrients to the area (1).

Sargassum is a genus of brown seaweed, known for its planktonic species. It can be identified by small bladders which help it to remain afloat. At sea, the seaweed mats provide havens for multiple marine species and create strong oceanic ecosystems. The Sargasso Sea itself is a recognised ecological treasure trove. However, once washed ashore in excessive amounts, the associated seaweed can cause havoc for coral reefs and turtle nesting sites, as well as the added long-term impact on the tourism industry which decreases in affected areas due to the displeasing aesthetics and problems associated with a surplus of rotting seaweed. In 2018, there was an estimated

3.5 billion USD loss due to the lack of tourists visiting Mexico alone, not to mention the millions of dollars spent each year in collecting and removing the seaweed from the beach. The need for solutions to this problem is becoming ever more evident.

PhycoMExUK established a group of researchers from universities, scientific organisations and industrial partners in both the UK and Mexico who have teamed up to tackle the crisis using innovative processing. Hydrothermal liquefaction (HTL) is a thermochemical depolymerisation process conducted in an enclosed reactor which uses moderate temperatures (180–370°C) and high pressures (100-250 bar)



MExUK



to convert wet biomass into a biocrude oil, an aqueous fraction containing nutrients and a solid char. Hydrothermal processing poses an attractive prospect due to its ability to process wet biomass thus removing the need for expensive washing and drying procedures (2). HTL has the capacity to deal with seaweed contaminated by plastics, heavy metals and having high salt contents which provide opportunity, rather than a threat, to the process (3).

Key to the process is the valorisation of each of the product fractions. For example, the aqueous phase contains bioavailable nitrogen, phosphate and carbon species which the team have demonstrated to be a highly effective nutrient source for both algae and higher plants. Additionally, the bio-crude can be upgraded on site or integrated into an existing fossil based refinery for the production of biofuels and bulk chemicals. The solid char contains the inorganic fraction, including any heavy metals, and some carbon deposition which can be used for low cost carbon capture or, if specific target metals are present, could prove for interesting extraction and recovery opportunities. Finally, plastic waste can be converted alongside the biomass, elevating the biocrude production or producing a secondary stream of stabilised monomers, effectively recycling the plastic. Experimentally, the group are working to optimise reaction conditions, to produce stabilised products suitable for direct use, conducting rigorous product testing and integrating the biocrude effectively with existing refineries. Besides the experimental work, simulations of large-scale hydrothermal processing biorefinery plants are being developed with life cycle assessment. Technoeconomic analysis is being conducted to compare the sustainability, operational and economic efficiency of each process and provide the Cost of Manufacture (COM) and minimum selling prices (MESP) of the various products produced

HTL processing is highly effective at breaking down organic material, as such can remove organic toxins. However, certain macroalgal species also contain high value polysaccharides. In a further iteration, the team have developed pre-treatments that can, using the salt water in the process, partition the saccharide fraction for further valorisation, prior to the HTL downstream processing stage. Careful manipulation of the pH, salinity and temperature of fractionation can be used, to direct the fractionation producing elevated levels of monosaccharides or distribute specific high value oligosaccharides away from the main biomass stream. The presence of saltwater was found not only to aid the fractionation process, solubilising more of the biomass, but can be used to direct product recovery. In the publication, the resulting saccharide fraction was used in a fermentation process, using a saltwater tolerant oleaginous yeast, though conversion to furans, biopolymers or further higher value products are all perfectly feasible (4). With this key work, a sustainable macroalgal biorefinery, based on valorising problematic harmful blooms, is within reach.

Follow the work of the team on Twitter (@PhycoMExUK) or find out more at www.phycomex.uk.

References:

1. Wang et al. *Science* 365, 83-87 (2019)
2. Zhang, Y & Chen, W.-T. p127-168 in *Direct Thermochemical Liquefaction for Energy Applications*, Woodhead Publishing (2018)
3. Raikova et al. *ACS Sustainable Chem. Eng.* 7, 6769-6781 (2019)
4. Jones et al. *J. Chem. Tech. & Biotech.* 95, 2098-2109 (2020)

BPS Project Report

The distribution and population structure of the range-expanding warm water kelp *Laminaria ochroleuca* at its poleward distribution limit

Submitted by: Dan Smale, Marine Biological Association of the United Kingdom, dansma@mba.ac.uk @DanSmale1

Kelp forests are found along 25% of the world's coastlines, playing pivotal roles in supporting biodiversity and primary productivity. As foundation species, they provide biogenic habitat for highly diverse communities, which include species of commercial importance^{1,2}. As with many natural ecosystems, kelp forests are threatened by a range of contemporary stressors, including ocean warming, and have recently undergone rapid changes in many regions³. In the southwest of the UK, the dominant cool-water kelp, *Laminaria hyperborea*, co-exists along moderately wave exposed coastlines with the warm water kelp *L. ochroleuca*. Recent research by our team and others has shown that *L. ochroleuca* is increasing in abundance and expanding its range polewards, coincident with increasing sea surface temperatures^{4,5}. Further work has demonstrated that *L. ochroleuca* is functionally dissimilar to *L. hyperborea*, in terms of habitat provision for associated plants and animals, as well as rates and timings of primary production^{5,6}. As such, if *L. ochroleuca* continues to proliferate at the range edge, extend polewards, and potentially displace *L. hyperborea* at some locations⁷, shifts in community structure and ecological functioning are likely to ensue.

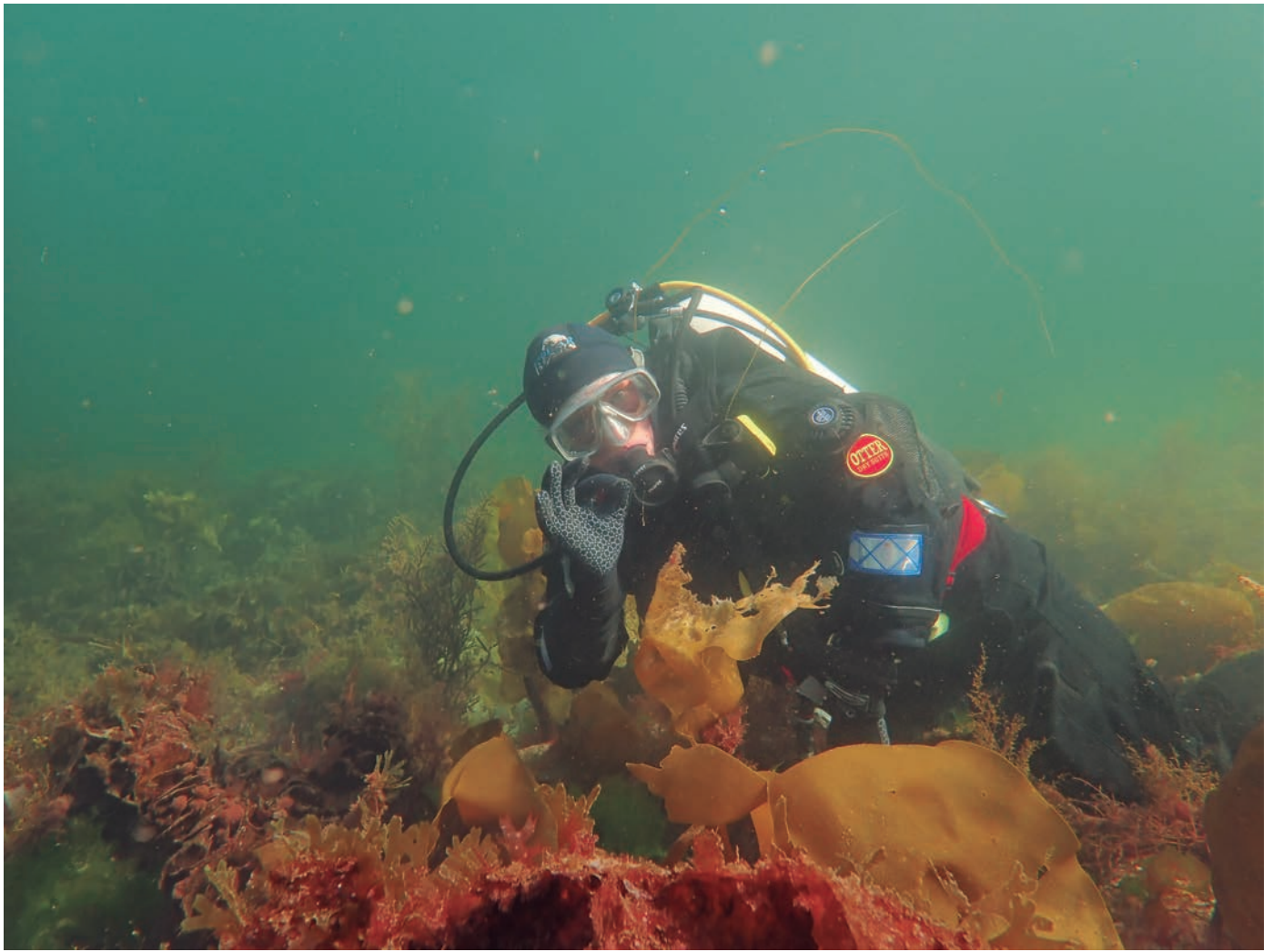
The poleward range edge of *L. ochroleuca* has crept northwards over the past 80 years; it was first recorded in Plymouth, S. Devon in 1948 and was subsequently found on Lundy Island, N. Devon in 1974, which was widely accepted as its northerly distribution limit for several decades. However, in September 2018, *L. ochroleuca* was recorded for the first time in Ireland, in County Mayo⁸, which lies some 500 km northwest of Lundy Island. It is currently unclear whether this high latitude population in northwest Ireland is a discontinuous isolated population or whether multiple 'stepping stone' populations persist along the west coast of Ireland, but have yet to be recorded. Particle tracking models suggest that fertile kelp tissue originating from Lundy Island could reach Bantry Bay, southwest Ireland in approximately 3-4 days. It is likely, therefore, that *L. ochroleuca*



The golden kelp, *Laminaria ochroleuca*, is abundant within the sheltered cove of Scotts Port, forming extensive canopies



Scotts Port, near Bellmullet, County Mayo, is home to the northernmost recorded population of *Laminaria ochroleuca*. On arrival, we were greeted with incredible weather and calm seas.



During our sampling trip the sea state was calm and the visibility excellent, allowing us to survey the kelp forest and collect samples.

ca is indeed present within wave-sheltered habitats along the west coast of Ireland, but such populations remain undiscovered.

Funding from the BPS allowed our kelp research team to travel to northwest Ireland to sample *L. ochroleuca* populations at the newly-described ranged edge, and to survey additional sites further south in search of 'stepping stone' populations, to better understand the dynamics of climate-driven range shifts. Moreover, the project aimed to compare populations at the current range edge with historical range edge populations near Plymouth and on Lundy Island, to examine shifts in population structure with latitude and time since expansion.

In September 2019, our team (comprising 3 MBA scientists and 2 from Aberystwyth University) travelled to northwest Ireland to collect quantitative information on the structure of populations at the range edge. On arrival at Scotts Port (near Bellmullet, County Mayo), we were met with glorious sunshine and calm seas, greatly facilitating scuba diving surveys. At two si-



A typical *L. ochroleuca* sporophyte collected subtidally from Scotts Port, County Mayo



The field team readying for kelp surveys



Prof. Pippa Moore heading out for another kelp survey dive

tes within the cove, we conducted quadrat and transect scale surveys to estimate population density, and collected ten canopy-forming sporophytes to obtain data on plant length, wet weight biomass and age. Samples were also collected to examine population structure at the genetic level.

Our team then headed southwards in search of ‘steeping stone’ populations along the Irish coastline, surveying suitable kelp habitat in both County Galway and County Clare. However, despite identifying seemingly ideal habitat for *L. ochroleuca* populations, this species still remains elusive along the Irish coastline.

Further sampling was later conducted at historical range edges, both near Plymouth and at Lundy Island in southwest England, to obtain directly comparable data on density, age, biomass and morphology along a gradient of latitude and probable time since colonisation.

Given that *L. ochroleuca* is a useful ecological indicator of ocean warming, it is critical that its current distribution and population structure are accurately described, to provide a baseline against which to detect future changes. Moreover, by comparing the structure of past and current range edge populations new insights into the dynamics of climate-driven range expansions can be gained.

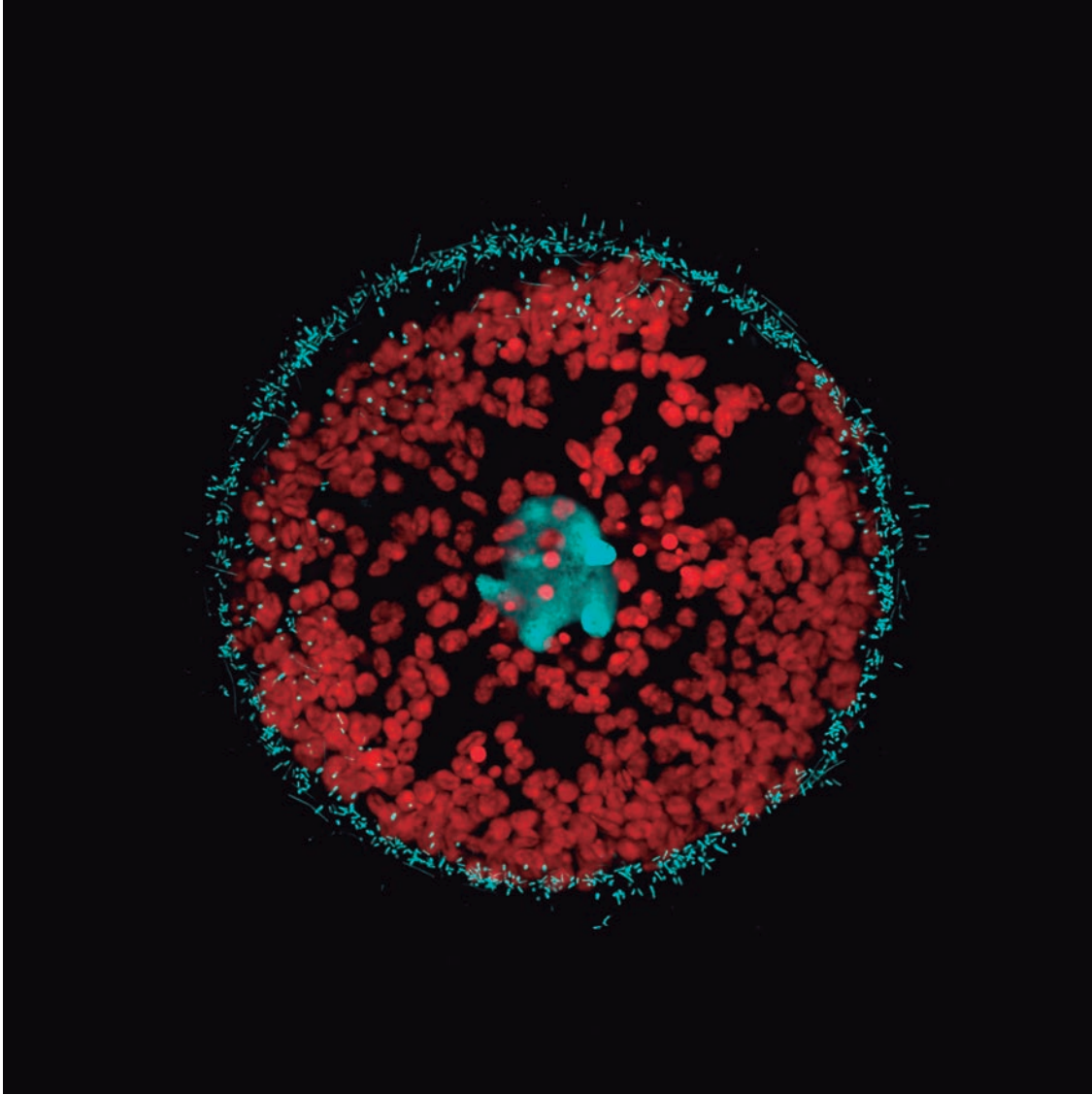
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8. Schoenrock et al. *Mar. Biodivers. Rec.* 12, 9 (2019)

Hilda Canter-Lund Photography Competition

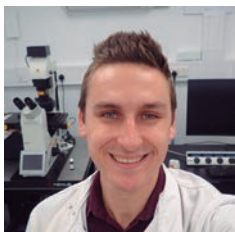
This award was established by the British Phycological Society in recognition of Hilda Canter-Lund, whose stunning photographs will be known to many members. Her photomicrographs of freshwater algae combined high technical and aesthetic qualities whilst still capturing the quintessence of the organisms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

Winners

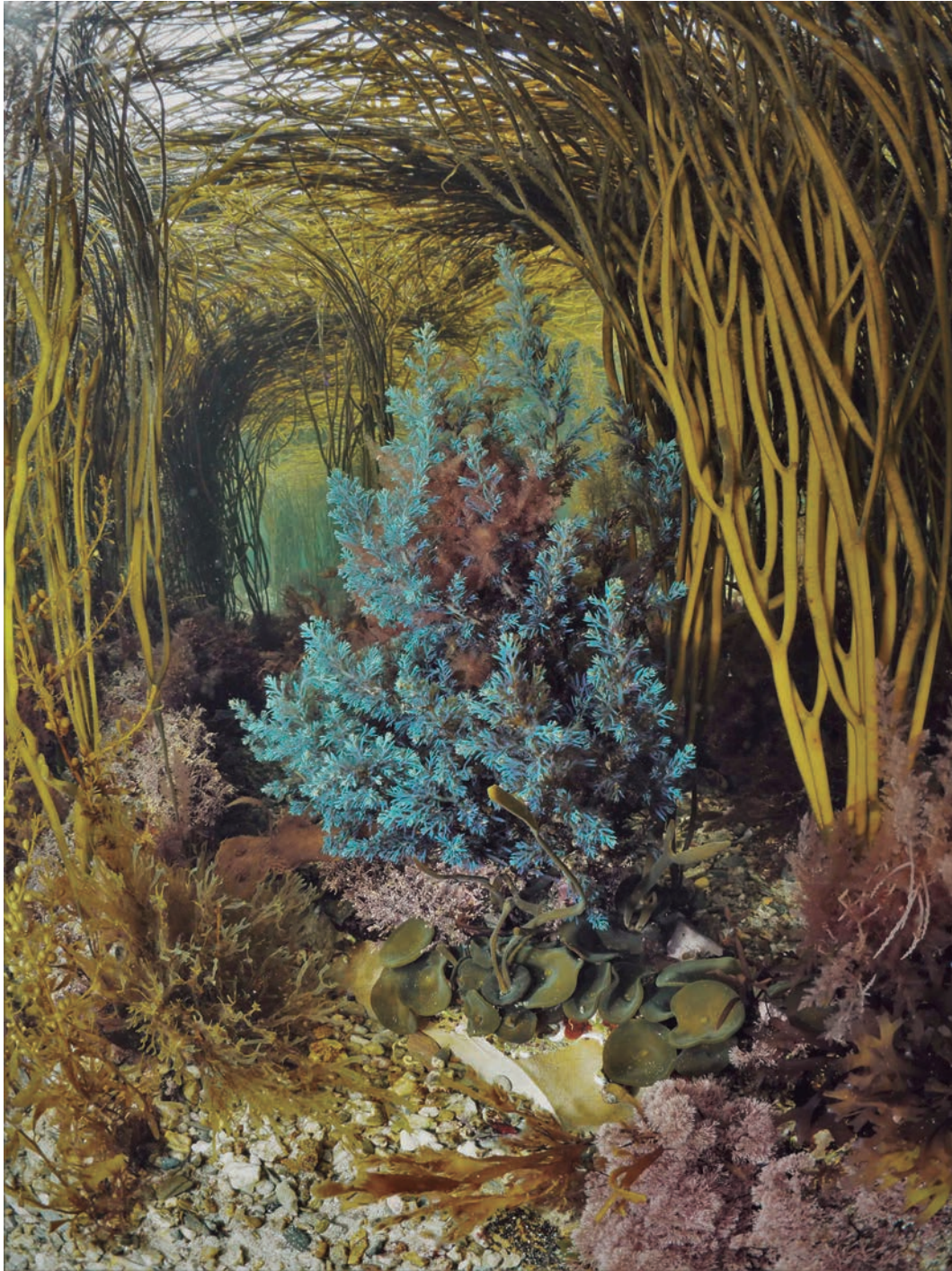


Davis Laundon: "The Phycosphere"

Even the smallest organisms can be a home for others. The thin layer of mucus surrounding phytoplankton cells, known as 'The Phycosphere', provides a rich microscale habitat for bacterial communities and is an example of the many microbe-microbe interactions that exist throughout the plankton. This example of the phycosphere is from a *Coscinodiscus* diatom, about a 10th of a millimetre in diameter, isolated from the English Channel (UK) with its associated bacteria. The diatom chloroplasts were imaged using their natural autofluorescence and are shown in red, while Hoechst-labelled DNA, representing the diatom nucleus and phycosphere bacteria, is shown in cyan. This image was taken with a Leica SP8 confocal microscope and is a maximum projection of a z-series. Diatom isolated by Angela Ward (MBA).



Davis is a PhD student at the Marine Biological Association of the UK and the University of East Anglia, dedicated to applying quantitative microscopy tools to investigate the cell biology of understudied marine microbes. During his undergraduate degree in marine biology at the University of Plymouth (UK), Davis developed a fascination for marine microbiology and optical microscopy and he is currently investigating how parasitic protists influence the growth dynamics of marine microalgae. In addition to his work, Davis has a passion for bringing microbes to life and to a broader audience through the creation of 'SciArt'.



Michiel Vos: “*Carpodesmia tamariscifolia* (Bushy Rainbow Wrack) framed by *Himanthalia elongata* (Thong Weed) in a rockpool in Falmouth, Cornwall, U.K.”

I took this photo of this stunningly beautiful iridescent Rainbow Wrack spring 2020 at a low tide when this rockpool was no more than a meter deep. This species is a perennial that forms a home to many animals, from sponges to tunicates, and is often used by the Bull Huss to attach its egg cases to. Many seaweed species also grow epiphytically on Bushy Rainbow Wrack, such as the invasive red species *Bonnemaisonia hamifera* on this photo. Photo taken using an Olympus OM-D E-M5 Mark II with an 8mm fisheye lens and with a single automatic strobe. The picture frame is about a metre deep.



Michiel Vos has an MSc in Marine Biology from the University of Groningen but proceeded to work on terrestrial bacteria in subsequent posts in Tübingen, Oxford and Wageningen, before moving to the University of Exeter Medical School (Cornwall Campus). Moving to Cornwall rekindled his love for marine biology and he tries to spend as much time as possible submerged in rockpools. He blogs about his finds on his blog “an_bollenessor” which means ‘the rockpool hunter’ in the Cornish language, and posts on Instagram as @an_bollenessor.

Shortlisted



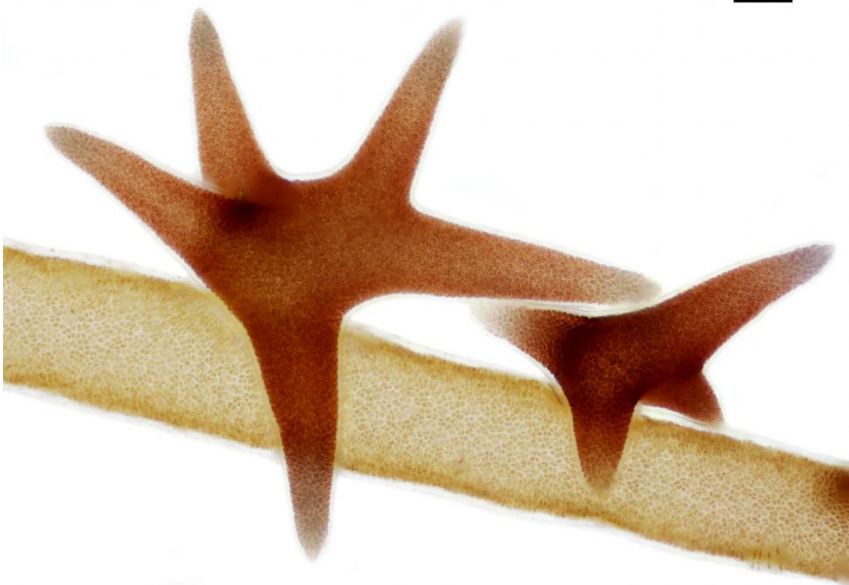
Erasmo Macaya
“Awesome Brown”

Macrocystis pyrifera the giant kelp, the largest seaweed on earth. Photo at the intertidal: stipes, pneumatocysts (floating structures) and blades in a nice combination and color. This image was taken during a Marine Botany Course in Punta Arenas, southern Chile. Equipment used was a Nikon AW300.



Galice Hoarau: “*Fucus*”

Fucus serratus, *F. vesiculosus* and *F. distichus* growing together in the shallow intertidal in Northern Norway (Bodø). *Fucus* species are important ecosystem engineers and are present in sympatry in several parts of their distribution where they can hybridize.

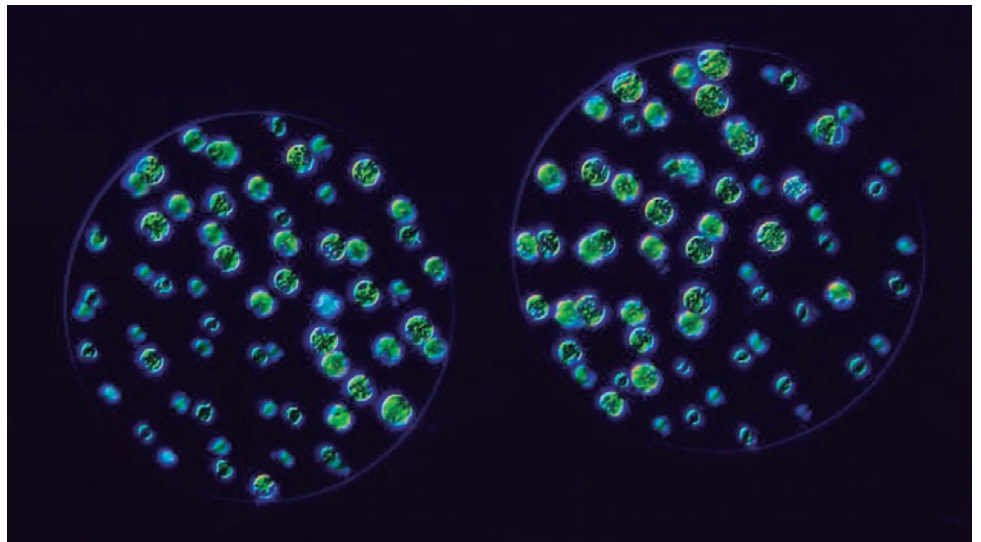


John Huisman: “Stellate propagules of an undescribed species of *Hypnea*”

The red algal genus *Hypnea* includes several species that reproduce vegetatively by coronate or stellate propagules. These are typically darker in colour than the bearing branches and are easily dislodged, growing into new thalli. This image was taken on a Nikon Eclipse 80i microscope with a Nikon DS-Fi1 camera, using bright field illumination. Several images were taken at different focal planes and

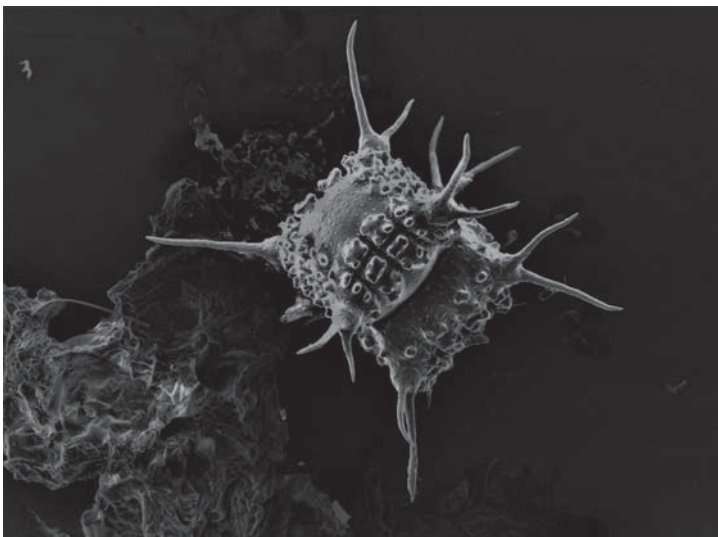
Thomas Proeschold: “Cosmic volvocine alga: *Pleodorina californica*”

Two colonies of *Pleodorina californica* (SAG 32.94), a strain isolated by Francis D. Ott from a drainage ditch in Maryland (USA), photographed with an Olympus BX60 with DIC contrast. This volvocine green alga represents one of the model organisms for studying the origin of multicellularity.



Kristy Sullivan: “*Staurastrum nova-caesareae*”

This unique specimen was collected from Lake Annie, a subtropical oligotrophic lake in Highlands County, FL, USA. The image was collected from a carbon-coated sample at 900x magnification in high vacuum using a JEOL JSM-5900LV scanning electron microscope at the Florida Center for Analytical Electron Microscopy.



Non-native *Antithamnion* at Portland, Dorset, England

Submitted by: Lin Baldock

Dorset Seasearch Coordinator, Dorset Wildlife Trust, Brooklands Farm, Forston, Dorchester DT2 7AA, metacnephia@gmail.com

While helping a colleague who was scrubbing the twin hulls of a large catamaran I collected a selection of seaweeds from the sides of a pontoon in Portland Marina in July 2020. Included in the sample was a highly distinctive, small, filamentous red alga epiphytic on *Rhodophyllis divaricata*. The seaweed had the characteristically large gland cells of *Antithamnion* occurring on the adaxial side (facing the main axis) of the secondary pinnules covering two lower cells of the branch. Pinnae were arranged in strictly opposite pairs in two dimensions and carried paired pinnules, apart from the distal two or three which were single and borne abaxially (facing away from the main axis). The alga grew strongly adhering to the substrate by rhizoids on very short branches, with the feathery upright thalli forming a fringe on the host alga. Critical identification details are shown in Figure 1.

This entity resembled *Antithamnion nipponicum* Yamada & Inagaki 1935 as described by Rueness et al. (2007) from the west coast of Norway. The species, now accepted as *Antithamnion hubbsii* E.Y.Dawson 1962, is non-native in Europe with records widely distributed in the Mediterranean, from the Portuguese, Spanish and French Atlantic coasts as well as from the Azores. The

type locality for this species is the Pacific coast of Mexico and it has a worldwide distribution including the eastern and western coasts of north America (M.D. Guiry in Guiry, M.D. & Guiry, G.M. 2020. AlgaeBase. World-wide electronic publication, National University of Ireland, Galway. <http://www.algaebase.org> ; searched on 26 August 2020). Cho et al. (2005), using rbcl sequence data, have demonstrated that *A. nipponicum* and *A. hubbsii* are conspecific but considered that sequencing of material from the type locality of *A. hubbsii* was needed before synonymising these two.

I would be interested to hear about records of this distinctive species from the UK and Ireland, has it already been recorded? Given its wide distribution in Europe and diminutive size, it is very likely to have been overlooked in a variety of both natural and artificial habitats.

References:

1. Cho et al. *Eur. J. Phycol.* 40, 323-335 (2005).
2. Rueness et al. *Aquat. Invasions* 2, 431-434 (2007).

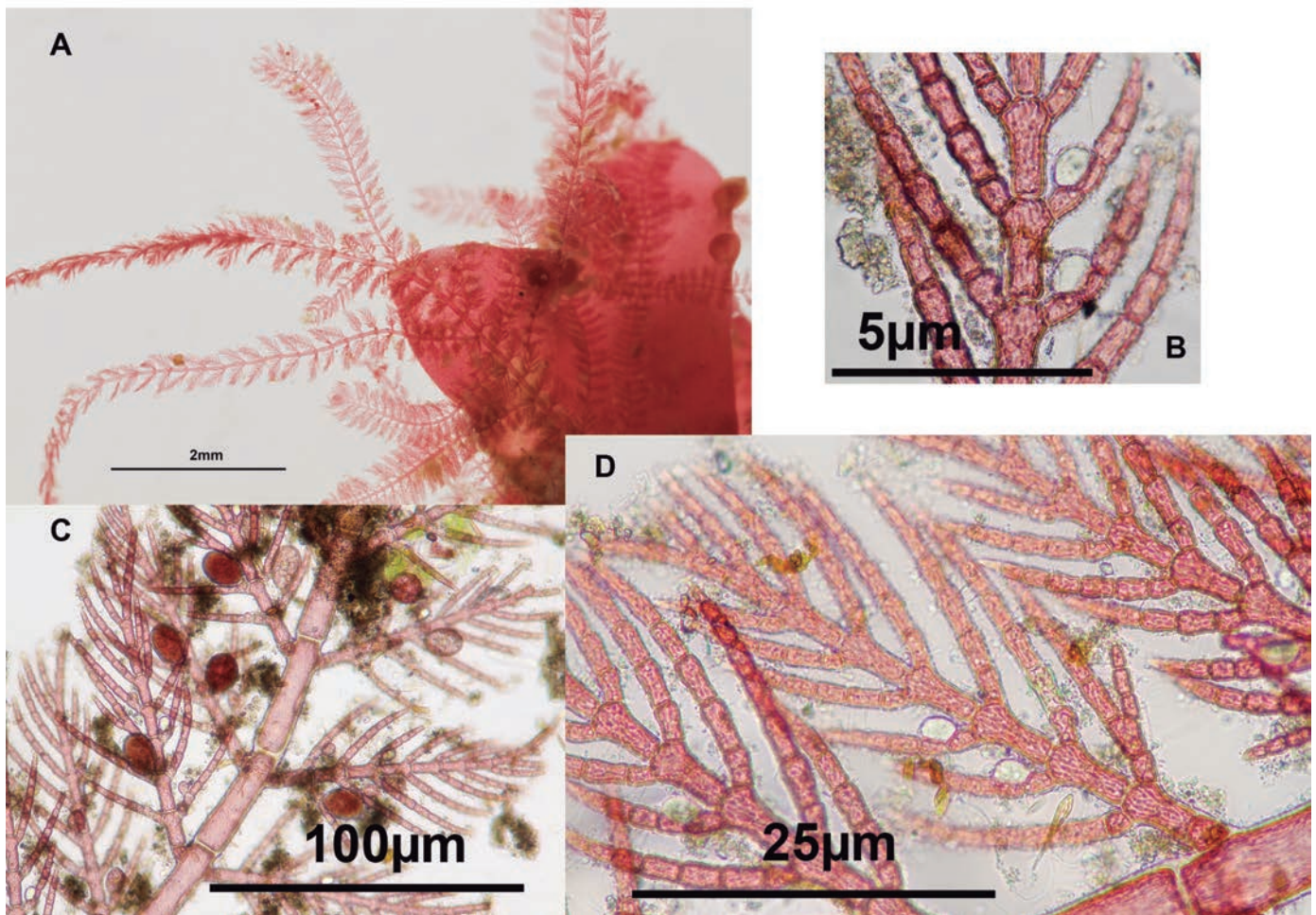


Figure 1) A: *Antithamnion hubbsii* as an epiphyte of *Rhodophyllis divaricata*; B: detail of gland cells lying over two cells on the adaxial side of pinnules; C: paired pinnae showing paired pinnules except for the distal two or three which are single and borne abaxially, with tetrasporangia; D: detail of pinna showing gland cells, paired pinnules and three abaxial pinnules distally.

Seaweeds for Wildlife Reports – British Wildlife September 2020

Submitted by: Francis Bunker, fbunker@marineseen.com



Seaweed covered reefs at Stackpole Quay

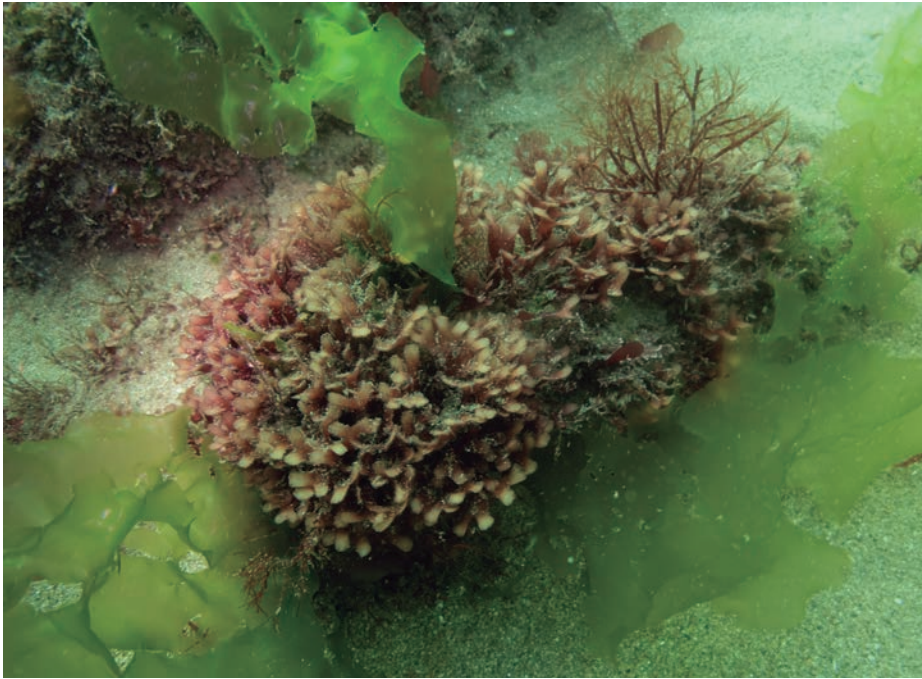
This is the first column on seaweeds in British Wildlife. To follow the format, I should be talking about the seaweed year with observations from all around the country. Unfortunately, our phycological forays, like most activities in 2020, have been curtailed by covid-19.

I will remember the spring lockdown for a time where nature revealed itself to the nation in beautiful weather with little traffic on the roads, no crowds of people and no plane contrails in the sky. It was a spring where bird song could be heard, the verges were left un-cut and wildflowers were prolific. The great thing about marine life is that it exists in an almost permanent lockdown, protected by the veil of the sea.

A highlight of each spring for the last 15 years has been an annual seaweed identification course run with my friend and colleague Christine Maggs, at the Marine Biological Association in Plymouth. On this course we get to visit the seaweed rich shores of Plymouth Sound and we always find something new. Sometimes a rarity like the starry liver weed, *Schizymenia dubyi* and other times a new non-native to the UK, such as the siphon weed *Polysiphonia morrowii* native to Japan which appeared in 2018.

This year's course was cancelled, along with most of my fieldwork, but we hope to run it again in 2021. I would urge anyone wanting to develop or further their interest in seaweeds to go on a field course. Varieties of courses are available, run on behalf of the British Phycological Society (<https://brphycsoc.org/>) and by the Field Studies Council (<https://www.field-studies-council.org>). As well as seaweeds, there are also courses in freshwater algae and planktonic forms such as the diatoms.

What could be safer in this pandemic than SCUBA diving where one wears a rubber suit, a mask and breathes air from tank? When I did get out to dive in Pembrokeshire in late June, it reminded me of what I'd been missing. All the seaweeds were in peak condition with a rich assortment of the three main types distinguished by their colour pigments, green, brown and red. Wales is on a biological boundary where colder water species from the north, such as the short leaf bearer *Coccotylus truncatus* are found together with warmer water species such as iridescent *Drachiella spectabilis*. The water was clear and calm and ideal for taking photographs and I managed to take some of the best seaweed photos I've taken in a while.



Gymnogongrus crenulatus

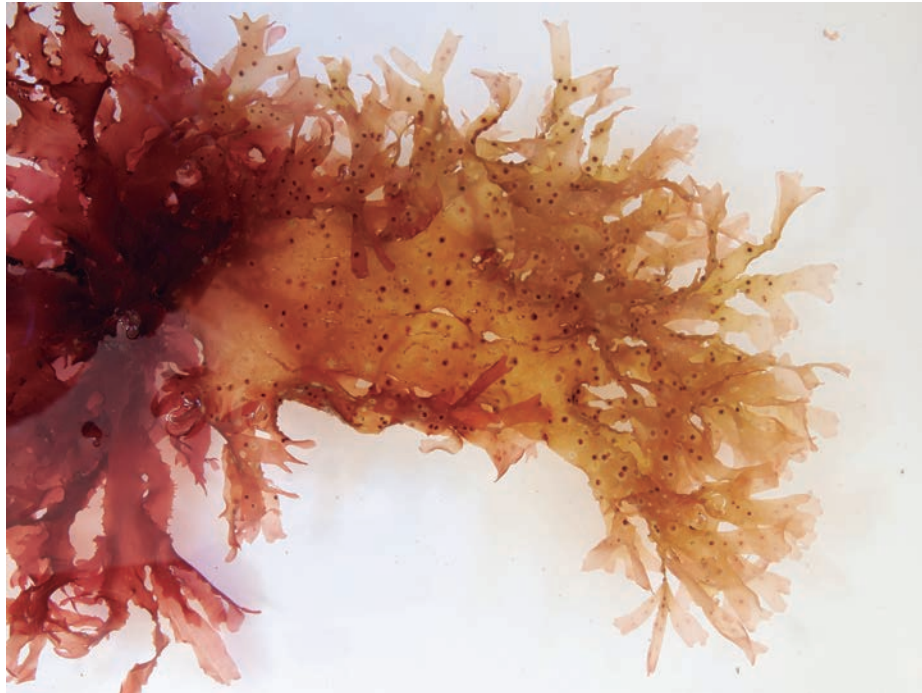
Photographing seaweed has its challenges. The dark reds and browns absorb light and make them difficult subjects, especially underwater when on most days they are continually moving backwards and forwards with the waves. Every year, the British Phycological Society runs a photographic contest called the Hilda Canter-Lund award. Seaweed lovers from all over the world put in entries, and results are always spectacular. The winners for 2020 and recent years can be seen online at <https://brphycsoc.org/hilda-canter-lund-prize>. Do consider entering in 2021 if you are a photographer.

I am fortunate to live on the shores of a tidal inlet into Milford Haven and get the benefit of being able to study seaweeds just outside my door. Sometimes the commonest seaweeds can be the

most mysterious and difficult to identify. One group of these are the sea lettuces and gut weeds. It was for a long time accepted that the tubular 'gut weeds' were in the genus *Enteromorpha* and the flat sea lettuces were in the genus *Ulva*. Modern molecular techniques studying the DNA of this group have found that the gut weeds and sea lettuces are in the same genus correctly called *Ulva*. Furthermore, some of the tubular gut-like species can grow as flat sheets, depending on environmental conditions. There is still a lot we don't know about *Ulva* and a group of us are doing a 'citizen science' project on this mysterious genus with help from my neighbour David Harries who has his own home molecular biology lab.



Nitophyllum punctatum with tetrasporangia



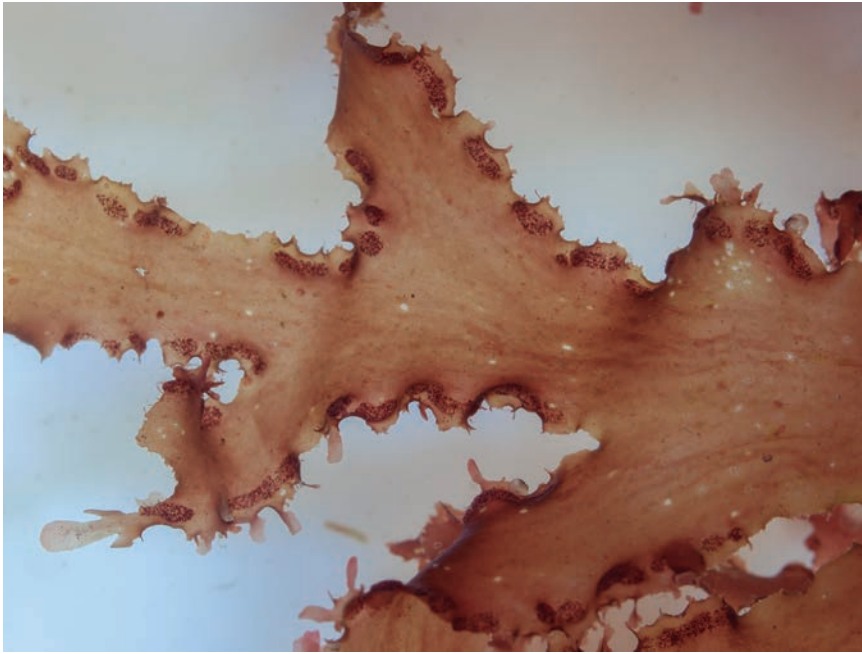
Nitophyllum punctatum with cystocarps



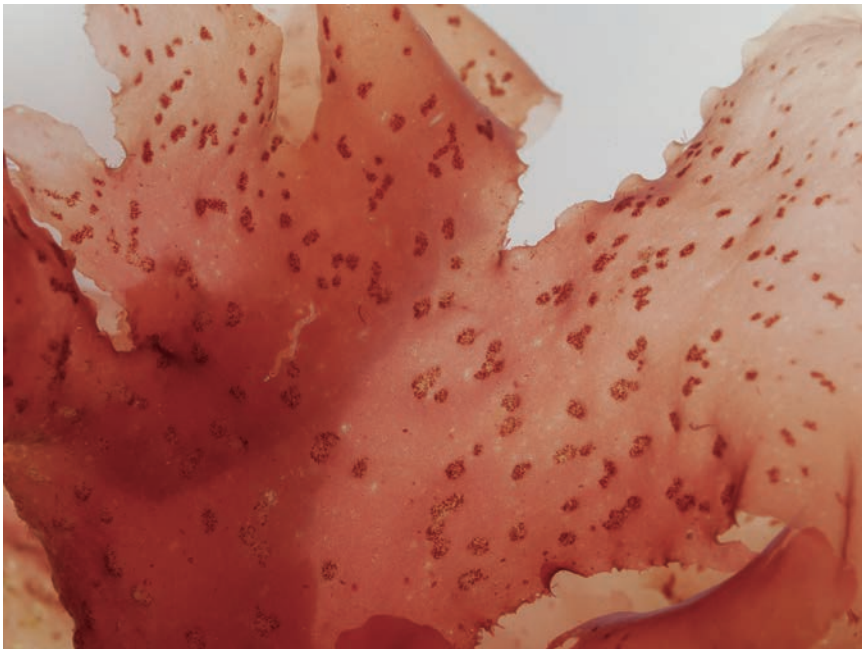
Cryptopleura ramosa (left) *Haraldiophyllum bonnemaisoniae* (right)

Citizen science projects are a good way to get involved with the seaweed world. Current projects include the Big Seaweed Search run by the Natural History Museum in partnership with the Marine Conservation Society (<http://www.bigseaweedsearch.org>). There is also Seasearch (<http://www.seasearch.org.uk>) run by the Marine Conservation Society where volunteers take part in underwater surveys and the results feed back into marine conservation initiatives.

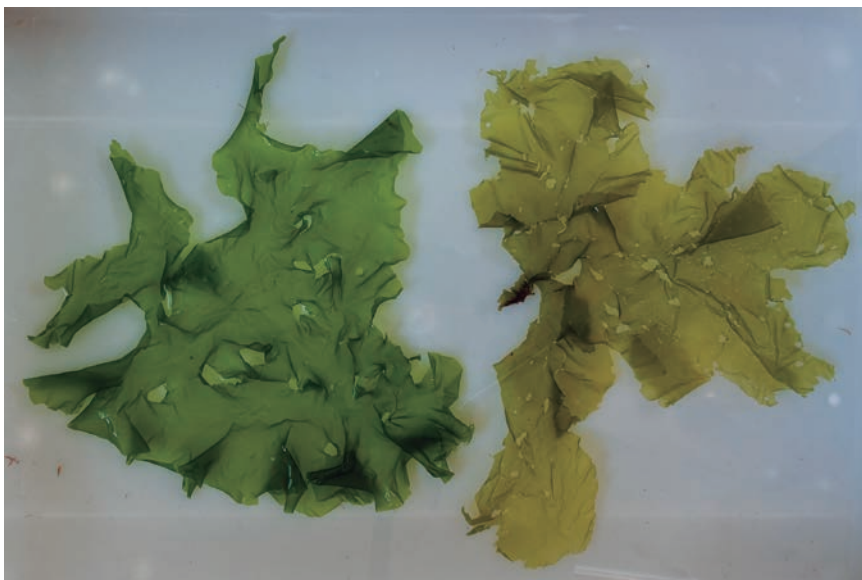
Some seaweeds are short-lived, surviving only a few months or a year, others are perennials and long lived and slow growing. If you are a budding seaweed enthusiast, always be conservation minded. A brightly glowing growth of bushy rainbow wrack, *Carpodesmia tamariscifolia* (formerly *Cystoseira*), may be a decade or more old. This species was once recorded from the shores around Dale in Pembrokeshire but has now disappeared. A result of overcollection? Who knows? It's best if such species are admired in situ and left in peace.



Cryptopleura ramosa showing veins and tetrasporangia



Haraldiaophyllum bonnemaisoniae showing tetrasporangia



Ulva lactuca (left) and *Umbraulva dangeardii* (right)

LINDA MARY IRVINE (née Newton)

(27th June 1928 – 24th February 2020)

A Phycological Tribute

Submitted by Jenny Bryant, Natural History Museum.
j.bryant@nhm.ac.uk

Note from editor: Although we ran a short notice of Linda Irvine's passing in the spring issue of this year, myself and Jenny Bryant, the author, agreed that because Linda was such a long-standing figure within the British Phycological Society, members would be interested in this tribute.

Note from the author: In the last issue of The Phycologist (98, Spring 2020: 31) there was a short piece headed 'In remembrance' announcing the death of Linda Irvine. It included a photograph of Linda celebrating her birthday at my flat some years ago. She was a coeliac so raspberries and cream replaced birthday cake. I was privileged to be asked by her family to deliver a phycological tribute at her funeral on March 10th as her friends and family knew almost nothing of her importance to phycology. I canvassed many of her collaborators for their memories of Linda. The following appreciation has been coloured by their comments and I thank them for their help. I would be grateful for any memories of, or anecdotes about, Linda (please use the Email address above).



Portrait of Linda M. Irvine, photo credit: Mike Wynne

The British Phycological Society owes a particular debt to Linda Irvine as she was both a founder member and, until her passing, the last survivor of the (formidably female) group of phycologists who came together in 1952 to launch a society dedicated to the study of algae. As Linda Newton she attended those first infant meetings of the BPS. Her change of name on marriage has meant that many of her earliest successes have been attributed to the other L. Newton, Lily, 35 years her senior. She was made an Honorary Member of the BPS in 1995.

Linda was born in Kingston-Upon-Hull, Yorkshire. As a child, she was forced to write with her right hand although she was left-handed, and she continued to write right-handed throughout her life, doing everything else with her left hand. She attended Queen Mary College, University of London, graduating with a first class degree in 1949. Whilst there, she came under the wing of the eminent phycologist, Professor F.E. Fritsch who was impressed that she wanted to do biological research.

Linda originally wanted to do medicine, not as a GP, but to do medical research. However, it was clear that demobilisation after WW2 would mean that men returning to civilian life were going to have priority. Gender roles were strictly adhered to in

the newly created NHS (founded 1948). So in 1949 she took up the post of marine phycologist in the Algae Section of the Botany Department of the British Museum (Natural History) in London (now The Natural History Museum). Her role was both as a researcher and curator of the Museum's collections of algae, dealing with specimens from Britain and all over the world. In 1955 she wrote the first account of the marine algae of Kuwait and Bahrain.

She found she wasn't taken seriously at the Museum and was even told that a woman would not be employed in the flowering plant section. As algae are 'only lower plants' her appointment was tolerated. An early battle to secure a microscope was successful despite the Keeper of Botany (Head of Department) commenting that he managed his studies of flowering plants using only a hand lens. Later in her career, as her office sweltered under a glass roof in a heat wave, she marched into the Keeper's office in a red bikini challenging him to do something about the stiflingly hot working conditions (Roy Vickery, pers. comm.). After a research trip to the USA she was taken more seriously, either through her own growing confidence or, simply, that working in America had placed 'a feather in her cap'.

Linda met her husband, David Irvine, when he was sent to the Museum to study the marine algae collections for his PhD. At first, she was quite put out as he needed a lot of help and that disrupted her research. But they soon became a team with the relationship actively encouraged by phycological colleagues. They married in 1954 and Linda resigned from her Museum post. They moved to Cambridge where David had a role at the University and where their first son, James, was born. In 1959 they went to do research in the USA where a second son, Robert, was born. They returned to the UK for David to take up the post of lecturer at the (then) Polytechnic of North London. They settled in Southgate, North London, where son number three, Andrew, was born in 1963 and where Linda remained the rest of her life.

Linda and David are remembered in the species *Rhodophyllis irvineorum* and genus *Irvinea* which were named in their honour. Mike Guiry considered them to be *“A truly phycological couple whose joint knowledge of the seaweed flora of Britain and Ireland was immense”*.

Linda returned to the Natural History Museum in 1964, becoming a Nature Conservancy Council funded research assistant to Peter Dixon. Their project was to produce a series of comprehensive handbooks for the identification of the seaweeds of the British Isles, with Linda dedicated to the Rhodophyta volumes. When the original grant ended in 1967, Bob Ross, then Keeper of Botany, secured Museum funds for Linda to continue this ground-breaking work. It became a collaborative project co-funded by the Museum and the British Phycological Society. Linda researched and wrote four of these volumes, three co-authored with other specialists. The first volume was published in 1977 and the fourth in 2003 – well after her 60th birthday and official retirement date.

Linda became an international authority on the coralline algae, co-authoring the Corallinales volume of *Seaweeds of the British Isles* with Yvonne Chamberlain. She carried out meticulous work at the laboratory bench, teaching herself to use the freezing microtome as many species have to be de-calcified and sectioned. Mike Guiry remembers that *“She undertook a minute study of the genus Peyssonnelia which has a surprisingly complex three-dimensional structure. In order to understand how each species comes into being, Linda painstakingly made little models using Plasticine and employed colour to represent the different cells”*.

One of her overseas coralline collaborators was Bill Woelkerling who remembers that *“Linda was a wonderful hostess on my many visits to London, both in terms of the accommodation she provided and in terms of tackling scientific matters at the Museum”*.

Her co-author on the *Bangiophycidae* volume of *Seaweeds of the British Isles* Juliet Brodie, comments *“I first got to know Linda when I was a PhD student in the 1980’s and then we worked closely together in the 1990’s. I brought molecular studies*

and extensive fieldwork to our collaboration, whilst Linda wrestled with the literature and nomenclature. We also spent many hours in the herbarium at the Museum working on the collections. I took Linda into the field on one occasion and she willingly scrambled over an extensive shore to reach the seaweeds we were aiming to collect, but she left the next bit of shore to me. I suspected she had a better idea than continuing to struggle over the rocks. When I got back she was happily eating an ice cream! It was fun working so closely and I got to know Linda really well. We had many discussions on almost every aspect of life. She was kind, generous and patient with me. I learnt from her the discipline to do good work”.

Mike Guiry considered Linda *“An incredibly organised person. Everything was noted, annotated, listed, filed and exhaustively checked. She was an ideal taxonomist. Her working week was also minutely planned and she took a dim view of people (like me) turning up at the Museum unannounced to disrupt her day. Her encyclopaedic knowledge of the collections and literature in the Museum’s herbarium and library was extraordinary, as was her knowledge of the International Code of Botanical Nomenclature”*.

Dave John agrees that *“Linda’s infinite patience assisted me to understand and interpret the rules of botanical nomenclature, of which she had immense knowledge. Linda was someone who was always prepared to take time to listen, analyse and she often came out with sound common sense solutions to problems, helping to resolve issues”*.

Chris Maggs commented *“Although Linda never liked to take any credit - and she would never give a presentation in public - she had a major impact on phycology in the UK via two different channels. Firstly, she gave personal guidance to those who sought out her knowledge and wisdom. She was always able to find elusive specimens and literature. Having herself started “in the days before plastic bags” - a really memorable concept - she was involved in the inception of modern phycology, and welcomed all the new discoveries. Secondly, her books in the Seaweeds of the British Isles series laid the foundation for careful and precise treatments of type specimens and synonymies. Far superior to earlier floras they were the best available guides to seaweed identification in the British Isles”*.

Linda worked with Mark Spencer on the Linnean Typification project and he remembers that whilst *“Untangling the complexities of Linnaean algal nomenclature we spent many happy hours tracking down literature, examining specimens and discussing the, often very complex, nomenclatural issues. I learnt so much from her about how to proceed with such a complex task, as well as having a lovely time laughing and, at times, consoling each other through life’s woes”*.

After her retirement in 1988 Linda transitioned from salaried staff to Scientific Associate in the Museum’s Botany Department and was active in that role until 2018. The current author started working closely with her in the 2000’s and it turned out to

.....

be a meeting of minds. One project we tackled was to research the life and collections of Mrs Margaret Gatty, a nineteenth century seaweed collector. We first divvied up the tasks and then came together to discuss, criticize, encourage and, finally, agree. We had a similar writing style so Linda usually accepted most of my text. However, she was very quick to spot any loose usage or anything ambiguous. She was an invaluable editor of my work and a 'go-to' phycological data source. Our colleague, Ian Tittley, agrees that *"She was very good at reading and correcting manuscripts. I value the many discussions with her on historical and floristic matters over the years"*.

The research on Mrs Gatty resulted in two papers that turned out to be the last of Linda's publications. The year was 2016 and Linda was 88 years old. Every contributor to this appreciation stressed the same points when describing Linda Irvine - that she was an exceptional taxonomist, authoritative collaborator, a very good friend and that she will be greatly missed.

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Courses and announcements

Purchase of microscopes for BPS educational courses

Submitted by Francis Bunker

A decision was made at the 2020 winter Council meeting in Plymouth to purchase a set of compound microscopes for use on freshwater and marine field courses run by BPS members.

Requirements included the capability to have battery-operated lights for venues without dedicated lab benches and x100 oil immersion objectives. Also needed was a good demonstration microscope equipped with a x100 oil immersion phase contrast objective lens, and a camera for projecting images onto a screen.

Negotiations followed and Microscope Services Ltd., based at Oxford University, gave us a Motic 2820 student microscope to try. Both myself and Martyn Kelly, who runs freshwater biology courses annually, put the microscope to the test, and it worked well both for macro algal sections and diatoms.

Microscope Services Ltd. also offered us a second-hand Leica DMLS with a x100 phase contrast objective, Ph3 slider, camera mount plus a Chromyx HD camera. This is a fantastic instrument for class demonstrations.

Purchase of the eight Motic 2820s and the Leica microscope was formally agreed by the BPS Council and we took delivery of them at the beginning of August. Unfortunately, the first course on which we wanted to use the microscopes was cancelled by the Marine Biological Association (MBA) in Plymouth, due to problems with Covid-19 restrictions.

An arrangement has been made with the MBA to store and service the microscopes in return for occasional use by their more specialised courses.



If any BPS member wants to use these microscopes for a course, please contact me (secretary@brphycsoc.org). The expectation is that you will cover the cost of transporting the microscopes, as well as insurance and a small charge to cover the cost of routine servicing.

7th Conference of the International Society for Applied Phycology

This will be an online only conference from 14 May-13 August 2021. Registration is currently open at <https://isap2020-phyco.org/>. Abstract submission deadline is 16 Nov 2020.



FEMS Funding opportunities for BPS members



Federation of European Microbiological Societies

The British Phycological Society is a member society of the Federation of European Microbiology Societies (FEMS, <https://fems-microbiology.org/>). It makes all BPS members eligible for funding opportunities offered by FEMS, which range from awards for conference attendance and international research visits and training by postgraduate students to funding toward organizing meetings and conferences (https://fems-microbiology.org/about_fems/network-and-activities/grants/).

Research and Training Grants: Research and Training Grants assist early career scientists in pursuing research and training at a European host institution in a country other than their own country of residence (and exceptionally to support research and training projects outside Europe). These grants may be used to contribute to travel, accommodation and subsistence costs of making the visit. Support is limited to a maximum of €4,000. Deadlines: 1 January and 1 July.

Meeting Attendance Grants: Meeting Attendance Grants enable early career researchers to attend microbiology meetings worldwide to network, collaborate and keep abreast of new developments in their field. Applications

to attend FEMS-sponsored meetings will not be considered as applications for support to attend these meetings should be made directly to the meeting organizer. Support is limited to a maximum of € 600. Deadlines: 1 March and 1 September.

Meeting Organizer Grants: FEMS supports selected meetings within the European Area with a Meeting Organizer Grant. Scientific conferences, laboratory workshops and training courses will be considered for such support. The maximum amount of a Meeting Organizer Grant is € 15,000. A minimum of 60% of total grant value of the Meeting Organizer Grant is to be used to support the attendance of Early Career Scientists. Deadlines: 1 June and 1 December.

Recent BPS Grantee: Prof Suzanne McGowan was awarded a Meeting Organizer Grant for the 69th annual meeting of the British Phycological Society that will be virtually held from the University of Nottingham from 4-8 January 2021.

Please contact the BPS delegate to FEMS Dr Anne D. Jungblut (Natural History Museum, London, email: a.jungblut@nhm.ac.uk) for any questions on the FEMS grants.

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

Copy should be submitted to:

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