

Forum Phycologicum



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Newsletter of the
**Phycological Society
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From the Editor

Greetings and welcome to Volume 81 in our PSSA newsletter series. Almost 18 months have passed since our last congress, and preparations are well in hand for our 30th Congress at De Hoop in January 2017. We are very pleased to report that the turnout may be a record, with about 70 delegates registered. A thirtieth congress is something of a milestone for our small Society. PSSA was inaugurated in 1983, at Wits, under the guidance and vision of Prof Richard Pienaar, and it is wonderful to see that the Society is still very much alive and well. There is a short update on our 30th Congress at the end of this newsletter.

Congratulations to Pierre Durand and his colleagues on the establishment of the new National Phycology Culture Collection (see the article by Andrew Ndhlovu and Pierre): this is a milestone in Southern African phycology!.

Thanks very much to those who contributed to this edition. As usual, please use the newsletter to let us all know what you and your research groups are up to.

Yours in Phycological Endeavour,



Robert Anderson

The South African National Phycology Culture Collection (SANPCC) for microalgae

Andrew Ndhlovu and Pierre Durand

Established in January 2016, the South African National Phycology Culture Collection (SANPCC) for microalgae (www.sanpcc.org.za) has the primary goal of providing a permanent biorepository for marine and freshwater microalgae from the Southern African region. In addition, the SANPCC project aims to (1) document and maintain the biodiversity of the region; (2) make the culture collection accessible to other phycologists nationally for teaching and research purposes; (3) promote the discipline of phycology; and (4) use the collection for biotechnology research. The SANPCC is under the custodianship of the Phycological Society of Southern Africa (PSSA) and ultimately belongs to the people of Southern Africa. It is managed and overseen by a strategic committee comprising Pierre Durand, Stuart Sym, Andrew Ndhlovu, Nisha Dhar (University of the Witwatersrand, Johannesburg); Grant Pitcher (Department of Agriculture Fisheries and Forestry); Thomas Dempster (Arizona Centre for Algae Technology) and Wendy Stirk (University of KwaZulu-Natal).



The SANPCC website has the primary goal of being a permanent biorepository for marine and freshwater microalgae from the Southern African region.

The strains of the collection are stored and cultured in growth chambers at the Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg and at the Council for Scientific and Industrial Research, Pretoria. The collection is maintained according to the quality control requirements of the internationally registered UWC Herbarium. The SANPCC is currently maintaining 50 strains of micro-algae, 23 of which has been isolated to axenic culture state and are listed on the on the SANPPC website. Isolated

organisms include Eutreptiella, Ankistrodesmus, Nephroselmis, Pyramimonas, Prymnesium, Cymbomonas and Chlamydomonas species. They have mostly been isolated from regions in Southern Africa although some isolates, for example, the *Chlamydomonas* species are used as model organisms in basic phycology and evolution research. One of the most recent additions to the culture collection is the dinoflagellate *Prorocentrum triestinum*. This organism was isolated in February 2015 on the west coast of Cape Town at St Helena Bay where it was identified as the dominant causative organism of a red-tide forming algal bloom (a manuscript describing the event is in review).

The SANPCC is the result of partnerships between the University of the Witwatersrand, Johannesburg; the Phycological Society of Southern Africa (PSSA); Inqaba Biotech; the University of the Western Cape (UWC) and the Council for Scientific and Industrial Research (CSIR), which will add to the collection strains that have potential applications in biotechnology industries. Cultures are maintained in a range of general media including F2 enriched seawater, IMK freshwater and TAP (Tris-Acetate-Phosphate) agar. Strains in the collection are identified microscopically, genotypically and in some cases ultrastructurally.

Isolates (except for those contractually associated with the CSIR) are available for use by basic science researchers in SA and for sale to industry. Enquiries and requests for strains are welcome and should be addressed to the Dr Pierre M. Durand on the following email address: pierre.durand@wits.ac.za. An update of the SANPCC will be presented at the PSSA meeting in January 2017.



Prorocentrum triestinum, in dorsi-ventral view, showing the chloroplast (photo: Stuart Sym).



“Academia meets industry”

Report on the 22nd International Seaweed Symposium, Copenhagen, June 19-24 2016

John J Bolton, Department of Biological Sciences, University of Cape Town

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The latest version of one of the oldest algal meetings brought over 450 delegates from 49 countries to the Scandic Copenhagen Hotel, coinciding with the Northern Hemisphere summer solstice. These meetings have always been run by the International Seaweed Association (ISA) which has long-term African links, with Rob Anderson (DAFF) stepping down from the ISA committee and Flower Msuya (University of Dar es Salaam) joining at this meeting. There were only two delegates from South Africa present, myself and Kai Duven (linked with Afrikelp). Rob Anderson and I convened the 17th meeting at the University of Cape Town in 2001, but there has been less South African contribution over the last few meetings. There were 4 other African delegates, from Madagascar, Mauritius and Morocco. In total 450 delegates from 49 countries participated.

ISS meetings originated as a link between the phycocolloid industry and researchers, and there is still considerable input from industry. As is tradition, one of the plenary sessions was reserved for global summaries of the colloid industry, this year given jointly by Brian Rudolph (CP Kelco) and Hans Porse (Intercolloids), both based in Denmark. In a sign of the times, this year this was followed by an additional industry plenary by Yimin Qin from China (‘A Brightmoon Perspective’). The latter was a detailed outline of the ‘bio-refinery principle’, which is increasingly mentioned with respect to seaweeds, with many products arising from the same biomass. In the last 15 years, Indonesia has replaced the Philippines as the centre of world carrageenophyte production (world total 58 000t in 2015), and the production of carrageenan itself has been mostly in Asia-Pacific regions (48%) and China (28%). The agar-

producing seaweeds show an interesting pattern, with 77% of the 115 000t per annum total of *Gracilaria* produced in the Asia-Pacific region, whereas only 10 000t of *Gelidium* is produced, globally, per annum, with 60% from Morocco. Brian Rudolph showed a newspaper article from Indonesia headlined “why *Gelidium* must be regarded as a national treasure” and elsewhere in the meeting Melo and Rui Santos highlighted the “global shortage of bacteriological and technical agars”. All attempts to cultivate *Gelidium* have ended in failure, and protection of natural stocks is critical.

The 40 oral sessions were dominated by cultivation (9 sessions, including 2 on Integrated Multi-Trophic Aquaculture); interesting considering that the first ISS to have more than one session of papers on seaweed aquaculture was Cape Town 2001. Other major topics were ecology (6 sessions), molecular (including taxonomy, 4), bioactives (4) food and feed (3), and a variety of topics directly related to industry (biofuel, processing and bio-refinery, valorisation, risk assessment, processing, economics). There was a single session on management and harvest.

All the plenaries were excellent, with the first one by Rocky de Nys of James Cook University (Australia) being particularly relevant. He initially acknowledged the work of Amir Neori in Israel and our group in South Africa on integrated aquaculture of seaweeds. The work of his group on the use of *Ulva* for bioremediation of prawn-farm effluent is making it feasible for a large expansion of this industry, otherwise not possible on environmental grounds. The new farm will provide Aus\$6m per annum production, with 2500t of prawns and 2500t of *Ulva ohnoi*. There are plans to produce “Australia’s largest aquaculture facility”, 6km² in area with “zero impact” on the adjacent ocean. The Australians are producing a large body of research on the use of *Ulva* biomass, including fertiliser on banana farms, nutraceuticals, protein-rich aquafeed, seaweed salt, biochar, etc. Rocky said something we in South Africa know about (Bolton et al. 2016): “there’s something about *Ulva* ...”. Evidence of nutraceutical benefits of seaweed-feed addition includes a large reduction in total internal fat in ‘fat rats’. There were a number of oral presentations discussing the benefits of seaweed ingestion, with significant evidence that inclusion in the diet can significantly reduce the use of antibiotics in the poultry and swine industries, respectively (Franklin Evans et al., Acadian Sea Plants; Stefan Kraan, Ocean Harvest Technology).



Some of the Danish seaweed foods on display at the ISS

The plenary by Ester Serrão (University of the Algarve, Portugal) was on ‘shifting genetic baselines in marine forests’, with a large body of data using molecular genetic markers to plot the movements and potential loss of genetic diversity in large brown algae as a result of climate change. Pockets of unique genetic diversity are often located in shrinking climatic refugia, and simply monitoring the movement of ‘species’ will be likely to miss evolutionarily critical events. The final plenary was a fascinating overview of recent research on the physiology of the seaweed/seawater boundary, by Catriona Hurd (University of Tasmania, Australia). She presented recent research on the importance of the diffusion boundary layer, both in the retention of excreted nitrogen and the protection of calcified seaweeds from ocean acidification. It was also shown how kelps may protect calcified organisms in kelp forests from ocean acidification effects.

I was lucky enough to go on a tour of one of the world’s largest producers of carrageenan (Copenhagen Pectin) on the midweek excursion. As was mentioned at the conference, the colloid industry has been static for the last few years, and their big growth sector is currently in beverages – those strange new bottled drinks with outlandish ‘bioflavours’ and interesting ‘mouth-feel’. Having seen *Eucheuma* grown, harvested, dried and baled in Zanzibar a few years ago, it was fascinating for me to see the same bales in an enormous warehouse in Denmark, about to be processed into carrageenan.

A big change I noticed from past conferences was confirmation of the exploding interest in seaweeds as human food in the western world. We had seaweeds every day in one or more sections of the excellent lunch buffet, and there were exhibitions showing the

production of seaweeds for human consumption all over Europe (including Copenhagen harbour, where you are also allowed to swim, as well as two types of ‘seaweed gin’). An innovative and different ‘plenary lecture’ was the interview with René Redzepi, the chef and co-founder of Restaurant Noma (one of the top restaurants in the world), and a man Time Magazine called ‘one of the world’s 100 most influential people. He was interviewed by Prof. Ole Mouritsen. Some quotes: “think of rice – what has been done with it - (seaweed) products could be as bountiful”. “We need to get kids eating seaweed, put them into schools”. “We need an ‘innovation cooking lab. for seaweed’, just exploring flavour, not only looking for nutrition”. “Freshness is not too important, flavour is the determining factor”. Noma always has 4-5 seaweed dishes on the menu (including ‘seaweed ice-cream’) with particular seasonal specialities in January to April. He believes that “every child should be a forager” in order to “taste nature and be better connected to your place, and use your senses in a different way”.

The 23rd International Seaweed Symposium will be held from April 29 to May 3 2019 on the beautiful tourist island of Jeju on the coast of Korea. The theme is ‘Seaweeds: From Tradition to Innovation’. Start planning now!

Reference:

Bolton JJ, Cyrus MD, Brand MJ, Joubert M, Macey BM (2016). Why grow *Ulva*? Its potential in the future of seaweed aquaculture. *Perspectives in Phycology*. Published online: September 2016.



Seaweed frescoes above the doors of the Copenhagen City Hall (where the ISS reception was held). They were painted by Jens Møller-Jensen and his wife Sigrid Vold in 1902-03. “They are signed only by Jens although Sigrid actually made many of the finest paintings. At the time it was not so acceptable, being a female painter”. The two here are *Phyllophora pseudoceranoides* and *Fucus serratus*. (photos John Bolton).

OBIS Training with UNESCO in Belgium

Kirtanya Lutchmanarayan, UCT

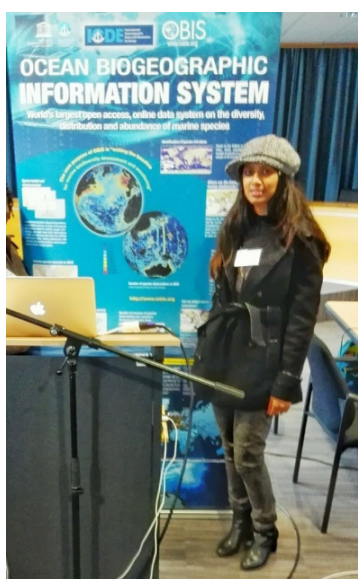
In November 2015 I had the privilege of being selected to attend an Ocean Teacher Global Academy Training Course in Marine Biogeographic Data Management in Belgium. The course was held at the UNESCO office in Oostende, and supported by the International Oceanographic Commission for International Oceanographic Data and Information Exchange (IODE).

Training was focused on OBIS, which is an Ocean Biogeographic Information System for data and information on marine life. The goals of OBIS are to build and maintain a global alliance that collaborates with scientific communities in order to facilitate free and open access and application of information. OBIS has a mandate under the United Nations to contribute to the protection of marine ecosystems by assisting in identifying marine biodiversity hotspots and large-scale ecological patterns, in all ocean basins. The Intergovernmental Oceanographic Commission (IOC), which supports these programs, is the United Nations focal point for ocean science, observation, data and information exchange and capacity building.



Attendees at the Ocean Teacher Global Academy Training Course in Marine Biogeographic Data Management, Oostende, 2015.

Eighty researchers applied for the OBIS program and 15 were selected to attend. I was fortunate to be fully sponsored by the Government of Flanders, and was also the youngest participant. The others were government and institutional researchers from many countries including Iceland, Venezuela, Ukraine, Argentina, Namibia, Nigeria, Colombia, Mexico, Malaysia and the United States. Many of them came from a fisheries background, and I was the only “algal” representative, which allowed me an opportunity to share valuable information. I represented South Africa and brought a number of datasets including occurrence data for Rhodophyta, Chlorophyta and Phaeophyceae. This amounted to about 43 000 rows of historical data (collected by phycology pioneers), that I was challenged to grapple with in just five days!



It proved to be an excellent experience; one of learning, teaching and networking. Part of the training included the use of various programs to map species distribution, abundance and density, which I was able to apply to red, green and brown algae. I also managed to use existing data from OBIS on *Ecklonia maxima*, *Ecklonia radiata*, *Laminaria pallida* and *Laminaria ochroleuca* and map their global trends. I found that 4672 South African marine species are listed on OBIS, which accounts for 161 years of data. I extracted an annual South African species count and the majority of these records accounted for chordata, which made it clear how under-represented phycological data are. I also gained further insight into ‘R’ and managed to incorporate Bio ORACLE environmental data into R to produce global trend maps. Lastly, we were briefed on the process required to publish data on OBIS. Finally, we each presented our findings to the rest of the group, where a process of peer-grading was used. I was pleasantly surprised to win the second prize, for my presentation on South African marine data trends. It was humbling to be acknowledged by these international researchers and professionals, and encouraging, given that I was the only student participant. Upon return to South Africa, I was featured in the Western Cape Government’s “110% Green” news, as well as on The Green Matter Network for Biodiversity Ambassadors.

Another highlight of the trip was an unexpected encounter. I had mentioned to the coordinators that I am using Bio ORACLE in my Masters research, only to find that the mastermind behind the dataset worked in the UNESCO building. It was great meeting him and getting to thank him for his contributions to marine science. The connections made

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during this program are ones that will last a lifetime, and the skills were invaluable. I realised the magnitude of data that exists and that will be uncovered in the future, and how important it is to publish this for the benefit of all researchers. Skills in information- and data-management are critical to research and collaboration, especially in the area of conservation.

I thank my supervisors, the coordinators and sponsors of this program who allowed and encouraged me to broaden my skill set and perspective, and afforded me the opportunity to experience Belgium.



Biographical note

Kirtanya Lutchmanarayan was originally from Durban, but her passion for nature and new landscapes and oceans brought her to Cape Town 7 years ago. She is completing her Masters in Biological Science at the University of Cape Town, under Prof. J.J. Bolton & Dr. M. Rothman. Her study involves niche modelling of kelps and the environmental variables that control their distribution. Her research is funded by the NRF and a Green Matter Fellowship. She followed her undergraduate degree at UCT (majors in Applied Biology, Ecology and Evolution) with an Hons degree that included a thesis on socio-ecological interactions in the Namaqualand Karoo.

Kirtanya has also been involved in many institutional, national and international projects for environmental and global change, namely: UCT Climate Action Project, UCT Ethical Investment Task Team, UCT Fossil Fuel Divestment Campaign, UCT Green Campus Initiative, SMILE UCT, Enviropaedia, Greenpop, Green Shift Africa NPO, AIESEC China-environmental teaching internship, The Art of Living Foundation, The International Association for Human Values, United Nations, Student Energy Canada & The World Student Environmental Network. She has also mentored undergraduate biology students and served on the Ethics in Research and Senate Animal Ethics committees at UCT.

Forthcoming conferences

11th International Phycological Congress

Szczecin, Poland, 14-18 August 2017

The First Circular for IPC11 is now available at <http://ipc11.intphycsoc.org>. Please see the website for details of the Congress, including early bird registration.

The Congress promises “an excellent scientific programme with plenty of opportunities to enjoy Szczecin and the beauty of the surrounding countryside. The local organizing committee has also made every effort to keep costs reasonable”.

Prof. Andrzej Witkowski (University of Szczecin) is convenor of the local organising committee.

World Aquaculture Society: World Aquaculture 2017

Cape Town, South Africa, 26-30 June 2017

“Sustainable Aquaculture - New Frontiers for Economic Growth – Spotlight on Africa”,

See www.was.org for more details.

Update on

30th Congress of the Phycological Society of Southern Africa (PSSA2017)

De Hoop, South Africa, 12 – 16 January 2017

The Venue

More on De Hoop at (<http://www.capenature.co.za/reserves/de-hoop-nature-reserve/>)

Getting there

De Hoop is about a 3-hour drive from Cape Town. If you are coming from Cape Town (approaching from the west), take the N2 past Caledon (watch for the speed trap there!) and through Riviersonderend, then pass the R319 turnoff that goes to Bredasdorp. About 1 km further, take the turnoff to the right signposted “Spitskop”. From there the road is gravel. Keep on this road until you reach a T-junction, then turn left. Just over 1 km later, turn right and follow the signs to De Hoop.

If you are approaching along the N2 from the east, go past Swellendam, and continue until you reach the Spitskop signpost, then turn left and follow the instructions above.

Arriving at De Hoop, you will have to report at the gate. Your “Conservation Fee” has already been paid with your registration fee, *unless you are a day visitor* (in which case you will have to pay it). Enter the reserve and follow the road, which winds over some hills. As you descend down the last slope, the tar section ends and a short distance further there is right turn to the accommodation and congress venue. When you arrive there, please report to the Reception. There you will receive the keys to your accommodation and instructions as to where to find the **Congress Reception Desk**, where you will receive your congress package.

The Dates.

Arrive Thursday 12 January, in the afternoon.

Leave Monday 16 January, after breakfast.

Shops

Although all chalets have cooking facilities, your meals and tea/coffee are included in the congress package, so you do not need to bring food. However, you might like to bring some snacks, drinks, tea or coffee for use in your chalet.

There is a small shop at De Hoop that sells basic supplies and lots of curios. However, if you need anything special, please bring it with you (e.g. medicines, special snacks, etc.).

Weather and clothing

Probably warm to hot, but rain and wind are possible, so equip accordingly. Remember there is a swimming pool and a tennis court. If you are going walking or to the shore, bring suitable footwear, a hat, etc. With good conditions there is some fine snorkelling in pools and gulleys. Marine life may not be removed (and fishing is forbidden).

Internet and cell-phone reception

Internet service there is reported to be “spotty” (unreliable). Cell-phone reception is fine.

Further Enquiries

If necessary, please contact a member of the organising committee.

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