PHYCOLOGICAL SOCIETY OF SOUTHERN AFRICA

FIKOLOGIESE VERENIGING VAN SUIDELIKE AFRIKA

NEWSLETTER
NUUSBRIEF

No. 42
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THE BOARD OF THE PHYCOLOGICAL SOCIETY OF SOUTHERN AFRICA

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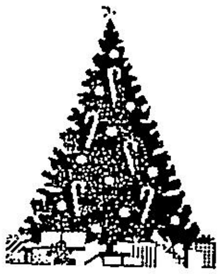


FROM THE EDITOR

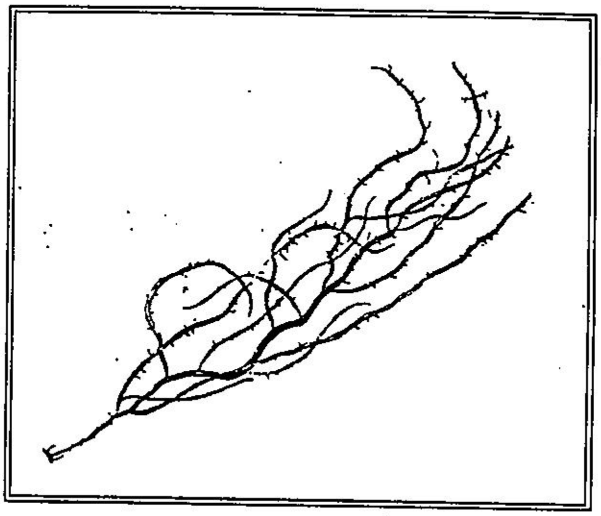
Dear Members

Best wishes to all members for the forthcoming festive season. I hope it is a restful period & I look for ward to seeing you at the PSSA conference in January. A special word of thanks to members that have contributed to the newsletter this year. I've included a list of members' names & addresses (page 9) as I often find it handy to have addresses available in hard copy form.

Regards

Janine

NEWS FROM THE SEAWEED UNIT OF SFRI



Dr Rob Anderson

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1. MARICULTURE

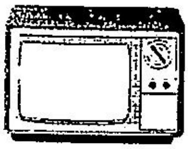
The Seaweed Unit's *Gracilaria* work at Saldanha started winding down in 1996, with the acceptance for publication of a paper summarising about 4 years of growth tests (to appear in *Journal of Applied Phycology).* However, we continued collaborating with AJ Smit, who is completing a PhD study on ecophysiology and strain selection, so we will still be visiting Saldanha Bay until about mid-1997. Biomass studies will be stopped early in 1997, once the dredging operations for the ore-quay extensions end.

We were greatly encouraged in our aim to establish seaweed mariculture on the west coast, when Sea Harvest began pilot-scale commerial tests at Saldanha in November 1995. However, growth of *Gracilaria* was very poor at their site near the mouth of the Bay, because of massive settlement by mussel spat, and prospects looked dismal until March 1996. Then Chris Dawes (the consultant who started the Luderitz operation) re-visited to assist, the spat settlement abated with the change of seasons, and since then good production has been obtained. If last summer's exceptionally heavy mussel spat-fall is not repeated this year, and there is a reasonable harvest of *Gracilaria*, the taxpayer's money we've spent on mariculture research will be justified.

The mussel spat problem is a good example of how important site-selection is for mariculture. Sea Harvest placed their cultivation rafts in their mariculture lease area, near existing mussel rafts. We had no problems with mussels in nearly 5 years of tests in the same bay, but our own experimental area is some 3 km away, and subject to different currents.

A final study in Saldanha Bay (with AJ Smit) aims to quantify the nitrogen sources available to cultivated and natural populations of *Gracilaria*. This is mainly to test whether ammonium-rich fish-factory waste could be a useful nitrogen source for *Gracilaria*, which normally grows poorly in late summer when natural nitrogen levels in the warm surface water are often too low to measure. This study will compare growth rates near a waste plume with those about 2 km away. We hope to use stable isotope techniques to identify the sources of nitrogen in the *Gracilaria* thalli, as we did to implicate the waste in a problem bloom of *Ulva* several years ago. Once work in Saldanha is complete, we hope to transfer our attention to St Helena Bay, where we believe there is excellent potential for cultivating various cold-water seaweeds, as well as *Gracilaria*.

2. EXTRACTING AGAR USING A MICROWAVE.



Derek Kemp

Seaweed Unit
Sea Fisheries Research Institute

Last year A.J. Smit and I needed to do agar extractions from the *Gracilaria gacilis* grown on the SFRI experimental mariculture raft and from the natural population in Saldanha Bay. We decided to look at various extraction methods before standardising on one. Using four different types of heating apparatus we then extracted agar from one *Gracilaria gracilis* sample. The types of heating were: microwave oven, hotplate with magnetic stirrer, hotplate without magnetic stirrer and heating mantle. The yields from these extractions showed no statistical differences. The microwave is preset to the operating temperature and maintains that temperature throughout the extraction period. The advantage of this is that you can do other work during the extraction period, which is not possible with hotplates and heating mantles, because you have to constantly watch the flasks in case they boil over. Taking this into consideration, we came to the conclusion that it was much more efficient to use the microwave oven.

I then tried to extract agar from *Gelidium pristoides* in the microwave, but the yields were not nearly as good as the ones using *Gracilaria gracilis*, and far lower than previously published yields. We then realized that the microwave only reaches a maximum temperature of 90 °C (operating temperature of 85 °C), which appears to be too low for extracting from *Gelidium*, although it is adequate for *Gracilaria gracillis.* I then re-extracted the *Gelidium pristoides* samples using a hotplate with magnetic stirrer at ±100 °C and got very good yields. I felt these results could be of interest to anyone doing *Gracilaria* extractions, because of the convenience of using a microwave.

THE 16th INTERNATIONAL SEAWEED SYMPOSIUM

VENUE : Cebu City, Philippines.
DATE: April 12 - 17, 1998.

HOSTS: University of the Philippines, University of San Carlos, and the Seaweed Industry Association of the Philippines.

Full paper and poster presentations are invited on all aspects of seaweed research and utilization. Those wishing to organize special sessions or topics, please contact the organizers.

Cebu is the Philippines' oldest city, and is located in the middle of the archipelago. International direct flights from major cities in the world are served: Tokyo, Kuala Lumpur, Sydney, Singapore, and Hong Kong. There are daily air links with many Philippine cities and several daily flights from Manila (1 hour). Ship travel by overnight ferries or by fast-speed catamarans (2 - 4 hours) to several cities are available. Cebu is a major tourist destination for scuba diving and island travel. A range of accommodation is available. *Eucheuma* culture farms are within reach by boat in less than a day.

The 3rd International Seagrass Biology Workshop will follow right after the 16th ISS, in 19 - 24 April 1998, in Palawan.

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Keats, D.W., A. Groener & Y.M. Chamberlain, 1993. Cell sloughing in the littoral zone coralline alga, *Spongites yendoi* (Foslie) Chamberlain (Corallinales, Rhodophycota). *Phycologia 32*: 143-150.

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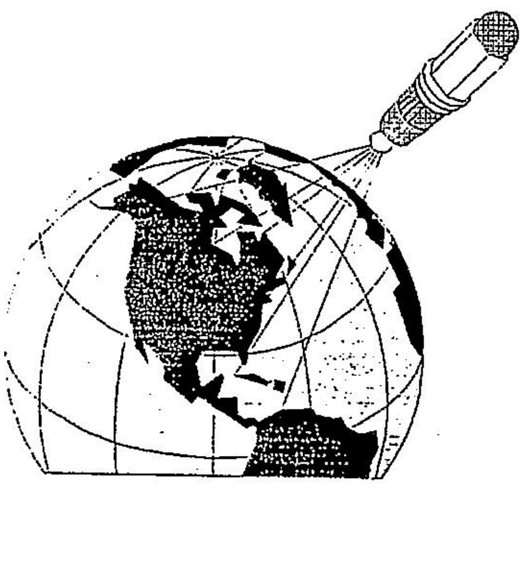

REMOTE SENSING OF PHYTOPLANKTON BIOMASS & PRIMARY PRODUCTION IN THE OCEAN: A PROMISING FUTURE

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Last year I attended an intensive course on the **"Applications of Remotely Sensed Data on Ocean Colour"** held in Bangalore, India from April 3 - 7, 1995.

Course presenters :
Drs Trevor Platt and Shubha Sathyendranath, a husband and wife team from the Bedford Institute of Oceanography and Dalhousie University, Canada, respectively.

Hosts:
The Indian CSIR Centre for Mathematical Modelling & Computer Simulation (C-MMACS) of the National Aerospace Laboratories in Bangalore.

Other sponsors:
COSTED, IOC, JGOFS, ROSTAS, SAREC, SCOR, START, UNESCO.

Participants:
47 participants from 19 countries, mostly third-world countries; six participants, including myself, were from African countries. The majority (23) of the participants were from India, perhaps understandably as India has a highly developed space programme and has launched several satellites in the past.

Ocean colour & primary production

Ocean-colour, which can be measured by remote sensing, reflects the amount of phytoplankton chlorophyll present in the ocean. Drs Platt and Sathyendranath have developed modelling procedures for transforming maps of ocean-colour data into maps of primary production. This transformation is based on the physiological processes involved in the interaction between chlorophyll and light. Their course covered the theoretical derivation of complex mathematical models needed to compute the rate of photosynthesis by phytoplankton, where both phytoplankton biomass and light vary through the water column and over time.

Avaliable space-borne colour sensors

The first space-borne colour sensor was the **CZCS** (Coastal Zone Colour Scanner) which operated from 1978-1986, yielding much ocean-colour data, the analysis of which is currently being assessed. The sensor recorded ocean-leaving radiances in several wavebands and the ratio of two of these (the blue-green ratio) was calibrated against the concentration of phytoplankton chlorophyll in the surface layer. The signal detected by the sensor emanates from the upper layer of the ocean equal to one attenuation depth, approximately one-fifth of the euphotic layer. The data are collected at a spatial resolution of better than 1 km at the sea surface. **SeaWiFS** (Sea-Viewing Wide Field-of-View Sensor), the next generation of sensor, has improved capabilities, and was due to be launched in the early 1990's aboard the **SEASTAR** satellite. After many disappointing delays, thelatest launch-date is scheduled for early 1997.

The way forward for South African waters

Algorithms relating ocean colour and phytoplankton biomass and production will have to be tailored for the biogeochemical provinces or domains within South African waters. The algorithms are complicated, requiring information about the light field both at the sea surface and as it changes with depth, and about phytoplankton populations, their distribution with depth and physiological characteristics. Some of the required information can be calculated (eg. sea surface irradiance as a function of time), or is obtainable from remote sensing (eg. cloud cover and phytoplankton biomass). Knowledge of the vertical distribution, photosynthetic and nitrogen-uptake characteristics of phyto- plankton populations as well as light penetration characteristics likely to occur in a particular domain in a particular season, can only be obtained from detailed field studies.

The need for a data archive

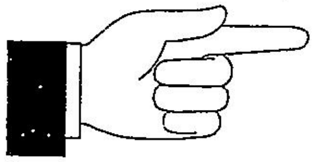
In practical terms this means that a data archive of the required biological and physical parameters on a regional and seasonal basis, must be created. Since the vertical distribution and population structure of phytoplankton populations is closely related to water column structure, within defined hydrographic domains these population characteristics are likely to remain constant. Once the generalized shape of the chlorophyll profile in a particular area has been established, the actual dimensions of the profile can be determined from satellite measured-chlorophyll. For instance, on the Western Agulhas Bank it has been established that there are three domains, an inshore upwelling domain, a shelf domain and an offshore domain. In each domain, the biomass profile has a characteristic generalized shape, but the actual dimensions may vary depending on such factors as the depth of the thermocline and the supply of nutrients.

Future applications of remote sensing

In the future, the application of remotely sensed data of all kinds (ocean colour, thermal etc) is likely to revolutionise environmental monitoring. By taking advantage of both ship-based surveys giving detailed information within the water column but low coverage, and satellite imagery giving frequent basin-scale coverage but of low accuracy, one can extrapolate from small numbers of discrete observations over large horizontal scales and at frequent time scales. Satellite imagery of ocean-colour promises to be an invaluable tool for assessing the magnitude and variability of the standing crop of phytoplankton and its productivity. Even more importantly, we will be able to assess 'new' production which is the production by larger phytoplankton size classes based on nitrates and which is channelled up the food-chain to fish. In the future primary and 'new' production estimates will be available on a daily basis for any geographic area of interest, leading to greater understanding of the magnitude and dynamics of primary production at frequent, ocean-basin scales and of possible causes of variability in pelagic fisheries. In addition ocean colour images will help to elucidate the dynamics of currents and eddies as well as the relationship between ocean physics and large-scale productivity patterns.

I found the course very valuable, not only for the knowledge I gained and the contacts I made, but perhaps more importantly for the inspiration and heightened awareness of the significance and potential of satellite imagery in a fisheries context. We were overwhelmed by the hospitality extended by our Indian hosts. A 'working lunch' (a three course meal of soup, curries and sambols, and dessert) was provided every day in the lush garden of the hotel and a dinner was given one evening. On arrival we were each presented with a small briefcase and on the last day there was a formal farewell ceremony, with speeches by several state politicians and local dignitaries, where each person was presented with a gift (an address book) and a Certificate of Participation. Although there was unfortunately little time for sight-seeing, we found that India is certainly an overwhelming and unforgettable experience.

14 th CONGRESS OF THE PHYCOLOGICAL SOCIETY OF SOUTHERN AFRICA



IF YOU WOULD STILL LIKE TO REGISTER PLEASE CONTACT DR EILEEN CAMPBELL ASAP

e-mail: PSSA@upe.ac.za

TEL: 041-5042329

FAX: 041-532317

DATE : 20-22 January 1997

VENUE: Victoria Protea Hotel, Port Alfred

<u>COSTS:</u>

Registration:	R200
Accommodation (single)	R440
Accommodation (sharing)	R350
Congress Dinner	R 40
Estuarine field trip	R 30
Dive field trip	R 55

Accommodation is from Sunday afternoon to Wednesday lunch and includes all meals and teas.

Information about the conference is also available on the Web at:

http://www.upe.ac.za/botany/pssa/conf97.htm

BOT RIVER ESTUARY SURVEY, JANUARY 1996

Dr.Rob Anderson

During the field excursion accompanying the 1996 PSSA Congress, participants visited several sites along the 10km-long Bot River Estuary and collected algae on 23.01.96. Studies of various aspects of this system (except the algae) were done some time ago and published in the *Transactions of the Royal Society of South Africa,* volume 45, 1985.

We had hoped to produce a short report on the algae, but fell a little short of this aim, for a number of reasons. Mainly, I think, because we did not have a clear idea of exactly what we wanted, and were being over-optimistic about what could be achieved in one day. Nevertheless, participants found it interesting, and lists of algae were obtained for various sites. The following information was compiled from the data which field trip participants very kindly sent.

SPECIES LIST

Information from:

Podge Joska, Botany Dept., UCT & Annelie Swanepoel, Dept. Plantkunde, Potchefstroom University.

Bot River. Sand pool - estuary side of sand bar.

Lyngbya sp. (dominant in sample) 20-25 μm in diameter, cells 0.1 to 0.2 x longer than broad. Cyanophyceae)

Bot River. Beneath road bridge. Agricultural area.

1. *Mougeotia* sp. 15-16 μm in diameter. (Conjugatophyceae)
2. *Spirogyra* sp. (Conjugatophyceae)
3. *Oedogonium* sp. (Oedogoniaceae).
4. *Microspora pachyderma* 34-36 μm in diameter (Microsporaceae)
5. *Melosira granulata* (Diatomaceae)
6. *Ulothrix zonata* 60 μm in diameter, cells 2 to 3 x longer than broad, zoospores present. (Ulotrichaceae)
7. *Oscillatoria* sp. 10-12 μm in diameter, cells 0.8 to 1.2 x longer than broad, blunt apical cell. (Cyanophyceae)
8. *Oscillatoria* sp. 1.5-2 μ in diameter, cells 1.5 to 3 x longer than broad, thin sheath. (Cyanophyceae)
9. *Lyngbya* sp. 20-25 μm in diameter, cells 0.1 to 0.2 x longer than broad. (Cyanophyceae)

10. *Ceratium* sp. (Ceratiaceae)
11. *Chaetoceros socialis* - (Chaetoceraceae)
12. *Gymnodinium* (2 spp.) - (Gymnodiniaceae)
13. *Gyrodinium* sp. (Gymnodiniaceae)
14. *Peridinium* sp. (Peridiniaceae)

Bot River. 2nd site ± 100 m above previous site.

1. *Cladophora glomerata* (Cladophoraceae)
2. *Melosira* sp.(Diatomaceae)
3. *Oscillatoria* sp. 16-18 μm in diameter, cells 0.1 to 0.2 longer than broad (Cyanophyceae)
4. *Spirulina* sp. 1-1.5 μm in diamter. (Cyanophyceae)
5. *Enteromorpha cf. prolifera*. Branches narrow, several pyrenoids. (Ulvaceae)

Karwyderskraal Road site. Agricultural area with evidence of nutrient input. Slowflow area.

1. *Spirogyra sp.* 30 μm diameter. Plane end with 2-3 chloroplasts.(Conjugatophyceae)
2. *Spirogyra* sp. 50 μm diameter, 4 chromatophores (Conjugatophyceae)
3. *Oedogonium* sp. (Oedogoniaceae)
4. *Stigeoclonium cf. tenue* (Ulotrichaceae)
5. *Mougeotia* sp. ± 14 μm diameter, 6-7 pyrenoids (Conjugatophyceae)
6. *Ulothrix* sp. 22.5 μm diameter (Ulotrichaceae)
7. *Closterium* sp (Desmidaceae)
8. *Pleurotaenium* sp. 440 μm long, 20-25 μm widest diameter (Desmidaceae)
9. *Melosira granulata* (Diatomaceae)
10. *Oscillatoria* sp (Cyanophyceae)

11. *Actinastrum hantzschii* (Scenedesmaceae)
12. *Actinospearium* sp. (phylogenetic affinity Actinophryida)
13. *Ankistrodesmus* sp. (Oocystaceae)
14. *Chaetoceros* sp. (Chaetoceraceae)
15. *Chroomonas* sp. (Cryptochrysidaceae)
16. *Euglena acus* (Euglenaceae)
17. *Euglena pusilla* (Euglenaceae)
18. *Lepocinclis salina* (Euglenaceae)
19. *Melosira granulata* (Coscinodiscaceae)
20. *Nitzschia* sp. (Nitzschiaceae)
21. *Oscillatoria* sp. (Oscillatoriaceae)
22. *Phacus longicauda* (Euglenaceae)
23. *Pleurotaenium* sp. (Desmidiaceae)
24. *Scenedesmus opoliensis* (Scenedesmaceae)
25. *Strombomonas ovalis* (Euglenaceae)
26. *Synura* sp. (Synuraceae)
27. *Tetraselmis* sp. (Tetraselmaceae)
28. *Tracehlomonas volovocina* (Euglenaceae)

Pennate diatoms

Lamloch Bridge site. Near Kleinmond.

1. *Batrachospermum* sp. x 2 (Rhodophyceae)
2. *Microspora* sp. (Diatomaceae)
3. *Tetraspora* (type) sp. (Tetrasporaceae)
4. *Gymnodinium* sp. (Gymnodiniaceae)

Aquatic moss: *Campylopus paradoxus*. 1st ever collection in South Africa.

Various interesting desmids sent overseas for identification.

Rooisandbridge.

1. *Enteromorpha* sp. (Ulvaceae)
2. *Cladophora glomerata* (Cladophoraceae)
3. *Lyngbya* sp. (Cyanophyceae)
4. *Nostoc* cp.(Cyanophyceae)
5. *Calothrix* sp. (Cyanophyceae)

Rooisand Pool

1. *Lyngbya* sp. (Cyanophyceae)
2. *Anabaena* sp. (Cyanophyceae)

Table 1

Temperature, salinity and chlorophyll profiles at 6 sites along the Bot River Estuary, January 1996.

Station 1 - Rooisand, 2 - near Meerensee resort, 3 - mid-lagoon, opposite yacht Club, 4 - 6 are about 1.5 km apart, going upstream (away from the sea).

Station	1.0	2.0	3.0	4.0	5.0	6.0
Depth (m)	1.5+	3.0+	2.3+	2.3+	1.2+	0.9+
Temperature						
Surface	20.6	21.6	22.3	23.4	24.4	24.3
Bottom	20.7	15.9	15.8	21.1	24.4	24.4
Temperature						
Surface	20.5	21.5	21.0	23.0	23.5	24.0
1 metre	20.5	21.5	21.5	23.0	24.0	24.5
Salinity						
Surface	34.0	35.7	36.5	37.2	37.8	31.0
1 metre	34.0	35.7	36.0	36.0	35.0	26.0
Chlorophyll-a (mg /m^3)						
		10.2		15.2	39.5	
Production (mgC/m^3/h)						
		230.0		320.0	730.0	

(Compiled by Betty Mitchell-Innes, from Profiling Natural Flourometer data, and additional temperature and salinity measurements by Derek Keats).

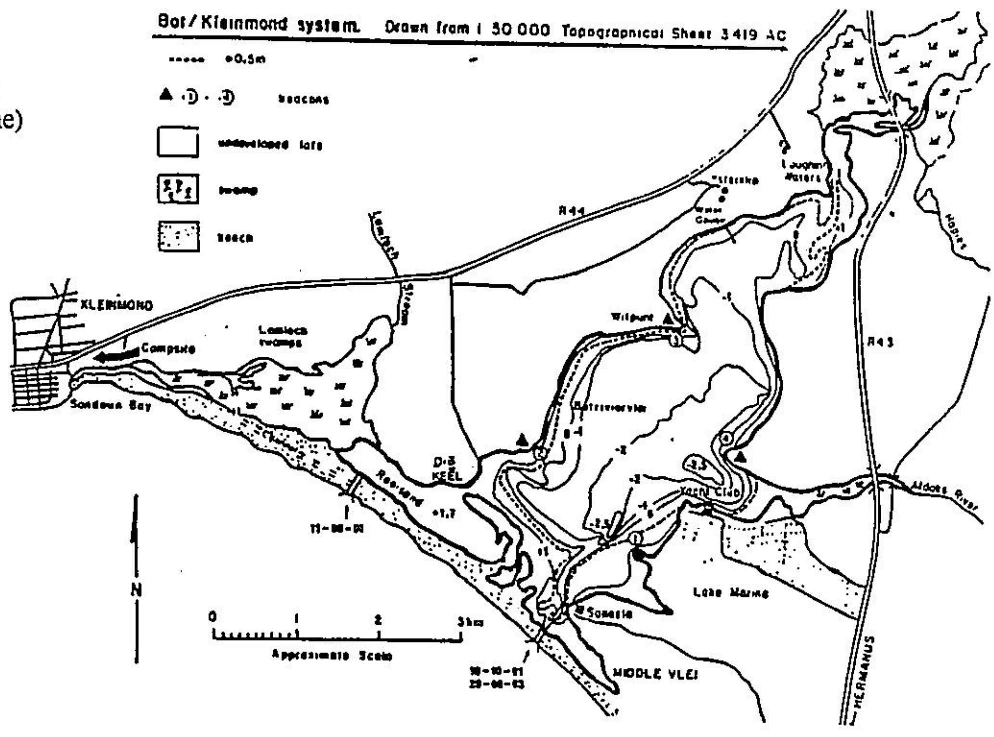


Fig. 1. Map of Bot River estuary, (Branch et al. 1985)

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