

**PHYCOLOGICAL SOCIETY
OF SOUTHERN AFRICA**

**FIKOLOGIESE VERENIGING
VAN SUIDELIKE AFRIKA**

**NEWSLETTER
NUUSBRIEF**

**No. 38
March 1994**



Dear PSSA members

I've taken over the task of newsletter editor from Eileen Campbell. The look of the new -letter has changed slightly but certainly not the contents. I look forward to any suggestions on improvement and eagerly await your contributions for the next issue.

The abstracts from the January PSSA Congress are included in this issue. Although the PSSA group was small the papers presented seem to be of a high standard. Next year PSSA will hold its own conference. It will be hosted by SFRI and members are encouraged to attend.

Regards

Janine Adams

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P.S. Thanks to G.C. Bate, P. Smalles & K. Bate for SEM diatom photos



THE BOARD OF THE PHYCOLOGICAL SOCIETY OF SOUTHERN AFRICA

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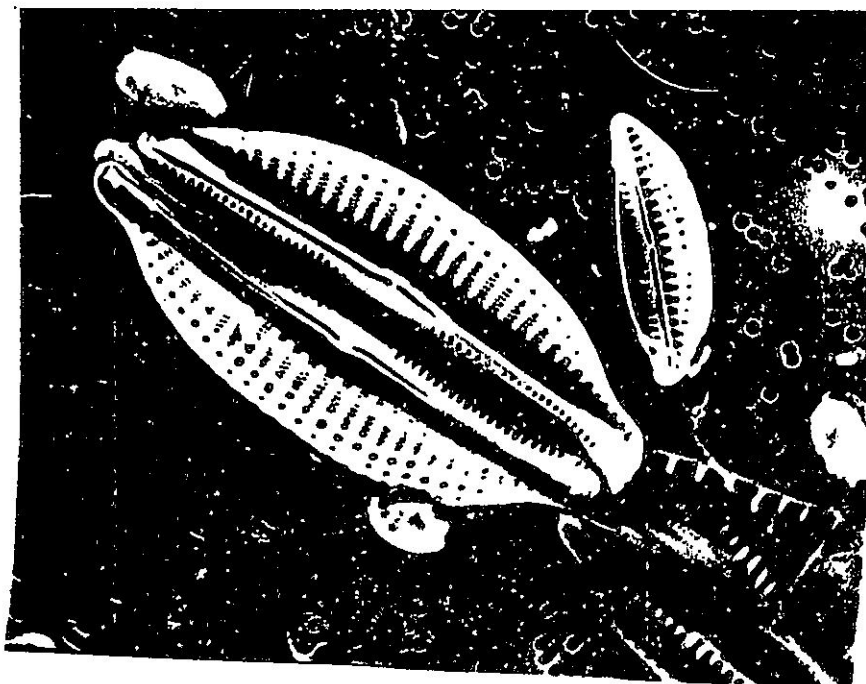
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Amphora acutiusecula



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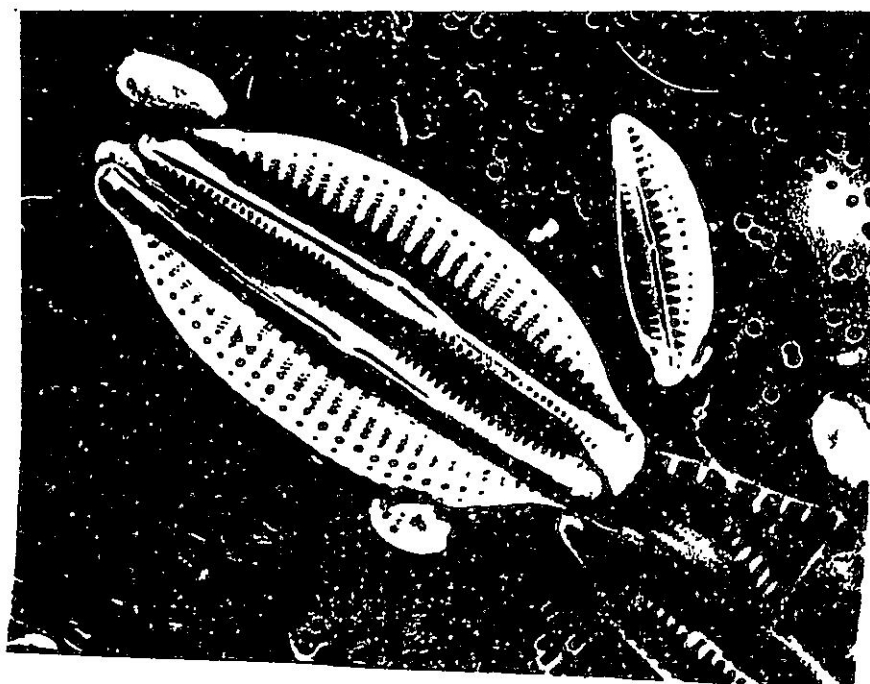
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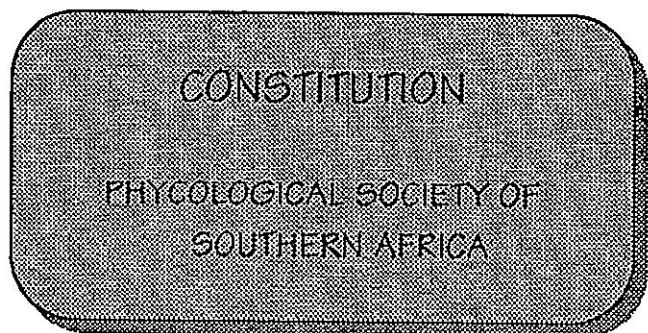


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Amphora acutiusecula



NAME

1. The name of the Society shall be the Phycological Society of Southern Africa.

OBJECTIVES

2. The objectives of the Society shall be to promote interest in Phycology, and to establish and maintain communication between persons interested in the algae of southern Africa.

MEMBERSHIP

3. Membership in the Society shall be open to any person organisation interested in any aspect of the study of algae. Application for membership together with appropriate dues shall be submitted to the Membership Secretary. Five types of membership shall exist:

- (a) Ordinary members
- (b) Life members
- (c) Corporate members
- (d) Honorary life members
- (e) Student members

Fully paid-up members will have the following privileges: (a) Ordinary members, (b) Life members, (e) Student members

- (i) To receive all notices pertaining to the activities of the Society, and to attend all meetings and excursions.
- (ii) To receive all literature issued by the Society.
- (iii) To vote in the election of the members of the Council, and to vote in the conduct of the affairs of the Society.
- (iv) To be eligible for service on the Council, the Society's committees or as an officer of the Society.

(c) Corporate members

- (i) To receive all notices pertaining to the activities of the Society, and to attend all meetings and excursions.
- (ii) To receive all literature issued by the Society. Corporate members shall be organisations which are engaged in or sponsor research in fields relevant to the objectives of the Society.

(d) Honorary life members

- (i) Privileges as for ordinary and life members. Honorary life members may be nominated by any member of the Society for

particular services to Phycology. Nominations to be approved by the Council.

DUES

4. Dues shall be payable on the first of January each year. Dues shall be determined by the Council and ratified by the membership. If any member shall be in arrears of dues for three months, the Membership Secretary shall advise the member of the fact and, if payment is not made before the end of the subsequent period of three months, the member's name shall be removed from the list of members.

5. Council of the Society

The Council shall consist of:

1. The President:
2. EITHER the President Elect
OR the Immediate Past President
3. The Secretary/Treasurer
4. The Editor of the Newsletter
5. The Membership Secretary.

The Membership Secretary, Secretary Treasurer, Newsletter Editor and President Elect shall be elected prior to every second General Meeting. The President Elect will serve on the Council for four General Meetings for which he will hold the posts, respectively, of President Elect, President (twice) and Immediate Past President.

6. The President shall be responsible for the coordination of the Society's business and shall call and preside at all meetings of the Society and the Council.

The President Elect/Immediate Past President, in the event of the inability of the President to be present or to perform his duties, shall assume the duties of President.

The Secretary/Treasurer shall maintain the records of the Society, take and distribute minutes of the meetings, shall control all financial transactions of the Society and shall present a financial report at each General Meeting. The financial report shall be audited by another member of the Council.

The Newsletter editor shall collate and disseminate information concerning the Society and its members and matters of mutual interest.

The Membership Secretary shall be responsible for membership records and collection of dues.

ELECTIONS

7. The Secretary/Treasurer of the Society shall request nominations from the membership 6 months before every second General Meeting. If nominations are not forthcoming before a predetermined date the Council will appoint an Electoral Officer who will solicit nominations from the membership.

8. A postal ballot will be distributed to all voting members at least three months before the General Meeting. Any problems arising through nominees receiving the same number of votes will be resolved by a further vote of the members present at the General Meeting. If the need arises the President shall have a casting vote.
9. All retiring Council members are eligible for re-election.
10. At the discretion of the Council, postal ballots shall be sent to the members concerning other items pertaining to the Society.
11. Premature vacancies on the Council shall be filled at the discretion of the Council. In the event of a President vacating his office prematurely the President Elect shall immediately succeed to that office and continue to serve as President through the period he would ordinarily have served. Elections for a new President Elect will be held as soon as possible.

MEETINGS

12. The Society shall hold at least one General Meeting within each two year period. Ten members shall constitute a quorum.

A General Meeting shall have the power to suspend any clause(s) in the Constitution to assure the functioning of the Society.

AMENDMENTS

13. Proposals for amending the Constitution of the Society may be submitted in writing to the Council. Proposals for amendments must have been considered and approved by the Council before being placed before the membership. The Constitution may be amended by a two-thirds majority vote of members responding to a mail ballot. Amendments shall become effective as soon as approved by the membership and shall be circulated in writing as soon as possible.



MINUTES OF THE 12TH ANNUAL
GENERAL MEETING HELD AT THE
UNIVERSITY OF THE
ORANGE FREE STATE,
BLOEMFONTEIN, WEDNESDAY,
11 JANUARY 1995

Members Present: Ms J-A Aingworth, Dr E E Campbell, Dr D R Du Preez, Mr R D Gillespie, Dr D W Keats, Mr G J Levitt, Mr G W Maneveldt, Ms W Stirk, Dr S D Sym

1. In the Absence of the President, Professor A J H Pieterse, and of the President-Elect, Dr R J Anderson, the meeting was chaired by the Membership Secretary, Mr G J Levitt, who welcomed the members to the meeting.
2. Apologies were received from the following members: Dr J Adams, Dr R J Anderson, Professor G C Bate, Professor J J Bolton, Professor R N Pienaar and Professor A J H Pieterse.
3. Minutes of the 11th AGM at the University of the Witwatersrand in January 1994 were read and approved. Proposed by : E Campbell; Seconded by S Sym.
4. Matters arising from the Minutes of Previous Meetings:
 - 4.1 It was noted that the minutes of the AGM of the 9th Meeting held at Pietermaritzburg in January 1991 were still outstanding despite repeated requests being made to the 1991 secretary. It was decided that these would be written off rather than be raised at future meetings.
 - 4.2 The question of producing a brochure to advertise the Society was investigated and found to be too expensive to pursue (it would cost in the region of R4 000) and council thought the money could be better used in getting students to conferences.
 - 4.3 The ideal of putting pressure to bear on NBI to give more priority to the algal taxonomic research was not addressed, but Mr Levitt ensured those present that this would be afforded his immediate attention.
 - 4.4 Mr Levitt was telephonically informed during the conference at the UOVS by Dr Anderson and Professor Bolton, who were at the time attending the International Seaweed Symposium in Chile, that the South African contingent had successfully tendered for the 2001 symposium to be held in Cape Town, thus satisfying one of the directives to council to revitalise the South African phycological community.
5. President's Report:

This was read in the absence by the membership secretary, Mr Levitt, and will be published in the PSSA newsletter. Its

acceptance was proposed by G Levitt; Seconded by D Du Preez.

6. Secretary/Treasurer's Report:

This was read in his absence by Mr Levitt. A request was made by Dr Campbell that less money (R1 500) be kept in the savings account with immediate access as the council had little need for large sums of money at short notice and it was attracting far less interest in this account. It was also proposed that there seemed little need to keep the visitor's account separate from the general account and that the monies be amalgamated in a general account to further attract interest. This was agreed to by all present (Attention: S Sym). The acceptance of the report was proposed by E Campbell and seconded by D Du Preez.

7. Membership Secretary's Report:

This was read by Mr Levitt. Although the overall membership is up (from 67 to 69), the secretary emphasised the need for supervisors to encourage their students to join. The report was accepted: Proposed by S Sym and seconded by W Stirk.

8. Newsletter Editor's Report:

This was read by Dr Campbell. Contributions for the newsletter were in general not forthcoming except from members of the Sea Fisheries Institute, whom the secretary thanked. She made a further appeal for members to at least send abstracts of papers published and of theses submitted as members could readily keep up to date with the interests of others in the Society. She added that the submission of articles was not improved by canvassing and that cajoling seemed to be the only successful means. Dr Campbell also explained that she had not stood for re-election as newsletter editor as she felt that she was becoming stale and that as things stood her post would be filled by Dr Janine Adams, but that there were problems in this regard that were better dealt with under Election of New Council.

The costs of the last newsletter had still not been refunded to the editor (attention: Dr Sym) and the question of the relatively high costs of a newsletter was also addressed. It was suggested that this could be reduced by either sending it only once a year or by transmitting it on e-mail. The latter option seemed rather attractive, although some members only had a street address and could not be on e-mail. It was decided that members would be asked for their e-mail addresses and Dr Keats kindly offered to make a file server available if necessary. The feasibility of the matter is to be investigated (Attention: D Du Preez)

The report was accepted. Proposer: G Levitt; Seconder: D Keats.

9. Ballot on Constitutional Changes:

The results of the postal ballot are that the constitutional changes be carried. (There was only one vote against one of the changes and two complete abstentions - the ballot returned without being completed!). Dr Levitt reminded those present that the changes were essentially cosmetic and had

been incurred by the need for more flexibility. The acceptance of the ballot was proposed by G Levitt and seconded by E Campbell.

10. Election of New Council:

Results of postal ballot for new Council are as follows:
 President: Dr R J Anderson (SFRI)
 Secretary/Treasurer: Dr S D Sym (Wits)
 Membership Secretary: Mr G J Levitt (SFRI)
 Newsletter Editor: Dr J Adams (UPE)
 and with Professor A J H Pieterse (PUCHO) as Past President.

As mentioned previously, there was a problem with the post of Newsletter Editor. Dr Campbell voiced her and her department's dissatisfaction with the manner in which the ballot had been handled. Apparently, nominations from UPE members had only been accepted on the understanding that they would stand if unopposed *en bloc*, as they felt their teaching loads were such that they could only operate effectively if they helped one another through the year. As things stood now, Dr Adams is the only member elected, is not really a psychologist, and would only have taken the job on as a favour to her peers. As a result, she feels rather intimidated by the prospect of this demanding job and has requested that her election be revoked. This was agreed to by those present and calls for nominations to this post will be made in the next couple of weeks. (Attention: S Sym). In the interim, Dr Campbell kindly offered to continue to avail herself as Newsletter Editor.

11. General:

11.1 Dr Keats raised the issue again of his attempt to get a response from NBI regarding this body's policy to algal taxonomic research in South Africa. His initial letter to Mr B Hundley, director of NBI, still remains unanswered and Dr Keats asked if he had the support of PSSA in now taking the matter further with higher levels. This was agreed to (Proposed: G Levitt; Seconded: Dr Campbell).

11.2 The problem of holding conferences under the umbrella of others was again raised. Although it was felt that this had worked in Pietermaritzburg, it was not considered successful at the University of the Witwatersrand or at the University of the Orange Free State, primarily because members were sorely tempted (or felt it their duty as lecturers) to attend papers in parallel sessions.

The time had thus arrived for the Society to hold its own independent meeting again and preferably at a venue which would ensure a captive audience, much as was achieved at Luderitz in 1988.

11.3 Professor Bate wanted the suggestion put forward that PSSA apply for funding from the FRD or some other statutory body for the express purpose of holding workshops that could systematically work their way around the coast from year to year and that could result in an annual report to such statutory body. Dr Keats was in favour and cited the success that the BPS had with such a programme. Field days should be reintroduced, but with specific goals in mind - not merely sorties. It was also noted that novices are

seldom if ever exposed to the expertise in this country (the experts are often invited to run workshops overseas!) and that the best way the Society could overcome this would be by holding regular workshops, much in the vein held in earlier years by Professor Pienaar on phytoplankton. The idea suggested by SFRI of holding two independent parallel workshops should also be avoided as there may be delegates with an interest in both. It was further suggested that these workshops be held independently from the conference, preferably in July and possibly tied to the beginning or end of the SASAQS conference. With these goals in mind, it was suggested that the possibility of running a PSSA workshop on river phytoplankton or nuisance algae before or after the SASAQS conference in Grahamstown in July be investigated. The UPE delegates present were agreeable to organise this, and a PSSA poster is to be circulated to all universities to advertise it.

12. Venue and Date of Next Conference:

An offer to host the 13th Annual PSSA Conference by SFRI was tabled. The suggestion made was that it be held on the Monday and Tuesday following SAAB, which will be held in Stellenbosch. The venue suggested was an isolated centre in the Western Cape. It was further suggested at the meeting that Knysna be considered, which met with the general approval of all present. The possibility of such a venue will be ratified by council at a future date.

13. Closure:

There being no further business, those present were thanked for their attendance and the meeting was dissolved by the Membership Secretary.

(S D Sym, Secretary/Treasurer, 15 January 1995)



ABSTRACTS FROM THE 12TH ANNUAL PSSA CONGRESS, BLOEMFONTEIN.

Short and long term fluctuations of the phytoplankton biomass of four freshwater lakes in the north-eastern coastal regions of Kwazulu/Natal

DN Boshoff, AM Zobolo and H de Wet
Department of Botany, University of Zululand, KwaDlangezwa

The development of Richards Bay as a harbour and industrial growth point resulted in a large influx of people, and increased human activities. This was foreseen to effect the catchment areas of some freshwater lakes. To determine the impact of these lakes, changes in phytoplankton biomass, measured as chlorophyll-a, were recorded for the past 14 years in Lakes Chubu, Empangeni, Mzingazi and Mangeza. The following aspects are discussed in the paper: 1) the phytoplankton biomass of the lakes relative to each other; 2) the nature of the biomass changes; and 3) the possible roles of metabolic disorders, limiting nutrients, seasonality and precipitation as driving forces of change.

Groundwater as a possible controller of surf diatom biomass

EE Campbell and GC Bate
Department of Botany, University of Port Elizabeth, Port Elizabeth, 6000

High nutrient loads often enter South African beaches, both as point sources and as seepage from freshwater aquifers which are located just behind beach foredunes. While point sources may have nitrogen loads up to 100 times higher than that of unpolluted seawater, the seepage water appears to contribute more to the increase nutrient loading of the surf-zone. *Anaulus australis* Drebes *et* Schulz accumulates to high cell concentrations in several of the surf zones of South Africa. The accumulations colour the water brown if the conditions are suitable. Ten beaches, other than the highly polluted False Bay beaches were investigated. Nutrient inputs and phytoplankton biomass showed that the higher the total inorganic nitrogen input from groundwater, the higher the biomass. Eutrophication, while not causing accumulations of *A. australis*, can be considered to change the natural dynamics of this organism resulting in elevated standing biomass. As a result of the increased discoloration of the water, the False Bay beaches have an unacceptable aesthetic appearance. *A. australis* utilises any high nutrient conditions to form excess standing stocks. In this way *A. australis* can mop up terrestrial nutrient effluent seeping into surf-zones and, as it is a nutritious organism which feeds a magnitude of surf fauna it protects marine systems from less desirable phytoplankton blooms. At sandy beaches where human impacts are minimal, large coastal aquifers can provide nitrogen to maintain a biomass level proportional to the magnitude of the nutrient supply. While surf energy is the major controlling force controlling the presence or absence of surf diatoms, nutrients may well control their standing stocks.

Cell coatings of surf diatoms

Dr du Preez and EE Campbell
Department of Botany, University of Port Elizabeth, Port Elizabeth, 6000

Many surf diatoms become buoyant by adhering to air bubbles. This, together with water circulation patterns within the surf-zone results in characteristic accumulations of cells. Early investigations suggested that flotation was facilitated by a mucilaginous cell coating. This coating was considered to be a unifying feature of surf accumulating diatoms. However, the degree to which a mucilage coat occurs, is considerably variable. For example, *Gonioceros armatus* (West) Peragallo & Peragallo has a thick mucilaginous sheath, whereas *Aulacodiscus* spp. only have thin mucilaginous strands emerging from labiate processes. *Aulacodiscus* spp. have no surface mucilage. The nature of the mucilage coating also differs between the different species. *Anaulus australis* Drebes et Schulz has a thin layer of mucilage that is continually dissolving into the water, whereas *G. armatus* has a coating that is permanent. *Asterionella glacialis* Castracane has a mucilage coat that is resistant to acid removal techniques, whereas the mucilage layer of *A. australis* is readily removed. The observations suggest that the flotation mechanism of surf diatoms cannot be simply explained by mucilages associated with surf diatom surfaces.

Environmental variables, abundance and seasonal succession of phytoplankton populations in the Vaal River

Sanet Janse van Vuuren and AJH Pieterse
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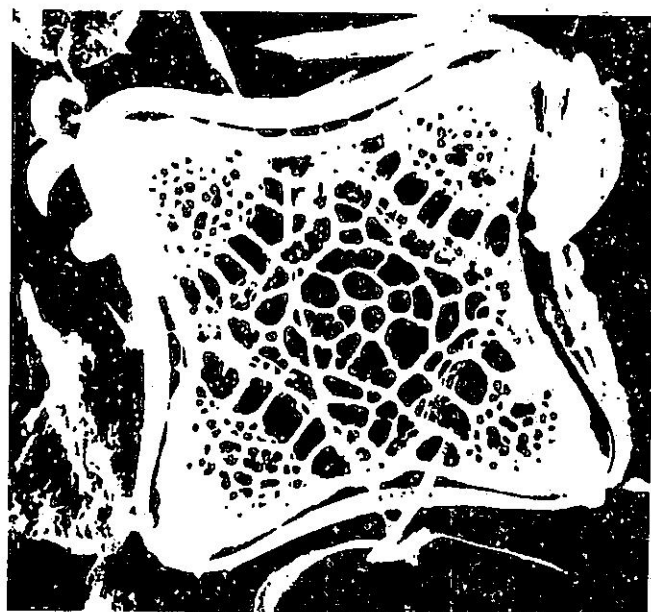
The Pretoria-Witwatersrand-Vereeniging (PWV) complex, also known as the economical heartland of South-Africa, is dependent on the Vaal River for water for drinking, mining, industrial, agricultural and recreational purposes. The Vaal River can justifiably be called the hardest working river in South Africa. Specific algal species are responsible for specific problems. It is, therefore, also important to identify the algal genera and species responsible for the problems. The number and kinds of algae which grow in surface waters depend on environmental conditions. It is, therefore, also important to investigate the environmental variables and their relation to species composition and succession in order to explain the development and decline of blooms. The aim of this study was to provide information about the types of algae present, their seasonal patterns of occurrence and the environmental factors controlling their growth and succession. Four sampling locations were selected in the Middle Vaal River, namely at the Rand Water Barrage, Parys, Stilfontein, and Balkfontein. From 1991 to 1993 representatives of seven major algal groups were found, namely the blue-green algae, diatoms, green algae, cryptophytes, golden algae, dinoflagellates and euglenophytes. Environmental variables which influence the occurrence and abundance of algal species include light, discharge, turgidity, temperature, as well as the concentration of dissolved inorganic phosphorus (DIP) and nitrogen (DIN) and silicate-silicon ($\text{SiO}_2\text{-Si}$). Higher average DIP, DIN and $\text{SiO}_2\text{-Si}$ concentrations were recorded at the upstream sampling locations (Barrage and Parys), an indication

of higher levels of pollution and eutrophication in the upstream section of the river. It seems as if the key factor determining blue-green algal dominance is the nitrogen to phosphorus ratio, while silica concentrations were associated with the wax and wane of diatom populations.

Algal species penetrating different unit processes at the Balkfontein water purification plant

Rolien Jordaan¹ and AJH Pieterse²
¹Department of Botany and Genetics, University of the Orange Free State, Bloemfontein,
²Department of Plant and Soil Sciences, Potchefstroom University for CHE, Potchefstroom 2520

Eutrophic water bodies like the Vaal River is characterised by intensive algal blooms. Algal species penetrate the different phases of the purification process. The main aim of the investigation into the penetration of algal species in the water purification plant at Balkfontein, is therefore, to determine the nature of extent of algal-related problems and the types of algae involved. For the purpose of this study, six sampling locations were selected in the purification plant at Balkfontein, namely at the Intake, after Secondary sedimentation for Modules II and III, after Sand filtration and Modules II and III and of the Final water. Representative of five different algal groups were present in the raw water as well as water in the different sampling locations. The groups were blue-green algae, diatoms, green algae, dinoflagellates and euglenophytes. A reduction in algal biomass occurred in the different phases of purification. Diatoms were dominant in the raw water and the Chlorophyceae were dominant in the final water. For comparative purposes the algal species from the different sampling locations were grouped into morphological groups. The Unicellular discoidal cells, namely the centric diatoms were dominant in the raw water. *Monoraphidium arcuatum* and *Chlamydomonas incerta* were dominant in the final water. The unicellular algae with spherical cells and unicellular algae with elongated cells were dominant in the final water.



Amphitetra sp.

A comparative assessment of the elemental composition and alginic acid content of several phaeophyta and *Ecklonia maxima*

LC Katsoulis and AT Critchley
Department of Botany, University of the Witwatersrand,
Johannesburg

Sargassum elegans, *Sargassum heterophyllum*, *Sargassum* sp1, *Styopodium zonale*, *Anthophycus* sp, *Iyengaria stellata*, *Carpemitra* sp, *Zonaria* sp, *Dictyopteris longifolia* were collected from sub-tropical waters along the Natal coast. The elemental content and alginate content of these species were determined and compared to that of *Ecklonia maxima* which grows in the temperate waters of the Cape. It was found that the elemental composition of the algae varies considerably between the species. *Anthophycus* sp is the only species yielding alginates in amounts and with viscosities comparable to that obtained from *E. maxima*.

A new species of nongeniculate coralline alga semiendophytic in *Hydrolithon onkodes* (Heydrich) Penrose et Woelkerling and *Neogoniolithon brassica-florida* (Harvey) Setchell et Mason from Fiji, South Pacific

DW Keats
Botany Department, University of the Western Cape, Private Bag X17, Bellville 7535

A new species of semiendophytic coralline alga is described from Fiji. The species is characterized by a thallus that forms a wedgelike inclusion that is partially buried in the thallus of the host coralline, *Hydrolithon onkodes* or occasionally *Neogoniolithon brassica-florida*, and that appears at the surface of the host as a small pustule that is usually paler in colour than the host. The thallus organization is dimerous, but is modified into erect filaments from a few single cells. The basal cell or cells, when visible, are predominantly non-palisade, and areas of bistratose margin are absent. Cells of contiguous erect filaments are joined by secondary pit connections. Tetrasporangial conceptacles are uniporate, with roofs formed from peripheral filaments. Tetrasporangial conceptacles lack a central columella of sterile filaments. Despite its semiendophytic nature, haustorial cells are evidently absent, and plastids and pigmentation are present. Epithallial cells are present in 2-3 layers, and individual trichocytes are common.

The effects of kelp harvesting at Danger Point on kelp recovery and benthic community structure

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Rogge Bay 8012

The establishment of abalone farms at Danger Point near Gansbaai in the Western Cape has led to a demand for fresh kelp as food. When operating at full capacity, each farm is expected to utilise up to 7t f.w. of predominantly *Ecklonia maxima* per day. The aims of this paper are: 1) To obtain an initial estimate of kelp standing stock; 2) To determine fluctuations in kelp standing stock; 3) To assess the rate of kelp recovery after

harvesting; 4) To determine the effects of harvesting on benthic community structure. Data have been collected in four experimental lanes, two on each side of the peninsula. Two lanes are controls and two have been harvested in order to determine the effects of kelp harvesting. Sampling was on a six-monthly basis, beginning in May 1992. Initial estimates of ca. 46 398t f.w. of kelp around the Danger Point peninsula have been revised, the 1992 standing stock being estimated at 31 723t, 97% of which was *E. maxima*. Kelp standing stock declined further during 1993. An initial kelp harvesting strategy based on a biannual cropping system in defined lanes has been implemented. Kelp recovery following harvesting has been negligible, with no recovery occurring prior to 1994. Some recruitment has occurred during 1994, but has been extremely low, probably because of the large numbers of grazers present in this locality. Possible amendments to the kelp harvesting strategy and the direction of future research will be discussed. To date, 80 species of algae have been identified, 63 of which belong to the Rhodophyceae, 4 to the Chlorophyceae & 13 to the Phaeophyceae. Some 143 species of benthic fauna have been recorded, dominated by gastropods (39 spp) and sponges (43 spp). No detrimental effects due to kelp harvesting have been observed in the understory benthic community.

An ecological consequence of grazing by the pear limpet, *Patella cochlear*, on the encrusting coralline alga, *Spongites yendoi*: a potential competitive reversal

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In this study, we examined the effects of grazing by the pear limpet, *Patella cochlear*, on the ecology of the encrusting coralline alga, *Spongites yendoi*. Data involving aspects of changes in the morphology and ecology of the encrusting coralline alga were recorded from Holbaaipunt along the south coast, to Groenrivier and Port Nolloth along the west coast. Along the south and south west coasts, the thallus of *S. yendoi* is relatively thin, being grazed down by *P. cochlear*, while on the west coast its thallus is thick as a result of the absence of *P. cochlear*. The presence or absence of *P. cochlear* invariably affects, not only the thallus thickness of *S. yendoi*, but also the general morphology, fecundity, growth rate, nutrient status, and the competitive ability of the coralline. In this particular case, differential thallus thickness, which directly affects the ability of encrusting algae to compete by overgrowth, may result in a competitive reversal along this geographical gradient.



Long-term changes in phytoplankton biomass and environmental variables in Loch Vaal

AJH Pieterse

Department of Plant and Soil Sciences, Potchefstroom University for CHE, Potchefstroom 2520

Algal blooms by *Microcystis aeruginosa*, *Anabaena cylindrica* and *Oscillatoria simplicissima* occur in the Loch Vaal. Because these blooms may sometimes form toxic substances, health problems may be created in an urban environment used for housing and recreation. Rand Water, Vereeniging, is monitoring algal biomass and environmental variables in the Loch Vaal since 1987. The algal biomass and environmental information was investigated with the view develop research and management strategies for algal growth. Loch Vaal is a shallow, open water body, morphometric characteristics which contribute to the development of algal blooms. Although nutrients may be supplied from the bottom sediments, the Rietspruit was shown to be the primary source of nutrients. Dissolved inorganic N and P act, in turn, as limiting nutrients for algal growth. *O. simplicissima* became dominant after increased $PO_4\text{-P}$ is most probably the primary growth limiting nutrient. Future strategies for the control of algal growth should include at least a reduction in the $PO_4\text{-P}$ supply to the water column in the Loch Vaal. Different options should be considered to make the reduction possible, i.e. reduction in diffuse and point sources in the Rietspruit catchment area, the removal of $PO_4\text{-P}$ from the inflowing Rietspruit water in an $PO_4\text{-P}$ elimination plant or by *Phragmites* stands, as well as by the covering of bottom sediments. Management strategies to investigate are the influence of dredging and the resultant exposure and drying of the bottom sediments, as well as the dilution of water in the Loch Vaal with Vaal River water.

Growth characteristics and pigment composition of two *Chlamydomonas* spp. in different growth media

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The growth and pigment composition of two *Chlamydomonas* species, one from Lake Kinneret (LK) and one from the Vaal River (VR), were investigated under controlled laboratory conditions. Growth experiments were done with the two species in different concentrations of four different growth media. An investigation of chlorophyll-*a* and -carotene composition were also done. The GBG 11 medium is apparently the best medium for the cultivation of the *Chlamydomonas* species. This conclusion is demonstrated by the growth rate during the exponential phase and the final yield. The *Chlamydomonas* LK species was shown to grow better in the culture conditions prevailing during the investigation than did the *Chlamydomonas* VR species. The levelling off of the growth rate after the exponential phase may be due to nutrient depletion or self-shading. Doubling of the light intensity increased the final yield, indicating that self-shading most probably resulted in the reduction of the growth rate towards the end of the exponential phase. The adding of major elements seems to change the stationary phase into a secondary exponential growth phase. This

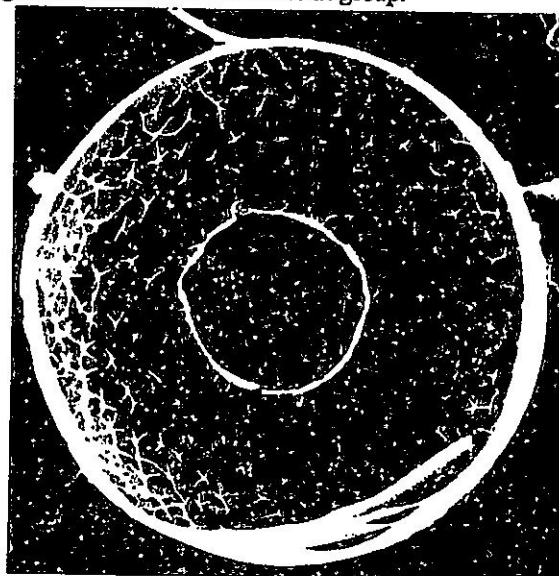
could perhaps be when the medium runs out of the nutrient supply (as in the case of the 5% and 100% media). High total nutrient concentration (300%) does not seem to be advantageous to growth. Increased medium concentrations up to 200% seem to improve growth significantly. The pigment composition in each of the *Chlamydomonas* species shows that chlorophyll-*a* is the most abundant pigment. When the species are apparently growing in nutrient limiting conditions (as in 5% medium), -carotene is dominating the pigment composition of the cells. Higher -carotene content in relation to chlorophyll-*a*, therefore apparently indicate environmental stress.

A new species of *Pyramimonas* (Prasinophyceae) from Natal and implications for the type subgenus

SD Sym and RN Pienaar

Botany Department, University of the Witwatersrand, Johannesburg

An as yet undescribed *Pyramimonas* species, isolated from Palm Beach, Natal, was found to have ultrastructural characters most consistent with the subgenus *Pyramimonas*. This subgenus is largely comprised of octoflagellate or sixteen flagellate species, with only the type species, *P. tetrahyinchus*, being quadriflagellate. This makes the discovery of the present quadriflagellate representative of interest. The flagellar apparatus, a pivotal character in modern ultrastructural phylogenetics of green algae, of the multiflagellate species (i.e. greater than four) has been described as having a discrete configuration ('shifted') from the two other forms ('rhombic' and '301') exhibited by quadriflagellates. The flagellar apparatus of *P. tetrahyinchus* has not been described, but the limited information available from the literature indicates that it is of the 3-1 type. The present species also has this format. An evaluation of the shifted type leads to the conclusion that it is no more than an elaboration of the 3-1 type. The flagellar apparatus of the new species also is of the 3-1 type. In addition, it has a structure (an oblique band) unique to the genus, and it has positional homology to the R2 associated fibre of the presumably more primitive genus, *Pterosperma*. The subgenus *Punctatae* is more commonly envisaged as most primitive but the discovery of the oblique band in a representative of the subgenus *Pyramimonas* is suggestive of an alternate ancestral group.



Melosira nummuloides

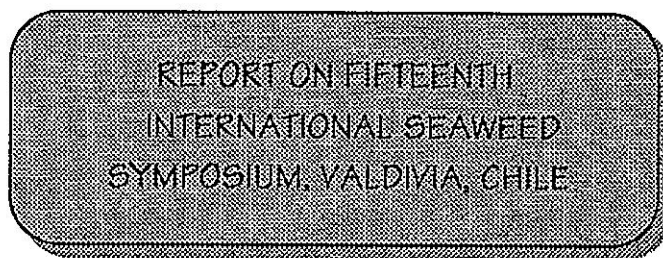
Coagulation and sedimentation of water from the Vaal River

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Coagulation is a process whereby small particles are combined into larger aggregates. Coagulation is an essential part of accepted water treatment practices in which coagulation, flocculation, sedimentation and filtration are combined in series to remove particles from water. If the particles to be removed, e.g. algal cells, bacteria, clays and silts, are too small for effective separation, their size can be increased substantially by causing the particles to form aggregates. Iron (III) salts, i.e. ferric chloride and ferric sulphate, were used as coagulants in the present study. The pH adjustment chemicals used were HCl, NaOH and lime. The jar test apparatus was used for the investigation. The experimental procedures followed in this investigation allowed comparison between different variables measured in untreated and chemically treated water. It was established how much material has been removed by flocculation and what effect increased pH and Fe concentrations had on the processes. Except for the removal of dissolved organic matter (DOM), the removal of total suspended solids and algal cells in the water was optimal pH 11. Optimal removal of DOM occurred at pH 5. Low Fe³⁺ concentration resulted in lower flocculation and removal efficiencies. With an increase in Fe³⁺ concentration, an increase in the efficiency of flocculation and removal occurred. It is, therefore possible to conclude that optimal flocculation occurred at pH 11 at a concentration of 608 mg/l iron. When different pH adjustment chemicals were compared, it was shown that Lime was more efficient in the aid of flocculation than Sodium hydroxide. Ferric chloride was more efficient in the coagulation processes than ferric sulphate.



Rob Anderson

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The 15th ISS was held in Valdivia, Chile from 8-13 January 1995. This town proved to be small, scenic and friendly, and a perfect venue for such an event. Lying about 700 km south of Santiago, on a system of natural waterways near the coast, Valdivia has a temperate climate and is surrounded by green hills. The symposium was held on the campus of the Universidad Austral de Chile, within walking distance of various hotels and hostels where the approximately 420 delegates from 39 countries stayed.

The International Seaweed Symposia take place every 3 years, under the auspices of the International Seaweed Association (ISA). They are certainly the premier international meetings on commercial seaweed research and development, but also attract a number of excellent contributions in the more "academic" fields, from taxonomy to physiology. Chile, with its 4330 km-long coastline, is one of the world's main seaweed producers, and by far the largest in the southern hemisphere. This large and active industry brings in more than 40 million US \$ per year from the sale of seaweeds and phycocolloids (our industry in SA is worth less than 5% of this figure), and has both stimulated and been stimulated by seaweed research in that country.

With four parallel sessions, it was as usual impossible to get to everything of interest, and I spent most of my time in the more "applied" sessions. The standard was high, even with the difficulties faced by non-English speakers. During a plenary lecture Bernabe Santelices described the development of seaweed research and exploitation in Latin America (and offered several lessons for similar developments in South Africa, although we are not blessed with the coastline that Chile can boast). They have seen returns from economic seaweeds more than triple in the last decade as commercial cultivation has taken off and local processing of raw materials has increased. In the last decade the percentage of the national seaweed crop that is farmed has increased from 2.5 to nearly 90%. Studies are now aimed at producing more seaweed for human consumption, for use in aquaculture feedstuffs and at increasing their use as biofilters and bio-indicators in pollution.

I attended parallel sessions on integrated aquaculture and cultivation, diseases, resources, physiology, grazing, population ecology, and co-chaired a session on biotic interactions. Integrated aquaculture of various marine organisms is not a new idea, but several new studies have tested such systems. Predicably most involved the use of seaweeds: as biofilters both to reduce dissolved inorganic nutrients (particularly nitrogen and phosphorus) and to increase overall profitability by producing a commercial seaweed crop. Examples included the growth of kelp



to mop up excess N and P from salmon cages in a Canadian bay (R. Petrell) and an Israeli system (Neori and colleagues) where effluent from a Sea Bream farm is used to produce phytoplankton, which is fed to mussels, the wastewater from which is used for seaweed cultivation. The system removes 95% of dissolved organic nitrogen and particulates from the fish farm, but the limiting factor is the space required for seaweed ponds.

The environmental costs of mariculture were discussed in a largely theoretical but thought-provoking paper by N Kautsky (Sweden). He pointed out that mariculture is the re-directing of flows of energy to certain species, and that it cannot replace natural production. As an example he cited energy-intensive salmon farming, where feed must be produced from fishmeal, etc. From estimates of the pollution costs of (fish?) mariculture he suggests an environmental tax of 15% to "internalise" such costs. Perhaps seaweed aquaculturists should get a tax rebate for reducing nitrogen loading.

Tank cultivation of salmonids produces high levels of particulate and dissolved inorganic wastes (especially nitrogen), which A. Buschmann and colleagues have used for successful cultivation of mussels and finally *Gracilaria*. The seaweed removes 50% (winter) to 90% (spring) of the ammonium from wastewater. They obtained *Gracilaria* production values of up to 48 kg m⁻² y⁻¹, which on an area basis are five times higher than those in intertidal farms. L. Martinez studied the agar yield and quality of this *Gracilaria*. Although agar yield was highest in pure seawater, the most efficient production strategy was to use the wastewater to maximise the biomass. We visited their system at the marine station of the University of Los Lagos, and I would recommend it as a place to visit: it is surrounded by green hills and lies on the shores of a picturesque, protected bay about 30 km south of Puerto Montt.

I presented a paper entitled "The effect of localised eutrophication on competition between *Ulva lactuca* L. and a commercial *Gracilaria* resource" (Anderson, Monteiro and Levitt). Subsequent discussions with researchers in France, Israel and Spain indicated that our *Ulva* is similar to entities in other problem areas, and seems to grow unattached, and to remain infertile. Some of the French workers have been investigating the taxonomy of their entity, and will shortly be describing it as a new species: they have reservations about the identity of our Saldanha *Ulva*.

Introductions of alien seaweeds to various coasts around the world continue to be of concern. The Japanese kelp *Undaria pinnatifida* appeared in Argentina in 1992 and is now spreading (Casas & Piriz), in an area where temperatures range from 10-18°C. It was deliberately introduced to France as a commercial food seaweed in about 1982, and farmed at several sites on the Atlantic coast (J. Floch). Initial spread was slow, but is now becoming more rapid, possibly by transport on ship's hulls. This appears to be one of the least invasive seaweeds to be introduced to foreign waters, but it is nevertheless modifying subtidal communities.

Several excellent physiological studies gave new insights into how seaweeds grow and function. For example, the study of Gonzales and Correa (Chile) showed that histocompatibility and fusion can occur in culture between the tissues of individuals,

species and even genera of red seaweeds, with important implications for strain development in cultivation.

Having been involved in research on the disappearance of *Gracilaria* at Saldanha Bay), and now in mariculture work, I found the session on pathology of seaweeds of interest. M. Pedersen (Sweden) reviewed studies of non-infectious diseases and how they are linked to stress conditions such as high light and low carbon dioxide levels. These result in the production of toxic peroxides and hypobromides, and cause diseases like "icc-ice". There were several papers on viral diseases in brown algae, from the laboratory of D. Muller (Germany). From more than a decade of intensive experimental tank cultivation of the red seaweed *Chondrus* in Canada, J. Craigie has obtained a good understanding of diseases and their causes, with important lessons for similar cultivation attempts elsewhere.

The standard of presentations was very high, but the atmosphere pleasantly informal. Almost daily social events ensured plenty of opportunity for discussions, and I think the organisers, particularly Dr. Renato Westermeier, are to be congratulated on an exceptionally pleasant and fruitful symposium.

The question of symposium organisation came to assume some importance for John Bolton and I, because we presented a bid to the ISA committee to host the 17th ISS in Cape Town in 2001 (the 16th is already scheduled for the Philippines in 1998). We were warned of strong bids from Israel, Spain (Canary Islands) and India, and were therefore very pleased when we were informed, on the Sunday afternoon after presenting the bid, that SA had won it. The rest of the day, as far as can be recalled, was spent with Fergus Molloy (ex Namibia, now in Scotland) and Klaus Rotmann (Taurus Seaweeds), in a series of important planning meetings at various hostels. We thank all those who so readily supported the bid (the Interim National Organising Committee), and give the assurance you that you will be approached for help in due course. Let's make the 17th ISS one of the best ever!

THE POST-SYMPOSIUM TOUR TO SOUTHERN CHILE, 16-20 JANUARY

This tour was intended to acquaint delegates with the main seaweed farms and research facilities in the Puerto Montt and Chiloe Island areas of southern Chile. It included visits to several university marine research stations where mariculture of various organisms from *Gracilaria* to salmon is studied. Interestingly, some of these are run on both research and commercial lines, with the sale of produce helping to subsidise further studies.

Several days were spent on Chiloe Island, where the importance of seaweed in the lives of the "Mariscadores" or artisanal fishermen is evident everywhere. *Gracilaria* is laid out to dry in a narrow strip along the edges of main roads, *Gigartina* and *Iridaea* (sorry, now *Mazzaella*) are drying on hen-house roofs, roads and any other flat surfaces, and blocks of compacted *Porphyra* or bundles of *Durvillaea* blades are on sale in rural markets, among a variety of fish and shellfish. Collectors sell

their dry or almost dry seaweed to dealers (the current price of *Gigartina* or *Mazzaella* is the equivalent of about R1 per kg), who re-sell to bigger local or overseas buyers. The system is therefore similar to that in Transkei, rather than in the (old) eastern or western Cape, where pickers work under the direct supervision of the concessionaire. While this informality may have advantages, it has led to disastrous over-exploitation of many of the Chilean seaweed resources (particularly *Gracilaria* in some areas), and it seems that only "ownership" rights to particular areas have improved the situation. Sites of past over-exploitation like the Maullin Estuary are now decorated by stakes marking individual "farms", and in some cases small huts on stilts, where guards watch over individual *Gracilaria* concessions. Interestingly, little re-planting is now done, and careful husbandry of the subtidal natural beds has been found to be the most efficient management practice.

Four members were subject to constant Chilean hospitality, which meant salmon at most meals and pisco (a spirit mixed with lemon juice and egg white) at all. Renato Westermeier gave us a really useful and memorable tour, and his translator and assistant Eliseo was invaluable. There is a lot of very good seaweed research going on in Chile, in too many centres to list, and one could do worse than spend a sabbatical (or holiday) there. The Chileans have set a high standard with the 15th ISS and excursion, but most of the delegates we spoke to are keen to visit SA, and we look forward to rivalling the Chilean hospitality when we hold the 17th ISS here in 2001.

3.4 Bid for 17th ISS to be hosted jointly by SFRI and UCT in Cape Town in 2001

This bid was presented to the Executive Committee of the International Seaweed Association on Sunday 8 January, in Valdivia. Members had previously been sent copies of the intended bid and other documentation on South Africa, some of which was provided by the Conference Division of the SA Tourism Board. John Bolton (UCT) and I gave a 20 minute oral and slide presentation, after which we were questioned. Strong rival bids were presented by delegates from Israel, Spain and India. We were officially informed that we had won the bid at the closing ceremony on Friday 13 January. I would like to thank the Director General for supporting our bid, as I believe that this symposium, which will attract at least 400 delegates, will bring economic, cultural and scientific benefits to South Africa.

3.5 Development of carrageenophyte resources in SA

During the symposium I met several times with representatives from two leading international colloid companies (FMC and Copenhagen Pectin) to discuss the development of a mariculture-based carrageenan industry in SA.

At present most of the world's cold-water carrageenan seaweeds come from the large natural stocks in Chile. However these supplies are being threatened by increased local processing (rather than export), and rising Chilean living standards which are pushing up labour costs and hence prices. Alternative supplies are being sought for example in New Zealand and South Africa. The most desired species at the moment is *Gigartina radula* (now *Gigartina polycarpa*), which, like the several other species they are interested in, is unfortunately present in only limited quantities on our coasts.

The industry believes that mariculture is the only way to control the supply and quality of cold-water carrageenophytes: they have already achieved this with warm-water species in the East and Tanzania. Mariculture of the relevant cold-water species has not been researched at all, and in most cases the basic cultivation biology of the plants is unknown. They are interested in SA as a research site because the right species are here and because there is an existing research infrastructure and expertise, mainly at SFRI and UCT. At a number of meetings between myself, FMC, Copenhagen Pectin, Taurus (SA), Prof J.J. Bolton (UCT) and Dr C.P. Dawes (Consultant), we agreed to take the proposals further, and representatives will be visiting SA in March for further meetings. Several important issues were identified, and will have to be addressed by Sea Fisheries, including:

1. Access to suitable mariculture sites
2. Access to seeding material of local species in the event of development of successful mariculture techniques. At the moment a concessionaire could effectively block mariculture by refusing to provide seed stock.
3. How any funding from overseas companies would be channelled to researchers in SA.
4. The role of SFRI (if any) in such mariculture research.

4. RECOMMENDATIONS

- 4.1 It would be useful for SFRI management to meet FMC/Copenhagen Pectin in March 1995 to discuss potential for development of carrageenophyte mariculture.
- 4.2 A baseline study is required to identify possible sites around the SA coast for various mariculture activities, in order to advise potential investors in mariculture. It is recommended that this be addressed by the SA marine science community.
- 4.3 Sea Fisheries needs to look into the problem of access to seed stock of seaweeds for mariculture. At present the permit system gives the concessionaire the right to the seaweeds in a particular area, with no regard to the supply of seeding material for a potential farmer to start cultivation with. This is of concern to FMC/Copenhagen Pectin, and has been an issue with *Gracilaria* and potential cultivation in Saldanha Bay. The permit system needs to make a clear distinction between natural and cultivated seaweeds in order to avoid conflict between concessionaires and "farmers".
- 4.4 The Seaweed Unit of SFRI should investigate having selected local seaweeds assessed for palatability and potential food use in Japan. If any turn out to be useful, their harvesting and mariculture would require investigation.
- 4.5 SFRI should budget to send a representative to the 16th ISS in the Phillipines in 1998, both to continue participation in this important symposium, and in order to meet with the ISA executive in essential planning meetings for the 17th ISS in Cape Town.
- 4.6 The Seaweed Unit, SFRI, together with UCT should begin planning of the 17th ISS. Applications for financial support from the Department will be made in due course.

5. FINANCIAL IMPLICATIONS

Cost effectiveness:

The visit was in my opinion cost effective as it achieved a number of results:

1. The gathering of information, establishment of contacts and presentation of a research paper.
2. The visits to research and commercial establishments provided technical innovations and ideas that can be used to stimulate use of, and improve management of, SA seaweed resources.
3. I held constructive discussions with international carrageenan companies (FMC and Copenhagen Pectin) which could lead to investment in SA: first in research, then hopefully in mariculture development.
4. We were able to win the bid to hold the ISS in South Africa in 2001.

17/1/95

18/1/95

19/1/95

20/1/95

21-23/1/95

24/1/95

25/1/95

26/1/95

aquaculture Station of Universidad de los Lagos. Stayed in Puerto Montt.
 Visit to Maullin estuary: *Gracilaria* farming operation and experimental station of the Universidad Austral de Chile. Stayed in Puerto Montt.
 Excursion travelled to Chiloe Island. Visited salmon farm at Abtao, and open coast at Mar Brava for seaweed communities etc. Stayed in Ancud.
 Visit to historic and scenic areas of Chiloe, and seaweed farm at Ancud, where we spent the night.
 Returned by bus to Puerto Montt, and excursion ended in afternoon.
 On leave: 3 days spent at Puerto Varas. Left Puerto Varas at 0900 and started return trip. Flew from Puerto Montt to Santiago where I stayed the night.
 Flew Santiago to Buenos Aires, changed aircraft for Cape Town (Malaysia Airlines flight 202).
 Arrived in Cape Town 09h00.

Future financial implications:

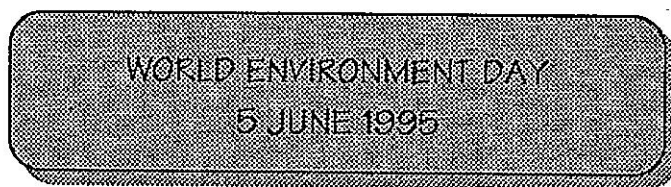
1. I strongly advise that SFRI be represented at the 16th ISS in the Philippines in 1998, in order to liaise with the ISA executive on the planning of the 17th ISS in Cape Town.
2. The National Planning Committee for the 17th ISS in Cape Town will in due course approach the Department of Environment Affairs and Tourism for some financial support for the symposium. Details have yet to be worked out, because the recent (15th) ISS was the first for which a full financial statement is to be provided (see Annexure B).

6. ACKNOWLEDGEMENTS

I am grateful to the Director, SFRI, and the Minister of Environmental Affairs and Tourism for supporting this visit. I thank the Reprographics Section, SFRI, for producing the excellent slides for my presentation.

DETAILED ITINERARY- PLACES AND PERSONS VISITED

4/1/1995	Flew from Cape Town to Buenos Aires (Air Malaysia), then to Santiago, Chile (Ladeco).
5/1/95	Flew from Santiago to Valdivia (Ladeco). Early arrival in Valdivia was result of timing of Air Malaysia flights.
5-8/1/95	Stayed in Hotel Mellilanca in Valdivia.
8/1/95	Presented bid to ISA committee for SA to host 17th ISS in 2001. Registered for symposium. Moved to Hotel Isla Teja for duration of conference.
9-13/1/95	Attended symposium. Meetings with FMC and Copenhagen Pectin held during the week.
14/1/95	Travelled by bus from Valdivia to Ancud, where I visited seaweed farms.
15/1/95	Paid private inspection visit to the seaweed factory of Gelymar Ltd in Ancud.
16/1/95	Travelled to Puerto Montt to join post symposium excursion. Visited experimental



The Department of Environmental Affairs and Tourism and the United Nations Environmental Programme (UNEP) will host the international celebrations for World Environment Day (WED) in South Africa.

The international theme for WED 95 is: WE, THE PEOPLE UNITED FOR THE GLOBAL ENVIRONMENT. The South African theme is: DIVERSITY IS LIFE, focusing on South Africa's rich biodiversity.

Each year UNEP pays tribute to a number of individuals and organisations that contributed to solving global environmental problems. These laureates are nominated by governments throughout the world and they receive awards during a special ceremony from the Executive Director of UNEP, Mrs Elizabeth Dowdeswell. The awards are known as the Global 500 Awards.

Various events are envisaged for the celebrations, among others the Award Ceremony, a special symposium on both the international and local themes of the day, as well as visits to local environmental projects by the international guests.

For more information contact:

Ms J Mackay
 Department of Environmental Affairs and Tourism
 Tel: (012) 310-3550
 Fax: (012) 322-2682

FORTHCOMING
INTERNATIONAL CONFERENCES

International Association of Applied Algology

7th International Conference
South Africa
16 - 19 April 1996

Theme "Opportunities from Micro- and Macroalgae"

Registration deadline: 30 November 1995

Contact:

IAAA Conference Secretary
Department of Botany and Genetics
University of the OFS
Bloemfontein
9300
South Africa



Email: pjg@rs.uovs.ac.za

Vic Falls Conference On Aquatic Systems - Monitoring And Managing Our Precious Resources

Organisers: South African Society Of Aquatic Scientists,
WISA: River Basin Management Technical Division, SAICE:
Water Engineering Division

Elephant Hills Hotel, Victoria Falls, Zimbabwe
15 - 19 July 1996

Abstract Deadline: 30 June 1995

Contact:

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Conference Secretary
P.O. Box 327
WITS 2050
South Africa

Tel: +27 (011) 716-5091
Fax: +27 (011) 339-7835
Email: Stephenson@cgoli.min.wits.ac.za

First European Phycological Congress

Cologne, Germany
11 - 18 August 1996

Contact:

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Gyrhofstrasse 15
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Koln
Germany

Fax: 0049 221 470-5181
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The Fourth International Chrysophyte Symposium

Denmark
22 - 27 May 1995

Contact:

Jorgen Kristiansen
Botanical Institute
Department of Phycology
Oster Farimagsgade 2D
1353 Copenhagen K
Denmark

Tel: 45 3532 2320
Fax: 45 3532 2321
Email: sporol@vm.uni-c.dk

Aquaculture Europe '95

Trondheim, Norway
9 - 12 August 1995

Contact:

EAS Conference Secretariat
Coupure Rechts 168
B-9000
Gent
Belgium

Tel: 32 9 2237722
Fax: 32 9 2237604



LIST OF THESES AND PUBLICATIONS
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WITWATERSRAND
DEPARTMENT OF BOTANY
(SUPPLIED BY DR S. SYM)

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