

Forum Phycologicum



Newsletter of the
**Phycological Society
of Southern Africa**

Vol. 73
July 2010

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From the Editor

Welcome to the mid-year edition of *Forum Phycologicum*. While not necessarily reflected in these pages, much has surely happened over the past few months. As usual, we are continually attempting to keep you abreast of the phycological happenings in and around our various institutions.

The year started off with our annual meeting that saw a fresh wave of young participants eager to showcase their various research initiatives. This was followed in April by an email from Bill Harding, summarizing the progress made reintroducing diatoms into South African aquatic science and the blow this had been dealt through the South African Department of Water Affairs declining to aid the Water Research Commission with funding for the project. No doubt some of you heeded Bill's call for comments on the matter and have responded accordingly. The early part of this year was also an opportunity to produce a "current state of phycological research in Southern Africa". This too is included here. However, the report is by no means complete as not all members responded to this call for information. From the two featured articles – reporting on phycological expeditions – it is clear that phycology is still a strong discipline within the aquatic sciences.

Planning for PSSA 2011 is well underway and I urge you all to take careful note of *what to do next* in preparation for this meeting. Stuart Sym has meticulously been preparing the proceedings of this meeting and will no doubt soon be informing you of the registration process. Please keep an eye on your email boxes for news on this event.

Until the next issue.
Best wishes.
Sincerely

Synarthrophyton patena
epiphytic on *Gelidium capense*

Gavin W. Maneveldt

News and Reviews

1. Reviving diatom resources in South Africa – Applications and Challenges

Summary

Diatoms have proved to be remarkably valuable for aquatic biomonitoring, as indicators of eutrophication and acidification, for the formulation of ecological inferences and providing an evidence base on which water resource management decisions can be made. In these roles they have eclipsed other biological data and conventional water quality analyses. After three phases of research and development funded by the Water Research Commission (WRC), a rich array of methods, tools and taxonomic aids have been produced (2004-2009). This work, undertaken by a very small team, is equivalent to that produced elsewhere by larger teams and considerably longer timespans. Regrettably the programme has been prematurely terminated (January 2010) due to the Department of Water Affairs, the primary user of the Diatom Assessment Protocol, declining to contribute financially to the work. Thus, for the second time in recent South African history, the most exciting development in aquatic biomonitoring has been shut down.

A summary of the progress made reintroducing diatoms into South African aquatic science and the blow this has been dealt through the Dept of Water Affairs declining to aid the WRC with funding for the project can be found at the end of this issue as Appendix I.

Comments on this situation are welcome to Bill Harding (diatoms@dhec.co.za).

2. Terms used in Bionomenclature

The Global Biodiversity Information Facility's (GBIF's) Informatics division would like to announce the publication of an updated edition of *Terms Used in Bionomenclature*, compiled by Prof. David Hawksworth. This is a glossary of over 2,100 terms used in biological nomenclature



(the naming of whole organisms of all kinds).

The glossary is available in print-ready PDF format (3MB) as well as via an online web application that can be browsed, searched, and output in HTML, JSON and RDF to support re-use and referencing. GBIF is also producing a limited number of paper copies of the glossary which will be available at GBIF-supported meetings and events. The web application supports the development of controlled vocabularies using resolvable identifiers for nomenclatural terms.

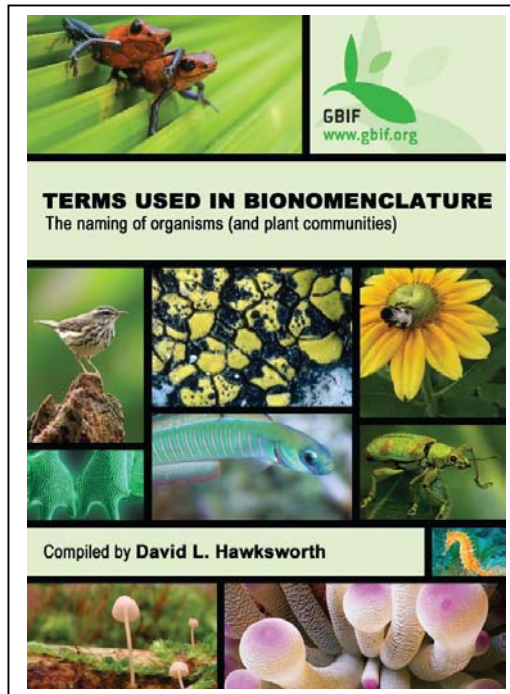
More information and links to the PDF and web versions can be found on the glossary home page at: <http://www.gbif.org/communications/resources/print-and-online-resources/bionomenclature/>

The web application is online at: <http://bionomenclature-glossary.gbif.org/>

David Remsen, Senior Programme Officer
Electronic Catalog of Names of Known Organisms
Global Biodiversity Information Facility Secretariat
Copenhagen, Denmark
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3. Current state of Phycological Research in the PSSA

The following represents research undertaken by various principal phycological research laboratories in Southern Africa. The list is by no means exhaustible and reports only on research undertaken by members of the Phycological Society of Southern Africa (that currently has around 45 – ordinary, student and corporate – registered members). Some of the research not highlighted below include: algal biofuels (UCT, NMMU); mariculture (UKZN); ecophysiology of surf-zone



diatoms and macroalgae (NMMU); microalgal primary production in estuaries (NMMU); and antimicrobial activity in macroalgae (UCT). The information is grouped according to four categories (University, Government, Industrial and Consultancy).

1. University

1.1 Janine Adams

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Area(s) of Focus/Expertise

- Estuarine Ecology and Environmental Flow Requirements

Formal collaborations

Felipe Garcia-Rodriguez (Facultad de Ciencias, Sección Oceanología, Maestría en Ciencias Ambientales, Iguá 4225, Montevideo, Uruguay)

1.2 Akash Anandraj (akash@mut.ac.za)

Department of Nature Conservation,
Mangosuthu University of Technology
PO Box 12363, Jacobs 4026, South Africa

Area(s) of Focus/Expertise

- Microalgae Physiology
- Estuarine Primary Production
- Microalgae Biodiesel / Biotechnology

Formal collaborations

- Microalgae Physiology: Christina Trois (Centre for Research in Environmental, Coastal and Hydrological Engineering, School of Civil Engineering, Surveying and Construction, University of KwaZulu-Natal, Howard College Campus, Durban, South Africa)
- Estuarine Primary Production: Renzo Perissinotto (School of Biological and Conservation Sciences, University of



KwaZulu-Natal, Westville Campus, Durban, South Africa)

- Microalgae Biodiesel / Biotechnology / Bioprospecting: Faizal Bux (Director : Institute for Water and Wastewater Technology, Durban University of Technology, Durban, South Africa); Dheepak Maharaj (CSIR Biosciences, Modderfontein, South Africa)

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Area(s) of Focus/Expertise

- Biomedical potential of seaweed natural products

Formal collaborations

John J. Bolton (Botany Department, University of Cape Town, Rondebosch, South Africa)

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Area(s) of Focus/Expertise

- Seaweed Biodiversity, Biogeography and Biosystematics
- Aquaculture and Aquaculture in Integrated Systems with Marine Animals.

Formal collaborations

- Seaweed Biodiversity, Biogeography and Biosystematics: Robert J Anderson (Marine & Coastal Management, Department of Agriculture, Fisheries and Forestry, Rogge Bay, South Africa); Gavin W. Maneveldt (Department of Biodiversity & Conservation Biology, University of the Western Cape, Bellville, South Africa)
- Aquaculture and Aquaculture in Integrated Systems with Marine Animals: Gavin W. Maneveldt (Department of Biodiversity & Conservation Biology, University of the Western Cape, Bellville, South Africa)

1.5 Amelia S. Buriyo (buriyo@amu.udsm.ac.tz)

Botany Department, University of Dar Es Salaam, PO Box 35060, Dar Es Salaam, Tanzania

Area(s) of Focus/Expertise

- Macroalgae Diversity and Taxonomy
- Seaweed Mariculture, Commercial Products Processing and Quality Improvement Techniques

Formal collaborations

- Macroalgae Diversity and Taxonomy: Flower Msuya (Institute of Marine Sciences, University of Dar-es-Salaam, PO Box 668, Zanzibar, Tanzania); Eurico Oliveira (Institute of Biosciences, University of São Paulo, Brazil); Mariana Oliveira (Institute of Biosciences, University of São Paulo, Brazil)
- Aquaculture: Flower Msuya (Institute of Marine Sciences, University of Dar-es-Salaam, PO Box 668, Zanzibar, Tanzania); Eurico Oliveira (Institute of Biosciences, University of São Paulo, Brazil)

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Area(s) of Focus/Expertise

- Surf Diatoms
- Phytoplankton Communities
- Biota of Solar Saltworks
- Coastal Zone Management

Formal collaborations

- Surf Diatoms: Clarisse Odebrecht (Institute of Oceanography, Federal University of Rio Grande, Av. Itália km 8, CEP 96201-900 Rio Grande, RS, Brazil)

1.7 Gavin W. Maneveldt

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Area(s) of Focus/Expertise

- Mariculture



- Ecology, Systematics and Taxonomy of Non-geniculate Coralline Algae
- Seaweed Biodiversity and Rocky Shore Ecology

Formal collaborations

- Aquaculture: John Bolton (Botany Dept, UCT); Jonathan Venter (Jacobsbaai Sea Products abalone farm, Jacobsbaai); Klaus Rottman and Wendy Ruscoe (Taurus Chemicals (Cape Kelp) (Pty) Ltd, South Africa)
- Ecology, Systematics and Taxonomy of Non-geniculate Coralline Algae: William J. Woelkerling (La Trobe University, Victoria, Australia); Gilberto M. Amado Filho (Instituto de Pesquisas Jardim Botânico, Rio de Janeiro, Brazil); Han-Gu Choi (Korea Polar Research Institute, KORDI, Korea); Claude Payri (Institut de Recherche pour le Développement (IRD), Nouméa Cedex, New Caledonia); Yvonne Chamberlain (University of Portsmouth, Portsmouth, UK).
- Seaweed Biodiversity and Rocky Shore Ecology: John Bolton (Botany Dept, UCT); Robert Anderson, Seaweed Unit, Marine & Coastal Management, UCT)

- 1.8 Flower E. Msuya** (msuya@ims.udsm.ac.tz)
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Area(s) of Focus/Expertise

- Seaweed Mariculture
- Seaweed Innovation
- Integrated Mariculture
- Socioeconomic studies
- Climate Change and Innovations

Formal collaborations

- Seaweed Mariculture and Phycocolloid Studies: Genevieve bleicher-lhonneur (Raw Materials Procurement, Cargill Texturizing Solutions, 50500 Baupte, France); Alan Critchley (Acadian Sea Plants Limited, 30 Brown Avenue, Dartmouth, Nova Scotia, Canada B3B 1X8)
- Integrated Mariculture: Amir Neori (Israel Oceanographic and Limnological Research,

National Centre for Mariculture, PO Box 1212, Eilat 88112, Israel)

- Seaweed Physiology: Sven Beer (Department of Plant Sciences, Tel Aviv University, Tel Aviv 69978, Israel)

- 1.9 Gavin Snow** (gavin.snow@nmmu.ac.za)

Botany Department, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth 6031, South Africa

Area(s) of Focus/Expertise

- Estuarine Ecology (water quality and microalgae).

Formal collaborations

Susan Taljaard (CSIR Natural Resources and the Environment, Stellenbosch, South Africa)

- 1.10 Wendy Stirk** (stirk@ukzn.ac.za)

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Area(s) of Focus/Expertise

- Plant Hormones in Seaweeds
- Microalgae and Seaweed Concentrates used in Agriculture

Formal collaborations

- Plant Hormones in Seaweeds: V. Ördög (Institute of Plant Biology, Faculty of Agricultural and Food Sciences, University of West Hungary, Mosonmagyaróvár, Hungary); M. Strnad (Laboratory of Growth Regulators, Palacký University and Institute of Experimental Botany AS CR, Olomouc, Czech Republic); N. Yokoya (Institute of Botany – Section of Phycology, Environmental Secretary of São Paulo State, São Paulo, Brazil)
- Microalgae and Seaweed Concentrates used in Agriculture: V. Ördög (Institute of Plant Biology, Faculty of Agricultural and Food Sciences, University of West Hungary, Mosonmagyaróvár, Hungary); N. Yokoya (Institute of Botany – Section of Phycology, Environmental Secretary of São Paulo State, São Paulo, Brazil)



1.11 Stuart Sym (stuart.sym@wits.ac.za)

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Area(s) of Focus/Expertise

- Marine Microalgal Ultrastructure and Molecular Systematics
- The Building and Maintenance of a Marine Microalgal Culture Collection
- Potential of Marine Microalgae for Biofuels
- Diet Diatoms of Post-larval Abalone

Formal collaborations

- Marine Microalgal Ultrastructure and Molecular Systematics: Richard N. Pienaar (Professor Emeritus, School of Animal, Plant & Environmental Sciences, University of the Witwatersrand, WITS, South Africa); M Melkonian (Botanisches Institut, Universität zu Köln, Biozentrum Köln, Köln, Germany); B Marin (Botanisches Institut, Universität zu Köln, Biozentrum Köln, Köln, Germany); Grant C. Pitcher (Marine & Coastal Management, Department of Agriculture, Fisheries and Forestry, Rogge Bay, South Africa)
- Potential of Marine Microalgae for Biofuels: V.M. Gray (School of Molecular and Cell Biology, University of the Witwatersrand, WITS, South Africa)
- Diet Diatoms of Post-larval Abalone: Carol Simon (Department of Botany and Zoology, Stellenbosch University, Stellenbosch, South Africa); Gavin W. Maneveldt (Department of Biodiversity & Conservation Biology, University of the Western Cape, Bellville, South Africa).

2. Government

2.1 Robert J. Anderson

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Area(s) of Focus/Expertise

- Seaweed Ecology, Biodiversity, Biogeography and Bbiosystematics
- Commercial Seaweeds

Formal collaborations

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Area(s) of Focus/Expertise

- Harmful Algal Blooms
- Ballast Water Introductions of Microalgae

Formal collaborations

- Harmful Algal Blooms: ???
- Ballast Water Introductions of Microalgae: Stuart Sym (School of Animal Plant & Environmental Sciences, University of the Witwatersrand, Wits, South Africa)

3. Industry

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Area(s) of Focus/Expertise

- Economic Seaweeds
- Seaweed Growth Stimulants

Formal collaborations

Lincoln M. Raitt; Gavin W. Maneveldt (Department of Biodiversity & Conservation Biology, University of the Western Cape, Bellville, South Africa)

3.2 Klaus Rotmann (krotmann@afrikelp.com)

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Area(s) of Focus/Expertise

- Economic Seaweeds
- Seaweed Growth Stimulants

Formal collaborations



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4. Consultancy

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Area(s) of Focus/Expertise

Diatom Ecology and Taxonomy of near shore
marine and coastal environment of South Africa.

Formal collaborations

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Featured Articles

Seaweeds and an expedition to southern Madagascar

Some thousand kilometers south of palm-fringed beaches and crystal water, lies south Madagascar. Here, to quote from pre-expedition information, is a region of “fierce promontories, open bays and extensive algal belts”. From April to June 2010 a massive expedition explored southern Madagascar in an effort to comprehensively document the marine biodiversity of this poorly-studied area for the first time. Entitled “Atimo Vatae” (“Deep South” in the local Antandroy language), and split into three regional phases, the expedition involved almost 70 scientists and 50 helpers from 15 countries including Madagascar, and sampled environments from estuaries to depths of about 1000 metres on the continental shelf slope.

I participated in the first phase, which operated from the town of Fort Dauphin on the south-east corner of Madagascar. Any illusions of tropical paradise were dispelled when we arrived to find four-metre swells, a sea the colour of the Vaal Dam, and rain driven horizontally by an easterly gale. However, the weather could only improve, and it did.

An assortment of about 35 malacologists, ichthyologists, phycologists and other –ologists (who study sponges, worms, crustaceans, and almost anything else that swims, crawls or sits immobile in the sea) lived and worked in a small hotel overlooking a bay. The Hotel de Petit Bonheur (ambiguously translated by my school French as “The Hotel of Small Happiness”) had been transformed for the expedition. One dining room was now a large laboratory, complete with lab benches and dissecting microscopes. Lean-tos had been constructed for rough sorting, and sheds built behind the hotel for all sorts of equipment including new diving cylinders, compressors and other paraphernalia. My astonishment at the scale of the expedition increased when I discovered the two brand-new inflatables at the harbour, and the ship that periodically brought in samples from the continental shelf. The expedition was led by Prof. Phillipe Bouchet of the Muséum National



Ichthyologist Phil Heemstra (dark blue shirt, centre) bargains with fishermen for interesting specimens. Expedition leader Phillipe Bouchet stands behind him (photo: Rob Anderson).



D'Histoire Naturelle (MNHN). This institution, together with the NGO Pro-Natura International, was responsible for the expedition, which included many MNHN staff, and therefore had a very Franco-Madagascan flavour.

The phycological component consisted of me, Dr Florence Rousseau of MNHN, and Tsarahevitra Jarisoa from the University of Tulear. "Jars" as he was called, was one of the many young Malagasy scientists who gained experience and training on the expedition, and he proved to be good company and a keen seaweed hunter, turning up more than his share of interesting material. Within two days we began a routine of rising at 5.30, eating the dreaded "continental breakfast" of white bread and milkless tea, gathering our equipment, and at 6.30 a.m. boarding a car to go collecting. We would drive to the harbour to board a diving inflatable or travel by 4X4 to a location on the coast where we collected by wading, snorkelling or SCUBA diving. The boat-based diving was straightforward enough, although the water was seldom calm and the visibility usually only a few metres. At least the water was warm: about 25° C on the surface and a little cooler at depth. The road journeys? Let's just say that anyone who complains about South African roads is a spoilt brat. Around Fort Dauphin, a journey of 60 km took us 2-3 hours of crawling and bumping along a series of potholes arranged in the semblance of a road (with the prospect of the same on the way back). The beauty of the coastal scenery



Florence Rousseau searches for seaweeds at 6m in Libanona Bay (photo: Alain Barrere).



The wave-cut platforms around Fort Dauphin covered in seaweed (photo: Rob Anderson).



In front of their Fort Dauphin home these women roast peanuts for sale, over a small charcoal brazier (photo: Rob Anderson).

compensated for some of the discomfort, but it was always a relief to get back to base (especially when we once nearly lost a wheel in a mosquito-ridden swamp, at dusk).

Single dives in the morning offered the pleasant prospect of lunch back at the hotel, an afternoon of sorting, pressing and DNA sampling, and with luck some free time in the evening. However, most days involved either two dives or a 4X4 trip, which meant staying out for "Le Pique-Nique" (a lunch of cold rice and chunks of zebu meat from the previous supper), a late return and work well into the night. In all we pressed more than 800 specimens representing at least 300 species, with DNA samples taken from everything. We also made a representative collection of seaweeds for the University at Tulear. The herbarium specimens are to be housed at MNHN in Paris, and once sorted and fully identified, will be accessible for loans by specialists around the world. The DNA samples will be analysed by the International Barcode of Life (iBOL) project in the laboratory of Prof. Gary

Saunders in Canada. Most of our collecting was done in groups. Whether diving from boat or from the shore, and so we all collected organisms that we thought might be of interest to other specialists. However, it's extraordinary how several specialists can dive in the same place, and usually not even notice the organisms that the other groups sees and collects!



My general impression is that the seaweed flora around Fort Dauphin is fairly similar to that of the Kwazulu-Natal coast, combining warm-temperate and tropical Western Indian Ocean elements, the latter predictably extending down from northern Madagascar. Without the time or literature to identify many specimens to species, it was impossible to get an idea of levels of endemism, but there will certainly be many new records and I would be surprised if there is not a fair complement of new species. Many taxa looked “similar-but-different” to KZN species, and there were at least half-a-dozen reds that were simply flat, irregularly branched and, well ... red. All three phases of the expedition are estimated to have collected about 500 seaweed species and have apparently confirmed a strong SA/KZN link. I was interested in *Laurencias* and *Plocamiums*, and there was definitely overlap with SA species.

Fort Dauphin lies on a small peninsula, surrounded by wide shelves of wave-cut aeolianite that are covered in seaweeds. There are numerous small bays, offering excellent opportunities for snorkeling (and surfing, when wind and swell cooperate!). The very shallow (0-2m) reef tops are covered with dense stands of mainly red seaweeds, usually dominated by *Polyopes*



The pitcher plant *Nepenthes* is common in swampy lowlands (photo: Rob Anderson).



Fishermen drag their wooden pirogue ashore in Lokaro Bay. There are many pirogues on the coast, in which the tough and intrepid fishermen often paddle kilometers out to sea to set gill-nets and drop lobster traps or fishing lines (photo: Rob Anderson).



Vertical stones and obelisks commemorate the dead, usually those whose bodies were never found. There are many around fishing villages (photo: Rob Anderson).

ligulatus, several species of *Plocamium* including *P. corallorhiza*, and various *Hypnea* species. Deeper reefs generally had a much lower cover of seaweeds, and the prominence of various *Peyssonnelia* species suggests that light levels may often be low as a result of turbidity. However, there may be other reasons such as grazing by fish and sea urchins (there are plenty of the latter, some of which left nasty spines in the knees of careless divers). We collected down to about 20 m, usually with the aid of a torch in the turbid water, but a few interesting samples were brought up in dredges as well. Nearby shores that we visited were usually of granite, with large domes and boulders and a relatively narrow intertidal zone on account of their steepness and the low tidal range (less than 1m).

Although there was little time to explore the area, the Malagasy on the expedition and the locals that I met lived up to their reputation for friendliness. The Malagasy people are an interesting mixture of the original Malayo-Polynesian settlers (who arrived some 1300 years ago) and later African settlers, as well as French colonists. The people are justifiably famous for their gentleness and their belief in *Fihavanana*, once defined as “benevolence and friendship towards all one’s fellow men” (the Malagasy



equivalent of *ubuntu*?). The indigenous language is described as about 80% Polynesian and 20% African, with smatterings of Arabic, Sanskrit, French and English. Ethnically, there is a stronger African influence in southern Madagascar.

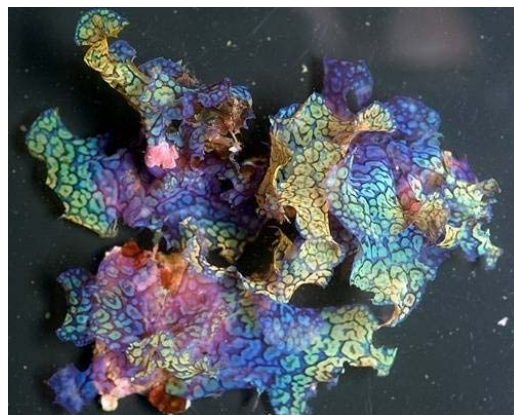
Fort Dauphin (also called Tolagnaro) lies on a well-watered slope just north of a range of hills that form a climatic boundary, south of which the land becomes truly arid. The town itself has a small centre of once-proud colonial buildings and homes, surrounded by “suburbs” of rather densely-packed small wooden houses with narrow lanes between them. There is no question that many of the people are very poor. Most houses on roads incorporate a tiny kiosk with items for sale: oranges, bananas, roasted peanuts, cigarettes, maybe a few tinned foods. The coastal villages we drove to, comprised clusters of simple wooden huts, often raised on stilts and clad with palm leaves, in Polynesian style. Groups of small, ragged boys would inevitably accompany us to the shore and try to assist by collecting all sorts of marine creatures. They took some convincing that we were actually collecting seaweeds, but were entertaining company and willing recipients of my cold zebu and rice (while I sat down to another rusty tin of Chinese sardines that I’d bought en route).



A typical fishing village (photo: Rob Anderson).



A morning scene at a nearby estuary. Everywhere, loads are carried on poles across the shoulders; these baskets bore firewood and wild potatoes (photo: Rob Anderson).



The most beautiful seaweed I have ever seen - and it only showed its colours underwater or in a black dish! Family Delesseriaceae, but further than that ...? (Photo: Bob Abela).

I found this “grand naturalist expedition” to be a wonderful experience. There is no question that such a large expedition is very difficult to fund, organize and to run. However, I believe that in a place like Madagascar, where there is so little infrastructure, the “economy of scale” makes it all very worthwhile. It would have been impossible for any small group (e.g. phycologists) to operate as effectively as we did in southern Madagascar, where diving equipment, suitable boats, and all the other logistics are simply unavailable. The permits and paperwork alone would put most people off. “Atimo Vatae” was one in a series of MNHN-led expeditions to biodiversity hotspots around the world, and with our environment changing and being altered as it is, I can only hope that many further expeditions will follow.

Acknowledgements

I would like to thank Prof Phillippe Bouchet and Dr Line Le Gall (MNHN) for the invitation to participate in the expedition, my colleagues Florence and Jars, and all the other participants for their good company (and patience with my French). Thanks are due to the many sponsors of the expedition (too many to list) but especially to the Stavros Niarchos Foundation who supported the participation of the few South Africans. The Minister of DAFF permitted my participation.


Robert J. Anderson

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**Phycological encounters in
the Eastern Cape, South Africa**

Most things in life start with a good idea. Here Stegenga, John Bolton and Robert (Rob) Anderson noticed that, apart from Richard Simons' guide to common seaweeds of South Africa, there was no real reference book for identifying South African seaweeds. So, in 1997 the three of them published a book on "Seaweeds of the South African West Coast" comprising illustrations of over 600 species, which some taxonomists regard as a benchmark book in taxonomy. Eight years later, John and Rob, together with Belgian taxonomists from Ghent University, published a guide to the seaweeds of KwaZuklu-Natal, South Africa (De Clerck et al., 2005) that included stunning colour photographs of over 200 common seaweeds in their natural environment. The next chapter in this adventure is what brought us to Kei Mouth in the Eastern Cape of South Africa.

Here Stegenga, John Bolton and Rob Anderson are currently working on a seaweed guide of the South African South Coast that will complete the quest to identify and document the seaweed flora of the South African Coast currently standing at a staggering 850 species, with about 500 species

recorded from the south coast. Besides collecting and photographing seaweeds for the south coast flora, we also collected specimens for the International Barcode of Life (iBOL, <http://www.ibolproject.org/>) whose mission is to extend the geographic and taxonomic coverage of the barcode reference library through DNA barcoding. The South African Department of Agriculture, Forestry and Fisheries' (DAFF) Seaweed Unit located in the Botany Department at the University of Cape Town has so far collected about 700 specimens for iBOL.



The sampling team (from left to right): Gavin Maneveldt, John Bolton, Rob Anderson, Elizabeth van der Merwe, Mark Rothman and Derek Kemp (photo: Gavin Maneveldt, timer set photograph).



John Bolton (left) and Derek Kemp studying and photographing seaweeds (photo: Mark Rothman).

The Kei Mouth team comprised Rob Anderson (DAFF), John Bolton (UCT), Gavin Maneveldt (UWC), Elizabeth van der Merwe (UWC), Derek Kemp (DAFF) and myself (DAFF). We were there for just over a week drinking in nature at its best. The history and spirit of the Kei Mouth was captured by Alan Jefferies in his well written, easy to read book "The Absolute Border" (2002).

Our accommodation comprised a cozy, spacious five bed-roomed house with lots of open space to setup microscopes and photography equipment, and a large stoep that was converted into a wet lab. No radio or TV meant that tea-times were largely spent watching (from the stoep) the large swells rolling in from the Indian Ocean, listening to the wind rustling through the trees, and staring

at the odd cow strolling onto the beach or onto the back lawn. Evenings were spent talking around the fire and playing games (soccer, cricket and dominoes).



Collections were made at four sites along a 25km stretch of the coast: Kei Mouth, Morgan Bay, Qolorha (pronounced !o-lo-ga - the “!” denotes a prominent click of the tongue) in the old Transkei and Double Mouth. The area forms part of the Agulhas Marine Province with mean annual sea surface temperatures of 17-18°C (Bolton & Anderson, 1997). The coastline here comprises large wave-cut rocky outcrops that form large gullies and beautiful rock pools, often dominated by a vast array of geniculate coralline algae with the mid-eulittoral zone dominated by the red seaweed *Gelidium pristoides*. The marine flora of this area is poorly studied and habits are varied with reasonably high algal diversity.

Sampling was done at low water of spring tides. While most of us were armed with only a collecting bag and dive knife, Gavin Maneveldt and Elisabeth van der Merwe looked as though they were ready for war, armed with sledge hammers, cold chisels and large yellow collecting bags. They were there to collect the completely calcified, non-geniculate (or crustose) coralline algae and consequently their sampling gear was much different to ours.

Each group usually headed in a different direction and spent between 1.5 and 2 hours collecting seaweed. Once collections for the day



Rob on the infamous stoep sorting through seaweeds collected on that day (photo: Mark Rothman).



The house we stayed in was flanked on one side by a small, but dense woodland. Herein there was an abundance of vervet monkeys who despite being very noticeable, were no menace (photo: Gavin Maneveldt).



The unforgettable ferry trip across the Kei River on our way to Qolorha. From left to right: Mark Rothman, Hazel Anderson, Sam Bolton, John Bolton, Joe Bolton, Derek Kemp, Elizabeth van der Merwe and Rob Anderson. The lady seated on the right was a local resident (photo: Gavin Maneveldt).

were done, we usually found Rob still immersed in a rock pool painstakingly photographing seaweeds far too difficult to photograph in the exposed rocky gullies. Working in the Eastern Cape ocean was very pleasant. The water is always warm, ... OK, relatively warm – remember, we are from Cape Town where the water temperature is seldom above 14°C, so by comparison, here we could spend hours in the water before we started to feel cold.

Once we got back to the house the real work started, but only after a ritualistic cup of tea and a sandwich or sweat snack. When the work commenced, we were like a well oiled machine; each one had his/her job. Rob and John were the main identifiers. Derek took the microscope photographs. I did the pressing and took the DNA samples. Gavin and Elisabeth would pull out their “rocks”, photograph, catalogue and then air-dry, preserve and/or place them in silica gel.

Work usually lasted until the early evening, except on Sunday the 11th when the World Cup Final was played. That entire day the excitement was high and it definitely was a driving force in us finishing our work early. The only thing left was to find a place where we could watch the game. The Kei Mouth Hotel

– where 11 years earlier some of us had watched



Jannie de Beer kick a record 5 drop goals to beat the English in the 1999 Rugby World Cup – that had long been torn down, was not to be the place. We did, however, find “The Bush Pig”, a lovely little bush pub with only a roof (no walls) where the bone-chilling evening wind would cut right through you and where there was no coffee on the menu to warm you up. But, as the saying goes, “all’s well that ends well”, because Spain won (ole-ole!). Not all of us were happy with this outcome though! We got to bed late that evening and collectively nominated Rob the designated alarm clock for the following morning’s trip to Morgan Bay.

During the first collection we found \pm 45 species to which we added another 35 species over the following three days. Samples were photographed, pressed and then stored in silica gel for DNA analysis by iBOL. On the final day we collected *Ecklonia radiata* sporophytes for weighing and measuring for an entirely different study that would form a baseline study for this kelp species. We also observed distinct morphological differences in the texture and rigidity of the fronds of the mature sporophytes at the different sites and collected samples for later DNA analysis.

Projects such as this have taken us to many spectacular places over the years, but none more so than the



Derek Kemp (left) and Mark Rothman collecting seaweeds along the Qolorha coastline. Note the band of *Ecklonia radiata* along the waters edge behind Derek (photo: Gavin Maneveldt).



A rich diversity of seaweeds with geniculate corallines being some of the most noticeable algae on these shores (photo: Gavin Maneveldt).



The unspoilt coastline of the east coast with Double Mouth in the foreground and looking out to Haga-haga on the furthest point. The group is standing at the edge of a sheer drop-off down to the cliffs below (photo: Gavin Maneveldt).

Seagulls Hotel at Qolorha. The simplicity of the place, the setting and the sheer beauty of the surroundings made me think of moving to a place like this. It took a long time to cover the 10 km stretch of road to the Seagulls Hotel because of the poor condition of the surface – Rob referred to it as Madagascar-like roads – but the trip was well worth it. Having to cross the Kei River on a ferry added to the adventure and mystique of the day.

A lesson I took from this trip was that one should never take for granted the opportunities we get to explore and experience. I honestly believe that there is no job more enjoyable or fulfilling than being a phycologist in this beautiful country of ours that houses the rainbow nation. I am sure that most of us on the trip will, for a while still, close our eyes at night and think about what we left behind, and dream of returning one day.

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Conference Countdown

PSSA 2011 will be hosted by the University of the Witwatersrand and is planned for 24-28 January 2011 at the Magaliesberg Conference Centre in Gauteng, South Africa. Registration will open in due course.

What to do now?

- ✓ Keep these dates free in your diary.
- ✓ Make sure you have funding for your group to attend.
- ✓ Start making your travel arrangements.

Convenor: Stuart Sym (stuart.sym@wits.ac.za)



A species of *Halimeda* encrusted with an as yet unidentified species of epiphytic non-geniculate coralline red alga (photo: Gavin Maneveldt).



Rob Anderson photographing seaweeds in a sheltered intertidal rock pool (photo: Mark Rothman).



Dense thickets of tree euphorbias (*Euphorbia triangularis*) were a common sight along the mountainous terrains (photo: Gavin Maneveldt).



Calendar of Events

1. Indian Aquaculture Workshop. Vijayawada, India. 3-5 September 2010.
www.asianaquaculturenetwork.com
2. 2nd SAEON SUMMIT 2010. Kirstenbosch, South Africa. 5-6 October 2010. Email: Summit@saeon.ac.za cc Rendani@saeon.ac.za
3. 3rd Algae World Asia 2010. Singapore. 19-20 October 2010.
www.cmtevents.com/aboutevent.aspx?ev=101038
4. 4th International Conference on Aquatic Resources (ICAR 2010). Alexandria, Egypt. 7-9 December 2010. www.niof.sci.eg/icar2010.html
5. 9th SASSB Conference: Biodiversity Matters. Grahamstown, South Africa. 19-21 January 2011. www.sassb.co.za
6. 14th South African Marine Science Symposium (SAMSS) / 49th Estuarine and Coastal Sciences Association (ECSA) International Conference. Grahamstown, South Africa. 4-9 April 2011. www.atas.co.za/SAMSS2011/



REVIVING DIATOM RESOURCES IN SOUTH AFRICA – APPLICATIONS AND CHALLENGES

Dr WR Harding

DH Environmental Consulting

www.dhec.co.za

Summary

Diatoms have proved to be remarkably valuable for aquatic biomonitoring, as indicators of eutrophication and acidification, for the formulation of ecological inferences and providing an evidence base on which water resource management decisions can be made. In these roles they have eclipsed other biological data and conventional water quality analyses. After three phases of research and development funded by the Water Research Commission, a rich array of methods, tools and taxonomic aids have been produced (2004-2009). This work, undertaken by a very small team, is equivalent to that produced elsewhere by larger teams and considerably longer timespans. Regrettably the programme has been prematurely terminated (January 2010) due to the Department of Water Affairs, the primary user of the Diatom Assessment Protocol, declining to contribute financially to the work. Thus, for the second time in recent South African history, the most exciting development in aquatic biomonitoring has been shut down.

In recent years the use of diatoms for aquatic biomonitoring has increasingly become a mainstay of many monitoring protocols, as reflected in the mandatory inclusion of periphyton, of which diatoms form an important constituent in the European Water Framework Directive. With appropriate use, diatoms provide insights that other biological data, e.g. invertebrates, and chemical data simply cannot provide. They have proven to be particularly-useful as early indicators of eutrophication and acidification, both issues prevalent in South Africa. Additionally, their position at the base of the foodweb (primary producers) and their rapid response times allows them to act as indicators of change more quickly than higher plants.

Since 2004, a very small group of South African researchers has produced a composite set of tools that has underpinned the addition of diatoms as a proxy for water quality, or for the extraction of ecological inferences, to existing methods (conventional water quality analysis, vegetation, invertebrates and fish). This work parallels other similar efforts from the United Kingdom and elsewhere.

Development of the South African Diatom Assessment Protocol (DAP), led by Dr Bill Harding and funded by the Water Research Commission (WRC), is producing a useable index to determine aquatic health, with an emphasis on water quality. This was not a simple task: by the mid-1980s diatom research in South Africa was all-but dead; moreover, for the better part of a decade thereafter, there was little interest in diatom-based monitoring techniques. Equally, there was scant interest in diatom taxonomy, the second of two diatom research fields that have to go hand-in-hand. This was unfortunate for a country that, without doubt, has fostered some of the leading diatomists of all times (Bela Cholnoky, ‘Archie’ Archibald and Ferdinand Schoeman heading this list).

Earlier research into many aspects of diatom biology, morphology and taxonomy conducted in South Africa, led to ground-breaking work investigating their use as water quality and ecological indicators. Only in the mid-1990s was this work to some extent revived and, subsequently, has gradually regained the acceptance of the aquatic monitoring community.

The DAP began by re-assessing the Cholnoky Collection, with the dual goals of making, first, diatom studies and monitoring techniques accessible to students, field operatives and water management agencies and, second, establishing a diatom index unique to South Africa. The first goal has been achieved with the production of a LUCID-based multi-access key to the common diatom species (Version 2 to be released shortly), that includes morphometric information and imagery for some three hundred species of diatom that occur commonly in South Africa. Coupled with this key is a hard-copy illustrated guide to common diatom species, serving as a useful aide-memoire for those engaged in routine analysis. Field and laboratory-based methodologies were also described in great detail in a special manual and are distributed with video clips demonstrating the relevant techniques. These tools have been requested from as far afield as South America, India and China. The reports are listed on the DHEC website (www.dhec.co.za) and are available from orders@wrc.org

Coupled to the production of guides and keys, there has been a strong capacity-building initiative, with a large number of students and other interested parties being trained in various aspects of diatom studies. Although reference material is very necessary, it cannot replace one-on-one mentoring and training.

The second goal of producing the index is currently nearing completion. Over 800 sites have been surveyed for both diatom communities and environmental parameters. This information will be used to determine the environmental requirements of South African diatom species, as well as to determine whether cosmopolitan diatom species react in the same way to environmental pressures in South Africa as they do elsewhere. Once this information has been obtained it will be possible to resolve it into indicator and tolerance values for individual species and then to include the species in an index.

Our greatest challenge, however, lies in training people to use the index. Our experience has shown that, provided the trainees are keen and receptive, recognition of the key characteristics of common diatom taxa is possible relatively quickly. It is our intention to conduct primary training using visual aids first, before switching to microscopy. We believe that the bulk of the fundamental, taxonomical, training can be imparted to relatively-large groups in a classroom setting, during which process we can also identify (pre-screen) those most likely to experience problems once in the laboratory environment.

Hand-in-hand with the development of the aforementioned tools has been the renewed curation of the Chohnoky Diatom Collection, one of the world's more important collections of a variety of diatom material. The Collection, essentially dormant and in storage since the mid-1980s, has recently been transferred to the aegis of the South African National Biodiversity Institute (SANBI), with the Collection itself being moved to the North-West University (NWU), under the curatorship of Dr Jonathan Taylor.

Regrettably, the South African Department of Water Affairs (DWA), the primary user of the work and tools arising from this research, has recently (January 2010) declined to contribute financially to the research programme. This incomprehensible decision, coming at a time when diatom monitoring is now well-established in Europe and elsewhere, has led to the premature termination of the work at a crucial stage.

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