

# Forum Phycologicum



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

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<b>Newsletter Editor</b>	
Gavin W. Maneveldt ( <a href="mailto:gmaneveldt@uwc.ac.za">gmaneveldt@uwc.ac.za</a> ) Dept. of Biodiversity and Conservation Biology University of the Western Cape Private Bag X17 Bellville 7535 South Africa	
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## From the Editor

Welcome to the midyear edition of our newsletter. As is usually the case, the year kicked off with our annual meeting, this year held at the Magaliesberg Conference Centre. As with the Saasveld meeting last year, this gathering was designed to integrate the contributions from the Biofuels Workshop. Stuart Sym assured me that both the workshop and the general meeting saw a fresh wave of young participants who impressed the adjudicators with the high standard of their presentations.

In the *News and Reviews* segment, we bring you both joyous news and some very sad tidings. Firstly, in recognition of their work on South African diatoms, the brothers Archibald have had a new genus of diatoms named after them. Catherine Browne provides us with a wonderful account of the SAMSS for 2011. On the flip side, we bid farewell to long-standing member Klaus Rotmann who passed away peacefully on 15 April after succumbing to cancer. Robert Anderson and Alan Critchley are thanked for the obituary on a man that truly was a giant in every sense of the word. The featured article uses familiar review, phenetic, and programming techniques for building a tool that hopes to encourage research interest into an important group of algae. The mechanics of the tool are fairly standard and can be applied to any group of organisms.

Next year's (2012) conference is planned for June at Qolorha (see issue 73: 11-14) in the old Transkei. The region is a beautifully rural area with green hills, black-sanded beaches, rocky shores with abundant algae, and extensive kelp beds with unusually long *Ecklonia radiata* 'plants'. This next conference promises to be a treat both academically and spiritually.

Best wishes

Gavin W. Maneveldt

*Synarthrophyton patena*  
epiphytic on *Gelidium capense*

## News and Reviews

### 1. Introducing the "Habitable Planet"

The Applied Centre for Climate and Earth System Science (ACCESS) will be hosting a workshop on the 11-20 July 2011 through the Universities of Rhodes and Fort Hare. The workshop will focus on the evolution of Planet Earth's glorious diversity of flora and fauna and the conditions required to maintain these favourable environments. The favourable conditions depend on the interactions between the atmosphere, biosphere, oceans and solid Earth including phenomena such as El Nino, La Nina, the circulations of the atmosphere and ocean, the drifting of the continents and the ice ages. The course will include a focus on human-environment relationships, both in the distant past and present, to investigate the impact future global warming and climate change may have.

See Appendix I for more information. Although the 16 May 2011 was the deadline for applications, please contact Dr Carl Palmer ([cpalmer@access.ac.za](mailto:cpalmer@access.ac.za)) for more information.

### 2. International Diatom News

#### *Professor Horst Lange-Bertalot honoured*

Jonathan Taylor of North-West University (Potchefstroom) and Colin G.M. Archibald (independent consultant) were privileged to be invited to the celebration of Professor Horst Lange-Bertalot's award of an honorary doctorate by the University of Szczecin (Poland) which coincided with his 75th birthday. Professor Lange-Bertalot is recognised as the greatest living diatomologist / taxonomist of freshwater species and perhaps has published more than any other person in the history of diatom research. The pre-ceremony dinner on the evening before was truly an international gathering of Professor Lange-Bertalot's closest friends and associates. There must have been at least 25 nationalities represented around the table, judging by the conversation and the many different spoken languages.

*5th Central European Diatom Symposium*

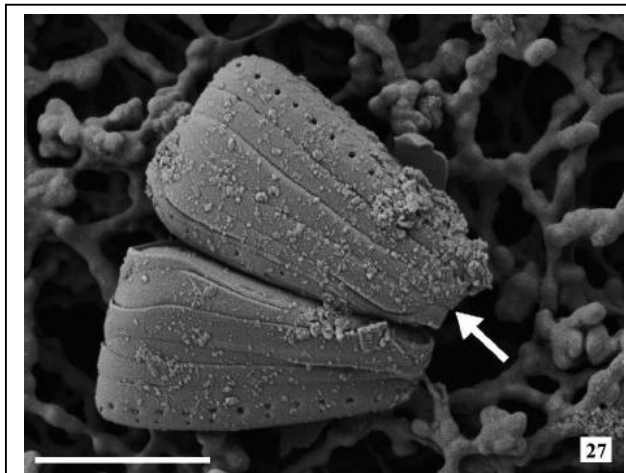




Jonathan Taylor and Colin Archibald represented South Africa at the 5th Central European Diatom Symposium held in Szczecin in March of this year. Jonathon gave a poster presentation and also co-author many other contributions along with other European diatomologist. Along with Professor Andrzej Witkowski, Colin Archibald co-authored a preliminary paper on diatoms of the west coast of South Africa from which they had collected samples between Port Nolloth and Cape Point during February of 2011, and earlier from Langebaan to Port Alfred during 2006. This latter research retraced the work and footsteps of the late Professor Giffen (Fort Hare diatomologist circa 1960-75).

*Archibaldia*, one of two new South African diatom genera:

Further to the participation of Jonathan Taylor and Colin Archibald at the 5th Central European Diatom Symposium, there was recognition given to South African diatom research with a recent paper establishing a new diatom genus (*Archibaldia*, see **Appendix II**) dedicated to the brothers R.E.M. (late) and Colin G.M. Archibald, recognizing their tremendous impacts on the study of diatoms.



**Figure 27.** Girdle view of two frustules of *Archibaldia capensis*. Although of the open type, girdle bands may be alternatively open and closed at each pole (arrow). Scale bar = 3  $\mu$ m (image source: *Phycologia* 50(2): 173).

The gist of all of this is that it demonstrates that the small band of diatom folk in South Africa is at the forefront of diatom research. These researchers are internationally recognised for their efforts in researching these algae, despite the difficulty in

securing local funds to continue all their important work.

#### Some of the key presentations at the conference

Taylor JC, Morales E, Ector L. 2011. Two monoraphid diatoms from Africa with unique cell wall morphology *Achnantheidium standeri* (Cholnoky) JC Taylor E Morales and Ector, and *A. taiaense* (Carter & Denny) JC Taylor, Morales & Ector.

Witkowski A, Archibald CGM, Dabek P. 2011. A review of benthic marine diatoms found on the west and south cape coasts of South Africa - in the footsteps of Giffen (1963-1984).

#### Archibaldia paper

Witkowski A, Kociolek JP, Kurzydowski KJ. 2011. Valve ultrastructure of two new genera of marine canal-bearing diatoms (Bacillariophyceae). *Phycologia* 50(2): 170-181.

Colin G.M. Archibald can be contacted at:

[carchibald18@telkomsa.net](mailto:carchibald18@telkomsa.net)

### 3. 14<sup>th</sup> SAMSS 2011

Joint 14<sup>th</sup> South African Marine Science Symposium / 49<sup>th</sup> Estuarine and Coastal Sciences Association International Conference

This year's SAMSS/ECSA conference was held at Rhodes University in Grahamstown from 4-7 April. It attracted over 200 marine scientists from destinations both near and far and was a leading forum at which both scientists and others concerned with coastal, estuarine and marine systems, presented their research and work to their peers.

The theme of this year's conference was "Estuarine, coastal and oceanic ecosystems: breaking down the boundaries". A broad range of disciplines came together to share their passion and work, showing that marine, coastal and estuarine sciences are alive and well. Clearly, interest in the understanding and knowledge of the wonders of such systems, their processes, structure, functioning and organisms within them, is vibrant and growing. The full programme



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PSSA members (left to right) John Bolton, Robert Anderson, Chris Boothroyd, Lydiane Mattio, Leanne Gersun, Derek Kemp, Courney Padua, Catherine Browne, Elizabeth van der Merwe and Gavin Maneveldt during a mid-conference excursion to Port Alfred.



A phycologist's paradise – mounds of 'easy picking' seaweeds (photo: Gavin W. Maneveldt).



Leanne Gersun (closest to view) and Lydiane Mattio sorting through specimens of *Sargassum* for genetic analysis (photo: Gavin W. Maneveldt).

included various oral and poster presentations covering topics on fisheries management, education, research, large marine ecosystems, estuaries, methods of monitoring and biogeography.

Other topics included biochemistry, diets and food webs, marine and coastal management, top predators, global change, invasion biology, biotic responses to abiotic drivers, genetics and phylogeography, biodiversity and mariculture. The papers reflected a healthy balance of marine, oceanic, estuarine and coastal work currently underway.

Each day commenced with interesting keynote addresses by speakers. Dr. RJ Uncles from the Plymouth Marine Laboratory, United Kingdom, presented on physical processes in estuaries and some physical-biological interactions. Prof. CD McQuaid from the Coastal Research Group in the Department of Zoology and Entomology, Rhodes University, spoke about time, space and generality in marine ecosystems. Dr. AB Yerro from AZTI-Tecnalia/Marine Research, Spain, spoke on biotic responses to human pressures: moving from research to management issues. Prof. C Griffiths from the Centre of Invasion Biology, University of Cape Town, shared his work on revealing the diversity and distribution of marine invasive species in South Africa.

Apart from the formalities of the conference, fellowship was enjoyed at the hosted functions and delegates enjoyed the sights of Grahamstown, as well as a drink or two at the infamous *Rat and Parrot*. Selected highlights featured were the nautical themed dinner, an informal PSSA visit to the shore at Port Alfred, and the Gala dinner.

This conference provided an excellent opportunity to discover innovative research and convey studies and concepts, as well as to network within the marine science community. The conference was characterised by warm interaction among participants as well as informative and entertaining activities. Those participants I spoke with, left feeling enriched and filled with enthusiasm for the year and endeavours that lay ahead. I'd like to conclude by thanking all who attended, especially the Rhodes organising team for hosting a successful and enjoyable conference.

**Catherine Browne**

Department of Botany, University of Cape Town

Email: [catmbrowne@gmail.com](mailto:catmbrowne@gmail.com)



#### 4. Tribute to Klaus Rotmann

Klaus Rotmann died peacefully on 15 April 2011 in St Gallen, Switzerland, with his family at his bedside, after succumbing to cancer. Klaus is survived by his wife Gisela, daughters Britta and Uschi, and son Harald.

Klaus was born in Osnabrück in 1945, but in 1950 his family left a war-ravaged Germany to settle in Keetmanshoop, Namibia (then South West Africa). He was schooled at the Deutsche Schule Lüderitzbucht and maintained a lasting affection for his old school and for the seaside town of Lüderitzbucht.



After a period of study the University of Pretoria, Klaus embarked on a commercial career with a Johannesburg company. He subsequently left to start his own company, which developed into Taurus Maintenance Products. In the late 1970's Klaus became interested in the seaweed business, and since the early 1980's the Taurus group of companies has played a leading role in the Namibian and South African seaweed industries.

In Namibia, Klaus' direction of Taurus Chemicals Namibia (Ltd) played an important part in the commercial life of Lüderitzbucht. The town was in a serious financial slump by the start of the 1980's, as fish-processing factories closed and the industry moved to Walvis Bay. Taurus brought new economic life to the town: building, buying and refurbishing infrastructure for the processing of seaweed and seaweed products for export. Klaus was justifiably proud of the many jobs that his company brought to the town that he was so fond of.

Klaus was constantly looking for new commercial ideas for seaweeds, and as a real entrepreneur, he was not afraid to try them out commercially. Klaus led the company into many seaweed-based activities from harvesting, through aquaculture, into processing. Taurus made alginate and agar, developed a kelp-based product for soil remediation, developed health and cosmetic

products, and more recently began producing a liquid kelp-extract for agriculture and horticulture under the AfriKelp brand. Taurus experimented with commercial pond-cultivation of *Gracilaria* in Lüderitzbucht in the 1980's, established the first oyster farm in the lagoon, and in 1985 began producing agar from Lüderitzbucht *Gracilaria* in premises converted from the old power station.

Taurus was also the first company to farm seaweed commercially and successfully in southern Africa. By 1991 large test systems were deployed in Lüderitzbucht lagoon to cultivate *Gracilaria* on suspended rope-rafts, leading to successful

commercial cultivation on a large scale. Klaus even tried to start the cultivation of *Gracilaria* in dis-used mining ponds in the diamond spoil areas along the South African west coast.

Throughout his career, Klaus maintained a strong interest in understanding the materials he worked with. His M. Comm. thesis at the University of the Witwatersrand in 1985, on the commercial viability of an integrated seaweed industry in southern Africa, contains much that is still relevant today. From 1984 onwards he regularly attended the 3-yearly International Seaweed Symposium, and over the years contributed several papers to the proceedings. Among his colleagues in the international industry, Klaus' experience and knowledge earned him the nickname "the Seaweed King of Southern Africa".

His effect on the South African seaweed industry remains enormous. Taurus first processed local red seaweeds in their Butterworth factory in the early 1980's, and they have continued to invest in local processing of seaweed products from "wellness" products to liquid plant-growth stimulants. The international business relationships that Klaus was able to build were largely instrumental in stabilizing a fragmented and unreliable South African seaweed industry.





Since his interest in the seaweed business began, Klaus was a staunch friend of phycology in southern Africa. He supported, and regularly attended the annual congresses of the Phycological Society of Southern Africa (PSSA), and Taurus also generously supported the 17<sup>th</sup> International Seaweed Symposium (ISS) that was held in Cape Town in 2001. (Furthermore, few delegates to the 17<sup>th</sup> ISS who enjoyed the limitless supply of free Windhoek beer will realize that this was thanks to Klaus' close relationship with Namibian Breweries!).

Klaus was a big man with an even larger personality. He was a southern African entrepreneur – a man with a passion for seaweeds and their uses. He was a trailblazer from Namibia to the Eastern Cape in South Africa, whose enthusiasm benefitted many. Professionally or socially, Klaus was always good company: helpful, modest, witty and ready for a good laugh. He will be deeply missed by his family and his many colleagues and friends.

#### Key Publications

Rotmann KWG. 1985. A strategic plan for the establishment of an integrated seaweed industry in Southern Africa. M. Comm. Thesis, Faculty of Commerce, University of the Witwatersrand, 166 pp.

Rotmann KWG. 1987. The collection, utilization and potential farming of red seaweeds in Namibia. *Hydrobiologia* 151/152: 3012-305 (*Proceedings of the 12<sup>th</sup> International Seaweed Symposium*, Sao Paulo, Brazil, 1986).

Rotmann KWG. 1990. Saldanha Bay, South Africa: Recovery of *Gracilaria verrucosa* (gracilariales, Rhodophyta). *Hydrobiologia* 204/205: 325-330 (*Proceedings of the 13<sup>th</sup> International Seaweed Symposium*, Vancouver, Canada, 1989).

Rotmann KWG. 1992. The marketing of seaweed from Africa with special reference to the South African experience. *Proceedings of the First International Workshop on Sustainable Seaweed Resource Development in Sub-Saharan Africa*. Eds: Mshigeni, Bolton, Critchley and Kiangi. Publ. by K. E. Mshigeni, Windhoek. pp. 321-333.

Anderson RJ, Bolton JJ, Molloy FJ, Rotmann KW. 2003. Commercial seaweeds in southern Africa. *Proceedings of the 17<sup>th</sup> International Seaweed Symposium*, Oxford University Press. pp. 1-12.

Obituary written by **Robert Anderson** and **Alan Critchley**, May 2011 (we thank Klaus Becker for information from the obituary that he wrote).



Klaus with Karen White (far left) and Deborah Robertson-Andersson (middle) at the 19<sup>th</sup> International Seaweed Symposium, Kobe, Japan, March 2007 (photo: Gavin W. Maneveldt).



Klaus with Wendy Ruscoe (front left), Colin Archibald (back left), Robert Anderson (front right) and John Bolton (back right) at the 23<sup>rd</sup> Congress of the Phycological Society of Southern Africa, Ellingham Resort, KwaZulu-Natal, South Africa, January 2008 (photo: Gavin W. Maneveldt).



Klaus with (left to right) Gavin Maneveldt, Wendy Ruscoe, Alan Critchley and Artur Simoes at the 20<sup>th</sup> International Seaweed Symposium, Ensenada, Mexico, February 2010.



## 5. Update on PSSA website

At the PSSA congress in January 2011, Eileen Campbell asked for suggestions for the content of the new, revamped PSSA website. Wendy Stirk will be collating this information and AJ Smit will be responsible for the construction and updating of the new site. If you would like your details to be included on the new PSSA webpage, please provide the information asked for in the document circulated by email.

Once you have this document, please be so kind as to pass this on to any PSSA member(s) who may not have received the file. In addition, please also encourage interested students to join the PSSA and send in their details via this form. We are also looking for suitable photographs. Please send any photographs that you are willing for us to use. You will be credited with the photograph.

**Please send this information to Wendy Stirk ([stirk@ukzn.ac.za](mailto:stirk@ukzn.ac.za)) by 30<sup>th</sup> JULY 2011.**



**Figure 1.** Examples of non-geniculate (top) and geniculate (bottom) coralline red algae.

## Featured Article

### Developing an Internet-based tool for identifying coralline red algae (Corallinophycidae, Rhodophyta)

Gavin W. Maneveldt<sup>1</sup>, Martin C. Cocks<sup>2</sup>,  
William J. Woelkerling<sup>3</sup>

<sup>1</sup> Department of Biodiversity & Conservation Biology, University of the Western Cape, Private Bag X17, Bellville 7535, South Africa; [gmaneveldt@uwc.ac.za](mailto:gmaneveldt@uwc.ac.za)

<sup>2</sup> International Ocean Institute of Southern Africa, Department of Biodiversity & Conservation Biology, University of the Western Cape, Private Bag X17, Bellville 7535, South Africa; [mcocks@uwc.ac.za](mailto:mcocks@uwc.ac.za)

<sup>3</sup> Department of Botany, La Trobe University, Bundoora, Victoria 3086, Australia; [W.Woelkerling@latrobe.edu.au](mailto:W.Woelkerling@latrobe.edu.au)

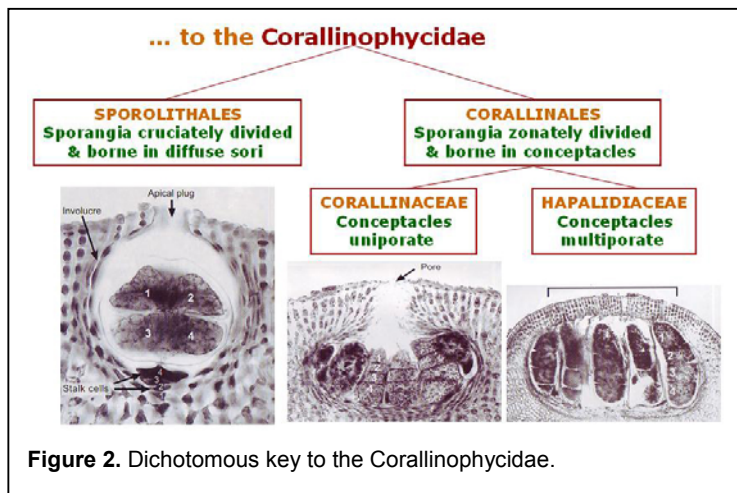
Coralline red algae (Fig. 1) are widespread in all of the world's oceans, yet despite their ubiquity, are a poorly known group of marine organisms. Much of our lack of knowledge of this group stems from a legacy of poor quality taxonomic work. Over the past 30 years, however, we have made tremendous strides in understanding the taxonomy of these algae. The number of researchers paying attention to the coralline algae has increased in recent years, but notably without any appreciable increase in the number of coralline taxonomists. The purpose of our current, ongoing research is to provide assistance to this increasing number of researchers by developing an Internet-based tool that will provide some basic data about these algae and to equip users with sufficient knowledge and information to collect and process corallines, and to identify specimens to genus level. The main target audience are persons with limited or no knowledge of corallines who wish to understand the basic features of corallines and identify specimens to genus level. Those more experienced with corallines should also find the website a valuable source of information and images.

As a basis for developing the identification tool, a dichotomous key was first established (see Fig. 2 for a portion of the key). Using this key, a phenetic character analysis of all the coralline algal taxa now ascribed to the subclass Corallinophycidae,





was carried out using both qualitative and quantitative data. Here individual taxa are regarded as Operational Taxonomic Units. Initially characters and character states were identified and assigned numeric (gap) codes (e.g. Table 1) and a data matrix of the codes for all taxa were then tabulated (e.g. Table 2). The final tabulated codes were used to generate a phenogram to determine the accuracy of the coding, as well as to write the software programme for the online identifications. Phenetic resolution of the data matrix of codes conformed very well to our current understanding of the taxonomy of the coralline red algae. The



phenogram shows clear resolution of the non-geniculate orders (Corallinales, Sporo-lithales), families (Corallinaceae, Hapalidiaceae and Sporolithaceae) and subfamilies (Fig. 3). Having this assurance, it was then possible to proceed and to use the tabulated codes to finalise the writing of the software programme for the online identification tool. To view the ongoing progress of the website, visit the URL below (see Figs 4-5 for screen captures). Note though that while some sections of the site are currently still under development, the identification tool is functional.

Table 1. Characters and character states used in the construction of the data matrix for orders of the subclass Corallinophycidae.

	Characters	Character states	
		1	2
	<b>Gap Code</b>		
1	Calcification	walls of most vegetative cells	calcite husk around specialized cortical cells only
2	Tetrasporangial division	zonate	cruciate
3	Tetrasporangia borne in conceptacles	yes	no
4	Tetrasporangia borne on cortical fascicles	yes	no
5	Tetrasporangia borne in sori	yes	no
6	Gametangia borne ...	in conceptacles	on cortical fascicles

Table 2. Data matrix of codes for orders of the subclass Corallinophycidae.

Characters	Corallinales	Rhodogorgonales	Sporolithales
1	1	2	1
2	1	1	2
3	1	2	2
4	2	1	2
5	2	2	1
6	1	2	1

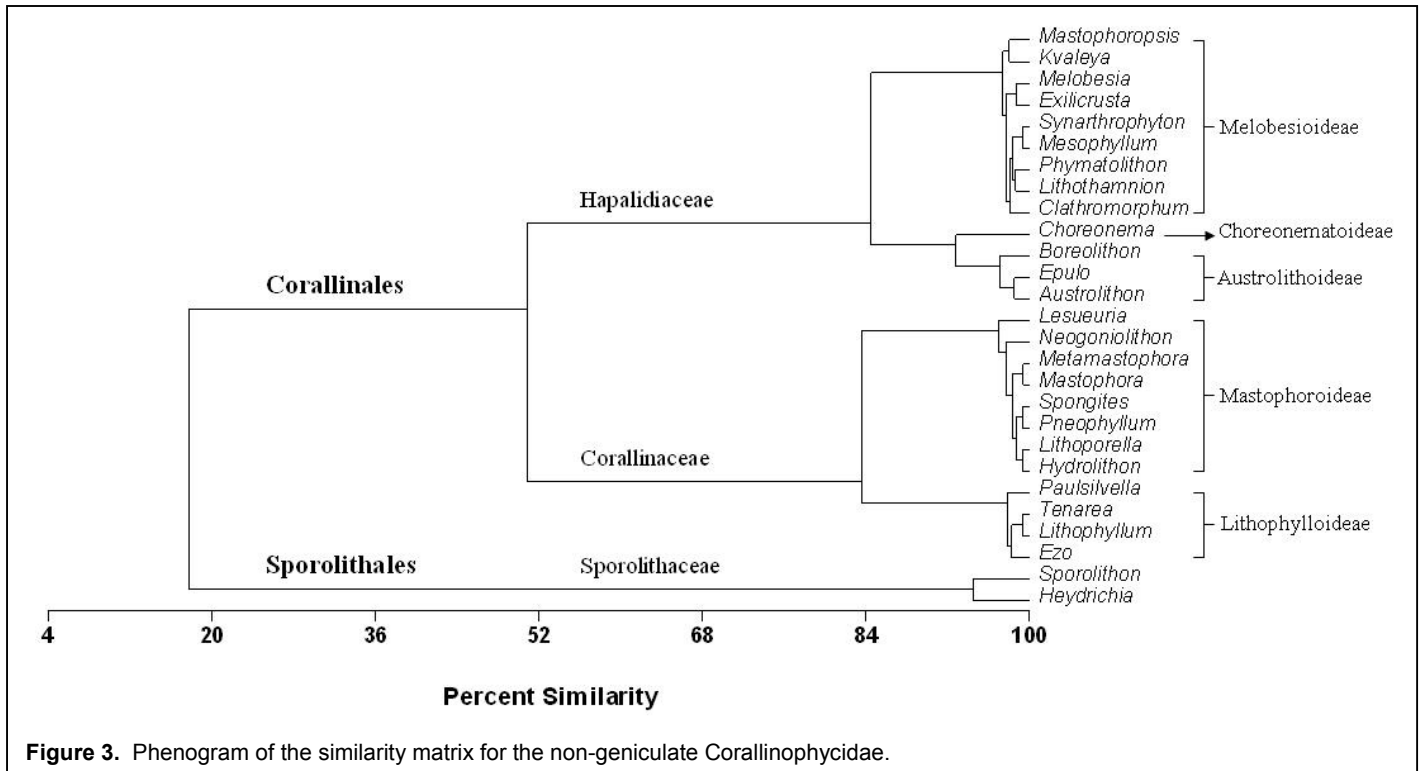


Figure 3. Phenogram of the similarity matrix for the non-geniculate Corallinophycidae.

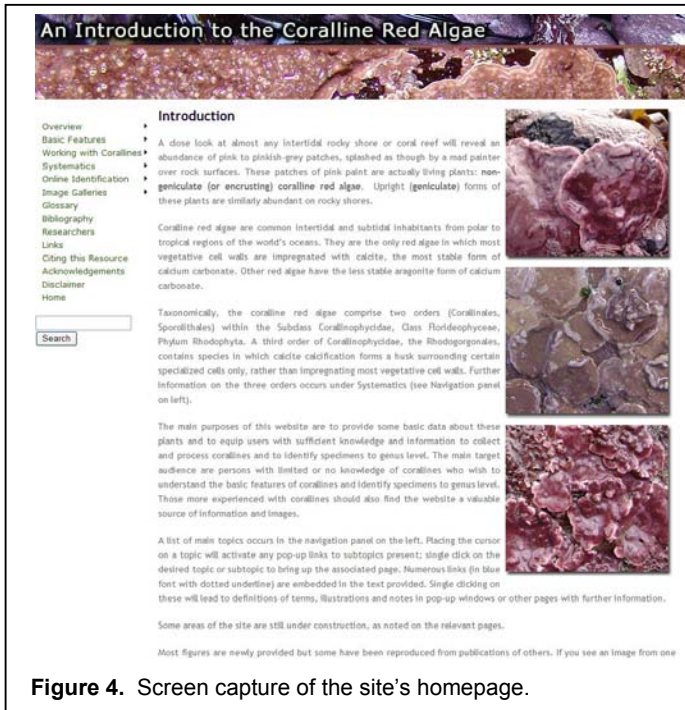


Figure 4. Screen capture of the site's homepage.

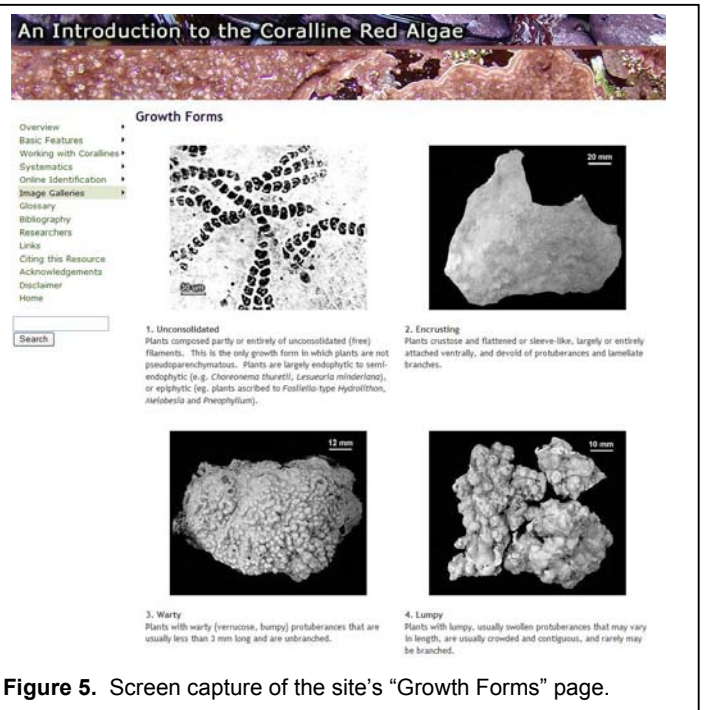


Figure 5. Screen capture of the site's "Growth Forms" page.

Site URL: <http://www.bcb.uwc.ac.za/clines/> - currently still under development, but can be accessed at: <http://development.ioisa.org.za/cait/>.

It is envisaged that the website and online identification tool will supplement coralline algal

taxonomy and systematics, and foster a greater interest in their ecology. Numerous colleagues have contributed (editorial, images, site testing) to the culmination of this resource. The authors take this opportunity of thanking you all most graciously for your generous offerings of time and energy. The website is based upon work supported





financially by the South African National Research Foundation, the University of the Western Cape (South Africa), and the La Trobe University (Australia).

### Conference Countdown

Conference 2012 is being hosted by the Seaweed Unit (Department of Agriculture, Forestry and Fisheries), under the chair of Robert Anderson. The conference has tentatively been arranged for June at Qolorha (old Transkei). Updates will be announced in forthcoming issues of the newsletter.

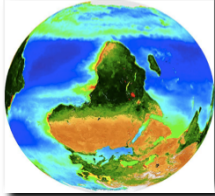
### Calendar of Events

#### Upcoming Conferences

1. International Student Conference: Climate Change and Indigenous Knowledge Systems. Johannesburg, South Africa, 15-17 August 2011. [www.cees.uio.no:80/news/2011/climate-change-conference-sa.html](http://www.cees.uio.no:80/news/2011/climate-change-conference-sa.html)
2. 7<sup>th</sup> IAHR Symposium on River, Coastal and Estuarine Morphodynamics. Beijing, China, 6-8 September 2011. [www.irtces.org/isi/WebNews\\_View-en2.asp?WebNewsID=622](http://www.irtces.org/isi/WebNews_View-en2.asp?WebNewsID=622)
3. Aqua Africa 2011: Aquaculture for a Growing Continent. Mangochi, Malawi, 13-16 September 2011. [www.aasa-aqua.co.za](http://www.aasa-aqua.co.za)
4. International Society for Ecological Modelling Conference (ISEM 2011): Ecological Modeling for Global Change: Coupled Human and Natural Systems. Beijing, China, 20-23 September 2011. [www.isem2011.org/](http://www.isem2011.org/)
5. 6th Asian Pacific Phycological Forum. Yeosu, Korea, 9-14 October 2011. [www.appf2011.org](http://www.appf2011.org)
6. 12<sup>th</sup> International Conference on Estuarine and Coastal Modeling. Augustine, Florida, USA, 7-9 November 2011. [www.oce.uri.edu/ecm12/](http://www.oce.uri.edu/ecm12/)
7. 5th International Algae Congress, Berlin, Germany, 1-2 December 2011. [www.algaecongress.com/page/3789](http://www.algaecongress.com/page/3789)
8. 12<sup>th</sup> International Coral Reef Symposium (ICRS 2012). Cairns, Australia, 9-13 July 2012. [www.coralcoe.org.au/icrs2012/](http://www.coralcoe.org.au/icrs2012/)



## Introducing the “Habitable Planet”



The Applied Centre for Climate and Earth System Science (ACCESS) will be hosting a workshop on the **11<sup>th</sup> – 20<sup>th</sup> July 2011 through the Universities of Rhodes and Fort Hare**. The workshop will focus on the evolution of Planet Earth’s glorious diversity of flora and fauna and the conditions required to maintain these favourable environments. The favourable conditions depend on the interactions between the atmosphere, biosphere, oceans and solid Earth including phenomena such as El Nino, La Nina, the circulations of the atmosphere and oceans, the drifting of the continents and the ice ages. The course will include a focus on human-environment relationships, both in the distance past and present, to investigate the impact future global warming and climate change may have.

The workshop uses South Africa’s magnificent physical environments to introduce 3<sup>rd</sup> and 4<sup>th</sup> year students (from a diverse range of field from mathematics to sociology / law) to the concept of **Earth System Science**. The workshop uses a unique combination of lectures, computer exercises, contemporary documentaries, peer discussion and appropriate field excursions to tell the story of why the Earth is habitable and why Southern Africa is such a special place. The workshop also aims to expose scholars to the range of master’s degree courses available in South Africa.



If you wish to apply please send us an **APPLICATION LETTER** stating why you should be considered to attend the workshop as well as a **ONE PAGE CV**. Your CV must include the name, e-mail address and other contact details of a course coordinator or supervisor at your university/institution.

**Funding is available to cover the travel and accommodation costs of all successful applicants.**

**DEADLINE – 16<sup>th</sup> May 2011**

Please note that late or incomplete applications will not be considered

To apply, or for more information, contact Dr Carl Palmer:

[cpalmer@access.ac.za](mailto:cpalmer@access.ac.za)

Join us on Facebook @ <http://www.facebook.com/group.php?gid=4352117413>

Note that the Habitable Planet is also happening in **PRETORIA**. Contact us for more info.



aperture 1.4) oil immersion  $\times 100$  objective. SEM observations were made with Hitachi S4500 field emission model and LEO 1450VP, whereas TEM was with FEI Tecnai F20 operating at 200 kV and Hitachi S5500 microscopes. Terminology follows that of Anonymous (1975), Paddock & Sims (1977), Ross *et al.* (1979), and Ruck & Kociolek (2004).

## RESULTS

### *Archibaldia* Witkowski & Kociolek *gen. nov.*

*Frustula symmetrica apicales axis, asymmetrica transapicales et pervalvares axes. Valvae clavatae. Raphe ramis 2 inaequalibus longitudibus, ramo basipolo longiora ramo apicipolo. Systema raphis fibulatum. Carina nulla. Striae simplices punctis rotundatis. Cingulum taeniis apertis punctatis.*

Frustules in girdle and valve view heteropolar (gomphonemoid). Valves clavate in shape with two raphe branches differing in length. Raphe gomphonemoid in appearance with footpole branch longer and the headpole one being shorter. The raphe canal supported by complex fibulae. Elevated keel absent. Transapical striae simple, composed of round areolae. Girdle composed of several open, punctate bands.

**ETYMOLOGY:** The generic name is dedicated to the late R.E.M. Archibald and his brother Colin Archibald, to recognize their impacts on the study of diatoms.

**TYPE SPECIES:** *Archibaldia capensis* (Giffen) Witkowski & Kociolek

### *Archibaldia capensis* (Giffen) Witkowski & Kociolek *comb. nov.*

Figs 1–39

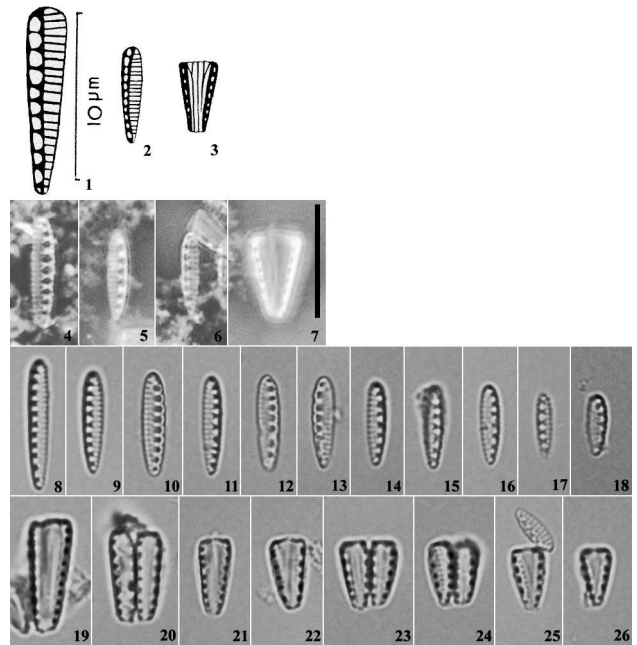
**BASIONYM:** *Gomphonitzschia capensis* Giffen 1984, *Bacillaria* 7, p.191, figs 29–32.

**HOLOTYPE:** Slide 647/7 in the Giffen Collection, CSIR Durban.

**TYPE LOCALITY:** Lamberts Bay on the Namaqualand Coast about 250 km north of Cape Town.

**LM:** Frustules in girdle view are cuneate, broadly truncate at the upper apices, and small, rounded at the lower apices. Pervalvar axis is 1.5–5.0  $\mu\text{m}$  long (Figs 4, 8, 19–26). Valves are small, linear-clavate, asymmetrical about the apical axis, with a rounded headpole and narrowly rounded footpole, 6–12  $\mu\text{m}$  long, 1.5–2.0  $\mu\text{m}$  broad. Transapical striae numbers 20–21 in 10  $\mu\text{m}$ . Fibulae are spaced regularly, 10–12 in 10  $\mu\text{m}$ , fairly large and distinct (Figs 1–3, 4–6, 8–18).

**EM:** Externally the valve face has a distinct raphe with two branches hooked at the distal ends, and straight, somewhat expanded, proximal ends. The two raphe branches are unequal in length, with the branch on the headpole side being shorter than the branch on the footpole side (Fig. 28). The raphe ranges from being central to eccentric, positioned at the valve margin or on the valve mantle (Figs 28–30). Areolae are simple, round (Figs 37, 38), with only one to three areola comprising a stria (Figs 28–30). A large unornamented area is present on one side of the raphe (Figs 28–30). Valve mantle is higher at the



**Figs 1–26.** Light microscope microphotographs of *Archibaldia capensis* (Giffen) Witkowski & Kociolek *comb. nov.* Scale bars = 10  $\mu\text{m}$ .

**Figs 1–3.** Scanned original line drawings by Malcolm H. Giffen.

**Figs 4–7.** Specimens from the holotype slide (phase contrast).

**Figs 8–26.** Specimens from the unmounted material from the sample from which the holotype originates (bright field illumination).

headpole and tapers toward the footpole (Figs 27, 39). None of the valves observed in SEM showed the presence of a pore field or any similar structure at either pole (Figs 30, 35).

Internally, the raphe is contained in a canal (Figs 31, 32). Proximal raphe ends are distinct, enlarged and liplike, being positioned very close to one another; distal ends terminate as helictoglossae. Internally, the valve is dominated by large, anastomosing fibulae, with one side of the valve containing a heavily silicified area. The fibulae produce oval-shaped fenestrae or portules (Figs 31, 32, 34–36).

Numerous girdle bands comprise the cingulum. Bands are of the open type. Bands alternate between being open at the head pole and the foot pole (Figs 27, 39). Bands may have a single row of poroids on the pars interior, which are not visible from the exterior (Fig. 33).

**HABITAT:** Observed by Giffen (1984) epiphytic on the stipes of brown algae *Ecklonia buccinalis* (Linnaeus) Hornemann. *Archibaldia capensis* (= *Gomphonitzschia capensis*) formed glossy patches mixed with tufts of *Polysiphonia* spp.

### *Nagumoea* Kociolek & Witkowski *gen. nov.*

*Frustula symmetrica apicales transapicales et pervalvares axes. Superficies valvarum planis. Raphe locata mediana, ramis 2 aequalibus longitudibus. Systema raphis fibulatum. Fibula relative robusta. Carina nulla.*

Frustules in girdle view rectangular, symmetrical about apical and transapical axes. Valve face flat, raphe composed of two branches of equal length, medial. Raphe canal supported by complex, anastomosing fibulae. Keel absent.