

ENCEPHALARTOS

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CYCAD SOCIETY OF
SOUTH AFRICA

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VAN SUID-AFRIKA

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www.cycadsociety.org

Council members / Raadslede

President

Dr Piet Vorster

Botany Department / Departement Plantkunde
University of / Universiteit van Stellenbosch
Private Bag / Privaatsak X1, 7602 Matieland
Tel.: 021 808 3056; Fax/Faks: 021 808 3607
E-mail/E-pos: pjvor@sun.ac.za

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Prof. Guillaume Theron

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tussen 17h00 and/en 19h00 and Fax during
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E-mail / E-pos: GTheron@nsnper1.up.ac.za

Accountant & Auditor Rekenmeester & Ouditeur

Werner Diedericks

P.O. Box/Posbus 17081
0027 Groenkloof
(Pretoria)
Tel. 012 460 6123

Electronic Services Elektroniese Dienste Pieter van der Walt

P.O. Box / Posbus 913
2158 Olivedale
E-mail/E-pos:
pvdwalt@altron.co.za

Editor of ENCEPHALARTOS Redakteur van ENCEPHALARTOS

Wynand van Eeden

P.O. Box / Posbus 3489
7536 Tygerpark
Tel. & Fax/Faks: 021 913 5187
E-mail/E-pos:
wynand@ananzi.co.za

Regional officers / Streeksverteenwoordigers

Lowveld / Laeveld

Charles de Beer

P.O. Box / Posbus 1107
1240 White River /
Witrivier
Tel/Fax.: 013 750 0719
Cell/Sel: 082 572 3233
e-mail / e-pos:
charles@lantic.net

KwaZulu-Natal

Danie Nel

P.O. Box / Posbus 45
3730 Umlaas Road
Tel.: 0332-510478
Cell/Sel: 082 9254540
082 9246969

Northern Province Cycad Working Group / Noordelike Provinsie Broodboom Werkgroep

Xander de Kock

P.O. Box / Posbus 21
0787 Faunapark
Tel/ Fax/Faks: 015 291 1381 (w)
Cell/Sel: 082 465 8432

Gauteng / Transvaal

Derik Minnaar

Postnet Suite 5
Private Bag / Privaatsak X8
0047 Elardus Park (Pretoria)
Cell/Sel: 082 4131025 (after
hours / na-ure)

Pollen- and seedbank officers / Stuifmeel- en saadbankbeamptes

KwaZulu-Natal

Rudi van Niekerk

P.O. Box / Posbus 252
4277 Southbroom
Tel: 039 314 9762
Fax/Faks: 039 314 9766; E-mail/E-pos:
arsvanniekerk@worldonline.co.za

Northern Province and Country-wide / Noordelike Provinsie en Landswyd

Diekie de Klerk

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Tel.: 015 297 3196/7 (W); Fax/Faks: 015
297 4627; Cell/Sel: 083 292 4310;
E-mail/E-pos: deklerkk@mweb.co.za

Lowveld / Laeveld

Diderik Nel

Private Bag/Privaatsak X507
1330 Hectorspruit
Cell/Sel: 072 339 9834;
E-mail / E-pos: diderik15@yahoo.com

Overseas correspondents / Buitelandse skakelbeamptes

Australia

Paul Kennedy

21 Sierra Road, Engadine, New South Wales 2233
Tel.: 02-520-7690
E-mail: cycads@awwwsome.com.au

U.S.A. & Canada

Willie Tang

65 Corydon Dr.
Miami Springs, Florida 33166
Tel.: 305-667-1651
E-mail: WLMTang@email.msn.com

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COVER / VOORBLAD : One of several cycads, said to be *Cycas seemannii*, at the Honolulu Botanical Gardens. This specimen shows three successive years' spontaneous reproductive activity - the current year's emergent megasporophylls, the previous year's fully developed seed crop (green seeds) and the prior year's seed crop (dark cherry red seeds). [The authors of the "Focus on..." article in this issue are circumspect about the identity of this cycad].

Photo / Foto: Leland Miyano

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FROM THE EDITOR

There you have it folks! My first edition of *Encephalartos*. Not having any experience in this field, I found it a daunting task to follow in the footsteps of our previous editor, Dr. Isabella Claassen. She delighted us for 10 years with her efforts and produced a journal of very high standard, as you will all agree. Often she had too little material but always produced a journal you can read and enjoy. She is a cycad expert in her own right and has made very interesting cycad hybrids. The horticultural possibilities of the genus *Encephalartos* has not been fully realized and some of her hybrids are very beautiful indeed. They have the potential to be better growers than the pure species and therefore will give a bigger plant faster. We all want that three-meter tall cycad in the garden as a focal point and a hybrid may be just the thing to make this possible. To all the purists that say hybrids are not acceptable, please consider this: "Why are we losing the large mature plants in the wild?" In my opinion there will always be a market for large specimens, regardless of species or origin. Any hybrid that is beautiful and there are many, and that grows fast will have a future. Garden plants, hybrids or not, should never find their way back into nature (I cannot see this happen at the rate plants are poached anyway!), ensuring that we do not have any contamination of wild populations. Any material used for re-establishment or augmentation of wild populations should be thoroughly regulated by the experts.

We are all quick to say that Nature Conservation authorities do not do their job and should concentrate on what are still viable populations in the wild. Is the reason for the tough regulations not perhaps because of us, the cycad collector? Sure, most of us are law abiding but our gardens do become a hiding place for wild plants that somehow got permits before it got to us. Many of our indigenous cycads are also not pretty plants, do not grow well and are very delicate to transplant. What do you do with your *E. ghellinkii* or *E. lanatus* when you move? Another point to consider is nature. Please have a look at the last habitat of *E. brevifoliolatus*. What sensible reason can you possibly have, to think that those plants will look better in your tiny little garden, compared to the vast mountains where they have been for thousands of years?

For a civilized society we have a poor record protecting our environment and the sad thing is very few care. Instead of making a real difference, justification is sought for what is our "rights". We have no rights, only the privilege to be curators of our planet for future generations.

WvE

Wynand van Eeden

FROM THE PRESIDENT



VAN DIE PRESIDENT

This is the first issue edited by our new editor Wynand van Eeden. Elsewhere in this issue (page 7) you can meet him. Wynand has his own style, and already in this issue you will see changes. Do let us know how you like them. Also, always keep in mind that *ENCEPHALARTOS* can only be as good as you make it, so keep Wynand supplied with news from your area.

Encephalartos brevifoliolatus has now joined the elite club of *Encephalartos* species extinct in nature. Its demise was perhaps inevitable, because it appears that it was at any rate on the brink of extinction. Despite exhaustive aerial searches only 5 clumps could ever be located, and we have never seen female cones. Still, its final demise was caused not by natural events, but by the greed of man. For some time now plants have been traded under this name, correctly or incorrectly, and some of those involved are members of this Society. I also know several of the stems are now in members' collections. This species is simply too valuable to be in private hands, given the fleeting lifespan of private collections. If they were not safe in nature, material should at least have been deposited in a national collection such as Kirstenbosch or the Lowveld Botanic Garden.

Not only are sources of wild material, including seeds, becoming scarce, but legislation and penalties are making it increasingly difficult to import propagative material. This makes it to me so much more remarkable that there is such ignorance and apathy amongst our members when it comes to foreign species. It is really so dull if one just grows the same species as your neighbour – in fact, one's plants become common. In spite of the considerable number of seedlings of tropical African species which have been grown in South Africa in recent years, we still know very little about those plants, and successful cultivation remains an adventure. Furthermore, our seedlings are still several years away from producing the next generation of seeds, and of many of these species new legal supplies of seeds will not be forthcoming. Even more difficult is the matter of foreign species where the door to legal imports has all but closed. With supplies still to be had in some backyard nurseries, I am amazed that growers are unable to sell their seedlings of *Cycas*, *Dioon*, *Ceratozamia*, and *Zamia*, not even at very reasonable prices. These species grow well in South Africa and are often indescribably beautiful, yet one very serious collector told me that in South Africa there is just no market for them. Once these supplies have dried up, it may not be possible to get these species again for a long time, if ever, because species are becoming extinct at an alarming rate in tropical America and Asia.

Piet Vorster

Piet Vorster

Hierdie is die eerste uitgawe wat geredigeer is deur ons nuwe redakteur, Wynand van Eeden. Elders in hierdie uitgawe (bl. 7) kan u hom ontmoet. Wynand het sy eie styl, en reeds in hierdie uitgawe sal u veranderinge sien. Laat weet vir ons of u van hulle hou. Verder, hou altyd in gedagte dat *ENCEPHALARTOS* net so goed kan wees soos u dit maak, en stuur dus gereëld vir Wynand nuus uit u kontrei.

Encephalartos brevifoliolatus het nou aangesluit by die eksklusiewe klub van *Encephalartos*-soorte wat in die natuur uitgesterf is. Sy uitsterwe was miskien onafwendbaar, omdat dit lyk of hy in elk geval op die rand van uitsterwing was. Ten spyte van uitgebreide lug-soektogte kon slegs 5 spruitende plante ooit gevind word, en ons het nooit vroulike keëls gesien nie. Nogtans is sy finale verdwyning nie veroorsaak deur natuurlike faktore nie, maar deur menslike selfsugtigheid. In die afgelope tyd is plante openlik verkoop onder hierdie naam, hetsy korrek of nie, en sommige van die betrokkenes is lede van hierdie Vereniging. Ek weet ook van verskeie van die stamme wat nou in lede se versamelings is. Hierdie soort is te waardevol om in private hande te verkeer, gedagtig aan die vlugtige lewensduurte van private versamelings. As hulle nie veilig was in die natuur nie, moes van die plante ten minste in 'n nasionale versameling soos by Kirstenbosch of die Laeveldse Botaniese Tuin bewaar geword het.

Nie alleen word bronne van wilde plante, insluitend saad, skaars nie, maar wetgewing en strawwe maak dit toenemend moeilik om voortplantingsmateriaal in te voer. Vir my is dit soveel te meer onverklaarbaar dat daar so 'n groot mate van onkunde en gebrek aan belangstelling in uitheemse soorte is by baie van ons lede. Dit is werklik so vervelig as mens net dieselfde soorte aanhou as jou buurman – uiteindelik is mens se plante nie meer buitengewoon nie. Ten spyte van die aansienlike aantal saailinge van tropies-Afrikaanse soorte wat in die laaste jare in Suid-Afrika gekweek is, weet ons nog steeds baie min van hierdie soorte, en dit bly 'n avontuur om hulle suksesvol te kweek. Dit sal nog verskeie jare duur voordat ons kan verwag om weer saad te kry van hierdie saailinge af, en van baie van hierdie soorte sal ons nie weer wettige voorrade saad kan invoer nie. Nog moeiliker is die kwessie van buitelandse soorte waar die deur na wettige invoere nou toe is. Daar is nog voorrade saailinge in agterplaaskwekerie, maar ek is verstom dat kwekers nie instaat is om hulle saailinge van *Cycas*, *Dioon*, *Ceratozamia*, en *Zamia* verkoop te kry nie, selfs nie teen baie redelike pryse nie. Hierdie soorte groei goed in Suid-Afrika en is dikwels onbeskryflik mooi, maar nogtans het 'n baie ernstige versamelaar vir my gesê dat daar eenvoudig nie in Suid-Afrika 'n mark vir hulle is nie. As hierdie bronne eers opgedroog het, is dit onwaarskynlik dat hierdie soorte gou weer, indien ooit, beskikbaar gaan word omdat soorte so vinnig uitgewis word in tropiese Amerika en Asië.

Piet Vorster

Piet Vorster

FROM THE COUNCIL / VAN DIE RAAD

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39	35	60	123
40	190	61	52
43	142	62	213
44	130	63	54
46	267	64	118
47	190		

SEVENTH INTERNATIONAL CONFERENCE ON CYCAD BIOLOGY

The next Cycad Conference is to be held in Xalapa, Mexico, from 8 to 15 January 2005. Limited funds are available for financial assistance to one or two members that contribute a paper or poster at the conference. To qualify for the assistance the member must undertake to make a contribution to *ENCEPHALARTOS*.

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Die volgende Broodboom Konferensie word in Xalapa Mexico, vanaf 8 tot 15 Januarie 2005 gehou. Daar is beperkte fondse beskikbaar vir finansieële ondersteuning aan een of twee lede wat 'n referaat of plakkaat tydens die konferensie lewer. Om te kwalifiseer moet die lid onderneem om 'n bydrae te maak tot die *ENCEPHALARTOS*.

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Wynand van Eeden

P.O. Box 3489, Tygerpark 7536, South Africa.

An die einde van 1999 is die voorstel gemaak en fondse geskenk sodat ons 'n webwerf vir die vereniging kon begin. Na 'n besoek aan die Vorsters het die takie in my skoot te lande gekom. Op daardie stadium het ek maar min van broodbome geweet en nog minder van webwerwe, HTML en die Wêreld Wye Web! Gelukkig is daar altyd

iemand iewers wat meer weet as jyself en ek het toe met die hulp van Patrizia Litty, wat die Vetplant Vereniging se werf hanteer, ons eie webwerf die lig laat sien. Die positiewe kommentaar was baie bemoedigend en ek hoop ons lede vind dit nuttig. Dit is egter nou tyd dat die taak oorhandig word aan iemand anders.

Die nuwe webmeester is **Pieter van der Walt**. Hy is 'n Transvaler, gebore en getoë. Selfs vir militêre diens is hy nie verder weg and as die Waterkloof lugmag basis nie. Sy studies het hy dan ook aan RAU voltooi en weg gestap met 'n honneursgraad in Informasie Wetenskap. Hy het by 'n groot elektronika en telekommunikasie maatskappy begin werk as Inligtingstelsel konsultant en later sy meestersgraad voltooi. Hy is besig met sy doktorsale studies en is tans die Groep IS bestuurder.



Pieter is van kleins af geïnteresseerd in die natuur en in plante, veral vetplante. Die broodboom gogga het egter in 2000 gebyt toe daar in 'n nuwe huis ingetrek is, en 'n tuin van nuuts af begin moes word. Sederdien het sy versameling gegroei van 'n paar saailinge tot 'n paar groter plante. Gevolglik sit hy nou met 'n probleem wat meeste ywerige tuiniers een of ander tyd ondervind; die tuin is nou te klein! Hy stel veral belang in die bloublaar en tropiese *Encephalartos* spesies.

Pieter is getroud met Celeste en saam geniet hulle dit om te stap, wat veral lekker is as dit in broodboom habitat is. Pieter is besig met die opdatering van die webwerf en het reeds 'n gratis diens verkry om ons werf te publiseer. Hy het ook planne vir interessante artikels wat saam met *ENCEPHALARTOS* 'n baie nuttige bron van inligting sal wees. Dit sal voornemende lede 'n voorsmaak gee van wat verwag kan word.

Pieter kan gekontak word by pvdwalt@hotmail.com vir enige voorstelle of kommentaar met betrekking tot die webwerf.

Pieter van der Walt was born in Pothcefstroom and later matriculated in Kempton Park. He completed two years of national service in the Air Force at Waterkloof in Pretoria. After his national service he enrolled at the Rand Afrikaans University for a degree in Information Science. In 1995, after completing his Honours degree in Information Studies he joined a large listed electronics and telecommunications company as Information systems consultant. He later completed his Master's degree in Information Studies and took up the position of Group IT Manager. Pieter is currently studying towards his doctorate, researching information architectures in business.

From an early age Pieter had an interest in nature and cultivating plants, especially succulents. However, in 2000 when moving to a new home in Randburg, the cycad bug bit when a garden had to be started. Since then the collection had grown from a few seedlings to a few larger specimens and the garden is unfortunately getting too small. The blue-leaved species are of special interest as well some African species. Pieter is married to Celeste and together they enjoy hiking, especially when a natural cycad habitat is on the menu.

Recently Pieter took over from Wynand van Eeden the responsibility of maintaining the Cycad Society of SA's website and is busy updating the site with minor details. He has also managed to obtain a new service provider that will host the site for free. The plans for the website include more articles to be published in conjunction with that of *ENCEPHALARTOS*, without having to overshadow the printed publication, but rather to give prospective members a taste of what to expect and to become a good reference source for all.

Pieter can be reached at pvdwalt@hotmail.com for any suggestions or comments regarding the web site!

NEW EDITOR / NUWE REDAKTEUR

Piet Vorster

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Wynand van Eeden, previously responsible for electronic services, is now our new editor. By profession he is an electronic engineer, working on secret weapons. While cycads are his main interest in plants, he cannot resist the lure of other plant groups, and this is reflected in his garden in Cape Town.

He also suffers from the incurable affliction of planting seeds "to see if they will grow and what comes up". Wynand received his first cycad as a wedding gift six years ago and the love and hobby grew from there. Wynand, who likes to be informed, had upon



receiving this gift, gone and bought and read all the available books on cycads. Currently his library includes two editions of "Cycads of South Africa" by Cynthia Giddy, all three editions of "Cycads of the World" by David Jones, a rare and hard to find copy of "Bothalia Vol.VII" and a complete set of *ENCEPHALARTOS* journals.

After this followed several trips to see cycads in collections and habitat. Other interests, which will come in handy for his editorship, are photography and travel. Wynand's father, a lover of all bulbous plants, is perplexed by his son's interest in these thorny plants, as is his wife, Thelma (T.C.) who does the weeding in their garden. Thelma is a civil engineer who likes animals big and small, and who shares my liking for neatly mown lawns.

Die nuwe webmeester is **Pieter van der Walt**. Hy is 'n Transvaler, gebore en getoë. Selfs vir militêre diens is hy nie verder weg and as die Waterkloof lugmag basis nie. Sy studies het hy dan ook aan RAU voltooi en weg gestap met 'n honneursgraad in Informasie Wetenskap. Hy het by 'n groot elektronika en telekommunikasie maatskappy begin werk as Inligtingstelsel konsultant en later sy meestersgraad voltooi. Hy is besig met sy doktorsale studies en is tans die Groep IS bestuurder.



Pieter is van kleins af geïntereeserd in die natuur en in plante, veral vetplante. Die broodboom gogga het egter in 2000 gebyt toe daar in 'n nuwe huis ingetrek is, en 'n tuin van nuuts af begin moes word. Sederdien het sy versameling gegroei van 'n paar saailinge tot 'n paar groter plante. Gevolglik sit hy nou met 'n probleem wat meeste ywerige tuiniers een of ander tyd ondervind; die tuin is nou te klein! Hy stel veral belang in die bloublaar en tropiese *Encephalartos* spesies.

Pieter is getroud met Celeste en saam geniet hulle dit om te stap, wat veral lekker is as dit in broodboom habitat is. Pieter is besig met die opdatering van die webwerf en het reeds 'n gratis diens verkry om ons werf te publiseer. Hy het ook planne vir interessante artikels wat saam met *ENCEPHALARTOS* 'n baie nuttige bron van inligting sal wees. Dit sal voornemende lede 'n voorsmaak gee van wat verwag kan word.

Pieter kan gekontak word by pvdwalt@hotmail.com vir enige voorstelle of kommentaar met betrekking tot die webwerf.

Pieter van der Walt was born in Pothcefstroom and later matriculated in Kempton Park. He completed two years of national service in the Air Force at Waterkloof in Pretoria. After his national service he enrolled at the Rand Afrikaans University for a degree in Information Science. In 1995, after completing his Honours degree in Information Studies he joined a large listed electronics and telecommunications company as Information systems consultant. He later completed his Master's degree in Information Studies and took up the position of Group IT Manager. Pieter is currently studying towards his doctorate, researching information architectures in business.

From an early age Pieter had an interest in nature and cultivating plants, especially succulents. However, in 2000 when moving to a new home in Randburg, the cycad bug bit when a garden had to be started. Since then the collection had grown from a few seedlings to a few larger specimens and the garden is unfortunately getting too small. The blue-leaved species are of special interest as well some African species. Pieter is married to Celeste and together they enjoy hiking, especially when a natural cycad habitat is on the menu.

Recently Pieter took over from Wynand van Eeden the responsibility of maintaining the Cycad Society of SA's website and is busy updating the site with minor details. He has also managed to obtain a new service provider that will host the site for free. The plans for the website include more articles to be published in conjunction with that of *ENCEPHALARTOS*, without having to overshadow the printed publication, but rather to give prospective members a taste of what to expect and to become a good reference source for all.

Pieter can be reached at pvdwalt@hotmail.com for any suggestions or comments regarding the web site!

NEW EDITOR / NUWE REDAKTEUR

Piet Vorster

Botany Department / Plantkunde Departement
University of / Universiteit van Stellenbosch

Wynand van Eeden, previously responsible for electronic services, is now our new editor. By profession he is an electronic engineer, working on secret weapons. While cycads are his main interest in plants, he cannot resist the lure of other plant groups, and this is reflected in his garden in Cape Town.

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NEW CYCAD PUBLICATIONS

BANACK, S.A. & COX, P.A. 2003. Distribution of the neurotoxic nonprotein amino acid BMAA in *Cycas micronesica*. *Botanical Journal of the Linnean Society*. 143: 165-168.

[BMAA (β -methylamino-L-alanine), a nonprotein amino acid with neurotoxic properties occurs in the cycad *Cycas micronesica* Hill in Guam. BMAA may have originally played a role as an antiherbivory compound in the plant, but is now of great interest because of its possible link to ALS-PDC, a neurological disease among the Chamorro people of Guam. Biomagnified cycad neurotoxins may play a role because they accumulate in flying foxes of the genus *Pteropus* that are eaten during traditional feasts. Since flying foxes feed on the seed sarcotesta it is important to understand the distribution of BMAA in the various tissues of the cycad. Using HPLC techniques, we quantified both BMAA and glutamic acid (GLU) in all cycad tissues. Although GLU is distributed randomly throughout the plant, BMAA is concentrated in cycad reproductive organs, with the highest concentrations being found in the immature staminate sporangium and the outermost layer of the sarcotesta. This finding is consistent with the putative evolutionary role of BMAA as an antiherbivory compound, as well as the biomagnification of the compound in flying foxes that ingest the seed sarcotesta.]

First author's address: Department of Biological Science, California State University, Fullerton, CA 92834, U.S.A.

BANACK, S.A. & COX, P.A. 2003. Biomagnification of cycad neurotoxins in flying foxes. *Neurology* 61: 387-389.

[β -Methylamino-L-alanine (BMAA) occurs in higher levels in museum specimens of the Guamanian flying fox than in the cycad seeds the flying foxes feed on, confirming the hypothesis that cycad neurotoxins are biomagnified within the Guam ecosystem. Consumption of a single flying fox may have resulted in an equivalent BMAA dose obtained from eating 174 to 1,014 kg of processed cycad flour. Traditional feasting on flying foxes may be related to the prevalence of neuropathologic disease in Guam.]

First author's address: Institute of Ethnobotany, National Tropical Botanical Garden, Kalaheo, HI 96741, U.S.A.

COX, P.A., BANACK, S.A. & MURCH, S.J. 2003. Biomagnification of cyanobacterial neurotoxins and neurodegradative disease among the Chamorro people of Guam. *The National Academy of Sciences of the U.S.A.* 100(23): 13380-13383.

[The authors report biomagnification (the increasing accumulation of bioactive, often deleterious molecules through higher trophic levels of a food chain) of the neurotoxic nonprotein amino acid β -methylamino-L-alanine (BMAA) in the Guam ecosystem. Free-living cyanobacteria produce 0.3 $\mu\text{g/g}$ BMAA, but produce 2-37 $\mu\text{g/g}$ as symbionts in the coralloid roots of cycad trees. BMAA is concentrated in the developing reproductive tissues of the cycad *Cycas micronesica*, averaging 9 $\mu\text{g/g}$ in the fleshy seed sarcotesta and a mean of 1.161 $\mu\text{g/g}$ BMAA in the outermost seed layer. Flying foxes (*Pteropus mariannus*) which forage on the seeds, accumulate a mean of 3,556 $\mu\text{g/g}$ BMAA. Flying foxes are a prized food item of the indigenous Chamorro people who boil them in coconut cream and eat them whole. Chamorros who

die of amyotrophic lateral sclerosis/parkinsonism-dementia complex (ALS-PDC), a neurodegenerative disease with symptoms similar to amyotrophic lateral sclerosis, Parkinson's disease, and Alzheimer's disease, have an average of 6.6 $\mu\text{g/g}$ BMAA in their brain tissues. The biomagnification of BMAA through the Guam ecosystem fits a classic triangle of increasing concentrations of toxic compounds up the food chain. This may explain why the incidence of ALS-PDC among the Chamorro was 50-100 times the incidence of amyotrophic lateral sclerosis elsewhere. Biomagnification of cyanobacterial BMAA may not be unique to Guam; our discovery of BMAA in the brain tissue from Alzheimer's patients from Canada suggests alternative ecological pathways for the bioaccumulation of BMAA in aquatic or terrestrial ecosystems.]

First author's address: Institute of Ethnobotany, National Tropical Botanical Garden, Kalaheo, HI 96741, U.S.A.

COX, P.A. & SACKS, O.W. 2002. Cycad neurotoxins, consumption of flying foxes, and ALS-PDC disease in Guam. *Neurología* 58: 956-959.

[The Chamorro people of Guam have been afflicted with a complex of neurodegenerative diseases (now known as ALS-PDC) with similarities to ALS, AD, and PD at a far higher rate than other populations throughout the world. Chamorro consumption of flying foxes may have generated sufficiently high cumulative doses of plant neurotoxins to result in ALS-PDC neuropathologies, since the flying foxes forage on neurotoxic cycad seeds.]

First author's address: Institute for Ethnobotany, National Tropical Botanical Garden, Kalaheo, HI 96741, U.S.A.

GONZALES-ASTORGA, J., VOVIDES, A.P. & IGLESIAS, C. 2003. Morphological and geographic variation of the cycad *Dioon edule* Lindl. (Zamiaceae): ecological and evolutionary implications. *Botanical Journal of the Linnean Society* 141: 465-470.

[The relationship in geographical distribution and morphological variation of leaflet width and length (diagnostic trait), between and within populations of *Dioon edule* Lindl., has been investigated throughout its known range in eastern Mexico (from the states of Nuevo Leon to Veracruz, north to south, respectively). A total of 1832 leaflets were measured for width and length from 154 plants distributed amongst five populations using four leaflet replicas from each of three leaves per plant. For leaflet width and length the variation among populations indicated significant statistical differences ($F_{4,147} = 125.88$; $P < 0.0001$; $R^2 = 92.17\%$ and $F_{4,147} = 9.04$; $P < 0.001$; $R^2 = 26.8\%$), respectively. With respect to leaflet width, the multiple range tests showed three groups with a north to south distributional relationship along the range of the species. The correlation coefficient among paired populations, with respect to geographical distance and the absolute value of the mean difference of leaflet width in each population, was positive, and different from zero ($r = 0.82$; $P = 0.013$). A great variation of important ecological and evolutionary parameters was shown.]

First author's address: Laboratorio de Genética de Poblaciones, Jardín Botánico Clavijero, Instituto de Ecología A.C., km 2.5 Antigua Carretera a Coatepec no. 351, Xalapa 91070, Veracruz, Mexico.

GONZALES, J., VOVIDES, A.P., FERRER, M.M. & IGLESIAS, C. 2003. **Population genetics of *Dioon edule* Lindl. (Zamiaceae, Cycadales): biogeographical and evolutionary implications.** *Biological Journal of the Linnean Society* 80: 457-467.

[*Dioon edule* Lindl. (Zamiaceae) is a cycad endemic to Mexico, that occurs as one species *D. edule* and the geographical variety *D. edule* var *angustifolium* (Miq.) Miq.. *Dioon edule* has a north to south distribution in eastern Mexico. In this study, we analysed 14 allozymic loci in eight populations of *D. edule* from its total distribution range by sampling all known populations. Patterns of diversity and genetic variability, within and among populations, were obtained. The mean number of alleles per locus (A) was 1.44 and the percentage of polymorphic loci was relatively high ($P = 54.78$). The mean observed (H_0) and expected heterozygosity (H_E) were 0.27 and 0.24, respectively. F -statistics revealed an excess of heterozygous genotypes, locally and globally ($F = -0.17$ and $f = -0.27$, respectively). The genetic variation explained by differences among populations was only 7.5%. We also detected a negative relationship between genetic diversity and latitude. On average, the gene flow between population pairs was relatively high ($Nm = 2.98$); furthermore, gene flow between population pairs was significantly correlated with geographic distances ($r = -0.38$, $P = 0.025$). Therefore, patterns of genetic diversity in *D. edule* appear to be associated with the post-Pleistocene spread of the species, from its southerly (origin) to its northerly range (derived populations, including its central distribution). The biogeographical and evolutionary aspects of the results of this study are discussed. We recognise *Dioon angustifolium* Miq. for the northernmost disjunct populations.]

First author's address: Laboratorio de Genetica de Poblaciones, Jardin Botanico Clavijero, Instituto de Ecologia, A.C., km 2.5 Antigua Carretera a Coatepec no. 351, Xalapa 91070, Veracruz, Mexico.

KEPPEL, G., LEE, S.-W. & HODGSKISS, P.D. 2002. **Evidence for long isolation among populations of a pacific cycad: Genetic diversity and differentiation in *Cycas seemannii* A. Br. (Cycadaceae).** *The American Genetic Association* 93: 133-139.

[The genetic structure of *Cycas seemannii* A. Br. (Cycadaceae), sampled throughout its range in Vanuatu, New Caledonia, Fiji, and Tonga, was studied using starch-gel electrophoresis. Twenty enzyme loci in 13 enzyme systems were examined. Low genetic diversity within populations ($A = 1.2$, $P = 21.3$, $H_0 = 0.047$, and $H_E = 0.057$) and a high degree of differentiation among populations ($F_{st} = 0.594$) were found. This, together with low gene flow estimates, suggests genetic drift by isolation to have been most critical to the current genetic structure of the species. Inbreeding may occur to some extent ($F_{is} = 0.165$). The decline in abundance of *C. seemannii*, coupled with the low level of genetic diversity, suggest that conservation strategies are urgently needed.]

First author's address: Biology Department, Room N224, School of Pure and Applied Sciences, University of the South Pacific, Suva, Fiji.

MONSON, C.S., BANACK, S.A. & COX, P.A. 2003. **Conservation implications of Chamorro consumption of flying foxes as a possible cause of amyotrophic lateral sclerosis-Parkinsonism dementia complex in Guam.** *Conservation Biology* 17 (3): 678-686.

[In the Pacific island of Guam, flying fox (*Pteropus mariannus* and *P. tokudae*) populations historically persisted for centuries despite subsistence foraging by the indigenous Chamorro people. However the militarization of Guam in the twentieth century, with an increased emphasis on a cash rather than a subsistence economy, led to two features that had deleterious effects on the flying fox populations: easy access to firearms greatly increased hunter yields and disposable income facilitated commercial traffic in flying foxes. As a result, consumption of flying foxes dramatically increased, leading to the extinction of one indigenous species and near extinction of another. The demise of the flying fox populations was mirrored by a subsequent decrease in the health of the Chamorro people. Amyotrophic lateral sclerosis-Parkinsonism dementia complex (ALS-PDC), a neurological disease with aspects of ALS, Alzheimer's, and Parkinson's diseases, became a major cause of adult death in some villages. It has been recently hypothesized that consumption of flying foxes by the Chamorro may have generated sufficiently high cumulative doses of neurotoxins to result in the observed high levels of ALS-PDC among Chamorros in Guam because flying foxes forage on cycad seeds that are rich in neurotoxins. Commercialization of traffic in wild flying fox populations may have therefore produced grave health consequences for the Chamorro people.]

First author's address: Department of Geography, University of Hawaii, Honolulu, HI 96822, U.S.A.

NORSTOG, K. 2003. **Reptiles of the Plant World – Cycads.** *The Cycad Newsletter* 26(5) Special Issue: 3-5. [This is a reprinted version of a paper that was published in 1980 by the late Knut Norstog in the Fairchild Tropical Garden Bulletin on pages 25-27. It describes the discovery of motile male sex cells in *Ginkgo biloba* and cycads – the only known seed plants to have such cells.]

WALTERS, T., Haynes, J., Nazor, C., Ironmonger, S. & Broome, T. 2003. **Cycad Focus: *Cycas panzihuaensis*.** *The Cycad Newsletter* 26(4): 10-14.

[In this composite contribution the first author deals mainly with the discovery and ecology of the species. The second author concentrates on the cultivation and phenology of *C. panzihuaensis* in South Florida whilst the last three authors relate their experiences of growing this cycad species in Central Texas, Southern California and Florida respectively.]

First author's address: Montgomery Botanical Center, 11901 Old Cutler Road, Miami, FL 33868, U.S.A.

Compiled by Nat Grobbelaar, P.O.Box 15357, 0039 Lynn East, South Africa.

BOOK REVIEW / BOEKBESPREKING

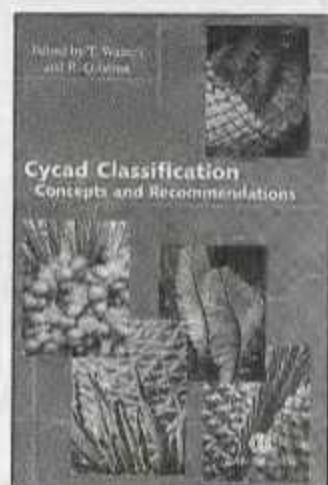
Wynand van Eeden
P O Box 3489, Tyger Park, 7536

Received 9 February 2004

WALTERS, T.; & OSBORNE, R. (eds.). *Cycad classification. Concepts and recommendations.*

WALLINGFORD (U.K.) & CAMBRIDGE (U.S.A.): CABI Publishing, 2004, xvii + 267 pages; monochrome photographs, line drawings, and diagrams. Hard cover.

This book is really the proceedings of a symposium hosted in March 2003 by the Montgomery Botanical Center in Miami with the aim of reviewing our knowledge of cycad taxonomy, identifying information still unavailable, deciding on how future research should be shaped, and standardising procedures so that the results of different taxonomists can be compared. Some 13 eminent cycad experts from all over the world attended and read papers.



Due to the nature of the symposium, there is no continuous thread through the volume, but the editors strived to unite the contributions by means of the introductory chapter, *'We hold these truths ...'*, which explains the rationale behind the symposium and the volume; and the last chapter, *In search of the true tree: guidelines for classification*. The subsequent chapters, providing more detail and insight into current taxonomic thinking, are:

2. **Saving Ghosts? The Implications of Taxonomic Uncertainty and Shifting Infrageneric Concepts in the Cycadales for Red Listing and Conservation Planning** – John Donaldson
3. **Character Evolution, Species Recognition and Classification Concepts in Cycadaceae** – K.D. Hill
4. **Morphological Characters Useful in Determining Species Boundaries in Cycas (Cycadaceae)** – Anders Lindström
5. **Comments on Cycas, Dyerocycas and Epicycas (Cycadaceae)** – Chia-Jui Chen, K.D. Hill and Dennis Wm. Stevenson
6. **Classification Concepts in Encephalartos (Zamiaceae)** – Piet Vorster
7. **Classification Concepts in Macrozamia (Zamiaceae) from Eastern Australia** – Paul I. Forster
8. **Classification Concepts in Ceratozamia (Zamiaceae)** – Loran M. Whitelock

9. **Relationships Phylogeography in Ceratozamia (Zamiaceae)** – Andrew P. Vovides, Miguel A. Pérez-Farrera, Delores González, and Sergio Avendaño
10. **A Morphometric Analysis of the Ceratozamia norstogii complex (Zamiaceae)** – Miguel A. Pérez-Farrera, Andrew P. Vovides, Luis Hernández-Sandoval, Delores González, and Mahinda Martinez
11. **Hypotheses on the Relationship between Biogeography and Speciation in Dioon (Zamiaceae)** – Timothy J. Gregory and Jeffrey Chemnick
12. **Molecular Phylogeny of Zamia (Zamiaceae)** – Paolo Caputo, Salvatori Cozzolino, Paolo De Luca, Aldo Moretti and Dennis Wm. Stevenson
13. **Systematics of Meso-American Zamia (Zamiaceae)** – Bart Schutzman
14. **Zamiaceae of Bolivia, Ecuador and Peru** – Dennis Wm. Stevenson

These chapters are of a specialised nature, and unlikely to be of interest to anyone other than practicing taxonomists, but they do explain how taxonomists arrived at certain conclusions. Each chapter has its own bibliography.

The last chapter is a summary by Osborne and Walters *In search of the true tree: guidelines for classification*. While it is good that this has been documented, the underlying principles and guidelines are not new but have for years now been refined by practicing taxonomists all over the world.

The book ends with two useful appendices, the latest version of *The World List of Cycads*, under the authorships of Hill, Stevenson, & Osborne; and a *Glossary of Terms encountered in Cycad Systematics*. Lastly there is an index to the whole work.

The book is printed on nice matt paper and the photographs are beautifully clear. It is sturdily bound but lacks a dust jacket. Although very technical, this book has value if you are interested in the science behind the names of the cycads in your garden.

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FOCUS ON ...

In each edition of *ENCEPHALARTOS*, we focus on one cycad species, in the form of an in-depth article in layman's language.

In this edition the spotlight falls on:

FOKUS OP ...

In elke uitgawe van *ENCEPHALARTOS* fokus ons op een broodboomsoort, in die vorm van 'n in-diepte-artikel in leketaal.

In hierdie uitgawe val die kollig op:

Cycas seemannii A. Braun

Gunnar Keppel¹ and Roy Osborne²

¹Biology Department, School of Pure and Applied Sciences, University of the South Pacific, PO Box 1168, Suva, Republic of the Fiji Islands

²PO Box 244, Burpengary, Queensland 4505, Australia

INTRODUCTION

How many of our readers would be able to answer the question: "What is the westernmost cycad in the world?" or, indeed, "What is the easternmost cycad in the world?" Surprisingly, the answer to BOTH questions is *Cycas seemannii* A. Braun. Since its area of occurrence - over many hundreds of large and small islands in the South Pacific Ocean - is bisected by the 180° meridian, part of its distribution technically falls in the Western Hemisphere and part in the Eastern. Recent research by the first author and colleagues has uncovered a great deal more than was previously known about this cycad and it is appropriate to bring this new information to the attention of the cycad community by means of this "Focus on ..." article.

DISCOVERY AND TAXONOMIC HISTORY

After studying at Kew, German-born Berthold Carl Seemann (1825-71) was, in his early twenties, appointed naturalist to the British HMS *Herald* expedition, which was to include a survey of the islands in the Southern Pacific amongst other ventures. In 1860 Seemann was commissioned to report on the vegetation and agricultural potential of the Fiji Islands. His instructions were "...to prepare a report on the native and cultivated vegetable products of the Fiji's, and the apparent capabilities of the islands ... to produce cotton, sugar, spices, indigo and other tropical plants" and "... to make as complete a collection as possible of the plants of the islands and all vegetable products." After two years' extensive traveling in the islands, he returned to England to compile various reports of his explorations. These included a report of the voyage of HMS *Herald* (Seemann 1854) and a 453-page work on Fiji's flora, the *Flora Vitiensis*, with one hundred plates of botanical illustrations (Seemann 1865-73). Incidentally, the earlier of these two works also included descriptions of *Zamia chigua* and *Z. pseudoparasitica* from information recorded when the *Herald* visited central and south America.

Seemann had collected an enormous number of Fijian specimens, several of which were subsequently named in his honour. Our palm colleagues, for instance will know



Berthold Seemann

1825 - 1871

Figure 1. Berthold Carl Seemann (1825-71), foremost European botanist in reporting on the flora of the Fiji islands in the mid 1800's. Frontispiece from *Flora Vitiensis* (Seemann 1865-73).

Balaka seemannii, one of the 21 endemic palms of Fiji (Doyle and Fuller 1998, Zona and Fuller 1999) that is featured on a pair of Fijian stamps issued in 2002. Seemann's notes refer to a collection of a cycad (Seemann # 572) on either Viti Levu or the adjacent island of Ovalau in 1860. At the time he assigned the material to *C. circinalis* L., and in due course, deposited specimens in the Kew and British Museum herbaria. Seemann reported back to Alexander Carl Heinrich Braun (1805-1877)



Figure 4. *Cycas seemannii* near Nadi, Viti Levu, with John Price. Photo: Jeanne Price.



Figure 5. Apart from their usual coastal habitat, some populations *Cycas seemannii* are found at higher altitude, drier, fire-prone sites, such as the talasiga grassland on Fiji. Nabou Pine Station, Nadi, Viti Levu. Photo: R. Phillips.



Figure 6. *Cycas seemannii* plants in cultivation at the SPAS Palm Garden, University of the South Pacific, Suva, Fiji. Photo: Gunnar Keppel



Figure 7. Stems of *Cycas seemannii* can reach up to 12 m, as with these plants on Efate Island, Vanuatu. Photo: John Dowe, reproduced by permission of PACSOA.



Figure 8. Female plant with new leaf flush and developing seed crop, in cultivation at SPAS Palm Garden, University of the South Pacific, Suva, Fiji, Photo: Gunnar Keppel.

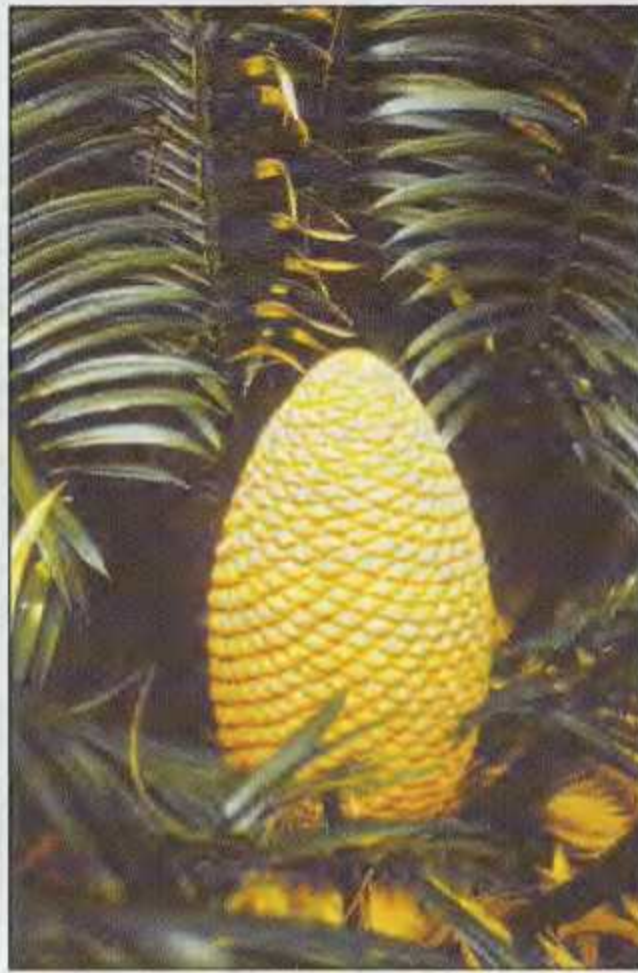


Figure 9. Male cones of *Cycas seemannii* emerge as ovoid structures with pale yellow tomentum in late September each year. Pannangisa, Efate, Vanuatu. Photo: John Dowe, reproduced by permission of PACSOA.

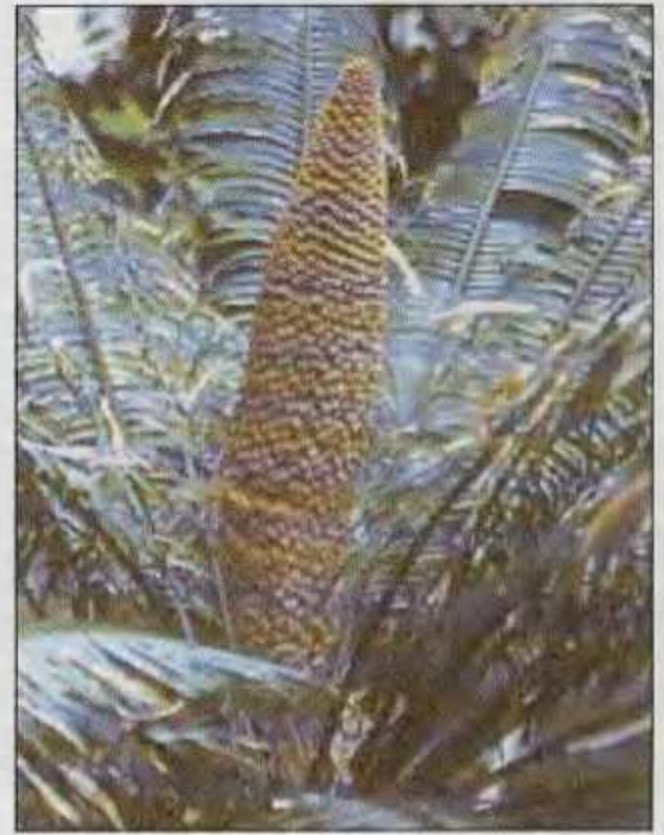


Figure 10. Mature male cones of *Cycas seemannii* are brown, narrowly ovoid, 35-75 cm long and 10-15 cm in diameter. SPAS Palm Garden, University of the South Pacific, Suva, Fiji. Photo: Gunnar Keppel.



Figure 11. Cluster of megasporophylls at the trunk apex of *Cycas seemannii* showing their typical greyish-orange tomentose appearance. Megasporophylls are regularly toothed towards at the apex and each bears 4-10 ovules. Plant in cultivation, Tontouta airport, New Caledonia. Photo: André de Does.



Figure 12. In common with most other members of the *Cycas rumphii* complex, seed crops of *C. seemannii* take about 2 years to mature. Specimen near Devil's Point, Efate Island, Vanuatu. Photo: John Dowe, reproduced by permission of PACSOA.

Professor of Botany and Director of the Botanic Garden at the University of Berlin, who named the cycad as *C. seemannii* in 1876, but without citing a type.

The taxonomic status of *Cycas seemannii* A. Braun has been subjected to a series of confused and unsatisfactory treatments. It was changed to *C. circinalis* subsp. *seemannii* by Schuster (1932), then to *C. rumphii* forma *seemannii* by Kanehira (1938) and to *C. rumphii* var. *seemannii* by Parham (1948). Smith (1979) designated the Seemann #572 at Kew as the lectotype for *C. rumphii* forma *seemannii* with an isoelectotype at the British Museum. The name *C. neocaledonica* was coined by Linden in 1881, but this epithet was not accompanied by any description and is thus invalid. Ken Hill (1993, 1994) restored the name *C. seemannii*, providing a comprehensive description for this and other species in the *C. rumphii* complex. This was challenged in 1998 by de Laubenfels and Adema, who considered *C. seemannii* and *C. micronesica* identical to *C. celebica* Miq. That treatment has not found widespread acceptance and compilers of the current World List of Cycads have, instead, regarded *C. celebica* as synonymous with *C. rumphii* and maintained the prior status of *C. seemannii* and *C. micronesica* (Hill, Stevenson and Osborne 2004).

While not directly challenging Hill's (1994) circumscription, Whitelock (2002) writes: "When Seemann referred his collections from Fiji to *C. circinalis*, he included herbarium material from the Tonga Islands, which Joseph Banks and Daniel Carl Solander collected during James Cook's first voyage to the South Pacific in 1768. William Carruthers (1893) mentioned that the Tongan specimens 'differ in the texture and the form of the segments of the leaves, and the presence of a large terminal spine on the spadix'". Little more is known about these specimens but the morphological characteristics of the species throughout its range have now been shown to be very variable (Keppel 1999, Keppel and Lee in preparation). Therefore, the somewhat broader description of *C. seemannii* provided below may well accommodate the variation to which Whitelock refers.

DESCRIPTION

[The description below is modified from Hill (1994) and Keppel (in preparation).]

1. STEM

Stems of *Cycas seemannii* are up to 8 m (rarely 12 m) tall, 10-25 cm (rarely 35 cm) in diameter, occasionally with one or more branches; light yellow to greyish brown in colour. Physically-damaged stems excrete a viscous, transparent mucilage that hardens upon exposure to air.

2. LEAVES

Leaves of mature *Cycas seemannii* plants are 120-250 cm (rarely 300 cm) long, 25-70 cm wide, flat (opposing pinnae inserted at 180° on rachis), with 90-300 pinnae, terminated by single pinna, pair of pinnae, or spine 3-10 mm long. They are greenish yellow in colour and densely covered with an orange-yellow tomentum when

young. During leaf maturation trichomes quickly disappear, faster on the upper than on the lower surface, and, beginning in the lower section, pinnae begin to darken to yellowish green, green, deep green and finally reaching a dark green colour.

The **petiole** of *C. seemannii* is usually glabrous, deep green on its upper surface and yellowish green on its lower surface, either without spines or spinescent for up to a one-third (rarely to half its length), 15-85 cm long and comprising one-tenth to one-third of the whole leaf length.

Median pinnae of *C. seemannii* are inserted at an angle of 45-75° to rachis, are 140-360 mm long by 7-18 mm (rarely 21 mm) wide, 0.25-0.75 mm thick, glabrous, strongly discolorous, dark green on the upper and deep green on the lower surface at maturity, flat with distinctly recurved margins, decurrent for 4-10 mm, narrowed to 4-9 mm at base (one-third to half of maximum width), 12-25 mm apart on rachis (the spacing increases from the apex, where pinnae may slightly overlap, towards the petiole), slightly (rarely strongly) undulated, with the apex attenuate. **Lower pinnae** are usually reduced in size, pointing upwards at an angle of about 45° to the horizontal leaf plane. **Midrib** not sharply raised, more or less equally prominent above and below, greenish yellow on the upper surface and yellowish green on the lower surface, 1.0-2.2 mm wide, 1.2-2.2 mm thick.

Cataphylls of *Cycas seemannii* are narrowly triangular, densely shortly tomentose, yellowish brown in colour, 50 to 150 mm long, weakly pungent.

3. REPRODUCTIVE STRUCTURES

Male cones of *Cycas seemannii* begin to form under cataphylls (which form on the stem apex in late July), emerge as narrowly ovoid structures with a pale yellow tomentum in late September and progressively increase in size as the tomentum becomes orange at maturity (November to December). Mature cones are brown, narrowly ovoid, 35-75 cm long and 10-15 cm in diameter. **Microsporophylls** are 30-50 mm long and 15-30 mm wide; with a fertile zone 25-45 mm long and a sterile apex that is 4-6 mm long and not recurved. The apical spine is somewhat reduced, broad, sharply upturned and 2-8 mm long. The **pollen** is pale yellow, released between mid-November to mid-December, having a musty smell. The **peduncle** is up to 5 cm long, 6 cm wide and brown.

Megasporophylls are 20-45 cm long, greyish orange tomentose, with 4-10 (rarely 12) ovules. Lamina 45-100 mm long, 20-50 mm wide, narrowly triangular and regularly dentate with 18-45 lateral spines. The apical spine is 10-30 mm long and the lateral spines are 2-9 mm long, the lamina apex is sometimes moderately to strongly down curved, often lacking tomentum on its upper surface at maturity. **Ovules** are initially yellowish white and develop into seeds when fertilised; while unfertilised ovules abort and shrink into dark brown, flat, ovoid structures 5-20 mm long.

Seeds are flattened-ovoid, 40-60 mm long and 30-52 mm in diameter, with a sarcotesta that is 3-5 mm thick.

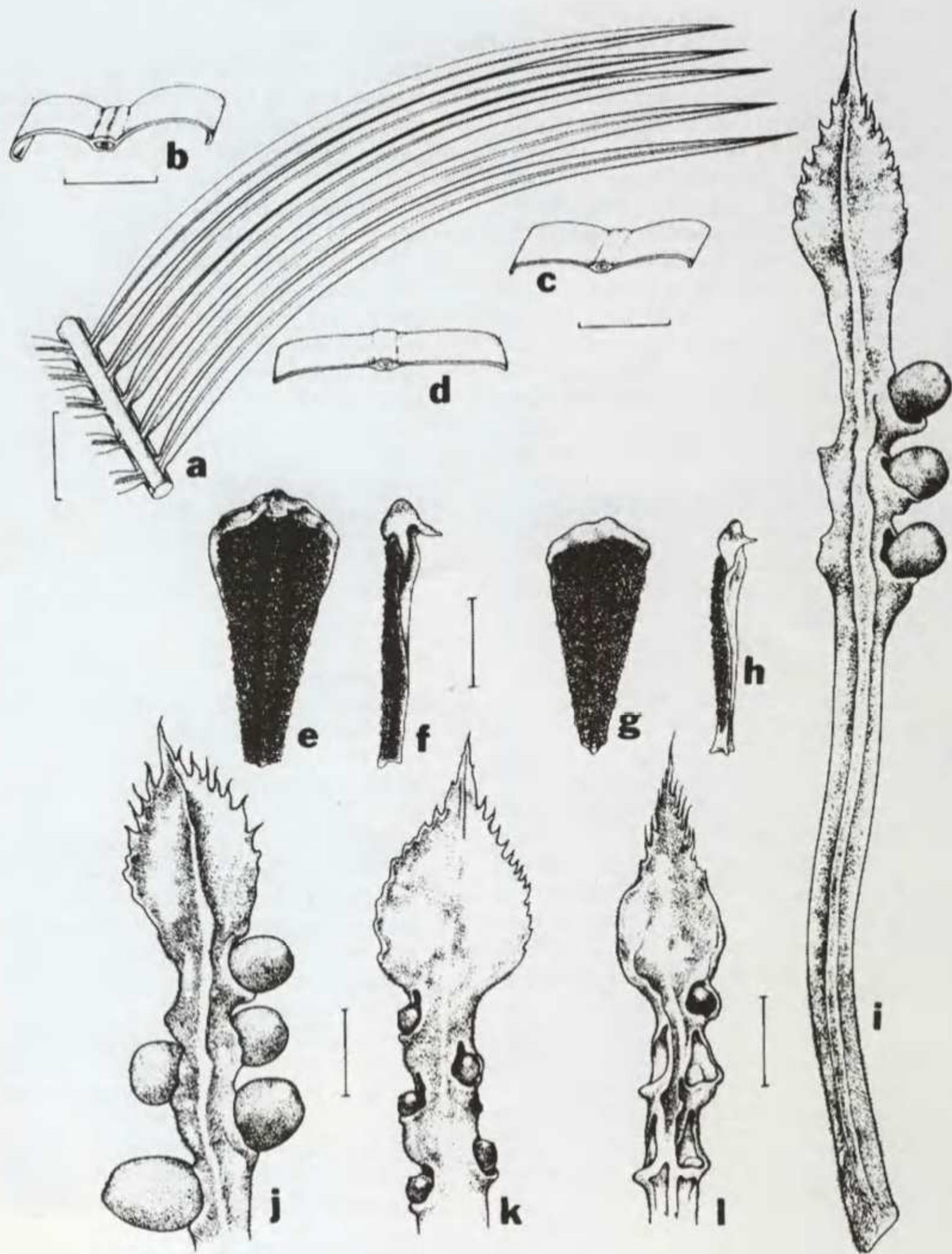


Figure 2. Morphological features of *Cycas seemannii*: (a) part of a leaf, (b-d) sections of pinnae, (e-h) microsporophylls, (i) megasporophyll with stipe, (j-l) megasporophyll laminae; scale bars: a = 4 cm, b,c,d, = 5 mm, e-l = 2 cm (Hill 1994). Reproduced by permission of Australian Systematic Botany, Ken Hill and CSIRO publishing. (<http://www.publish.csiro.au/journals/asb>).

The young seeds are yellowish white in colour initially, but quickly become light yellow, yellowish green and then deep green. The sarcotesta is initially hard but softens after about 12-18 months as the seeds change from deep green to

orange, brownish orange, light brown, reddish brown and finally dark brown, then emitting a fruity smell resembling that of dried figs. The sarcotesta then slowly decays to expose the greyish yellow sclerotesta.

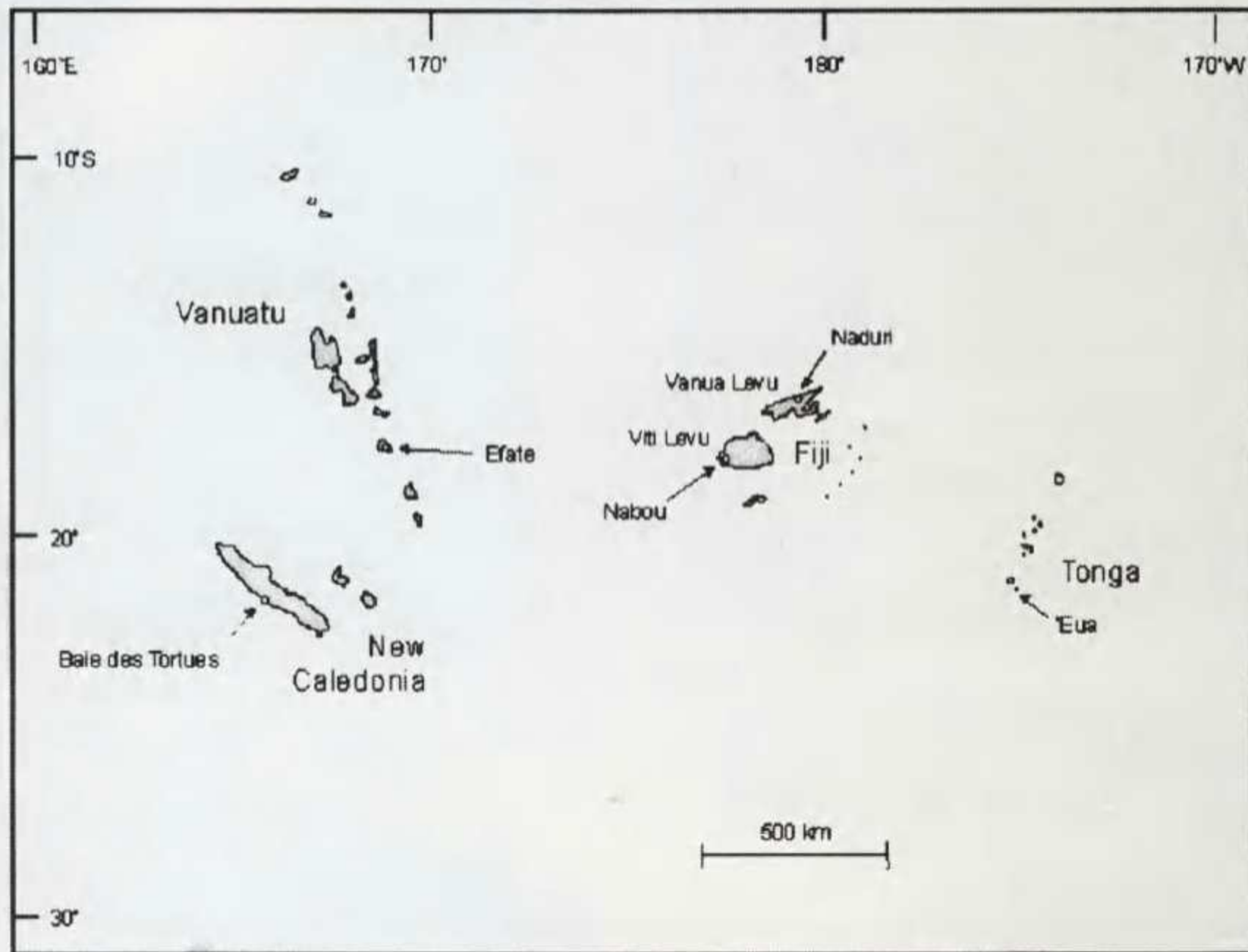


Figure 3. Distribution of *Cycas seemannii* on the islands of the South Pacific Ocean, showing the location of sites (arrowed) where populations were studied in detail by the first author (Keppel 1999, 2001).

DISTRIBUTION AND ECOLOGY

Cycas seemannii is found on several hundred large to small islands in the South Pacific Ocean. These fall under four principal jurisdictions (from west to east):

- **Kingdom of Tonga (Friendly Islands)**, a long chain of about 150 islands. *C. seemannii* is almost extinct in the wild on the main island of Tongatapu, but occurs in relative abundance on 'Eua, Tofua, Vav'u and possibly other islands.
- **The Republic of the Fiji Islands (Viti)**, which comprises about 250 volcanic and coral islands, the largest two being Vanua Levu and Viti Levu. *C. seemannii* occurs on both these landmasses, as well as on many of the smaller islands in the major groups (Kadavu, Lau, Lomaiviti and Yasawa). Despite being widespread, the species is not particularly common anywhere except for northwest Vanua Levu.
- **The Republic of Vanuatu** consists of about 80 scattered islands. *C. seemannii* has been reported from Aneytium, Efate, Eromango, Espiritu Santo, Maewo, Malekula, Pentecost and Tanna but is likely to occur on other islands as well.

- *C. seemannii* occurs on the main landmass of the **French Territory of New Caledonia** and is almost certainly also present on adjacent islands. The cycad is not abundant in New Caledonia and is thought to be a fairly recent migrant to this old Gondwanaland island (Hill 1996, Keppel 2001).

Apart from the above, cycads closely akin to *C. seemannii* occur on the Santa Cruz Islands (administered by the Solomon Islands), including the outlying island of Tikopia. These islands are located more than 300 km east of the Solomon Islands (where *C. bougainvilleana* occurs, and more than 200 km north of Vanuatu, the range limit for *C. seemannii*). The identity of the cycad present on the Santa Cruz Islands remains to be ascertained. Cultivated *C. seemannii* plants are present on the islands of Samoa and Niue.

Cycas seemannii is most often found on calcareous beach dune sands and coral limestone formations. For example, plants at the Baie des Tortues (New Caledonia) are on limestone cliffs exposed to strong winds and salt spray, plants on 'Eua Island (Tonga) grow on limestone

terraces with a poor soil covering while the population at Yanuyanu-i-loma (Kadavu, Fiji) survives on a goat-denuded basaltic substrate. Other populations such that at Devil's Point, Efate Island (Vanuatu) are in coastal rainforests. Somewhat fewer populations are found at higher altitudes and in grassland areas like those of the dry and fire-prone *talasiga* vegetation of Fiji's Nausori highlands. Plants have been recorded at altitudes from sea level to 600 m. Common to all localities is the plants' preference for well-drained sites. In Fiji it is found only of the leeward side of the two major islands and appears to be restricted to rainfall regimes of less than 2200 mm annually as it is not found on the moister windward sites. The temperature minima/maxima are 16/31°C.

In contrast to the situation in most cycads, pollination in *Cycas seemannii* seems to be wind-effected. Illustrative of this, Keppel (2001) reports on a female plant in cultivation in Suva (Fiji) which is shielded from wind on three sides by buildings but which has male plants at each end of the direction of wind flow; the great majority of seeds are found to develop on the windward side of the female plant. In addition, Keppel has observed that plants in closed forest on Efate Island (Vanuatu) do not bear seeds but plants in the more exposed coconut groves on the adjacent coastal plain yield good seed crops. However, male cones of *C. seemannii* are thermogenic and produce a typical *Cycas* cone odour—features all circumstantially associated with insect pollination. Clearly, further investigation is required before one can reach a final verdict on pollination mediation in this cycad.

Because of their internal spongy layer, seeds of *Cycas seemannii* float in water and it is this property which has allowed the species to colonise the numerous South Pacific islands (Dehgan and Yuen 1983, Hill 1996). Added to this, the cultural significance of the cycad to Polynesian tribes (see below) would have contributed to its spread. Once established, local plant populations could slowly extend their local range as successive seed crops were moved by water, gravity, bats and, in past times, possibly by now-extinct giant ground-dwelling birds (Keppel 2001).

AFFINITIES

In the current infrageneric classification of the genus, *Cycas seemannii* falls within subsection *Rumphiae* of section *Cycas* (Hill 1994). The subsection is defined by the presence of a spongy layer within the sclerotesta, dorsiventrally thickened microsporophylls with short upturned spines, a pronounced wing on the distal end of the intact seeds, and a two-year seed maturation period (although not all these characters are present on all representatives). The group comprises a complex of widely distributed but closely related taxa that, apart from *C. seemannii* itself, includes *C. bougainvilleana* K.D. Hill (Bougainville, New Britain and Solomon Islands), *C. edentata* de Laub. (Philippines), *C. littoralis* K.D. Hill (Thailand), *C. micronesica* K.D. Hill (Marianas Islands), *C. rumphii* Miq. (S. Borneo, E. Indonesia, N.E. Java, Moluccan Islands, New Guinea and Sulawesi), *C. thouarsii* R. Br. ex Gaudich. (E. Africa and Indian Ocean Islands), and possibly as many as another 3 species (Hill 1994, 2004; Hill and Yang 1999, de Laubenfels and Adema 1998).

The species geographically closest to *C. seemannii* is *C. bougainvilleana*—the westernmost limit of *C. seemannii* on the Vanuatu Islands lies about 850 km to the south east of the easternmost limit of *C. bougainvilleana* on the Solomon Islands. As may be anticipated, there is some evidence of *C. seemannii* / *C. bougainvilleana* intergradations on both Vanuatu and the Solomon Islands. In a key to distinguish the members of the subsection *Rumphiae*, Hill (1994) separates out the two species as follows:

Hypodermis continuous; petiole often partly spinescent; adult pinnae 13-18 mm wide, margins weakly recurved; longest cataphylls to 160 mm long.

..... *C. bougainvilleana*

Hypodermis interrupted; petiole usually unarmed; adult pinnae 8-14 mm wide, margins distinctly recurved; longest cataphylls to 90 mm long.

..... *C. seemannii*

A recent genetic study by the first author and colleagues (Keppel *et al.* 2002), using the technique of starch gel electrophoresis on leaf extracts of a large number of *C. seemannii* samples, and surveying 20 enzyme loci from 13 different enzyme systems, has found that there is a low genetic diversity *within* populations but a high degree of differentiation *between* different populations. This pattern is not uncommon in cycads, and suggests that, after their geographic isolation, there has been only a very limited genetic exchange between various cycad populations.

Current work by Keppel and Hodgskiss (in preparation), using both morphological and electrophoretic data, supports the monophyly of subsection *Rumphiae* and also shows that the species of the insular Southwest Pacific (*Cycas seemannii*, *C. bougainvilleana* and *C. micronesica*) form a closely-knit subgroup which can be separated from a second subgroup comprising *C. edentata* and *C. thouarsii*, the latter set being characterised by a long (more than 1 cm) apical spine on the microsporophylls. However, much work remains to be done in resolving the fine details of the relationships between all the species concerned.

ETHNOBOTANY

The large number of vernacular names for *Cycas seemannii* is a reflection on both the extensive geographical range of the species and its significance to the inhabitants. The species is best known under the name *logologo* (pronounced "longolongo") in Bauan, the official native language of Fiji. Variations of this name are *longolongo*, used on Tonga and Niue and *rongorongo* on Tikopia. Other Fijian names for *C. seemannii* are *roro*, *sisila* (Nadroga dialect), *tuawawa niu* (Devil's coconut) and *wiro*. The range of vernacular names for this species on Vanuatu is even more extensive. *Namele*, from the official Bislama language, is the most commonly used and other names in various local dialects include *no-moll* (Eromanga Island), *mwele* (Pentecost Island), *nemol* (Espiritu Santo) and *namail* (Maskelynes Islands, southeast of Malekula).

Seeds, trunk starch and even male cones of *Cycas seemannii* were variously used until fairly recently as an emergency food source in parts of Fiji, Tonga and New Caledonia. This usage followed the common pattern seen in

Africa, the Americas and Australia, where washing and other detoxification processes are used to yield a crude flour for bread making. The practice is still carried out on some of the remote islands in Fiji (Keppel in preparation). In past times, folks in the Navua river area on Viti Levu reportedly prepared cycad "cakes" for the exclusive use of the chiefs (Seemann 1865-73).

In Vanuatu, *Cycas seemannii* has held, and still holds, a much greater cultural significance than elsewhere in the Pacific and in other parts of the world—the plant even features on their national flag. The traditional usages differ from island to island, but a common thread is the mystic power held by the plant, detailed knowledge of which held by a select few and passed from generation to generation in initiation ceremonies. Those with the knowledge may wear cycad leaves on their belts. Plant specimens feature in dance grounds and at ceremonial feasts and burning leaves are used in tribal punishment rites. An interesting additional feature is that the pinnae on a leaf are used in communication and counting, e.g. to keep track of the number of days before an important event or the number of people present at a ceremony (Thaman 1992, Keppel in preparation).

In all countries of its occurrence, *Cycas seemannii* is widely planted as an ornamental, especially in private gardens and in Catholic church grounds and sometimes in street plantings, public parks and cemeteries. Its leaves which keep a fresh appearance for several weeks, are used in decorations. In Tonga, specimens are often planted in cemeteries (as with *Encephalartos lanatus* in South Africa) and were cultivated for food. In New Caledonia, the empty sclerotestae of seeds were used to make rattles used in traditional dances (similar to the use of *Dioon* seeds to prepare ocarina-like whistles in Mexico). The mucilage of *C. seemannii* has been used as a glue, an application also known from some American cycads (Keppel in preparation).

CULTIVATION

Jones (2002) describes *Cycas seemannii* as an attractive cycad for cultivation in coastal tropical and warm subtropical areas but also amenable to inland zones. "It has attractive glossy foliage and plants have proved to be adaptable and will grow in a sunny position in a range of well-drained soil types. It responds vigorously to applications of fertiliser". Propagation is by seed or by removal of trunk offsets. However, the latter are not commonly formed in cultivated plants but seem to be more often a response to stress, such as fire or trunk injury (Keppel 2001). The species is frost sensitive. Whitelock (2002) points out that "...the lack of spines on the petiole makes *C. seemannii* a good choice for gardens frequented by children and pets."

CONSERVATION STATUS

Although the 1997 IUCN Plant Red List classified *Cycas seemannii* as **R** (rare), this status has since been revised to **VU** (vulnerable) (Hill, Chen and Loc 2003; Keppel 1999; Keppel *et al.* 2002). Although the total range for the species is very large (2 million km², the area available for colonisation is only about 47,000 km². As a result, the total population size is relatively small. Keppel

(2002) projects that the present population size is at least 17,000 mature individuals.

Habitat reduction over the last ten years is estimated at 30-50% and has been a consequence of shifting agricultural cropping and grazing practices, coastal "development" projects, fire-damage and competition from afforestation and exotic weeds. Fire and agriculture threaten many of the remaining populations in Fiji especially, and their decreasing importance as an emergency food had reduced the incentive for local people to protect the plants. Most of the populations on Fiji have already been reduced to small fragments that are now prone to loss of genetic variation (Keppel 2002).

It is of concern that, as yet, few plants have been protected in any kind of officially proclaimed reserve. The only population known to occur in an established protected area is found on the steep, eastern hills of 'Eua in Tonga (Keppel 2002). A proposed nature reserve in the Mt. Koroyanitu (Mt. Evans) Range in western Viti Levu (Fiji) would include one to several populations of the species (Lees 1989). A positive note here is that a significant number of mature plants in a fire-threatened zone have been transplanted to a farm in the Sigatoka Valley on Viti Levu (Fiji) as an *ex-situ* contingency (Keppel *et al.* 2002). Unlike the situation with so many other cycad species, poaching of *Cycas seemannii* from the wild is almost non-existent, as propagation from seeds and offsets of the many plants in cultivation is simple and more convenient.

THE GOLDEN CYCAD OF FIJI AND VANUATU

Quite apart from the "normal" *Cycas seemannii* plants as discussed in the preceding paragraphs, several authorities, including Ken Hill, John Dowe and the late Dick Phillips, have recorded a particularly unusual form of cycad, known only in cultivation as female specimens and found only on Viti Levu in Fiji and a number of localities in Vanuatu, which has become known as the "Golden cycad of Fiji/Vanuatu". In the account of this plant, given in *ENCEPHALARTOS* No. 36, Hill (1993) mentions "huge flushes of spectacular yellow leaves" which ultimately turn green. In many respects this occurrence seems analogous to that of the "yellow" form of *Cycas revoluta* found in the Japanese Ryukyu Islands (Osborne and Tomiyama 1996). A further oddity is that the golden cycad is not successfully pollinated by male plants of *C. seemannii* even when plants are in close proximity.

There are slight morphological differences between *C. seemannii* and the "golden cycad" and it was first thought that the latter plant is more closely akin to *C. rumphii*. Current work indicates that this plant may in fact constitute a separate taxon closely allied to the three species of the insular Southwest Pacific but the absence of any natural population inhibits further taxonomic specification (Keppel 1999, Keppel and Hodgskiss in preparation). Further study of this interesting phenomenon is necessary to determine its precise affinities.

ACKNOWLEDGEMENTS

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reproduce the illustration of *Cycas seemannii* morphological features. Dennis Stevenson arranged for us to obtain the print of B.C. Seemann. We thank PACSOA, André de Does, John Dowe, Leland Miyano, the late R. Phillips, and John and Jeanne Price for permission to use photographs.

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SHORT COMMUNICATIONS AND ARTICLES

KORT MEDEDELINGS EN ARTIKELS

IN MEMORIAM: DENIS & ROSA HEENAN

Roy Osborne

P O Box 244, Burpengary, Queensland 4505, Australia

Received 28 February 2004

It is with great sadness that we report that Denis Heenan (76) and his second wife Rosa, passed away after a tragic car accident on the road from Johannesburg to Swaziland.



They were returning home on 13th of November 2003, after a visit to South America. Rosa died soon after the accident while Denis passed away on 10 December 2003, never recovering from multiple internal injuries and coma.

Denis was born in Liverpool, UK on 25 February 1927. He came out to South Africa after the war to work on the mines as a shaft sinker. After surviving a number of near fatal mining accidents, he chose a career in forestry.

He married his first wife, Jean, in 1950 and the couple lived for many years in Barberton where Denis' cycad interest was sparked by a fine specimen of *Encephalartos paucidentatus* growing in their garden. After moving to Pigg's Peak in Swaziland in 1960, Denis worked for the Forestry Department, his job taking him to habitats for *E. paucidentatus* and *E. laevifolius*. It was in 1969 that he stumbled across a remarkably "different" cycad; material sent to Dr. Allan Dyer in Pretoria lead to the naming of *E. heenanii* in 1972 (*Bothalia* 10(4): 539-544). Denis himself published an account of the discovery of this plant in the journal *Aloe*, also in 1972 (*Aloe* 15(1): 3-7).

Continuing his now vigorous cycad interests, it was Denis' planning that resulted in the expeditions, lead by his son David, in 1972/73 to Mozambique, Malawi, Tanzania, Uganda, Kenya and Zaire, with a second trip in 1974 to Kenya, Tanzania and Zambia.

The account of these expeditions was written up by Denis in the *Botanical Journal of the Linnean Society* (1977, No. 74, pp.279-288) and was a major advance in the then limited knowledge of the east and central African cycad flora. An updated summary of the trips was published in *Encephalartos* (1995, No. 43, pp.16-23). These expeditions lead to the collection of about 1000 cycad specimens that were distributed to sponsors of the expedition and sold to others. Most of these are now fully mature specimens and many have been used for propagation by suckers and seed.

A colourful, strong-willed and sometimes controversial figure in the cycad world, Denis had many arguments with the Transvaal Nature Conservation authorities that disapproved of his cycad collecting and sales. Nevertheless his was highly regarded by the South African and international cycad community. In his own words "I have met and made many wonderful friends ...and this has been a reward worth all the effort and time" and "Friendship through plants is one of the finest in the world" (quoted from the *Aloe* 1972 article).

Denis is survived by his sons, David and Michael, three grandchildren, and one great granddaughter. On behalf of the cycad community, we express our sincere condolences to them.

IN MEMORIAM: ITA VAN DER WALT

Piet Vorster

Botany Department / Plantkunde Departement
University of / Universiteit van Stellenbosch

Received 19 April 2004

Ita van der Walt, a long-term member of this Society (membership no. 38) passed away on 28th January 2004. We hope to publish an obituary in the next issue.

I first met Ita in 1974 during a field trip. At that time she and her husband Henkie were living on a farm near Trichardtsdal, on the northern slope of the Transvaal Drakensberg. Her garden

was one of the most beautiful places I had ever seen, with its own patch of evergreen forest and a mountain stream. At that time she was still a relative novice in cycads, but already had some interesting things collected from the mountains behind the house. It was she who first brought to our attention plants with blue foliage, which she called *Encephalartos dolomiticus*. When some of these plants came into cone twenty years later, we realised that at least two species were involved, viz. *E. dolomiticus* and *E. nubimontanus*.

Ita had an endearing nature, and we soon established a regular correspondence and exchanged seeds. I still remember her delight at the reaction of her seedlings when she erected, at my advice, a fibreglass cover over her nursery to protect against the frequent periods of drizzle. On another occasion she got the idea that the plants would benefit from an application of carcass meal. This was available from the Pretoria abattoir, but only to residents of Pretoria, so I arranged a supply of this horrible-sounding elixir – in those days we tried everything.

Soon afterwards the Van der Walts moved to Pretoria, and set up house and nursery on the northern side of the Magaliesberg. Her nursery soon expanded into a world-renowned enterprise. One of the more interesting things she did was to plant out cycad seedlings (*E. transvenosus* and *E. manikensis*, if I remember correctly) in lands on her daughter's farm near Tzaneen. These rapidly grew into enormous specimen plants.

Ita's passing ends an era of adventure and learning. We, who were fortunate to have known her, shall miss her; but her legacy lives on in our knowledge of *E. dolomiticus* and *E. nubimontanus*. As I write this, I look out at an enormous *E. transvenosus* with a trunk almost 60 cm across and a meter tall, which I swapped from her for a dozen seedlings of *E. senticosus*. At that time it was so small that it fitted, roots and leaves, comfortably into my Volkswagen Beetle.



Figure 1. Ita van der Walt in her garden near Trichardsdal, with a huge *Encephalartos laevifolius* from The Downs, February 1974. This plant had dark green foliage in contrast to the blue leaves of plants from near Barberton.

ANOTHER ONE BITES THE DUST

Xander de Kock

P O Box 21, Faunapark, 0787

Received 7 April 2004

Encephalartos woodii was the first to become extinct in nature and now another few species have followed the same tragic path in the Limpopo Province. Will the greed of individual collectors never stop?

Nature Conservation did aerial surveys from mid November 2003 till mid February 2004. During their 2000 survey they discovered a drastic decline in several of the cycad populations. Today *E. cupidus* (in the Limpopo Province) *E. nubimontanus* and *E. brevifoliolatus*, from all the known localities, are extinct with another 3 species on the verge of extinction.

In December 2003 during their last survey, official visited me and informed me that of the known *E. brevifoliolatus* specimens only a few were still in nature, the rest has

disappeared over a 4-year period. They were considering translocating the last ones, before poachers got hold of them. We are all familiar with the unsuccessful translocation of the Tugela Ferry *E. laevifolius* a few years ago of which all the plants died. With this in mind, the time of the year and the input from Piet Vorster, we didn't feel at ease with the idea, but it was a catch 22 situation. To plan and perform the translocation is no easy task and would take time to finalize. During this time, which was less than 3 weeks, aerial surveys revealed that the decision to translocate the plants, were warranted. One 4-meter stem disappeared and the other 3-meter stem was chopped one meter above ground level and fell down. Photographs of these two stems were published in both Douglas Goode and Prof. N. Groblaar's cycad books respectively. All the published pictures of *E. brevifoliolatus* are now of historic value since these plants don't exist in nature any more.

On 5 February 2004, I was invited to join Nature Conservation to recover this damaged *E. brevifoliolatus* and to advise and assist with its translocation. The habitat is in the Drakensberg and no easy terrain to perform a translocation. The easiest way to reach and recover the plant was by helicopter.



Figure 2. Stan Rodgers in habitat with *E. brevifoliolatus*. Observe chopped area on left and spectacular flush of leaves.



Figure 3. *E. brevifoliolatus* in three pieces and ready to be airlifted out of nature forever.



Figure 4. Both areas of stem damage of *E. brevifoliolatus* clearly visible.

Weather delayed the missions till late morning. The locality was very steep and on arrival we had a relative easy walk down to the plant. What a sad sight to see this last *E. brevifoliolatus*, down on the ground, with a set of at least 200 leaves of which about half were pushed in December (Figure 2). On closer inspection it appeared that the poachers returned to the plant and started to chop it about a meter from the top. This cut was 60% through the stem and the decision was made to cut the stem on the two chopped areas into three pieces. The plant was dug out and secured to prevent it from rolling down (Figure 4). We had to carry the 3 pieces about 50 meters higher up to a safer area to be airlifted from, and we were exhausted. Only then did we realise why the poachers started to chop this plant into smaller pieces. They carried the previous plant out in one piece! On completion of the mission we followed the tracks of the poachers up the mountain and it's unbelievable that they carried a 4-meter stem. Along the way we found that they moved rocks out of their way and used thick 2meter long branches to make their going easier. The tracks disappear later in thin air and the suspicion is that it was airlifted.

The three pieces were airlifted and planted at a secure location. Of the three pieces, the top section with leaves (only 4 were left on) will have the best prognosis. Only time will tell whether this plant has been saved for future generations or not. Do any of our members know where the five stolen plants are?

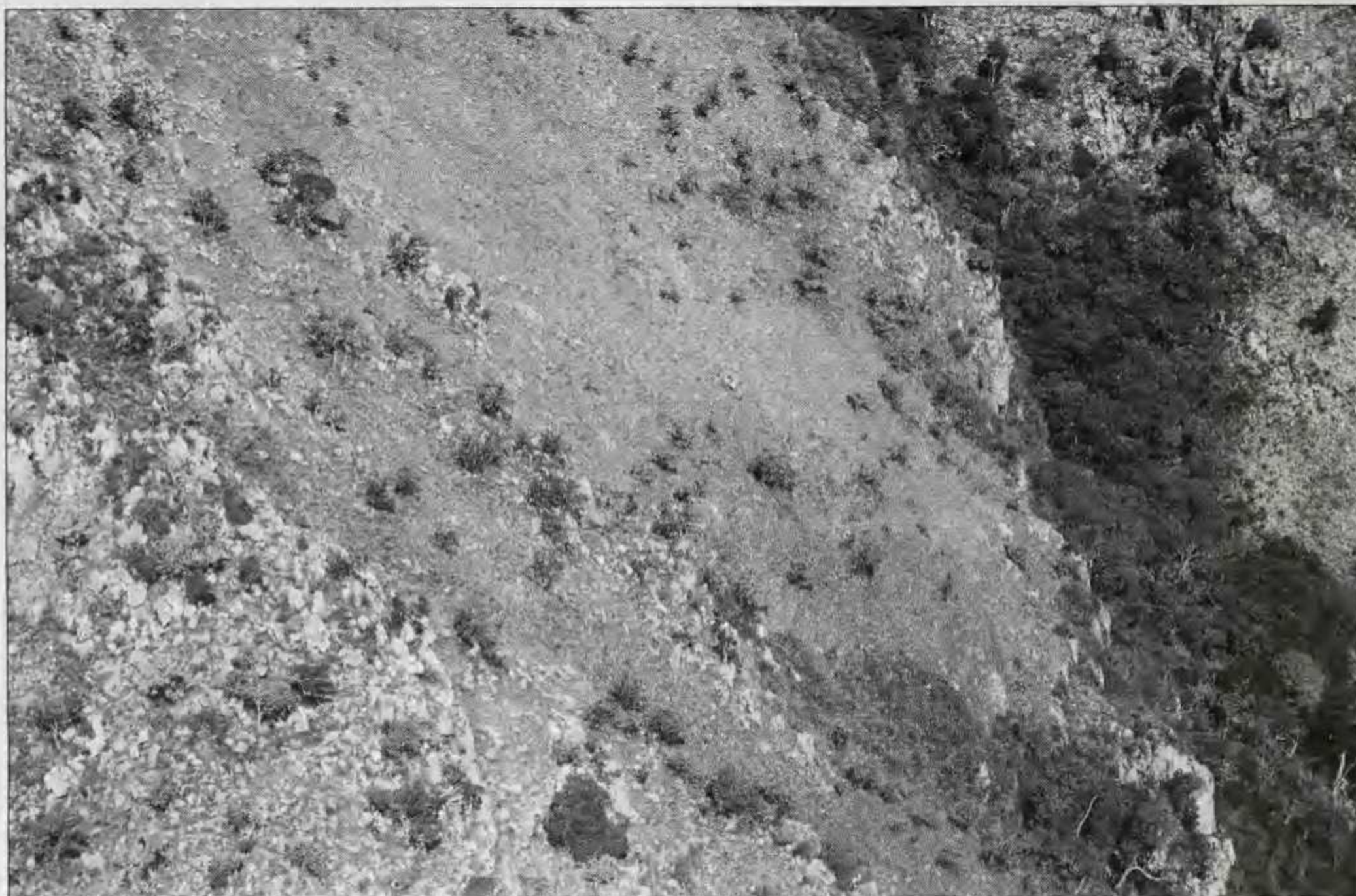


Figure 5. The last habitat of *E. brevifoliolatus*. In the centre officials are sitting on the stem, to be airlifted and to the right the barren soil is visible as the only witness of its existence.

[All photographs taken by Xander de Kock.]

CYCAD BIOLOGY CONFERENCES

Roy Osborne

Conference Coordinator: Cycad Specialist group
P O Box 244, Burpengary, Queensland 4505, Australia

Received 28 February 2004

After some delays in their production, I am pleased to inform readers of *ENCEPHALARTOS* that the Proceedings of the past two International Conferences on Cycad Biology are now in the final stages of printing and should be available within the next few months.

The Proceedings of the 5th International Conference on Cycad Biology, held in Miami, USA, in 1999, would be incorporated into a special issue (Volume 70, part 2) of the *Botanical Review*, issued from the New York Botanical Gardens. The Proceedings of the 6th International Conference on Cycad Biology, held at the Nong Nooch Tropical Garden in Thailand in 2002, are presently being printed under the supervision of the conference organizer, Anders Lindström. Readers will be informed when these two volumes become available and how to order copies.

More exciting news is that planning for the 7th International Conference on Cycad Biology, to be held in Xalapa, Veracruz,

Mexico, over the period 8-15th January 2005, is in full gear. This event promises to be the highlight of the series of cycad conferences and will cater for the growers, researchers, interested laymen and government officials. Participants must send in abstracts of their intended presentations by 31 July 2004. Delegates registering before 1 August 2004 will be entitled to a significant discount to the standard conference registration fee. For further information, visit the website:

www.ecologia.edu.mx/cycad2005/

(A program will shortly be available on the site. For more information contact Andrew Vovides at vovidesa@ecologia.edu.mx or Roy Osborne at cycad@iprimus.com.au. You can also write to Dr Andrew Vovides at Instituto Ecologia, A.C., Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico.

At present Monday 10 January to Friday 14 January 2005 will be used for lecture and poster presentations with 1 day set aside for a visit to a conservation-oriented nursery. Evening meetings for specialist groups and social excursions for accompanying persons are planned. See registration information elsewhere in this issue. Ed.)



Figure 5. The last habitat of *E. brevifoliolatus*. In the centre officials are sitting on the stem, to be airlifted and to the right the barren soil is visible as the only witness of its existence.

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TRANSVAALSE STREEKTAK: VERGADERING OOR EUGENE MARAIS

Derik Minnaar

Postnet Suite 5, Privaatsak X8, 0047, Elardus Park

7 April 2004

Lede van die Broodboom Vereniging is uitgenooi na die Leerste gesamentlike vergadering van die tak Eugene Nielen Marais van die Afdeling Geneeskunde en die Werkgemeenskap Pretoria van die S.A. Akademie vir Wetenskap en Kuns. Hierdie vergadering het Woensdagaand 24 Maart 2004 plaasgevind in 'n lokaal by die Pretoriase Akademiese Hospitaal. Belangstellendes van al drie organisasies het die vergadering bygewoon.

Twee sprekers het die vergadering toegesprek, onder voorsitterskap van prof. Carl Mieny, voorsitter van die Werkgemeenskap in Pretoria. Eerstens is dr. Johann Lodewyk Marais, Navorsingsgenoot van die Universiteit Pretoria, en hooftaalpraktisyn SANW, aan die gehoor voorgestel. Hy het 'n breedvoerige geskiedenis van Eugene Marais voorgedra wat baie interessant was. Die fokus van sy voordrag was op die ontdekking en beskrywing van die Waterbergse broodboom en die Marais mite. Fotos is vertoon en band opnames is gespeel van dr. Inez Verdoorn se gesprekke en beskrywings van hoe sy oor 'n lang tyd die broodboom soort *Encephalartos eugene-maraisii* help ontdek en beskryf het, na aanleiding van Eugene Marais se vertelling aan haar. Fotos is ook vertoon van waar sy die eerste keer by die broodboom in die natuur sit.

Hierna is prof. Nat Grobbelaar, Emeritus hoogleraar van die Department Plantkunde aan die Universiteit Pretoria en ereid van die Broodboom Vereniging, aan die gehoor voorgestel. Hy het sy toespraak gefokus op die Waterbergse broodboom en naverwante spesies. Die uiterlike kenmerke en die verskille tussen *E. eugene-maraisii*, *E. dyerianus*, *E. dolomiticus* en *E. middelburgensis* is in detail uitgelig. Die interessante mededinging deur twee navorsings groepe om die plante te beskryf, is ook vertel.

Na 'n vroe-sessie is die vergadering afgesluit waarna verversings gesellig saam geniet is.

Hersiende Voorlopige jaarprogram van die Transvaalse Streektak van die Broodboom Vereniging:

Opedag	Laubser de Kock: 1 Mei 2004
Praatjie	Hanneke Grobbelaar
Lokaliteit besoek	Derik Minnaar: Oktober
Jaarvergadering	John Kloppers: 7-9 Augustus

Belangstellendes moet Derik kontak (082 4131025 na-ure) so vroeg moontlik asseblief om teleurstelling te voorkom.

THE TRANSVAAL REGION YEAR-END FUNCTION

John Kloppers

cycad@mweb.co.za

1 April 2004

The itinerary for the yearend function is finalized and available. [The detailed itinerary could not be published. Please see our website for details. Ed.] I would like to make the following comments as an addition to the itinerary.

At meetings held at the Northern Province Cycad Working Group it was found that there were differences in the forms of the following *Encephalartos* species: *E. nubimontanus*, *E. laevifolius* and *E. transvenosus*. Some of these different forms were previously discussed in the *Encephalartos* magazine. Since then new varieties of these species were discovered. The three persons that shall be discussing these differences have made a thorough study on these species and are knowledgeable on the subject. There will be a colour booklet on the topic available at these lectures, the cost of which will be announced at the meeting. The lecture presented by Prof Nat Grobbelaar would be one of the highlights of the outing, as you all know he is one of the worlds most knowledgeable persons on the genus *Encephalartos*, and his talk should be something to look forward to. His latest book *Cycads* will

be offered at a special price during the weekend. The Afrikaans version *Broodbome* will also be available.

Mr. Karl Bischofberger is one of South Africa's leading cycad evaluators and his latest monetary value list will be supplied and discussed at the meeting. This discussion will take place after Prof. Nat's lecture. Of all the botanical gardens in Africa the one we shall be visiting in the Lowveld, it has the largest variety of cycads on the continent. We shall be met by an official of the Lowveld Gardens, and given an outline on the layout of the cycad population.

On Sunday afternoon a raffle will be held of Cycad seedlings, everyone will be welcome to participate in this raffle. Raffle tickets will be sold at R20.00 each during the weekend by members as published on the itinerary. Duplicates of the tickets will then be drawn, whereby the holder of the drawn ticket may choose any one of the seedlings presented at the raffle. The raffle will continue until all the plants are taken. The income generated at this

raffle will go to the TVL Region of the Cycad Society, and will be used to finance future outings, and make them more affordable to participants.

Finally I want to ask all participants of this weekend to contribute cycad seedlings to make this raffle possible. It will not be held against you if you have no seedlings to donate, you can still participate in the raffle. On Monday we shall

Rates per person sharing:

Bed & Breakfast - R185.00 each
Dinner, Bed & Breakfast - R245.00 each

Rates per single person:

Bed & Breakfast - R270.00
Dinner, Bed & Breakfast - R330.00

If you are prepared to share a room with other attendees, the staff of the Ingweyama Lodge will arrange it. The above prices include tea breaks and conference facilities.

Telephone: (013) 751 3493
Fax: (013) 751 2166
Web-site: www.ingweyama.co.za
E-mail : ingweyama@mweb.co.za
Contact Person: Christelle, (082) 493 7817

Banking information
Account Name: Ingweyama Lodge
Standard Bank cheque acc. No. 030383005
Branch code 053052

VERY IMPORTANT!

Bookings must be made before 6 Julie 2004. Participants will be accepted on a first come first served basis. If you have any inquiries concerning the weekend please do not hesitate to contact me at:

Telephone: (013) 262 4226
Fax: (013) 262 2465 or
Cell: (083) 701 3482

THE CITATION OF THE NAME *ENCEPHALARTOS HILDEBRANDTII*

Leonard E. Newton

Department of Botany, Kenyatta University, P.O. Box 43844, Nairobi 00100, Kenya.
lnewton@avu.org

21 April 2004

Encephalartos hildebrandtii (Zamiaceae) is an East African cycad species, occurring in the dry coastal forests of Kenya and Tanzania. In the standard flora for the area (Melville, 1958) the name is cited as follows:

Encephalartos hildebrandtii A. Br. & Bouché
Ind. Sem. Hort. Berol. 8 (1874).

The same reference appears in the *Index Kewensis*, in both the original printed work and the Internet version (<http://www.ipni.org>). Normally, authors would assume that the citation in the *Index Kewensis* and in a standard flora would be correct, and that there is no need to check with the protologue (the original publication of the name). Presumably this is why the same citation is given by later authors, of which recent examples are Beentje (1994) and Hill & Stevenson (1999).

The indication of a nomenclatural author after a plant name is intended to add to precision in the application of

visit a few local gardens in the White River / Nelspruit area. This subtropical area is most suited for gardening, therefore you can be assured that these visits will be a worth your while. To minimize confusion and double booking, each participant of the weekend will have to make their own booking at the **Ingweyama Lodge & Conference Centre**. You can book from Friday night, 6 August 2004 to Monday 9 August 2004 (National Woman's Day)

names, because there are cases where the same name has been applied to different taxa by different authors. Such names are called homonyms. Many periodicals now require authors to cite nomenclatural authors in accordance with recommended abbreviations in the listing by Brummitt and Powell (1992), and this requirement prompted the investigation reported here. In the Brummitt and Powell list the abbreviation "A. Br." is used for Addison Brown (1830–1913). According to Barnhart (1965), Addison Brown was a US-American botanist, but there is no indication of his botanical activities. Brummitt and Powell list three people with the surname Bouché, but the one who should be cited as "Bouché" died 18 years before the name *Encephalartos hildebrandtii* was published. He was Peter Carl Bouché (1783–1856). The other two in the list are Carl David Bouché (1809–1881), to be abbreviated as "C. D. Bouché", and Pierre M. Bouché (dates not given), abbreviated as P. M. Bouché. As Pierre M. Bouché was shown as a specialist in algae it seemed likely that the author of the cycad name is Carl David Bouché.



Figure 1. *E. nubimontanus* "robusta" with female cone.



Figure 4. *E. nubimontanus* from the Strydom Tunnel locality.



Figure 2. *E. nubimontanus* "robusta", leaf detail (petiole).



Figure 5. *E. nubimontanus* leaf detail, Strydom Tunnel locality.

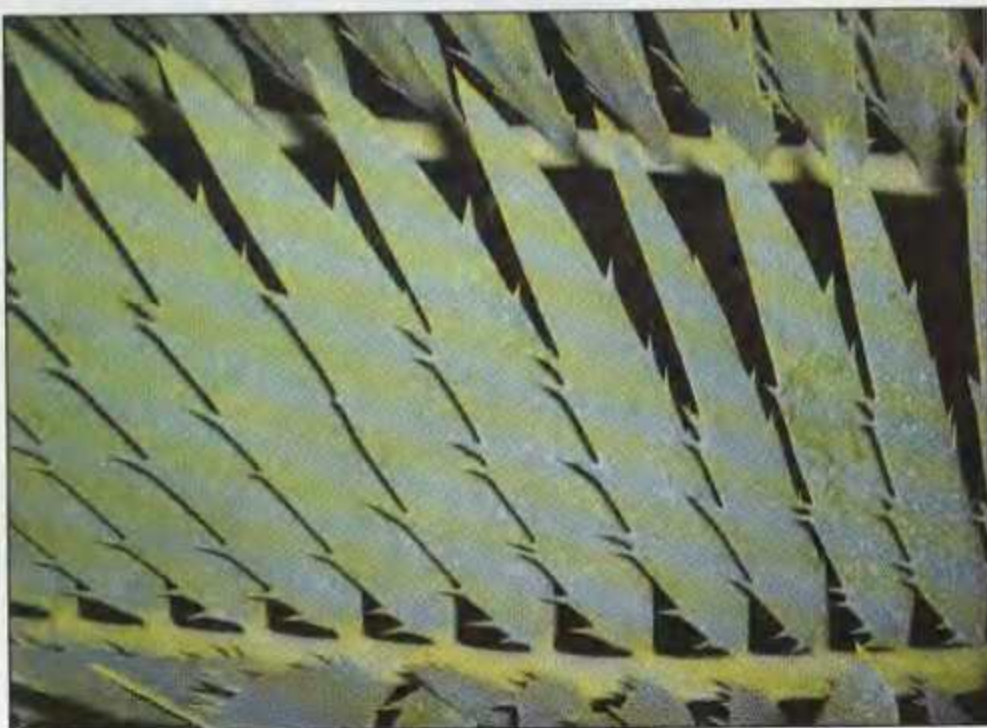


Figure 3. *E. nubimontanus* "robusta", median pinnae detail.



Figure 6. *E. nubimontanus* petiole detail, Strydom Tunnel locality.

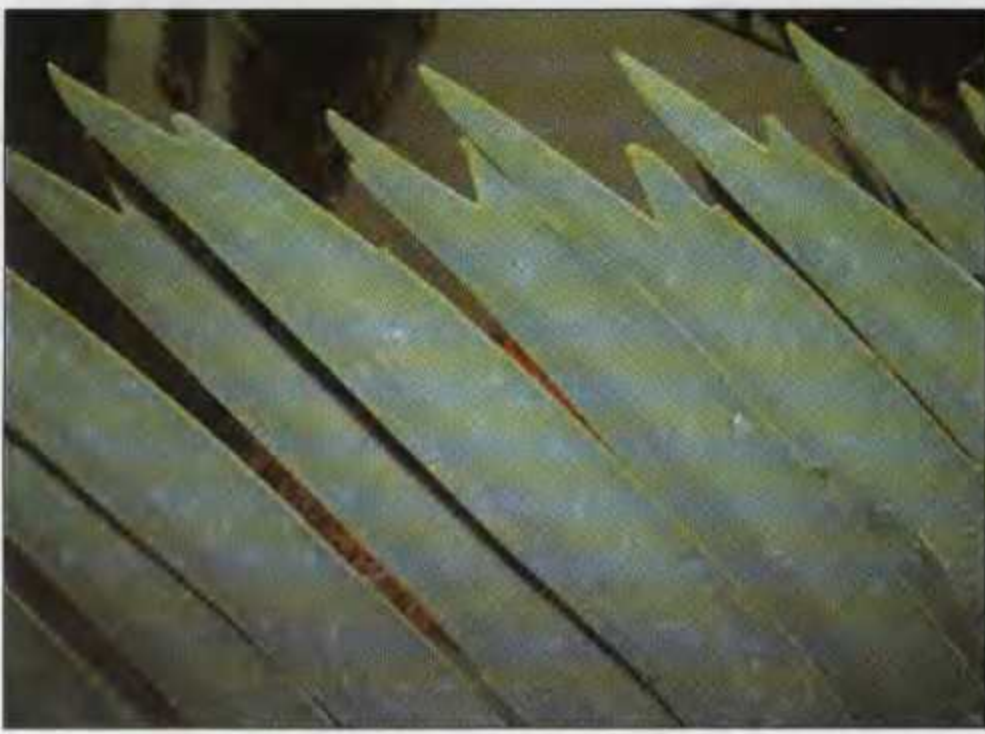


Figure 7. *E. nubimontanus* "fishtail", pinnae detail.

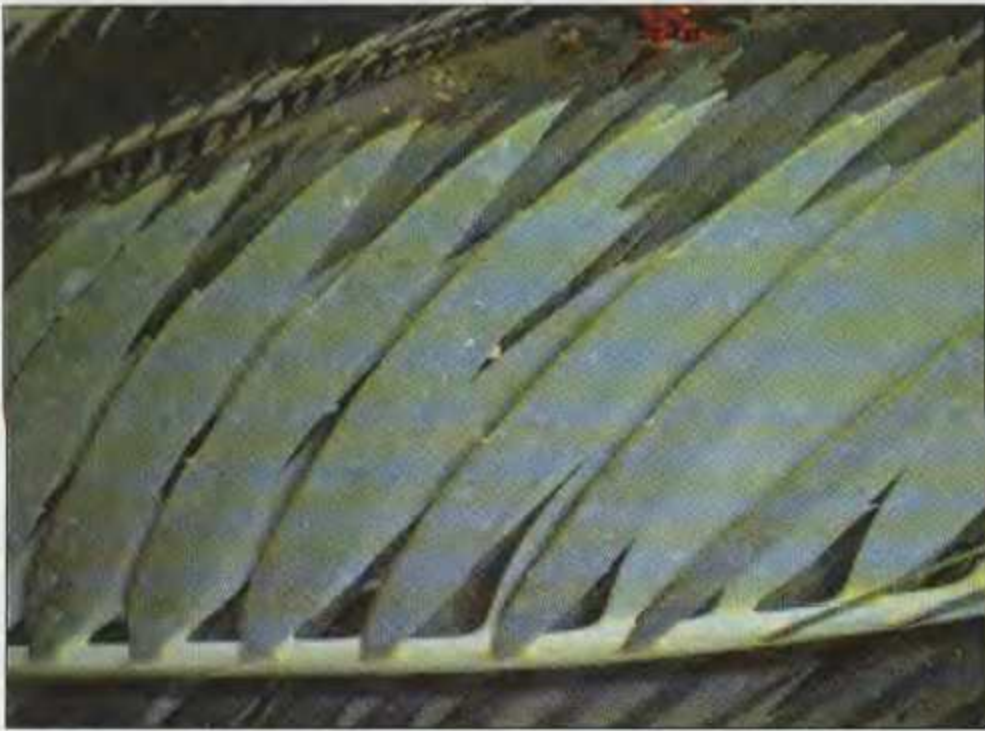


Figure 8. *E. nubimontanus* "fishtail", pinnae detail.



Figure 10. Differing cones of *E. cerinus*.



Figure 9. *E. nubimontanus* "fishtail", petiole detail.



RIGHT Figure 11 and 12. Top and Side view of Fossil found in Lebombo mountains, Komatipoort.

The next step was to look at the protologue in order to check the identity of the authors. The publication (Braun *et al.*, 1874) was located in the herbarium library of the Royal Botanic Gardens, Kew, but there was a problem. The name of this species does not appear on page 8. Fortunately the publication is not a long document and the description of *Encephalartos hildebrandtii* was soon found on page 18. It seems that the original erroneous page reference in the *Index Kewensis* has been copied by all later authors and nobody else has looked at the protologue for well over 100 years.

In the protologue the authors are shown as A. Braun and C. Bouché. The first name eliminates Addison Brown, and also eliminates the abbreviation "A. Br." if we are to follow the recommendations of Brummitt and Powell. The first author's full name was Alexander Karl (Carl) Heinrich Braun. He was born in Regensburg on 10 May 1805 and died in Berlin on 29 March 1877. The full name is shown by Brummitt and Powell, where the recommended citation is "A. Braun".

As indicated above, in the list by Brummitt and Powell there are two people called Bouché whose initials include "C." and only one of those was alive when the plant name was published, but his full name is Carl David Bouché. Confirmation that this is indeed the co-author of the cycad name is found in the Barnhart list (Barnhart, 1965), where it is stated that Carl David Bouché (born 4 June 1809, Berlin; died 27 September 1881, Berlin) collaborated with A. Braun.

Further confirmation of the authorship is given by Stafleu and Mennega (1995). The 1874 edition of the Berlin *Index Seminum* is listed, with reference to the descriptions by Braun and Bouché of plants collected in Africa by Hildebrandt. *Encephalartos hildebrandtii* commemorates Johannes Maria Hildebrandt (1847–1881), an amateur botanist from Düsseldorf, Germany, who collected plants in north-east Africa, Arabia, Madagascar and Comores (Beentje, 1998). He died in Antananarivo, Madagascar, at the age of 34 years.

My starting references were the *Flora of Tropical East Africa* (Melville, 1958) and the *Index Kewensis*, but several books on cycads have appeared in recent years. A few of these give the name Braun in the authorship of the name, though one has "A. Brown". The only book to cite the authorship in the form recommended below is that by Whitelock (2002). The following conclusions can be drawn from this small investigation:

- 1 It is often useful to check the protologue of a name.
- 2 Whilst not obligatory, the use of Brummitt and Powell's recommendations is advisable, to avoid ambiguity.
- 3 The name of this species should be cited as follows: *Encephalartos hildebrandtii* A. Braun & C.D.Bouché, Ind. Sem. Hort. Berol., 18 (1874).

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CYCADS, ROOTS AND FEEDING

André Cilliers

E-mail: andre.cilliers@plaaskem.co.za

21 April 2004

As with so many things in life, we often tend to neglect that which we cannot see!! In the case of plants, surely it is the roots that we tend to forget about. We can see the leaves and stems of our cycads, but the roots pretty much remain out of sight, barring natural disasters such as floods that can wash plants away!! We see signs if

nutritional deficiencies manifest in the leaves of the plants, but we never really know what the condition of the roots are.

Obvious signs of problems on parts above ground, such as insects (scale, aphids, chewing bugs etc) can be easily and

quickly identified, and action can be taken to rectify the problem.

I believe that all plants, including cycads, function optimally if they have very healthy roots. There has been a lot of talk about complex cycad feeding programs (which have their merits) but you can feed a plant whatever you like: if the roots that have to absorb and transport the nutrients are underdeveloped, a great deal of the feed will go to waste. Plant feeds are valuable and most of them are aimed at boosting foliar growth rather than stimulating root growth. These valuable elements can be meaningless if there is not a well developed root system. Therefore, cycad feeding should have two components: vegetative nutrients as well as root growth stimulants, much the same as we humans need proteins and carbohydrates for optimal development. One of the often forgotten nutritional requirements of humans is vitamins. These are required in small amounts, but are critical for our development. Plants are the same. They require what we call trace elements that are vital elements or minerals required by the plant in small amounts. Who of us has ever given our cycads boron? Or molybdenum? Iron? Manganese? These are examples of microelements required by all plants for optimal growth.



Figure 6. Root growth after a year of treatment.
Photo by André Cilliers

Let us consider a potted cycad. Year after year the plant withdraws nutrients from the limited volume of soil in the pot. Year after year we cut off old and dead leaves, effectively removing nutrients that ought to be replaced. This is one reason why potted plants often seem to have limited growth, and may even stagnate after a few years in the same pot.

But back to the roots: I acquired an *Encephalartos dyerianus* some time ago and planted it into a pot. There were minimal roots at the time of transplanting. During the year that followed, I made an effort to feed the plant and especially to stimulate the growth of new roots. Being a valuable plant, I wanted to maximize the chances of survival after the transplant and I also wanted to keep the leaves, which I did. I fed the plant with Maxiboost (a root stimulant) and Multifeed (a soluble feed containing macro and micro elements). I since moved to Pretoria (from Potchefstroom) and I am in the process of planting all my potted plants into the garden. Upon transplanting again a year later, I decided to break the pot so that the disturbance was minimal. I was astounded when I observed the prolific root growth that had, up to that time, been invisible to me (figure 6). Suffice to say, I am now no longer worried about the plant's well being. If the roots are healthy, the plant will be too. Since that time the plant has produced the most beautiful flush of leaves that show no signs of the transplant shock, as is often the case.

For years it has been known that kelp (seaweed) extracts stimulate root growth of plants. The two components involved are auxins and cytokinins. The product that I used (Maxiboost) contains these two components and is derived from seaweed. I now happen to work for the company that makes both Maxiboost and Multifeed, and these are therefore the products I use. However, at the time of transplanting the *E. dyerianus*, I was not employed at Plaaskem and I obtained the products from a friend and "tested" them in good faith on my plants. The results speak for themselves. All plants treated with these products have shown dramatic root development upon transplanting. However, the *E. dyerianus* was the only plant photographed and it was the one that was in the pot for the shortest time. I believe that any kelp product containing auxins and cytokinins will significantly stimulate root growth. This can be combined with any good soluble feed and optimal growth ought to be the result. However, always remember that cycads are very slow growing plants. No amount of feeding will increase the growth rate beyond a certain point. I have had numerous enquiries regarding Maxiboost and Multifeed from cycad enthusiasts.

The products are available from Plaaskem on 011-8238000. Maxiboost costs in the order of R40 per liter and only sells in 20-liter volumes (4 x 5 liter). Persons interested could share costs. The product is applied at 5ml/l and therefore goes a very long way. Multifeed (classic) is available at most stores that sell plant feeds of plant protection products to the public. Larger volumes are available from Plaaskem.

ENCEPHALARTOS NUBIMONTANUS – THE VARIOUS FORMS

Phil Grobber¹ and Diekie de Klerk²

¹Posbus 236, Polokwane, 0700
E-mail: phil@evn.co.za

²Posbus 2234, Polokwane, 0700
deklerkk@mweb.co.za

24 March 2004

On 1 March 2003, the Northern Cycad Workgroup held a meeting to discuss the various forms of *E. nubimontanus*. Leaves from the different forms were collected from various gardens and nine were identified and discussed.

The natural habitat of *E. nubimontanus* is in the Drakensberg in the Limpopo Province, specifically in the vicinity between Wolkberg and Strydom Tunnel – a rough mountain range of approximately 100 km long. Unfortunately, only 30 plants are still left in their natural habitat according to information received from Nature Conservation, following a recent field study. All plant materials used in this study are from private collections and the names allocated are, in many cases, described according to appearance, rather than habitat. This discussion has led to a more comprehensive set of notes and eleven types were eventually identified and their typical characteristics summarized in table form.

Unfortunately not all the plants used in the study were mature specimens, but they had reached a size where the

differences could easily be noted. Cone and seed detail will also be included in the table and photo gallery as the plants form cones.

The different leaf shapes, summarized in table 1, page 32, appear on page 27 and 28 of this issue. More photos will be included in future issues of *Encephalartos*. The complete picture gallery, together with the key table, printed in A4 format, will be available from the Northern Cycad Workgroup.

For more information, please contact Diekie De Klerk, Phil Grobber or Ben Jordaan. The aim of the study is research, but also to create a gene bank in an effort to use pollen from the same leaf types when pollinating cones in an attempt to prevent hybrids of the different leaf forms as far as possible.

It will be appreciated if members with mature specimens of any of the different forms will contact anyone of us in order to create a databank for pollination. [See colour figures 1 to 9 on page 27 and 28 and Table 1 on the following page. Ed.]

CAPE CYCAD CONFUSION CLARIFIED

SAPA
Business Day 1st Edition

29 March 2004

CAPE TOWN; Cape Nature Conservation authorities have tried to allay the fears of cycad owners who have inundated the organisation with calls following media broadcasts that anyone not in possession of a permit for the plants by the end of the month will face prosecution.

"Such a campaign was launched and the message contained therein is in fact true, but, and this is the important part that has been overlooked or misunderstood, this campaign only applies to Eastern Cape," Deon Hignett, the Cape Nature Conservation's senior law administrator, said on Friday. The Eastern Cape economic affairs, environment and tourism ministry had taken the approach that cycads in the province must be put on a permit before March 31 or the plants would be regarded as being possessed illegally, it said. It was stressed that the campaign was active solely in Eastern Cape, with the Western Cape

nature conservation authorities not having launched such an initiative.

All cycads were classified as "endangered flora" in Eastern Cape, and if someone had a cycad irrespective of its origin, species, age and size on their property, a permit was needed for it. There was no deadline for application, although Cape Nature Conservation urged all owners of cycads without permits to contact it.

Cycads are a small group of plants with many unique features, and a very long history. They have been on earth at least since the Permian era, more than 200-million years ago, with fossil evidence found that could date them to the late Carboniferous period, almost 300 to 325-million years ago.

[See also Letters to the Editor regarding permit fees. Ed.]

E. nubimontanus : Key to Locality Forms

Habitat :	Wolkberg - Limpopo Province
From the Latin :	Nubilus = Blue Grey Montanus = Grows in the mountains
First described by:	P.J.H.Hurter - 1995 P.J.Vorster - 1996 described as <i>E. venetus</i>
Compiled by:	Northern Cycad Workgroup Julie/2003
Contact Persons:	Diekie de Klerk 083 292 4310 Phil Grobler 082 927 1816 Ben Jordaan 082 495 6075
Copyright:	Reserved

General Comments: Cones both male and female as well as seeds differ according to form (locality)
Only different leaf forms named and described below

No.	Key to Locality Forms										
	1	2	3	4	5	6	7	8	9	10	11
Form	Blue broad leaflet form	Common blue leaflet form	Dwarf form (Fine)	Fishtail leaflet form	Strydom tunnel form	Munchi form	Trichardisdal form	Green broad leaflet form	Robust form	Giant Rough Cupidus form	Fine Giant Cupidus form
Type (looks like)	Drakensberg type	Most common type					Dolomitica				
Length (m)	1,1 m	1,2 - 1,4 m	0,9 m	1,6 m	1,6 m	1,3 - 1,5 m	1,0 m	1,4 m	1,4 - 1,7 m	1,3 m	1,2 m
Colour	Blue	Very blue	Blue	Blue	Blue	Blue	Very Blue	Greenish Grey	Grayish Blue	Grayish Blue	Grayish Blue
Rachis	Straight with slight sideward twist near apex	Mostly straight but with twists and turns present	Straight	Straight but twisted near apex	Straight with downwards arch near apex	Straight with slight twist near apex	Twisted and disorderly	Straight, slightly twisted near apex	Straight, slightly twisted near apex	Straight with twist near apex	Straight, curved downwards near apex
Petiole length	5 - 10cm	Long : 22 - 29cm	18cm	14 - 18cm	18cm	None	20cm	14cm (thick)	7cm	19cm	7cm
Overlap	Very little	Slight. Incubous	Very little	Slightly at apex	None	A lot. Incubous	None	A lot. Incubous	Slight	A lot. Incubous	None
Median leaflet	Average length & width	Average length & width	Fine and narrow	Average length & width	Very long and broad	Short and broad	Long and broad. Slightly disorderly	Average length & width	Average length & width	Short and broad	Average length & width
Leaflet form	170 x 15mm	190 x 20mm	130 x 8mm	180 x 15mm	220 x 20mm	130 x 22mm	260 x 22mm	180 x 24mm	180 x 30mm	130 x 18mm	170 x 15mm
Teeth	Moderate	Very few to none	Fine and few	Thick fishtail shape at tip. Rest of leaflet moderate	Moderate	Severe	Fine and few	Very little	Very severe and rough teeth	Rough and many	Moderate and many
PP angle in degrees	40	45	60	35 (near twist)	30	60	30	45	50	60	40
Basal	30	50	55	25	75	80	40	50	30	60	40
PR angle (°)	80	45	50	50	90	60	70	45	60	45	80
Basal Leaflets	Slight prickles to lobed	Few to slight	Small and fine, few present	Severe prickles to lobed	Few prickles	Severe prickles	Few to slight prickles	Slight prickles	Very rough prickles to lobed	Rough prickles to lobed	Slight rough prickles
Cones											
Male											
Female											
General Comments											Leaflets shorten rapidly towards base

INTERESSANTE FOTOS

Die Redakteur

Ek geniet elke uitgawe van *Encephalartos* en sien uit na elke volgende uitgawe. Ek voel egter so skuldig dat ek nooit 'n bydrae lewer nie. Hiermee dan 'n paar fotos wat ander versamelaars hopelik interessant sal vind.

Encephalartos fossiel?

Hierdie fossiel klip het ek by iemand raakgeloop. Hy beweer dat hy die fossiel gevind het bo-op die Lebombo berge naby Komatipoort. Ek het êrens gelees dat daar nie 'n fossiel van die genus *Encephalartos* bestaan nie. Wat is hierdie? (Figuur 11 en 12, bladsy 28) Wat my verwonder is hoe op aarde hout in klip verander. Is daar dalk 'n kundige wat ons kan vertel hoe hierdie proses plaasvind?



Figuur 1. *E. manikensis* keel

Groot *E. manikensis* keël

Ek stuur vir u fotos van 'n *E. manikensis* keel wat nogal groot is vir 'n plant wat die 1^{ste} keer keël. Soos u kan sien is hy 70cm lank.

Krulblaar *E. laevifolius*

Hierdie fotos is van 'n uitsonderlike *E. laevifolius* wat ek by iemand gekoop het. Hy is blou en die blare is gekrul soos die van *E. lanatus*. Weet iemand van watter lokaliteit dit kom?

Verskil in *E. cerinus* keëls

Fotos van vier *E. cerinus* keëls wat van vier verskillende plante afkomstig is. Ek verstaan dat die manlike keëls 'n deurslaggewende rol speel by die bepaling van spesies. Kyk hoe verskil die keëls (Figuur 10, bl. 28).



Figuur 2. Krulblaar *E. laevifolius*



Figuur 3. *E. nubimontanus*

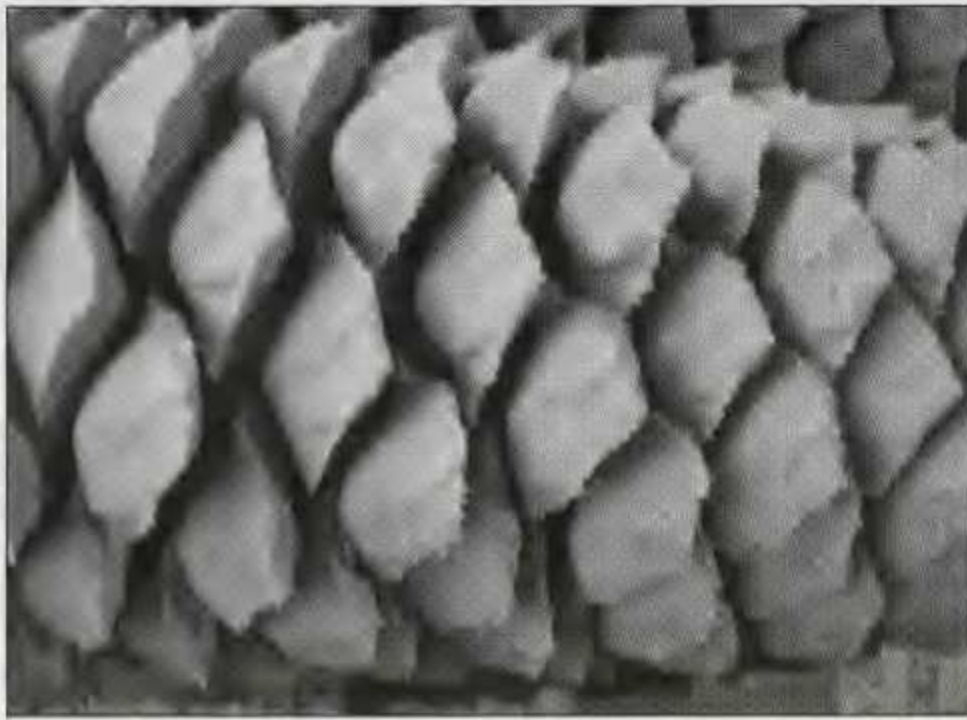
Reuse "cupidus"?

Ons weet almal van die bestaan van die verskillende vorme van *E. nubimontanus*. Hierdie is vir my 'n besondere mooi vorm. Sou dit die een wees waarna verwys word as die reuse "Cupidus"?

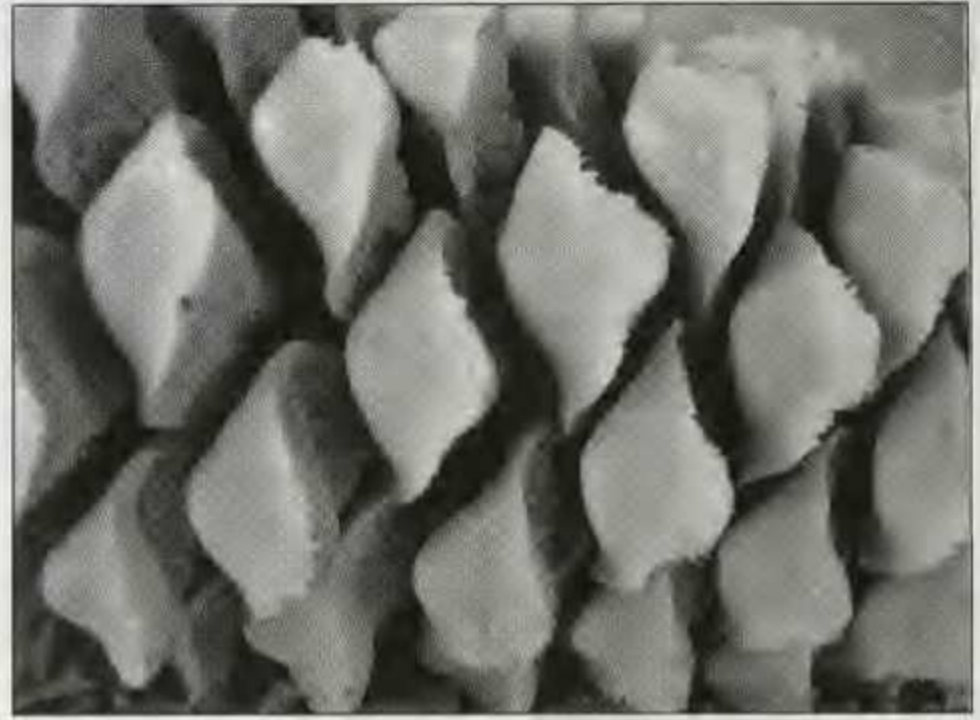
Mnr. Roelof van Wyk

Mooinooi.

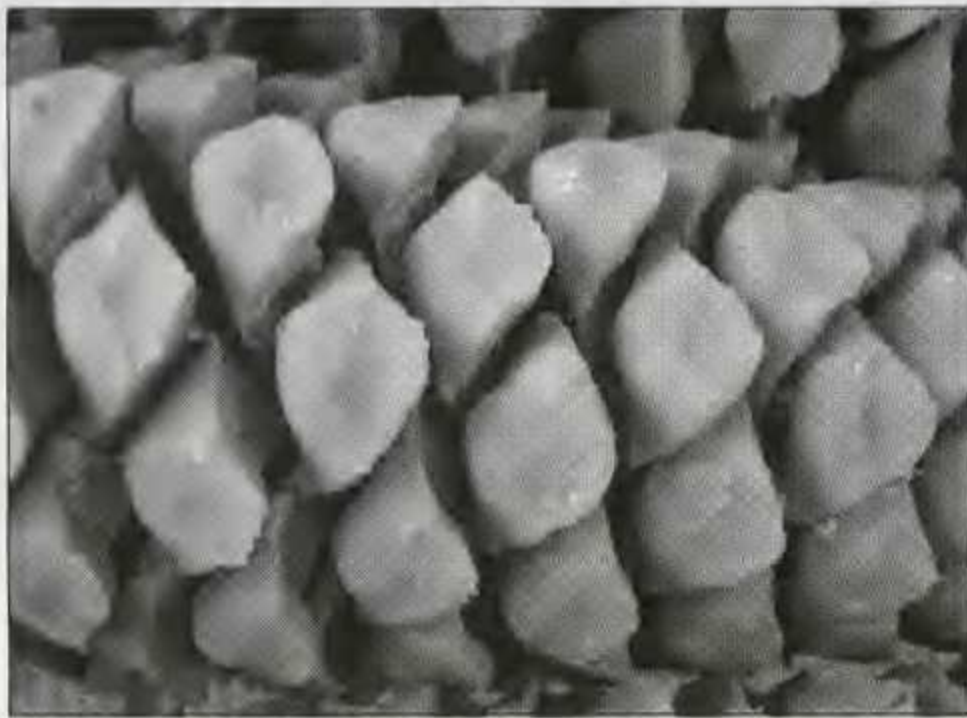
Ontvang 7-Maart 2004



Figuur 4. *E. cerinus*, keel 1



Figuur 6. *E. cerinus*, keel 3



Figuur 5. *E. cerinus*, keel 2



Figuur 7. *E. cerinus* keel 4

NEW TERMINOLOGY

Dear Sirs,

In the December 2003 edition of *Encephalartos*, I see that Nat Grobbelaar has suggested new terminology to overcome some ambiguity in describing locations on plants structures. However, I think some existing terms widely used in pteridology do suffice to overcome these difficulties. As defined in Lellinger, 2002, these are:

Acroscopic: facing or directed towards the apex of the axis on which the structure is borne.

Basisopic: facing or directed towards the base of the axis on which the structure is borne.

Reference: Lellinger, DAVID, B., 2002 A Modern Multilingual Glossary for Taxonomic Pteridology. American Fern Society. ISBN 0-933500-02-5

R. Graham Ackers

Deersbrook, Horsham Road, Walliswood, Dorking, Surrey RH5 5RL, UK

Received 4 April 2004

HONDURAS CYCAD EXPEDITION

I am pleased to announce that the 150+ page final report on my 2003 Honduras cycad expedition is now being made available to cycad researchers, enthusiasts, hobbyists, and growers. For a minimum donation of US\$35 (plus US\$7.00 S/H) to Montgomery Botanical

Center's Cycad Program, you will receive a signed copy of this comprehensive report on CD-ROM. The report details the results of the most extensive botanical expedition ever conducted on Honduras's unique cycad flora, and includes the following:

- A day-by-day synopsis of the activities of the expedition group;
- A summary of the cycad (and palm) populations visited (including two undescribed *Zamia* species and one undescribed *Ceratozamia*);
- Maps of the cycad populations visited;
- Information on insects associated with Honduran cycads;
- A detailed discussion of the cultural and historical geography of Honduran cycads;
- A discussion of the conservation status and recommendations for Honduran cycads;
- An outline of future work that needs to be conducted on Honduras' unique cycad flora;
- Numerous figures, photos, and data tables; and
- A report from noted Honduran botanist, Dr. Cyril Hardy Nelson-Sutherland, on his MBC-sponsored excursion to western Honduras in search of the "tree" cycad, *Dioon mejiae*.

If you are interested in your very own copy of this first-of-a-kind report, please print and complete the attached contribution form and mail it, along with your check or money order for US\$42.00 made out to Montgomery Botanical Center, to the address listed below. Note: Any donations exceeding the value of the CD are tax deductible (and would be greatly appreciated!).

Please feel free to forward this e-mail and/or the attached contribution form to anyone you know who might be interested.

If you have any questions about the report or if you would like to learn more about MBC's Cycad Program, please feel free to write me at jodyhaynes@bellsouth.net or call me at 305-667-3800 x27.

Kindest regards,

Jody Haynes

Cycad Biologist

Montgomery Botanical Center

11901 Old Cutler Road

Miami, FL, 33156-4242, U.S.A.

<http://www.MontgomeryBotanical.org>

Received 4 April 2004

COMMENTS FROM NATURE CONSERVATION, WESTERN CAPE

Dear Mr. Van Eeden

Piet Vorster has asked me to make comment to you concerning the Western Cape Province's administration fee for all applications of R50, as mentioned in his editorial in the March 2004 issue of "Encephalartos".

Attached hereto please find information on the fees charged by Cape Nature Conservation for permit applications, as well as an info flyer, which went out last month concerning certain new and increased tariffs. Below is also the websites that provide additional information on our tariffs and permits. **[Anyone interested can request the flyer from me. Ed.]**

<http://www.capenature.org.za/permits/html/flora.html#endangered>

http://www.capenature.org.za/what_is_new/2003/html/adminfees.html

<http://www.capenature.org.za/permits/html/payment.html>

We have in fact been charging an administration fee for pretty much all permit applications since 1 April 2003, which includes all endangered flora (cycad) applications. The fact that something is or isn't indigenous to the Province has nothing to do with the fee.

If there's any further comment required, please don't hesitate to contact me anytime.

Regards,

Deon L. Hignett

Fauna, Flora, CITES & Hunting

Western Cape Nature Conservation Board

Private Bag X100, Cape Town, South Africa 8000

The Western Cape Nature Conservation Board (WCNCB) will be adjusting its administration and license tariffs this year. Some services that were free, will remain so, while others that were free in the past will now be charged for; some services will cost you the same as in previous years, while the cost of other services will increase. Coming out to do inspections, where appropriate, is now included in the administration fee for a permit payable by customers.

It is WCNCB's intention that the permit/license administration tariffs are equitable and easily administered, and are in keeping with our conservation objectives. Organisations that frequently need permits can apply for a concessionary annual payment of R1000.00, while activities in respect of conservation objectives will remain free of charge.

The following guiding principles explain how the tariff structure was developed:

- In the **administration tariff** for a particular permit/license is included an **inspection tariff** where applicable. We trust that this will encourage clients to organise their affairs in such a way that inspections can be expedited.
- It is envisaged that the tariff structure will **discourage** those activities that **do not** contribute to our conservation objectives e.g. keeping wild animals in captivity.
- The **tariff structure** applies to those permits/licenses where the **utilization of wild animals or plants** may benefit the applicant financially, or where wild animals are kept as pets. For instance, in the case of the captivity of a wild animal such as an indigenous or exotic snake.
- **Administration tariffs** will be applied **even though a relevant permit and/or license has been declined.**
- **No administration tariffs** will be applicable for **advisory conservation services** that benefit conservation and which have extension or **environmental education value**, such as providing landowners with information pertaining to minimising crop losses due to wild animals.
- **No administration tariff** will be applicable to **registrations. (Except Pure Bontebok Herd registrations and certification - this time-consuming registration and certification has immediate and significant financial benefit for the applicant.)**
- **No administration tariffs** will be applicable to **research applications and registered rehabilitation and captive breeding centres that do not exhibit their animals to the public for commercial gain.**

The administration tariff structure for permits, subject to the above guidelines, will be as follows: **A minimum administration fee of R50 (incl. VAT) per permit.**

Permit renewals: A minimum administration tariff of R50.00 will apply.

For further information contact (021) 483-3585/3586.

[About Us](#) | [Nature Reserves](#) | [Info & Education](#) | [Biodiversity](#)

Certificate of registration as a grower and permit to sell endangered flora

Cost: Certificate of Registration is free. The cost for the relevant permit is R50 (administration fee)

Where to apply: Head Office of Cape Nature Conservation or any regional office

Processing time: One to several months

Contact numbers:

(021) 483-3539/2651/3170/3588/3733
or email dkleinha@pgwc.gov.za, zking@pgwc.gov.za,
dhignett@pgwc.gov.za, ephiland@pgwc.gov.za or
vmalamba@pgwc.gov.za

Validity period: Permits are valid for one year from date of issue

Why must I have a permit?

In terms of section 62 of the Ordinance no person shall, without a permit, sell any endangered flora **that has been cultivated by that person** without that person, firstly, being registered as a grower of such species of endangered flora and, secondly, that person

receiving a permit to sell such endangered flora.

No permit is required to purchase, receive as a donation, transport or be in possession of any endangered flora that has been sold or donated by a registered grower/seller of endangered flora, as a receipt or similar such written document will suffice.

Kindly take note that a receipt or similar such written document does not permit the export of any endangered flora from the Western Cape Province and a separate permit must be applied for, to export any such endangered flora from the Province.

It is important to note that, with regard to Cycads, such annual permits to sell endangered flora are applicable only to plants classified as "seedlings".

Cycad seedlings are any species of Cycad with a stem diameter less than 15 centimetres, other than the following species: *Encephalartos caffer*, *E. cerinus*, *E. cupidus*, *E. humilis*, *E. ngoyanis* and *E. umbeluziensis*, where any plant with a stem diameter less than 7 centimetres is regarded as a seedling.

Any plant with a stem diameter greater than 15 centimetres (or 7 centimetres for the fore-mentioned six species) is classified as an "adult plant" and to sell, buy, donate etc. any such plant that is legally in one's possession requires the prior acquisition of an "Endangered Flora Permit" as mentioned below.

Endangered Flora Permit

Cost: R50 admin fee

Where to apply: Head Office or any regional office

Processing time: One to several weeks, depending on the nature of the application, ie species, amount and origin

Contact numbers:

(021) 483-3539/2651/3170/3588/3733
or email dkleinha@pgwc.gov.za, zking@pgwc.gov.za,
dhignett@pgwc.gov.za, ephiland@pgwc.gov.za or
vmalamba@pgwc.gov.za

Validity period: For transport usually one month; for possession three years

Why must I have a permit?

In terms of section 62 of the Ordinance no person shall without a permit be in possession of, sell, buy, donate, receive as a donation, pick or import into, export from or transport in or through the Western Cape any endangered flora.

Permit to pick flora

Cost: R50 admin fee

This permit is free to scientific based research collections.

Where to apply: Head Office of Cape Nature Conservation or any regional office

Processing time: One to several months

Contact numbers:

(021) 483-3539/2651/3170/3588/3733
or email dkleinha@pgwc.gov.za, zking@pgwc.gov.za,
dhignett@pgwc.gov.za, ephiland@pgwc.gov.za or
vmalamba@pgwc.gov.za

Validity period: Permits are usually valid for one year from date of issue but may be issued for longer periods upon well motivated request

Why must I have a permit?

In terms of section 63 of the Ordinance no person shall, without a permit, pick any endangered or protected flora from property that he or she is not the owner of, without a permit.

In addition, no person may pick any flora on a public road or on the land on either side of such road within a distance of ninety metres from the centre of such road, without a permit. In addition to a permit, to pick any flora from property that one is not the owner of, that

property owner must grant his permission **in writing** to the permit holder allowing him to pick the species of flora mentioned on the permit.
Scientists or researchers wishing to collect flora specimens must also apply for such a permit.

Certificate of registration as a grower or seller and licence to sell protected flora

Cost:

- * Registered grower: R200 (licence valid for one year)
- * Registered seller: R600 (licence valid for three years)

Where to apply: Head Office of Cape Nature Conservation or any regional office

Processing time: One to several months

Contact numbers:

(021) 483-3539/2651/3170/3588/3733
or email dkleinha@pgwc.gov.za, zking@pgwc.gov.za,
dhignett@pgwc.gov.za, ephiland@pgwc.gov.za or
vmalamba@pgwc.gov.za

Validity period:

Registered grower: licence valid for one year from date of payment
Registered seller: licence valid for three years from date of payment

Why must I have a permit?

In terms of section 65 of the Ordinance no person may sell protected flora without the prior registration of that person as a flora grower or seller and the acquisition of the appropriate licence to sell protected flora.

* The same application, registration and licence system applies to those that grow and sell artificially propagated / cultivate protected flora except that licences for such operations are issued free of charge.

Flora export/import

Cost: R50 admin fee, and "Express Service" fee payable for applications made to the CNC Head Office

Where to apply: Head Office of Cape Nature Conservation or any regional office

Processing time: One week

Contact numbers:

(021) 483-3539/2651/3170/3588/3733
or email dkleinha@pgwc.gov.za, zking@pgwc.gov.za,
dhignett@pgwc.gov.za, ephiland@pgwc.gov.za or
vmalamba@pgwc.gov.za

Validity period: Permits are valid for one month from date of issue but may be issued for longer periods upon well motivated request

Why must I have a permit?

In terms of section 70 of the Ordinance no person may export any flora from the Western Cape Province or import any protected flora specified in CITES Appendix II into the Province without a permit.

Contact:

Deon Hignett
(021) 483-3539

dhignett@pawc.wcape.gov.za

Payment and banking details for administration, licence and permit fees

- Please take note of the codes in Column 2 of the attached table to be used whenever direct payments (i.e. bank deposit or internet transfer) are made.
- The correct code must be reflected whenever a direct deposit or internet transfer is made into the Western Cape Nature Conservation Board's bank account using the following format example (using the code applicable to that application, permit or licence).
Reference: HO18 / 42210 Depositors Details (i.e. your full name, company etc.)

- Payment may be made by depositing the relevant amount into our bank account, and faving or producing the proof of payment (i.e. stamped deposit slip, internet banking confirmation etc.) on application.

PLEASE TAKE NOTE THAT APPLICATIONS NOT ACCOMPANIED BY A PROOF OF PAYMENT CANNOT BE PROCESSED.

Banking details:

Western Cape Nature Conservation Board
ABSA Bank
Current Account
Branch Code: 632005
Account number: 4055113644

Please take note that the following fees have increased as from 1 April 2004:

- Professional Hunter from R110 per permit to **R200** per permit
- Hunting Outfitter from R570 per permit to **R600** per permit
- Director of a Professional Hunting School, **R1000** per permit (new tariff)
- CITES: from R250 per permit and R5000 per annum to **R300** per permit and R6000 per annum. In addition, non-CITES letters from R50 per letter to **R100** per letter
- Certificate of Adequate Enclosure from R50 per permit to **R500** per permit (valid for three years)
- To invigilate over the writing of and / or to mark professional hunter exams: **R100** per examination or exam marked

Please take note of the following new fees as from 1 April 2004:

- Should a client desire an "express service" for any application processed solely by Head Office, an additional surcharge of the same value of that permit / application will be levied. All "express service" applications will enjoy priority attention.
- All applications that have to do with commercial filming will carry an additional surcharge of **R500**, over and above the existing fee.

Should you have any queries please contact Cape Nature Conservation's permit office at: 021 483 2651 / 3170 / 3588 / 3733 or fax at: 021 483 4158.

WCNCB hopes to continue a happy relationship with our clients and is committed to better service delivery.

FLORA			
• Licence to sell protected flora if registered as a seller only	HO18 / 42110	R600.00 valid for 3 years	None
• Licence to sell protected flora if registered as a grower only	HO18 / 42110	R200.00 valid for year	None
• #Protected flora: Export and import permit – Express service fee payable	HO18 / 46350	R50.00 administration fee per application (permit valid for 1 month) or R1000 (permit valid for 1 year)	*For administration fees, businesses/traders may register with WCNCB at a once-off payment of R1000.00 per annum (VAT included). Once registered, all applications received during the validity period of such registration will be processed free of administration charge. Please note that this registration does not include permit replacement/reissues, filming and express service applications (see below). A fee concession may also be considered in respect of applications received from recognised research institutions or projects, and in respect of conservation programs that are not conducted for commercial gain.
• *Endangered flora (e.g. Cycad): Permit for possession, transport, import, export, buy, sell, donate, receive as a donation etc. of endangered flora	HO18 / 46350	R50.00 administration fee per application	
• *Registration fee per dealer per annum	HO18 / 46350	R1000 per annum	

#CITES			
• #CITES permit / certificate – Express service fee payable	HO18 / 42210	R300 administration fee per application	Businesses/traders may register with WCNCB at a once-off payment of R6000.00 per annum (VAT included). Once registered, all CITES applications received during the validity period of such registration will be processed free of charge. Please note that this registration does not include permit replacement/reissues, filming and express service applications (see below). A fee concession may also be considered in respect of applications received from recognised research institutions or projects, and in respect of conservation programs that are not conducted for commercial gain.
• #Non-CITES letter – Express service fee payable	HO18 / 42210	R100 administration fee per application	
• CITES registration fee per dealer per annum	HO18 / 42210	R6000 per annum	

FAUNA, FLORA AND CITES			
• #For URGENT applications an additional administration fee for express service is levied. Such applications will enjoy priority attention. PLEASE NOTE THAT THIS SERVICE IS APPLICABLE TO APPLICATIONS THAT ARE SUBMITTED TO AND PROCESSED BY CNC'S HEAD OFFICE ONLY.	Same code as permit applied for	Additional fee to the same value of permit / certificate / licence / administration fee	None
• Additional administration fee (surcharge) for applications involving #mrig	Same code as permit applied for	R500 / application	None

Contact:

Deon Hignett (021) 483-3539

dhignett@pgwc.wcape.gov.za