ENCEPHALARTOS

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ENCEPHALARTOS

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COVER / VOORBLAD : ***Encephalartos transvenosus*** **in habitat at Modjadji Reserve. This site has approximately 15 000 plants and seed is collected for use at the nearby nursery where the public can purchase seedlings.**

Photo / Foto: Pieter van der Walt

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FROM THE EDITOR

VAN DIE REDAKTEUR

For this issue I had very little to do and it is just as well. I had traveled to Malawi for 3 weeks, via Botswana and Zambia and back through Mozambique. Unfortunately very few cycads were spotted and the ones I did get to see were in gardens. I came across five very handsome plants (4 meter stems, more or less) at Nkhoma and was told they were planted there more than 50 years ago. They were brought from Tanzania at the time and I naturally thought it is *E. hildebrandtii* but it may be just *E. gratus* that has traveled a bit, with the help of man, to confuse future paleontologists when they find its fossil few million years from now. Can anyone identify it from the photo? (Colour Figure 12, 13)

We saw giant Boabab trees (*Adansonia digitata)* in Zambia, at lake Malawi and in northern Mozambique and a very attractive, branched *Cussonia spicata* with blue-green leaves on Nkhoma Mountain. The trees of Africa are magnificent but due to pressure from the growing population for charcoal, most of the trees have been cut down and burned. From the top of the mountain numerous smoke columns can be seen where people were making charcoal to sell at the local market. Handcrafts also take its toll and African Blackwood trees cut for that purpose, which I saw, was less than 30cm in diameter. Even the roots are dug up and used to carve souvenirs from. The cost of the wood in South Africa is currently R450 000/m3 but north of our borders you can buy a handsome set of table lamps for a mere R100! These trees are slow growers and one can only hope that something is done in time to save them from being entirely wiped out.

The north of Mozambique is dotted with granite domes and covered by trees and grass 2m tall, as far as you can see. There may very well be more *Encephalartos* species hiding there. At Inhambane in Mozambique, I saw a good number of *E. ferox* specimens and they all had handsome stems but the leaves were compact and the pinnae narrow. They are not as spectacular as the so-called "Kosi Bay" *E. ferox* with the very broad pinnae.

This edition of *ENCEPHALARTOS* is, regrettably, a lot thinner than the previous one because contributions were few. I have to point out that *ENCEPHALARTOS* can only be as good as the articles contributed by members of the society. We cannot expect a handful of people to write 30+ pages for every issue. Also, do not underestimate the value of your observation, question or idea for the journal, even if it is very short. This is your invitation to become a published author and your chance to tell me what you would like to see. One request I did get was for a "Beginner's Guide to Growing Cycads". If your are new to cycads and would like to know more, make sure you get the next few issues. We'll look at soil, water, light and nutrient requirements, propagation and pollination, suitability of the different species to different climates and a lot more. On our website is also information on cycad books currently in print. If you are considering buying one, it may make the decision a bit easier for you.

This edition has an article on the reserve at Modjadji by Pieter and Celeste van der Walt. It is indeed a spectacular sight to see a population of *Encephalartos* like this, in the wild. If you visit a population in a reserve, please write about it and share it with us. Seeing plants in habitat is becoming difficult and soon we may not have much left to go and see.

WvE

Wynand van Eeden

FROM THE PRESIDENT

VAN DIE PRESIDENT

This issue is noteworthy for its modest stature, and probably it will become a collector's and conversation piece in years to come. Why is it so slim? Because you, the members of this society, neglected to send in material.

ENCEPHALARTOS is not a commercial magazine of the type which one buys at your newsstand, and produced by a team of journalists who scour the country in search of material for articles to entertain their readers. Instead it is the newsletter of our Society; and its purpose is to establish communication between members, and to provide a forum for readers to tell what happens to them and their plants, whether good or bad. It enables us to report our problems and hopefully to get answers to our questions. It also enables us to report on our successes, to the benefit of the whole cycad community. When some of us are fortunate enough to travel to places where wild cycads grow, we should tell about it in the pages of *ENCEPHALARTOS*. In this issue Pieter and Celeste van der Walt tell us about their visit to Modjadje where thousands upon thousands of *Encephalartos transvenosus* grow together in a veritable cycad forest. A pilgrimage to Modjadje is a must for anyone interested in cycads. Other important places are our botanical gardens, which belong to the nation and where our national botanical heritage is preserved or should be preserved, within easy access. Regular reports on such gardens are of inesteemable value to people who don't live close to such gardens. On page 16 Manie Maritz reports on the shocking deterioration of the collection at the National Botanical Garden in Pretoria. Hitherto this has been one of the most important collections of *Encephalartos*, because, it was built up by Dr. R.A. Dyer, who laid the foundations of our present knowledge of *Encephalartos*. Then there are the regional meetings and outings. Earlier tonight Morne Ferreira was telling me about the enjoyable and informative outing which the Gauteng Regional Branch had undertaken to Nelspruit over the August long weekend, and I wished I could have joined them. Some of us are going to try and attend the conference in Mexico, and certainly we will report in *ENCEPHALARTOS*. In short, *ENCEPHALARTOS* is your comunication medium, and it is you who come short if you dont make full use of it.

When one joins a society, what matters is not what one gets out of it, but what one can contribute. Therefore it breaks my heart when I hear of someone "joining *ENCEPHALARTOS* ". *ENCEPHALARTOS* is very important in our Society, but there is much more. Do get involved with the Society, attend activities, and share your knowledge and seeds with other members.

Piet Vorster

Piet Vorster

Hierdie uitgawe is merkwaardig omdat hy so dun is, en waarskynlik sal dit 'n versamelaarsitem word waaroor daar in latere jare nog gepraat sal word. Waarom is hy so dun? Omdat u, die lede van hierdie vereniging, nie materiaal ingestuur het nie.

ENCEPHALARTOS is nie 'n handelstydskrif met 'n span joernaliste wat die land deurkruis op soek na artikel-materiaal wat die lesers kan vermaak nie. Dit is die nuusbrief van ons Vereniging, wat ten doel het om lede met mekaar in aanraking te bring, en waarin die lede vertel van wat met hulle en hulle plante gebeur het, ten goede en ten kwade. Dit stel ons in staat om ons probleme te rapporteer en om hopelik antwoorde op ons vrae te kry. Dit stel ons ook in staat om oor ons suksesse te berig, tot voordeel van die hele broodboomgemeenskap. As party van ons so gelukkig is om te kan reis na plekke waar wilde broodbome groei, behoort ons in *ENCEPHALARTOS* daarvan te vertel. In hierdie uitgawe vertel Pieter en Celeste van der Walt van hulle besoek aan Modjadje waar daar derduisende plante van *Encephalartos transvenosus* bymekaar groei. 'n Pelgrimstog hierheen is 'n moet vir elkeen vir wie broodbome na aan die hart lê. Verder is daar ons botaniese tuine, wat aan die nasie behoort en waar ons volkserfenis aan plante bewaar word of bewaar behoort te word. Gereëlde verslae oor sulke tuine is van onskatbare waarde vir mense wat nie naby sulke tuine woon nie. Op bladsy 16 berig Manie Maritz oor die skokkende agteruitgang van die versameling by die Nasionale Botaniese Tuin in Pretoria. Tot dusver was dit een van die belangrikste versamelings van *Encephalartos*, want dit is opgebou deur Dr. R.A. Dyer wat die basis gelê het van ons huidige kennis van *Encephalartos*. Dan is daar die streeksbyeenkomste en streeksuitstappies. Vroeër vanaand het Morne Ferreira vir my vertel van die heerlike en leersame naweekuitstappie wat die Gauteng Streeks-tak na Nelspruit onderneem het oor die Augustus-langnaweek, en ek het gewens dat ek kon saamgegaan het. 'n Paar van ons gaan probeer om die kongres in Mexico by te woon, en sekerlik sal ons kom verslag lewer in *ENCEPHALARTOS*. Kortom, dit is u kommunikasiemiddel, en u lei skade as u nie ten volle daarvan gebruik maak nie.

As mens by 'n Vereniging aansluit, gaan dit nie oor wat mens daaruit kry nie, maar oor wat mens daarin kan sit. Daarom maak dit my moedeloos om the hoor dat iemand "aansluit by *ENCEPHALARTOS*". *ENCEPHALARTOS* is baie belangrik in ons verenigingslewe, maar daar is veel meer. Raak meer betrokke by die Vereniging, woon geleenthede by, en deel u kennis en saad met ander lede.

Piet Vorster

Piet Vorster

FROM THE COUNCIL / VAN DIE RAAD

CYCAD SOCIETY OF SOUTH AFRICA: MEMBERSHIP FEES FOR 2005
BROODBOOM VERENIGING VAN SUID-ARIKA: LEDEGELD VIR 2005

Our overseas members must please note that due to exchange rates we had to adjust the membership fees for 2005. Local members are not affected. The new fees are listed on the subscription form, in brackets after the 2004 fees, in the front of the journal.

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36	100	58	219
38	45	59	160
39	35	60	123
40	190	61	52
43	142	62	213
44	130	63	54
46	267	64	118
47	190		

NEW CYCAD PUBLICATIONS

GREGORY, T.J., CHEMNICK, J., SALAS-MORALES, S. & VOVIDES, A.P. 2003. **A new species in the genus *Dioon* (Zamiaceae) from north-central Oaxaca, Mexico.** *Botanical Journal of the Linnean Society.* 141: 471-476.

[*Dioon argenteum* sp. nov. (Zamiaceae) is described from northern Oaxaca, Mexico. Flat leaves and persistently tomentose, slightly imbricate leaflets with marginal prickles characterise the species. The specific epithet argenteum was chosen to describe the silver appearance of the persistent tomentum covering the new leaves. *D. argenteum* appears to have affinities with *D. purpusii* and *D. califanoi*.]

First author's address: The Montgomery Botanical Centre, c/o 1 DNA Way, San Francisco, CA 94080-4990, USA.

HALL, J.A., WALTER, G.H., BERGSTROM, D.M. & MACHIN, P. 2004. **Pollination ecology of the Australian cycad *Lepidozamia peroffskyana* (Zamiaceae).** *Australian Journal of Botany 52: 333-343.*

[Experiments carried out to investigate the reproductive ecology of the Australian cycad *Lepidozamia peroffskyana* (Regal, Bull. Soc. Imp. Nat. Mosc. 1857, 1:184) revealed that this species is pollinated exclusively by host-specific *Tranes* weevils (Pascoe 1875). The weevils carry out their life cycle within the tissues of the male cones but also visit the female cones in large numbers. Female cones from which insects (but not wind) were excluded had a pollination rate that was essentially zero. In contrast, female cones from which wind (but not insects) were excluded had a pollination rate comparable with naturally pollinated cones. Assessment of *Tranes* weevil pollen load indicated that they are effective pollen-carriers. No other potential insect pollinators were observed on cones of *L. peroffskyana*. Sampling of airborne loads of cycad pollen indicated that wind-dispersed grains were not consistently recorded beyond a 2-meter radius surrounding pollen-shedding male cones for airborne transfer of pollen to explain observed natural rates of seed set. These multiple lines of evidence suggest that wind once considered the only pollination vector for cycads and other gymnosperms, plays only a minimal role in the pollination of *L. peroffskyana*, if any at all. The global diversity of insects associated with cycads suggest that some lineages of pollinating beetles may have been associated with cycad cones since Mesozoic times.]

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HILL, K.D., CHASE, M.W., STEVENSON, D.W., HILLS, H.G. & SCHUTZMAN, B. 2003. **The families and genera of cycads: a molecular phylogeneric analysis of Cycadophyta based on nuclear and plastid DNA sequences.** *Int. J. Plant Sci. 164(6):0933-948.*

[A phylogenetic analysis of cycad genera was conducted using sequences of plastid rbcL (coding), trnL-F (largely noncoding) regions, nuclear internal transcribed spacers (ITS), and part of the adjacent 26S rDNS gene. Trees were constructed from each region separately and a combined data set. The combined analysis yielded greater resolution but with a consensus tree that was not completely consistent with any published morphological studies or recent taxonomic classifications. The analysis supports a tree topology of (*Cycas* (*Stangeria* (*Dioon* (*Bowenia* (*Macrozamia* (*Lepidozamia*, *Encephalartos*)))), (*Ceratozamia* (*Microcycas*, *Zamia*)))). This topology implies inclusion of *Epicycas* in *Cycas* and *Chigua* in *Zamia*. *Cycas* is a distant sister to the remaining cycads, which form a coherent natural group, supporting recognition of two higher taxonomic groups.]

First author's address: Royal Botanic Gardens, Sydney, New South Wales 2000, Australia.

KLAVINS, S.D., TAYLOR, E.L., KRINGS, M. & TAYLOR, T.N. 2003. **Gymnosperm from the Middle Triassic of Antarctica: The first structurally preserved cycad pollen cone.** *Int. J. Plant. Sci. 164(6): 1007-1020.*

[The first permineralised cycad pollen cone is described from the lower Middle Triassic of Antarctica. The cone is characterised by helically arranged, wedge-shaped microsporophylls each with five or more spine like projections extending from the rhomboid distal face. The vascular cylinder is dissected and produces paired traces to each sporophyll. Three vascular bundles enter the base of the microsporophyll and divide to produce at least five vascular strands in the sporophyll lamina. Pollen sacs occur in two radial clusters near the lateral margins on the abaxial surface of the microsporophyll. Each cluster bears up to eight elongate pollen sacs that are fused for approximately half their length and display longitudinal dehiscence. Pollen sacs are sessile and attached to a vascularised, receptacle-like pad of tissue that is raised from the surface of the microsporophyll. Pollen is ovoid, psilate, and monosulcate. Although the affinities of this cone with the Cycadales are obvious, the complement of characters in the fossil is unique and thus does not permit assignment to an extant family. Features of the cone are evaluated against reproductive aspects of living cycads.]

First author's address: Department of Ecology and Evolutionary Biology, University of Kansas, Lawrence, Kansas 66045-7534, USA.

MOORE, T.C.J., WALTER, G.H., FORSTER, P.I., ROEMER, R.B., DONALDSON, J.D. & MACHIN, P.J. **Association of cone thermogenesis and volatiles with pollinator specificity in *Macrozamia* cycads.** *Plant Systematics and Evolution. 243:233-247.*

[Cone traits (volatile components and thermogenesis) of three cycad species in the genus *Macrozamia* were examined for differences related to their specific insect pollinators, the weevil, *Tranes* spp., or the thrips, *Cycadothrips chadwicki*. Linalool (>80% of emissions) dominated cone volatile components of *M. machinii* (*Tranes*-pollinated) and beta-mycrene was a minor component (<9% of emissions). Volatiles of *M. lucida* and *M. macleayi* cones (*Cycadothrips*-pollinated) were dominated by beta-mycrene (up to 97% of emissions); but no linalool was detected. Pollinator movement into and out of cones coincided with cone thermogenesis and peak odour emission: around sunset for *Tranes*, and at mid-day for *Cycadothrips*. Female cone traits were similar to those of their conspecific male cones. Differences in cone traits between *Macrozamia* species may thus be responsible for conferring pollinator specificity in areas of sympathy.]

First author's address: Department of Biology, University of Utah, Salt Lake City, USA.

RAI, H.S., O'BRIEN, H.E., REEVES, P.A., OLMSTEAD, R.G. & GRAHAM, S.W. 2003. **Inference of higher-order relationships in the cycads from a large chloroplast data set.** *Molecular Phylogenetics and Evolution. 29:350-359.*

[The authors investigated higher-order relationships in the cycads, an ancient group of seed-bearing plants, by examining a large portion of the chloroplast genome from seven species chosen to exemplify our current understanding of taxonomic diversity in the order. The regions considered span ~13.5 kb of unaligned data per taxon. And comprise a diverse range of coding sequences, introns and intergenic dispersed throughout the plastid genome. Our results provide substantial support for most of the inferred backbone of cycad phylogeny, and weak evidence that the sister-group of the cycads among living seed plants is *Ginkgo biloba*. *Cycas* (representing Cycadaceae) is the sister-group of the remaining cycads; *Dioon* is part of the next most basal split. Two of the three commonly recognised families of cycads (Zamiaceae and Stangeriaceae) are not monophyletic; *Stangeria* is embedded within Zamiaceae, close to *Zamia* and *Ceratozamia*, and not closely allied to the other genus of Stangeriaceae, *Bowenia*. In contrast to the other seed plants, cycad chloroplast genomes share two features with *Ginkgo*: a reduced rate of evolution and an elevated transition: transversion ratio. The authors demonstrate that the latter aspect of their molecular evolution is unlikely to have affected interference of cycad relationships in the context of seed-plant wide analysis.]

First author's address: Department of Biological Sciences, CW 405 Biological Science Center, University of Alberta, Edmonton, Alberta, Canada T6G 2E9.

SHARMA, I.K., JONES, D.L. & FORSTER, P.I. 2004. Genetic differentiation and phenetic relatedness among seven species of the *Macrozamia plurinervia* complex (Zamiaceae). *Biochemical Systematics and Ecology. 32:313-327.*

[Starch gel electrophoresis was employed to estimate the levels of genetic variation among seven species of the *Macrozamia plurinervia* complex (Zamiaceae) from eastern Australia. A total of 295 specimens were assayed for 11 enzyme systems coded by 17 loci. The mean number of alleles per locus (A) and proportion of polymorphic loci (P) averaged over seven species were 1.5 and 36.58%. The average observed and expected hererozygosity (H_o, H_e) were 0.08 and 0.11, respectively, which falls within the range of other *Macrozamia* species. In the case of *Macrozamia cranei* and *M. machinii*, they displayed strong genetic similarity, but were markedly different to the other five species. Among the seven species, *M. conferta* was the most and *M. fearnsidei* was the least variable. A fixed allele difference was found only in *M. fearnsidei* where locus Menadione reductase (MR2) was absent. Along with this, numbers of rare alleles were found in various species, which would facilitate distinguishing one species from another. Based on genetic identity/distance, the *Macrozamia* species were clustered into two groups. Although the taxa are undoubtedly closely related, the results reinforce current taxonomic concepts based on morphological characters.]

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SHORT COMMUNICATIONS AND ARTICLES
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Travelling to the Limpopo province late in June presented an opportunity to briefly stop over at the Modjadji Nature Reserve, close to Tzaneen. Located approximately 450km from Johannesburg, Gauteng and roughly 3.5 hours drive. Getting there is relatively easy. Take the N1 north to Polokwane (previously Pietersburg) and just before you reach Polokwane take the R71 to Tzaneen and travel in an easterly direction. On your way you will pass through rural areas and pass the City of Moria, Zion church. After you have passed the turn-off to the quant little village of Haenertsburg you will see the first road signs to the Modjadji nature reserve. Soon you will start descending into the magnificent Magoebaskloof.

A few hair raising curves calls for a sturdy hand on the wheel and not much time to look at the scenery if you are the driver! Still continuing on the R71 you will reach a T-junction where you turn left, continuing to follow the road signs to the reserve. Soon you will drive through some rural areas and be on the look out for animals and pedestrians. You are now in the Duiwelskloof area. After you have reached the Modjadji nursery on your left hand side you turn right towards the reserve. The last section winds up the hill and a few kilometres later, you will reach the top of the hill where you will be greeted by a few rondawels at the main gate of the reserve (Figures 1 and 2).

You are greeted by very friendly rangers and have to enter the office to pay your entry fees. Per motor vehicle the fee was R20, R10 per adult and R5 per child. Unfortunately there was no hiking or route maps available at the main gate.

From the main gate you travel up to the picnic area. The main road up to the gate was in a very good condition, but this is where it ended, as you have to drive slowly on the last stretch of dirt road – making the anticipation to get to the final destination even greater. As you approach the picnic area you are greeted by a few magnificent specimens of *E. transvenosus* (Colour Figure 2), making it even more exciting to see what awaits you around the next corner! There was ample parking at the picnic area and it appeared to be very clean. Walking towards the braai and picnic facilities enormous and magnificent cycads appear in front of you! Truly an unbelievable sight!

Figure 1: Entrance to Modjadji Nature Reserve.

Figure 2: Entrance to Modjadji Nature Reserve.

Figure 3: Picnic Area at Modjadji.

Passing briefly through the information centre and pass the canteen (which was closed) one could not help notice the enormity of the specimens located in the picnic area. The only map of the nature reserve we could find was in the information centre (Figure 4). This is a rough reproduction of the map and accuracy is probably 80-90%! There was also a brief history of the Modjadji Queen and a few posters on cycads in Southern Africa in general.

In the picnic area there are some excellent procumbent specimens as pictured in colour figures 3 and 6. A few specimens were in cone, both male and female. There was a female with three enormous cones. Unfortunately I only had my cell phone to use to give some comparison of the size of the cones (Colour Figure 4).

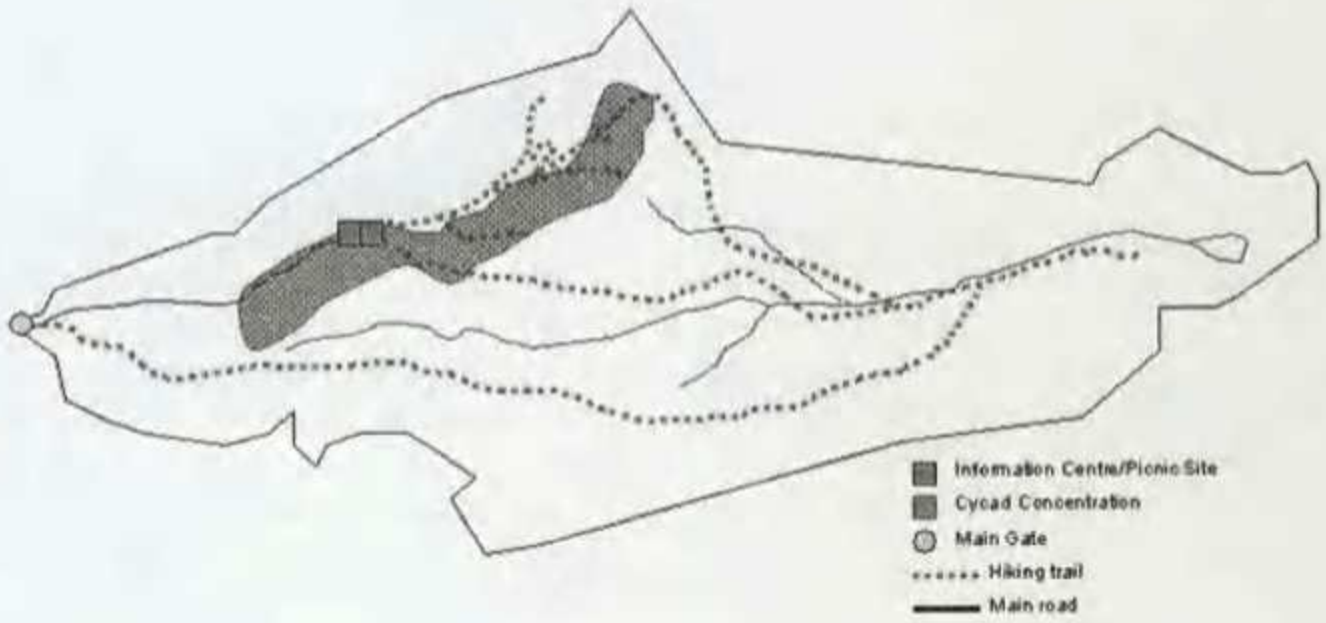


Figure 4: Map of Modjadji Reserve

Moving down from the picnic area into the actual forest one can only but be amazed by the sheer size and beauty of these plants, and wonder about the time it must have taken for specimens to grow in excess of lengths beyond 5 meters (Figure 5 and 6).

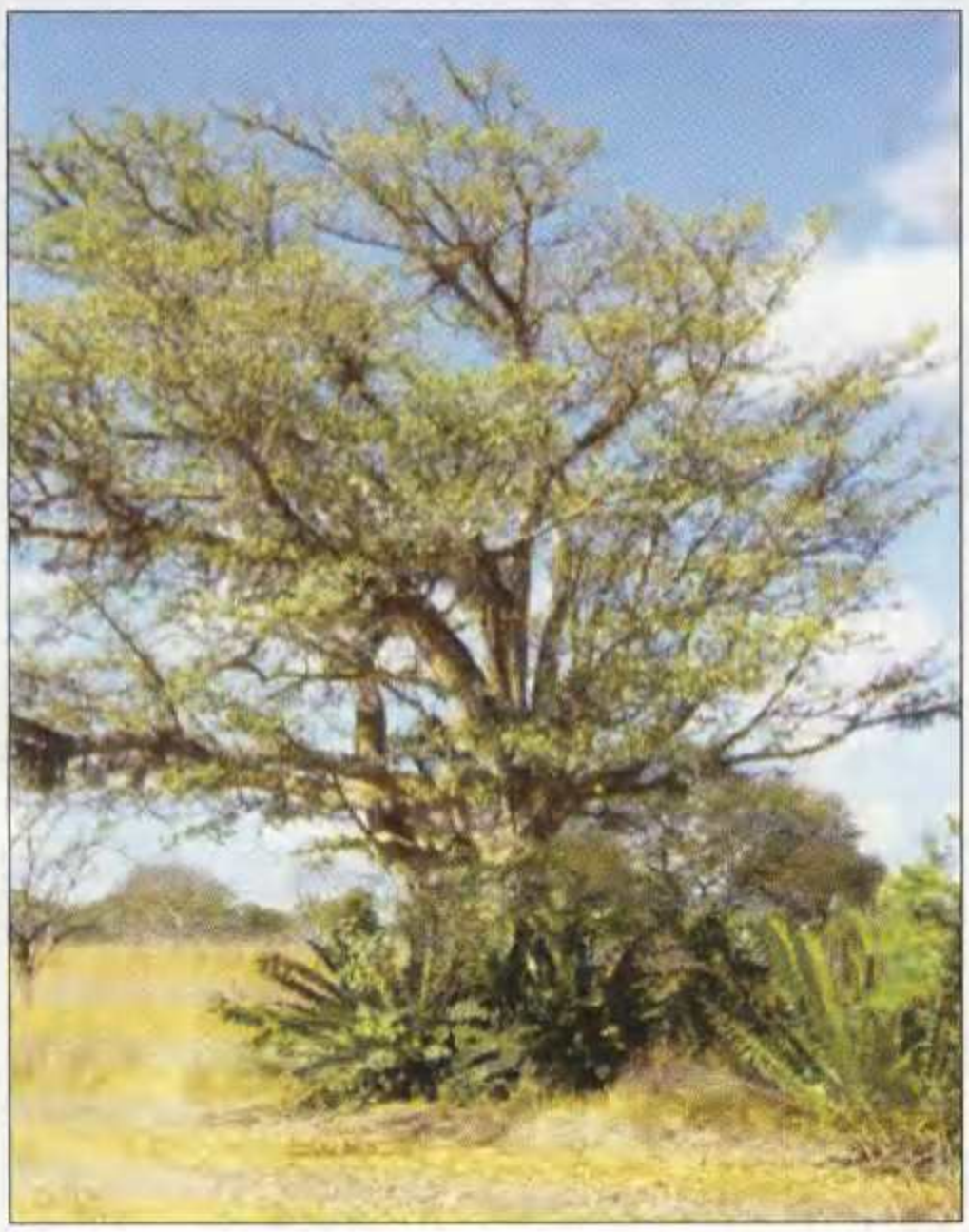
Branching is evident on larger specimens; however some do stand alone without any signs of branching either higher up or at the base of the stem.

Along the pathway there was a specimen that clearly showed the effect of the weight of the enormous trunk on the leaf base compressing almost entirely (Figure 9).

Figure 5: Tall Specimen of *E. transvenosus.*

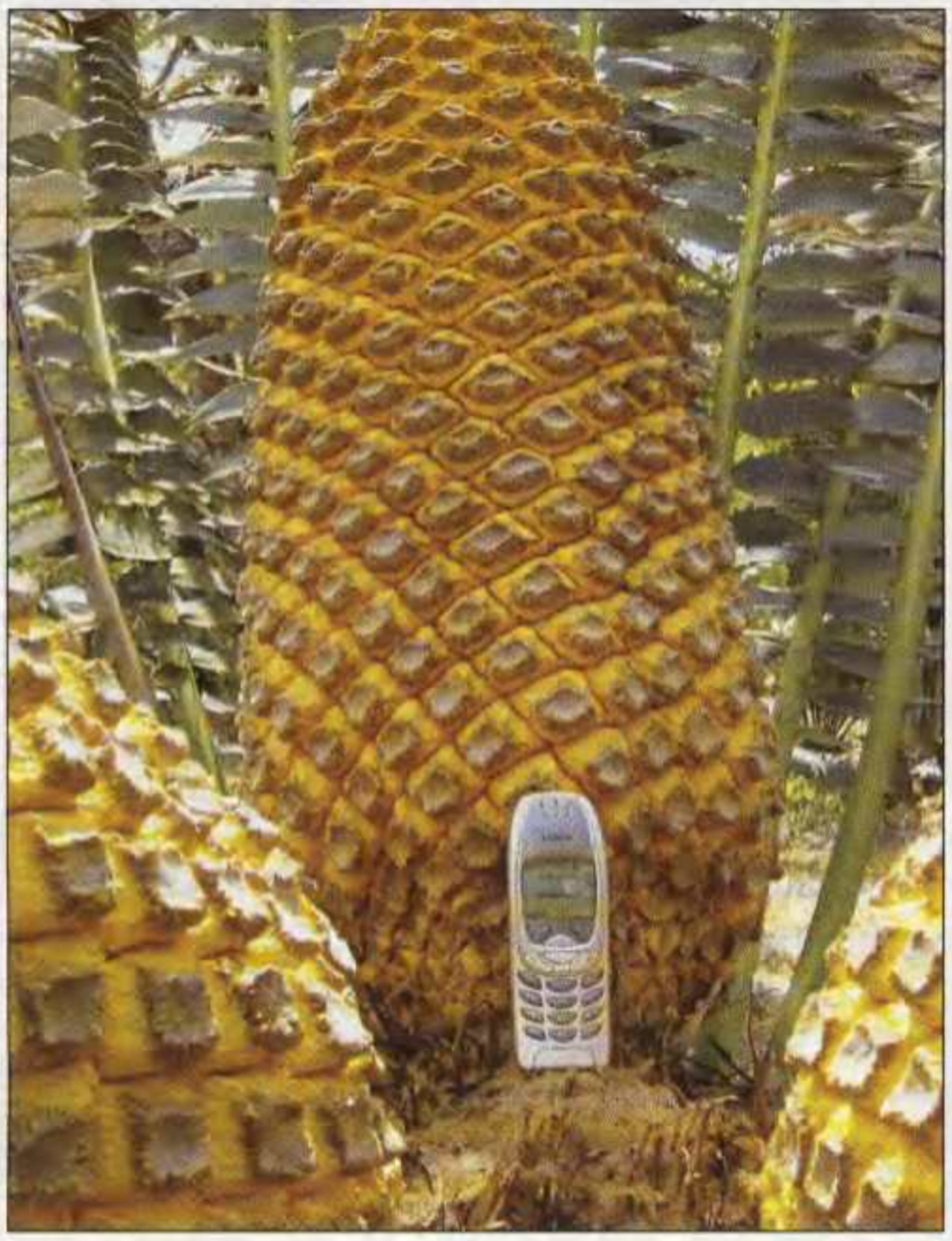
Figure 6: Tall Specimens of *E. transvenosus.*

Colour Figure 1: *E. transvenosus* **in Habitat, Modjadji. [Photo by P. van der Walt]**



Colour Figure 2: Some specimens en route to the picnic area. [Photo by Pieter van der Walt]

Colour Figure 3: A large procumbent specimen and the photographer.



Colour Figure 4: Three female cones with a cell phone for scale. [Photo by Pieter van der Walt]

Figure 5: .Male cones of a plant grown from seed picked up in the road at Modjadji , February 1972. [Photo by Piet Vorster]

Colour Figure 6: Another large procumbent specimen. [Photo by Pieter van der Walt]

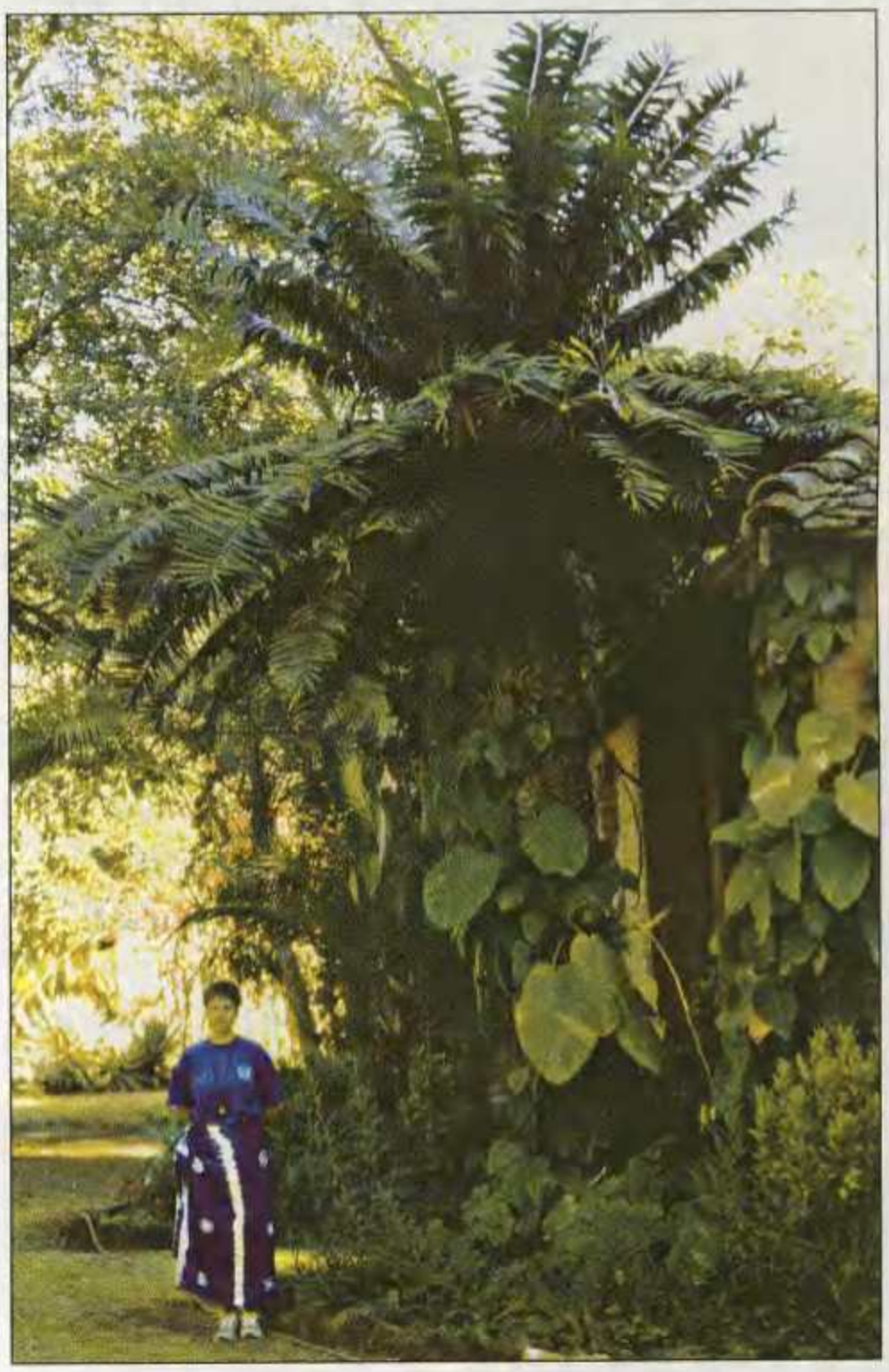
Figure 7: Modjadji Nursery. [Photo by Pieter van der Walt]

Figure 8: Modjadji Nursery. [Photo by Pieter van der Walt]

Figure 9: Disintegrating female cone of *E. transvenosus*.
[Photo by Pieter van der Walt]

Figure 10: Modjadji Habitat. [Photo by Pieter van der Walt]

Figure 11: Seedling regeneration at Modjadji.
[Photo by Pieter van der Walt]



Colour Figure 12: TC van Eeden providing scale with an unknown *Encephalartos* species at Nkhoma, Malawi.
[Photo by W van Eeden]

Colour Figure 13: Leaf detail of unknown *Encephalartos* species, Nkhoma, Malawi. [Photo by W van Eeden]

Colour Figure 14: Cone of unidentified *Encephalartos* species. [Photo from Day Smuts]

Colour Figure 15: Leaf detail of unidentified *Encephalartos* species.. [Photo from Day Smuts]

Colour Figure 16: Happy *Encephalartos inopinus* in cultivation. [Photo from Day Smuts]

Colour Figure 17: Female cones of *Encephalartos laevifolius.* [Photo by Jarred West

Figure 7: Tall branching specimen of *E. transvenosus*.

Figure 8: Specimen of *E. transvenosus* with evidence of branch forming.

Figure 9: The effect of weight on the lower part of the stem.

Clear differences could be noted between plants exposed to sunlight versus those standing underneath the forest canopy. The mid-green to olive green leaves are far less erect in the shade than those in sunlight, and also much longer. A carpet of older leaves cover most of the uncleared forest floor, and here and there seedlings emerge between the old brown leaves, making for a contrasting effect of new growing from the old.

Clear differences could be noted between plants exposed to sunlight versus those standing underneath the forest canopy. The mid-green to olive green leaves are far less erect in the shade than those in sunlight, and also much longer. A carpet of older leaves cover most of the uncleared forest floor, and here and there seedlings emerge between the old brown leaves, making for a contrasting effect of new growing from the old.

We only noticed a single cone that has broken up, with some seed lying on the ground (Colour Figure 9). It was also very clear that the flesh has been gnawed off from the seed. A small troop of Vervet monkeys (*Cercopithecus pygerythrus*) was jumping from branch to branch higher up, and one could only assume that these mammals have been involved in assisting in seed dispersal. As Grobbelaar (2003: p291) remarks in his book, these monkeys are responsible for often damaging the apex of the stem of plants when feeding on the sarcotesta of the omnules of female cones without removing the cones.

This was quite evident with some plants showing severe damage at what could only have been the apex, but fortunately new growth was also evident from the damaged areas. Other evidence of damage on larger stems was also found along the pathway.

The pathway was fairly easy to follow, even though no map was available, but we had to turn-around once we reached the bottom of the pathway, as no circular route was evident. Unfortunately, we did come across what appeared to be a rest area that was quite messy, polluted by old used cool drink cans and rubbish.

If you wanted to purchase some plants you have to pay upfront at the entrance gate and present the invoice/permit at the nursery which is situated at the turn-off. Prices for seedlings range from R20, R40 and R60 per plant. The caudex of the R40 plants was roughly the size of a tennis ball. Other plants are slightly smaller or larger. Overall the nursery appeared to be in a neat condition (Colour Figures 7, 8). Only *E. transvenosus* specimens where available at the time. Unfortunately we could not stay for long, but a revisit is certainly on the cards and I would gladly recommend any cycad enthusiast to visit this site!

Reference:

Grobbelaar, N. 2003 **Cycads – with special reference to the southern African species.** Pretoria.

[Photographs by Pieter van der Walt]

COLD HARDINESS OF CYCAS TAITUNGENSIS

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Received 18 July 2004

Cycas taitungensis C. F. Shen, K. D. Hill, C. H. Tsou & C. J. Chen is known from two populations in Ta'i-tung County, Taiwan. It grows at elevations of 400-900 m (1300 -3000 ft) in a subtropical maritime climate (Whitelock, 2002). Whitelock (2002) and Jones (2002) both mention the cold tolerance of this species. Whitelock (2002) states that C. taitungensis in southern California has survived -9.5°C without apparent damage, and Jones mentions that it survives to -9°C but does not give any location. These low temperatures are rare in southern California and do not last for long periods of time.

Norfolk is well out of the range where cycads are usually grown in the United States. Florida and southern California are two areas where cycads are commonly cultivated. The first frost in Norfolk occurs in late November and cold weather can be expected from that time until at least the middle of March or later. The average temperature in Norfolk (Table 1.) during the month of January is 15.6°C lower than in Miami, 11.7 °C colder than Tampa, 9.5°C lower than Los Angeles and 10°C below the average found in San Diego. A comparison of the average temperatures of the above four cities and Norfolk for the months of December and February show similar differences. This paper reports the survival of plants over an extended period of cold temperatures and demonstrates the cold hardiness of *C. taitungensis*.

Three small seedlings with one or two leaves were obtained in June 2002 from Mr. Michael Perry of Englewood, Florida. They were volunteers from plants growing in his garden. The seedlings were planted on the south side of the author's residence in Norfolk, Virginia (36° 52" 40' N, 76° 14" 41'W, determined by G.P.S.) approximately 0.65m from the foundation. The top of the caudices of the plants were placed about 3 cm below the surface of the soil. After planting, the plants were not given any special care other than an occasional watering the first year and an application of water-soluble fertilizer the second and third summers. The plants were mulched each winter (2002-2003 and 2003-2004) with cypress mulch to a depth of about 15 cm. No other precautions were taken to protect the plants during the winter. The leaves of all the plants survived until late December or early January.

Location:	Nov.	Dec.	Jan.	Feb.	Mar.
Florida					
Miami	23.3	21.1	20.0	20.6	22.2
Tampa	20.6	17.2	16.1	17.2	19.4
California					
Los Angeles	16.7	14.4	13.9	14.4	14.4
San Diego	16.7	14.4	14.4	15.0	15.6
Virginia					
Norfolk	11.1	6.7	4.4	5.6	9.4

Table 1. The monthly average, for a 30-year period from 1971-2000, temperatures (°C) for four cities within the area where cycads are cultivated and for Norfolk, Virginia (McGeveran, 2004).

The tissue above the mulch died, but the bases of the petioles that were covered by the mulch remained green through the winter. All three plants survived both winters, and new leaves became visible in about mid-May. No measurements have been taken to plot the growth, but all plants are healthy and appear to be growing rather slowly.

Table 2 gives the mean temperatures and the lowest temperatures for the months of the winters of 2002-2003 and 2003-2004. The coldest temperature for the two winters was -8.9°C. The mean monthly temperatures ranged from -1.2°C to 6.0°C for the winter of 2002-2003. For the winter of 2003-2004, the monthly mean temperatures ranged from -0.5°C to 9.2°C.

	2002		2003					2004		
	Nov.	Dec.	Jan.	Feb.	Mar.	Nov.	Dec.	Jan.	Feb.	Mar.
Mean Low Temp.	6.0	1.7	-1.2	0.1	6.0	9.2	1.9	-0.5	1.6	6.3
Lowest Temp for Month	-3.3	-4.4	-8.9	-3.9	0.0	0.0	-2.8	-6.1	-5.0	0.0

Table 2. Monthly mean temperatures (°C) and lowest monthly temperatures (°C) for the winters of 2002-2003 and 2003-2004 in Norfolk, Virginia, U.S.A. (Anonymous, 2004).

Daily low temperatures for the two winters were obtained (Anonymous, 2004), but are not reported here. A summary of those temperatures is presented in Table 3.

The temperature was below freezing on 34 days during the winter of 2002-2003, and below freezing temperatures occurred on 38 days during the winter of 2003-2004.

Low temperatures of below 10°C werereported for 138 days during the winter of 2002-2003 and for 133 days during the winter of 2003-2004. During the two winters, the highest low temperature was 20.6°C. This occurred on 5 November 2003.

During the winter of 2002-2003, the highest low temperature was 17.2°C. The low temperature for the day was above 15°C on three days during the first winter and nine days during the second winter.

Temperature range	Winter of 2002-2003	Winter of 2003-2004
-10°C to –4.9°C	9	2
-5°C to -0.9°C	25	36
0°C to 4.9 °C	69	59
5°C to 9.9°C	35	36
10°C to 14.9°C	10	10
15°C to 19.9°C	3	8
20°C to 24.9°C	0	1

Table 3. Number of days where daily low temperature was within a five-degree-C range (Anonymous, 2004).

The long-term survival of these plants is quite uncertain. Several questions do arise. At what low temperature will the plants survive even with defoliation? If the plants form a caudex and the caudex is protected will the plants survive the winters? If the plants produce a caudex, what is the lowest low temperature that they will survive with protection?

Cycas taitungensis has been reported to withstand short periods of temperatures to -9.5°C and can survive without damage. This paper shows that plants can survive long periods of temperatures below 10°C. Plants defoliate but produce new leaves in the spring.

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ENCEPHALARTOS NUBIMONTANUS – THE VARIOUS FORMS.

Nat Grobbelaar
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Received 8 July 2004

In the interesting paper with the same title by Phil Grobler and Diekie de Klerk in "*ENCEPHALARTOS*" number 78 of June 2004, the impression is created that each form of *E. nubimontanus* will breed true to its type. If the various forms of *E. nubimontanus* are each a representative of a whole colony with similar morphological characters, this will probably be the case. If, however, several of the forms co-existed in a single colony in the wild, then it would simply indicate that genetically the plants in the colony were very heterozygous and that they therefore will not breed true to type - they then would not qualify to be called forms in a taxonomic sense.

The problem seems to be that the colonies from whence the plants came, have in almost all cases been obliterated and that no reliable information appears to exist about whether the plants in any colonies were morphologically very similar. By using similar parents in a breeding exercise one should, however, be able to sort this out. If the offspring are morphologically quite uniform and similar to the parents then it would be acceptable to consider them a true-breeding form. If on the other hand the offspring is morphologically very variable, it would be appropriate, in a taxonomic sense, to refer to the parents as a form of the species. It therefore is gratifying to learn about the Nothern Cycad Workgroup's proposed extensive breeding project which will entail the growing of numerous seedlings to maturity under similar conditions. Many of us will look forward with keen interest to their results.

[Comments from Dr. Piet Vorster: Nat Grobbelaar raises a very actual matter, namely variation within species. This is one of the factors which make taxonomy very difficult, because so often by the time a scientist gets to study a supposed new species, its numbers have been decimated to such an extent that it becomes very difficult to collect data. It is easy to consider two very different individuals as belonging to different species, but it is quite a different story if these same two individuals are joined

by a series of intermediate specimens. *Encephalartos nubimontanus* is a point in case. This species has been systematically looted over a period o 30 years, to the point where it is impossible to assess its natural variation in terms of geographical location and breeding. Even ten years ago when I studied it, hardly any plants remained in nature.]

CYCAD 2005 - SEVENTH INTERNATIONAL CONFERENCE ON CYCAD BIOLOGY

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

Received 26 July 2004

Nine of our South African members (and many of our international members) have already signed up to attend and participate in CYCAD 2005, the Seventh International Conference on Cycad Biology, to be held in Xalapa, Mexico, over the period 9-14 January 2005.

Planning for this meeting by Andrew Vovides is in the advanced stages. Plenary speakers at the Conference will be Andrew Vovides, Dennis Stevenson and Paul Cox. About 40 regular scientific talks will be given and other presentations will be in poster format, while a dedicated workshop on the Honduras cycads, forms part of the Conference. Special interest groups will hold meetings during the evenings and one day has been set aside for a site visit to see a community-based *Dioon edule* nursery and to explore for *Ceratozamia mexicana.* If there is sufficient interest, a one week cycad-oriented post-conference sightseeing trip in Veracruz Province will be offered to delegates.

Late registrations can still be accepted. Full details are available on the Conference website at :

http://www.ecologia.edu.mx/cycad2005/

E-mail enquires can be sent to Dr Andrew Vovides:

vovidesa@ecologia.edu.mx

Roy Osborne
Conference Co-ordinator, Cycad Specialist Group

[Having been to Cycad 2002, I can recommend attending the conference. Meeting all the friendly people, like Roy, sharing their knowledge, from all over the world, is a wonderful experience. Almost certainly there will be a post-conference tour for non-scientists, a wonderful opportunity to see something of the country, its plants, and its people. It is still possible to register. Ed.]

PRESS RELASE
KRUGERSDORP MAN NABBED SMUGGLING PROTECTED PLANTS

Issued by : Gauteng Department of Agriculture, Conservation and Environment

Received 13 July 2004

Att: News Editor
For immediate use

Date Issued: 9 July 2004

Johannesburg: The work of the Special Investigation Unit of the Gauteng Department of Agriculture, Conservation and Environment (GDACE) has in the past week led to the arrest of a Krugersdorp man smuggling cycads (specially protected plants) with a street value of R85 000-00 into the Gauteng Province. The arrest took place in Krugersdorp on 10 June 2004 and a total of 57 plants were confiscated.

This major breakthrough is part of the GDACE's campaign to thwart the smuggling of wildlife and wildlife products, in particular rare and endangered species. Over the past year the Department has been able to seize smuggled consignments at a street value of nearly R1 500 000 and this not only includes cycads but also parrots, snakes, tortoises, ivory and other wildlife.

Mr. Andre Viljoen, a Krugersdorp resident, was apprehended after three days of close monitoring by GDACE officials. The suspect was charged under the transgression of Section 95 and 96 of the Nature Conservation ordinance 12 of 1983 respectively.

He pleaded guilty to all the charges, at the Krugersdorp Magistrates court, on 22 June 2004. He was sentenced to 3 months imprisonment for the transgression of Section 95 and 3 years imprisonment for the transgression of section 96, with an option of a R 45 000-00 fine for both offences.

The plants were taken to the Walter Sisulu Botanical Gardens, where they will be treated and re-planted. The cycads consisted of five different species such as;

1) Encephalartos humilus
2) Encephalartos inopinus
3) Encephalartos lanatus
4) Encephalartos villosus
5) Encephalartos altensteinii

The GDACE would like to appeal to members of the public who have information on the smuggling of wildlife and wildlife products to contact the Department's Nature Conversation Directorate on the following numbers:

Office: (011) 390-3687
Fax: (011) 390-1720
Cell: (083) 308-1366

Media Contact: Sizwe Matshikiza @ 011-355 1316 or 082 778 9996

[It seems every month people get caught for transgressing the law, including removal of plants from nature. WE get the blame, but the transgressors are not members of our Society. They definitely do not subscribe to our aims where conservation is concerned. What are we going to do about this? Ed.]

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Natuurlike Bestuiwing van *E. villosus*.

Geagte Redakteur

Ek woon in Annlin, Pretoria, en het sowat 10 jaar gelede twee jong *E. villosus* plante sowat 3-m van mekaar af in my tuin aangeplant. Hulle het verlede jaar gelyktydig gekeël en dit blyk toe dat die een 'n manlike en die ander 'n vroulike plant is. Ek het die keëls met rus gelaat totdat albei naderhand omgeval het. Die bedding waarin albei staan, het in daardie stadium heelwat grondbedekkers gehad en, eendag toe ek die bedding begin netjieser maak het, ontdek ek dat 27 van die pitte by die vroulike plant wat toe reeds afgeval het, ontkiem en plantjies begin vorm het. Die kiemlinge het verbasend vinnig groter geword en is almal al mooi sterk en gereed om verplant te word.

Ek was met Wynand van Eeden van die Vereniging (waarvan ek 'n nuwe lid is) in verbinding en hy het my meegedeel dat hy vermoed daar is die een of ander kewer in my tuin werksaam wat die bestuiwing kon bewerkstellig het.

Dit sal interressant wees om te verneem of daar enige van die ander lede van die Vereniging is wat soortgelyke ondervindings in hul tuine gehad het.

Ek besit nog al die plantjies en verneem graag van ander lede of hulle oor saailinge beskik van die *Encephalartos*-spesie wat ek nog nie in my tuin het nie en moontlik bereid is om uitruilings te maak, nl: *E. aplanatus*, *E. arenarius*, *E. cycadifolius*, *E. inopinus*, *E. laevilfolius*, *E.msinganus* en *E.trispinosus*.

Ek kan gekontak word by (012) 567 0969 of 082 448 1343 of per e-pos by hroos@absamail.co.za."

Groetnis

Hennie Roos

Ontvang 30 April 2004, e-pos

[Reply from Dr. Piet Vorster: Hennie Roos reported spontaneous pollination of *Encephalartos villosus* in his garden, where he had a male and a female plant coning together. It is practically certain that most, if not all, cycad species are pollinated exclusively by special insect species, which are associated with cycads only. In other words, the insects cannot exist without the cycads, and the cycads cannot exist without the insects. When the cycads are not in cone, these insects either live in the stems, or else rest in pupal stage in the soil underneath the plants. In almost every town in South Africa there is now a remarkably big population of cultivated cycads, and it seems as if in many cases the accompanying populations of insect pollinators are also present. It seems probably that these insects were initially introduced in the stems of intrduced plants.]

How Fossils are Formed.

Die Redakteur

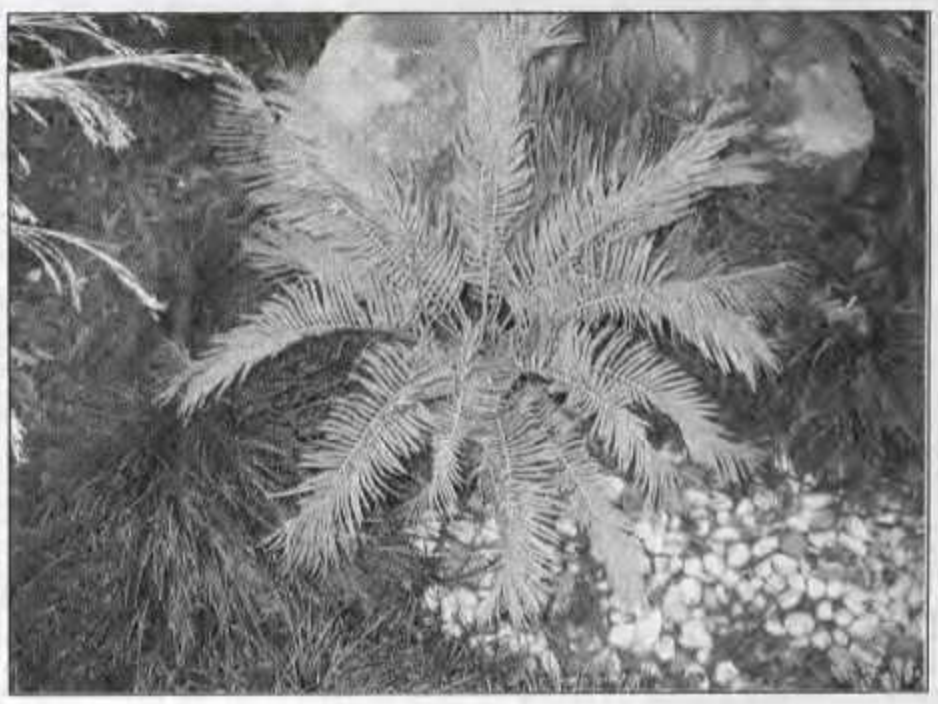
In antwoord op die vraag van hoe hout in klip kan verander (Encephalartos No 78 Junie 2004, p 33), rig ek hierdie skrywe. As 'n broodboomversameler al vir 'n klompie jare lees ek altyd graag die tydskrif en voel dat ek tog moet probeer om die vraag te beantwoord. Om die Engelse lesers te help is dit miskien goed as ek dit in Engels doen.

Palaeontology is the study of ancient life and thus deals with fossils. Fossils include all traces or remains of organisms. Generally only hard parts are preserved and then, if rapidly buried, survive. From a geological point of view fossils are useful for assigning an age to a formation and also to indicate deposition conditions. To get to plant fossils, a further distinction in palaeontology is made and one refers to palaeobotany. Plants represented in South Africa include amongst others the spermatophytes under which the cycads fall.

Fossils can be formed in two ways. Firstly the original material of the plant has not undergone a chemical change and may only be impregnated with minerals, such as silica or calcite. These minerals enter in solution from the surrounding sediments and tend to increase the hardness and weight of the fossil and this mechanism is called petrification. Alternatively chemical changes may occur in the material leading to recrystallization. This does not affect the appearance of the fossil but may totally alter the fine structure and in many cases the original material may have been entirely dissolved away, which tends to leave a space in the consolidated sediments that may become occupied by minerals from the surrounding rock - a process known as replacement.

From the photographs in *ENCEPHALARTOS* it is clear that the first mechanism was responsible in the fossil cycads to form. Under the microscope one can often see the excellent preservation of the original cellular structure which occurs as a result of silica in solution in the ground water, becoming deposited in the voids within the wood cells. In the Lebombo range (dating back some 100 million years) the predominant fossil plants were cycads, thus the nice examples shown in Encephalartos.

Ek hoop hierdie verklaring los Roelof van Wyk so problem rondom die fossiel broodboom op.



Ingesluit ook 'n foto van my *E humilis* wat die afgelope 20 jaar of so in my tuin in Potchefstroom staan. Ek het die plant by 'n vriend gekry nadat hy na die tehuis vir bejaardes moes verhuis. Die plant was ongeveer 30 jaar in sy besit. In 2003 is vyf suiers verwyder wat André Cilliers (wat die artikel oor die wortelgroei geskryf het) en Kenne de Kock gekry het. Die plant het nog nooit keëls gemaak nie hoewel dit nog elke jaar nuwe blare stoot. Ek dink dis 'n mooi voorbeeld van 'n humilis-plant met 'n stamhoogte van ongeveer 30 cm en deursnee op die dikste gedeelte ongeveer 11 cm.

Vriendelike groete

Prof F B Waanders
Direkteur Skool vir Chemiese en Mineraalingenieusrwese

Ontvang 4 Julie 2004, e-pos

Boek deur Nat Grobbelaar.

Geagte Leser

As jy nie voorheen passievol was oor broodbome nie, kan Prof Nat Grobbelaar se boek dit alles verander. Elke oomblik wat ek deur die boek geblaai het was vir my 'n ongelooflike ondervinding. Die boek is propvol waardevolle inligting wat selfs 'n leek soos 'n expert laat voel. Elke aspek van hierdie boek het my beïndruk: die stofomslag, die foto's, die papier waarop dit gedruk is en, natuurlik, die wetenskaplike inligting wat daarin opgesluit lê. Prof Nat, ek kan sien dat jou liefde vir, en kennis van

broodbome, opgesluit lê in hierdie boek, en ek en Wirna sê graag vir jou hoe ons die kennis wat jy met ons gedeel het waardeer. Ons waardeer ook dat jy so vryelik jou kennis met ons deel wanneer ons by jou kuier op jou plaas.

Vir alle ware en potensiële broodboom-entoesiaste: as jy nie dié boek het nie, het jy nog nie genoeg inligting nie. Maak 'n plan!

Groete

Ruan en Wirna Harris

Ontvang 6 Julie 2004, e-pos

Cycad Hybrids

Wynand,

I refer to your interesting 'from the editor' in Encephalartos No.78 regarding Isabella Claassen's hybrids. Here in New Zealand, *Encephalartos* grow very slowly, so naturally people here would be interested in more information on hybrids.

Has any of the work Isabella Claassen has done been reported in *ENCEPHALARTOS* before? It may be a good topic for a future edition. It would be particularly useful to know which species have been crossed most successfully and also whether hybrid seeds are covered by CITES.

Looking forward to your reply.

John Lok
Dargaville
New Zealand
President New Zealand Palm and Cycad Society

Received 16 July 2004, e-mail

Views on Botanical Gardens.

Dear Sir

I note in the article "From the President" in the June/July 2004 issue of *ENCEPHALARTOS* that *Encephalartos brevifoliolatus* is now extinct in nature. He states that this species is simply too valuable to be in private hands, given the fleeting lifespan of private collections and he proposed that material should at least have been deposited in a national collection such as Kirstenbosch or the Lowveld Botanic Garden. Fortunately he has not included Pretoria Botanic Gardens in his list as they are the last place where valuable plants should be brought to.

A few years back I regularly visited the Pretoria Botanical Gardens and I have taken many photos of their cycads. At that stage one could see that there was life in the cycad section as new plants were planted regularly and existing plants were looked after. Since then I noticed a gradual decline in the state of the cycad section of the garden. Leaves are covered with plant lice, dried out male cones remain on the plants, plants of scarce species appear to have died and many plants have dissappeared. During a recent visit I was so disgusted that I left barely ten minutes after entering the gardens and rather went to the Witwatersrand Botanical Gardens for the day.

What guarantee do we have that scarce cycad species are indeed safe in Botanical Gardens? The availability of money and personnel turnover may affect the level of care that cycads receive in Botanical Gardens. In view of this I wonder whether such plants are not better off in private collections.

If I was a cycad, I would much rather be in my wife's garden than in the veld or in the Pretoria Botanical Garden.

Kind regards

Manie Maritz

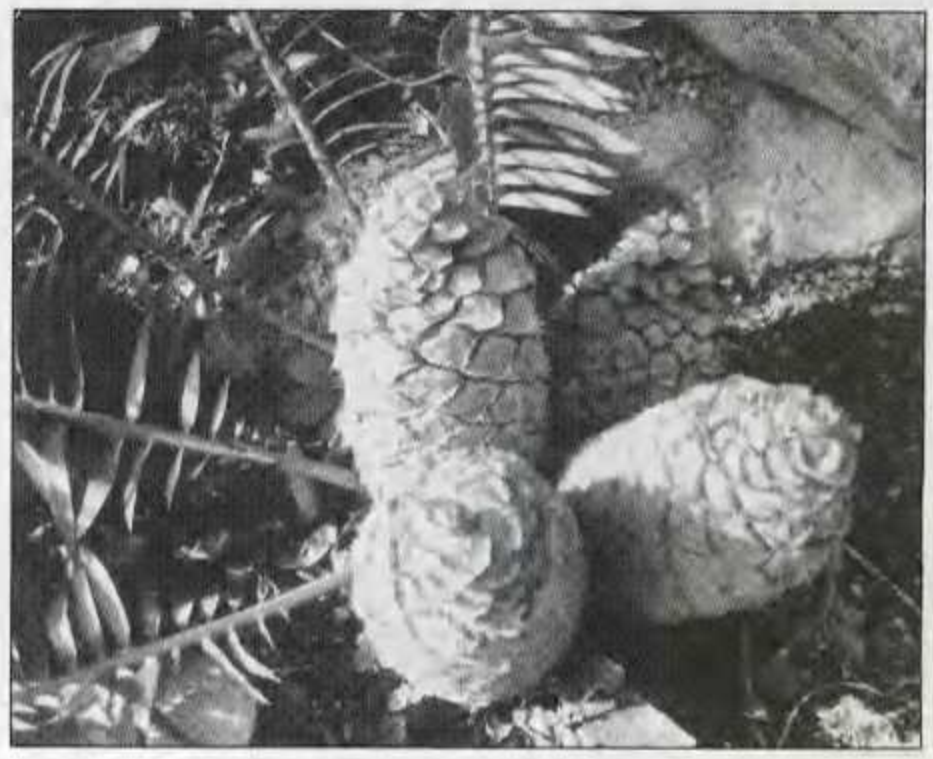
Received 16 July 2004, e-mail

[The letter was forwarded to the authorities for comment but no response was received at the time of printing. Ed.]

Coning habits of *E. caffer.*

Dear Sir

During the growth of 2002 the *E. caffer* shown in the provided photos (photo 1 and 2) pushed a remarkable 4 female cones!!! I read up on *E. caffer* in Nat Grobbelaar's book and saw that female plants of this species usually form only 1 female cone. For that reason I thought it a good idea to send you these photos of what I believe is one of the first female *E. caffer* to have 4 cones. Futhermore these photos show a strange "bulla" form unlike the one in Nat's book.



Also included is a photo of a female *E. laevifolius* with 3 cones. (Colour Figure 17)

Yours faithfully

Jarred West

217 Carinus Street
Meyers Park
Pretoria
0184

Received 30 July 2004

Raaiselagtige Kruis.

Beste Isabella,

Ek sluit hierby in foto's van 'n onbekende plant vir publikasie in die *ENCEPHALARTOS*. Kan iemand dalk help met die identifisering van die plant?

Die plant het 4 keëls aan, grasgroen. Die foto's wys die blare en keëls baie mooi. Ons het hierdie plant met die versameling 20 jaar gelede by Oom Gerrie Bouwer gekoop. Aanvanklik het ons gedink dit is 'n kruising tussen 'n Natalensis en Villosus, maar met groen keëls (Kleur Figure 14, 15) is dit nie bostaande kruising nie. Help asseblief. Het iemand anders dalk ook so 'n plant? Ek sal graag die plant wil bestuif.

Ek sluit verder hierby in 'n foto van *E. inopinus* (Kleur Figuur 16) net om te wys hoe gelukkig die plant is. Baie dankie aan jou vir 'n pragtige tydskrif.

Groete

Day Smuts
Posbus 13682
Sinoville 0129
Tel: (012) 5485165 (W)
(012) 5470596 (H)

Received 20 March 2004

[Better late than never! Day Smuts asks if anybody can identify this plant. Isabella Claassen is of the opinion that *E. trispinosus* might have been involved id this is a hybrid because the tips of the pinnae angles towards the leaf apex. The cones are green, similar to *E. trispinosus*, but there the similarity ends. The petiole has reduced pinnae ending in spikes close to the leaf base which is the case with *E. villosus*, but the cones have no resemblance to that of *E. villosus* at all. If you have any ideas let us know. Red.]