ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTH AFRICA

TYDSKRIF VAN DIE BROODBOOM VERENIGING VAN SUID-AFRIKA

NO. 67 SEPTEMBER 2001 ISSN 1012-9987

CYCAD SOCIETY OF SOUTH AFRICA
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COVER / VOORBLAD : ***Encephalartos altensteinii*. How many of these seeds will eventually germinate? / Hoeveel van hierdie sade gaan uiteindelik groei?**

Photo/Foto: Piet Vorster

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FROM THE PRESIDENT

VAN DIE PRESIDENT

We have received several compliments on the appearance of ***ENCEPHALARTOS* 66**. The reason for the crisp text is that it is now printed directly from our computer disk, instead of making a metal plate from a paper printout. The colour photographs with Alvaro Calonje Daly's article, and the monochrome photos with Gono & Phiri's article, were sent to us by E-mail

However, this same issue is also one of the slimmest ever. If you complain about that, we are going to trash your complaint without replying. The magazine belongs to our members, and it can only exist and thrive if we all submit contributions regularly. No. **67** is again very slim.

When ***ENCEPHALARTOS*** is mailed, it is noteworthy that our membership numbers presently exceed 2686, yet we sent out only 726 copies of no. **66**. What happened to the remaining more than two thirds of the enthusiasts who used to be members? Can we afford not to have them as members?

Ons het verskeie pluimpies ontvang oor die voorkoms van ***ENCEPHALARTOS* 66**. Die rede vir die skerp teks is dat dit nou direk van ons rekenaardisket af gedruk word, eerder as dat daar 'n metaalplaat vanaf 'n uitdruk gemaak word. Die kleurfoto's by Alvaro Calonje Daly se artikel, en die swart/wit foto's by Gono & Phiri se artikel, is per E-pos aan ons gestuur.

Hierdie selfde uitgawe is egter ook een van die dunstes ooit. As u daaroor kla, gaan ons u klagte weggooi sonder om te antwoord. Die tydskrif is ons lede s'n, en dit kan net bestaan en goed wees as ons almal gereeld bydraes instuur. Nr. **67** is ook baie dun.

Wanneer ***ENCEPHALARTOS*** gepos word, is dit opmerklik dat die lidmaatskapnommers reeds verby 2686 trek maar van nr. **66** het ons slegs 726 eksemplare gepos. Wat het geword van die ander meer as twee derdes van die entoesiaste wat eentyd lede was? Kan ons bekostig dat hierdie mense nie lede van die Vereniging is nie?

When looking at the first 100 people who joined in 1985, we see almost the same tendency as in the Society as a whole: only 22 of them are left. Some of them are deceased, but it is noteworthy and heartening that so many of them are still enthusiastic about cycads, and that so many of them have served the Society or its ams over the years.

Space does not allow us to mention all the survivors of that first year, but out of the first 50 members the following are still with us:

6. Ollie Minnie, dentist at Mtubatuba, and for many years seed- and pollen-officer.
8. Edgar Wohlberg of Durban, who is involved with the Durban Botanic Garden as a volunteer.
10. Maans Kemp[+] of Port Elizabeth. At the very beginning he single-handedly typed, printed, and distributed ***ENCEPHALARTOS***. Maans died two years ago, but his Widow, Petro, is still a member.
12. Roy Osborne, founder of our Society, currently living in Australia but still regularly contributing to ***ENCEPHALARTOS***.
16. Piet Vorster, Stellenbosch.
24. Leon Pienaar, Pretoria. Throughout the years he remained an enthusiastic collector who tirelessly hunt down those species lacking in his collection.
38. Ita van der Walt, Pretoria, is one of the pioneer collectors and nurserykeepers, and well known throughout the cycad world.
39. Bunny Wentzel, Germiston. Together with Neil Munro he took over the editorship of ***ENCEPHALARTOS*** in 1989 from Maans Kemp, and occupied this difficult desk up to September 1992. His interest in cycads has never waned.
47. Stephanus Wentzel, Pretoria.

As we go to press, the cycad community is reeling from press reports about people being arrested for alleged cycad trafficking. Some of those mentioned are members of this society, or have been until recently. Keep in mind that an accused remains innocent until proven to be guilty.

Piet Vorster

As ons kyk na die eerste 100 mense wat aangesluit het in 1985, vind ons byna dieselfde neiging as met die Vereniging as geheel: net 22 van hulle is oor. Sommiges van hulle is oorlede, maar dit is opmerklik en verblydend hoeveel van hulle nog entoesiasties is oor broodbome, en hoeveel van hulle deur die jare baie gedoen het vir die Vereniging.

Hier is nie plek om te gesels oor al die oorblywendes uit daardie beginjaar is nie, maar uit die eerste 50 is die volgendes nog by ons:

6. Ollie Minnie, tandarts op Mtubatuba en vir jare lank saad en stuifmeelbank-beampte.
8. Edgar Wohlberg van Durban, wat vrywillig betrokke is by die Durbanse Botaniese Tuin.
10. Maans Kemp[+] van Port Elizabeth. Heel aan die begin het hy jare lank man-alleen vir ***ENCEPHALARTOS*** getik, gedruk, en versprei. Maans is twee jaar gelede oorlede, maar sy weduwee, Petro, is nog steeds lid.
12. Roy Osborne, stigter van ons Vereniging, tans woonagtig in Australië maar lewer nog steeds gereeld bydraes tot ***ENCEPHALARTOS***.
16. Piet Vorster, Stellenbosch.
24. Leon Pienaar, Pretoria. Deur al die jare heen 'n geesdriftige versamelaar wat onvermoeid die ontbrekende soorte in sy versameling soek en ook vind.
38. Ita van der Walt, Pretoria, is een van die pioniers-versamelaars en -kwekers, welbekend dwarsdeur die broodboomwêreld.
39. Bunny Wentzel, Germiston. Saam met Neil Munro het hy in 1989 die redakteurskap van ***ENCEPHALARTOS*** oorgeneem by Maans Kemp, en hierdie moeillike taak behartig tot September 1992. Sy belangstelling in broodbome het nog nooit verflou nie.
47. Stephanus Wentzel van Pretoria.

Kort voordat hierdie uitgawe na die drukker gestuur word, is die broodboomgemeenskap geskud deur persberigte oor mense wat arresteer is oor beweerde onwettige internasionale handel met broodbome. Sommige van dié wat genoem is, is lede van hierdie vereniging, of was tot onlangs nog lede. Hou in gedagte dat 'n beskuldigde onskuldig bly totdat hy skuldig bewys is.

Piet Vorster

FROM COUNCIL / VAN DIE RAAD

REGIONAL OFFICER OF THE NATAL BRANCH OF THE SOCIETY

Danie Nel (Figure 1) was born in Cradock. He completed his school career in Cradock - then joined the S.A. Railways Police and accepted a post in Durban.

He married Tienie and has three children (Tienie died in 1993).

He joined the S.A. Police but in 1991 he broke his hip and was medically boarded.

Danie assisted Roy Osborne at the Botanical Gardens in Durban with caring for the cycads, and he was our Cycad Society's seedbank officer for several years. In 1992 he was the first winner of the Natal Regional Branch's Conservation Award. During his term of office as seed-bank officer he distributed an impressive total of 32655 cycad seeds to Society members.

Figure 1 Danie and Avis Nel.

His other interests include collecting of coins, banknotes and firstday covers.

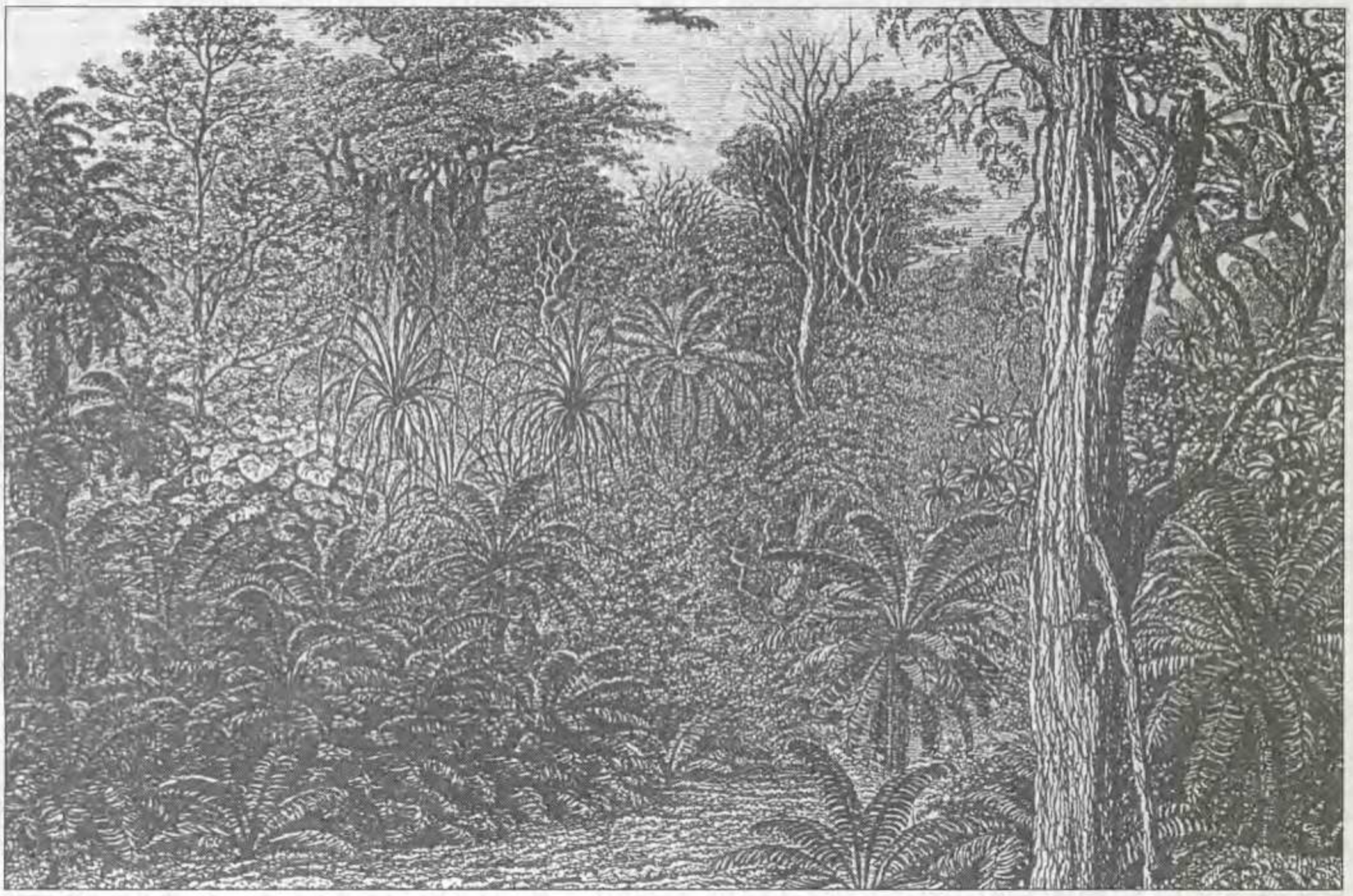
In September 1996 he and Avis Meresman took over

Figure 2 The entrance to the Cycad Centre.

Giddy's nursery at Umlaas road (KwaZulu-Natal and changed the name to CYCAD CENTRE (Figure 2). Avis formerly wrote the news items concerning the Natal Branch of the Society for our journal.

Danie married Avis in December 1999.

WOODCUT OF A *CYCAS* SPECIES



The accompanying woodcut (depicted on p. 4) appeared in *The treasury of botany* by J. Lindley & T. Moore (1876), vol. 1. It shows "*Cycas circinalis*" [now recognised as *C. micronesica*] in the "Forest on Guahan [Guam], one of the Marianne Islands". The accompanying text reads:

CYCAS. A remarkable genus giving its name to the order *Cycadaceae*. It consists of trees of no great height, with cylindrical usually unbranched stems, terminated at the top by a crown of handsome deeply-cut pinnate leaves of thick texture. The male flowers grow in cones, consisting of scales bearing anthers on their under surface. The female plants bear in the centre of the crown of leaves surmounting the stem, a tuft of woolly pinnately-cleft leaves, in the notches of whose margins the naked or uncovered ovules are placed. The species are natives of the tropical regions of Australia, Polynesia, and Asia.

***C. circinalis* furnishes in Malabar a sort of sago, which is prepared from the seeds, which are dried and powdered; medicinal properties are attributed to the seeds, but these are of little importance. The plant is said to be singularly tenacious of life. The pith in the interior of the stem of *C. revoluta* abounds in starch, which is highly esteemed in Japan. A clear gum exudes from the trunks of these trees, which is said to be employed by the natives of India in promoting speedy suppuration. These elegant species are great ornaments in our plant-houses. A fine group of them and of the allied genera may be seen at one end of the large palm-house at Kew. They are popularly but erroneously called Sago-palms, as they furnish none of the sago of commerce. See Plate 6, figs. b and d, the latter showing an old branched stem. [M. T. M.]**

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2686	DURRHEIM, Mr Kevin C	1 George Street, BERLIN, 5660

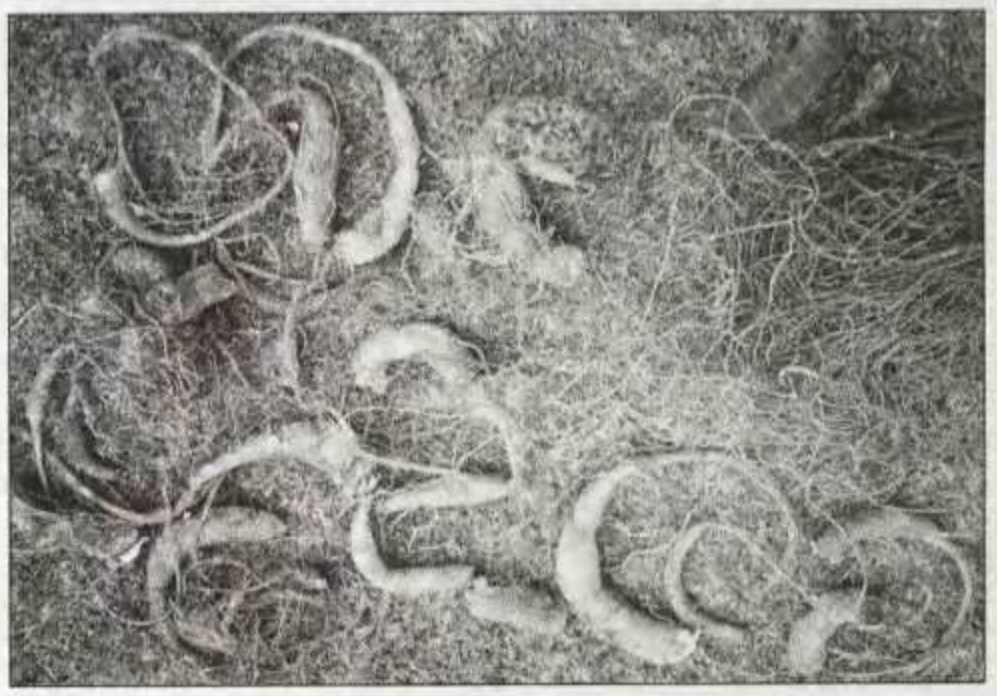
BROODBOOMDIEFSTALLE IN PRETORIASE TUINE

Gedurende die afgelope paar maande is broodbome in verskeie privaat tuine in Pretoria, asook by die Universiteit van Pretoria, gesteel.

By die Universiteit is suiers van twee skaars *Encephalartos* spesies, 'n groterige saailing van 'n ander skaars spesie, asook 'n vroulike *E. ngoyanus*-plant gesteel. 'n Paar weke later het buitengewone belangstelling wat in die manlike *E. ngoyanus*-plant getoon is veroorsaak dat 'n lokval gestel is. 'n Tweedejaar student en 'n skoolseun is toe op heterdaad betrap toe hulle die plant in die nag wou uitgrawe. Ironies genoeg is die student se pa 'n lid van ons Broodboom Vereniging.

By iemand in Monumentpark is in Meimaand twee broodbome gesteel, onder andere sy enigste *E. eugene-maraisii*. In nog twee tuine in hierdie omgewing is pogings aangewend om broodbome uit te grawe, maar gelukkig sonder sukses. Net vanoggend het ek by die veearts verneem van nog 'n persoon wat onder broodboomdiewe deurgeloop het.

Oor die naweek van 4–6 Mei is vier broodbome by my gesteel en gedurende die nag van 10/11 Julie nog twee. Die plante is maklik uit hul houers geskud en drie van die eerste vier se wortels is afgebreek en in die leë houers asook op die grond gegooi. Figuur 1 toon die afgebreekte wortels van my enigste *Dioon califanoi* (± 22 jaar oud) links voor en die res van die wortels op die foto is van twee ± 12 cm stamdeursnee *Encephalartos princeps*-saailinge afgebreek. Word broodbome in tuine maar gewoonlik op so 'n vandalistiese wyse gesteel? Ek moes ten duurste lemmetjiesdraad op die mure rondom my tuin laat aanbring in die hoop dat dit die diefstal sal keer. Die gesegde lui mos dat die hoop nie beskaam nie en mens sal maar moet sien wat in die toekoms gaan gebeur. [**Redaktrise,** 20 Julie 2001.]



Figuur/Figure 1 Die afgebreekte wortels van my *Dioon califanoi* (voor, links) en *Encephalartos princeps*-plante. / The broken-off roots of my *Dioon califanoi* (front, left) and *Encephalartos princeps* plants.

Summary

THEFT OF CYCADS IN PRETORIA GARDENS

During the past few months several cycads were stolen from private gardens in Pretoria as well as at the University of Pretoria.

In my garden plants were shaken out of their containers and their roots were broken off in a vandalistic manner. Only the stems with leaves were taken away. Figure 1 shows the broken-off roots of my only (± 22 year old) *Dioon califanoi* specimen (front, left), and two 12 cm diameter *E. princeps* seedlings. [**Editor,** 20 July 2001.]

NEW CYCAD PUBLICATIONS

OSBORNE, R. 2001. **Virus alert!** *The Cycad Newsletter* 20(1): 7–9.

[A brief resume is provided of viral infections in cycads. The symptoms of a viral infection in cycads are illustrated with several photographs.]

Author's address: 281 Buckley Road, Burpengary, Queensland 4505, Australia. (281 Buckley Road, Burpengary, Queensland 4505, Australia.
(cycad@iprimus.com.au)

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

OBITUARY

D.D. PANT

It is with sadness that we report the death of Divya Darshan Pant (Figure 1), long-time Head of the Department of Botany at the University of Allahabad, India, and well-known and respected honorary member of our Society, on 9 May 2001. Those of us who have had the honour to know D.D. Pant will agree that one could not find a person more aptly fitting the description "a gentleman and a scholar" (*The Two Dogs*, Robert Burns). Impeccable in his courtesy, exact in his science, prolific in his correspondence, passionate in his teaching and determined in his fund-raising - these are thoughts that come to me in association with this distinguished cycad botanist.

Professor Pant will be known to our members for his definitive book "Cycas and the Cycadales". This landmark in cycad literature was first published in 1962, a second edition followed in 1973, while a final revised edition is presently in print. (My own copy is showing signs of wear through frequent reference.) Add to that another two books and over 300 original research papers, and one begins to sense the contribution that D.D. Pant has made to botany. He was widely-travelled and many of us had the pleasure to meet him at various International Cycad and other Conferences. His cycad writings - focussed authoritatively on palaeobotany, classical morphology and anatomy - were always very carefully structured and often exquisitely illustrated, whether they were publications in erudite journals or simply just letters to his many friends.

D.D. Pant is survived by his widow, Dr Radha Pant, to whom we pass on our sincere condolences. Our cycad world will be poorer for this loss.

Roy Osborne.

Figure 1 D.D. Pant inspecting a specimen of *Encephalartos lehmannii* at the Jardin Thuret, Antibes, France, in 1987. Photo: Roy Osborne.

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 CLIVICOLA SUBSP. *CLIVICOLA* K.D. Hill

William Tang
Fairchild Tropical Garden, 11935 Old Cutler Road, Miami, Florida 33156, U.S.A.

DISCOVERY

Some of the first herbarium specimens of *Cycas clivicola* subsp. *clivicola* were collected by the English botanists Curtis, in northern peninsular Malaysia in 1894, and A.F.G. Kerr, in 1927 near Ko Tao in peninsular Thailand. In one of the early reviews of the cycads of Thailand this *Cycas* was placed by Smitinand (1971) under the name *C. circinalis* (see Hill 1995a for a discussion of misuse of this name). It was not until the 1990's, after a series of expeditions sponsored primarily by Nong Nooch Tropical Garden and also by Fairchild Tropical Garden, Montgomery Botanical Center, and the Royal Botanical Gardens Sydney, that this *Cycas* was recognized as a distinct taxon (Hill & Yang 1999, Tang *et al.* 1997).

DISTRIBUTION

Hill (Hill & Yang 1999) described this species with two subspecies. The first, subspecies *clivicola*, the main subject of this paper, is found primarily in the lower half of peninsular Thailand with extensions across into neighbouring Malaysia and probably Myanmar (see Figure 1). The second, subspecies *lutea*, ranges from SE Thailand across southern Cambodia into Vietnam. In this paper these taxa may be referred to as *clivicola* and *lutea*, for short, and when *C. clivicola* is indicated without a subspecies epithet I refer only to subspecies *clivicola*. In leaf, stem, and female sporophyll characters these two taxa are very similar, however, there are significant differences between the male cones and the probable pollinators of the two taxa. These differences are discussed in detail below.

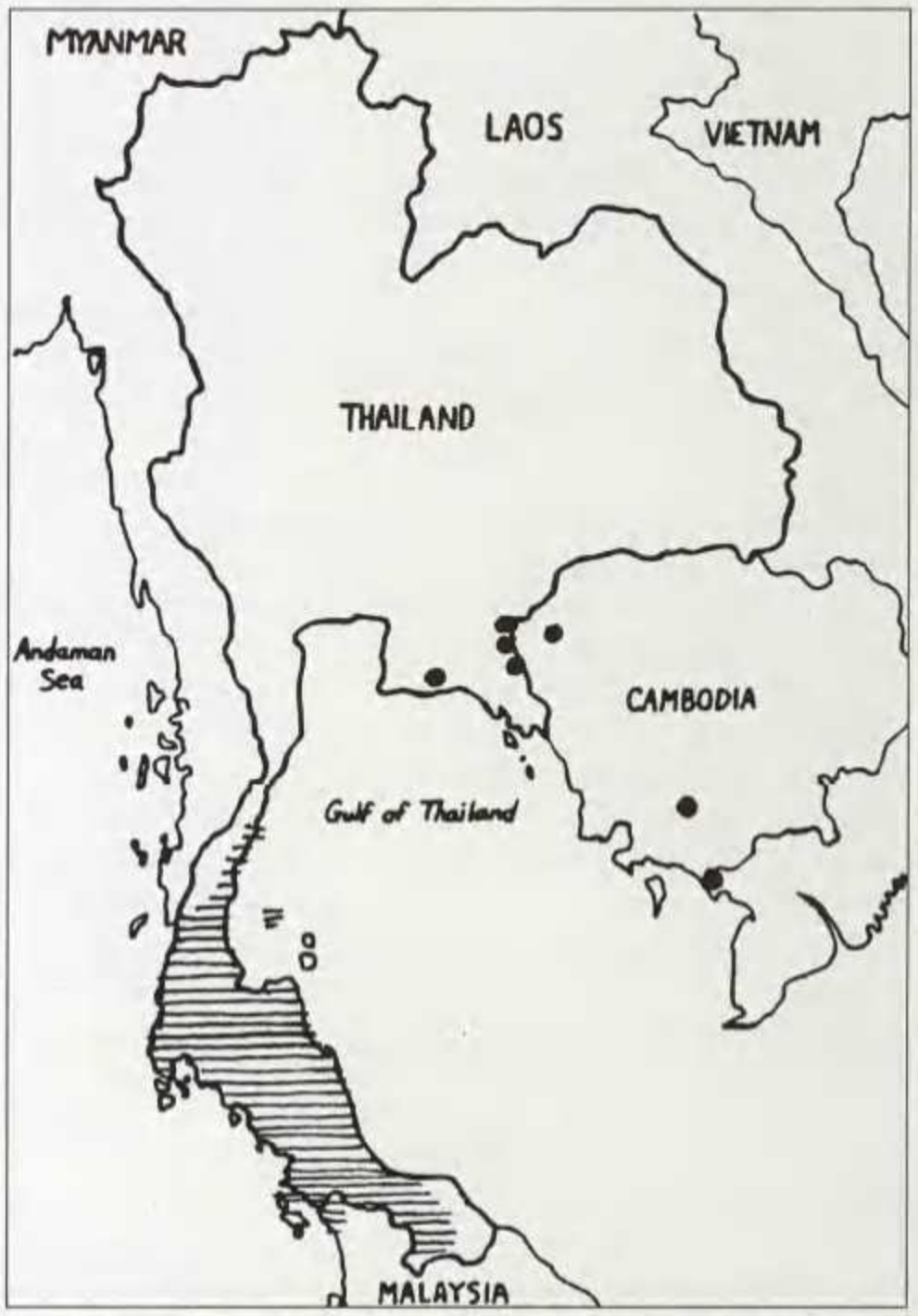


Figure 1 Known distribution of *Cycas clivicola* in Thailand and surrounding countries: subspecies *clivicola* is indicated by horizontal lines and subspecies *lutea* by black dots.

HABITAT

Cycas clivicola subsp. *clivicola* is a cliff dweller. It grows on the numerous limestone mountains that jut out of the otherwise relatively low terrain of southern penisular Thailand (Colour Figure 1 on p. 11). The sides of these mountains are steep and support little tree growth. The cycads grow out of cracks or ledges of steep to vertical cliffs, with little or no soil, usually in full sun (Colour Figures 2, 4 on p. 11). They sometimes form the dominant vegetation on these cliff faces (Figure 2). On inland sites, adult plants are typically found 20 metres or more above the base of the limestone cliffs. Only seedlings are evident in the soil or rock debris below this level (Colour Figure 3

Figure 2 Small limestone mountains such as this one near Ban Tumtalord in peninsular Thailand, demonstrate the habitat of *C. clivicola* subspecies *clivicola*. Hundreds of plants can be seen clinging to cracks and ledges on this cliff face.

Figure 3 *Cycas clivicola* subsp. *clivicola* growing on a near shore island cliff above mangroves near Satun, Thailand.

on p. 11). Although most of the land around these mountains are presently cultivated, until recently they were covered by a seasonally moist monsoon forest that grew up to the cliff walls. It appears that the canopy of these forests formed the lower limits of this *Cycas*' cliff populations. In populations on coastal cliffs and near shore islands, these plants are found closer to the cliff base, being limited by the canopy of mangroves or in many cases to high tide levels on cliff walls (Figure 3; Colour Figure 8 on p. 12). These obser-vations indicate that this species requires full sun and does not establish itself in the shade of forests. The limestone cliffs of its habitat, when exposed to the tropical sun reach high temperatures. I have seen afternoon showers burst into steam after striking the sun-exposed cliff habitat of these plants. These plants undoubtedly experience drought, particularly in the dry season.

DESCRIPTION

1. STEM

Erect, leaning, or dangling from cliff walls to 8 m long, often branching from the base (Colour Figure 8 on p. 12). Base swollen, narrowest near apex where it is 10–16 cm in diameter. Leaf bases persistent on stem for 30 cm below apex, below this the stem surface is smooth and pale grey (Colour Figures 2, 4 on p. 11). In subspecies *lutea* the trunk tends to be more yellowish in colour.

2. LEAVES

Leaves are 0.7–1.65 m long, pinnate with 90–220 leaflets (Colour Figure 2 on p. 11). Middle portion of leaf is flat, but the basal portion of the blade may form a "V" in cross section. Median leaflets 90–220 x 5–9 mm, inserted at an angle of 45–70° to the rachis, margins flat to slightly recurved. Transition from leaflets to petiolar spines abrupt. Petiole 150–550 mm long (12–35% of total length), tip of the rachis frequently terminated by 2–15 mm long spine. The new leaves of subspecies *lutea* are coated with a waxy bloom that give it a bluish cast (Colour Figures 9, 10 on p. 12). This character is also seen in some populations of subspecies *clivicola*.

3. REPRODUCTIVE STRUCTURES

Female sporophylls 120–220 mm long, with the end flattened to form a broad surface 70–140 mm long x 60–95 mm wide (Colour Figures 5, 6 on p. 11). The edge is pectinate, or deeply incised to give it a comb-like appearance. The teeth of the "comb" number from 26–54 and range from 26–40 mm long with a spine at the tip. The seeds have a yellow fleshy outer coat and are 35–49 x 26–35 mm.

The male cones are yellow to brown to green (Colour Figures 7, 11 on pp. 11, 12), 250–500 mm long x 80–110 mm wide, with sporophylls 19–25 mm long x 10–15 mm wide. The male cone of *clivicola* differ from *lutea* in having a wider axis, which may make up more than half its diameter (see Figure 12, Tang *et al.* 1997). This character will also distinguish *clivicola* from most other *Cycas*. Subspecies *lutea*, on the other hand, has narrower male cones, 80–90 mm wide, with the axis forming only a third of the diameter. The apical spines on the scales of *lutea* also tend to be shorter (5–8 mm) than in *clivicola* (5–16 mm).

POLLINATION

Male cones collected in four populations of subspecies *clivicola* from Ban Tumtalord to Satun and Pak Meng (a range of 190 km from inland to coastal sites) revealed only one species of insect, an undescribed weevil in the genus *Tychiodes* (Tang *et al.* 1997, Tang *et al.* 1999). Adults and larvae were found burrowing into the fleshy axis of the cones in the hundreds. Old dried cones were observed to remain on the plant and these contained numerous weevils. It appears that the old cones are the only place where these beetles can persist on the otherwise harsh and barren cliff habitat of this cycad. The unusually wide cone axis appears to be an adaptation that serves as a refuge for the cycad beetles. Beetles such as these are widely believed to be pollinating agents of cycads (see Tang 1999 for a review). This is not unlike the case for the pollinators of *Zamia furfuracea* and *Z. pumila*, where pollinators persist in cone debris until the next pollination season (Norstog *et al.* 1995). However, in the case of subspecies *clivicola* the wider the cone axis and the more persistent its old male cones on the plant, the more likely it will have an abundant supply of pollinators for the next pollination season. Cones that fall from the crown would drop down the cliff and its supply of pollinators lost to the plant. These beetles swarmed in large numbers in the evening around fluorescent lights from cones that were brought back into a hotel room, suggesting that they are nocturnal. Male cones and female sporophylls of subspecies *lutea* were examined only at one population (Tang *et al.* 1999) and contained beetles of an entirely different group tentatively assigned to the genus *Xenocryptus* in the family Languriidae, subfamily Xenoscelinae. Unlike subspecies *clivicola*, the male cones of *lutea* begin disintegrating shortly after the pollination period and do not appear to persist on the apex of the plant more than a few weeks or months. The significant differences in the male cone shape and persistence and different presumed pollinators indicate that there are major differences in the pollination biology of these two taxa.

RELATED SPECIES

Cycas clivicola is in subsection *Indosinensis* of the genus *Cycas* It is closely related to *Cycas pectinata*, a species inhabiting relatively cool mountain forests typically above 500 m elevation and ranging from eastern India to Vietnam and from southern China to central Thailand. The closest known *C. pectinata* population in Thailand is some 450 kilometres north of populations of *clivicola*. *Cycas pectinata* appears to be ancestral to a number of other lowland species with limited geographic ranges, including *C. chamaoensis, C. nongnoochii, C. tansachana, C. elongata*, and *C. pachypoda*. Like *clivicola* and *lutea*, many of these species are also distinguished on small or subtle morphological differences. Each of these species probably evolved separately from *C. pectinata*. Similarly, *lutea* and *clivicola* may have evolved independently from *C. pectinata*. In Thailand the closest populations of the *C. pectinata* species complex to *lutea* are *C. chamaoensis* (2 km away), *C. tansachana* (190 km away) and *C. pectinata* (230 km away). In contrast subspecies *clivicola* is 350 km away from *lutea* across the Gulf of Thailand. This distance is over 600 km away if measured along the coast, with large gaps in suitable habitat between. During the Pleistocene period sea levels fluctuated and this distance and amount of suitable habitat between *clivicola* and *lutea* may have varied. When the amount of water locked in polar ice caps were smaller, sea levels were higher and the Chao Phraya River delta, on which the city of Bangkok sits, was inundated by a shallow sea, further separating these two cycads. When the amount of water locked in ice caps was larger, portions of the Gulf of Thailand were exposed above sea level and the amount of suitable habitat between these two subspecies may have been greater. In Thailand only one other *Cycas, C. litoralis*, presently has a distribution similar to *clivicola*'s and *lutea*'s distribution combined (see Tang *et al.* 1997 and Hill & Yang 1999 for details). *Cycas litoralis*, however, is a beach colonizer, whose seeds float on ocean currents and germinate along beaches. It is found strictly on the coast. The seeds of both *clivicola* and *lutea*, on the other hand, sink in water. They are cliff dwellers, not beach colonizers, and therefore far less likely to be successfully dispersed by sea water. Furthermore, the bulk of the populations of both *clivicola* and *lutea* are located well inland. They appear to rely on dispersal by animals, probably birds, such as hornbills, rodents, and monkeys, to carry their seeds from ledge to ledge and cliff to cliff. Geographic evidence would suggest that *clivicola* and *lutea* have been isolated from one another for hundreds of thousands, if not millions of years, and that little or no gene flow has occurred between the two.

On the basis of the biological species concept, which distinguishes species on their ability to interbreed, current knowledge on the pollination biology and presumed insect pollinators of subspecies *clivicola* and *lutea* would indicate that they are distinct species. Their placement by Hill (Hill & Yang 1999) into a single species is based mostly on similarities in leaf, stem, and female sporophylls. When considered alone, these characters which have mislead many past workers in *Cycas* taxonomy (Hill 1995b). The similar habitat (growing on cliffs) is shared by at least two other species of the *Cycas pectinata* species complex and at least 5 other more distantly related *Cycas* and in itself is not a unifying character for *clivicola* and *lutea*.

Yang and Merrow (1996) examined genetic diversity of *C. clivicola* subspecies *clivicola* populations and related species. Their findings indicate that some of the northern populations near Chumphon have greater genetic diversity than southern populations. Their data suggest that these northern populations may be older and that there were probably several waves of establishment in the southern portion of the species range.

CULTIVATION AND CONSERVATION

Pot cultivation of *Cycas clivicola* from seed has resulted in mixed results. Some growers report that seedlings rot out easily, but others have had moderate to very rapid growth. Excellent drainage appears to be the key. This species appears especially suited to areas with strong sun and high

Colour Figure 1 *Cycas clivicola* **inhabits limestone cliffs, such as this one near Ban Tumtalord. Photo: Willie Tang.**

Colour Figure 2 Female plant of *Cycas clivicola* **subsp.** *clivicola* **growing on limestone ledge over sea water near Satun, Thailand. Photo: Willie Tang.**

Colour Figure 3 Seedling of *Cycas clivicola* **subsp.** *clivicola* **rooting at the base of a limestone cliff near Ban Tumtalord, Thailand. Photo: Willie Tang.**

Colour Figure 4 Large female plant of *Cycas clivicola* **subsp.** *clivicola* **growing on a cliff ledge near Tanto, Thailand. Photo: Willie Tang.**

Colour Figure 5 Female sporophylls and seeds of *Cycas clivicola* **subsp.** *clivicola* **from near Tanto, Thailand. Dollar bill gives scale. Photo: Willie Tang.**

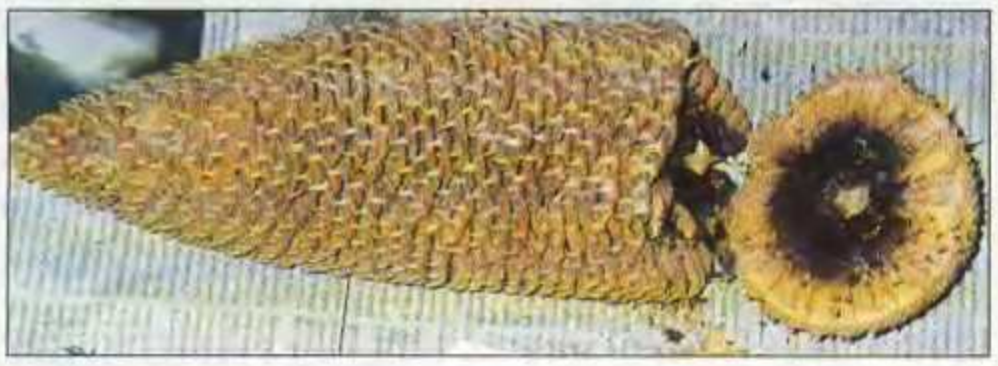
Colour Figure 6 *Cycas clivicola* **subsp.** *clivicola***: female plant with a flush of sporophylls prior to pollination, cultivated near its habitat at Satun. Photo: Willie Tang.**

Colour Figure 7 *Cycas clivicola* **subsp.** *clivicola:* **old male cone still intact on plant near Satun, Thailand. Photo: Willie Tang.**

Colour Figure 8 A large *Cycas clivicola* with stem dangling over seawater near Satun, Thailand. The stem is branching at several points with the apex at the high tide mark. Photo: Willie Tang.

Colour Figure 9 *Cycas clivicola* subsp *lutea* collected near Aranyaprathet, Thailand, cultivated at Nong Nooch Tropical Garden. Photo: Willie Tang.

Colour Figure 10 *Cycas clivicola* subsp. *lutea* in habitat along Thai-Cambodian border near Ban Laem, Thailand. Note the plants overhanging the limestone cave. Photo: Willie Tang.



Colour Figure 11 Old male cone of *C. clivicola* subsp. *clivicola* past pollination, freshly collected from habitat near Satun, Thailand. Note that the cone axis is more than twice the width of the cone. Although dried, the axis is filled with adult and larvae of the weevil *Tychiodes* sp. Photo: Willie Tang.

Colour Figure 12 **Both species of *Lepidozamia* and several *Cycas* plants have been used to effect in "Fern Gully" at the Roma Street Parklands. Photo: Roy Osborne.**

Colour Figure 13 Nine different Encephalartos species have been used in a cycad garden at the Roma Street Parklands project. Photo: Roy Osborne.

Kleurfiguur 14 *Encephalartos laevifolius* by Kaapse Hoop.
Colour Figure 14 *Encephalartos laevifolius* at Kaapse Hoop. Foto/Photo: Derik Minnaar.

temperatures and is quite tolerant of drought, once established. Plants and seeds of subspecies *clivicola* have been distributed in cultivation under the name *Cycas* "Saba Yoi" and subspecies *lutea* under the name *Cycas* "Aranyaprathet".

Both subspecies have unusually wide distributions for cycads and occur abundantly in many populations. Although easily accessible plants are often removed and sold as ornamentals by locals, many remain in nearly inaccessible sites. Some of the mountain habitats are quarried for rock (limestone or marble), but this activity occurs on a small scale and is not presently a serious threat. Based on these factors, this species is not threatened and must be considered one of the cycads with the greatest chance of being relatively unaffected as human population and development increases in Southwest Asia.

ACKNOWLEDGEMENTS

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REFERENCES

HILL, K.D. 1995a. The genus *Cycas* (Cycadaceae) in the Indian region, with notes on the application and typification of the name *Cycas circinalis* L. *Taxon* 44: 23–31.

HILL, K.D. 1995b. Infrageneric relationships, phylogeny, and biogeopgraphy of the genus *Cycas* (Cycadaceae). Pp. 139–162 in P. Vorster (ed.) Proceedings of the Third International Conference on Cycad Biology. Cycad Society of South Africa, Stellenbosch.

HILL, K.D. & VATCHARAKORN, P. 1998. The Cycads of Thailand, Pp. 178–190 in D. Hodel (ed.) The Palms and Cycads of Thailand. Allen Press, Lawrence, K.S.

HILL, K.D. & YANG, S.L. 1999. The genus *Cycas* (Cycadaceae) in Thailand. *Brittonia* 51: 48–73.

NORSTOG, K.P., FAWCETT, P., NICHOLS, T. VOVIDES, A. & ESPINOSA, E. 1995. Insect-pollination of cycads: evolutionary and ecological considerations. Pp. 265–285 in P. Vorster (ed.) Proceedings of the Third International Conference on Cycad Biology. Cycad Society of South Africa, Stellenbosch.

SMITINAND, T. 1971. The genus *Cycas* Linn. (Cycadaceae) in Thailand. *Nat. Hist. Bull. Siam. Soc.* 24: 163–175.

TANG, W. 1999. Insects visitors and pollination of cycad cones: a global view. *Encephalartos* 60: 7–14.

TANG, W., OBERPRIELER, R. & YANG, S.L. 1999. Beetles (Coleoptera) in cones of Asian *Cycas*: diversity, evolutionary patterns, and implications for *Cycas* taxonomy. Pp. 280–297 in C.J. Chen (ed.) Biology and Conservation of Cycads Proceedings of the Fourth International Conference on Cycad Biology. International Academic Publishers, Beijing.

TANG, W., YANG, S. L. & VATCHARAKORN, P. 1997. Cycads of Thailand. Nong Nooch Tropical Garden Cycad Conservation Co., Bangkok.

YANG, S. L. & MEEROW, A. 1996. The *Cycas pectinata* (Cycadaceae) complex: genetic structure and gene flow. *Int. J. Plant Sci.* 157: 468–483.

ARTICLES / ARTIKELS

DISINTEGRATION OF FEMALE *ENCEPHALARTOS* CONES

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

Received 30 June 2001

Some years ago I studied the spontaneous disintegration of mature *Encephalartos* female cones. Although the work was published in the *South African Journal of Botany* (Vol. 55, pages 581–585, 1989), our editor asked me to rehash my findings in "*Encephalartos*" in a way that will be more readily understandable to the layman.

It is well known to cycad enthusiasts that the female cones of most *Encephalartos* species eventually disintegrate spontaneously when the seeds are shed. The process usually starts near the upper end of the cone where the cone's circumference starts to enlarge. Closer inspection reveals that the stalks of the upper cone scales have ruptured and that the outermost part of the scales with their attached seeds have become completely detached from the cone axis and is usually prevented from dropping by the neighbouring scales with seeds. Initially I thought it must be a simple matter of the cone scales first being abscised from the cone axis and the seeds then later being abscised from the cone scales.

Now it is well known that plants can enhance the shedding of its leaves, fruits, etc. by the formation of an abscission layer in the stalk of such organs. The abscission layer not only provides a weak spot in the stalk where the break can easily occur but it also provides a well insulated scar on both the mother plant and the organ that has been shed as is commonly found when *Encephalartos* seeds separate from the cone scales. The break in the stalk of the cone scale of disintegrating female *Encephalartos* cones, however,

results in very ragged ends on both sides of the point of separation - quite unlike what one would expect from a selfrespecting conventional abscission layer.

There were other worrying aspects that did not appear to fit in with a simple case of abscission. Why does the cone's circumference enlarge? As can be seen in Colour Figure 27 on p. 18 the cone scales with their attached seeds will actually move upward when a harvested cone is left to lie hori-zontally on a hard surface during the onset of its disintegration. Another aspect that bothered me resulted from field observations. At the Modjadji Nature Reserve, monkeys often excise the seeds from the cones shortly before the cones disintegrate spontaneously, leaving the cone scales still attached to the cone axis as can be seen in Figure 1. These deseeded cone scales are never shed but will remain attached to the cone axis until the whole lot eventually dries out.

Figure 1 Female cone of *E. transvenosus* deseeded by vervat monkeys at the Modjadji Nature Reserve.

A theoretically plausable explanation or hypothesis, of what happens is the following: In the immature female cone, the seeds and scale stalks form a solid band around the cone axis to which it is anchored by means of the scale stalks (Figure 2). As the cone matures, the swelling power of the seeds increase, probably because compounds like starch in the outer seed flesh (sarcotesta) are broken down to smaller molecules like sugars. The seeds therefore absorb more water and enlarge. To make provision for the lateral expansion of the seeds, the seedband must now move outwards to enable it to attain a bigger circumference. This is however prevented by the scale stalks which experiences increased stress. As a result of this stress, a kind of autolysis process is initiated in the base of the scale stalks which weakens it and eventually results in the rupture of the scale stalk at this point allowing the seedband with the apical parts of the cone scales to move outward.

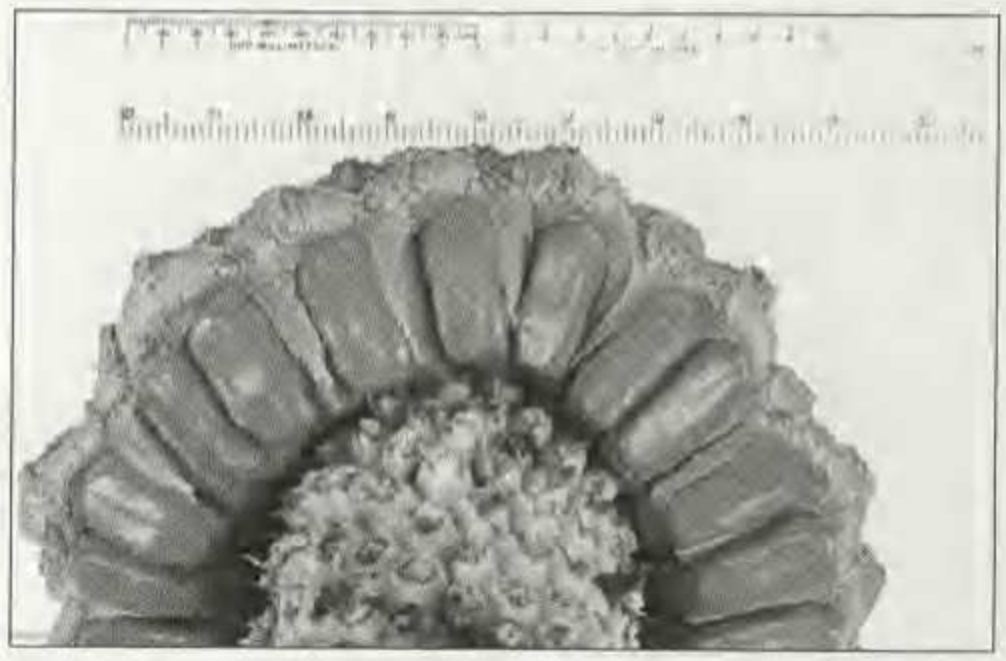


Figure 2 Seedband with apical parts of cone scales (sporophylls) around the cone axis from which it has become detatched.

To test the above hypothesis I measured the swelling power of the seeds during the maturation of a cone and found that it did in fact increase about 300% during the three days before the cone started to disintegrate. During the 10 days leading up to cone disintegration, the width and volume of the seeds increased by 2.7% and 10% respectively, probably as a result of water withdrawal from the rest of the plant, especially from the bullae of the cone scales which shrunk slightly during the same period.

In another test of the hypothesis, most of the cone scales were removed from the upper part of an almost mature female cone which was secured within a trellis (Colour Figure 28, on p. 18). Several cone scales with their seeds attached were however left attached to the cone axis in well separated positions on the upper part of the cone. In some cases strings were tied around the apical part of the cone scale with its seeds and the string was passed over a rod in the trellis and secured to a weight some distance above the floor. Weights ranging from 0.2 kg to 2 kg were used in different cases to induce longitudinal stress in the cone scales. The experiment was terminated when the bottom part of the cone disintegrated spontaneously. By then none of the cone scales on the upper half of the cone which did not have weights suspended from them had been dislodged even though their seeds had already abscised. All the cone scales from which 2 kg weights were suspended ruptured first. Next followed all those from which a 1 kg weight was suspended, after which only one of the cone scales from which a 0.5 kg and 0.2 kg weight was suspended became dislodged, in that sequence. The remaining cone scales from which 0.5 kg and 0.2 kg weights were suspended remained firmly attached to the cone axis even after the cone scales started to shrivel up.

To my delight, the results above, appears to support the hypothesis, given above, in all respects - something that rarely happens in scientific research!

In the case of species like *E. lanatus*, the outolysis of a cross sectional area of the cone scale stalk apparently is not induced by stress. As a consequence of the stress that develops in the cone scale stalks the cone axis ruptures longitudinally before the whole cone eventually dries out (Figure 3). In species such as *E. eugene-maraisii*, the seeds apparently do not suddenly enlarge during cone maturation. As a consequence a stress is not induced in the cone scale stalks and neither the cone scale stalks nor the cone axis is ruptured. In these species the whole cone simply dries out whilst the seeds are dislodged from their cone scales by conventional abscission. The seeds are, however, kept within the cone by the dessicated cone scales until the latter is physically broken up by some outside force.

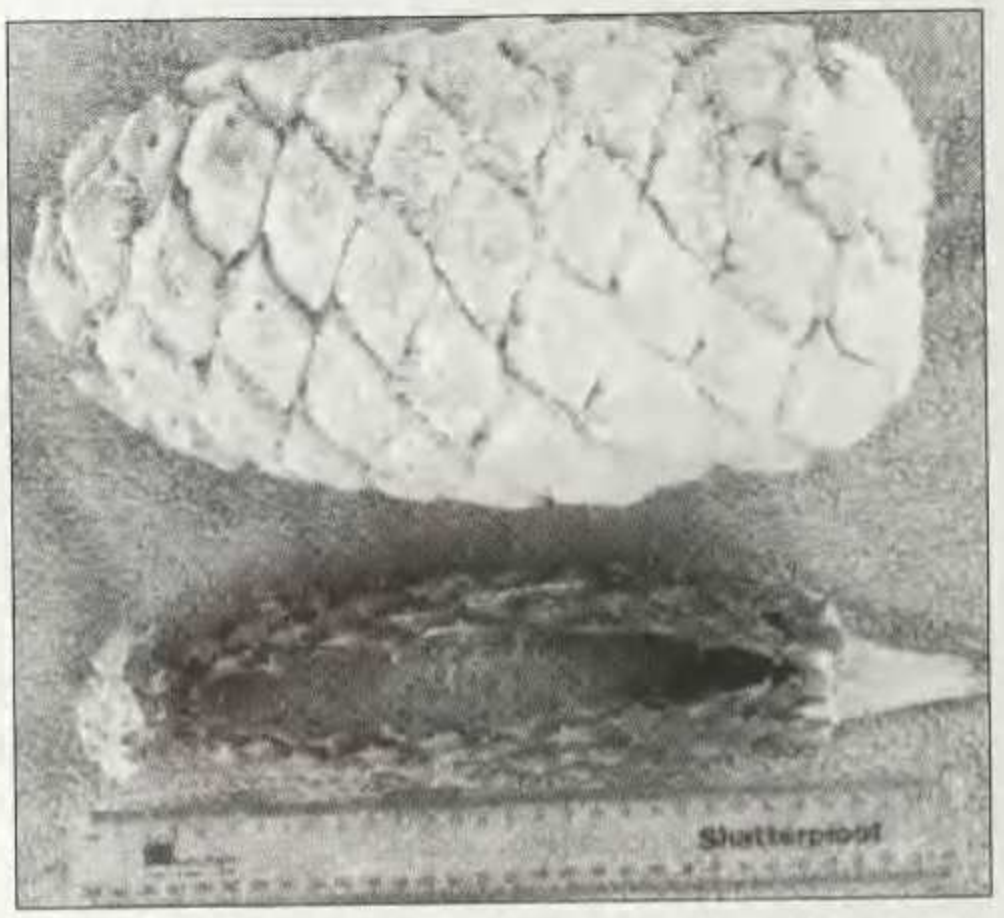


Figure 3 ***E. lanatus*** **female shown cone above that appears flattened due to a longitudinal rupture in its cone axis as in the cone axis shown below.**

WALLISII WALTZING IN THE CLOUDS

Alvaro Calonje Daly
Carrera 28 # 5B. 102, Cali, Colombia

Received 28 June 2001

It was midday on a warm and breezy beautiful October day in Medellin, Colombia, when we boarded a Cessna towards the incredibly biodiverse cloud and rainforests of the Choco region of Colombia.. The Choco region is one of six prime sites of biodiversity in the world and it is estimated that it houses between five and six percent of all the plants on the planet . It is believed that about 30 % of the plants found there remain unidentified. The purpose of our trip was to search for the very elusive *Zamia wallisii*, a plant in the family Zamiaceae that had been discovered by the German botanist Gustav Wallis in 1875 and collected for the last time in 1877, until it was rediscovered by a Colombian botanist working for the Universidad Nacional in Bogota in 1983.

As we flew over an ocean of green, we were excited by our mission but worried about our destination, the town of Urrao, perched in the High Andes at 2500 metres above sea level. Urrao, a typical Colombian town built around a central plaza in Spanish colonial times, displays white-washed houses with red-tiled roofs and balconies decorated with geraniums and colourful cascading orchid blooms. Children took advantage of the October winds to fly their kites and men rode their horses through the market place. The town has a microclimate ideally suited to growing passionfruit for the export market; with an abundance of sunny days and cooled by frigid winds that come from the paramo, a moorland type of ecological zone high up in the Andes. Urrao is best known as the gateway to the famous Las Orquideas national park which is known for its astonishing variety of orchids. Urrao was like a paradise lost in time but the tranquility of the small town was only apparent. Behind the quiet and peaceful façade that met us that day the town was full of fear.

Just two months earlier it had been the stage of battles between leftist guerrillas and right-wing paramilitaries, who are thugs hired by rich landowners and drug lords to combat the guerrillas. The humble peasants of Urrao were caught in the middle of this confrontation, unable to go about their business and remain neutral. Providing food, water or shelter to members of either group would automatically make that person a sympathizer of that group in the eyes of the opposing group, with potentially deadly consequences. The year before, 150 selective murders were carried out in Urrao, and just two months before our trip 23 peasants had been murdered by paramilitary death squads. This made us very nervous, but our mission was important and we had reports that the area was now clear since no major incidents had occurred during the past two months, so we decided to embark on this adventure.

Our group was composed of five people with interests in orchids, cycads, and botany in general. We knew that in the cloud forest above Urrao (Figures 1, 2) grew a wealth of highly ornamental plants, many of them yet to be

Figure 1 Urrao Cloudforest.

Figure 2 Cloudforest formation.

discovered, and the prospect of seeing a *Zamia wallisii* (Colour Figures 24–26 on p. 18) in habitat excited us all.

That evening we hired two local guides who knew the trails leading to the Choco well, and by the following morning we had two mules and were ready to depart. The air was crisp and the sun was shining over the lush hills around the town where we could see 60 metre tall Andean wax palms of the genus *Ceroxylon*. It was brought to our attention by the botanist in our group that in a 1000 hectare tract of the Choco rain forest more species would be found than in the whole of North America, excluding Mexico.

As we started uphill away from the town the forest became more massive, with giant white Cecropias shading the path. We followed a stream with embankments crowded with tree ferns of various species, particularly *Cyathea*. The day was warm and the change in altitude brought a change in vegetation. There was an increase in the number of flowering trees we sighted, with more orchids and bromeliads in the upper canopies of the forest. The air became cooler and more humid. The most prominent trees were the Tibouchinas, with flowers in several shades of purple. Another handsome shrub was *Cavendishia*, named after the famous Scottish botanist. Our group was amused because Colombian folk medicine ascribes these plants with powers to heal broken hearts.

After a very difficult daylong climb, we reached our campsite. As the sun set that evening, we could see in the distance the high plateau where Urrao is located. Our elevation was 3000 metres and the fog was coming in thick and wet. We set camp amid a forest of *Podocarpus rospigliosii*, the fabled king of the Andean mountains, a conifer capable of living more than 1000 years and having wood fine enough to make the best English harpsichords.

The following morning we were up early and during breakfast we showed our guides pictures of *Zamia montana* and *Zamia wallisii*, but neither had seen anything remotely similar. We marvelled at the beauty of the high Andean forest; there were oaks, alders and trees in the *Magnolia* family. At this elevation it is cold most of the time and trees grow very slowly. We were told by our guides that from there on our journey would be wet and muddy, the downhill route would be very steep and we would be heading down the slope of the western Andes facing the Pacific Ocean.

The day started well because it was not raining and the visibility was good. After a few hours of walking the weather became warmer and even more humid and the vegetation changed drastically. This part of the Choco is particularly rich in aroids such as *Philodendron* and *Anthurium* which displayed handsome leaves and attractive flowers. We had come to a slowdown because this was the altitudinal range where *Z wallisii* was supposed to be. The paths were muddy and the upper canopy was so high and thick we could not see the sky. At one point one of our guides called us to show us a "palm" that looked like the pictures we showed him and there it was, *Zamia wallisii* waltzing in the mist. It was unmistakable with its huge petiolulate dark green leaflets resembling ping-pong paddles measuring two feet across, its six foot leaves mimicking a bird in flight (Colour Figure 24 on p.), its gracious architecture as a whole, its acaulescent trunk and a broken-up cone in pieces with a few seeds scattered on the ground.. Everyone was silent looking at this jewel of the forest This plant was taken out of habitat and registered with the Colombian Ministry of the Environment, and is part of the national ex-situ *Zamia* collection. Two years later it is producing its first female cone in a private arboretum close to Cali, Colombia. We were elated to have found one specially since we knew we would not be able to go back to Urrao, in view of the ongoing, escalating conflict of violence in Colombia which makes travel and exploring very hazardous.

This is the world of a lady *Zamia wallisii* glowing in the mountains of a world that may be lost before we know it. Colombia is a symptom of a sick world with a huge appetite for drugs and wood. Its mountains are targets for the lucrative business of poppy growing. When heroin production occurs everything is destroyed (Figure 3). There is no respect for trees or animals as they are cut and displaced to make room for the flowers of death, as they are known in Colombia. The drug trade is an apocalyptical force that is destroying large tracts of tropical highland forest in the Andes and Asia.

The second day ended with a small celebration and that night we camped close to a stream. No other Zamias were found the following day and by night we were somewhat

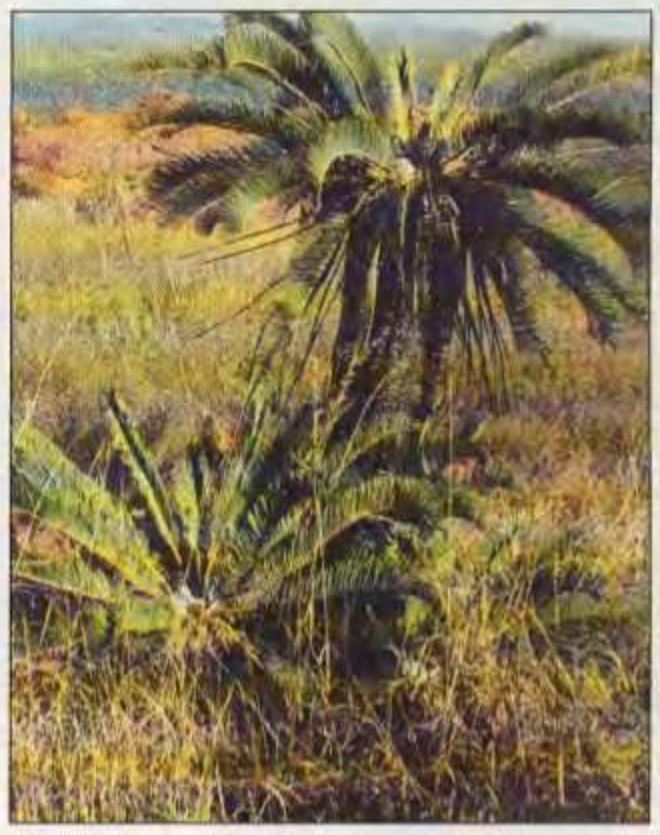
Colour Figure 15 *Cycas revoluta* **is used extensively in plantings at the Roma Street Parklands project. The tree in the background is the Queensland Bottle tree,** *Brachychiton rupestris***. Photo: Roy Osborne.**

Kleurfiguur/Colour Figure 16 *Encephalartos laevifolius* **by/at Kaapse Hoop. Foto / Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 17 *Encephalartos middelburgensis* **by die broodboomvoetslaanpad naby/at the cycad hiking trail near Middelburg, Mpumalanga. Foto/Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 18 *Encephalartos laevifolius***. Foto / Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 19 *E. middelburgensis***, een van die koppe bo-op die stam is verwyder / one of the branches on the stem has been stolen. Foto / Photo: Derik Minnaar.**



Kleurfiguur/Colour Figure 20 *E. lanatus* **by die broodboomvoetslaan-pad / at the cycad hiking trail near Middelburg. Foto /Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 21 *E. laevifolius***. Afgebreekte stam / Broken-off stem. Foto/Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 22 *E. middelburgensis***, omgevalle stamme / fallen-down stems. Foto/Photo: Derik Minnaar.**

Kleurfiguur/Colour Figure 23 *Encephalartos ferox* **met geel manlike keëls / with yellow male cones. Foto/Photo: Gerrie de Haas.**

Colour Figure 24 *Zamia wallisii* **in habitat in Colombia. Photo: Calonje Daly.**

Colour Figure 25 *Zamia wallisii* **in habitat in Colombia. Photo: Calonje Daly.**

Colour Figure 26 Detail of *Zamia walliisi* **leaflets. Photo: Calonje Daly.**

Colour Figure 27 Spontaneously disintegrating female cone of *Encephalartos altensteinii* **whilst resting horizontally on a table top. Photo: Nat Grobbelaar.**

Colour Figure 28 Tension is artificially created in cone scale (sporophyll) stalks by suspending weights from strings that have been tied to the apical parts of the cone scales. Photo: Nat Grobbelaar.

Figure 3 The results of cloudforest destruction.

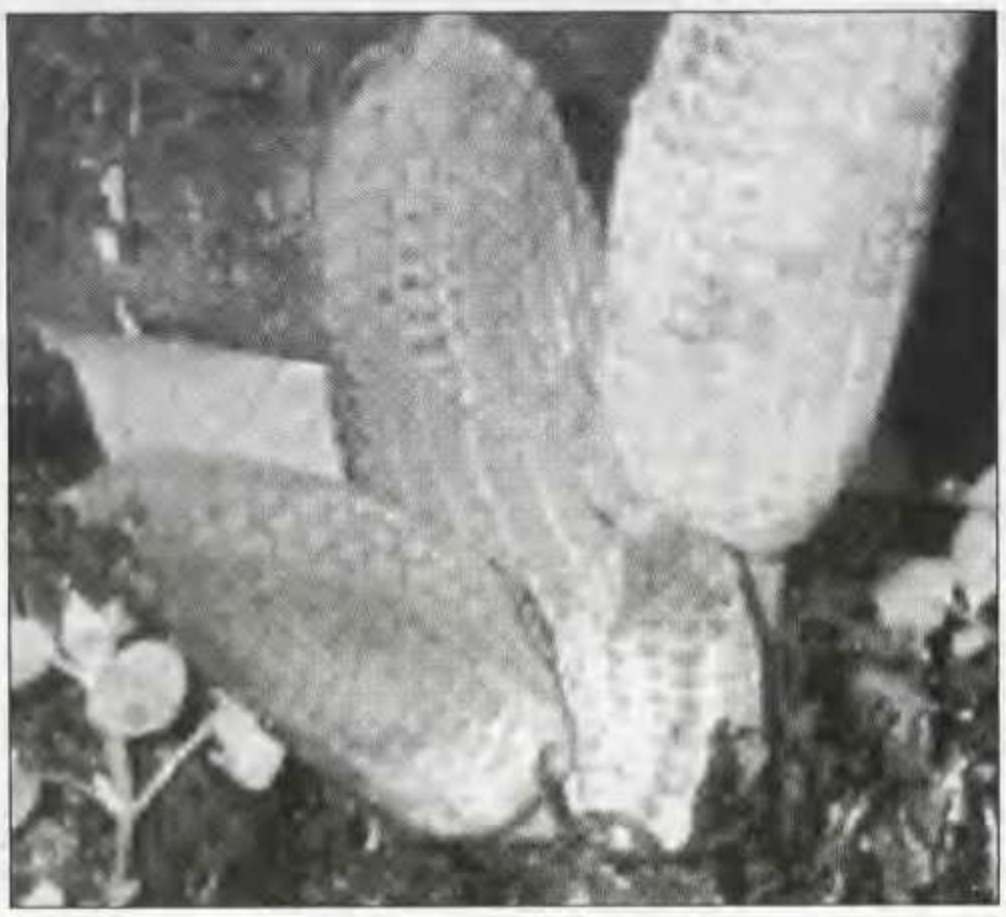


Figure 4 Male cones of *Zamia wallisii*.

discouraged. We had thought that *Zamia wallisii* was going to be more plentiful. On day four we came across a small nucleus of five plants of *Zamia wallisii*. These plants were smaller than the first one we found, and two had male cones (Figure 4) while two others had lost their leaves, perhaps suggesting deciduousness. They were growing on a bed of leaf mold and humus. We had many questions that lingered on our minds that day. What is the mode of seed dispersion? Which are the pollinating agents? What is the ultimate size of the plant? How long do they live? Can they produce more than one leaf at a time? How can we grow these plants?

We know the cloud forest does have very uniform temperatures during the day followed by very cool, humid evenings and nights. This would presumably make them very difficult to grow in places with hot, dry summers. That day we thought *Zamia wallisii* was a narrow endemic species along with other cloud forest species like *Zamia montana* and another cloud forest golden emergent leaf *Zamia* which remains undescribed. However, on a subsequent expedition two years later while exploring the southern Choco, we found a small population of what appears to be *Zamia wallisii* at about 300 kms south of the originally described Urrao main habitat. It is possible that this is a new species on account of the leaflets being more linear lanceolate and tougher than the original *Zamia* and the growth habit being slightly different. Due to the lack of male and female cones at this time, it is too early to conclude whether it constitutes a new species.

No more *Zamia wallisii* plants were found on the Urrao expedition. Today it is impossible to access the area. In retrospect, it becomes clear that the Choco ecosystem remains largely unexplored botanically and with the Colombian conflict escalating, the chances of exploring it are scant. Places like the Urrao cloud forest are a reservoir of beauty and knowledge for humanity and they should be preserved at all costs.

ENCEPHALARTOS TEGULANEUS SUBSP. *POWYSII* (ZAMIACEAE): A NEW CYCAD IN CENTRAL KENYA

Beatrice W. Miringu
East African Herbarium, National Museums of Kenya,
P.O. Box 45166, Nairobi, Kenya
plants@africaonline.co.ke[1]

Henk Beentje
Royal Botanic Gardens Kew,
Richmond, Surrey TW9 3AE, U.K
h.beentje@rbgkew.org.uk

ABSTRACT

A new cycad taxon, *Encephalartos tegulaneus* subsp. *powysii*, is described from Central Kenya. Taxonomic characteristics unique to this taxon in relation to the other subspecies are discussed. Its habitat preference, population and conservation status are also discussed.

INTRODUCTION

This taxon was first observed by a local administration officer in the 1950s but remained unknown to the scientific community until 1989, when one of us made the first incomplete collections. It took until 1996 before our collections were complete enough to allow a description. The taxon is named after Gilfrid Powys, a former District Officer of the area and avid plantsman, who took the second author up to the hill to show him the plants.

While there are considerable similarities with *Encephalartos tegulaneus* Melville *sensu stricto*, the difference in leaflet and male cone structure warrant, in our opinion, subspecific status. The description of this population means a considerable range extension for the species as a whole.

DESCRIPTION

Encephalartos tegulaneus *Melville* **subsp**. **powysii** *Miringu & Beentje* **subsp. nov**. a typo foliorum margine revoluto, dentatiore, dentibus conspicuis, microsporophyllis deflexioribus, e basi fertilibus, dorso uniangulus megastrobilo aurantiaco-brunneo differt.

Typus: Kenya, Meru District, 23 Nov. 1995, *Miringu* 1 (holotypus EA, isotypus K) (figure 1).

Tree up to 8 m tall, solitary or clustered with up to five trunks.

Trunk erect or procumbent, unbranched or rarely with basal branching, 34–60 cm across at breast height, covered with rhomboidal pale brown scars 9.5 cm wide and 4 cm high, which become indistinct towards the base of the trunk.

Leaves 48–59 per trunk, suberect to spreading with some older leaves marcescent, 2–3.6 m long and 40–60 cm wide, pale green and white-pilose when young, glabrous when mature; petiole absent; rachis 280–290 cm long, proximally slightly pilose, 5–8 cm across and thick, glabrous between the leaflets; leaflets opposite or alternate, arranged at an angle of 180° between opposing rows, in 65–95 pairs inserted on the adaxial side of the rachis, proximal leaflets gradually reduced to prickles towards the base of the leaf, 2–4 cm apart in mid-leaf, overlapping, narrowly elliptic, ± straight but slightly falcate near apex, 18–31 cm long, 2.5–3.3 cm wide, proximal margins with (2–)3–4(–5) evenly spaced teeth, on the distal margin with (1–)2–3 teeth crowded near the base of the leaflet and 1 further towards the apex, the margins slightly revolute but the teeth clearly visible; distal leaflets decreasing in size, the terminal pair about 10 cm long and 0.8cm wide. Cataphylls (scale leaves) confined to apex of trunk, c. 60, narrowly triangular, 8–19 cm long, to 2 cm wide, attenuate, coriaceous, pale brown-tomentose.

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[1] Miami University, Institute of Environmental Sciences, 102 Boyd Hall, Oxford, Ohio 45056, USA, miringbw@po.muohio.edu

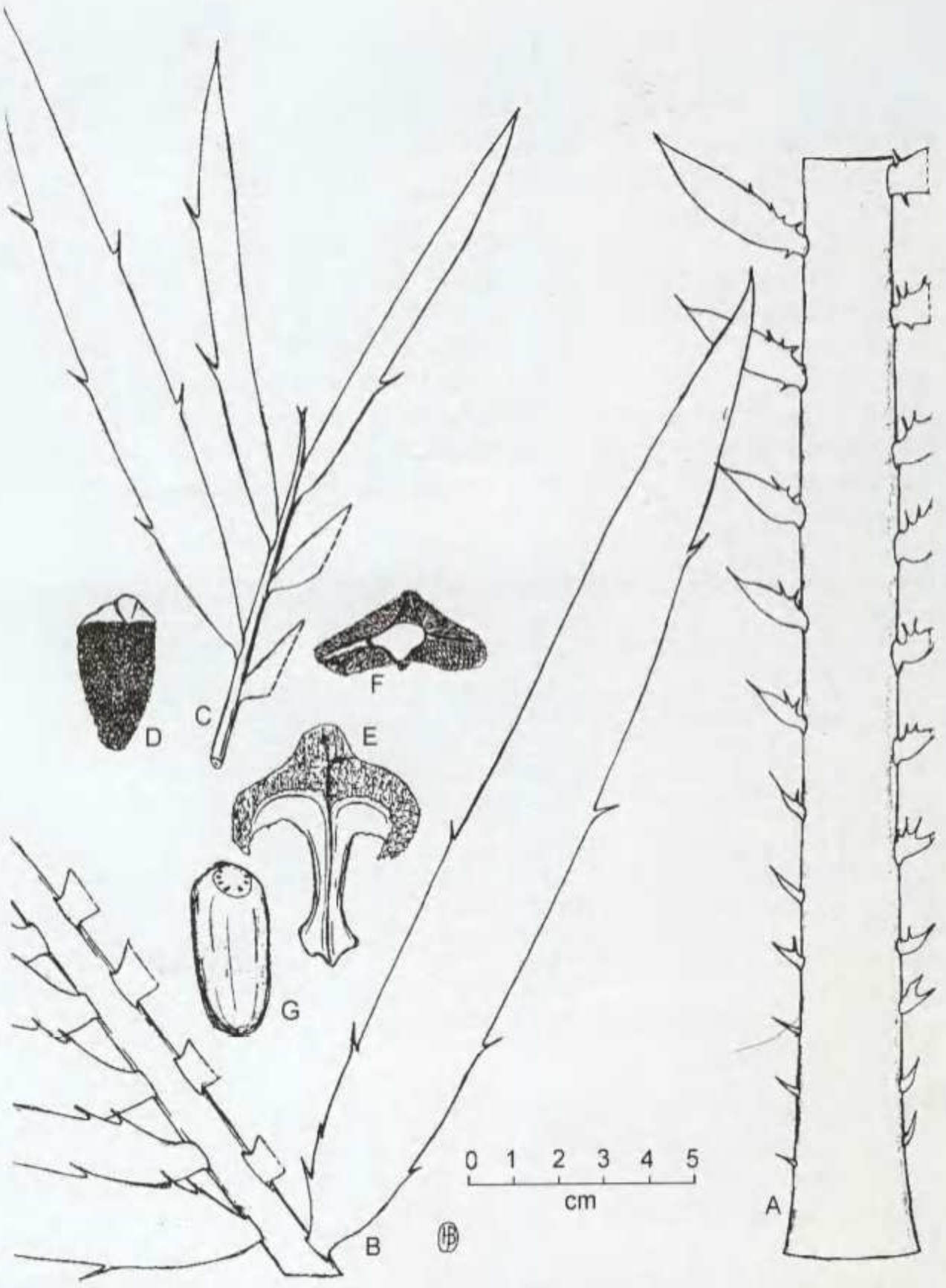


Figure 1 Encephalartos tegulaneus *subsp.* powysii, *A–proximal leaf section, B–middle section, C–distal part, D–microsporophyll abaxial surface, E–female cone scale abaxial, F-female cone scale, terminal facet, G–seed. All drawn from the type collection by Henk Beentje.*

Megastrobili 1–3(–4) per trunk, apparently sessile but with peduncle 6–16 cm long and 7–9 cm in diameter, hidden among the cataphylls; cones cylindrical or ellipsoid, 42–68 cm long, 16–22 cm in diameter, apricot orange; megasporophylls (cone scales) with pedicel acutely angled and 3 cm long, glabrous, the angle bulla/pedicel ± 60 degrees, the bulla 55 mm wide, 28–30 mm high, projecting 20–25 mm, the terminal face ± central and 1/2 to 1/3 of the horizontal diameter of the bulla, terminal facet smooth and slightly concave or flat, other facets rugose to tuberculate at the margins, the tubercles flattened and triangular, 1–4 mm long.

Microstrobili (1–)3–5 per trunk, stalked with peduncles 11–22 cm long and 4–4.5(–9) cm thick, cylindrical or narrowly ovoid, 40–52 cm long, 9–12 cm in diameter, orange-yellow; bracts similar to those of megastrobili; median microsphorophylls spreading and angled, 38–44 mm long, 21–24 mm wide, 5–7 mm thick, bulla 8–9 mm wide, 5–6 mm high, projecting for up to 2 mm, smooth, glabrous, terminal facet slightly raised and about 1/3 the horizontal diameter of the bulla.

Seeds covered with orange to mandarin-red sarcotesta, angled-obovoid, 30–43 mm long, 18–30 mm in diameter, with the sarcotesta removed 28–36 mm long, 16–24 mm in diameter.

AFFINITIES

E. tegulaneus subsp. *powysii* resembles *E. tegulaneus* subsp. *tegulaneus* in many characters but differs in the number and position of spines on the leaflet margins. In both taxa the leaflet margins are revolute, but in subsp. *tegulaneus* this causes the teeth to be hidden, while in subsp. *powysii* they are pronounced. The number of teeth/spines also differs: subsp. *tegulaneus* has

1–2 teeth on the proximal leaflet edge (Melville, 1957, 1958; Faden & Beentje, 1989), while subsp. *powysii* has (2–)3–4(–5): subsp. *tegulaneus* has 0–2 teeth on the distal leaflets margin with one near the middle and one near the apex, while subsp. *powysii* has (1–)2–3 basal ones and 1 higher up. The female bulla pedicel has 4 sharp angles, and while the peduncle is described as irregularly dentate in subsp. *tegulaneus* (Goode, 1989), this is certainly not the case in all specimens of the latter. The colour of the female cone is orange-brown, not yellow as in subsp. *tegulaneus,* and the male cones scales are more deflexed than in the latter species.

The male cone scales in subsp. *powysii* have a much shorter sterile lower surface (5–7 mm), with a single angle and are fertile right down to their very base, while those of subsp. *tegulaneus* have a longer sterile part (10–15 mm long), with two angles enclosing a facet, and have a sterile part near their base of 5–6 mm long.

The presence of the groove on the rachis between the leaflets in subsp. *tegulaneus* mentioned in various descriptions (Melville, 1957, 1958) does not hold true for the type of the taxon. We believe this might be an artifact.

One of the referees suggested that specific status would be preferable for this taxon. This was our original idea as well, but upon thorough study of the material we decided that the differences between *E. tegulaneus sensu stricto* and the new taxon were less than those with other species (table 1), and hence we decided on this status. There is a precedent with a Nigerian subspecies described by L. Newton.

Table 1. Taxonomic similarities and differences between subsp. tegulaneus and subsp. powysii

Characteristic	Similarities	Differences	
		subsp. powysii	Subsp. tegulaneus
Margins	Revolute	Teeth hidden	Teeth exposed
Spines	Present	2–5	1–2
Proximal	Present	1 near the apex	1 near the apex
Distal	Present	1–3, basal	0–2, near the base, 1 at the middle
Female cone	Same size	Orange-brown	Yellow
Female bulla	Same size	Pedicel with 4 sharp angles	Irregular
Male cone		Less deflexed	Deflexed
Male cone scales		Short (5–7 mm)	Longer (10–15 mm)
		Single angled	2-angled, enclosing a facet
		Fertile to base	Sterile part of 5–6 mm near base

GEOGRAPHICAL DISTRIBUTION

Only known from a single hill in Meru District (K 4). To protect this taxon from collection from the wild, we have deliberately left out the specific locality details in this publication.

HABITAT PREFERENCE

The subspecies occurs in rocky sites in dense bushland/thicket with *Commiphora* sp., *Ochna* sp. and *Teclea* sp. where it is locally common. It is less common in dry forest with *Drypetes natalensis, Croton megalocarpus, Rawsonia lucida, Milletia leucantha, Garcinia volkensii, Uvariodendron anisatum, Strychnos henningsii.* The highest density is found in the altitudinal range of 1,600 m to 1,800 m.

POPULATION AND CONSERVATION STATUS

Sub-populations are found on different parts of the hill at about 1,600–1,800 m altitude. The whole population is estimated to be 500–600 mature individuals. A preliminary sex count done on one of the sub-populations showed a sex distribution of 2/1, male/female.

By the IUCN category (1994) this taxon is 'Critically Endangered', as it is occupying an area of less than 10 km^2. Although this species occurs in a forest reserve, the neighbouring human communities use the forest as a source of fuelwood and construction materials. Hunting of small mammals and honey gathering are other human activities going on in the forest, and some illegal collecting of seedlings by cycad amateurs has already taken place.

ACKNOWLEDGEMENT

Many thanks to Gilfrid Powys for having reported the existence of this taxon to the scientific community and for taking the second author to see the population. We would also like to thank Prof. Len Newton for his help in drawing up the description of the cones and cone scales. We are most thankful to ODA/NMK Plant Conservation Programme for financial support and providing equipment during the field surveys. Many thanks to the staff of the East African Herbarium, and to

the local administrators and communities for their hospitality during the surveys. Two anonymous reviewers are thanked for helpful comments and suggestions.

REFERENCES

Faden, R.B. & H.J. Beentje (1989). *Encephalartos kisambo,* a new cycad from Kenya, with a note on *E. tegulaneus: Utafiti* **2(1)**: 7–10.
Goode D. (1989). *Cycads of Africa*. Struik, Winchester.
Melville, R. (1957). *Encephalartos* in Central Africa. *Kew Bulletin* **12**: 237–257.
Melville, R. (1958). *Gymnospermae*. In W.B. Turrill & E. Milne-Redhead (eds), *Flora of Tropical East Africa*. Crown Agents, London.
IUCN (1994). *IUCN Red list categories*. IUCN Species Survival Commission, Gland.

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Geagte Redaktrise

ENCEPHALARTOS FEROX: GEEL KeëLS

Hiermee 'n foto van twee manlike *E. ferox* keëls in my tuin. Hulle is geel en nie rooi nie. (Kleurfiguur 23 op p. 18).

Gerrie de Haas, *Posbus 1897, 0700 Pietersburg, R.S.A.*

Ontvang 24 Junie 2001

Summary

Gerrie de Haas sent the photograph (Colour Figure 23 on. p. 16) of the *E. ferox* male cones in his garden. The cones are yellow and not red.

Dear Prof. Theron

CONGRATULATIONS!

Yes Yes Yes !
Thankyou to all involved in the new web page. It's great and is everything it should be. It is exactly what the Dr ordered for this time of the year in JHB. It's also about time we caught up with the rest of the world on an instant access and daily basis.

May the site and the Society go from strength to strength.

Patrick Doddemeade, **paddyd@freemail.absa.co.za**

Received 13 June 2001

Dear Editor

•MOZAMBIQUE STAMP. •DYING OF CYCAD FOLIAGE

Figure 1 Although the plant depicted on the stamp is named *Encephlartos ferox*, it is definitely not an *Encephalartos*.

I enclose a Mozambique stamp (Figure 1) featuring an *Encephalartos ferox* plant. To me the plant concerned looks more like a ***Thesium***, but I may be mistaken. I am

pretty sure though, that it is not ***Encephalartos ferox***.

I have grown cycads from seed for close on 25 years. Lately an increasing number of my cycad plants have revealed steadily increasing dying foliage. This discoloration appears to occur among reasonably healthy foliage, meaning not necessarily the basic, older foliage, and I have heard similar comment from other cycad growers elsewhere in South Africa. I venture the following explanation:

Lately municipalities in South Africa have increased the chlorine content of municipal water, in order to curb diseases such as cholera. Could this chlorine be responsible for the dying back of foliage? If this is the case, it appears from my plants as if chlorine affects *E. longifolius, E. villosus* and, to a lesser extent, *E. lebomboensis* more than *E. natalensis, E. altensteinii* and *E. transvenosus*, to mention a few. It would be interesting to hear from readers whether they have made similar observations.

Joh Scriba, *P.O. Box 1708, 6530 George, R.S.A.*

Received 20 July 2001

SHORT COMMUNICATIONS / KORT MEDEDELINGE

ENCEPHALARTOS MIDDELBURGENSIS: THE AVONTUUR VARIANT

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

Received 30 June 2001

Every now and then, I receive queries about the Avontuur type of *E. middelburgensis*. It might therefore be of value to some readers if I hereby document what I know about the plants in question

The plants that are today known as *Encephalartos middelburgensis*, used to be considered a form of *E. eugene-maraisii* until Lavranos & Goode described it as *E. eugene-maraisii* subspecies *middelburgensis* in 1988. In 1989 Robbertse, Vorster & van der Westhuizen elevated it to full species status and named it *E. middelburgensis*. In both descriptions, the plants are said to have leaves with long petioles. Lavranos & Goode says: "...the rachis is usually straight and is bare of leaflets in the basal 30–40 cm of its length, with only a very few rudimentary leaflets (prickles)." Robbertse, Vorster & van der Westhuizen notes that the leaves are "…. rigid, with well-developed trigonous and unarmed petiole 100–200 mm long; …."

During 1996 I visited Mr Hugo Duvenhage who farmed near Marble Hall. He had quite a large cycad collection, part of which he inherited from his father, One of the plants, a male, which suckered profusely caught my attention. It corresponded to an *E. middelburgensis* in all respects except that its leaves had virtually no petiole. The pinnae basally decreased in size to prickles as is characteristic of *E. dyerianus*. Mr Duvenhage told me that his late father obtained the plant from the wild in the Avontuur area to the east of the Loskop dam and that he doubted if any plants were still to be found there. He wasn't aware of the uniqueness of the specimen.

Shortly afterwards I visited John Kloppers at his farm on the outskirts of Groblersdal. He had several *E. middelburgensis* plants that he obtained from the wild many years earlier. Amongst these there was a female with leaves which resembled those of Duvenhage's male although the prickles did not go down the rachis quite as far as in the case of Duvenhage's male. John was not very sure where he obtained the plant.

After I discussed the matter with John Kloppers, he searched the Avontuur area for plants and eventually came upon two plants similar to the one in Duvenhage's garden. They were also males and were growing in a farmer's garden. He bought the plants, sold one to a well-known cycad collector in Pretoria, and planted the other in his own garden where it is still flourishing.

Mr Hugo Duvenhage has since moved to another farm situated between Groblersdal and the Loskop dam. When he moved his cycad collection to the new farm, he removed many suckers from his Avontuur cycad and offered them for sale.

A photograph illustrating the leaf bases of the Avontuur cycad can be seen on page 20 of *Encephalartos* No 50 of June 1997. The photograph was taken in Mr Duvenhage's garden of a plant that developed from a sucker of the plant that was originally taken from the wild.

ROMA STREET PARKLANDS, BRISBANE, AUSTRALIA

Roy Osborne
P.O. Box 244, Burpengary, Queensland 4505, Australia

Received 26 April 2001

After many years in the planning, a new park was officially opened by the Hon. Peter Beattie, Premier of Queensland, in April 2001. The ambitious project, costing Australian $72 million, involved the conversion of Brisbane City's obsolete downtown railway yard into a 64-ha "people's park" including a large central lake, numerous water features, eye-catching works of art, kilometres of multi-level walkways and many speciality exotic and native theme plantings.

Cycad plantings are prominent throughout the park. Several hundred mature *Cycas revoluta* (Colour Figure 15 on p. 17) have been used to effect in many areas. Queensland endemics *Lepidozamia* and *Bowenia* grace a rainforest display and native *Macrozamia* and *Cycas* species are used to effect on the drier slopes (Colour Figure 12 on p. 12). Mexican cycads are represented in the form of several large specimens of *Zamia furfuracea, Dioon edule, D. califanoi* and especially impressive plantings of *D. mejiae* and *D. spinulosum*. South African readers will be interested to know that *Cycas thouarsii, Encephalartos altensteinii, E. arenarius, E. cerinus, E. gratus, E. hildebrandtii, E. natalensis, E. manikensis, E. senticosus* and *E. trispinosus* are well-represented in a specific cycad garden (Colour Figure 13 on p. 12). Most of the cycads used in the develop-ment were supplied by Roy Osborne and Stan Walkley.

The new development is the third of Brisbane's botanic gardens, the others being the downtown City Gardens on Brisbane River and the larger Botanic Gardens at Mount Coot-tha on the City's outskirts, both these gardens also have cycad feature plantings. Public and business buildings in the metropolitan area have similarly used cycads, particularly *Cycas revoluta* and *Zamia furfuracea*, in their landscaping. The net effect is that Brisbane must be well towards the front in any ranking of "cities with cycads", in terms both of plant numbers and in species diversity.

PHYLOGENY OF *ENCEPHALARTOS*

Piet Vorster
Botany Department, University of Stellenbosch, Private Bag X1, 7602 Matieland, R.S.A.

Received 28 June 2001

In ***ENCEPHALARTOS* 66**: 17–18 (June 2001) a DNA-based cladogram of *Encephalartos*, from Miss M.E. Coetzer's M.Sc. thesis, was reproduced. Nat Grobbelaar queried some of the conclusions, to which I would like to offer explanations.

The research leading to this thesis was conducted at the University of the Orange Free State, and I supplied Miss Coetzer with as much material as I could, including quite a number of species not appearing on the cladogram. In spite of what the popular press would have us believe, it was found that it is by no means easy to extract useful DNA from the leaves unless the leaves are very young. The reason why *Encephalartos woodii* and *E. chimanimaniensis* did not feature in the cladogram, is that Miss Coetzer was unable to extract useful DNA from them. It should also be kept in mind that M.Sc. students are limited in how long they may spend on a project, and often there simply is not time to repeat failed attempts.

The conclusions are indeed at variance with the morphology, and personally I will have to be persuaded that they reflect the true relationships between the species. On the other hand, results from the families Geraniaceae and Ericaceae are also grossly in conflict with morphology, yet are apparently accepted as the truth.

What then is the significance of DNA?

"Fingerprinting" will almost certainly help to identify species and even populations, but the technology is still undeveloped for cycads and far too expensive for the sort of budgets which botanists have.

DNA is supposed to tell us how species are interrelated. That the results are sometimes difficult to believe, may mean firstly that the wrong genes were compared, but more probably that the analist did not know what to look for and compare. In some cases it also means erroneous analysis. It is unfortunately true that cladistic analysis, leading to cladograms such as reproduced in the previous issue, lead to many different cladograms of which the most acceptable has to be selected, so that this "exact" methodology is not so very exact after all. It is unfortunately true that many

DNA experts are not acquainted with the plants with which they work, do not co-operate with people who do know the plants, and ignore other pointers to evolutionary relationships. Nevertheless, once properly understood and applied, this technology is bound to be a powerful tool in understanding evolutionary relationships.

What DNA will not tell us, is whether a group of plants constitute a good species. Amongst the uninformed (including some DNA experts), there is the totally erroneous belief that a certain degree of genetic difference ("genetic distance") indicates a separate species. To believe this, is to ignore the mechanism and philosophy of the spécies concept.

NUUS OOR DIE TRANSVAALSE STREEKTAK VAN DIE VERENIGING

Derik Minnaar
Posbus 95597, 0145 Waterkloof, R.S.A.

Ontvang 12 Julie 2001

Verslae oor onlangse aktiwiteite:

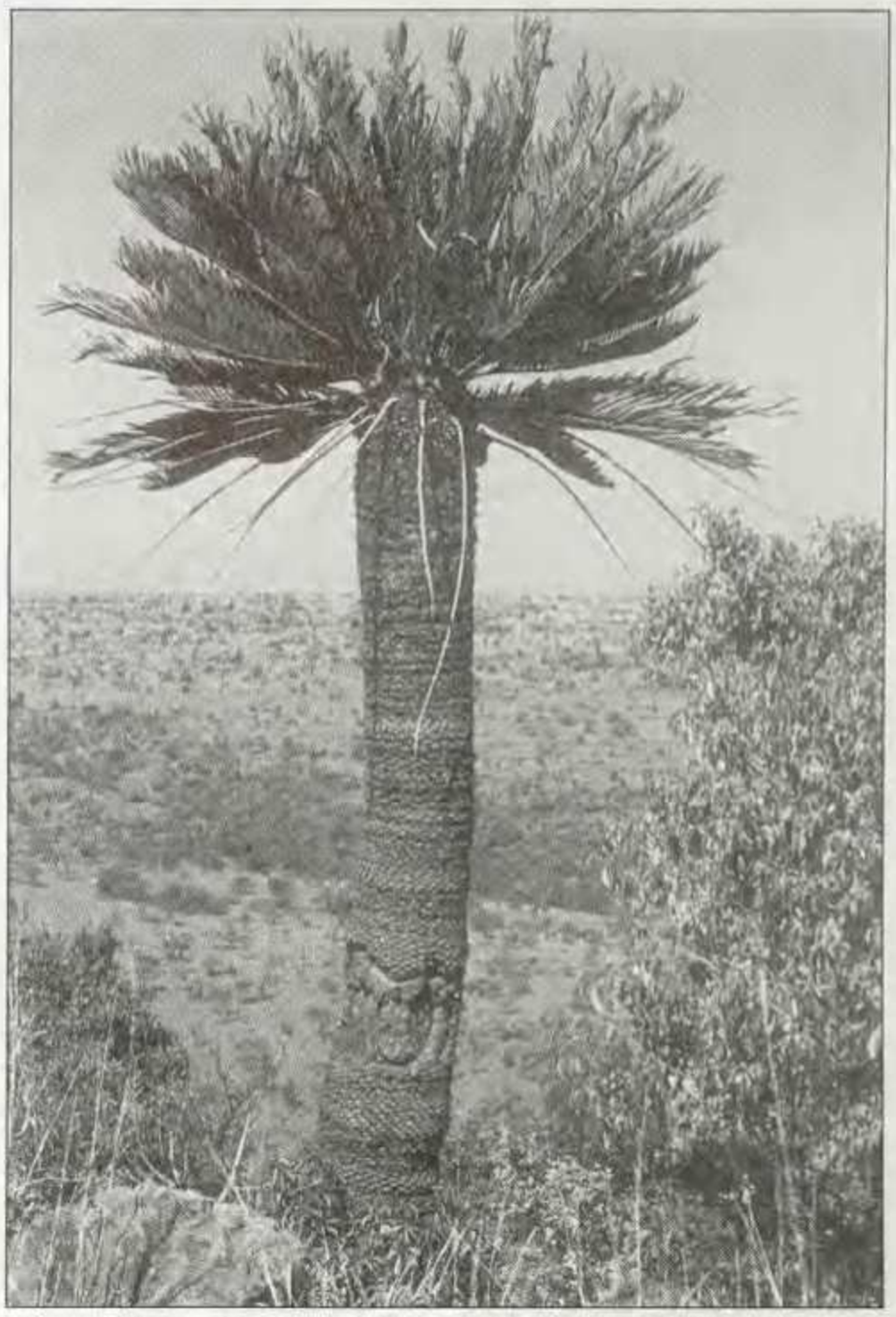
Vroeg die oggend van 12 Mei het lede van die Laeveld en Transvaal streektakke van die Broodboom Vereniging op die dorpie Kaapse Hoop bymekaargekom. Nadat Derik die groep verwelkom het, het Juan de Beer van die Mpumalanga Parkeraad en 'n verteenwoordiger van die Departement Bosbou die groep toegespreek. Juan het verduidelik dat die diefstal en plundering van *Encephalartos laevifolius* in die omgewing buite beheer geraak het en dat van die ongeveer 600 plante skaars die helfte oor is.

Figuur/Figure 1 ***Encephalartos laevifolius*** **wat uitgehaal en waarvan die blare afgesny is / dug up and the leaves were cut off.**

Die groep het vertrek na die kloof waar hulle teen die steil hang afgeklim het. Mooi groot *E. laevifolius* plante kom in die habitat voor (Kleurfigure 14, 16, 18 op pp. 12, 17). Oral was tekens van plunderings (kyk Figuur 1 en Kleurfiguur 21 op p. 17). Groot stamme van bykans drie meter is afgebreek (Kleurfiguur 21 op p. 17) en eenkant toe gegooi om die kleiner plante by te kom. Gelukkig is daar baie saailinge waargeneem. Let op hoe die regterkantse stam se blare klaar geknip is vir diefstal daarvan (Kleurfiguur 16, op p. 17). Twee weke later is hierdie plant gesteel.

Na 'n blitsbespreking tussen die bestuurslede van die Transvaalse streektak is besluit om een jaar se finansiële begroting af te staan en te skenk vir die bewaring van *E. laevifolius* by Kaapse Hoop. Die geld is in die Mpumalanga Parkeraad se rekening oorbetaal.

Na die besoek het die groep op die dorpie ontspan tot laat die middag.



Figuur/Figure 2 ***Encephalartos middelburgensis*** **in habitat.**

Op 9 Junie het 'n klein groepie lede van die Broodboom

Vereniging by die broodboom voetslaanpad buite Middelburg (Mpumalanga) bymekaargekom. Die doel was om soveel moontlik *Encephalartos middelburgensis* plante te voet te besoek en te fotografeer (Figure 2; 3; Kleurfigure 17 19, 22 op p. 17). Vyf groot plante, onder andere ook die groot "Octopus"-plant wat as monument verklaar is, is besoek en gefotografeer. By meeste van die plante is tekens van diefstal opgemerk. Suiers is afgehaal, totdat net die lang enkelstamme oorbly. Die blare van die suiers is afgesny en oral neergegooi (Figuur 4) By een plant is van die koppe bo-op die stam onlangs verwyder (Kleurfiguur 19 op p. 17). Baie *E. lanatus* plante (Kleurfiguur 20 op p 17) is ook opgemerk, en dit was verblydend om te sien hoe baie saailinge tussen die gras en rotse groei.

Figuur/Figure 3 *Encephalartos middelburgensis*, **'n veel-stammige eksemplaar / a multi-stemmed specimen.**

Toekomstige aktiwiteite:

Die Transvaalse streektak van Die Broodboom Vereniging sal hul jaareindfunksie op **3 November 2001** by die Botaniese Tuin in Pretoria hou. Die bring en braai byeenkoms is oudergewoonte by Velcichhuis in die tuin van die Nasionale Botaniese Instituut, Pretoria, aan die noordelike kant van die rant. Die bestuur van die Streektak sal pap en vleis gratis voorsien maar verder moet elke persoon sy/haar eie eet- en drinkgoed sowel as eet-gereedskap saambring. Lede wie se vanne met **A tot M** begin moet asseblief mengelslaai bring terwyl diegene wie se vanne met **N tot Z** begin vrugteslaai moet bring. **R.S.V.P. aan Derik voor 25 Oktober 2001 [082 4131025 (na-ure)].**

Figuur/Figure 4 *Encephalartos middelburgensis*, **blare is van afgehaalde suiers afgesny en neergegooi / leaves of suckers that were removed were cut off and thrown down.**

Summary

NEWS OF THE TRANSVAAL REGIONAL BRANCH

Report on recent activities:

On 12 May we visited a habitat of *Encephalartos laevifolius* near Kaapse Hoop, Mpumalanga. In this ravine habitat of the species we saw many fine specimens (Colour Figures 14, 16 on pp. 12, 13; Figures 2, 3) but observed every-where also signs of poaching (Colour Figure 21 on p. 17; Figure 4). Note that the leaves on the stem on the right depicted in Colour Figure 16 have already been cut off by prospective thieves. This stem has indeed been stolen two weeks after our visit.

On 9 June we visited the Cycad Hiking Trail near Middelburg, Mpumalanga. This is the habitat of .*E. lanatus* and *E. middelburgensis*, and our aim was to find as many specimens of the latter species on foot. We visited five large specimens (Colour Figures 17, 19, 22 on p. 17; Figures 2, 3), including the "Octopus" plant which was declared a monument a few years ago. Signs of theft were observed at most of the plants. Suckers were removed and their leaves were cut off and thrown everywhere (Figure 4). One of the branches on top of the stem of another specimen has been removed and stolen (Colour Figure 19 on p. 17). Many specimens of *E. lanatus* (Colour Figure 20 on p. 17) were observed as well as good seedling recruiting.

NEW CALEDONIA TRIP, 2 TO 28 OCTOBER 2000

Steve Trollip
P.O. Box 3622, 0250 Brits, R.S.A.

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My wife Lelani and I spent two weeks in New Caledonia where we were able to see about 30 species of palms in habitat but only one *Cycas* species. The trip to New Caledonia was part of the I.P.S. biennial tour. The habitat of *Cycas seemannii* was not part of the main tour but we were very fortunate to be taken to the habitat, where the plants are growing on a steep hillside facing the Pacific Ocean. These cycads are very tall with very good seed production. A little further we came across some plants growing virtually on the beach. This appeared to be almost a cultivated colony of *Cycas seemannii*, but we were assured that it was in fact part of the habitat. New Caledonia's geographical location, about two thousand kilometres east of Sydney, is almost in line with the Queensland city of Cairns.

From the capital of New Caledonia, Noumea, we flew back to Sydney, which was a two-hour flight, and then onto Cairns which was a further four-hour flight. From Cairns we were able to head north to the wonderful tropical resort of Port Douglas and further north into Daintree country and Cape Tribulation. It was a great trip we undertook with our friends Percy and Val Simonsen from Sarina in Old Australia. Also on this trip was the President of the U.S. Cycad Society, Don Kurth from California. We were particularly keen to see *Cycas media* in habitat, it looked as if severe fires had been raging through parts of the mountainous areas that we were driving through. When we finally came across colonies of *Cycas media* they appeared to be in excellent condition. Some plants that had been burnt had started pushing new leaves, we could find no evidence of coning, but we were very fortunate to find seedling regeneration below some mature plants. A little further on we came across some plants that had not been burnt at all; here there was no evidence of new leaf production.

We then moved on to the habitat of *Bowenia spectabilis*. I must confess that seeing these plants in habitat was not quite as exciting as I had imagined, they were very small, mostly one-leafed plants in a very dense tropical forest where the palm *Licuala ramsayii* totally overshadowed almost everthing else growing in that area. Also in this forest we were able to find some quite large specimens of *Lepidozamia hopei*. This particular cycad has been recorded as growing taller than any other species of cycad.

From this wonderful tropical paradise we returned to Cairns, where we visited more great cultivated gardens. The more I see gardens, the more I realize that one hundred man-made gardens does not even come close to equalling even one God-made garden, that would be a natural habitat of cycads.

From Cairns we flew to Darwin via Gove, an Aboriginal settlement almost at the top end of Cape York Penisula. Gove is the locality of the world's largest BAUXITE deposit; it is mined here for the aluminium industry. From Gove we flew across the Gulf of Carpentaria to Darwin where we spent four wonderful days exploring the plant wealth of the surrounding area.

I had a few things to do in Darwin, a few of them being finding and photographing the palm *Gronophyllym ramsayii*, one of about thirty species of *Gronophyllum*, but the only species that grows in Australia, the rest grow in Borneo and Papua and New Guinea. I was also very keen to find and photograph the very slender and beautiful *Cycas armstrongii*. We were able to find this particular *Cycas* in the Darwin Botanical Gardens but we needed to find it in habitat. On our third day we found a few hundred plants growing near the edge of the city. I duly photographed as many different specimens as possible; unfortunately no seed, or evidence of seedling regeneration. I must confess that this was by far the most exciting cycad I had seen on our entire month long trip. I was very lucky to purchase some seed from a merchant in Darwin.

In Darwin we were able to see a lot of evidence of the World War II bombing raids by Japan, also a lot of stories are still told about the devastating cyclone Tracy that struck Darwin about 27 years ago. On our last day in Darwin, Lelani and I were able to spend a few hours on board a pearl harvesting boat.

The following morning we flew back via Alice Springs, Perth and then onto Harare (Zimbabwe) and finally onto Johannesburg. We finally arrived back after a very exhausting 27-hour trip. It was a wonderful 4-week palm and cycad adventure.