ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTH AFRICA

TYDSKRIF VAN DIE BROODBOOM VERENIGING VAN SUID-AFRIKA

NO. 55 SEPTEMBER 1998 ISSN 1012-9987

CYCAD SOCIETY OF SOUTH AFRICA

BROODBOOM VERENIGING VAN SUID-AFRIKA

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COVER / VOORBLAD : ***Encephalartos schmitzii***

Plants in woodland, with some suckers partially exposed.

Photo: Johan Hurter

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FROM THE PRESIDENT

It can safely be assumed that members of the Cycad Society would like to know what is permissible and what is not. This wish is probably reinforced by the incorrect supposition of the well-known proverb "ignorance of the law is no excuse". If ignorance of the law is no excuse it would be the advice of many a cycad collector and dealer, that one has to ascertain what is permissible and what is prohibited. This was also the point of view of the magistrate in the case of the State versus Rabson.

Like many of us, Mr Rabson was a keen collector. He was also a member of two societies that focused on the conservation of plants. In the early seventies he planned to travel to the then Lourenço Marques, obtain some cycads and other plants there and to bring his purchases back to South Africa. On enquiry he was informed by his societies that he would need only an import permit from the Department of Agriculture and Technical Services and an export permit from the Mozambican government. With these permits in his possession and with the cycads clearly vissible on the roof-rack of his vehicle het set out on his journey back to Johannesburg. In Nelspruit an inspector noticed the plants and requested him to produce his permit in terms of section 82 (1) of Ordinance 17 of 1967. In terms of this section permits authorized people to transport listed indigenous plants in the Republic. In response to the inspector's request Mr Rabson produced the permits that he had and told the inspector that he did not need a section 82 permit.

In the case that followed the magistrate accepted that Mr Rabson had indeed believed that the transportation of the plants was covered by his permits. He had just not realized that he also needed a section 82 (1) permit. Nevertheless, the magistrate found that Mr Rabson had contravened section 82 (1) and was liable. Although culpability is a requirement for liability in terms of section 82 (1) and Mr Rabson had no blame because of his misconception it does not excuse him because it was a mistake of law: "Ignorance of the law is no excuse". Fortunately, this extremely unfair verdict was repealed in the appeal to the High Court that followed. This will be discussed in the next issue.

Frederick de Jager

VAN DIE PRESIDENT

Daar kan met veiligheid aangeneem word dat lede van die Broodboomvereniging wil weet wat mag en wat nie mag nie. Hierdie begeerte word moontlik versterk deur die foutiewe aanname dat onkunde aangaande die reg geen verskoning bied nie. "Ignorance of law is no excuse" lui die meer bekende Engelse spreekwoord. As onkunde aangaande die reg 'n mens nie verskoon nie moet mens doodseker maak wat toelaatbaar is en wat verbied word sou menige broodboomversamelaar en -handelaar se standpunt wees. Dit was dan ook die standpunt van die landdros in die saak van die Staat teen Rabson.

Mnr Rabson was soos baie van ons 'n ywerige broodboomversamelaar. Hy was dan ook 'n lid van twee verenigings wat hulle op die bewaring van plante toegespits het. In die vroeë sewentigerjare het hy beplan om na die destydse Lourenço Marques te reis, daar broodbome en ander plante te bekom en dan sy aankope na Suid-Afrika terug te bring. By navraag word hy deur sy verenigings meegedeel dat hy slegs 'n invoerpermit van die Departement van Landbou en Tegniese Dienste en 'n uitvoerpermit van die Mosambiekse regering benodig. Met die permitte in sy besit en met die broodbome duidelik op sy dakrak sigbaar pak hy die reis terug na Johannesburg aan. Op Nelspruit merk 'n inspekteur die plante op en versoek hom om sy permit ingevolge artikel 82 (1) van Ordonansie 17 van 1967 te toon. Permitte ingevolge dié artikel het persone gemagtig om inheemse plante wat op 'n lys verskyn in die Republiek te vervoer. In reaksie op die inspekteur se versoek toon mnr Rabson die permitte wat hy wel gekry het en deel die inspekteur mee dat hy nie 'n artikel 82 permit nodig het nie.

In 'n daaropvolgende saak aanvaar die landdros dat mnr Rabson inderdaad geglo het dat die vervoer van die plante deur sy permitte gedek was. Hy het ten ene male nie besef dat hy daarbenewens ook 'n artikel 82 (1) permit benodig het nie. Nogtans bevind die landdros dat mnr Rabson artikel 82 (1) oortree het en aanspreeklik is. Hoewel skuld 'n vereiste vir aanspreeklikheid ingevolge artikel 82 (1) is en mnr Rabson as gevolg van sy dwaling geen skuld gehad het nie verskoon sy dwaling hom nie omdat dit 'n regsdwaling was: "Ignorance of the law is no excuse". Gelukkig is hierdie uiters onbillike uitslag in 'n daaropvolgende appèl na die Hooggeregshof ongedaan gemaak. Hieroor word in 'n volgende bydrae berig.

Frederick de Jager

FOCUS ON ... FOKUS OP ...

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:

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:

ENCEPHALARTOS SCHMITZII Malaisse

Johan Hurter[1] and Loran Whitelock[2]

[1]Lowveld National Botanical Garden, P.O. Box 1024, 1200 Nelspruit, R.S.A.

[2]4524 Toland Way, Los Angeles, California 90041, U.S.A.

Figure 1 *Encephalartos schmitzii* **in habitat showing usually subterranean habit of the trunk and a large number of suckers. Photo: Johan Hurter**

INTRODUCTION

The discovery and description of this very interesting cycad, starts in 1955. André Schmitz found a single cycad with a subterranean trunk in the extreme south of the Kundelungu plateau in the Shaba province of Zaire,

Figure 2 Female plant with exceptional long trunk of 2m and 1.5 m high. Photo: Johan Hurter.

which was subsequently transplanted to the botanical garden at Kipopo near Lubumbashi, where it produced two male cones (Mallaisse 1969). Ten years passed before a female plant was found in the same vicinity as the first, thus enabling Prof. Malaisse to formally describe the plant as a new species.

During the same time, a well known dentist and amateur field botanists working in collaboration with the then Salisbury Royal Herbarium and Botanical Garden, discovered cycads growing along the Muchinga escarpment in the Northern province of Zambia. Some plants were collected as well and these can be seen in the Harare Botanical Garden. The identity and locality was unknown to the cycad world, until an expedition to the Mpika region of Zambia by Ian Turner and Jean-Pierre Sclavo solved the mystery, but once again only a single very large female plant was found. Herbarium material collected on this expedition enabled Prof. Malaisse to determine the identity of the mystery plant as *E. schmitzii*. This remarkable discovery increased the distribution range of the species some 400 km ESE (Malaisse, Sclavo & Turner, I. 1990).

Subsequent expeditions to Zambia has now firmly established that *E. schmitzii* is not a relict in this area but rather a common and widespread species.

DESCRIPTION

1. TRUNK

Subterranean or sometimes developed up to a height of 800 mm, or reclining up to a length of 1.5 m long in rocky areas, profusely suckering from the base (Front cover and Figures 1, 2), even through rhizomatous root-like structures (this has also been observed in the unrelated *E. princeps*). Up to 50 suckers having been recorded from a single plant (Malaisse, Sclavo & Turner, I. 1990). Leaf bases persistent but often disintegrating at soil level, giving a soft bark-like texture to the trunk, as the contractile root system "pulls" the plant into the soil. Cataphylls apparent, velvety white.

2. LEAVES

Semi-deciduous, crown spreading with 8–25 leaves (Front cover and Figures 1, 2, 5). The leaves, green or slightly glaucous, 450–1200 mm long, becoming yellowish with age. Leaf bases small and slightly triangular in cross-section. Petiole not apparent, the proximal

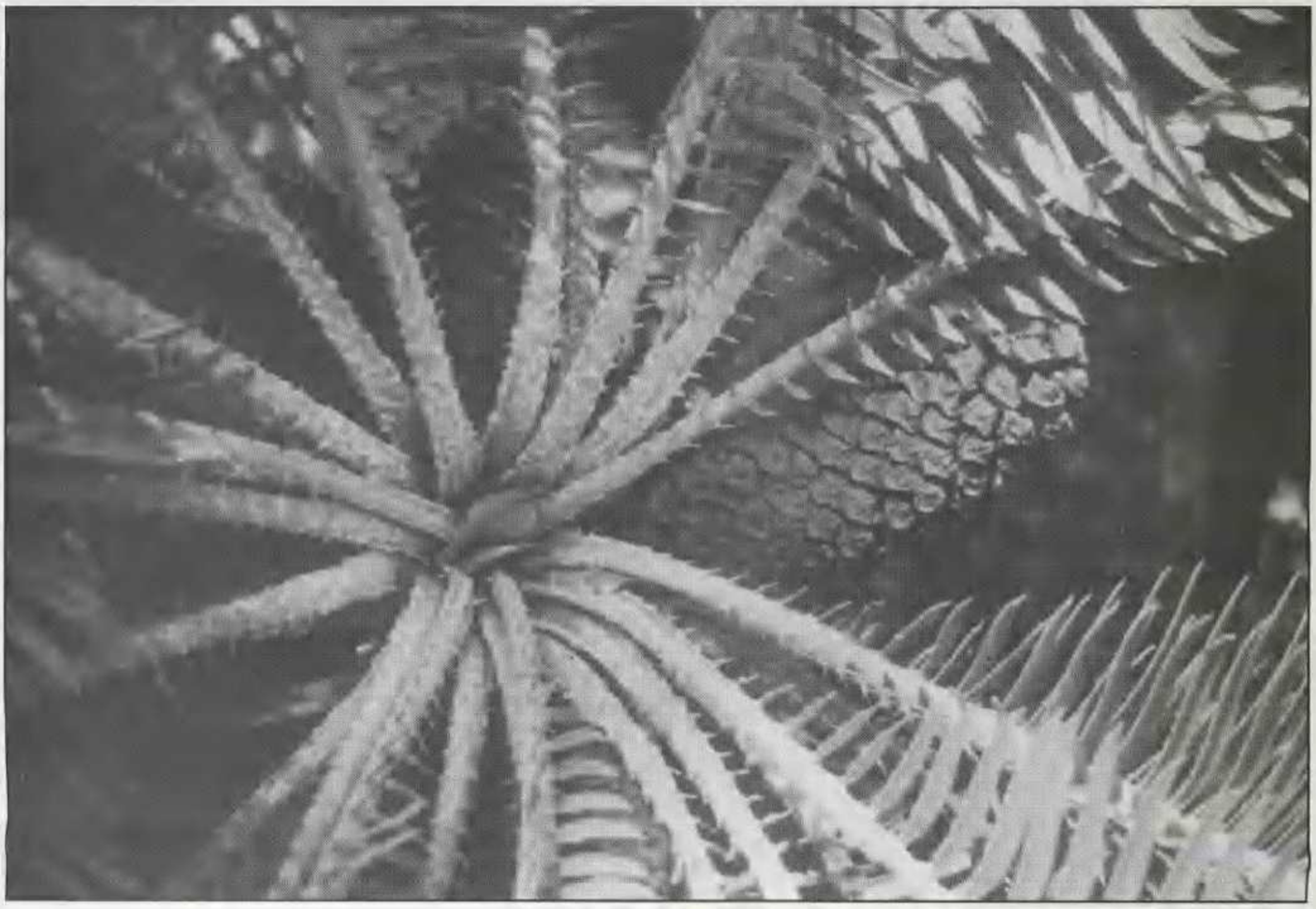

Figure 3 Old male cone and showing pinnae reduced to a series of spines to the base of the petiole. Photo: Johan Hurter

leaflets reduced to a series of spines right on to the leaf base (Figure 3). Rachis straight or recurved, the terminal part often slightly spirally twisted and incurved. Median leaflets, well spaced, obliquely inserted on the rachis (succubously orientated), but not overlapping, inflexed and ascending, 100–150 mm long and 10–15 mm wide, pungent, often sparsely dentate on the anterior margin. Terminal leaflets orientated incubously on the rachis, not overlapping. Leaflet bases slightly decurrently attached to the rachis.

3. CONES

Male cones (Figure 3) on a peduncle 25–60 mm long, seriate or single, small (120–230 mm long and 45–70 mm broad), ovate to narrowly ovate in shape, glabrous, green becoming greenish yellow at maturity.

Female cones (Figure 4) on a peduncle 100–150 mm long, hidden within the cataphylls, ovate, 240–350 mm long and 100–150 mm broad, glabrous, green becoming greenish yellow at maturity.

AFFINITIES

Malaisse (1969) and his subsequent co-authors (Malaisse *et al*. 1990; Malaisse, Sclavo & Crosiers 1992 and 1993) place this species in a group named the *E. poggei* complex, shared with species such as *E. delucanus, E. marunguensis* and *E. schaijesii*. A numerical phenetic study of the genus *Encephalartos* (Osborne, Grobbelaar & Vincent 1993) places *E. schmitzii* and *E. marunguensis* in a group called the "Eugene-maraisii" group and *E. poggei* in a so-called "villosus" group. Goode (1989) states that *E. schmitzii* and *E. marunguensis* are obviously related. Oberprieler (1995) speculates that the so-called *E. marunguensis* complex probably also includes *E. bubalinus*. Personal *in situ* and *ex situ* observations by the senior author clearly indicate that *E. schmitzii, E. delucanus* and *E. marunguensis* are related or maybe even conspecific taxa. The affinities of *E. poggei* also having similar decurrently attached leaflets, probably also being with this group, but being a well differenciated species in the group. The affinities with *E. bubalinus* more probably lying with the recently described *E. equatorialis* (Hurter & Glen 1995).

Figure 4 *E. schmitzii* **female cone. Photo: Johan Hurter.**

Figure 5 *E. schmitzii* **plants among quartzite boulders in Miombo woodland. Photo: Johan Hurter.**

DISTRIBUTION

The distribution in nature, broadly follows the catchment area of the Luapula River, plants having been recorded from both areas east and west of the main river.

ECOLOGY

Plants grow scattered or in colonies of up to 200+ individuals at altitudes of 1000–1400 m in sandy quartzitic soils. The vegetation consists of semi-deciduous Miombo woodland (Front cover and Figures 2, 5), dominated by *Brachystegia* sp., *Cryptosepalum* sp. and *Julbernardia* sp. Occasional quartzite ridges dot the landscape and it is here that plants attain there greatest stature (Figures 1, 2, 5).

As far as this cycad's life history is concerned, it clearly falls within Donaldson's Type 1 or persister category (Donaldson 1995) Cycads in this category all have a large number of basal suckers with relatively short individual stems. These individuals are long lived and, in at least females, a single cone is produced per trunk. Sexual reproduction is infrequent through seed mastings in response to environmental cues such as fire or rainfall. Persisters are generally associated with seasonally dry areas such as woodland, grasslands or thicket vegetation.

In this species vast numbers of seed is produced in mast years with a density dependent mortality rate (at least in certain protected areas), seedling survival is further complicated by annual or even bi-annual fires. In certain localities no fertile seed could be found in a mast year which leads one to speculate that this cycad's pollinator may be in extreme danger of extinction. It may be possible that the uncontrolled burning of these areas may have eliminated the pollinator in or on some other habitat, where it spends time in the dry season. There is also no evidence that fire actually stimulates cone formation but that masting must be dependent on some other environmental cue.

CONSERVATION

As is probably the case with most conservation efforts in the Democratic Republic of the Congo, it can be described as non-existent. Zambia is a co-signator of CITES and as such is compelled to protect and regulate the trade of *Encephalartos* species. Although not uncommon in nature and probably less threatened than other African species, the lack of recruitment, collector activities and the obsessive burning practices in the area raise concern for its long term survival but should be considered with the observed life history of the species. Considerable collector activity has already been noticed at one locality and the original plant found by Turner and Sclavo has just about had all its suckers removed. Large populations of this species occur in the vague buffer area abutting the strict North Luangwa Reserve and is thus well protected.

This species in my opinion fortunately, does not qualify for the criteria for Critically Endangered, Endangered or Vulnerable and should be classified as Lower Risk and

Near Threatened (Mace *et al.* 1992), based on life history and numbers in the wild.

CULTIVATION

Not much is known about the cultivation of this species. A few specimens are in public and private collections. As is the case with most grassland, or in this case, woodland species, plants generally don't make good horticultural subjects. These are plants only for the most avid collector.

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ARTICLE / ARTIKEL

ENCEPHALARTOS TURNERI

Ian S. Turner
Springs Gardens, P.O. Box CH 613, Chisipite, Harare, Zimbabwe

Received 6 July 1998

Many years have passed since I first saw *Encephalartos turneri* growing near Nampula in the North of Mozambique. I have often though about returning there but until quite recently it has not been possible for security reasons. However, of late, the position in Mozambique has changed for the better and travelling in that country is not dangerous, so a friend and I decided to go to the Nampula area to look at the cycads there and if possible, get some seeds.

Some of the roads in Mozambique are not very good and distances between towns quite far so we decided to go by air. That way we could get there in a few hours whereas by road it would have taken at least two days of hard driving.

We arrived in Nampula airport and we were lucky to find a car hire firm with four-wheel drive vehicles for hire, and even more lucky to have one with a driver who could speak a language I could understand. Everyone speaks Portuguese in Mozambique and, of course, their own tribal language so it is hard to find any one who can understand English, and in the smaller villages not possible at all. Our driver had lived in Malawi and since

there are many Malawians in Zimbabwe, I have learnt their language.

Figure 1 *E. turneri* **growing where some soil has built up.**

Figure 2 The area area around Nampula is dotted with big granite hills. To the right of the *E. turneri* **a specimen of** *Aloe mawei* **in flower can be seen.**

Figure 3 Fire sweep over the mountains and the *E. turneri* **get burnt.**

We got ourselves booked into a good hotel, something I did not expect to find in Nampula because the town is in a pretty poor state of repair after all the turmoil of a civil war.

The next day found us headed out in the direction where I had found the cycads growing. We stopped along the way and asked people if they knew the cycads and if so are seeds available. Most people knew the plants and

Figure 4 *E. turneri* **with an old male cone.**

Figure 5 *E. turneri* **female cones.**

said they would look for some seeds for us. The first time I was in that area there were no people living around there but now the road is lined with houses and cultivated fields.

The area around Nampula is relatively flat, but dotted all over the landscape are very big granite hills and it is on these hills where *E. turneri* grows – right out in the full sun. We climbed to the top of one of the hills and found the cycads growing where there were cracks in the rocks or where there were pockets where soil had built up over the years (Figure 1). Short grass and an *Euphorbia* species grow there, and in full flower were *Aloe mawei*, both red and orange colours. It was a very beautiful place. The cycads with their dark green leaves and the bright flowers of the Aloes and the view was quite spectacular also (Figure 2).

Figure 6 At the second locality where *E. turneri* grows the clouds drift off the mountain slowly in the morning.

Figure 7 *E. turneri* **high up the mountain in full sun.**

It was winter and the dry season so the grass was all very dry and although quite sparse in places, bush fires sweep over the hills most years and the cycads are not left unscathed (Figure 3).

It had been a good year for coning (Figures 4, 5) but quite a lot of the seeds were unfertile so pollination was not very good on that particular hill and there were not many young plants around either. So even seeds which are viable are usually unable to find a place to grow, so to collect the seeds and grow them in cultivation is certainly a very good thing to do.

I had heard about cycads growing on a mountain which is about three hours drive from Nampula, so we decided to leave early the next day to check it out. We were on

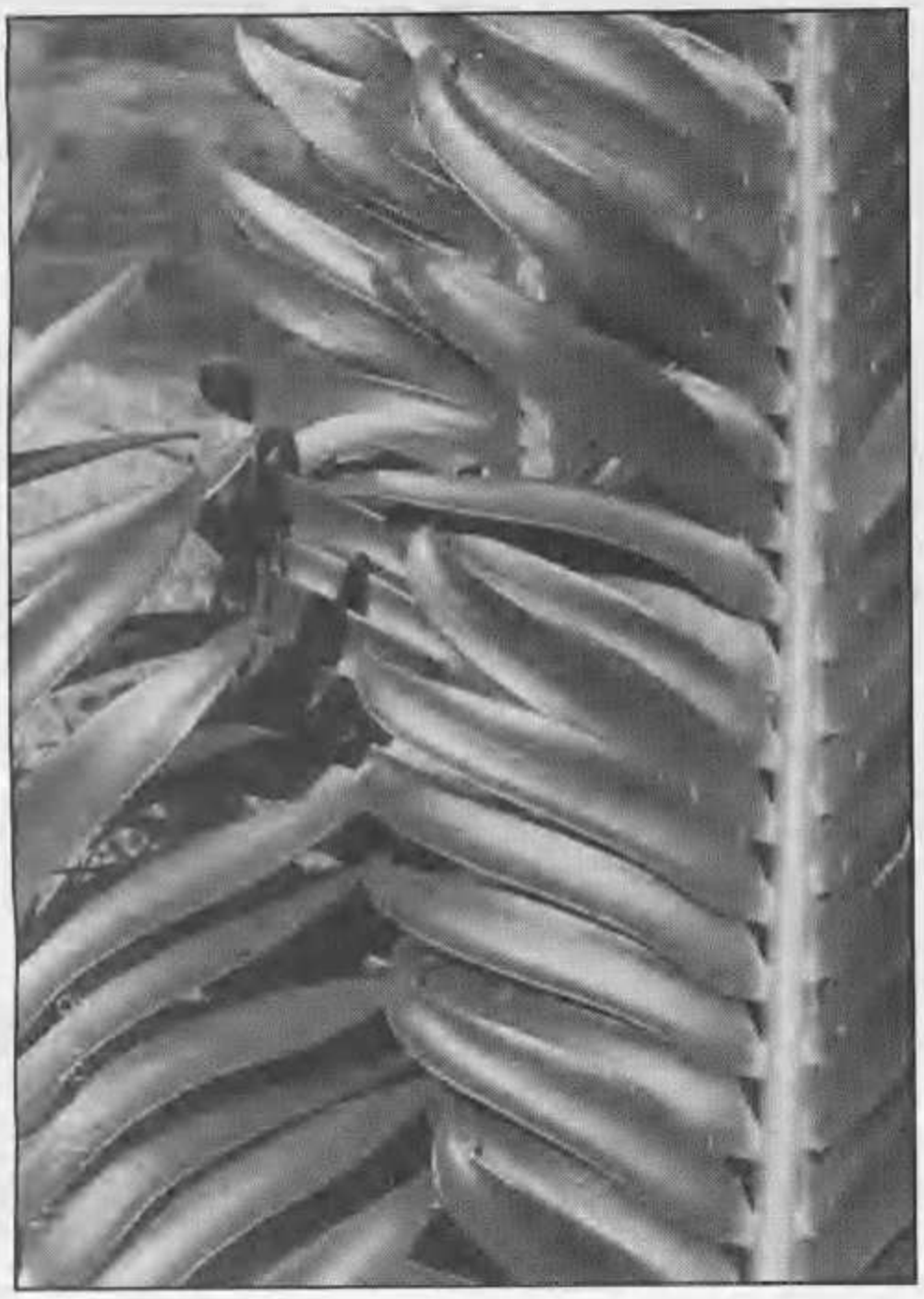

Figure 8 The leaves of some *E. turneri* have leaflets with hooks on their ends.

Figure 9 The leaves of some other *E. turneri* have straight leaflets without hooks on their ends.

our way by 6 a.m. and when we arrived at the mountain, some of it was still covered in early morning mist (Figure 6). We drove around and asked if anyone knew about the cycads and eventually found a young fellow who said he could show us where they are growing. This mountain was very big and high and not like the ones around Nampula. After quite a hard climb, we got to a flat area and saw our first cycads (Figure 7). We had a good look around and found more cycads on quite a steep face. One plant had a female cone and I saw that the seeds were yellow whereas the plants at Nampula (Figure 5) all have red seeds and their cones are very much bigger. We carried on looking around and found a place where a female cone had broken up about a month previously. The seeds were scattered over quite a large area, all completely cleaned of the sarcotesta. Most of the seeds were under clumps of grass where they must have been carried by rodents, but some had rolled down over the rocks to lodge in cracks. It was a very high and steep place and I am sure some of the seeds must have made it right over the edge but the only place cycads were found growing was on the mountain top. It would seem logical that over the thousands of years the plants would gradually move down the slopes as the seeds go down but it is never that way. Why, I do not know but maybe at the foot of the mountain the bush fires are too fierce for the cycads to establish. This, however, would not be the case halfway up because there is still just rocks like on top. Anyway, how did the cycads get to the top of the mountain in the first place?

We returned to Nampula and the next day went to try to find the place where I first saw the cycads growing about 20 years ago. We searched the area thoroughly but could not find a single plant. Some of the plants I had seen there were really big specimens with trunks about 3 metres long lying on the rocks. I was only able to conclude that the local people had made use of them for food when they were hungry. It seems as if cycads are only used as a food as a last resort. It takes quite some time to prepare the starchy pulp and get rid of the toxins before it can be eaten and then I think it must have a taste of its own which one has to get used to.

I found the leaves of the cycads quite variable. All the specimens I had collected from the small colony I originally found had leaflets with a positive hook on their ends (Figure 8), but this is not the case with all the populations. On some of the other plants the leaflets are straight (Figure 9).

It was a pity that only one cone was found at the colony

which have the yellow seeds because that cone was not like the ones from Nampula, but with a single cone it was not possible to make a true comparison. I have, however, noticed that seedlings from the yellow seeds seem to have a glaucous sheen on their leaves whereas the others are just dark green.

I was pleased to see that *E. turneri* was growing on quite a few of the hills around Nampula and although not in very large numbers they seem to be holding their own with some young plants seen growing. Because a female plant can produce cones for very many years, should only one seedling become established every ten years from that one plant that would keep the colony growing. That is of course as long as a collector does not come along and dig up a whole lot of plants because once the plants are gone that is for ever. This is not the case with collecting seeds because hundreds of seeds can be taken and distributed to anyone who is interested, then plants from these seeds will be in cultivation world wide. There would then be no need to collect plants from habitat and in fact no need to collect more seeds because there would be no demand for them. There is a limit to the number of seeds which can be distributed, simply because once the collectors who are interested get their plants there would be no need to make further collections of seed.

In cultivation *E. turneri* likes to be in a bright sunny place where the soil is rich and very well drained, although they grow in a seasonally dry area, as in fact do most *Encephalartos*, they benefit from some water during a prolonged dry spell.

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Dear Editor

FOCUS ON ARTICLES

I look forward to receiving and reading each issue of "*Encephalartos*" with great anticipation. The wealth of knowledge that our members possess concerning cycads is truly amazing. I have learned quite a bit about cycads from reading each issue cover to cover.

However, recently I received the March 1998 issue and immediately noticed that my favourite column (Focus On) was painfully absent for the first time in the 53 issue history of the journal. I understand the reasons for this as was stated on the requests page.

Furthermore, I wanted to express my appreciation to all of the past contributors on the Focus On articles as they have been very educational. As a reader, this column is very beneficial; I believe it is the most beneficial column in the journal. In addition, I am hopeful that with all of the expertise of our members, this educational column might continue without absence in the future for the benefit of all members who share a common appreciation for these magnificent plants.

Sincerely,

***Scott Gordin**, 411 W. Lambert # 402, Brea, CA 92821, U.S.A.*

Received 18 May 1998

[I hope this letter will inspire some readers to write and send in "Focus on ... " articles. I thank Johan Hurter and Roy Osborne who have already sent articles though their names do not even appear in my requests list. - **Editor.**]

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Dear Editor

***DIOON EDULE*: ATYPICAL LEAVES**

In *Encephalartos* **53**: 24–25 Andre Cilliers reported on abnormal leaves in what he called *Dioon edule*. From the photographs this is almost certainly not that species, but probably *D. mejiae*, as manifested by the relatively wide and overlapping leaflets.

***Piet Vorster**, Botany Department, University of Stellenbosch, Private Bag X7, 7602 Matieland, R.S.A.*

Received 20 May 1998

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Dear Editor

RE: *MACROZAMIA COMMUNIS* - FORKED LEAFLETS

I have been propagating *Macrozamia communis* cycads and the first leaf of one of the seedlings had some leaflets which were forked as seen on the photograph (Figure 1). All the leaflets on the other leaves are normal so far. Could this be the result simply of environmental conditions or a mutation of the leaflets? Another *Macrozamia* species, namely *M. diplomera* has leaflets forked once into two segments on the entire leaf.

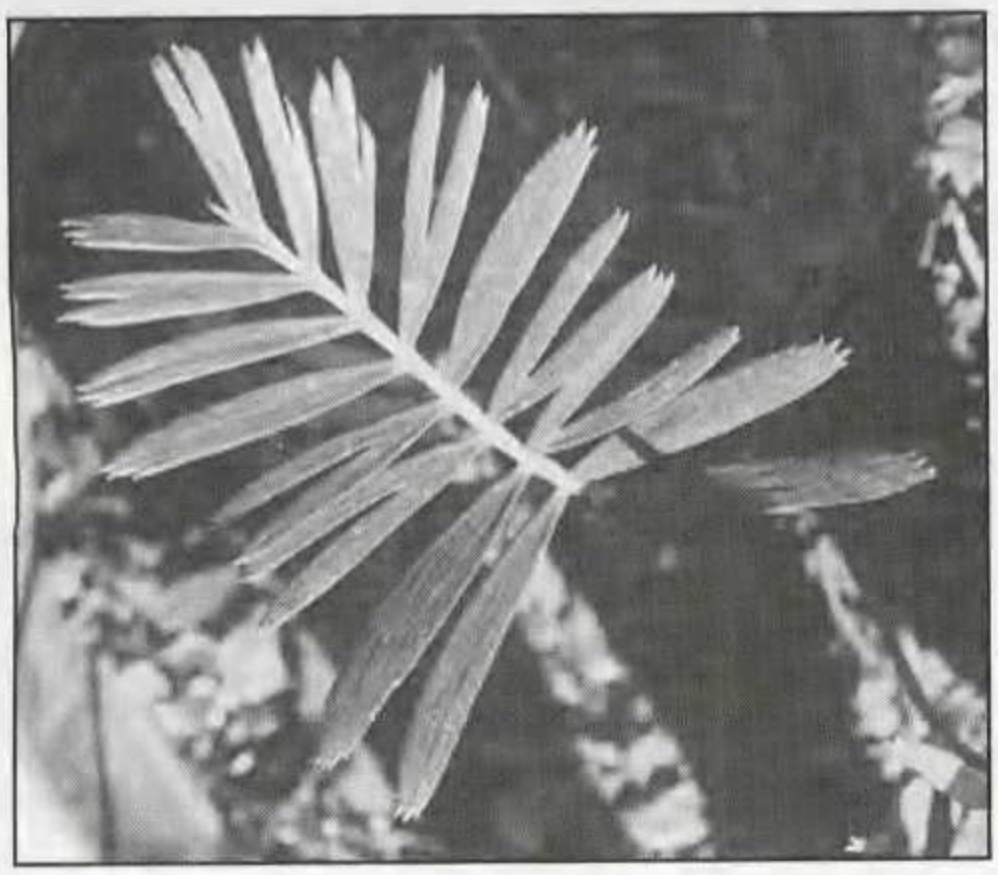

Figure 1 First leaf of the *Macrozamia communis* showing forked leaflets.

Could any of the other readers explain why this happened and whether they have perhaps had similar experiences with cycad seedlings?

Johann Nieuwoudt, P.O. Box 292, 0232 Skeerpoort, R.S.A.

Received 4 May 1998

[I had a similar experience with a seedling of *Encephalartos arenarius*. At the end of October 1994 I put out some seeds to germinate, and the first leaf of one of the seedlings had forked leaflets (Figure 2). I cannot explain why this happened, but perhaps we should look for the answer in the report mentioned by Piet Vorster (see Piet's letter below). Since this first "abnormal" leaf the *E. arenarius* seedling has produced another six leaves, one at a time, and all of them are normal. - **Editor.**]

Figure 2 Line-drawing of the first leaf of the *Encephalartos arenarius* seedling.

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Dear Editor

FUSED AND BRANCHED CYCAD LEAFLETS

In view of various reports in ENCEPHALARTOS of fused and branched cycad leaflets, the following additional report may be of interest:

Chavan, A.R.; Bedi, S.J.; & Sabins, S.D. 1962. Observations on some abnormal pinnae of Cycas. J. Maharaja Sayajirao University Baroda 11(3): 61–62. [Mainly fusing and branching of pinnae].

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

Received 9 July 1998

[I don't think it will be easy to obtain a copy of this

report since it has been published 36 years ago, and it seems to me as if "J. Maharaja Sayajirao University Baroda" is an address rather than the name of some kind of magazine. According to my old "Philips' College Atlas" Baroda is a city near the Gulf of Cambay on the east coast of India. Perhaps Piet Vorster would be so kind as to summarize the report for us. - **Editor.**]

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Dear Editor

CLARITY OF THE SUCKER/BASAL OFFSET ISSUE

Despite numerous efforts to clarify the issue of basal suckers with other enthusiasts and, in fact, the law, I have still come up with very few satisfying answers. According to Ordinance 12 of 1983 (to my knowledge the only legislation concerning protected plants), protected plants or specially protected plants may not be transported, picked, etc., without permits and so on. Most of us are familiar with this. The Ordinance, however, makes no mention of a **PART** of a plant. After six years of studying natural science I cannot in my mind accept that a basal offset is an entire plant. It is **PART** of a plant the same way a cutting or "steggie" is a part of a tree or bush and if removed, the original plant/bush/tree is still just where it was, unharmed and unremoved. According to the author of "Cycads of the World" (page 179), "A few species produce offsets from the trunk and these can also be used successfully for propagation. Although they lack roots these portions can be induced to grow if handled carefully." As in my previous letter I ask again: How are collectors supposed to work with basal offsets? Strictly, according to Ordinance 12, there is no need for any documentation, except perhaps a letter of donation from the owner. In Gauteng, apparently suckers are treated in the same way as seedlings. What then if the sucker is more than 15 cm in diameter? How are collectos to know how to work with the suckers if no Ordinance covers the topic? Does the law expect such information to be passed on by word of mouth? To my mind, and after a rather in-depth study of the matter, anybody handling a sucker which was legally given to him, cannot possibly be acting outside the law. The law apparently does not see it this way.

Still confused

Andre Cilliers, P.O. Box 351, 2520 Potchefstroom, R.S.A.

Received 3 June 1998

[In South Africa, as far as I know, all cycads with a stem diameter of 15 cm or more are regarded as mature plants, irrespective of their origin as either seedlings or suckers (after the latter have been removed from the parent plants). The Nature Conservation Authorities in Gauteng, KwaZulu-Natal and the Western Cape receive complimentary copies of "*Encephalartos*" and I kindly request the officials concerned to clarify the issue of basal suckers in reply to Andre Cilliers' questions. - **Editor.**]

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Dear Editor

RESPONSE TO MAANS KEMP'S LETTER (which appeared in *Encephalartos* **54**: 32–33 June 1998):

It is nice to know that Maans Kemp, former Editor of "*Encephalartos*" who started it, got it printed, and sent it our single-handedly in the early days of the Society, is keeping tabs on us. In reply to his query in *Encephalartos* **54**: 32–33 about the status of certain names for cycads, we offer the following

- *Ceratozamia spinosa*: The origin of this name could not be traced. It was listed by Pienaar (1971), but is apparently not a valid name.
- *Cycas desolata*: described from Queensland, Australia, by Society member Paul Forster in 1995.
- *Cycas diannensis*: described from China by Guan & Tao in 1995.
- *Cycas elonga*: the origin of this name could not be traced.
- *Cycas ferruginea*: a new species from China, described by F. Wei in 1994.
- *Cycas guandongensis*: not a validly published name. The correct name is *C. fairylakea*, according to F. Wang *et al.*, Cycads in China p. 57 (1996).
- *Cycas jenkinsiana*: described by Griffith in 1854. Hill (1995) lists it as a synonym of *C. pectinata*.
- *Cycas micholitzii* var. *stonensis* (not *stenosis* as used by Tang, Handbook of cycad cultivation and landscaping, p. 16 (1995): the name apparently originated in a paper by Walters & Yang (1994), but was never validly published.
- *Cycas multiovula* (not *multiovata*): described from China by D.Y. Wang in 1996.
- *Cycas norstogii*: Maans Kemp misread his own handwriting. The reference is to *Cycas nathorstii*, an apparently valid species from Sri Lanka described by Schuster in 1932.
- *Cycas undulata*: a mysterious species described by Gaudichaud-Beaupré in 1829. According to Hill (1995) it may be synonymous with *Cycas balansae*.
- *Macrozamia lucida*: a good species described by L.A.S. Johnson in 1959.
- *Zamia cupatiensis*: described from the Amazon basin by Ducke in 1922. It is a synonym of *Z. ulei* according to Stevenson *et al.* (1995: 62).
- *Zamia jirijirimiensis*: described from Colombia by

Schultes in 1953. It is a synonym of *Z. lecointei* according to Stevenson *et al.* (1995: 62).

- *Zamia kickxii*: from Cuba, stated to be a synonym of *Zamia pygmaea* by Stevenson (1987), but considered a separate species by some collectors.
- *Zamia lindenii*: from Ecuador. According to Stevenson et al. (1995: 62) this is a synonym of *Z. poeppigiana*.
- *Zamia monticola*: described by Chamberlain in 1926, but not seen subsequently.
- *Zamia obidensis*: described from the Amazon basin by Ducke in 1922. It is most probably a synonym of *Z. lecointei* according to Stevenson *et al.* (1995: 62).
- *Zamia ottonis*: stated to be a synonym of *Z. pygmaea* by Stevenson (1987).
- *Zamia sylvatica*: described by Chamberlain in 1926. It is probably a synonym of *Z. lecointei* according to Stevenson *et al.* (1995: 62).

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

Received 9 July 1998

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Dear Editor

MEMORIAL SERVICE: TED AND CYNTHIA GIDDY

A memorial service for Ted and Cynthia Giddy was held at Cycad Centre on 11th July 1998. Advertisements and articles were placed in the newspaper by the two daughters Caitlin and Janet. At 10:30 Pastor Jock Brown and his wife gave a very good service, and also of the 110 people who came to pay their respects, many of them at lib got up and gave testimonies of Cynthia and Ted's colourful lives. It was not a sad service, it was one that touched the heart but also had its funnier and lighter sides and was enjoyed by one and all. The staff came along and sang two hymns and the pastor, being fluent in Xhosa, was able to give them a few words of comfort.

I am including the eulogies from both daughters for both parents, asking that you could please print it as many persons who were here asked for copies, and I felt that perhaps the "overseas circle" of cycad collectors might also enjoy knowing more about these two people. [I have complied with your request but as the relevant newspaper clipping "Growing up among the cycads" appears on p. 32 of this issue, I have left out some parts in the daughters' tributes that also appeared in the clipping to avoid duplication. Therefore, I recommend that readers should read the newspaper clipping before reading the tributes at the end of this letter. - **Editor.**]

One of the testimonies was: How Cynthia in her bad temper had one day chopped a cycad collector to the ground with her tongue and someone asked her later "You know you actually have a good and small heart, why do you do these things?" - she replied: "Professional and famous people are not always popular, so therefore I am keeping up with my reputation".

The other was that they were more or less atheists. Ted belonged to the commandos and they were doing a dummy run where they had to search cars for terrorists and everyone in the commando was told not to search boots immediately, but to start off with the rest of the car. Ted in all his wisdom opened the boot and out jumped a terrorist. Pastor Brown, who was present, said that Ted's first words were "Oh my G..", and the pastor said that goes to show that everyone looks for his Lord when there is trouble, and finds Him.

Avis Meresman, Cycad Centre, P.O. Box 45, 3730 Umlaas Road, R.S.A.

Received 17 July 1998

Caitlin: TRIBUTE TO CYNTHIA GIDDY

Remember also thy Creator in the days of thy youth
or ever the evil days come,
and the years draw nigh,
when though shalt say,
I have no pleasure in them
or ever the silver cord be loosed,
or the golden bowl be broken,
or the pitcher be broken at the fountain,
or the wheel be broken at the cistern,
and the dust return to the earth as it was,
and the spirit return unto God who gave it.
Ecclesiastes 12: 1–7

I have read you that passage because I think it expresses some of the desolation my sisters and I feel having lost not one, but two parents in a very short space of time.

But then a friend wrote to me and said "We can't feel saddened over the loss of those we love without first remembering the joy of loving them. The real sadness would have been never having had them in our lives at all. We who have truly loved are blessed. Remember everything."

The last six weeks have been a time of great anguish for us. Looking back on it, it was a time of hope and despair. And in the end we came to the calm acceptance that we had to let her go.

Cynthia Theron was born in Cradock on the 20 th of September, 1934, at home. Her mother was a school teacher and her father a journalist. She was the oldest of three children and an adopted sister. She attended Rocklands School in Cradock up to Std 6, and then completed her schooling in Cape Town at Jan van Riebeeck High School. In 1952, at the age of 17, she began her degree at Rhodes University, Grahamstown, where she spent four happy years. At the end of 1955 she graduated with an honours degree, majoring in Psychology and Social Anthropology, both of which were confirmed on her *cum laude*.

She was also awarded an overseas scholarship which she regretfully declined and married my father in December of that year. They actually married each other twice in the space of a week, once was an elopement and the other a large society wedding to please the family.

The first year of their married life was spent in Port Elizabeth, where my mother worked for the Mental Health Society in a day care centre where mentally and physically disabled children were cared for, to give their families a break. My mother enjoyed the work and several of the people in her care learned social skills they'd never had, such as feeding themselves, dressing themselves and doing simple handwork.

The following year my parents lived in London. My mother taught a class of young female troubled teenagers. They often evaded their social workers.

A wonderful holiday in Norway, a romantic Christmas Eve, and suddenly they were going to be parents.

They returned to South Africa and I was born in 1958, Janet in 1959 and Louise in 1961. One last try for a son resulted in Laurel in 1967.

My parents moved down from Barkly East to a farm called "Hillside" near Maclear. My mother soon established a magnificent garden, with great sweeping stretches of gladiolii interspersed with fine elliot grass. They also ran an Afrikaans holiday farm where school children came in the holidays to learn Afrikaans.

After she became concerned in cycads, when residing in Natal, my mother was an office bearer for various conservation groups and was often called in to help with investigations. She then later testified against people prosecuted for the illicit possession of cycads. She had the courage of her convictions, and in court, when cross-examined by very aggressive Defence Councils, stood her ground, with calm assurance. Between June 1990 and June 1991, she was involved in 23 operations with the Conservator Investigation Unit. She gave invaluable support to the Natal Parks Board in its efforts to control the illegal trade. She was instrumental in running numerous training courses for Parks Board officers, in teaching them to identify cycads.

She served on several committees, the Natal Parks Board, the KwaZulu Bureau of Natural Resources, and she served on the International Union of the Conservation of Nature/Species Survival Commission/Cycad Specialist Group. She attended meetings all over the world including Nice, Brussels, Chiang Mai in Thailand, San Miguel de Allende in Mexico, Kew Gardens, and Malawi.

In her private life she enjoyed making miniatures and in the last twenty years has derived enormous enjoyment from building and furnishing dolls' houses. She was a superb cook who loved experimenting with different ethnic styles. She devoted almost forty years to researching the Giddy family tree, back to 1820. She loved to travel and when in England especially enjoyed researching tombstones and church records for family connections.

My mother had a nomadic spirit with an insatiable zest for travel. She had a great interest in other cultures. Her diminutive stature housed an enormous personality and it seems ironic that her body failed her, she lived with chronic pain for the last ten years. Her hip replacement in 1994 left her with less pain, but a pronounced limp and a great fear of falling.

My mother was an author, lecturer, horticulturalist, nursery woman, botanical photographer, miniaturist, philatelist, gourmet cook, genealogist, globe trotter, social anthropologist and historian. She had a formidable intellect and temper, and didn't suffer fools gladly. She was a strong woman, who came from a line of strong women, and from her, stretches a line of strong women.

Janet: TRIBUTE TO TED AND CYNTHIA GIDDY

My parents were variously described as being like the sun and the moon (one all powerful and the other gentle), the hillbillies, and by the sons-in-law as

the outlaws! No one who ever stayed with them or met them ever forgot them.

My mother was a bit like Joan of Arc in her tireless crusade to protect cycads by fighting for better legislation, uniform legislation in all the provinces, and end to political favours allowing people to export illegal cycads, and fervent in her assistance to the conservation authorities. She appeared on the TV News reports on the various cycad cases - one memorable one where she followed the accused out of the courtroom, he beaming happily to be on TV and Cynthia glowering thunderously at the ridiculously light sentence. She appeared on 50/50 often promoting the conservation of cycads, particularly the replanting of a huge consignment stolen out of the wild. They were re-planted in a particularly inaccessible gorge and had to be flown in and suspended under a helicopter, she loved being on board and surrounded by the guys. Filming another segment for 50/50 she was accompanied by a famous film actor. When a bee crawled into his shorts and stung him on a sensitive spot, she was able to assist She whipped out her anti-histimine tablets and cream, whipped off the shorts and did first aid. The out takes from that day's filming are reputed to be histerically funny.

My father enjoyed more simple pleasures - buying vegetables at the municipal market being one of his favourite pastimes. His gentle, mischievous personality made him a firm favourite with all the market agents. He ended up buying for his immediate family, then all the staff on the farm, then the shop at Umlaas Road and finally for most of his friends. He was passionate about his jam making to which he applied his usual creative flair and using the recipe as a vague guide, made superb jam.

Dad loved duck in orange sauce and he is reputed to have eaten 48 half ducks at Els Amics - their favourite restaurant in Pietermaritzburg, until his doctor read him the riot act about cholesterol. He would often whistfully comment that he nearly made his 50 half ducks. Roy Travenor would come to the table and say "Oh well, I know what you're having!"

Cynthia once foiled a bag snatcher in a small shop in East Street. She had a large purse with a strap around her wrist and the assailant grabbed the purse. The shop had hessian sacks of dried beans, dhall, chickpeas, etc., arranged around the doorway and in front of the counter. An enormous fight broke out with the two of them pummelling and shouting at each other, and the Indian shopkeeper shouting as they fell over sacks and the pulses and dried beans were strewn everywhere, and everyone rolling around on the floor being watched by a delighted crowd.

My mother had a formidable temper - as various shopkeepers around Maritzburg will attest. As will members of Telkom and the Post Office who experienced her wrath on many occasions. She bought a fancy fax and answering machine, which wouldn't work on the farm line. Everyone heard about it, from the technician right to the Minister of Telecommunications! It took some time - but her fax machine eventually worked perfect. Her tirades were legendary and several were recorded by the relevant authorities when she reported her phone out of order for whatever reason from lightning to arson.

My parents went to the Far East in 1974 and were accompanied by Barbara Jeppe and Anne van Rooyen. My father was assured of great prestige as most people assumed he had four wives. Anne van Rooyen was my shool-teacher in Std 4 and she became a great family friend and spent most Sundays with us on the farm, this went on for about 25 years. Sundays were for lounging on the verandah, surrounded by successive generations of bulldogs and pugs, and reading all the papers all day.

OBITUARY

TED AND CYNTHIA GIDDY.

It is with great sadness that we record in this issue of "*Encephalartos*" the deaths of Ted and Cynthia Giddy. Ted (68) was killed in a collision with a truck near Port Elizabeth, on May 15, 1998. Cynthia (63) was critically injured in the accident, fought a valiant battle for survival in Livingstone Hospital in Port Elizabeth, but lapsed into a coma and passed away on June 16. It is of little comfort to know that the driver of the truck was arrested for drunken driving and has been charged with culpable homicide.

Ted and Cynthia were a colourful, well-respected, dynamic albeit somewhat controversial couple. Many of our readers will have experienced their wonderful farm-style hospitality at their Umlaas Road nursery in KwaZulu-Natal; others would have had the pleasure of hosting Cynthia during her many national and international travels. The couple met as students

Figure 1 Cynthia Giddy demonstrates artificial pollination techniques at a meeting of the Natal Regional Branch of the Cycad Society of South Africa, April 1989.

at Rhodes University, Grahamstown. They moved to Natal to establish their well-known cycad nursery. Apart from her passion for cycads, Cynthia and Ted shared a host of other diverse interests: cacti and succulents (especially Aloes), caudiciform plants, orchids (especially Epidendrums), breeding bulldogs, photography, painstaking construction and furnishing of intricate dolls' houses and community work. Cynthia became internationally renowned when she published "The Cycads of South Africa" in 1974, revised and reprinted in 1984.

Cynthia embarked on a relentless battle against plant poachers in South Africa, becoming deeply involved with both the local and the international conservation bodies, and holding positions of influence with groups such as the IUCN's Plant Group, the Cycad Specialist Group, The Natal Parks Board and the Cape Nature Conservation Department. She was a forthright and uncompromising critic of whatever she considered anacceptable. She was generous in sharing her knowledge (Figure 1), giving countless lectures, radio and televison presentations and writing copiously for newspapers and magazines. A great linguist (she spoke perfect English, Afrikaans and Zulu to my knowledge), she astonished me at the First Cycad Conference at Beaulieu sur Mer in France 1987 by delivering an opening address in perfect French. A participant in the Australian Cycad Conference in 1990, she was a key player in the organisation of the Third Cycad Conference in South Africa in 1993.

No-one could have been a more complimentary partner to Cynthia than Ted Giddy. The perfect gentleman on all occasions, he was a man of great intellect and infectious humour. I remember him as a wonderful host and a welcome guest; many were the times we spent with the vernacular, vivacity and vino (Chateau de Cardboard Box, Ted would call it). Ted and Cynthia "retired" from the nursery business in 1996, to move back to their home Province, settling near Bathurst where they soon became involved in community affairs.

Although Cynthia and I had bouts of friction (quite dramatic at times), the Giddy family and our family became very dear friends and we will miss them immensely. We join the whole cycad community in expressing our heartfelt sympathy to Janet, Louise, Caitlin and Laurel and their families. "Hambani kahle" Cynthia and Ted.

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

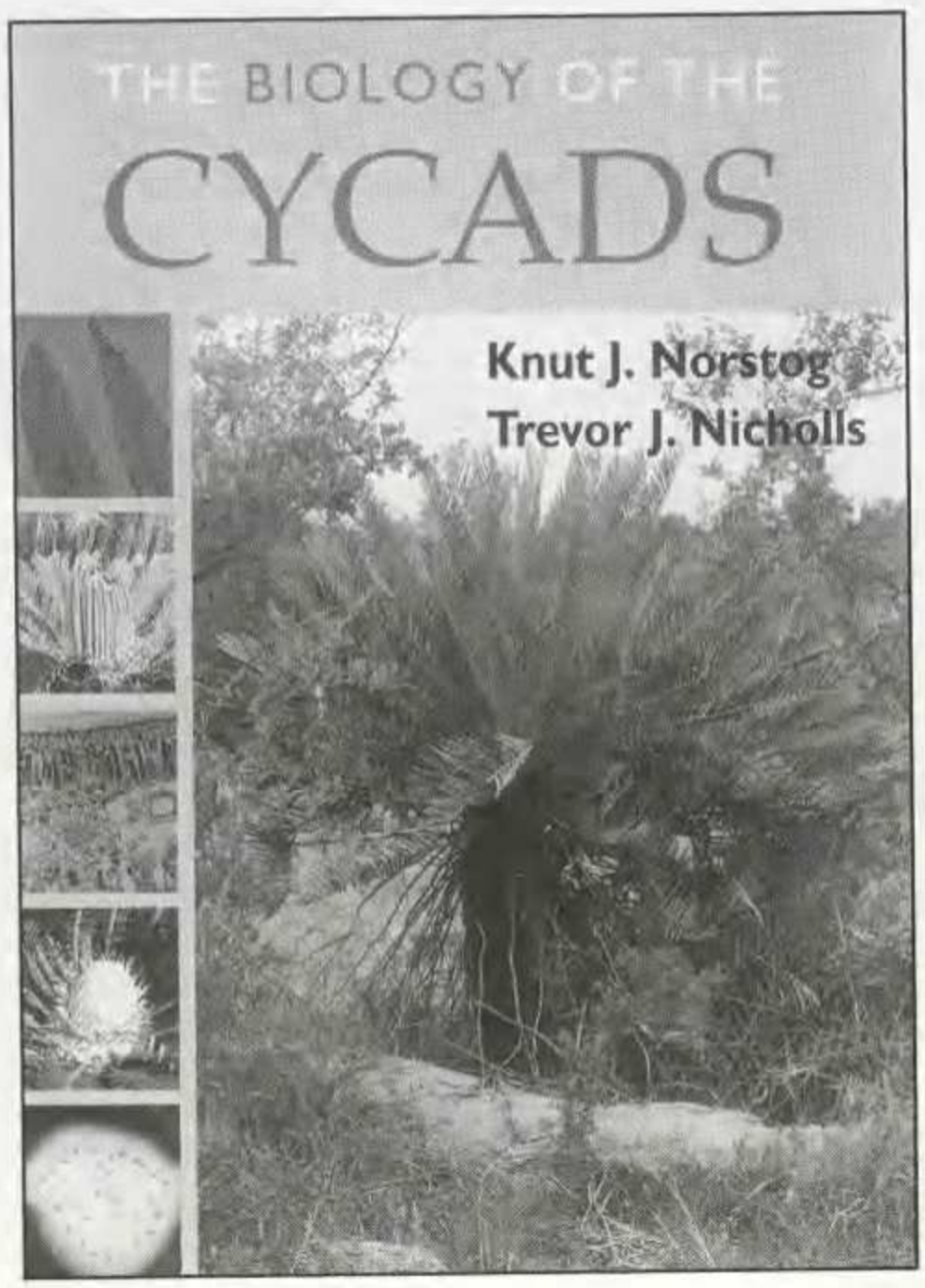
Received 29 June 1998

[See "Tribute to Cynthia Giddy" on p. 15, "Tribute to Ted and Cynthia Giddy" on p. 16, and "Growing up among the cycads" (newspaper clipping) on p. 32. - **Editor.**]

BOOK REVIEW / BOEKBESPREKING

THE BIOLOGY OF THE CYCADS

Norstog, Knut J.; & Nichols, Trevor J.
Ithaca: Cornell University Press. 1997. 363 Pages, numerous monochrome photographs, line drawings, diagrams, and 134 colour photographs on 32 pages.
Hardcover with laminated dustjacket.
Available at £113-95 plus £18-23 postage from NHBS Mailorder Bookstore, 2–3 Totnes, Devon TQ9 5XN, United Kingdom; or U.S. $145 plus postage from Cornell University Press, Sage House, 512 East Street, Ithaca, New York 14850, U.S.A.



In 1906 C.J. Chamberlain published his first paper on the biology of the cycads, on the ovule and female gametophyte of Dioon. His comprehensive research during ensuing years on many aspects of cycad biology was summarised in The living cycads (1919) which, apart from a limited edition reprint in 1965, has long been out of print and much sought after. His researches were culminated in Gymnosperms: structure and evolution (1935), which remained the standard source of information for six decades.

This new book is authored by Dr. Knut Norstog, known to most of our readers from his pioneering demonstration of insect pollination of cycads, but also for a number of other ground-breaking discoveries on the biology of cycads spanning a period of more than 30 years. Dr. Trevor Nichols is "a devoted cycad hobbyist [and] endocrinologist in the Department of Zoology of the University of Bristol".

Unlike several other books on cycads which appeared in recent years, this book is not an inventory of cycad species, but rather a compendium of current knowledge of the biology of the cycads. It brings together for the first time all the discoveries since Chamberlain's time, integrating it all. And discoveries there were enough.

This reviewer is not qualified to judge the text, spanning so many subdisciplines of botany. However, given the credentials and reputations of the authors, that is not necessary. To provide the reader with some idea of the field covered by the book, the following is a brief summary of the different chapters:

1. General features, genera, and relationships. This is an introduction to the cycads. For the novice the general morphology and geographical distribution are explained, a short overview of the living genera (including a key to their identification) is provided, and finally their relationship with other plant groups as well as their interrelationships as deduced by means of a variety of modern techniques, are elucidated.
2. Anatomy of the stems, leaves, and roots. This is a good overview of what is known about this somewhat neglected aspect, and includes growth patterns and functional structure.

3. Reproduction and embryo development. This is Dr. Norstog's personal speciality. It discusses sex, cones and reproductive structures, fertilization and subsequent development to the seedling stage, as well as hybrids.
4. Physiology and growth. This chapter cannot possibly cover all ramifications of these subjects, as that would require an entire book. Instead it concentrates on nitrogren fixation, salt tolerance, growth rates and growth-limiting factors, longevity, seasonal events, and production of toxins.
   Disappointly the interesting phenomena of heat production and release of volatile compounds by mature cones, thought to play a key role in attracting pollinators, are not mentioned at all in this chapter, and only obliquely referred to in the next chapter (pages 153 and 156).
5. Population biology and pollination dynamics. This is perhaps the most important chapter for the future of the cycads, and should be compulsory reading for all involved with cycad conservation. Apart from a section on biogeography, there is a very superficial section on cycad habitats on the different continents; but also sections summarising what is known about demography, age-, size-, and sex-classes and reproduction rate; population genetics, advantages of dioecy, pollination biology, the fascinating aspect of co-evolution of cycads and insects, seed dispersal and associated animals, the still poorly-understood phenomenon of mast-seeding, and finally the rather glum status and prospects of cycad populations.
6. The fossil cycadophytes. This thought-provoking chapter discusses not only the true cycads (order Cycadales), but also the closely related seed-ferns (order Pteridospermales) and the order Bennettitales (the latter so off-handedly featured in Crichton's novel The lost world* - would that we could bring these strange plants back to life!). This chapter is essential reading for all interested in cycads, because it explains so eloquently why cycads are remarkable and cannot be allowed to become extinct. Aspects treated include evolution of the seed-bearing habit, seed-ferns, Cycadales of different geological eras, the Bennettitales, and the evolution and inter-relationships of these three groups of Cycadales.
7. Old World genera and species and 8. New World genera and species constitute an inventory of the living cycads, with short descriptions of the species. This is perhaps the weakest part of the book, because not all species are listed, many of the descriptions use data from other publications, and many species are not illustrated so that identification of a plant of unknown provenance is likely to be difficult. Curiously the authors include *Cycas simplicipinna* under *C. micholitzii* though Hill (1995b) (the recognised authority on *Cycas*) raised it to specific rank in a publication cited by the authors. Similarly the name *Cycas taitungensis* is included as a synonym (albeit with a question mark) of the very different *C. taiwaniana*, thus misinterpreting Shen *et al.*'s 1994 paper in which they convincingly demonstrated that two distinct species are involved and that the name *C. taiwaniana* should only be applied to plants in mainland China, not in Taiwan. While this reviewer is flattered by the citation of his juvenile 1973 article to circumscribe *Cycas circinalis* (pages 212–213), it should be pointed out that Hill's (1995a) paper on Indian *Cycas* (not cited) is much more authoritative. On page 239 the myth is perpetuated that "African cycads have suffered greatly from loss of habitat as a result of the development of large land areas ...". This is not correct: most African species occur naturally on rock outcrops, cliffs, or in forests, which are unsuitable for "development". Only a few species ever got in the way of development, such as *Encephalartos ferox* and *E. humilis* in areas developed for forestry, and *E. arenarius* in an area cleared for pineapple farming. The area flooded by the Josini Dam constitutes only a minute percentage of the distribution area of *Encephalartos senticosus*, although some really prime habitat got submerged.

The book is richly illustrated with monochrome photographs, line drawings, diagrams, and 134 small but mostly excellent colour photographs on 32 pages depicting aspects of cycad biology. Some of these are very striking indeed; such as color figs. 9 and 10 showing the enormous amount of pollen produced by *Cycas rumphii*, color fig. 13 showing an immensely long trunk of *Lepidozamia hopei* (reputedly the tallest-growing cycad species), color figs. 23 and 24 showing cone domes revealed through longitudinal sections through trunks (probably available as a result of hurricane Andrew devastating the Fairchild Tropical Garden in 1992), color fig. 44 showing the unusually large (for *Zamia*) female cone of *Zamia roezlii*, and color fig. 127 of a chopped-off plant of the gigantic *Zamia obliqua*. Readers will be interested in a number of rare photographs showing species in natural habitat. Amongst the monochrome photographs, figures 3.38–40, 42, 44, 45, and 47 especially stand out, showing spermatozoids with multiple flagella - results of a branch of research in which Dr. Norstog excelled. Several of the drawings, including color fig. 132, were made by Priscilla Fawcett, a very gifted botanical artist married to Dr. Norstog. Her striking painting of a collection of cycad cones is reproduced on the back of the dust jacket and should really have adorned the front cover. I particularly appreciate the way in which the authors collected illustrations from a variety of sources, rather than trying to use exclusively their own.

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*"The animal had entered an area marked with thick Benettitalean cycads [sic]. The rough trunks scratched at them".

There is a glossary of 11 pages, very necessary as the work contains many unfamiliar terms due to the unusual nature of the cycads.

The bibliography is extensive, but not exhaustive - that would have taken far too much space. Apparently it constitutes only titles referred to in the text. It comprises 22 pages of references spanning the period 1737 to 1995, with two from 1996. With a work like this it is inevitable that there has to be a cut-off point, with a fairly long interval before publication. This is probably the reason why the new species described from 1996 onwards are not mentioned, nor the two books by Wang *et al.* (Cycads in China) and Guan & Zhou (Cycads of China) respectively (both published in 1996 and reviewed in *Encephalartos* 47: 28–31 (1996)). The latter tomes, though unpolished, cover much the same ground from a Chinese perspective, and are our only compendiums on Chinese cycads.

The standard of production is good but constrained. It is easy to read and access any topic. The book is printed on acid free paper, and sturdily bound in cloth with a laminated dust jacket. I spotted only a handful of typesetting errors, for example in the bibliography on page 335 where Forster *et al.* 1944 should read 1994, on page 337 where the reference to Helmsley should read *Gardeners' Chronicle* instead of *Garden Chronicle*, and page 338 under Kuntze where *Linnea* should read *Linnaea*.

As delectable as this book is, it is a fact of life that this type of publication has limited sales potential because the subject is very specialised and, apart from botanical libraries, relatively few people are interested enough to buy a copy. This in turn results in a limited print run, increasing the cost of individual copies. The price of £132 (about R1200 at the current exchange rate) or $145 (about R800 but excluding carriage) in the U.S.A., places the book well beyond the reach of many potential readers and students.

I have read my copy pretty extensively, but the book is so rich in information that I can memorise only a fraction of its contents. For this reason I will always keep it close at hand, where I am sure that it will be consulted a thousand times in years to come.

Finally, I wish to congratulate the authors on the publication of this milestone in cycadology, and thank them for undertaking this mammoth task. I unhesitatingly recommend this book to every serious student of cycads, indeed of botany itself.

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VORSTER, P.; & VORSTER, E. 1973. The African *Cycas*. *Excelsa* 3: 14–22, 26.

VORSTER, P. Book reviews: Cycads of China, and Cycads in China. *Encephalartos* 47: 28–31.

SHEN, C.-F.; HILL, K.D.; TSOU, C.-H.; & CHEN, C.-J. 1994. *Cycas taitungensis* C.F. Shen, K.D. Hill, C.H. Tsou & C.J. Chen, a new name for the widely known cycad species endemic in Taiwan. *Botanical Bulletin of the Academia Sinica* 35: 133–140.

WANG, F. *et al.* 1996. Cycads in China. Guangzhou: Guangdong Science and Technology Press.

Piet Vorster
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NEW CYCAD PUBLICATIONS

BATTEN, D.J. & DUTTA, R.J. 1997. **Ultrastructure of exine of gymnospermous pollen grains from Jurassic and basal Cretaceous deposits in Northwest Europe and implications for botanical relationships.** *Review of Palaeobotany and Palynology* 99(1): 25–54.

[Ultrathin sectioning and examination of gymnosperm pollen grains from various Northwest European, mid-Mesozoic successions has confirmed or

added weight to previous suggestions of botanical relationships for some taxa, and indicated possible affinities for others. The structure of the exine of *Clavatipollenites hughesii* sensu Schulz from Jurassic deposits is fundamentally different from that of Cretaceous grains referred to the same species, confirming observations made previously on the basis of analysis under the light microscope, and suggesting a possible derivation from cycadalean rather than angiospermous plants. Species of *Chasmatosporites* may also be linked to the Cycadales, or perhaps to the Ginkgoales.]

First author's address: Inst. Geography Earth Sci., Univ. Wales, Aberystwith SY23 3DB, U.K.

BROOME, T. 1998. **Water, the third variable.** *The Cycad Newsletter* 21(1): 16–17.

[In this paper, which is the final contribution in a series of three on the cultivation of cycads, the effects of water quality and the intensity of watering on cycad growth are discussed.]

Author's address: 9128 Golden Gate boulevard, Polk City, Florida 33868, U.S.A.

CIUFFI,G.C. & DI FAZIO, L. 1998. **The cycad collection of the botanical gardens of Florence.** *The Cycad Newsletter* 21(1): 11–15.

[The botanical garden of Florence University is amongst the oldest in the world; it was founded in 1545 and today it forms one of the six sections of the Natural History Museum of Florence University. The garden currently covers an area of 23 892 square metres of which 1 694 square metres are occupied by hot-houses. Today the garden holds some 4 500 plants and in 1996 some 8 000 people visited the gardens. The Cycadales is represented by 40 species from eight genera.]

First author's address: Bot. Garden of the Univ. of Florence, V.P.A. Micheli n. 3, 50121 Firenze, Italy.

DODSON, C.H. 1998. **A new species of *Zamia* (Zamiaceae) from Ecuador.** *Novon* 8(1): 12–14.

[A new species of the genus *Zamia* (Zamiaceae), *Z. gentryi*, from northwestern Ecuador is described. This arborescent species appears to be most closely allied to *Z. roezlii* Linden, with which it grows sympatrically along the margins of the populations. *Zamia gentryi* is occasionally found growing as an epiphyte. Character states that distinguish the two species are presented.]

Author's address: Missouri Bot. Garden, P.O. Box 299, St Louis, Missouri 63166-0299, U.S.A.

DURLACH, J., BAC, P., DURLACH, V., DURLACH, A., BARA, M. & GUIET-BARA, A. 1997. **Are age-related neurodegenerative diseases linked with various types of magnesium depletion?** *Magnesium Research* 10(4): 339–353.

[Age-related human neurodenerative diseases are a major social and medical problem. This environmental proposal relies mainly on data concerning the Western Pacific amyotrophic lateral sclerosis-Parkinsonism-dementia complex (WP ALS-PD) considered as a prototypal human neurodegenerative disease and on extrapolation from it to the bulk of neurodegenerative diseases (NDD), NDD would be due to an accelarated ageing process in certain populations of neurons due to the noxious synergy of (i) increased environmental slow deleterious factors (such as slow toxins) and of (ii) decreased environmental protective factors (Mg deficient intake particularly). Epidemiologic study has shown that preference for traditional Chamorro food is only one of the 23 tested variables significantly associated with an increased risk for PD. Laboratory investigation of cycad seed revealed the presence of various toxins and particularly of an "unusual" non-protein amino acid: L-BMAA (beta-N-methylamino-L-alanine), an excitotoxic amino acid. This slow toxin presents some structural similarity to another "unusual" excitotoxic amino acid: L-BOAA (beta-N-oxalyl-amino-L-alanine), an exogenous neurotoxin present in the grass pea (*Lathyrus sativus*) whose excessive consumption may cause lathyrism. The excitotoxicity of both L-BMAA and L-BOAA mainly concerns non-NMDA receptors. The neurotoxicity of these amino acids varies with experimental models failing to induce an experimental model akin to WP ALS-PD or displaying many of the motor-system and behavioral changes of WP ALS-PD. It may also be considered as a model of magnesium deficit, but it does not concern simple magnesium deficiency reversible with mere oral physiological magnesium supplementation. Magnesium deficiency cannot result in neurodegenerative disease. The physiopathological mechanisms of neurodegenerative and neurotoxic insults associate several intricated and interactive factors. From studies mainly based on endemic WP ALS-PD data, it appears difficult to infer a general environmental scheme of the bulk of neurodegenerative diseases. But they have generated various experimental acquired models of magnesium depletion whose pathogenic mechanisms are linked to those of neurodegenerative diseases, particularly when excitotoxicity and magnesium deficiency were combined. Today, magnesium supplementation carried out with the usual magnesium salts either at physiological or at pharmacological doses appears of little help as a curative treatment of neurodegenerative diseases. It might even be contraindicated in such cases as Alzheimer's disease and multiple sclerosis. But the experimental models of magnesium depletion related to neurodegenerative diseases should constitute promising tools for screening effective treatments.]

First author's address: 64 Rue de Longchamp, F-92290 Neuilly/Seine, France.

KOKUBUGATA, G. & KONDO, K. 1998. **Comparative karyotype analysis of *Ceratozamia mexicana* and *Microcycas calocoma* (Zamiaceae) using fluorochrome banding (CMA/DAPI) and fluorescence *in situ* hybridization of ribosomal DNA.** *Plant Systematics and Evolution* 210: 41–50.

[Orcein staining, differential staining with CMA and DAPI, and FISH with an rDNA probe were used to compare somatic chromosomes of *Ceratozamia mexicana* and *Microcycas calocoma*. CMA-positive dots and hybridization signals appeared on chromosomes at early interphase and mititic prophase, but in significantly different number in the two species. In *Ceratozamia mexicana*, the CMA-positive and DAPI-negative bands and the hybridization signal were located at the terminal region of the short arm of two median-centromeric chromosomes and the terminal region of the long arm of two subterminal-centromeric chromosomes. In *Microcycas calocoma*, they were located at the pericentric region of two median-centromeric chromosomes. These chromosome data suggested that *Microcycas* has no simple Robertsonian relationship to *Ceratozamia*.]

First author's address: Lab. of Plt. Chromosome and Gene Stock, Fac. of Science, Hiroshima Univ., Higashi-Hiroshima 739, Japan.

LEVESQUE, A. & ZAVADA, S. 1998. **Cycad-like fossils from the Molte . Formation of South Africa.** *The Cycad Newsletter* 2 (1 6–8.

[The Molteno Formation of South Africa has produced a number of important fossil plants from the Triassic of the Southern Hemisphere with an abundance of seed ferns, Ginkgophytes, silicified wood, and a small number of fragmentary cycad-like plants. The cycad-like plants generally fall into two groups in the Triassic, the true cycads and the seed bearing cycadeoids, extinct plants of the order Bennettitales. For the first time a complete specimen of a cycad-like leaf was recently obtained from the Molteno Formation in the Drakensberg. The superficial similarity of the whole leaf to that of some *Zamia* species is quite striking. The cycads have haplocheilic stomatal complexes and the cycadeoids syndetocheilic stomatal comple: .s. Unfortunately the compressed plant material was subjected to enough heat to alter the cuticle pattern beyond recognition. As a consequence it was not possible to establish whether this fossil leaf belonged to a cycad or a cycadeoid.]

First author's address: Dep. of Biology, Providence College, Providence, RI 02198, U.S.A.

MAXWELL, F.F., ELLIOTT, S. & ANUSARNSUNTHORN, V. 1997. **The vegetation of Jae Sawn National Park, Lampang Province, Thailand.** *Natural History Bulletin of the Siam Society* 45(1): 71–97.

[Research on the botanical diversity, vegetation, and floristics of Jae Sawn National Park was started by herbarium staff of the Department of Biology, Chiang Mai University in August 1995 and is continuing. The species most in danger of extirpation from the park and most in need of immediate conservation measures include *Podocarpus neriifolius* D. Don (Podocarpaceae), *Epirixanthes elingata* Bl. (Polygalaceae), and *Cycas pectinata* Griff. (Cycadaceae).]

First author's address: Dep. Biol., Fac. Sci., Chiang Mai Univ., Chiang Mai 50200, Thailand.

SHARMA, I.K., JONES, D.L., FORSTER, P.I. & YOUNG, A.G. 1998. **The extent and structure of genetic variation in the *Macrozamia pauli-guilielmi* complex (Zamiaceae).** *Biochemical Systematics and Ecology* 26: 45–54.

[Allozyme variation in 12 enzyme systems coded by 17 loci was investigated in six populations of *Macrozamia*, including two populations of *M. parcifolia*, three populations of *M. pauli-guilielmi* and one population of *M. crassifolia* from Queensland (Australia) in order to measure the levels of genetic variation. This was required to establish whether the allozyme data supports recent taxonomic treatment. Seven loci were found to be monomorphic. All species were genetically depauperate, with low levels of genetic diversity (P = 17.6–35.3%, A = 1.2–1.4, H_e = 0.02–0.11) compared with two (only) existing reports, and plants in general. Genetic differentiation among populations was high (G_{ST} = 0.47). UPGMA cluster analysis using Nei unbiased genetic distance showed *M. parcifolia* and *M. pauli-guilielmi* to be more similar genetically to each other than either is to *M. crassifolia*. This is concordant with groupings based on morphological characters, thus supporting the objectives of the investigation.]

First author's address: Centre for Plant Biodiversity Research, CSIRO, Division of Plant Industry, GPO Box 1600, Canberra, ACT 2601, Australia.

SINGH, R. & PANT, D.D. 1997. **On the occurrence of lenticels in seeds of *Cycas* L.** *Phytomorphology* 47(3): 325–331.

[The presence of lenticels is well known in practically all exposed parts of diverse land plants including roots, stems, petioles, leaves and fruits but hitherto except for a preliminary report of lenticels on the ovules of *Cycas* (Pant & Singh 1991) they had never been reported in seeds of any living or fossil plants. This paper fully describes the first detailed morpho-anatomical investigations of lenticels in *Cycas* seeds and discusses the significance of their presence.]

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

GIMNOSPERME BY DIE POTCHEFSTROOMSE UNIVERSITEIT VIR CHRISTELIKE HOËR ONDERWYS

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Ontvang 15 April 1998

'n Groot verskeidenheid interessante gimnosperme word by die Potchefstroomse Universiteit vir Christelike Hoër Onderwys aangetref en is aangeplant as 'n bron vir navorsing en versiering. Die meeste plante is goed aangepas teen die droë toestande en koue winters. Ek was verbaas om twee groot *Encephalartos altensteinii* eksemplare raak te loop. Die plante is onder die *beskutting van groot bome aangeplant en groei in volle* skadu wat in die winter ook beskerming teen die ryp bied. Dit was egter interessant om te let dat die stamme kleiner word na bo en dus dui om minder gunstige groeitoestande as vroeër. Die deursnee van die stamme op grondvlak is ongeveer 40 cm en bly konstant tot op 'n sekere hoogte waarna dit vinnig dunner word na slegs 20 cm. Die blare vertoon baie goed in die skadu, maar ek verwag dat moontlike koue skade aan die blare in die winter mag voorkom en dus die groei van die stamme mag onderdruk.

Baie mooi eksemplare van *Encephalartos lehmannii* is ook in gedeeltelike skadu aangeplant en vertoon besonder goed. Volwasse *Encephalartos lanatus* eksemplare groei goed in gedeeltelike skadu van soetdorings (*Acacia karroo*) en kombineer goed met aalwyne en inheemse bolplante. Ek het opgemerk dat dit baie mooier lyk as broodbome en ander inheemse plante gekombineer word as wanneer slegs broodboomplante in beddings deurmekaar geplant word. 'n Groot versameling broodbome van verskeie spesies verloor die natuurlike voorkoms en begin deurmekaar en onbeplan lyk.

Een van die mooiste gimnosperme word ook by die PU vir CHO aangetref en het onmiddelik my aandag getrek. *Araucaria bidwillii* is 'n baie groot boom wat 'n massiewe impak op die landskap het en word tot 15 m hoog. Volwasse bome dra baie groot vroulike keëls wat tot 4 kg kan weeg en byna so groot soos 'n sokkerbal kan word. Die manlike keëls is sowat 20 cm lank met 'n deursnee van ongeveer 2 cm en 'n boom kan 'n groot hoeveelheid dra. Die groen vroulike keëls is soos by broodbome in die minderheid en ek het slegs 2–7 per boom gesien en ook slegs op die hoogste toppe. Met rypwording of soms met wind sal die vroulike keëls van die bome afgeruk word en breek wanneer dit die grond tref. Die struktuur van die keëls is baie dieselfde as by broodbome en nie soos by dennebome waar die keëls uitdroog en die sade uitval nie. Die vrugskubbe skei van die sentrale as en elke vrugskub dra slegs een saad. Die sade is groot en bevat baie stysel om aan die embrio se behoeftes te voorsien en kieming geskied binne 6–10 dae nadat sade 24 uur in water geweek is. Die sade het baie *water geabsorbeer en sommige sade het oopgebars as* gevolg van die swelling. Die radikula beur vinnig deur die mikropilum en groei teen ongeveer 1 cm per dag afwaarts in die grondmengsel in. Ongelukkig het verrotting by baie saailinge voorgekom al was die grondmengsel slegs effens klam. Die anatomie van die sade is baie dieselfde as by broodbome en soortgelyke toestande sal dus vir kieming benodig word. Ongelukkig het vroulike keëls wat aan my beskikbaar was slegs 6% vrugbare sade gedra waarvan 1% gedryf het. Dit is onbekend of bestuiwing deur insekte of wind geskied. Indien lede oor meer inligting oor die kweek van hierdie boom beskik sal dit waardeer word as hulle dit met ons sal deel.

Vir die besoeker sal 'n besoek aan PU vir CHO altyd die moeite werd wees en kan besoekers weet dat hulle altyd welkom is.

Summary

GYMNOSPERMS AT THE POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION

A large variety of interesting gymnosperms are grown at the Potchefstroom University for Christian Higher Education, and were planted there for research as well as decoration. Most of the plants are well adapted to drought and cold winters. Erik, now a first-year undergraduate student, was surprised to come across two large *Encephalartos altensteinii* specimens growing in full shade under the shelter of large trees, and thus protected against winter frost. What interested him is that the diameter of the stems are about 40 cm at ground level, remains constant up to a certain hight and then attenuates quite suddenly to only 20 cm. The

leaves look quite well in the shade, but he thinks that cold chills in the winter months may cause damage to the leaves, thus repressing stem growth.

Fine specimens of *E. lehmannii* are planted in partial shade and appear particularly well. Mature *E. lanatus* specimens are growing well in the partial shade of Karoo thorntrees (*Acacia karroo*) and combine well with aloes and indigenous bulbous plants. Erik observed that it is far more impressive to combine cycads with other indigenous plants than to plant only cycads together in garden beds. In his opinion a large collection of cycads of several species loses its natural appearance and looks mixed-up and planless.

One of the most beautiful gymnosperms at the Potchefstroom University, that immediately attracted his attention, is *Araucaria bidwillii*, a large tree up to 15 m high. The female cones on mature specimens can weigh up to 4 kg and can attain the size of a soccer ball. The male cones, occurring in large numbers on a tree, are about 20 cm long and about 2 cm in diameter. Only about 2-7, green coloured, female cones are borne on the highest tree tops. At maturity, or as a result of wind, the female cones fall off and disintegrate when falling on the ground. The structure of the cones are very similar to those of cycads, and not at all as in fir trees where the cones dry out and the seeds fall out. The megasporophylls, each bearing only a single seed, separate from the central axis. The large seeds contain much starch to satisfy the need of the embryo. The seeds germinate within 6–10 days after being soaked in water for a period of 24 hours. The seeds absorbed a large amount of water and some of them burst open due to swelling. The radicle quickly forces its way through the micropyle and grows at a rate of about 1 cm per day downwards into the soil mixture. Unfortunately many of the seedlings rotted although the soil mixture was kept only slightly damp. The anatomy of both these seeds and those of cycads are very similar and conditions for germination should be the same. Unfortunately only about 6% of the seeds in the cones at his disposal were fertile, of which about 1% floated. It is unknown whether insects or wind play a role in pollination.

It would be appreciated if readers familiar with the propagation of this tree (*Araucaria bidwillii*), can share their knowledge with us.

A visit to the Potchefstroom University would always be worth the trouble, and Erik can assure all visitors that they will be most welcome.

NUUS OOR DIE TRANSVAALSE STREEKTAK VAN DIE VERENIGING

Hanneke Grobbelaar
Posbus 15357, 0039 Lynn-oos, R.S.A.

Ontvang 20 Julie 1998

PROGRAM VIR 1998

SATERDAG 5 SEPTEMBER OM 14H00 IN DIE HOOFGEBOU VAN DIE NASIONALE BOTANIESE INSTITUUT, PRETORIA: Mnr Martin Schwellnus, een van die voorste kenners van broodbome van die Oos-Kaap, wat ook 'n broodboomkwekery in Port Elizabeth bedryf, het goedgunstiglik ingewillig om ons toe te spreek oor "**Een en ander oor die Oos-Kaapse broodbome**" (veral blaarkleur). Maans Kemp wat as spreker sou optree, kan ongelukkig nie meer die afspraak nakom nie.

SATERDAG 7 NOVEMBER OM 16H00 IN DIE HOOFGEBOU VAN DIE NASIONALE BOTANIESE INSTITUUT, PRETORIA: Afsluitingsfunksie. **Mnr Kevin Zunckel**, van Mpumalanga Parkeraad, sal ons toespreek oor "**Ecology and management of *Encephalartos laevifolius***", waarna 'n verteenwoordiger van dieselfde organisasie ons sal inlig oor die bewaringsbeleid van broodbome in Mpumalanga. Hierdie praatjies sal deur 'n bring-en-braai by Velcichhuis in die gronde van die Botaniese Tuin, waar ons verlede jaar ontspan het, gevolg word. Die bestuur sal pap en vleis gratis voorsien, maar elkeen moet hul eie drinkgoed, glase en eetgereedskap voorsien. Bring asseblief ook jou eie veldstoel en musiekinstrument saam indien jy ons verrigtinge met musiek wil opvrolik. Lede wie se vanne op **A** tot **M** begin moet asseblief vrugteslaai bring terwyl diegene wie se vanne op **N** tot **Z** begin mengelslaai moet bring. R.S.V.P. aan Hanneke by telefoon (012) 8080995 teen 31 Oktober 1998.

Verslag oor uitstappie op 18 April

Om Jan van Vuuren van Pretoria se broodboomtuin te besoek, is om pragtige volwasse eksemplare van feitlik al

Figuur 1 **'n Groep belangstellendes in Jan van Vuuren se tuin. (Figure 1 Persons taking an interest in the garden of Jan van Vuuren, Pretoria.)**

Figuur 2 (Figure 2) Voor, links: (Bottom, left) Twee pragtige eksemplare van (two beautiful specimens of) *Encephalartos latifrons*, regs: (right) *E. trispinosus*; Agter, middel: (Top, middle) *E. arenarius*, regs: (right) *E. inopinus* in die tuin (in the garden).

die inheemse broodboomspesies van Suid-Afrika in een dag te sien. Dit was weer eens ons taklede se voorreg om op Saterdag 18 April 'n besoek aan Jan se tuin te bring (Figuur 1, 2). Die woord het blykbaar vinnig versprei dat dit 'n besondere tuin is want daar het ongeveer 40 persone opgedaag. Ons wil weer eens vir Jan baie dankie sê dat hy sy tuin en kennis met ons gedeel het. Dit was 'n groot vreugde. Baie dankie ook aan Lynette en Derek Minnaar wat vir ons heerlike koeldrank en versnaperings verskaf het.

GROWING CYCADS IN FLORIDA
1. FERTILIZER

Tom Broome
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Received 3 April 1998

Reprinted from *Palm Review*, Volume 17, Issue 4: 1, 13 with permission from the president of the Central Florida Palm and Cycad Society.

Fertilizers can be the most important "tool" for manipulating your cycads to perform the way you want them to. First, you have to ask yourself, what am I trying to accomplish by using a particular fertilizer?

A homeowner-collector may want the healthiest plants possible, in the easiest possible way. A lot of times people don't have enough time to fertilize all their plants several times a year. The nurseryman wants to grow the fastest plant possible. The faster the finished product, the better the turnover, and the more money you make. Companies like Disney, that are concerned more about display purposes, want their plants to look good. With our frosts and freezes, *Cycas revoluta* can get spotted and burned. By forcing leaves out earlier, the waiting time for new leaves can be minimized. The person who is interested in producing seeds wants a plant to grow as fast as possible until it cones. After that point, a female bearing seeds needs to be strong enough to take the strain of holding seeds (Usually for a year). Also, I have found that a strong, healthy plant produces more seed than a weak plant. As an example, I have a *Ceratozamia kuesteriana* that produced 188 seeds. The next year, in a weakened state, it produced 97 seeds. After fertilizing the plant and waiting a year, it produced 270 seeds. After experimenting for several years I have found a way to "force" cones on cycads. The first year I succeeded, I doubled, and tripled my seed production, depending on the species. For the last three years, my seed production has continued at this level, or increased on multi-headed cycads.

People are just finding out how energy oriented cycads really are. In habitat, many cycads push leaves, at most, once a year. Plants that are hundreds of years old, in many cases, only produce female cones every five to eight years. Most species of cycads can cone every year, and produce multiple leaf flushes each year, with the proper energy. *Cycas taitungensis* in particular, can produce leaves up to six times a year. I find many people using palm fertilizer on cycads. They think because cycads look like palms, they are closely related. Of the seed bearing plants, cycads are about the farthest plant group away from palms. Most palm fertilizers are low in nitrogen (with N around 7–10). To produce a high enough energy level so that previously mentioned results can be attained a fertilizer with a nitrogen level around 18–25 needs to be used.

After documenting leaf flushes on 150 species and coning cycles from 25 species and correlating these results with fertilizer applications from eight brands of fertilizer, I am pleased with two brands. The first is Scott's Premix with Minors. It is a 24–7–8 plus minors, with 14 of the 24% being derived from a fast reacting nitrogen. The second is Nutricote 360. It is an 18–6–8 with minors, 360 day formula. According to the distributors, the pellets are plastic coated, and do not release more fertilizer when watering is increased. The Premix gives a big push in the beginning, but levels off. It lasts about three months, so it is used in cycles, four times a year. Nutricote starts out slow, but after 6–8 weeks, stays at a constant level for up to 10 more months, depending on the temeperature of the growing area.

In the beginning stages of growth, usually only one leaf is pushed at a time. With each consecutive leaf flush, the number of leaves per flush increases. In these beginning stages, it is common for leaves to push several times a year. At a certain point, when larger, cycads seem to change the way they grow and only flush once

per year, but many leaves per push. As the number of leaves per flush increases, the higher the energy level necessary to force these new leaves out.

In the beginning stages, the Nutricote wins hands down for the fastest, healthiest plants. When the plants get larger (around the six leaf per flush stage), the Premix works better. As an example, I have a group of eight *Encephalartos ferox* that produce 3–4 flushes per year using Premix. When I switched to Nutricote, they flushed once during the entire year. The next year, I went back to Premix and got 3–4 flushes on all eight plants. According to an article written by Hannes Robbertse in "*Encephalartos*", the Journal of the Cycad Society of South Africa, cycads have an episodic growth pattern. In most cases, I have found this to be true. Palms have more of a continuous growth pattern. For this reason alone, your strategy for growing cycads needs to be different from growing palms. My *Macrozamia* and *Stangeria* seem to have a continuous growth pattern. For these two genera, Nutricote works better. After plants get burned in the wintertime, apply Premix at the highest level on the label instructions. After that, wait two weeks and cut off all the burned leaves. Usually within three weeks, new leaves will be produced. I have used this procedure in the middle of winter, and produced leaves on *Zamia furfuracea, Cycas revoluta* and *C. taitungensis*. If you use this procedure in the wintertime and expect a frost before the leaves harden, application of a copper based fungicide to the new leaves when they are full size will harden them in a fraction of the normal time.

A problem with some (usually central American) Zamias is that they can grow too fast, and the caudex will split right down the middle. They usually harden up, but sometimes they die. Not only did all the Zamias react well to Nutricote, producing many flushes per year, I have not had a single plant split in years. With Premix, I had 3 or 4 plants splitting every year. They really seem to like the constant feed. It is important to note that some people have found that increasing or decreasing watering schedules has caused splitting of Zamias.

If you are looking to produce seeds, first you have to grow a cycad to the size that it can tolerate the strain of holding seed. Most cycads have a starch content of about 65%. This starch reserve is somewhat depleted while holding seed. To stimulate cone production, the plant needs to feel strong enough to hold seeds. If you fertilize with Premix two months before the expected emergence of cones, the plant will have this extra strength. Once you have produced cones, switch to Nutricote, and this will keep the plant healthy for the rest of the year. Each species has its own timing for producing cones. If you don't know when to expect cone formation, you may have to watch your plants the first year and chart their timing. Either that or ask someone in your area who has dealt with that species before.

Some species react well to fertilizer applications, some do not. The plants that react best, at least in my collection, are *Cycas taitungensis, C. revoluta, Encephalartos arenarius*, and *E. ferox*. You will see the best results of the use of Premix with these species. *Dioon mejiae* does not react well to fertilizer. This species seems to wait until about June or July when the weather heats up before leaves are produced. For plants like this, you may as well use Nutricote because it's easier.

A homeowner may not have enough time to fertilize often. In many cases, a homeowner may want nice looking plants, but may not care how fast the plants grow. In this case, they can use Nutricote. One application in spring and forget about fertilizing for the rest of the year.

Fertilizers can be the most important tool a grower can use. Keep in mind that over-use or over application of fertilizers can kill your plants. As long as the pH of your soil does not incapacitate your fertilizer, the proper use of it will show you great results. Cycads are thought to be very slow-growing plants. In habitat, these plants are relying on their coralloid root systems, which produce very low levels of nitrogen. If you use a high nitrogen fertilizer that has a release pattern similar to the growth pattern of a particular species, growth can be optimized. With the proper use of fertlizers, cycads may no longer need to be known as "slow-growing" plants.

MAN HAS TO SAVE OUR CYCADS

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Received 14 July 1998

If man doesn't put his hands out and help save our cycads they will be lost for the future generations. Although we have a commercial nursery one of our alpha concerns is the conservation and preservation of

cycads for future generations.

You may ask what exactly do we mean by this. Well as cycads are some of our most ancient and endangered plants, concerned persons need to hand-pollinate these plants' female cones to help preserve our most precious relics of the past.

Figure 1 Male cone of the Australian cycad *Lepidozamia peroffskyana*. Note the contorted nature of the cone.

Figure 2 Female cone of *Lepidozamia peroffskyana*.

Cycads are dioecious, which means that male and female cones can only be produced on separate plants (Figures 1, 2). So where there is only one specimen of a species in your garden, or even in habitat, there is no hope for future production of fertile seeds.

In the habitat where the colonies have been left undisturbed, comes autumn, the male cones start shedding pollen and the female cones start swelling. There have been different opinions on how these female cones became pollinated, one being that wind was the only way of taking the pollen from male to female. Then there were those people who believed that the insects, birds and bees also carry out this vital function. Now there is the extremely important assistance by man, and as long as interested and caring individuals carry out this process we should never see the cycads become extinct.

Once these seed-cones have been pollinated, by whatever means, then the cones take their time to disintegrate and over the years birds, animals, and others carried the seeds off to other areas and thus new colonies began millions of years ago. There are also people who believe that seeds can still germinate in habitat between one and five years.

When man first came to South Africa and saw the wealth of plant life here, he collected these plants, including cycads, and sent them to all over the world, hence how a lot of our indigenous cycads got to other parts of the globe. Some of these collectors were extremely ruthless and started to plunder many of the natural habitats - today it is looked upon as a status to own the very rare cycads, and to have a good collection of these plants is always something that makes many a man proud. I have always told women that **if the only competition you have in your marriage is cycads, wow what a pleasure.**

Some people have female cones in their garden and never bother to find out what species they are or where one could obtain pollen. We now have regular talks on how to harvest pollen, put it into containers, label, date, and deepfreeze it, because even though you may not need it there are many others who would be elated at obtaining that pollen. We have a deepfreeze full of pollen which we give away free of charge, without any strings attached, as part of our conservation statement - the person requesting must only pay the courier's postage for their pollen.

Hand pollination can be done very easily. In some cases we use dry pollen on certain species and in others we use wet pollen. In *Dioon* species we have found that wet pollen with a drop of liquid soap and a drop of honey does the trick as these cones always come upside down and are therefore very tricky to get to.

Now, if you would like to assist in pollinating these

plants for the future, may we suggest that people owning male plants observe their cones regularly in autumn and the minute that these cones start shedding a baby powder-like substance around the collar of the cycad caudex then it is time to cut the cone off, put it onto a newspaper and leave it there for a day or two, then start patting it gently from top to bottom and all around the cone and harvest the pollen by funelling it into a glass vial or a film container closing tight, labelling, dating, and naming the pollen (Figure 3). We at Cycad Centre will gladly keep your pollen in our deepfreeze for other cycad enthusiasts, or you can give us your name and we will put the persons requiring pollen in contact with you. **Remember: do not use plastic bags to harvest pollen as it is inclined to get moist and becomes useless.** Even when transporting the male cone from A to B put it onto a newspaper or brown paper.

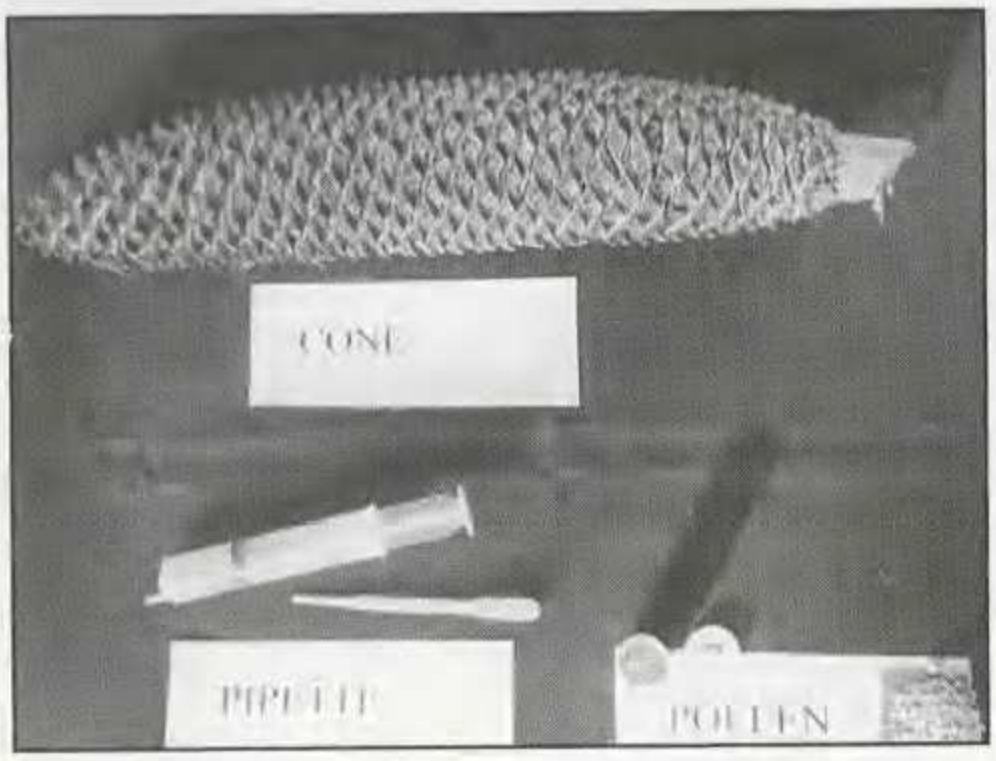

Figure 3 Top: Pollen-shedding male cone. Bottom left: Pipette. Bottom right: Film container and pollen.

Remember that female and male specimens do not cone every year, so it is important to harvest the pollen, it can be deepfrozen for up to 5 years and can still have some viability.

HOW TO POLLINATE THE FEMALE CONES

I would like to say that this is the **Nel-Meresman** recipe and so far it has proven to be quite reliable as most of you out there receive very good seed from us.

We set about pollinating when the top sterile scales of the female cone start opening, and if the opening is large enough we will use a douche (pipette) (Figure 3) filled with dry or wet pollen depending on the species (most of the blue-greys are only done with **DRY** pollen as they at the best of times don't like to get wet). We pump the pollen into the crack. Should this pollen escape at the second or third set of scales abandon the pollination as the female cone is not quite ready for pollination. Should the pollen come out at the bottom nearest the caudex then you have done a mighty good job. Since the scales are arranged in spirals a meat baster can also be utilised. An interesting point is that in most of our indigenous cycad species the "seeds" (ovules) are mature before pollination and not as in other plants whose "seeds" have to be pollinated before they swell out and become mature.

Now the long wait comes, between six and seven months will pass before the cone is fully developed and starts to break up. This is the exciting part because now you will do the sink and float test where the "seed" is popped into water in small amounts, those that float are off to the garden compost heap or, as we call it, the fruit salad bowl. The "seed" that sink are put on one side, these are cleaned (cycad seeds contain toxin, always use household or latex gloves when cleaning the red flesh off of the seeds) and retested, if they still sink dry them in the sun for two days and then proceed to put them onto your medium, which can be clear sterile river sand or vermiculite, spray lightly once a week. There are a whole lot of other ideas on the market, we have ours in perlite on hot beds constantly at 30°C and our germination is excellent. Getting back to some of the other ideas, like two layers of underfelt, hessian, glass, even cut plastic bottles, keep in mind that condensation and too wet produces fungus and once you have that disease it is almost as bad as the big C which humans get. We therefore ask people to take care and perhaps use Funginex on their seed before using hessian, carpet, glass, underfelt, etc., etc.

These seeds need to be kept on the medium for between 6–12 months when they will start producing radicles. They are then put into individual bags where the seed is placed at 45 degrees to encourage the radicle to grow down and pull the plant upright. The bag which you choose should be able to give the plant at least 5 years growth before disturbing it if you wish to grow nice specimens. However, in our case we plant 10 seeds in a bag, which we call a community bag, and sell them to the young enthusiast collector who can then either give away or re-sell some of these seedlings and carry on building his collection by buying different bags of seedlings.

Remember that cycads roamed with dinosaurs and they have learned to survive with the minimum amount of water, so **PLEASE** don't kill them by overwatering. All this may sound extremely tedius but this is the only way we can save our cycad species. So my appeal to all of our fellow cycad enthusiasts is **get out there, pollinate, we need the seed for the future.**

We of course have the other side of the coin where certain of the enthusiasts are so selfish in their desire to preserve the commercial value of certain rare plants that they destroy the pollen and also female cones of many of the rarer plants to keep the prices exorbitant for the

"must have" collector. Of course there are also the nice "to have" collectors who go out of their way to pollinate and produce seed, in their thoughts for the continuing preservation of these wonderful and mysterious plants.

We have always said that **cycads are a love and a hate plant** - you either love them to death or hate them to death, they never grow on you.

One last word is that one of our doctor friends always walks around the nursery with his arms tightly at his side. One day I asked "why do you do that?" and his answer was "I am terrified of being pricked by one of these cycads as it is like cocaine, once it gets into your blood you would kill for them".

CYCAD 99

The Fifth International Conference on Cycad Biology (CYCAD 99) will take place at Fairchild Tropical Garden, Miami, Florida, U.S.A. on the 8th, 9th and 10th of August, 1999.

[Unfortunately no further information is available. - **Editor.**]

EXCHANGE COLUMN / RUILHOEKIE

After seeing Dr. Piet Vorster's suggestion of a swop column I hereby submit a list of plants I have available:

Encephalartos altensteinii	4–5 years	100 plants
E. trispinosus	4–5 years	50 plants
E. longifolius	4–5 years	20 plants
E. lehmannii	2 years	40 plants
E. villosus	2–3 years	30 plants
E. arenarius	2–3 years	40 plants

Very reasonable prices on application.

James C. Hoole, 1 Kennelly Rd., Wolmer Downs, 6070 Port Elizabeth, Tel. 041 381356.

. . . . . .

Contribution for the exchange column as suggested by Piet Vorster in a previous issue.

I have seedlings of the following species to sell or exchange for other species:

Encephalartos altensteinii, E. ferox, E. ghellinckii, E. hildebrandtii, E. kisambo, E. lebomboensis, E. manikensis, E. natalensis, E. senticosus, E. transvenosus, E. villosus

The seedlings are between 1 and 2 years old and cost R15.00 each. I am looking for seedlings or suckers of the following for myself to complete my collection of South African cycads:

E. brevifoliolatus, E. cupidus, E. heenanii, E. latifrons, E. nubimontanus

Please contact **Andre Cilliers, P.O. Box 351, 2520 Potchefstroom**, or phone **018 2996308 (o/h) or 018 2971602 (a/h)**.

. . . . . .

Re: Advertensie vir die ruilkolom in "*Encephalartos*"

Te ruil/To exchange: *Encephalartos senticosus* saad en saailinge/seed and seedlings vir ander/for other *Encephalartos* spesies/species. Skakel/Phone **082 807 1029** (Aliwal-Noord/North / Queenstown - Ooskaap/Eastern Cape).

Gesoek/Wanted: Saailinge en saad van die volgende/Seedlings and seed of the following:
E. arenarius, E. cupidus, E. caffer, E. dolomiticus, E. dyerianus, E. heenanii, E. inopinus, E. latifrons, E. middelburgensis. Skakel/Phone **082 807 1029** (Aliwal-Noord/North / Queenstown - Ooskaap/Eastern Cape).

Marius Helm, Posbus/P.O. Box 9612, 5320 Queenstown.

THE NATAL WITNESS, SATURDAY, JULY 11, 1998

Pg. 7

Growing up among the cycads

Life with former midlands residents Cynthia and Ted Giddy, who died recently after a car crash, was never dull, writes their daughter CAITLIN LEACH.

Ted and Cynthia Giddy . . . eccentrics.

MY parents are best remembered for their eccentricity and their larger-than-life personalities. My father was most famous for going barefoot, while my mother had a terrible temper.

Both from the Eastern Cape, they met at Rhodes University and married in 1956. In 1963 they moved to Natal and bought a 500-acre farm in the Manderston area, 20 km outside Pietermaritzburg. They lived there until 1996 when they returned to the Eastern Cape village of Bathurst for their retirement.

The farm was run as a guest farm and they taught Afrikaans to schoolchildren in the holidays. Ted returned to university to do his higher teaching diploma and two other families, the Stuckenbergs and the Van Dijks, moved into the farmhouse with us as their fathers had also become mature students for the year. There were nine children all under six. What followed was a wonderfully bohemian year with the band of small children prowling through the overgrown remains of the old garden and the construction of the new one.

My mother established a huge garden with a very large section for roses, terraced lawns, fish ponds and acres of spring bulbs. Gradually it became more indigenous and she began to grow aloes and started a nursery. The first cycads appeared and soon the roses and spring bulbs disappeared. In her nursery she began to propagate cycads from seed.

In the early seventies, when asked to write an article on cycads, she found little material on these fascinating plants. Because of this she started her own research which grew into a book. Barbara Jeppe illustrated it whilst living with us and painting and illustrating her own book, *Wild Flowers of Natal*.

My parents travelled thousands of kilometres to photograph cycads for the book. Some localities my mother visited every year for up to five years to get pictures of the particular cones she wanted. She visited Mujaji the Rain Queen, in the Lethaba district, and photographed cycads that grew in nearby gorges. Her book appeared in 1974, to critical acclaim, and remains a landmark work. Her great passion for the last 27 years was championing the cause of cycads, by campaigning furiously against the illegal trade in wild plants. She lobbied for legislation governing the trade and ensuring the survival of endangered species, and testified against people prosecuted for illegal possession of cycads.

The Endangered Species Protection Unit would phone to say there was a "bust" in the Eastern Cape and they would pick her up on the way. She'd drop everything and disappear in the middle of the night. My father was unfazed by her frequent absences.

In 1991 she won the Natal Parks Board's Conservator of the Year Award and in 1993 she was honoured as a world authority on cycads by the International Rolex Awards for Enterprise.

Ted was best known for his work as the first teacher at the study centre run by the Natal Education Department in the Botanical Gardens. This was a very happy time and he became a minor superstar in Maritzburg. As self-conscious teenagers, we cringed at going out with him because everyone under 20 would recognise him. That period ended when he resigned on a point of principle, thinking he would be offered his job back, but this didn't happen.

'The Endangered Species Protection Unit would phone to say there was a 'bust' in the Eastern Cape and would pick her up on the way.'

He retired to the farm to help my mother run her nursery. During this time he was chairman of the Pietermaritzburg branch of the Botanical Society of South Africa. He was also a passionate jam-maker, ballroom dancer, music lover and an interesting dresser, his sartorial splendour ranging from shorts and no socks to a salmon pink formal jacket, Peruvian ponchos that looked like horse blankets, dinosaur ties and Madiba-type shirts. Most of all my father loathed wearing shoes — he never saw the point.

Both my parents loved cooking and were famous for their dinner parties, which were always very noisy and riotous, with excellent food. At one memorable party my mother invited two families from the opposite ends of the political spectrum, thinking the conversation would sparkle — it sparked all right, into a huge row, and everyone left before they'd eaten.

They travelled extensively to the East, Europe and South America, and often gave slide shows at home of their travels. Their retirement in Bathurst was a time of great happiness. The town welcomed them and they involved themselves in community affairs and, freed from the worry of living isolated in KwaZulu-Natal, enjoyed the best time of their lives.

A memorial service for Cynthia and Ted Giddy will be held at 10.30 am today, at the Cycad Centre. Take the R56 from the N3 from Pietermaritzburg.

Cynthia Giddy photographing *Cycas ophiolitica* in Queensland, Australia. July 1990. Photo: Piet Vorster.

Cynthia Giddy and Elsa Vorster taking time off from studying *Macrozamia communis*, to befriend the locals. New South Wales, Australia. August 1990. Photo: Piet Vorster.

Man steel glo broodbome uit sy goeie vriend se erf

Beeld Bladsy 10 ★★

Vrydag 26 Junie 1998

Michelle Pieters

'n Broodboomkweker se vriend van meer as vyftien jaar het na bewering in die nag teen 'n leer uit oor sy goeie vriend se muur geklim en glo meer as 35 broodbome uit sy erf gesteel.

Dié man en 'n vrou is kort ná die beweerde diefstal by 'n huis in Groenkloof, Pretoria, deur 'n oplettende polisiereservis in hegtenis geneem. Die broodbome is glo agterop hul bakkie gekry. Die man en vrou is aangekla en verskyn eersdaags in die Pretoriase landdroshof.

Mnr. Owie Heyns, wat broodbome kweek en verkoop, het gister gesê hy was nie verlede Maandag tydens die beweerde diefstal tuis nie. Sy vrou was alleen tuis.

Die vermeende broodboomdief het glo in die vroeë oggendure teen 'n leer uit oor Heyns se huis se staalheining van sowat 2 m hoog geklim. Hy het glo sowat 35 gevestigde broodbome en broodbome wat in sakke was, gesteel. Van die broodbome is glo uit die grond geruk.

'n Polisiereservis het kort ná die diefstal die dief se bakkie opgemerk omdat dit verdag gelyk het dat iemand in die vroeë oggendure met 'n leer agterop sy voertuig rondry. Hy het ook die blare van plante op die bakkie gesien en die voertuig van die pad laat trek.

'n Man en 'n vrou is in hegtenis geneem nadat die broodbome agterop die bakkie ontdek is.

Heyns het gister gesê die man wat aangekeer is, is al langer as vyftien jaar 'n vriend van hom. Hy was kort voor die diefstal by sy huis en het presies geweet waar die broodbome in sy erf is. Die man was glo eergister by Heyns om hom om verskoning te vra.

Summary

A MAN STOLE AND REMOVED CYCADS FROM THE PREMISES OF HIS GOOD FRIEND

A cycad nurseryman's friend of more than fifteen years allegedly used a ladder to climb over his good friend's trellis fence and stole some 35 cycads.

Only a short time after the theft at a house in Groenkloof, Pretoria, the man and a woman were arrested by an attentive police reservist. In the early morning hours a light delivery van looked suspicious to the police reservist because of a ladder at the back. He also noticed the cycads on the van. The man and woman were charged with theft and will appear shortly in the Pretoria magistrate's court.

Mr. Owie Heyns, who propagate and sell cycads, said that he was not at home on the Monday (15 June) when the theft occurred. Only his wife was at home.

The alleged cycad thief used a ladder to climb over Mr. Heyns' steel fence, of about 2 m high, in the early morning hours. He stole about 35 cycads that were planted in plastic bags. Some of the plants were pulled out of the ground.

Mr. Heyns said that the man who was arrested, has been a friend of his for more than fifteen years. He was at Mr. Heyns' house only a few days before the theft and knew exactly where the plants were on the property. The man went to Mr. Heyns the day before yesterday to apologize.

[Yesterday (15 July) Mr. Heyns told me that he has dropped all charges. He never had to appear in court throughout his life and now, at the age of 80, he has no desire to do so. However, some rare specimens were damaged when they were pulled out of the ground and as they did not survive he and the offender came to an agreement regarding compensation. - **Editor.**]

Beeld Bladsy 8 ★★

Vrydag 15 Mei 1998

'Statussimbool van rykes' groei wéér wederregtelik by Jhb

Adrian Lackay
alackay@beeld.com

Daar is gister weer digby Johannesburg beslag gelê op broodbome, 'n bekende "statussimbool van die rykes" wat die afgelope twee jaar van mikrorekenaarskyfies as teenvoeter vir diefstal uit natuurreservate voorsien is.

Die klopjag van die Gautengse departement van landbou, bewaring en omgewingsake op 'n huis in Bedfordview het drie van dié gesogte bome, met 'n gesamentlike waarde van tot R25 000, opgelewer.

Volgens mnr. John Baker van die departement se wetstoepassingseenheid is die bome van die Starvation Creek- Nasionale Natuurreservaat in Mpumalanga afkomstig. Natuurreservate in dié provinsie het sowat twee jaar gelede begin om broodbome met mikroskyfies te merk in 'n poging om hulle in tuine in veral Johannesburgse noordelike voorstede op te spoor.

"Dit maak ons werk makliker omdat ons met duidelikheid kan sê waar die bome vandaan kom en of die eienaars permitte daarvoor het," het Baker gesê.

Volgens hom wissel die lengte van die bome, wat tot die *Encephalartos Laevisolius*-spesie behoort, tussen 1 m en 3 m en het dit tussen 600 jaar en 800 jaar geduur om dié lengtes te bereik. Die bome, wat 'n bedreigde spesie is, word vir tussen R5 000 en R15 000, afhangend van die lengte, verkoop.

Die eienaar van die huis is nie weens die onwettige besit van die bome in hegtenis geneem nie omdat hy 'n vaste woonadres en 'n Suid-Afrikaanse identiteitsdokument het, het Baker gesê. Hy is wel aangekla.

'n Boete van tot R100 000, tien jaar tronkstraf of albei kan aan hom opgelê word. 'n Boete gelykstaande aan drie keer die waarde van die bome se markprys kan ook aan hom opgelê word.

Daar is gister gevrees dat die bome weens swak behandeling kan sterf omdat van die plante se wortels verwyder is.

Me. Nomvula Mokonyane, Gautengse LUR vir landbou, bewaring en omgewingsake, en mnr. John Baker van die departement se eenheid vir wetstoepassing, wys drie broodbome waarop gister beslag gelê is. Foto: JOYRENE KRAMER

Ms Nomvula Mokanyane, Gauteng M.E.C. for agriculture, conservation and environmental affairs, and Mr John Baker of the department's unit of law enforcement, show three cycads that were confiscated yesterday (14 May, 1998).

Summary

'STATUS SYMBOL OF THE RICH' GROWING ILLEGALLY NEAR JOHANNESBURG AGAIN

Cycads, a known status symbol of the rich, were confiscated near Johannesburg yesterday. These cycads were some of those into which microchips were inserted during the past two years, to discourage theft from nature reserves. In the raid by the Gauteng department of agriculture, conservation and environmental affairs on a house in Bedfordview three *Encephalartos laevifolius* specimens, valued at about R25 000.00, were found.

Mr John Baker of the department's law enforcement unit said that the cycads were removed from the Starvation Creek National Nature Reserve. Marking cycads with microchips made it easier for officials to establish with certainty from where the plants came and whether the owners have permits for them.

According to Mr Baker the trunks of the three *E. laevifolius* specimens were 1–3 metres tall, and it took about 600–800 years for them to attain that height. *Encephalartos laevifolius* is a threatened species and, depending on stem length, sell at R5 000.00 to R15 000.00.

The owner of the house was charged with the illegal possession of the cycads, but not arrested because of his permanent address and South African identification document.

He can be fined up to R100 000.00, imprisoned for ten years, or both. A fine equal to three times the market value of the cycads can also be inflicted.

It is feared that the cycads will not survive because their roots have been removed.

Gardening

Giants of the Asian jungle

OUTSIDE of a relatively inaccessible Asian ravine, the world's only plantation of the rare Taiwanese cycad is believed to be at Burpengary.

The seeds in giant cones on the graceful Cycas taitungensis are maturing from green to bright gold, so plantation director Roy Osborne has set his team to work on the annual harvest.

"As far as we know, we are the only people with a plantation of these plants outside its natural habitat," Roy said.

He said workers wore gloves and stood on a "very wonky ladder" to hand-pick the seeds from the top of female trees.

Buyers from Australia, Europe, America and Thailand then snap up the seeds.

Roy said the plantation was lucky to obtain some Taiwan cycad seeds 20 years ago and once they had matured, workers used artificial propogation to build up the plantation of 200 trees.

"We see when the pollen is ready on a male cone and transfer it physically onto female plants," Roy said.

"In the wild, this is done by the natural insect population but of course we don't have the insect population that they have in Taiwan.

"It takes about six months for the seed to develop to maturity which is where we're at now."

The trees look similar to the popular Japanese sago palm, with thick trunks and dark green foliage.

Some trees from Roy's Cycad Connections are being transplanted as part of the beautification of Eagle Farm race course.

Phone 5498 5112.

— **Judy Smart**

DEc802472

● Cycad Connections directors Stan Walkley, left, and Roy Osborne with seed-laden Taiwanese cycad.