ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTHERN AFRICA

TYDSKRIF VAN DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA

NO. 23

SEPTEMBER 1990

Cycad 90

Cycas "Glen Idle" Blue

REPORT BACK ON CYCAD 90

TOWNSVILLE AUSTRALIA

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TYDSKRIF VAN DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA

NO. 23

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EDITOR/REDAKTEUR

NEIL MUNRO
P.O.BOX 2373
EDENVALE
1610

VOORBLAD/COVER

Map of Australia where the 2nd International Conference of Cycad Biology was held at Townsville Queensland

CONTENTS-INHOUD

FROM THE PRESIDENT

A report appears elsewhere in his issue on ENCEPHALARTOS on the 2nd International Conference of Cycad Biology which was held in Australia in July of this year. From the report, it will be obvious that the conference was a great success and that the South African contingent contributed significantly to the proceedings. .It is gratifying that it was decided to hold the next conference in 1993 in South Africa. We trust that the local cycadologists will once more put up a good show at that meeting.

A coloured page which you should read carefully because it is of importance to all members, has been inserted near the front of this issue of ENCEPHALARTOS.

The subscription to the Society has not been increased for several years despite a continuous increase in the Society's running cost. To keep the finances of the Society sound, it has therefore now become essential to increase the subscription rates slightly. It has been possible to keep the increase in the subscription rates small by simultaneously introducing some austerity measures. In future separate accounts will no longer be sent to individual subscribers. Copies of ENCEPHALARTOS which were not received due to the late payment of subscriptions will also henceforth have to be ordered as back copies from Roy Shooter at the current price. At present they are supplied free of charge after late payment of dues.

Your Executive Committee regrets that circumstances have compelled us to introduce these measures but trust that you will appreciate its necessity under the prevailing conditions.

Nat Grobbelaar

VAN DIE PRESIDENT

Elders in hierdie uitgawe van ENCEPHALARTOS verskyn 'n verslag oor die 2e Internasionale Konferensie oor Broodboombiologie wat in Julie vanjaar in Australië gehou is. Soos u daaruit sal sien, was die konferensie 'n groot sukses en het die Suid-Afrikaanse kontingent 'n noemenswaardige bydrae tot die verrigtinge gelewer. Ons is ook trots daarop dat daar besluit is om die volgende konferensie in 1993 in Suid-Afrika te hou. Hopelik sal die plaaslike broodboomkundiges by dié geleentheid weer 'n goeie indruk maak.

Voor in hierdie uitgawe van ENCEPHALARTOS is 'n gekleurde bladsy wat u sorg-vulig moet deurless omdat dit alle lede ten nouste raak.

Nieteenstaande 'n volgende toename in die Vereniging se bedryfskoste, het ons die verskeie jare nie die ledegelde verhoog nie. Om die geldsake van die Vereniging gesond te hou het die now egter noodsaaklik geword om die ledegelde effens te verhoog. Die verhoging in the ledegelde kon laag gehou word deur tegelykertyd ook sekere besparingsmaatreëls in te voer. So sal daar nie meer in die toekoms afsonderlike rekenings aan lede gestuur word nie. Laatbetalers sal ook in die vervolg tydskrifnommers wat hulle as gevolg van hul laatbetalery misgeloop het teen die heersende prys van Roy Shooter as ou nommers moet aankoop waar hulle dit vroeër na laatbetaling gratis ontvang het.

U Uitvoerende Komitee is spyt dat omstandighede genoodsaak het dat bogenoemde stappe geneem moet word maar vertrou dat u die noodsaaklikheid daarvan onder die heersende toestande sal insien.

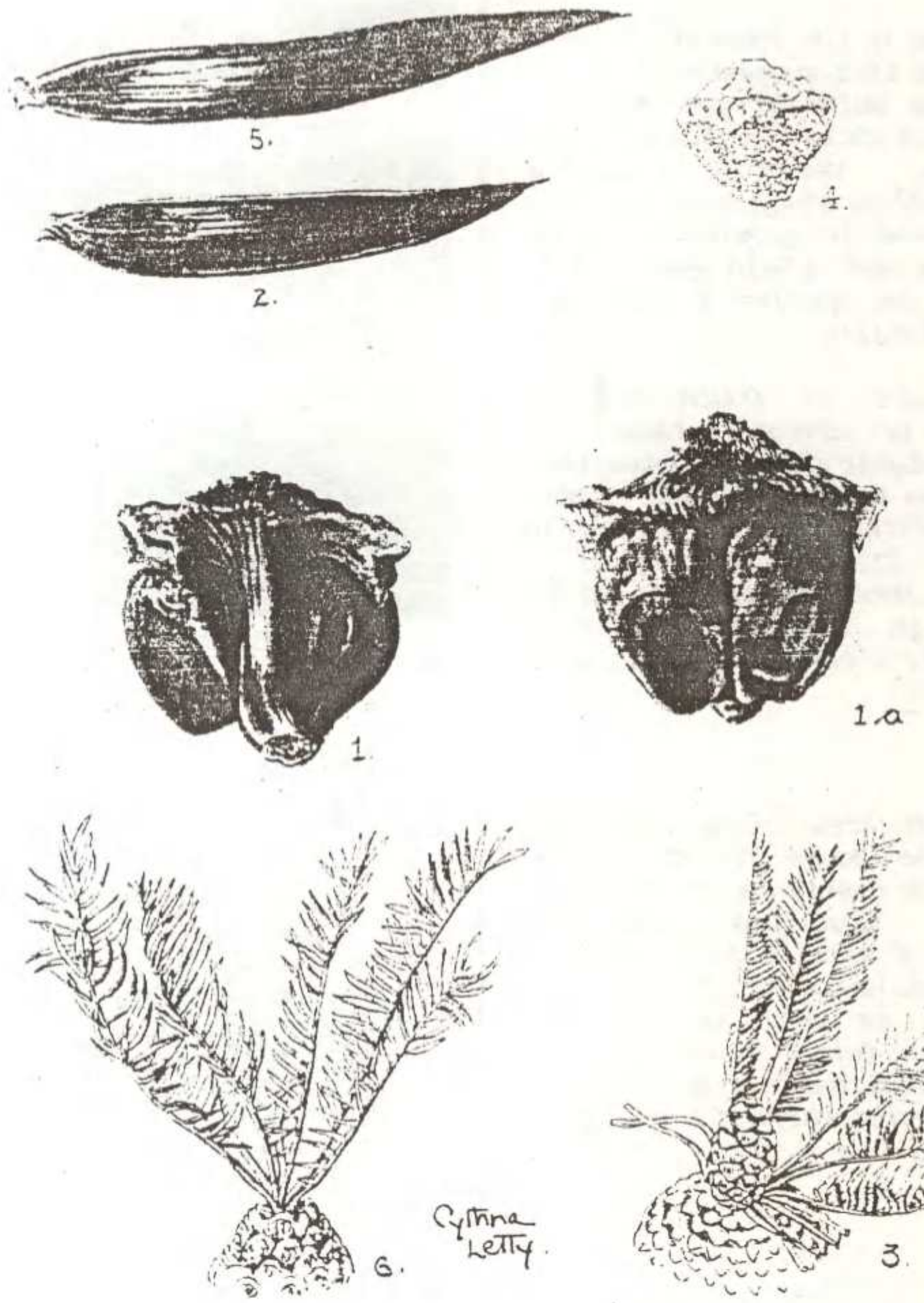
Nat Grobbelaar

FOCUS ON... FOKUS OP...

In each edition of ENCEPHALARTOS, we focus on one Southern African species, in the form of an indepth article in layman's language. In this edition the spotlight falls on:	**In elke uitgawe van ENCEPHALARTOS fokus ons op een Suider-Afrikaanse broodboomspes in die vorm van 'n in-diepte-artikel in leketaal. In hierdie uitgawe val die kollig op:**

Encephalartos ngoyanus Verdoorn

by Cynthia Giddy



The original drawings by Cythna Letty used to illustrate Dr. Verdoorn's description of E. ngoyanus in 1949. Fig. 1 and 1a, female cone scales and seeds viewed from the above and below, 2 female leaflet, 3 female plant reduced, 4 male scale from below, 5 male leaflet, 6 male plant reduced.

Introduction

E. ngoyanus is a semi-dwarf subterranean Encephalartos species which was described by Verdoorn in 1949 in Flowering Plants of Africa, Volume 27. Prior to that the species had a confused nomenclature. The first recorded name was E. brachyphyllus. Both Medley Wood in 1906 and Chamberlain in 1912 found it growing in close proximity to E. woodii at Ngoye and referred to it as E. brachyphyllus. At the time the local Zulus thought it to be the juvenile form of E. woodii. Hutchinson and Rattray in 1933 listed 2 specimens from Zululand under the name E. caffer.

However Henderson in the Journal of South African Botany in 1945 suggested that the dwarf cycad from Zululand was distinct from E. caffer and should be described as a new species. Verdoorn during a expedition in 1947 to study Encephalartos in the field found it growing at Ngoye and at Ingwavuma and upheld Henderson's view and named the species E. ngoyanus after the type locality.

Through not rare in South African collections both private and botanic, the world list of Botanic Gardens notes that only four foreign Botanic Gardens namely Les Cedres at Saint-Jean-Cap-Ferrat in the South of France, Huntington in California, the Honolulu Botanic Garden and Ewanrigg in Zimbabwe lists E. ngoyanus in their accession lists.

Distribution

The distribution area of E. ngoyanus extends from the Ngoye forest in the south through the districts of Mtunzini, Mkuze, Ubombo, Ingwavuma into the southern border of Swaziland and into the Transvaal at Pongola Poort. It occurs in open grassland, as well as on rocky hillsides and in forest margins. The habitat is a summer rainfall area with an annual precipitation varying from 750 to 1000mm.

Description

Stem: The stem of E. ngoyanus is a subterranean caudex about 30cm in length and 20cm in diameter. Unless the soil is washed away the caudex usually does not appear above ground. Unlike that of E. villosus the caudex never branches or suckers and plants are thus solitary unless physically damaged. The author has seen a plant with a multiple crown which on examination revealed a previous injury to the crown. Plants have a thickened root system though not as tuberous as that of E. caffer.

E. ngoyanus plant in grassland habitat. Low growing plants are particularly vulnerable to veld fires.

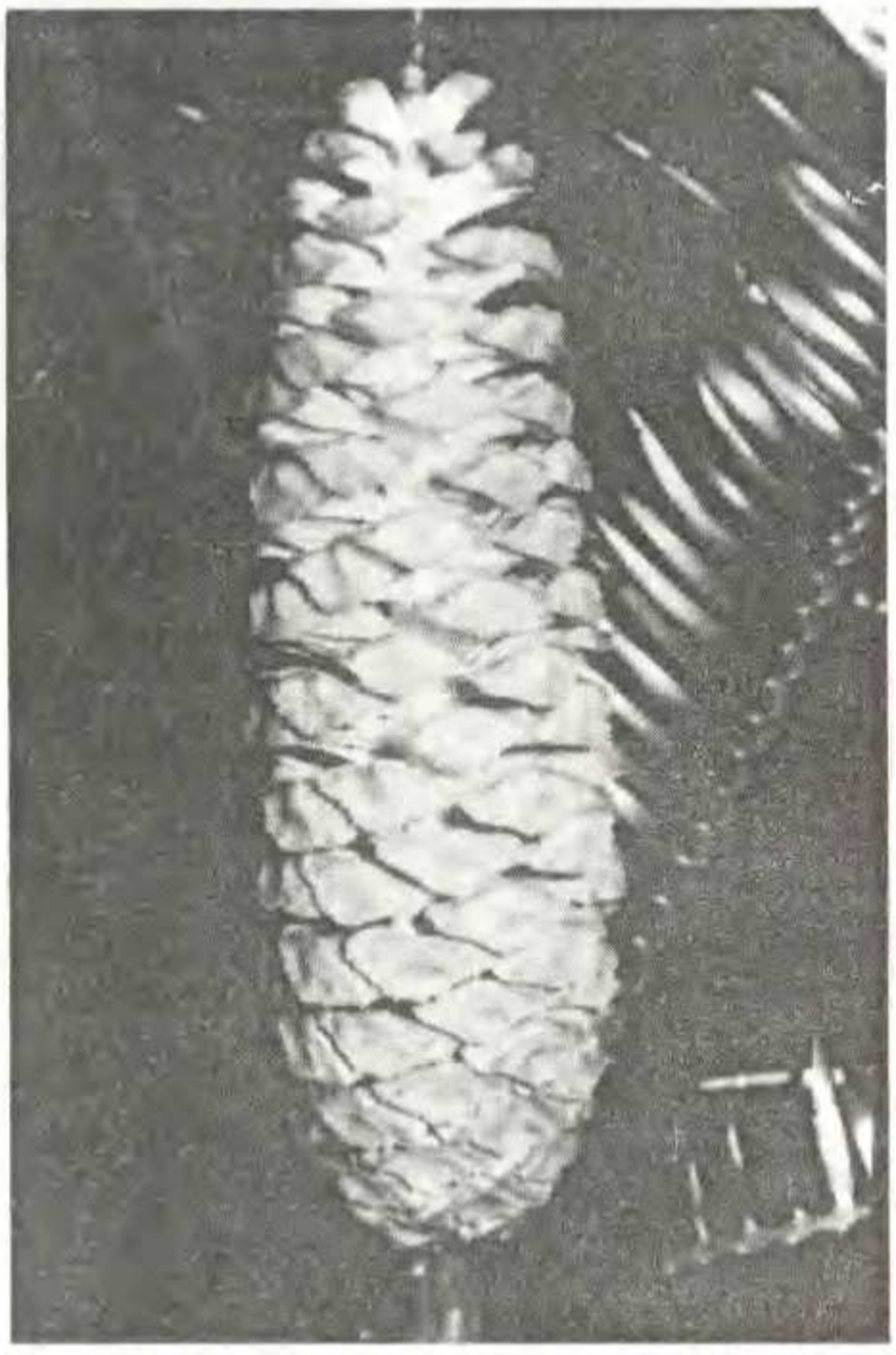
Leaves: *Each plant bears a crown of 5-10 leaves 0,5-1,25 m in length. The leaf colour is medium to dark green. The rhachis is straight with the leaflets well spaced. New leaves have silky, woolly hairs which disappear with age. Leaflets are reduced in size to the base but rarely to a prickle, leaving a bare petiole of 10-15cm. The median leaflets are 7-8cm long, 9-11mm broad. The leaflets are rarely entire and usually have 1-3 teeth on the lower margin.*

Leaf detail of median leaflets of E. ngoyanus. Note that the leaflets are well spaced which distinguishes this species from the overlapping and ruffled effect of E. caffer leaflets.

The lower 10-12cm of the petiole of E. ngoyanus is bare.

A new crown of leaves on a cultivated plant. At this stage the soft leaves are particularly vulnerable to attacks from the Leopard moth (Zeronopsis leopardina) and a careful watch should be kept for these caterpillars in coastal gardens.

Cones: The cones are solitary and pale olive green at first turning yellow with maturity if grown in the sun. Cones on plants in the shade may retain the original green colour. The male cones are 20-25cm long and 5-7cm diameter. The median cone scales have the face elongated into a beak 7-8mm long. Female cones are egg shaped, about 25cm long and 10-12 cm in diameter. The median cone scales are flattened and slightly overlap the lower ones. Cones in cultivation may exceed these measurements.



The solitary male cone of E. ngoyanus.

Female cone of E. ngoyanus.

Female cone of E. ngoyanus. Note that cones in some localities have a fringed lower margin to the cone scales and bear a marked resemblance to those of E. cerinus.

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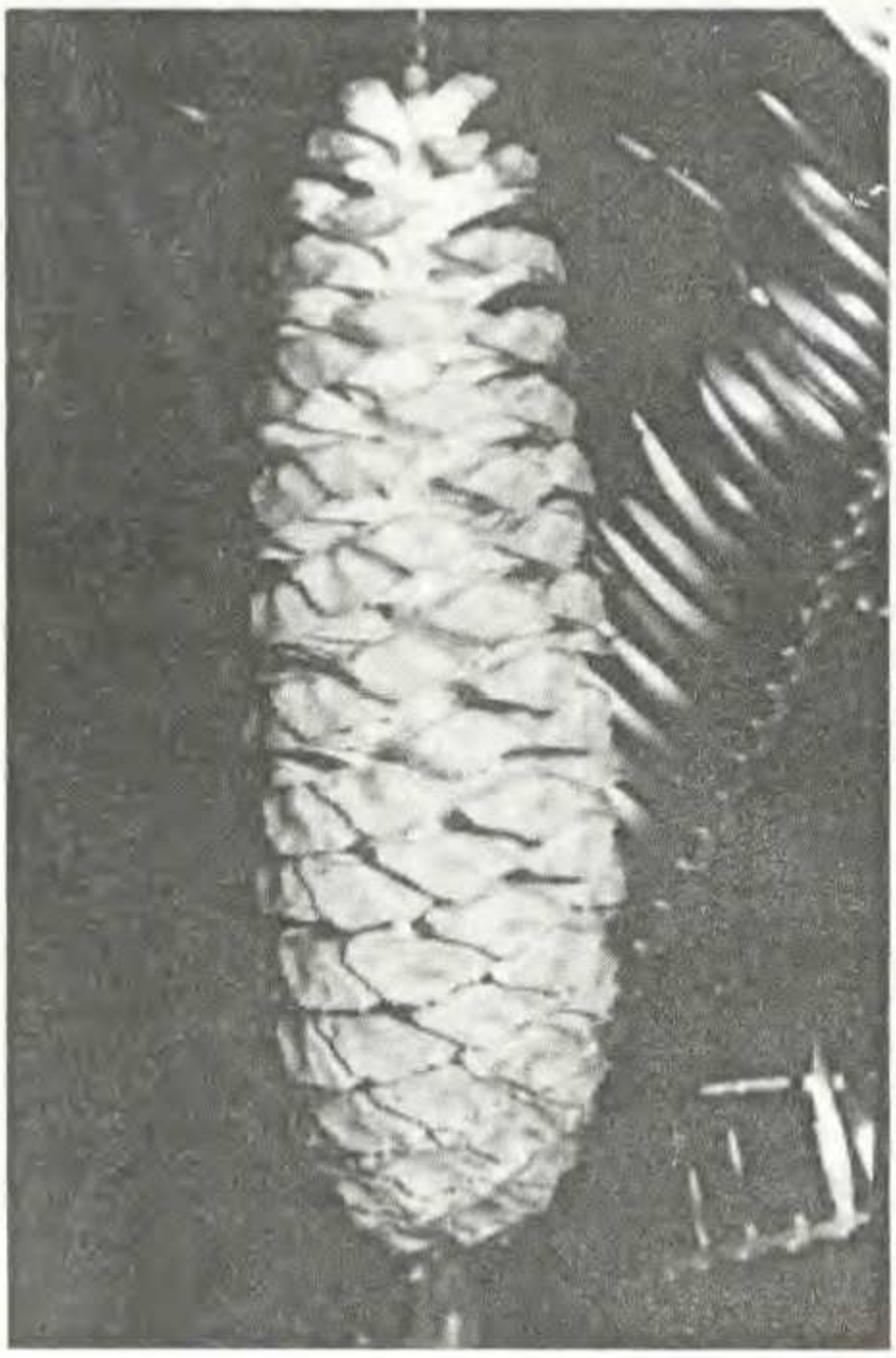
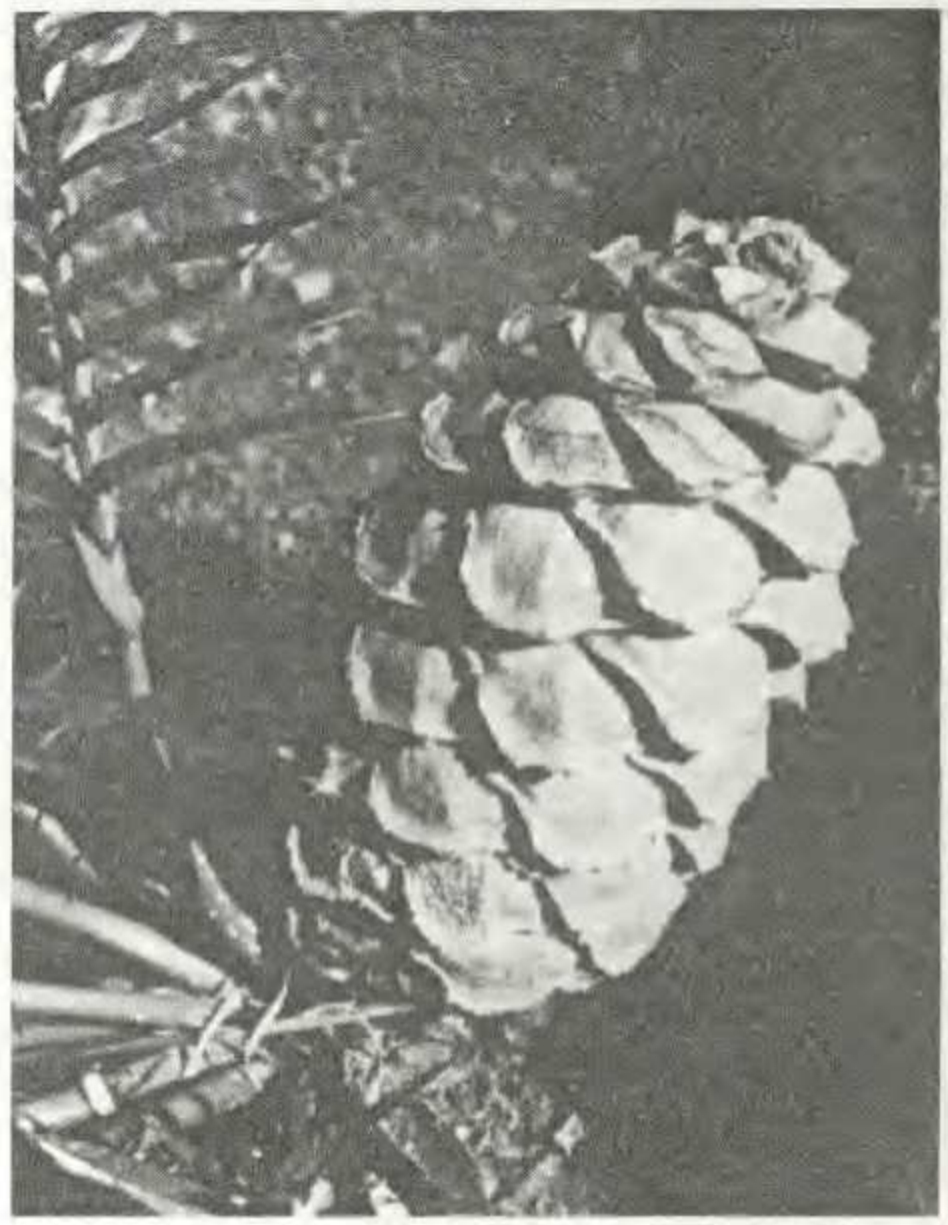


The solitary male cone of E. ngoyanus.



Female cone of E. ngoyanus.

Female cone of E. ngoyanus. Note that cones in some localities have a fringed lower margin to the cone scales and bear a marked resemblance to those of E. cerinus.

Seeds:

The seeds are scarlet 2,5-3cm long, 2cm in diameter. The seeds are longitudinally marked with 8-10 sunken grooves. Female cones contain 80-100 seeds.

Affinities:

E. ngoyanus would appear to be closely related to E. caffer in the Eastern Cape and E. cerinus in Central Natal. Separated by almost 1000 kilometers from the Eastern Cape species, the distribution gap with E. cerinus is not as great and more extensive fieldwork may reveal a continuum.

E. ngoyanus can be distinguished from E. caffer as follows: The leaflets of E. ngoyanus are usually toothed and seldom entire while those of E. caffer are usually entire and only toothed in the seedling stage. The leaflets of E. ngoyanus are a glossy dark green and the leaflets are well spaced on the rhachis. The leaflets of E. caffer are a soft green, slightly hairy and so numerous that they give a ruffled effect. The leaflets of E. ngoyanus are soft and thin textured even at maturity while those of E. caffer are hard and leathery.

The female cone scales of E. ngoyanus overlap the lower ones, while those of E. caffer have a terminal facet. The cones are green at first and turn yellow with maturity. In certain localities the female cone scales of E. ngoyanus are fringed on the lower margin and are almost indistinguishable from those of E. cerinus.

Hybridization

In several localities E. ngoyanus grows socially in very close proximity to ther cycad species notably Stangeria. Intergeneric hybrids are not possible due to the differing chromosome numbers of the two genera. Chamberlain reporting on his botanical travels in 1912 writes:

"In Zululand Encephalartos brachyphyllus (=syn E. ngoyanus Verdoorn - authors note) is abundant .... associated everywhere with Stangeria" and again "about 20 miles from Mtunzini in the midst of the Stangeria and E. brachyphyllus stands a single specimen of another species of Encephalartos ... called E. woodii."

In northern Zululand the distribution area of E. ngoyanus overlaps with that of E. lebomboensis but although one would expect natural hybrids, none have been reported in the field. Vorster however reports a garden hybrid and states that the resultant F1 cross had long pale green fronds with a slightly waxy bloom. The leaflets were virtually entire and the lower leaflets were not reduced to a series of prickles. Vorster concludes: "From its appearance one would never guess its ancestry." However this is not so surprising because of the phenomenon of cytoplasmic inheritance whereby a hybrid will inherit more characteristics from its female than its male parent.

Cultivation:

E. ngoyanus grows well in cultivation but is not a vigorous grower and seldom has more than 8-10 leaves in a crown. It is often deciduous before new leaves or cones emerge. It prefers slightly dry conditions and should be grown in full sun. In its habitat they are found growing on steep slopes between boulders indicating its need for good drainage. Seedlings are very prone to damping off and should not be overwatered. It is semi hardy to frost and will often lose its leaves particularly on the Highveld. Such dormancy is normal and plants should not be watered when the leaves turn yellow in the autumn.

Conservation Status:

Although E. ngoyanus is at present classified as "vulnerable" by the Threatened Plant Unit of the IUCN, the

species is in need of stringent protection in its habitat. Growing in open grassland, both overgrazing and veld fires have over the years taken their toll of the wild populations. Large colonies that used to exist in forest margins and on grassly hillsides can no longer be found. The natural reproduction rate of E. ngoyanus is low compared to other species. Plants bear only single cones with less than 100 seeds per cone compared to the 500-600 seeds per cone and 3-4 cones per plant of a species like E. transvenosus or E. natalensis.

In addition over zealous collectors and commercial interest have latterly removed thousands of specimens. On a recent visit by the Bureau of Natural Resources more than 200 holes were counted on a single hillside. It is difficult to convince a third world population that first world conservation ethics should apply to what they perceive as a commercially exploitable resource. Regrettably the structures of the law usually apply to the sellers not the buyers who initiate the desecration.

More than 200 holes were counted by conservation officers on a single hillside. Plants with leaves removed and roots mutilated seldom survive.

Female cone of E. ngoyanus ready to shed. The number of seeds produced (80-100) is low compared to other species. This is a container plant hence the exposed caudex.

Roadside vendor offering E. ngoyanus for sale at R2-R5 each indicating that they have little awareness of their value.

References

DYER, R.A. 1965 The Cycads of Southern Africa. Bothalia Vol. 8, Part 4.

DYER, R.A. & VERDOORN, I.C. 1966 Zamiaceae In: Flora of Souterhn Africa 1:3-34

GIDDY, C. 1984 Cycads of South Africa. 2nd Revised edition. C Struik Cape Town.

GILBERT, S. 1984. Cycads: status, trade, exploitation and protection 1977-1982 World Wildlife Fund, U.S.

LUCAS, G. 1989. The Botanic Gardens List of Cycads. IUCN Report, Kew.

VERDOORN, I.C. 1949. Encephalartos ngoyanus. The Flowering Plants of Africa. 27: plates 1053-1054.

VORSTER, P. 1986. Hybridization in Encephalartos. Excelsa 12: 101-106, reprinted June 1987 in Encephalartos 10: 10-15.

In addition to cycads these children also offered firewood and guavas for sale. it is difficult for them to understand why firewood and guavas from the veld are legal and cycads are not.

Habitat collected E. ngoyanus for sale in a Natal nursery.

Cycas "Glen Idle" Blue

Cycad 90

CYCAD 90 - THE SECOND INTERNATIONAL CONFERENCE ON CYCAD BIOLOGY

A REPORT ON THE MEETING HELD IN QUEENSLAND, AUSTRALIA, JULY 1990

by Roy Osborne

Perceptions changed, knowledge was spread, friendships were made or renewed and a great time was had by all - could that sum up the many and varied experiences of 105 Conference delegates in an action-packed fortnight or so in Australia? Let me try to elaborate.

Australia - the country

For the first-time visitor to the Commonwealth of Australia, one of the first impressions is that of the vastness of the country. Covering 7.7 million square kilometers, it is 7 times the area of South Africa and 32 times the size of the United Kingdom, but the population density is a mere 2 individuals per square kilometer. Its culture represents a combination of British, other European, Eastern and aboriginal influences. Its climate, and hence its vegetation, varies from the mediterranean west, the cool south, the sub-tropical east to the tropical north. And it shares places with Mexico and South Africa as one of the three cycad-richest countries (in terms of numbers of species) in the world.

The Conference

Of the 105 Conference delegates, 47 were "Internationals" and 58 were Australians. A total of 48 lecture and 14 poster presentations formed the academic core of the meeting; these were amplified by several audio-visual presentations (e.g. a fascinating pollination video - complete with motile spermatozoids - by Knut Norstog and a movie on the rescue of endangered Chinese cycads by Zhou Lin and Zhou Zheng), plant and other informative displays (e.g. the fascinating leaf samples provided by Joe Perner). The first two days were spent at the magnificent "get-away-from-it-all" Burdenkin Wilderness Lodge while the second part of the Conference was held at the Hotel Allen in small-but-friendly Townsville.

Viewing posters at the Conference

Right : Bart Schutzman, John Donaldson, Sharon Chirgwin and Aldo Moretti at the *Cycas media* locality

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Cycas "Glen Idle" Blue

Perhaps the most notable feature of the Conference was its interdisciplinary character; delegates and speakers included anthropologists, geologists, chemists, toxicologists, entomologists, geneticists, ecologists as well as the more traditional cycad botanists and growers - all united by their common interest in the cycad plant group. Because of this mix, several informal groups emerged with future interaction plans being formulated.

The 12 southern African delegates, who contributed 6 papers and 9 posters, were well-received. There was frequent reference to ENCEPHALARTOS, Journal of the Cycad Society of Southern Africa, which by all accounts seems to have made a hit in the international cycad community and is now regarded as the world's leading cycad-interest-group publication. (Roy Shooter did brisk business with sales of South African posters and back-copies of ENCEPHALARTOS, as well as signing up several new members for the Society.)

One of the many hundreds of impressive "Glen Idle Blue" *Cycas* specimens in natural habitat in central Queensland

A happy group enjoying their meal at the official CYCAD 90 Conference Dinner

Douglas Goode, Roy Shooter, John Donaldson and friends sampling the local refreshments at the Burdekin Wilderness Lodge "Pub"

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Cycas "Glen Idle" Blue

Above : Paul Resslar with *Lepidozamia peroffskyana* on Mount Glorious in the Queensland rain forest.

Right : Some of the Australian outback roads require skillful navigational talents - *en route* to the "Glen Idle Blue" *Cycas* locality in central Queensland

Academic highlights

Taxonomy of the genus *Cycas* still poses problems; attention is being given to the Australian species by Sharon Chirgwin (who is presently describing a new species *Cycas conferta* from the Northern Territory) and Ken Hill (whose cycad-orientated work is scheduled for Volume 48 of the *Flora of Australia* due in 1993). Much work is being done in quantitative relationships in cycads leading to informative phenetic and cladistic studies such as those presented by Aldo Moretti, Roy Osborne, Bart Schutzman and Dennis Stevenson. Other, more traditional taxonomic presentations - with excellent slide illustrations - were given by D.D. Pant, Ian Turner and Piet Vorster with paleobotanical aspects being addressed by Ted Delevoryas.

Renewed critical attention is being given to the cycad toxins (the azoxyglycosides macrozamin, cycasin and the non-protein amino acid BMAA), with several eminent medically-orientated workers (Arthur Bell, Mark Duncan, George Hoffmann, Leonard Kurland, Phillip Ladd, Robert Nash, Peter Nunn, Alan Seawright and Peter Spencer) addressing the meeting on the neurotoxological and carginogenic properties of these compounds. In her address, anthropologist Wendy Beck told us that the Australian aboriginals still use cycad seeds as a foodstuff - after fairly elaborate pre-treament. The Osborne & Nair poster, cautioning against the reliability of some of the analytical methods, served a useful purpose in this field of work.

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Left : American visitors Tim Gregory, Terry Brabham and Tim Pickering cleaning *Cycas* seeds at a Brisbane nursery - note the use of protective gloves

Cautionary note

Medical authorities at the CYCAD 90 Conference drew our attention to possible dangers to the cycad hobbyist. The practice of cleaning the flesh off cycad seeds in a container of water, which many of us do quite regularly, leads to a solution of progressing increasing concentrations of the water-soluble cycad toxins - which are quite readily absorbed through the skin. **It is absolutely essential for persons in this situation to wear protective gloves whilst handling such material.** Secondly, cycad pollen may also contain significant quantities of the cycad toxins and the pollen is known to cause severe allergenic responses. **Persons dealing with cycad pollen are strongly advised to wear dust-masks during the time of exposure.** The medical consequences are all the more frightening since it may take several decades before the symptoms manifest themselves.

CYCAD 90 delegates posing alongside their bus at the Storth site of *Cycas media*, Mount Elliot National Park, Queensland 25 July 1990.

Cycad 90

Cycas "Glen Idle" Blue

By contrast, a light note at the meeting was introduced by geologist Alan Wilson who maintained that gold micro-nuggets often found in soils in Australian cycad habitats might well arise by complexation with ions (e.g. cyanides) which arise from the plants.

As expected, the phenomenon of cycad nitrogen-fixation featured in the proceedings, with interesting presentations here by Nat Grobbelaar, John Pate and Ian Staff.

Plant-insect interactions is an up-and-coming research topic, especially in respect of pollen transfer by host-specific insects. Important contributions in this area were made by Charles Chadwick, Stephen Connell, John Donaldson, Priscilla Fawcett, Knut Norstog and Rita Singh. Population studies, including sex-ratios and other similar aspects were addressed by Nat Grobbelaar, Robert Ornduff, Willie Tang and Mario Vazquez Torres.

The concept of conservation-through-propagation was a central theme and important contributions on this topic were made by Cynthia Giddy, Grant Hawley and Andrew Vovides. The latter speaker surprised and distressed all by reporting that *Zamia furfuracea* has been so over-collected in Mexico that it is now near endangered. An attention-grabbing lecture by Bijan Dehgan told of his work on multiple-branching induced on cycad crowns by the topical application of a secret PGR (plant growth regulator) "cocktail". Paul Resslar confirmed the possibility of cycad tissue culture but morphogenesis *in vitro* remains elusive.

Future global cycad conservation strategy

A special meeting of the delegates was called to discuss the matter of an action plan for future cycad conservation strategy at an international level. Plans drafted by Roy Osborne for the South African situation and by Andrew Vovides for Mexico are to be consolidated into a single document by the Cycad Specialist Group representatives to the IUCN. An attempt is to be made to ascertain the approximate number of cycads in habitat for each species.

Dennis Stevenson and Andrew Vovides look on while John Pate explores a likely site for coralloid root samples

Cynthia Giddy, Nat Grobbelaar, Piet Vorster, Elsa Vorster and Hanneke Grobbelaar in the bush "down under"

Publication of the Proceedings

The full proceedings of the Conference are to be published by special arrangement with the Palm and Cycad Societies of Australia. All manuscripts are to be submitted to editors Knut Norstog or Dennis Stevenson by 1 December 1990, so that early printing can be facilitated.

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The field trips

What would a Conference in Australia be like without field trips? And what glorious winter weather blessed the visitors. The only difficulty was the matter of choosing where to go and what to see within the short time available to most delegates. One consistent report was that the number of cycads in any single population was staggering: the South Africans, for instance, would call a cycad population numbering 1000 plants a "large" colony, but this would be tiny by Australian standards. Colonies of *Cycas* and *Macrozamia* seem to run commonly to hundreds of thousands and cover vast acreages.

The Northern Territory pre-Conference visits, organised by Marty Bishop and Monty Anderson and centred around the Darwin area, were described as "mind-boggling". The mid-Conference break gave everyone a chance to see *Cycas media* in habitat at the Mount Elliot National Park and another afternoon break allowed delegates to visit Townsville's Anderson Botanical Gardens and the striking palm collections at that town's Palmetum - enthusiastically guided by municipal horticulturist Robert Tucker. At termination, delegates were shown the northern Queensland rain-forest flora (and its associated leech fauna) near Cairns and a trip to the Glen Idle Nursery demonstrated propagation on a massive scale. A small party had the privilege of seeing the new "Glen Idle Blue" *Cycas* in habitat in the central Queensland outback. An enthusiastic team explored the *Lepidozamia peroffskyana* and various *Macrozamia* populations in southern Queensland under the careful guidance of Stan Walkley, and also had the opportunity to see the impressive Mt. Coot-tha Botanic Gardens at Brisbane. The southern Queensland field trips terminated with a special meeting of the Palm and Cycad Society in Brisbane which was addressed by Bijan Dehgan, Roy Osborne and Andrew Vovides.

Western Australia

Because of travel arrangements, Roy Osborne entered and left Australia through the Western Australian capital of Perth. He gave a special lecture on "Cycads of Africa" to the Palm and Cycad Society of Western Australia which appears to have been received with acclaim (as demonstrated by the Akubra hat presented to him by the Western Australian group). It also gave at least one person the chance to see the stands of *Macrozamia riedlei* so prolific in that area and to visit King's Park.

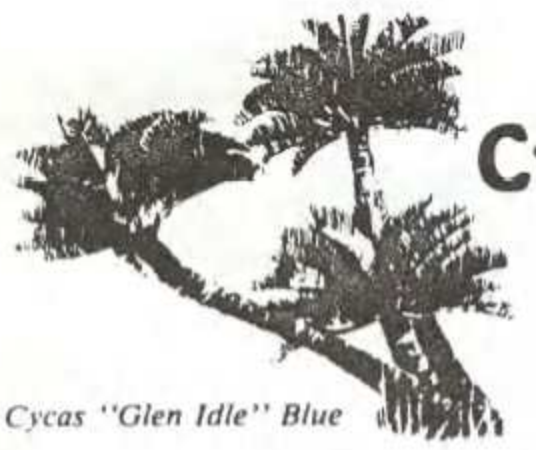
A fine stand of *Cycas* "Glen Idle Blue" in habitat in central Queensland

Overseas visitors sharing Australian hospitality with farmhands at the "tucker table" of an outback cattle station

The Next Meeting - CYCAD 93

A decision has been reached that the Third International Conference on Cycad Biology - CYCAD 93 - will be held in South Africa, probably in July 1993 at a Pretoria venue. The meeting will be hosted by the Cycad Society of Southern Africa, and all enquiries in this connection should be addressed to the President, Prof N. Grobbelaar, P.O. Box 15357, Lynne East, 0039 South Africa.

Future long terms plans are for the CYCAD 96 Conference to be held in mainland China and for the CYCAD 99 meeting to be held in Florida, USA.



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Cycas "Glen Idle" Blue

Right : Robert Tucker, technical officer of the Townsville Palmetum, addressing CYCAD 90 delegates

Scientific contributions by delegates from southern Africa

Charles Chakavarika, Ewanrigg Botanical Gardens, P O Box 8119, Causeway, Harare, Zimbabwe
POSTER: The cycad collection of Ewanrigg Botanical Gardens in Zimbabwe

John Donaldson, National Botanical Institute, Kirstenbosch, Private Bag X7, 7735 CLAREMONT
LECTURE: Insect predation of cycad ovules in South Africa; implications for cycad conservation
LECTURE: Effects of cone structure in Encephalartos *on ovule predation by two cycad weevils,* Antliarhinus zamiae *and* A. signatus
POSTER: Insects as potential pollinators of Encephalartos *spp. in South Africa with special reference to* E. villosus

Cynthia Giddy, Cycad Nursery, P O Box 45, Umlaas Road, 3730 Natal
LECTURE: Cycad conservation legislation - does it work in South Africa?
POSTER: Cultivation of cycads from seed, with special reference to Encephalartos *spp.*

Nat Grobbelaar, P O Box 15357, 0039 LYNN EAST
LECTURE: Pollination and sex ratio of Encephalartos transvenosus
POSTER: Senescence patterns in the female cones of Encephalartos
POSTER: Specificity of the cycad-cyanobiont symbiosis

Roy Osborne, University of Natal, 4001 DURBAN
POSTER, with N. Grobbelaar & P.L.D. Vincent: A numerical phenetic study of the genus Encephalartos *Lehm.*
POSTER, with D.W. Stevenson: The World List of Cycads
POSTER: The Cycad Society of Southern Africa
POSTER, with J.J. Nair : Potential errors in the determination of methylazoxymethanol glycosides in plant material

Ian Turner, Springs Farm, P O Box 2162, Harare, Zimbabwe
LECTURE: Some interesting Cycas *species*

Piet Vorster, Dept Botany, Univ Stellenbosch, 7600 STELLENBOSCH
LECTURE: Taxonomy of Encephalartos

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Cycas "Glen Idle" Blue

Acknowledgements

The success of CYCAD 90 would not have been possible without the input from a number of dedicated people. Pat and David Coutts and members of their staff were the foremost in contributions of time, money, effort and enthusiasm. The organising committee, comprising Knut Norstog, Dennis Stevenson, Pat Coutts, Roy Osborne and Aldo Moretti, did a sterling job. Finally, the cycad enthusiasts of Australia, who so generously opened up their homes and their hearts to their overseas visitors, deserve a special and very sincere vote of thanks.

The South African sponsors

The southern African delegation to the CYCAD 90 Conference was partially funded by contributions from the following organisations and the participants' grateful appreciation is hereby recorded. Some individual delegates also obtained additional funding from their own institutions. The collective donors were:

AECI Limited
Burgess Nurseries, Westville.
Checkers South Africa Limited
The Cycad Society of Southern Africa
The Endangered Wildlife Trust
Natal Earthworks Limited
Pick 'n Pay Stores Limited
Southern Sun Hotel Corporation (Pty) Ltd
The South African Government (Department of Foreign Affairs)

AN INTRODUCTION TO THE GENUS CYCAS IN AUSTRALIA

A most-impressive booklet **An Introduction to the Genus *Cycas* in Australia** has just become available. Written by the well-known Australian cycad personality, Len P Butt, the 56-page booklet is excellently illustrated with colour plates and contains some really useful information on the Australian representatives of this genus. It is written in terms easily readable for laymen and gives details of *Cycas angulata, C. armstrongii, C. basaltica, C. cairnsiana, C. calicola,* the new species *C. conferta, C. furfuracea, C. kennedyana, C. media, C. normanbyana, C. pruinosa* and several plants not yet officially named, but known by locality names such as "Glen Idle Blue", "Champion's Blue Surprise", "Marlborough Blue", "Fog Bay/Finniss River" and "Bynoe/Cox Peninsula". The booklet is yet another feather in the cap for the Publication Fund, Palm & Cycad Societies of Australia who are to be commended on their superb quality. Moderately priced (about R 20), the booklet can be ordered through the Palm & Cycad Societies of Australia. P O Box 1134, Milton, Queensland 4064, Australia.

FROM THE ANZ BOOKSHELF

It is appropriate to add to our CYCAD report, the news of two new contributions the cycad literature, details of which w announced at the Conference. See left a below.

NEW PALM & CYCAD BOOK

Our New Zealand representative, Keith Boyer, ha completed a major new book : **Palms and Cycad Beyond the Tropics** which is scheduled for publication March 1991. The 210-page work has 100 colour photo and numerous line drawings to illustrate the 160 specie of palms and cycads which can be grown in cool regions of the world. Two chapters introduce the palm and cycads, and further chapters discuss propagatio landscaping, maintenance and conservation aspect Hardiness is a major theme with information on the col tolerance of all species included. Enquiries should b addressed to the publisher, David Bateman Ltd, P O Box 100-242, North Shore Mail Centre, Auckland 1 New Zealand. The book will be distributed in the USA UK, South Africa, Australia and New Zealand.

TWO NEW REPORTS ON CYCAD SEX CHANGES

by Roy Osborne

The phenomenon of possible sex changes in cycads has been a subject which has engendered heated debate since it was first reported. The "traditional" geneticists maintained that, in dioecious plants (plants where the male and female reproductive structures are borne on separate plants) like cycads, the gender is controlled absolutely by the genetic make-up as constituted at the time of fertilization of the female egg cell by the male spermatozoid; there is *no possibility* of a change and all reports of sex changes must therefore be fallacious. This is the viewpoint underlying the letter from Prof P N Mehra (ENCEPHALARTOS 8: 34-35).

However, more tolerant views seems to be emerging in two directions. The first school of thought is that there are many dioecious plants in which the gender is irreversible - these plants sometimes being referred to as "supermales" and "superfemales". These individuals have a genetic code where a number of genetic zones are all consistently in the same direction - the codes could be written for example as MMMMM for the supermales or FFFFF for the superfemales. But some plants may have a genetic make-up which is not quite so absolutely one or the other. To illustrate, a plant with the genetic code MMMFF would generally act as a male, but perhaps the female "side" could emerge given special circumstances.

The second school of thought is that all dioecious plants can be *either* male *or* female - i.e. the genetic constitution is not absolute - and that the local environmental situation will have an influence, probably *acting through a hormone balance, on how the gender is* expressed. (Just like the eggs of some reptiles, depending on the temperature at incubation, can develop into either male or female progeny).

Right now, we have no evidence to say which of these various theories is most plausible, but the point of this feature is to record two new cases of sex changes and to summarise, in one report (see Table 1), all presently known cases of cycad sex changes.

Sex change in *Encephalartos villosus*

This report is based on a personal interview with Danie Nel, the Society's seedbank officer. He obtained a mature female specimen of *E. villosus* in 1974. At that time, it bore a female cone from which normal seeds developed. In 1977, it produced a cone which aborted and the sex of which could not be determined. In 1986, it produced two male cones - and it has produced male cones annually ever since (See Fig 1).

TABLE 1: Documented records of sex changes in cycads

Species	Change	Circumstances	Reference
Cycas circinalis	F to M	Bud from female	Chamberlain 1935
Cycas circinalis	F to M	Physical damage	Menninger 1967
Cycas circinalis	M to F	Severe frost	Menninger 1967
Cycas revoluta	?	Mechanical damage	Schuster 1932
Cycas revoluta	F to M	unknown	Chamberlain 1935
Cycas revoluta	M to F	Transplanting	ENCEPHALARTOS 2: 24
E. latifrons	F to M	Severe drought	ENCEPHALARTOS 13:42
E. lebomboensis	F to M	Sucker from female	see this text
E. villosus	F to M	Severe drought	Swanepoel, R. *pers. comm.*
E. villosus	F to M	Transplanting	see this text
E. umbeluziensis	M to F	Severe cold spell	ENCEPHALARTOS 21: 8
Stangeria eriopus	F to M	Side crown	ENCEPHALARTOS 19: 27
Zamia sp.?	F to M	Side crown	ENCEPHALARTOS 2: 21

Sex change in *Encephalartos lebomboensis*

This report is based on a personal interview with Gilbert Christopulo, a keen Zululand cycad enthusiast. He tells of a plant of *E. lebomboensis* obtained from northern Natal in 1963. The plant was transplanted several times until it was permanently established in 1977. The plant produced female cones from 1980 onwards - as evidenced by the two female cones produced in 1990 *(Fig 2). These cones* were completely normal and have been hand-pollinated to yield viable seeds crops. However, in its final move in 1977, nine suckers had been removed, at least three of which can be positively identified. Of these three plants from the female mother plant, one produced a female cone in January 1990 (Fig 3) while the another produced one male cone in 1988, two in 1989 and three in 1990 (Fig 4). The third sucker plant has not yet coned. Regrettably, the plants from the other six suckers can not be traced.

The three plants are in a similar environment, except that the female plant is in a somewhat more shady situation that the male.

Conclusion

The summarised information of all known cycad sex changes is given in Table 1. There is now just too much evidence that these reports are incorrect, and we must therefore accept that sex change does occur. This is an area of tremendously-important plant physiological research. Clearly, if the mechanism for such sex changes can be found, then gender might be controllable. Once again, the possibility of "creating" a female *Encephalartos woodii* (see ENCEPHALARTOS 2:20-22) might not be altogether out of the question.

Fig 1: The *E. villosus* plant of Danie Nel's, wh changed from female to male. Male cones are cle evident in this photo.

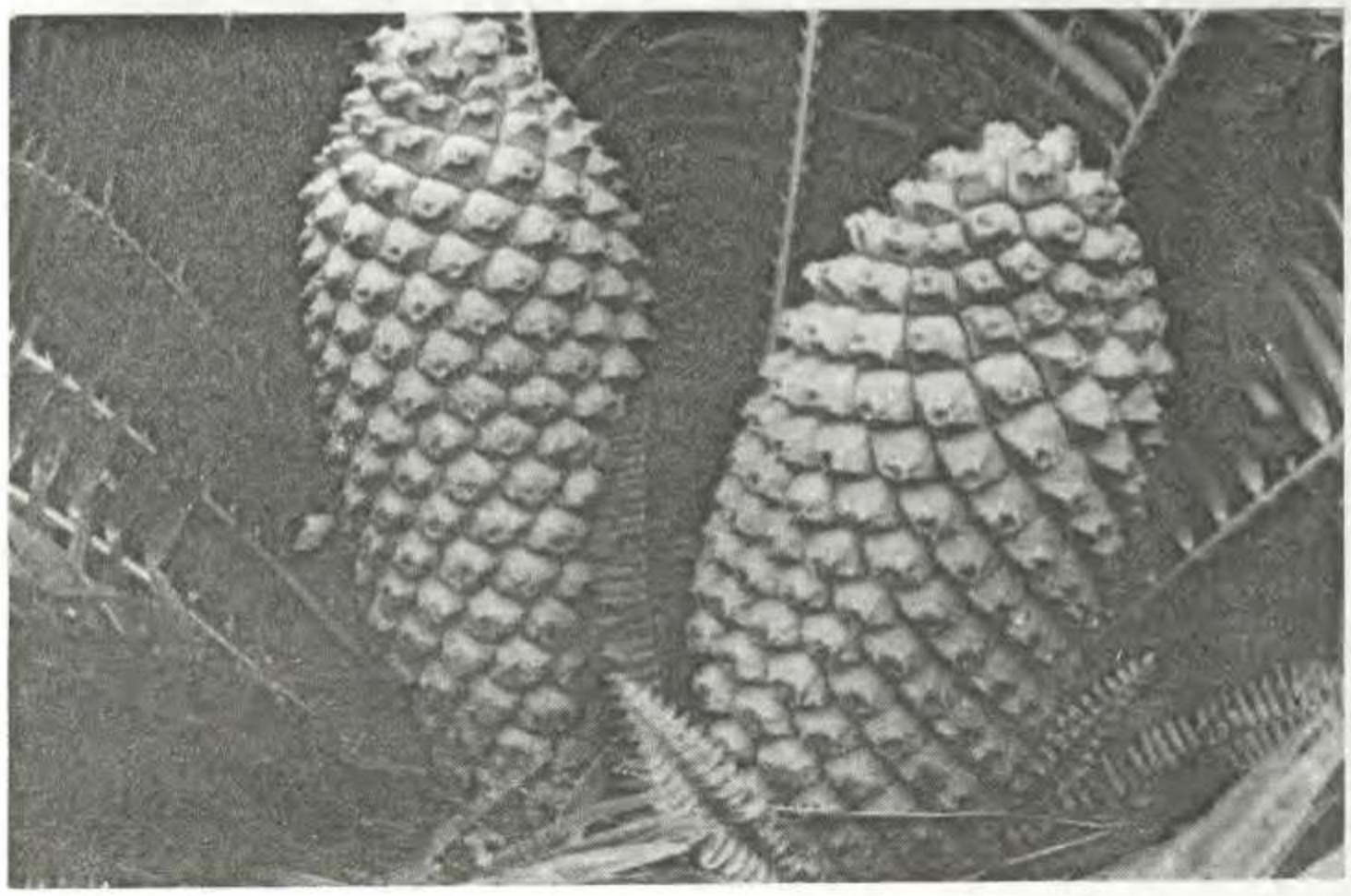


Fig 2: The female "mother plant" of *E. lebomboensis* which produced three suckers, at least one of which was female and one of which was male.

Fig 3: One of the sucker plants taken from the mother plant in Fig 2 - clearly a female.

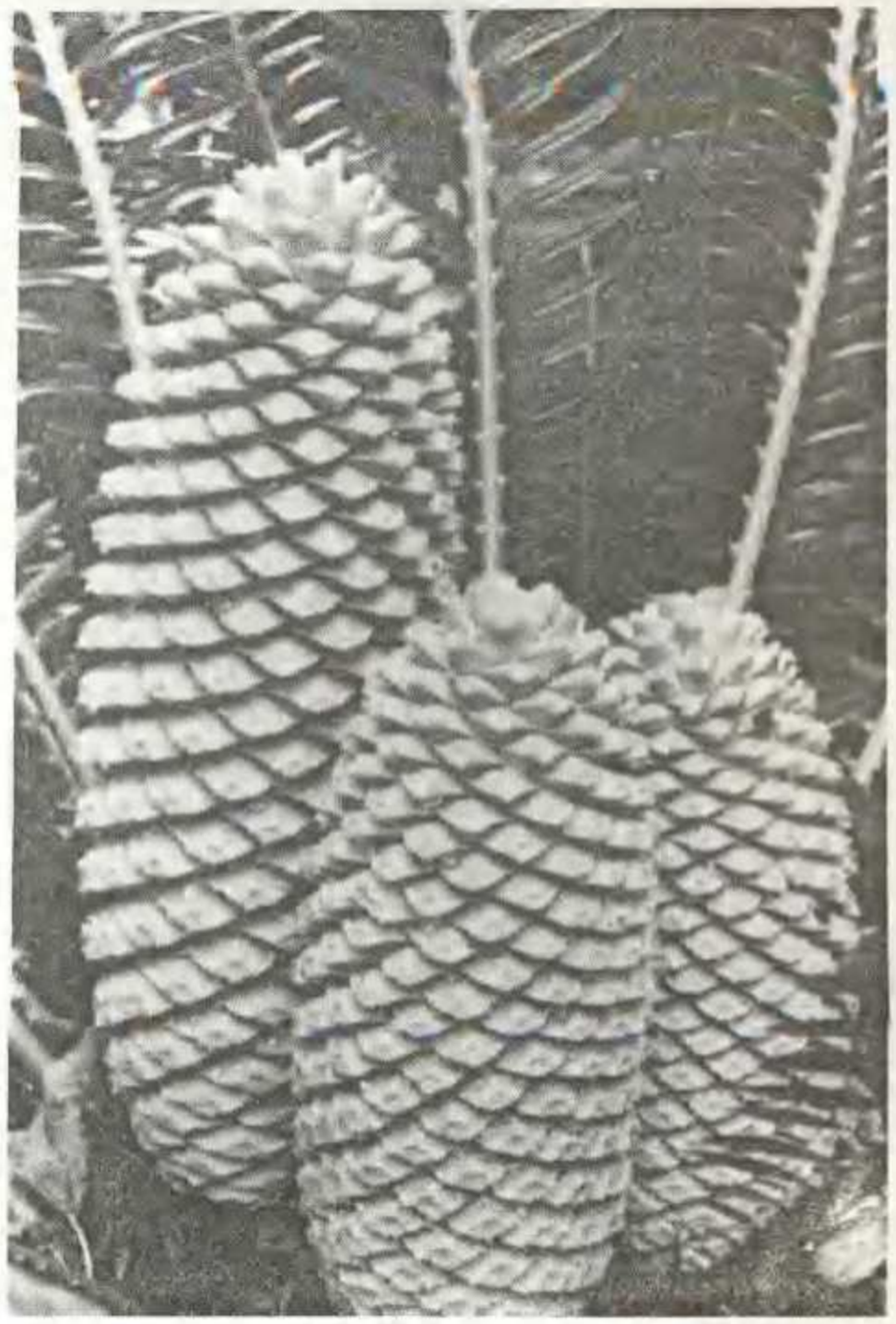


Fig 4: Another of the sucker plants taken from the mother plant in Fig 2 - clearly a male.

HONORARY MEMBERSHIP

The highest honour that the Cycad Society of Southern Africa can bestow on a member, is to present him with a life-long honorary membership of the Society. The constitution prescribes that: "Honorary membership shall be restricted to persons who have rendered outstanding services either in furthering the knowledge of Southern African cycads, or towards their conservation."

The Executive Committee recently unanimously decided to honour Dr. Roy Osborne, our one and only Past President, by bestowing an honorary membership of the Society on him.

Congratulations Roy!

CYCAD 87 PROCEEDINGS

The long-awaited publication of the **Proceedings of the First International Conference on Cycad Biology** - CYCAD 87 - held in France in 1987 (see ENCEPHALARTOS 10: 4-8) has now appeared. The 210-page booklet, entitled "**The Biology, Structure and Systematics of the Cycadales**", constitutes Volume 57 of the **Memoirs of the New York Botanical Garden** and was released in March 1990. Edited by Dennis Stevenson (who deserves the highest commendation for his painstaking work), the illustrated journal contains 21 scientific papers covering an impressively broad spectrum of cycad interests. Taxonomic descriptions of several new central African *Encephalartos* species are given, as well as that for the new South American genus *Chiqua*. Other subjects dealt with fall under the headings of historical perspectives, morphology, reproductive biology, propagation, cytology, karyology, physiology, phytochemistry, ecology and ethno-botany. Southern African contributors to the volume are Cynthia Giddy, Roy Osborne and Ian Turner. This work will be an invaluable reference work for all serious cycad students.

The publication is dedicated to the memory of Padre Sergio Restrepo of Colombia, an avid amateur botanist who was instrumental in the discovery of the new genus *Chiqua*, and who was assassinated in June 1989 by person(s) unknown.

The book retails at US$ 49.50 plus US$ 5.50 to cover handling and postage, i.e. a total of US$ 55.00. To obtain a copy of this work, send your order with a bank draft in US$ to: **The Scientific Publications Department, New York Botanical Garden, Bronx, New York 10458, USA.**

A NEW ZAMIA SPECIES

Bart Schutzman of the Horticultural Systematics Laboratory, Department of Ornamental Horticulture, University of Florida, Gainesville, Florida, has described a new cycad, *Zamia standleyi*. The plant, occurring in northern Honduras, appears to be related to *Zamia splendens* - which was also described by Schutzman. The publication, entitled **A new species of** Zamia **from Honduras** appears in *Systematic Botany* 14(2): 214-219 of 1989. Reprint requests should be addressed to Bart Schutzman directly.

TANG AND MESO-AMERICAN CYCADS

Willie Tang, well-known for his work on the meso-American cycads, has published an illustrated article on "The Tropical Rain Forest Cycads" in the April 1990 issue of the *Fairchild Tropical Garden Bulletin*, pp. 7-11. Willie describes how the rain-forest representatives of *Zamia, Dioon, Ceratozamia* and *Chiqua* have a tough life on the forest floor, where they have become adapted, in different ways, to conditions of very low light intensity, limited water availability and widely-scattered distribution of plants in any single population. He regards the cycads as being "ecological counterparts of the angiosperms" in this regard. A sad message is that the wholesale destruction of rain-forests in the American tropics is leading to the rapid demise of cycad populations. Persons wanting a copy of this article are invited to contact Willie, c/o Fairchild Tropical Garden, 10901 Old Cutler Road, Miami, Florida 33156, USA.

MORE INSECT-CYCAD WORK

Husband-and-wife team Knut Norstog and Priscilla Fawcett have continued their studies on cycad-insect relationships and their latest paper is as follows: **Insect-cycad symbiosis and its relation to the pollination of** *Zamia furfuracea* **(Zamiaceae) by** *Rhopalotria mollis* **(Curculionidae)**. The weevil is host specific to the cycad's starch-rich male cones where feeding, mating and egg-laying takes place. The insects visit female cones, which do not have the abundant starch, but pollen transport occurs at this time. The paper is published in the *American Journal of Botany* Volume 76: 1380-1394 of 1989, and persons interested in obtaining a reprint should contact the authors c/o Fairchild Tropical Garden, 11935 Old Cutler Road, Miami, Florida 33156, USA.

CORPTALK - MONTHLY NEWSLETTER FOR THE
STAFF OF THE DURBAN CORPORATION

DECEMBER 1989

Doug Goode, Africa's only specialist cycad artist, with his recently published book "Cycads of Africa".

Doug's book will be a collector's item

"IT'S a great relief," says Doug Goode, principal technician at the Natural History Museum, who has just had his book "Cycads of Africa" published. And no wonder . . . the magnificent review has over 1 000 illustrations and took Doug 21 years to complete.

"There were a lot of doubtful species which first had to be examined and identified before I could complete the book," says Doug. It was a huge challenge, but necessary if the book was to be a complete reference. I tackled the book as an artist - I'm facinated by the form and variation of cycads which are the only plants I paint."

Doug's beautiful book will be sold at R150 per copy and is aimed at collectors and professional and amateur botanists. He is still working on 16 special leather-bound editions which will each contain an original painting. These will sell for R2 000 each and are being made to order only.

The Star Wednesday July 11 1990

Colourful stamps mark the 150th anniversary of London's famous Kew Gardens, which attract plant lovers from all over the world. The 20p stamp shows a cycad and the Sir Joseph Banks building which actively promotes economic botany. The 29p features a stone pine, a Mediterranean tree with edible seeds. The 34p stamp shows a graceful willow tree, while a cedar tree adorns the 37p stamp together with Kew's famous 18th century pagoda. The stamps were designed by Paul Leith, a freelance illustrator.

CORPTALK - MONTHLY NEWSLETTER FOR THE
STAFF OF THE DURBAN CORPORATION

JULY 1990

Australia beckons Doug down under !

Doug Goode, Principal Technician for the Natural Science Museum, is off to Australia this month to attend the Second International Conference on Cycad Biology, in Townsville, on the East Coast of Australia.

He was invited by the organisers of the conference because of his expert knowledge of cycads in South Africa, and is one of several delegates to represent the country at the 10 day conference.

Doug has been studying cycads since 1962. At that time he was living in the Transvaal, where he had access to many different varieties.

"The variety is what attracted me to the plants," says Doug. "Some are so different, they don't even look related. They also date back to the days of the dinosaur, and have managed to survive all this time!"

The conference will involve several field trips and Doug hopes to have time to paint some of the cycads in the Townsville area.

"We'll be in a tropical zone, which is cycad country so I'm interested to see what I can find there."

He plans to set up a display at the conference, which will include the special cycad posters he recently designed for the Natural Science Museum.

"South Africans can be proud of their colourful varieties of cycad and I want to advertise them!" says Doug.

Doug Goode, Principal Technician at the Natural Science Museum, with one of the posters he plans to use in a display for the Second International Conference on Cycad Biology, in Australia.

NATAL SECTION NEWS

About 45 Natal members and guests enjoyed a stimulating presentation by Prof **Nat Grobbelaar**, President of the Society, accompanied by his wife **Hanneke**, on Wednesday 27 June 1990. Using some of his excellent slides, Nat discussed a range of subjects relating to cycad propagation, including the limited successes with tissue culture, propagation from leaves and leaf bases, sucker removal, natural and artificial pollination, pollen allergies, cone degeneration and seed germination. Nat's scientific expertise was abundantly clear in the way in which he related each of these topics to careful observations and experimentation.

Several interesting items were on display including an *Encephalartos ferox* which had been propagated from a leaf (**Roy Shooter**) and a male cone and photographs of a new East African cycad (**George Walters**). Winners in the plant competition were **Dirk Esterhuyse** (first prize, *E. cycadifolius*), **Roy Osborne** and **Robert Campbell**. A delightful spread of cheese, snacks and wines was provided with catering by **Angela Osborne**.

Members of the Natal Committee with Nat Grobbelaar at the Society's function on 27 June 1990. Left to Right:
Gerry Camp, Danie Nel, Robert Campbell, Nat Grobbelaar, Roy Shooter and Harry Gerber.

Roy Shooter with the specimen of *Encephalartos ferox* which he has propagated from a set of leaf bases.

NATAL SECTION NEWS - ESKOM VISIT

By kind invitation of Eskom's Pinetown District Manager, 32 members from the Natal Section and guests inspected the cycad and other indigenous plantings, and the nursery operations on Saturday 28 April 1990 at Eskom's Pinetown offices. Speaking for the District Manager, Edgar Wohlberg and Horticulturist Andrew Gray told members of Eskom's commitment to nature and environmental conservation and explained that all the large specimens in the grounds had been transplanted either as donations or when Eskom's power line operations meant that the plants might otherwise be destroyed. The nursery had grown some 600 - 800 cycads from seed and was using this stock for plantings into the grounds of the 10 depots and 3 district offices of Eskom's Natal Coastal Section. Members were treated to a fine afternoon tea and thank especially Lorraine Theunissen for her splendid catering contribution.

Members of the Natal Section of the Society viewing the gardens at Eskom's Pinetown offices. The four tall cooling towers in the background are a well-known Pinetown landmark. Photo by Roy Osborne.

KEW CYCAD STAMP

Our philatelic members will recall the two previous features in ENCEPHALARTOS on "cycad stamps" (ENCEPHALARTOS 4: 3 and 21: 19). For those who collect these cycad stamps, there is now another to add.

The British Postal authorities have just issued (June 1990) a series of four stamps commemorating the 150th Anniversary of Kew Gardens. The 20p stamp shows the new Sir Joseph Banks building with a large cycad in the foreground. Purists may be somewhat alarmed by the choice of colours, the artistic licence taken with the cycad representation, and the description of the plant as "an ancient fernlike tree"! Other stamps in the series comprise a Mediterranean stone pine with the Princess of Wales Conservatory opened in 1987, a willow with the recently-restored Palm House and a cedar with the Chinese-style Pagoda built in 1761-1762 as a reminder of Kew's origin as a private Royal Garden. The series can be obtained from philatelic dealers.

THE 20p STAMP FEATURING A CYCAD IN FRONT OF THE NEW SIR JOSEPH BANKS BUILDING, ONE OF FOUR STAMPS ISSUED BY THE BRITISH AUTHORITIES TO COMMEMORATE THE 150th ANNIVERSARY OF KEW GARDENS.

ENDANGERED WILDLIFE

Our readers with a broader interest than cycads alone may have previously read the magazine *Quagga*, published by the Endangered Wildlife Trust since 1982. Recent developments by that organisation, under the capable stewardship of Dr John Ledger, have included the launch of the exciting new magazine *Endangered Wildlife*. The first issue, released in March 1990, featured cycads prominently - with a review of Douglas Goode's *Cycads of Africa* (page 20) and a succinct article on Conservation of Cycads (pages 22-23) in which The Cycad Society of Southern Africa is commended for its progress in creating a code of ethics amongst cycad collectors and in developing an awareness of the importance of cycad conservation.

Persons interested in subscribing to *Endangered Wildlife* should contact the Endangered Wildlife Trust, Private Bag X11, Parkview 2122, telephone 011-486-1102.

BITS AND PIECES STUKKIES EN BROKKIES

NEW MOTH MENANCE?

Natal cycad enthusiasts, long suffering from the ravages of the Leopard Moth, may be facing a new moth menace. The larvae of the Emperor Moth, *Bunaea alcinoë,* have now been found on cycads. Fondly(?) known as the "bulldozer caterpillars", these mammoth creepy-crawlies eat just about *any* vegetation. The above specimen, spotted in a Natal midlands garden, and usually more fond of a nearby cabbage tree (*Cussonia*), seemed in this case to show a distinct preference for *Cycas thouarsii* foliage.

Len Forrester who owns the farm Riverside in the Cathcart district sent in this photograph of a E. frederici-guilielmi which he came across on his farm. In the photo is his son-in-law Ken Goulding who is over 1,8m tall. Ken is holding a 2,1m staff and still it is not taller than the plant so this giant must be over 4m tall.

EMBRYOGENY MONOGRAPH

Stephan Schneckenburger of the internationally well-known **Palmengarten** of the City of Frankfort, has been studying gymnosperm embryo formation and developmental processes since the early 1980's. Much of this work has involved studies on cycads *Cycas, Dioon, Macrozamia* and *Zamia.* He has now written up this research in a 123-page, extensively-illustrated monograph entitled *"Studien zur Embryogenese und Keimung vershiedener Gymnospermen unter besonderer Berücksichtigung der Suspensorbildung und Keimwurzelgenese*", which has been published as issue number 1 of *Palmarum Hortus Francofortensis*. This special issue is available at DM 30,- from: The Director (Dr Gustav Schoser), Palmgarten, Siesmayerstrasse 61, D-6000 Frankfurt am Main, FRG. Alternatively, the Society's copy may be obtained on a short-term loan from the President.

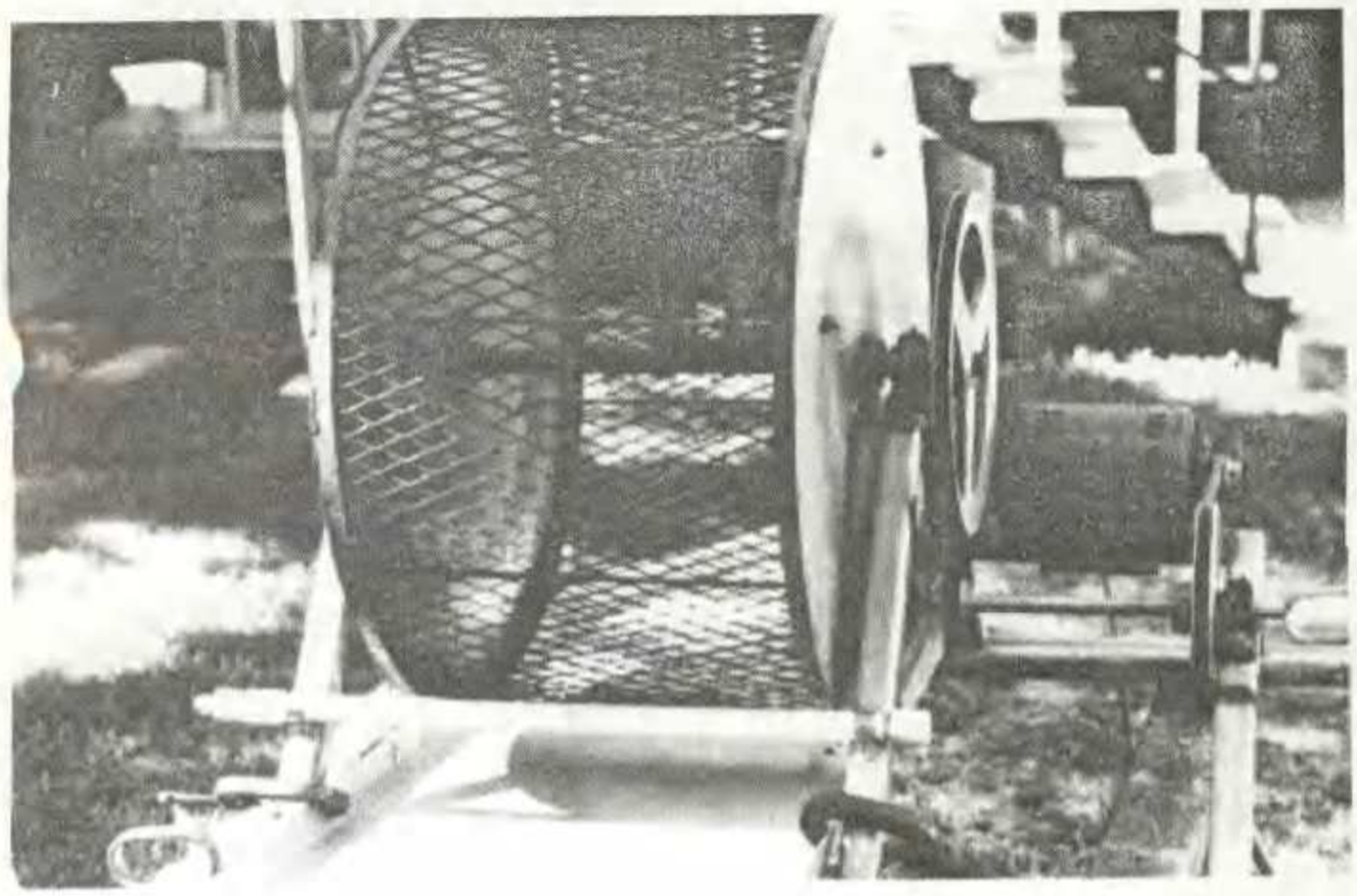


Photo: GREG SEAMAN

A NOVEL SEED CLEANING MACHINE

Cycad seed is usually so scarce that one cannot conceive of the problem of having too many seeds to clean but an inventive Australian, Greg Seaman of Queensland, recently had to build himself a seed cleaning machine when he was faced with this problem.

He writes: "I have built a machine for cleaning the flesh off the seeds. The only drawback is that the flesh has to be fairly soft when placed in the machine. It is constructed like a gem tumbler which rotates at about 30 RPM.

The outer part of the drum is made of expanded metal. This is diamond shaped and the way it is made leaves the edges very sharp, which slowly removes the flesh as the drum turns.

A small jet of water is played onto the seed as it turns and this removes all the rubbish into the drainage tray below. It takes about an hour to clean 1000-2000 seeds depending on how soft the flesh is and how many seeds can be introduced before overloading the small electric motor. The best I can do by hand is 250.

A definite saving in time"

Frustrated E. altensteinii? I acquired this plant 6 years ago and having no space in my small garden I decided to plant it in a plastic pot where it has flourished. I think it is now frustrated as can be seen from the mass of coralloid roots which encircle the rim of the pot.

Photo: Neil Munro

SPINYNESS OF CYCAD PINNAE

By: N Grobbelaar
P O Box 15357
Lynn East, 0039

Unlike animals, plants do not age in their entirety. As the plant grows, its apical bud ages and consequently the basal part of the stem of an old plant will still be in a juvenile state when the apical part of the stem is fully mature or even becoming senescent.

When a lateral branch therefore develops from the base of the stem of an old plant, it will initially, generally exhibit many of the characteristics of the stem of a juvenile plant. Now, it is a common phenomenon that spiny plants are much more so in the juvenile than the mature state - spinyness gets lost or diminishes during maturation.

When I recently inspected an Encephalartos lebomboensis female in a Pretoria garden which has a stem of about 2 metres with several young shoots developing from its base, I was amazed at the lack of spines on the pinnae of the mature stem. The pinnae of the "suckers" (see accompanying figure) however had the spiny nature which I always associate with E. lebomboensis. There can be no doubt about the identity of the specimen. It is merely a case of my knowledge of E. lebomboensis being derived largely from relatively young plants. This case serves to remind one that characters such as the spinyness of pinnae must be treated with considerable circumspection as taxonomic criteria.

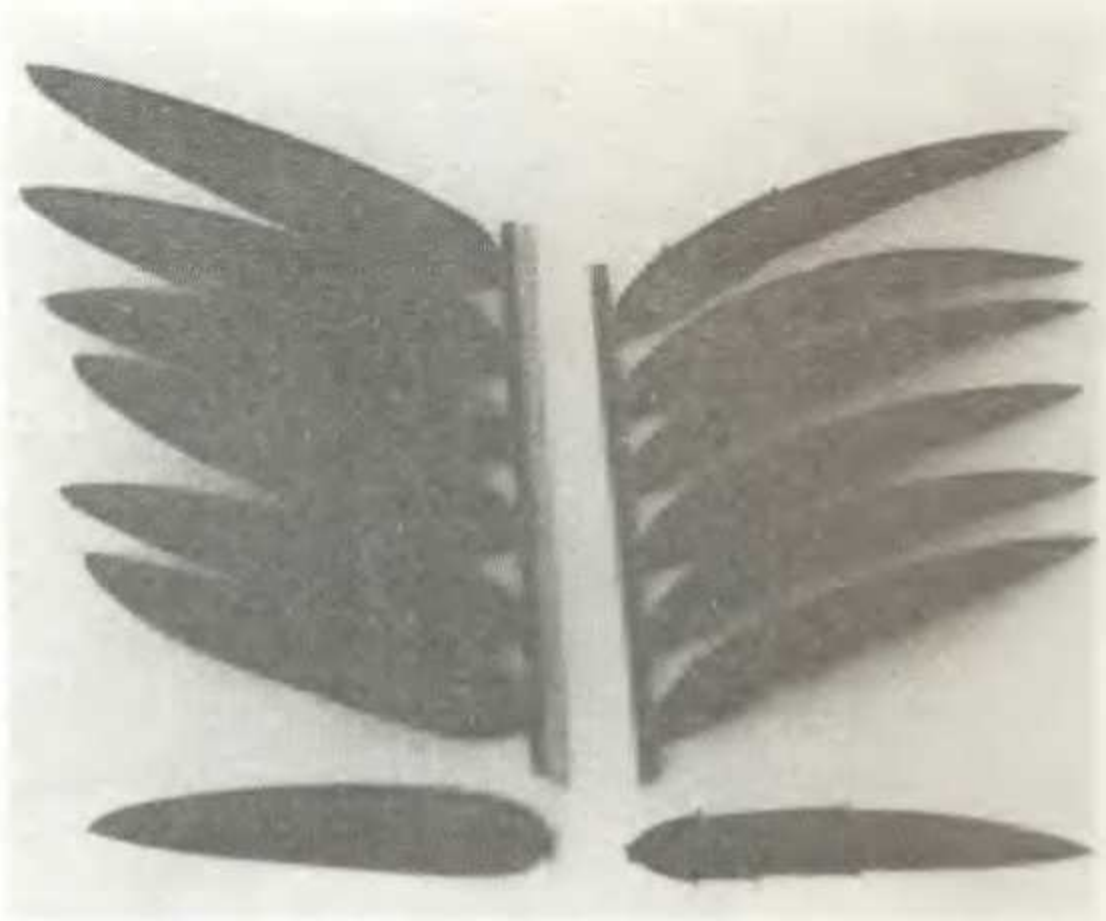


Fig. 1 The pinnae on the left are from the median part of a leaf from a 2m E. lebomboensis stem whilst the pinnae on the right are from the median part of a leaf of a young basal shoot of the same plant growing in the garden of Mr A J J Botha. Note the difference in the spinyness of the pinnae.

MAJOR BBC TV SERIES ON CYCADS

The Natural History Unit of the BBC recently visited South Africa to film cycads in the wild as well as in private collections and Botanic Gardens as part of a series to be shown early in 1991.

This 6 part series will feature Endangered Plants world wide and in addition to cycads also includes cacti in Mexico and orchids in Thailand.

Producer John Deering spent 10 days in South Africa and visited cycad habitats and collections in Natal and Eastern Cape.

High light of his visit to the Durban Muti market at Umlazi where a sangoma assured him that Stangeria would "give you victory over your enemies" in the township violence. Large numbers of Stangerias are offered for sale at these markets.

The sale of cycads along main roads as well as the new electronic devices installed at the Durban Botanic Garden are also featured in the script. Interviews with conservation authorities high light the problems experienced with cycad protection.

FLLO! ELLO! WHAT 'AVE WE 'ERE?

UNCONVENTIONAL PLACEMENT OF SEED KERNELS FOR GERMINATION

By: Nat Grobbelaar
P O Box 15357
Lynn East, 0039

Cycad seed kernels are usually placed on top of a moist substrate with its long axis parallel to the soil surface to germinate. Professional growers (see "Mystery picture" and note on pages 33 and 34 of Encephalartos 19) nowadays apparently prefer to plant the kernels almost vertically, with the micropylar end of the kernel pressed into the moist sand or soil.

When the kernels are placed horizontally on the soil surface, especially when they are closely spaced, it is often difficult to see which seeds have started to germinate. When the micropylar end of the seed is pressed into the substrate, it is of course impossible, at an early stage, to see whether the seed has germinated. Pathogens can also readily penetrate the kernel through the micropyle in the latter case because of the moist conditions that surround it.

A novel method of germinating the kernels which appears to be superior to both the above methods is illustrated in the accompanying figure. The kernels are pushed vertically into a moist substrate with the micropylar end pointing upwards! The kernels can now be very closely spaced and even the most incipient stages of germination can be observed without any trouble.

Because the part of the kernel which is in contact with the moist substrate, is the same part through which the developing seed absorbed nutrients from its parent, it can readily absorb water through it from the substrate. The micropyle is kept relatively dry and infection of the embryo through it is small.

As one can see from the accompanying figure, the seeds germinate well under these conditions and if they are not transplanted soon after root emergence, the root will curve downwards and grow into the substrate and eventually the seedling will produce a leaf.

It must, however, be mentioned that apart from preliminary tests, the author has not yet compared the percentage germination of samples from a single batch of seed that has been put out to germinate by the three different methods under non-sterile conditions.

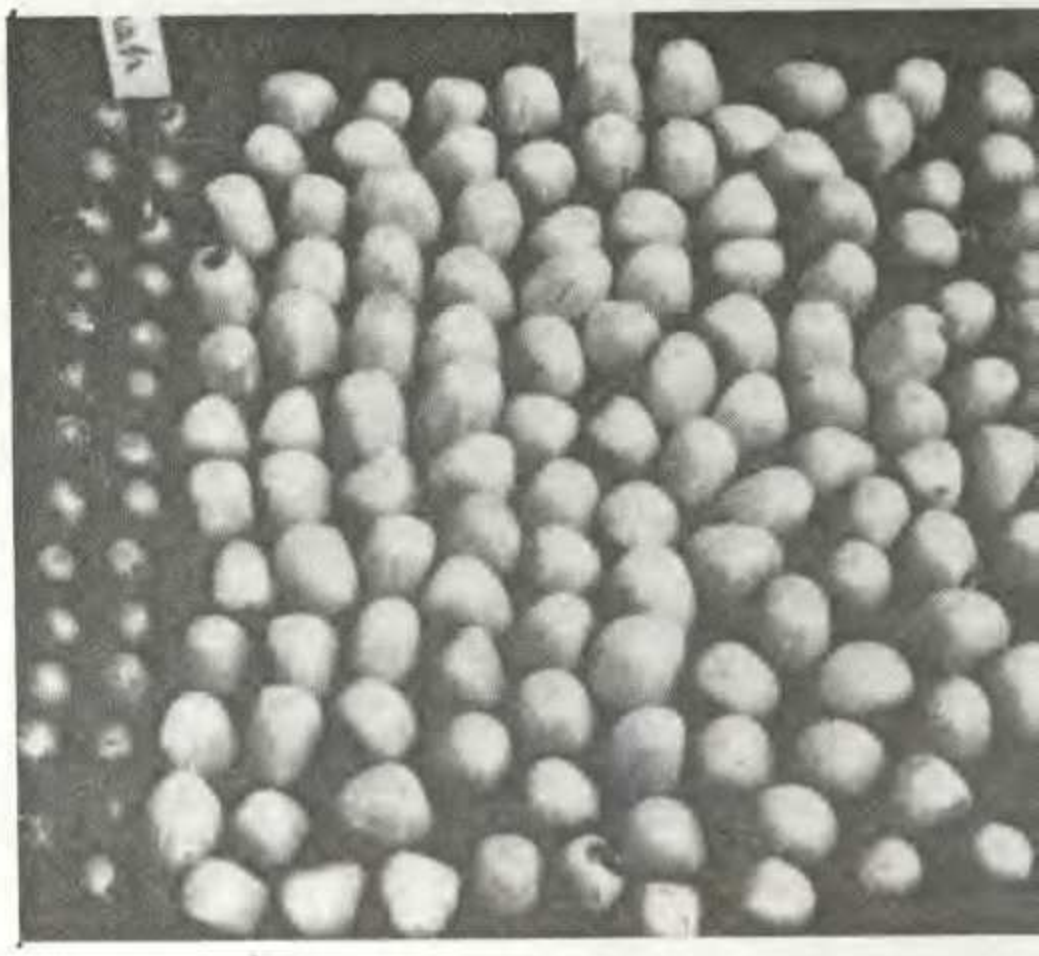


Fig. 1 Seed kernels of two cycad species which have been set out to germinate in moist soil with their micropylar ends facing vertically upwards. Note the emerging roots from some kernels.

THE CITIZEN Wednesday 15 August 1990 Page 15

Cycads stolen from Durban home

DURBAN. — Thieves made off with a rare cycad collection from a Durban home on Sunday — just two days after Arbor Day was observed.

The thieves seemed to heed the call to plant trees, but did not care where they came from. Now distraught collector Mr William Dennis Ross of Glenmore, Durban, is appealing to the public to help find his cycads, some of which he planted 30 years ago.

Mr Ross (68) said yesterday: "I feel as though I've lost my children".

Mr Ross believes the thieves knew just what they wanted.

Ever seen a beehive in a cycad stem? This one was found at the Modjadji Nature Reserve in the stem of an E. transvenosus plant.

Photo
(N. Grobbelaar).

Damage to the base of an E. transvenosus plant at the Modjadji Nature Reserve that is claimed to be the work of porcupines which sometimes cause the stem to die or fall over.

Photo
(N Grobbelaar).

SEEDBANK

Growing cycads from seed is becoming more and more popular. Those members who have never grown cycads from seeds will find it a very interesting and rewarding activity. The process of germination and early growth is particularly fascinating.

Once the seedlings is established, they grow rapidly and may double their size in a few years provided they have been given the right conditions.

Cycad seedlings also grow much quicker than is generally thought. It is not difficult to grow cycads from seed. It is essential however, to provide the right elements for germination and growth - good soil, light, water, air and warmth.

The following seed is now available. Encephalartos natalensis, E. villosus, E. transvenosus. Macrozamia miquelli - from Australia

Danie Nel : Seedbank Officer
120 Bowker Road
Escombe 4093
Tel: (031) 442505 (after 18h00)

POLLEN URGENTLY REQUIRED:

Cycas thouarsii/ rumphii/ circinalis, as well as Encephalartos laevifolius, E. friderici-guilielmii, or E. lanatus, not later than 1st December.

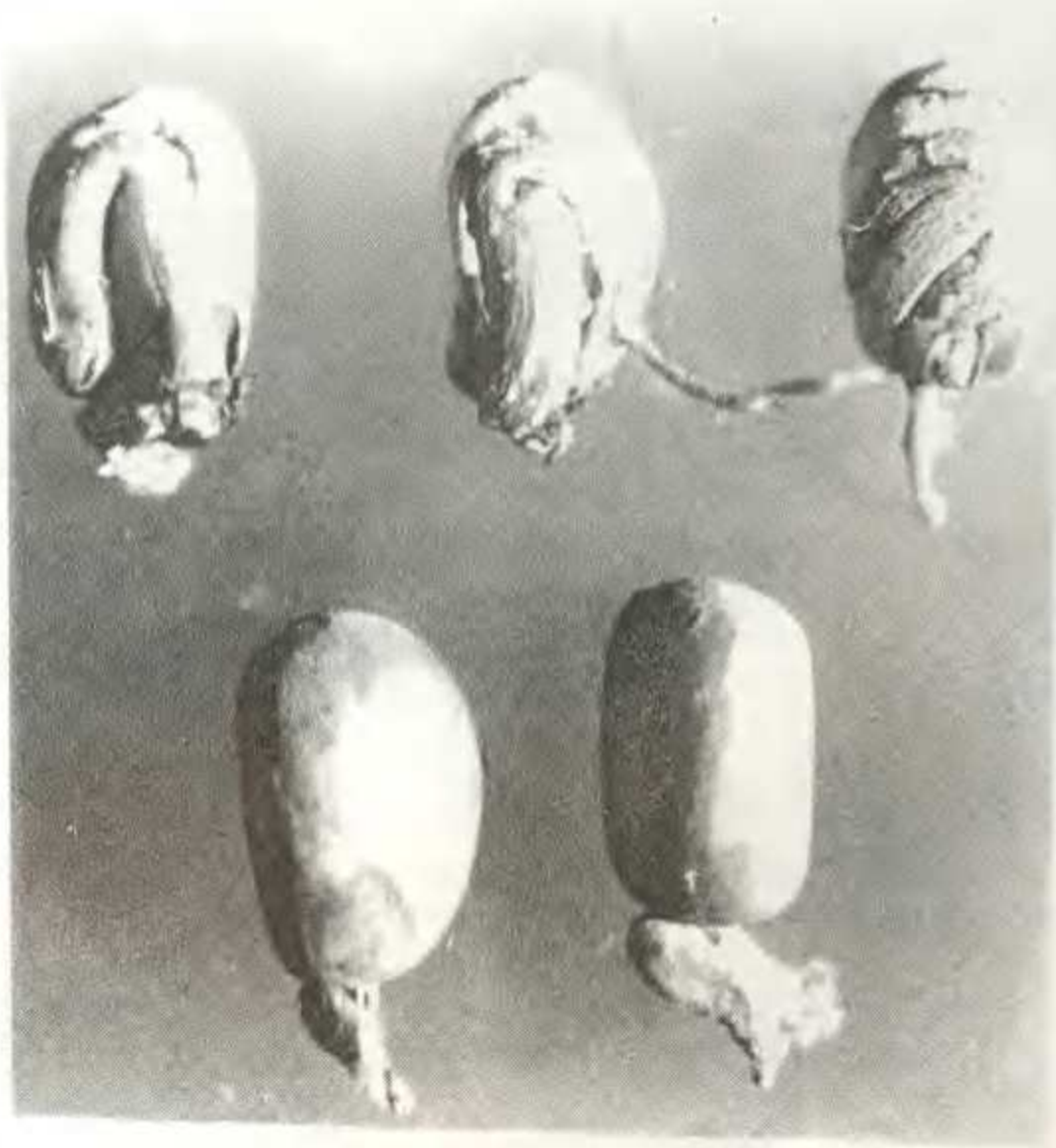
Piet Vorster, Botany Dept., University of Stellenbosch, 7600 Stellenbosch.

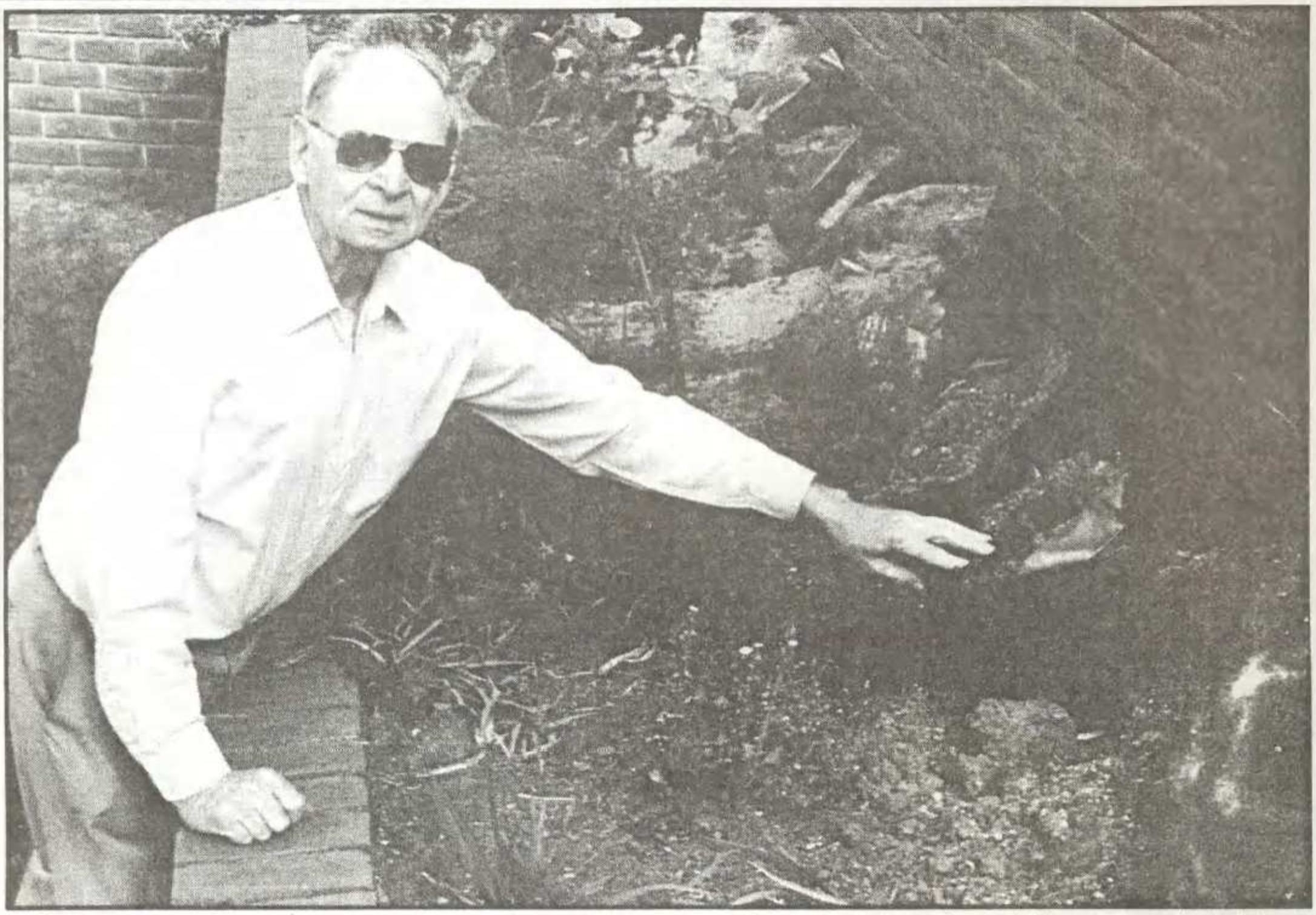
Meneer,

Ek het 'n klompie E. lanatus saad wat aan die ontkiem is. Wat vir my interessant was, is dat minstens tien van hierdie sade (10%) nie op die normale wyse 'n penwortel uitgestoot het nie, maar wel direk blare. Ek het hulle doppe versigtig verwyder en opgemerk dat die worteljies al 'n hele ent binne in die dop gegroei het - skynbaar kon die wortelpunt nie die opening vind nie. Is hierdie verskynsel algemeen by Encephalartos?

Die twee sade onder vertoon die plantjies wat by die saadopening uitkom. Die doppe van die boonste drie sade is verwyder en vertoon die opgekrulde wortels.

Gerrit Prinsloo
N.I.T.K.
Privaat Sak X82075
Rustenburg, 0300





RARE plants missing: cycad collector William Ross points to some of the empty bags from which rare cycads had been ripped.
Picture: Peter Duffy

Rare cycad collection stolen from home

Daily News Reporter

THIEVES made off with a rare cycad collection from a Durban home on Sunday — just two days after Arbor Day was observed.

Now distraught collector Mr William Dennis Ross (68) of Wanless Road, Glenmore, Durban, is appealing to the public to help find his cycads, some of which he planted 30 years ago.

A member of the Cycad Club of South Africa, Mr Ross said the cycads were in plastc bags and were kept at the back of his home when they disappeared. He did not want to plant them in his garden as he feared they would be stolen.

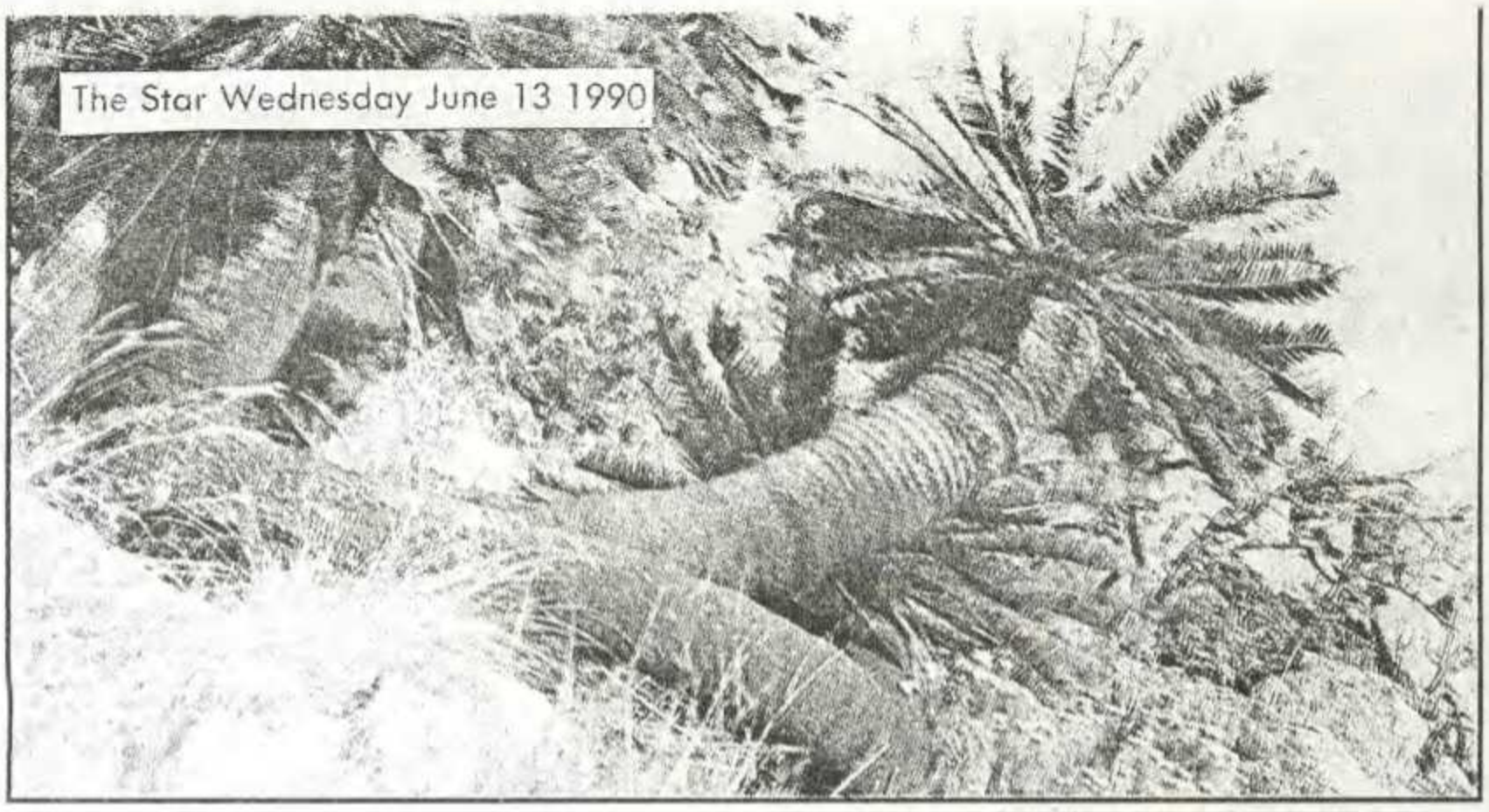
At 2am on Sunday, a young girl returning home after a party saw a man walking down the road with a box. She alerted her father, who phoned Mr Ross to ask whether anything was missing from his home. But Mr Ross said everthing was intact and went back to sleep.

When he awoke, his wife told him his cycads had gone.

The various cycad plants, worth more than R2 000, include Altenstein, Arenarius, Friderici-Guilielmi, Horridus, Lebomboensis, Lehmann, Natalensis, and Transvenosus — all of which were between eight and 10 years old.

However, the most prized pieces in the collection were two rare cycad plants, commonly known as "mother-in-law's cushion" or "Echino Cactus".

Anyone who has any information about the stolen cactus plants is asked to contact Mr Ross on telephone 254-664 or call the nearest police station.



Survival of the cycads . . . two cycads species in South Africa are already extinct, four species are on the verge of extinction in their natural habitat, and seven more are on the endangered list.

ECOLOGY

Living fossils in the garden – save the cycads

Citizens of the new South Africa will hopefully be colour blind except when it comes to the colour green.

Politics aside, the environment has become one of the hottest issues around and, in line with this trend, the Wildlife Society has launched a campaign to save South Africa's cycads.

The main thrust of the campaign is to encourage the effective, large-scale propagation of, and legal trade in, cycads by nurserymen, thereby introducing these rare plants into the gardens of all conservation-minded South Africans.

The SA Nurserymen's Association has agreed to co-operate with the society in increasing the cycads' chances of survival.

The Wildlife Society is launching a campaign to encourage the effective, large-scale propagation of, and legal trade in, cycads by nurserymen, thereby introducing these rare plants into the gardens of all conservation-minded South Africans.

Tourists

The Wildlife Society has challenged the tourism industry to contribute to the fund to save the cycads, on the grounds that support for the campaign would be to their advantage.

"Cycads occur in some of the most beautiful and pristine areas of South Africa, which are a great attraction to overseas tourists," Keith Cooper, conservation director of The Wildlife Society, said.

"By contributing to the cycad fund, tour operators and airlines in South Africa will be investing in their own industry."

Swissair has already pledged to contribute R100 for each booking on its summer Alpine tours this season to The Wildlife Society's campaign, and has challenged the South African tourism industry to follow suit.

Two cycads species in South Africa are already extinct, said Erina Botha of The Wildlife Society.

Four are on the verge of extinction in their natural habitat, while seven more are on the endangered list.

Apart from four fairly common species, the rest of the cycads species are rare and have a limited distribution.

An international ban on trade in cycads has virtually eliminated the international trade of the plants in the wild, said Miss Botha, but the major threat is the lucrative local market.

"Prices as high as R30 000 are known to have been offered for a single specimen," she said.

Hence the importance of encouraging legal trade in these beleaguered prehistoric plants.

Cycads are descendants of plants that existed long before man, and are often referred to as living fossils.

JACQUELINE MYBURGH

CONSERVATION

Big new forest reserve

Cape Town

SOUTH Africa's Minister of Environment Affairs, Gert Kotze, announced last month the establishment of a huge new conservation area on the northernmost part of the country's east coast. It will bring together the existing Lake St Lucia and Mkuze game reserves, the Sordwana Bay National Park, several state forests and the St Lucia Marine Reserve, and will include a state forest on the eastern shores of Lake St Lucia where a controversial dune mining operation for titanium has been proposed. Last week in parliament, Kotze denied that the declaration of the new conservation area was a "trade-off" for granting permission for the development, and said that the government is awaiting the outcome of an environmental impact assessment before making a final decision on the mining proposal.

The Lake St Lucia Game Reserve is, together with the Umfolozi and Hluhluwe Reserves, the oldest in Africa, having been proclaimed in 1895. Lake St Lucia is the largest estuarine system on the continent, and contains a variety of wetland and other habitats considered critical to the survival of 102 rare and endangered species. But since 1954 it has been damaged by the introduction of large-scale timber plantations, which, together with water abstraction from its main source, the Mkuze River, have led to serious hypersalinity problems. These problems should soon be alleviated, as the new reserve will incorporate much of the Mkuze catchment zone, and areas under timber plantation will be replanted with indigenous vegetation.

In addition, a South African Defence Force missile-testing range at St Lucia is to be phased out. The consolidated area will be more than 275,000 hectares in size, making it the third largest reserve in South Africa. But the proposed dune-mining operation has become perhaps the country's most controversial development to date: a petition opposing it has drawn over 250,000 signatures. Prospecting and subsequent mining rights to the area were granted about 20 years ago to Richards Bay Minerals, 50 per cent of which is owned by the British-based multinational Rio Tinto Zinc company. The mining operation would bring in an estimated R5,000-R9,000 million ($1,250–$2,250 million) over its 20-year lifespan, and create 600 jobs in an area of high unemployment.

Richards Bay Minerals argues that 60 per cent of the 1,300 hectares due to be mined is covered by exotic pine plantations which will be replanted with natural vegetation once the operation is finished. Environmental pressure groups have countered that their main concern is less that a particular area will be mined than that power lines will have to be built across the lake, and that trucks filled with ore will travel through the reserve at a rate of one every five minutes for 24 hours a day. The National Union of Metalworkers of South Africa has been reluctant to take sides, but has expressed reservations about the way that the campaign for St Lucia has been run. "None of the environmental organizations have consulted us about the issue and some of our members are wondering if they think it is more important to save insects and animals while people have to sacrifice jobs and wages", their regional secretary, Michael Mabuyakhulu, was quoted as saying in the *Weekly Mail*.

Michael Cherry

NATURE · VOL 344 · 22 MARCH 1990

Natal Parks Board zone officer for Umtentweni, John Maltby, with some of the cycads which were impounded earlier this week.

Rare cycads seized

Environment Reporter

THE Natal Parks Board has seized 216 cycads, specially protected and endangered plants, from a lower South Coast cycad nursery.

Investigations by Parks Board zone officer for Umtentweni, John Maltby, and South Coast conservator Cedric Coetzee, led the men to the nursery where they impounded the cycads.

The value of the plants has not been determined yet, but it is believed there are two specimens which could fetch R10 000 each on the black market.

Four bakkie loads were needed to take the plants away. Many of the cycads had their leaves chopped off, but others were growing in pots.

Investigations are continuing in conjunction with the head of the Port Shepstone CID, and an arrest is expected soon.

Cycad challenge to tourism

Having survived geological and climatic cataclysms for millions of years, cycads now face extinction thanks to the the avarice, or the misplaced love, of Homo sapiens. Two cycad species in South Africa have already been plundered to exctinction, four more are on the verge of extinction in their natural habitat, and seven species are on the endangered list. This tragic situation facing our magnificent "living fossils" called for urgent action, so the Wildlife Society launched a nationwide fundraising campaign which involves a challenge to the tourism industry to help save this invaluable part of our natural heritage.

Only immediate action can save what is left of South Africa's cycads.

And immediate action is just what Swissair took by pledging R100 for each booking on their summer Alpine tour this season to the campaign. The airline is also challenging other members of the the tourism industry to follow suit.

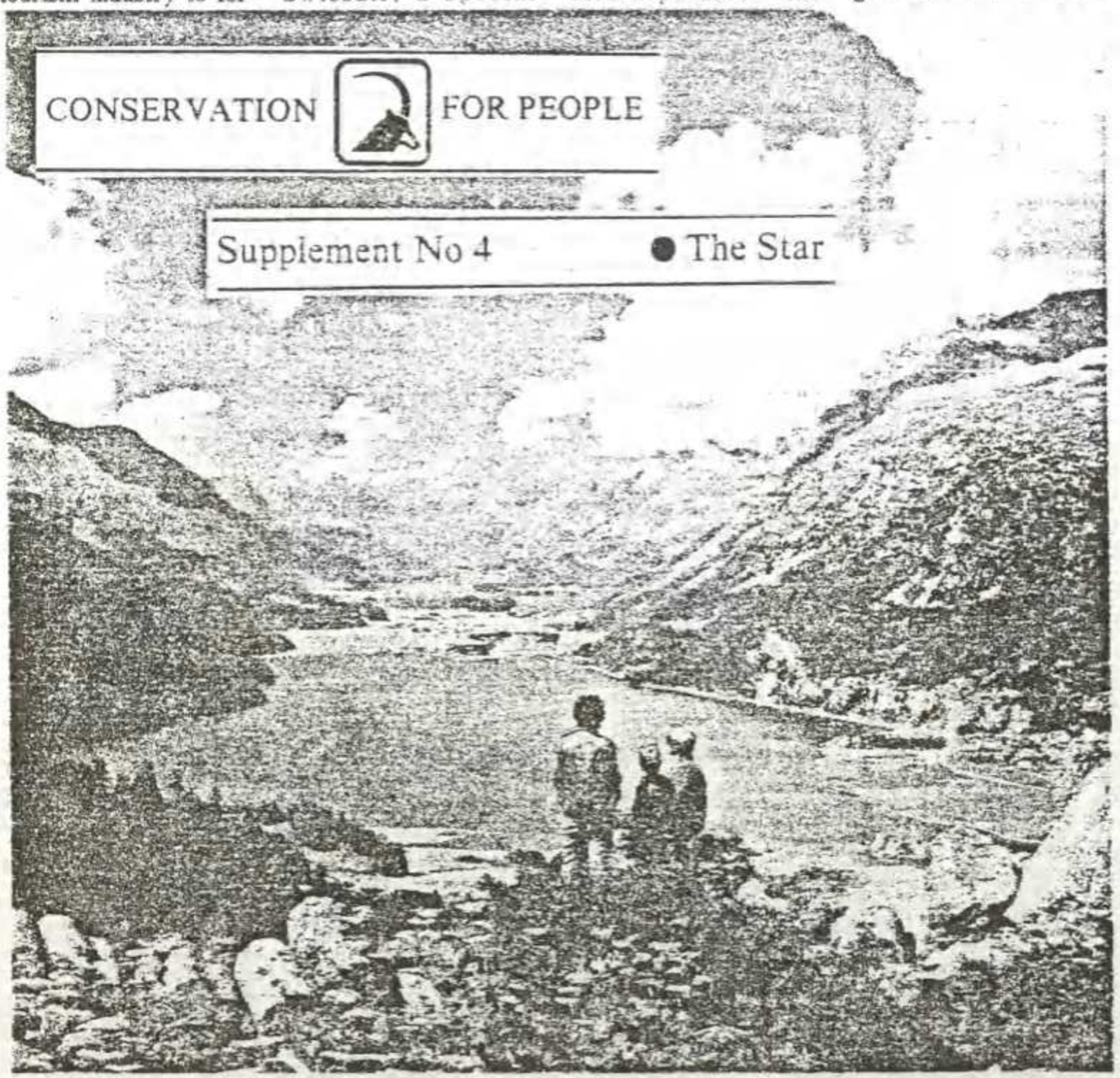
In conjunction with Swissair, a special Swiss Wildlife Excursion from mid-June to mid-September has been planned in aid of the campaign and to give South Africans an opportunity to experience Switzerland's natural areas.

The Wildlife Society and Swissair's challenge to other airlines and tour operators is that they should each donate a percentage of at least one tour or of airline bookings over a certain period to the fund too.

A strategy to save our cycads is currently being developed in conjunction with the Cycad Society of SA, the National Botanical Institute and the South African representatives on the IUCN working group on cycads. The 600-strong SA Nurseryman's Association has also pledged its support of this attempt to conserve our cycads.

CONSERVATION FOR PEOPLE

Supplement No 4 ● The Star



In conjunction with Swissair, a special Swiss Wildlife Excursion has been planned in aid of the Society's campaign to save our endangered cycads. At the same time, the excursion gives you an opportunity to experience Switzerland's magnificent natural areas like the one above.

Campaign

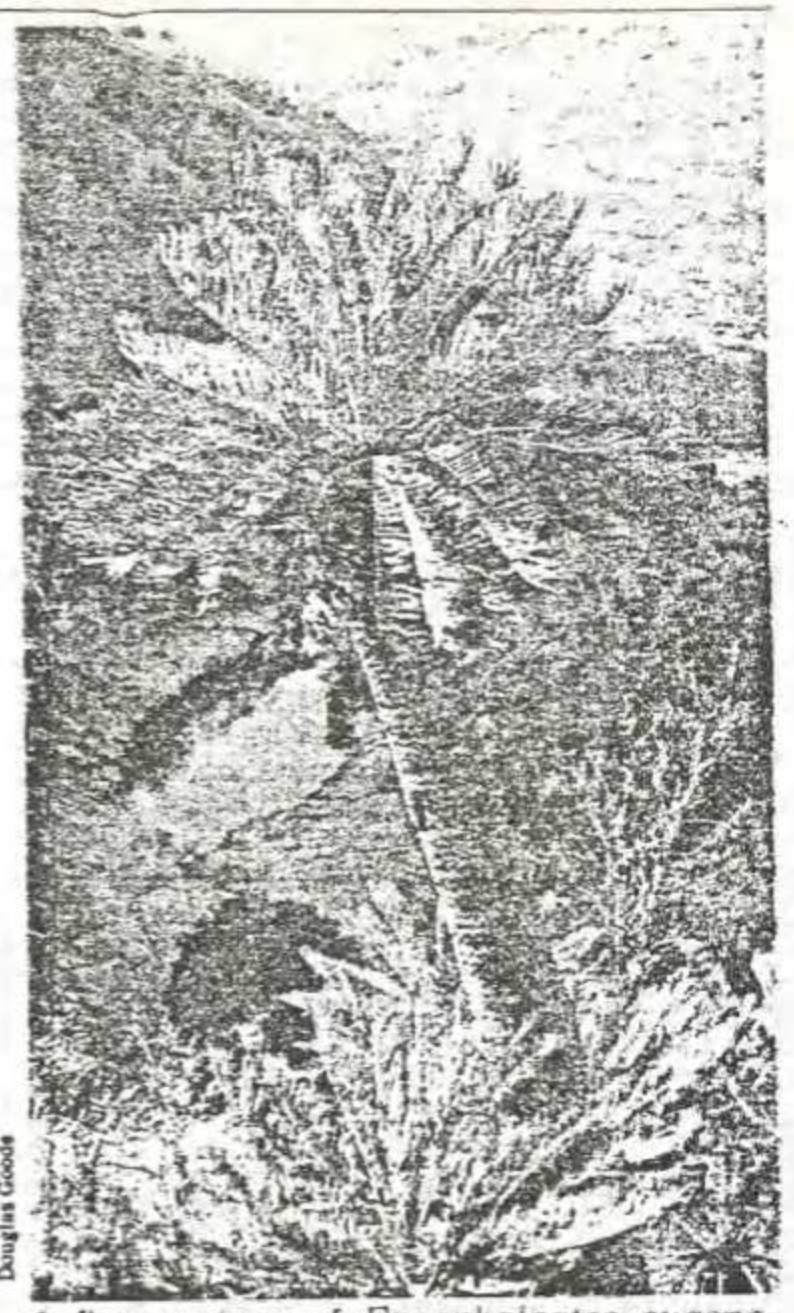
A minimum of R500 000 will be needed to launch an effective cycad conservation campaign, to institute more propagation programmes, to facilitate legal trade of cycads and eliminate illegal trade and to distribute information to the public.

Of the 160-odd cycad species left in the world, 32 occur in South Africa — one fifth of the world total. This remarkable concentration of cycads should be a source of pride to all South Africans.

Unfortunately, they have become much sought after and prices as high as R30 000 are known to have been offered for specimens of some of the rarer South African species.

With more than half the cycad species of the world on the threatened list, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) placed a ban on the international cycad trade.It is now the lucrative domestic market that is the greatest threat to local cycads.

The desire to possess an adult cycad which has taken 500 to 1 000 years to grow to a height of one to five metres, is all the greater because these plants date back to the age of the dinosaurs 250 million years ago.



Douglas Goode

A fine specimen of *Encephalartos eugene-maraisii ssp. middelburgensus* growing at 'The Hell' near Middelburg in the Transvaal.

● Members of the tourism industry who would like to respond to the challenge can contact the Wildlife Society's national office in Johannesburg.

For more information on the special Swiss Wildlife Excursion or any of the Swissair summer tours, contact the Wildlife Society, P O Box 44139, Linden, 2104, tel (011) 782-4716/7. Queries and bookings can also be directed to the Swissair offices in Johannesburg, Cape Town or Durban.

John George Hendricks

I first came to know John George Hendricks through an unexpected hand written letter which reached me in December 1979. In this he said, "You may not be aware of it but you have been the centre of discussions (oral and written) world wide among many of us, seriously interested in cycads. We all feel that you are ideally qualified and hope you will consider doing a definitive work on Cycas."

Ever since then we started our regular correspondence I have been receiving his hand written letters regularly with closely packed lines, often running into four or more pages. In these letters he outlined projects which I and my colleague Dr. D.D. Nautiyal could take up and discussed various topics from old unnoticed literature to latest papers on diverse aspects of cycads. Often he would send me xerox copies of rare old papers or new ones which he thought would be useful to me. Indeed he was very knowledgeable and readily shared his ideas. His letters often gave me much needed information on diverse aspects of cycads. He was also very generous and helpful. He arranged to sell copies of my book in various counties and extended financial help to me in 1981 for my trip to Australia.

Although I never met him personally, I always regarded him as a close friend. I was in fact thinking that, at long last, I would be able to meet him at "Cycad 90 Conference" in Townsville as his name was among those who would be attending. However, fate seems to have willed otherwise.

As far as I could judge from his correspondence and writings John was interested in all aspects of cycads, particularly in the exploration of their localities, finding new taxa, revising the existing ones and above all in their cytotaxonomy and chemistry and biochemistry. The last mentioned subject interested him more because of his training in chemistry.

In the last few letters which I received from him about a year or more ago he wrote that he had lost his job and found a new one, but in his new position he would be receiving substantially lower emoluments. He also mentioned the problems he was facing in shifting and maintaining his extensive cycad collection in his new place. In one of these letters he mentioned that he had been rather unwell and that he was suffering from emphysema. Although I wrote a few more letters to him after his last communication, I never received any response. Last July I went to the United States to attend the 28th International Geological Congress and before going I wrote to him about my impending visit, but again I did not receive any reply. I though that he may have changed his job again and my letters were not reaching him or he may be unwell, however I was not prepared to learn that he had passed away.

I would therefore, like to salute him through the columns of this journal as one of the most knowledgeable and selfless devotees of cycadology with whom I was fortunate in having a friendly association.

Signed: D.D. Pant

UNIVERSITY OF ALLAHABAD
Botany and Palaeobotany Laboratory

PROFESSOR DIVYA DARSHAN PANT
D.Phil., F.P.S., F.N.A.Sc., F.A.Sc., F.L.S., F.N.A.
INSA Senior Scientist
Ex-Head of the Department of Botany

THE CYCAD SOCIETY OF SOUTHERN AFRICA
DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA

OFFICE-BEARERS

ELECTED/VERKOSE

PRESIDENT

Prof Nat Grobbelaar
PO Box/Posbus 15357
0039 LYNNE EAST
tel: 012-8080995

ADDITIONAL/BYKOMISTIG

Ben Visser
PO Box/Posbus 61
0250 BRITS
tel: 01211-22928

Dr Piet Vorster
Dept. Botany/Plantkunde
Univ. Stellenbosch
7600 STELLENBOSCH

REGIONAL CHAIRMEN/STREEKSVOORSITTERS

EASTERN CAPE/OOS-KAAP
Martin Schwellnus
PO Box/Posbus 7045
6055 NEWTON PARK
tel : 041-213032

EUGENE MARAIS
Stef Schoeman
95 Erich Mayer St/-str.
0182 PRETORIA NORTH/NOORD
tel: 012-552082

NATAL
Harry Gerber
45 Anleno Rd/-weg
Montclair
4001 DURBAN
tel: 031-423616

CO-OPTED/GEKO-OPTEER

MEMBERSHIP OFFICER/LIDMAATSKAPBEAMPTE
Pieter Stroebel
P O Box/Posbus 189
6000 PORT ELIZABETH
tel: 041-661816

ENCEPHALARTOS

EDITOR/REDAKTEUR
Neil Munro
PO Box/Posbus 2373
1610 EDENVALE
tel: 011-8823244

AMPSDRAERS

BACK COPIES OFFICER/ VORIGE UITGAWES-BEAMPTE
Roy Shooter
16 Benjamin Road/-weg
4052 FYNNLANDS
tel: 031-4662002

PRINTING & DISPATCH OFFICER/ DRUK & VERSENDINGSBEAMPTE
Dr Piet Vorster

OVERSEAS CORRESPONDENTS/ BUITELANDSE SKAKELBEAMPTES

AUSTRALIA/AUSTRALIE
Paul Kennedy
21 Sierra Road
Engadine
New South Wales 2233
tel: 02-520-7690

NEW ZEALAND/NU-SEELAND
Keith Boyer
70 Opanuku Road
RDI Henderson Valley
Auckland
tel: 837-0394

USA & CANADA/VSA & KANADA
Douglas Atwater
PO Box 3524
San Luis Obispo
California 93403
tel: 805-5498018

POLLEN EXCHANGE OFFICER/ STUIFMEELRUILBEAMPTE
Cynthia Giddy
PO Box/Posbus 45
3730 UMLAAS ROAD/-WEG
tel: 03325-478

SEEDBANK OFFICER/ SAADBANKBEAMPTE
Danie Nel
120 Bowker Road/-weg
4093 ESCOMBE
tel: 031-442505