

ENCEPHALARTOS

JOURNAL OF THE
CYCAD SOCIETY OF
SOUTHERN AFRICA

NO. 17

TYDSKRIF VAN DIE
BROODBOOMVERENIGING
VAN SUIDELIKE AFRIKA

MARCH / MAART 1989



ENCEPHALARTOS

JOURNAL OF THE
CYCAD SOCIETY OF
SOUTHERN AFRICA

NO. 17

TYDSKRIF VAN DIE
BROODBOOMVERENIGING
VAN SUIDELIKE AFRIKA

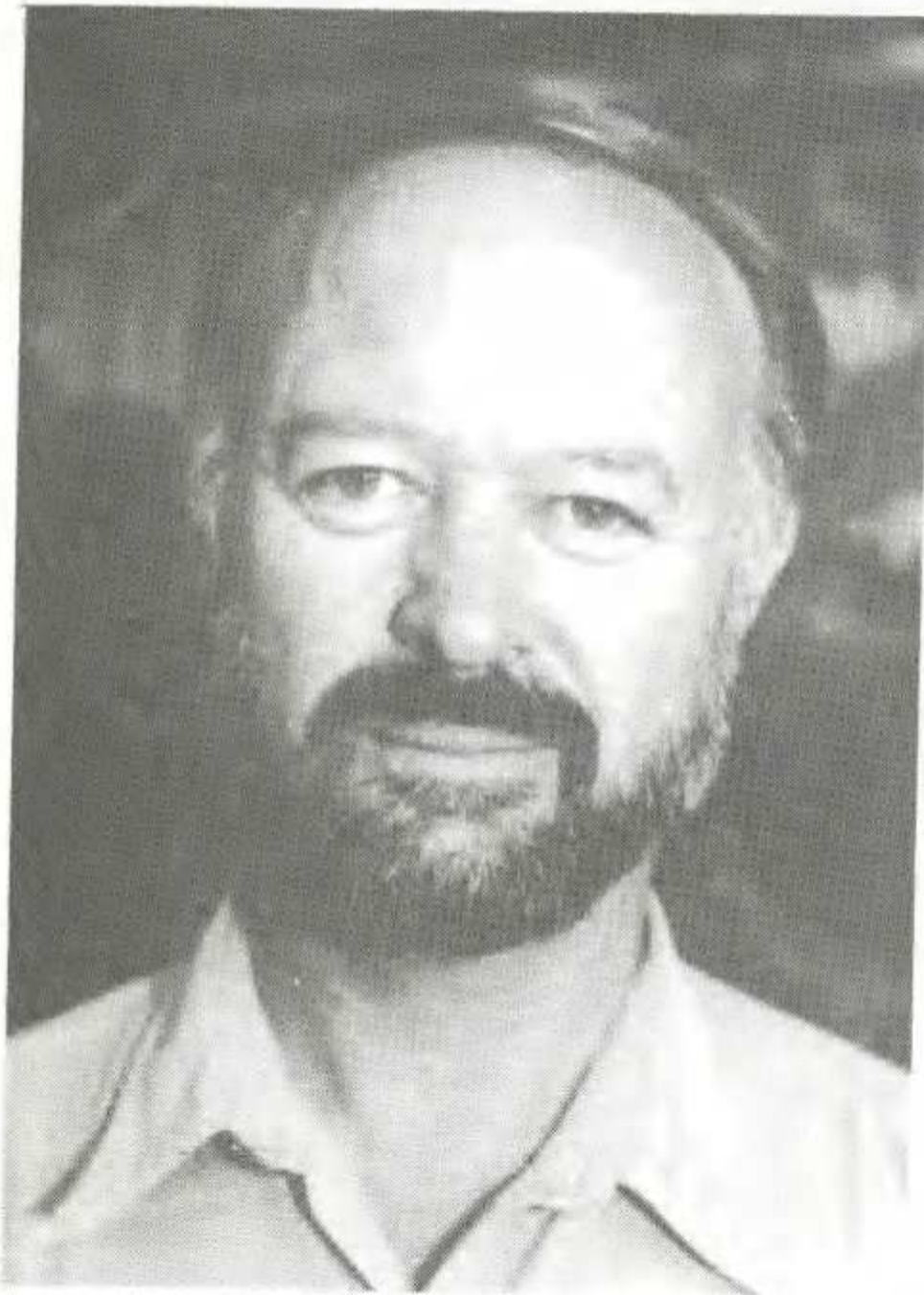
MARCH / MAART 1989

EDITOR/REDAKTEUR

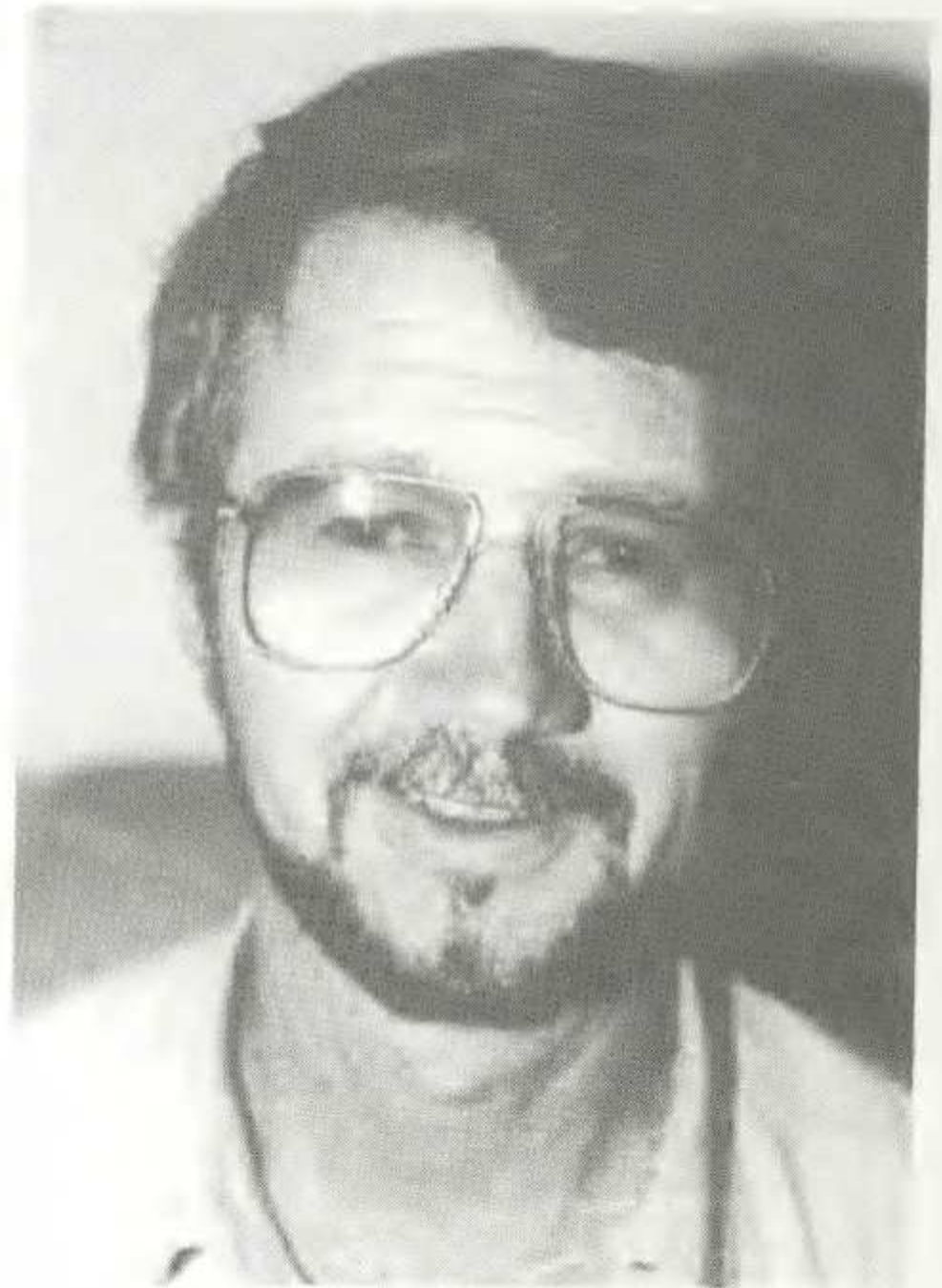
NEIL MUNRO / BUNNY WENTZEL
P.O. Box 89101
Lyndhurst
2106

VOORBLAD/COVER

ENCEPHALARTOS
EUGENE-MARAISII
Subsp. MIDDELBURGENSIS
Photo. Nat Grobbelaar



NEIL MUNRO



BUNNY WENTZEL

This, the 17th issue of ENCEPHALARTOS ushers in the 5th year of your Society's activities. I am very pleased to introduce your new editors, Neil Munro and Bunny Wentzel, both businessmen from the Johannesburg area, who take over the job carried out so well in the past by Maans Kemp. They are to be congratulated on a fine first effort with this issue and we wish them well with the numbers to follow. Especially at this time, they need your support in the form of contributions of text and photographs, letters-to-the-editor and suggestions for material which you would like to see in our magazine. The address for correspondence is P O Box 89101, Lyndhurst, 2106.

Please also make a special effort this year to participate in the seedbank and pollen-exchange programmes and your regional branch activities.

The success of our Society depends not only on your active participation, but also on the members of the Executive and Regional Committees; I thank them all for their past and future work for the Society. We should also note that a number of other persons make important contributions to the successful running of operations and I would like to single out two in particular. Mr L M D Vorster of Hermanus has so very competently looked after the Society's financial records. A "new" helper, Mrs Marie Kruger, of Stellenbosch, is kindly assisting Piet Vorster with the onerous job of getting each issue of ENCEPHALARTOS mailed out in good time.

We look forward to a stimulating and productive New Year for the Society and for ENCEPHALARTOS.

ROY OSBORNE
PRESIDENT

Hierdie 17de ENCEPHALARTOS uitgawe lei die 5de jaar in van u Vereniging se aktiwiteite. Dit is vir my baie aangenaam om u nuwe redakteurs, Neil Munro en Bunny Wentzel, aan u bekend te stel. Albei is sakemanne in die Johannesburg area en neem die pligte oor wat so goed deur Maans Kemp in die verlede uitgevoer was. Ons wens hulle geluk met 'n puik eerste poging met hierdie uitgawe asook ons beste wense vir toekomstige uitgawes. Hulle het veral nou u ondersteuning nodig by wyse van inhoud en fotografiese bydraes, briewe aan die redakteur en voorstelle vir materiaal wat u graag in u tydskrif wil sien. Die adres vir korrespondensie is Posbus 89101, Lyndhurst, 2106.

Geliewe ook hierdie jaar 'n spesiale poging aan te wend om deel te neem in die saadbank en stuifmeel uitruil programme en u streek se takaktiwiteite.

Die sukses van ons Vereniging hang af van u en lede van die Uitvoerende en Streekkomitees se aktiewe deelname; my dank aan hulle vir hul werk in die verlede en wat hulle in die toekoms sal verrig. Ons moet ook kennis neem dat 'n aantal ander persone belangrike bydraes lewer om die werksaamhede suksesvol te bedryf en sonder graag twee persone uit. Mnr L M D Vorster van Hermanus vir sy bekwame hantering van die Vereniging se finansiële rekords en 'n "nuwe" helpster, mevrou Marie Kruger, van Stellenbosch, wat goedgunstiglik vir Piet Vorster help met die las om elke uitgawe van ENCEPHALARTOS betyds te pos.

Ons sien uit na 'n stimulerende en produktiewe Nuwe Jaar vir die Vereniging en vir ENCEPHALARTOS.

ROY OSBORNE
PRESIDENT

In each edition of ENCEPHALARTOS, we focus on one Southern African 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 Suider-Afrikaanse broodboomspesie, in die vorm van 'n in-deepte-artikel in leketaal. In hierdie uitgawe val die kollig op:

ENCEPHALARTOS

EUGENE – MARAISII

by Roy Osborne



Artist Jeannie Mentz's impression of a youthful Eugene Marais. Reproduced by permission of the Editor, VELD & FLORA.

1 INTRODUCTION : Eugene Nielen Marais

Eugene Marais (1872 - 1936), journalist, lawyer, writer and naturalist, is one of South Africa's fascinating personalities. His son, writing in the foreword to *The Road to Waterberg*, says ... "There was no natural phenomenon ... whose underlying causes Eugene Nielen Marais did not seek to probe". His astute powers of observation are abundantly evident to readers of his great books : *Burgers van die Berge/My Friends the Baboons*, *Die Siel van 'n Mier/The Soul of the White Ant*, *The Soul of the Ape* and *The Road to Waterberg*. One particular passage in his *Notes on Some Effects of Extreme Drought in the Waterberg* reads ... "change in environment ... has been the great moving cause of natural selection and the evolution of living species." Written in 1914, these words have an almost prophetic significance to the cycad which bears his name if not to cycads in general. Little did he know that the small scattering of *broodbome* he found wedged in between the rocks on the Waterberg's Polala Plateau was one of several widely-separated populations of similar plants - which at one stage in the past might have been a large continuous group stretching across the width of the Transvaal.



Male cones of *E. eugene-maraisii*, thought to be subsp. *middelburgensis*.

Photo by Nat Grobbelaar.

These surviving groups have since been so isolated in time and in distance, that each has developed its own unique character. Since these characters are retained when plants are transplanted to different environments, it seems they are genetically controlled rather than a result of the local habitat conditions. Whether or not these differences are sufficient to call the plants separate species, subspecies or varieties is not as critical an issue as it might first seem. These populations are clearly undergoing a slow progressive speciation process - hence the significance of Eugene Marais' words.

2 DISCOVERY AND REDISCOVERY

The first documented evidence of the discovery of *Encephalartos eugene-maraisii* was in 1925, when Eugene Marais sent a leaf and some seeds to Dr Rudolf Marloth who was then working on *The Flora of South Africa* in Cape Town. Accompanying the specimens was a note saying that the roasted seed caused giddiness when eaten. Marloth prepared an herbarium sheet of the specimen but took no further action at the time. Since no other cycads had ever been recorded in the Western Transvaal, the inference is that Marais' report was regarded with some scepticism. These doubts were eroded when, in the 1930's, further specimens were collected by Dr Pole-Evans, Dr Galpin and Mr Steyn, with the localities described as Kafferkraal, Honingklip Mountains and Bokpoort - all in the Waterberg area.

A heroine of the story is undoubtedly Dr Inez Verdoorn, research worker of the Botanic Research Institute at Pretoria, and, by coincidence, niece of Eugene Marais (and also Honorary Life Member of the Society). On reviewing the material which her uncle had sent to Dr Marloth, she arranged for a Mr P Toerien, Agricultural Extension Officer at Potgietersrust, to explore the Polala Plateau in the Waterberg. Her insight paid off, and in October 1944 a small group of the plants was rediscovered on the farm Vlakfontein. Dr Verdoorn described the plant officially in the *Journal of South African Botany* in 1945, appropriately naming it in honour of her late uncle.

A curious incidental story to this was that at the time of the 1944 rediscovery, it was noted that cones of the plant were infected with a beetle. Specimens of the insect were sent by Dr Verdoorn to entomologist Karl Jordan who recognized this too as a new species. The beetle was therefore named *Apinotropis verdoornae* in her honour. (See the accompanying note by Stephen Compton).

Since that time, reports of other small populations of very similar plants in the Transvaal have been followed up. It first appeared that at least four widely-separated populations were present. These have been commonly referred to as (i) the Waterberg form, (ii) the Middelburg form, (iii) the Wolkberg form or "Dolomitica", and (iv) "Mica". In a remarkable thesis, submitted in 1976 to the University of Pretoria for an MSc degree, student Suzelle van der Westhuizen made a critical comparison of the plants from the four habitats. After careful descriptive and statistical analysis of their comparative morphology and anatomy, she suggested the creation of three subspecies and one variety.

Several recent publications have followed up on Ms van der Westhuizen's thesis. The first of these, by John Lavranos and Douglas Goode and published in June 1988, isolated the Waterberg and Middelburg populations as the "true" *E. eugene-maraisii* and distinguished them as separate subspecies, i.e. subsp. *eugene-maraisii* and subsp. *middelburgensis* respectively. Lavranos and Goode then named the Eastern Transvaal populations as different species; the Wolkberg group being named *E. dolomiticus* and the Mica population being called *E. dyerianus*. By coincidence, Prof Hannes Robbertse and Dr Piet Vorster, recognising Ms van der Westhuizen as co-author, independently named the two new species as *E. verrucosus* and *E. graniticulus* respectively. Since their papers appeared after the Lavranos and Goode publication, the rules of botanical nomenclature dictate that the latter two names are superfluous.

3 PRESENT DISTRIBUTION

The Waterberg cycad, *E. eugene-maraisii* subsp. *eugene-maraisii*, is confined to a small area on the Polala Plateau to the north-west of Naboomspruit at an altitude of about 1450 m. No other Transvaal cycads are found so far west. The closely-related Middelburg form, *E. eugene-maraisii* subsp. *middelburgensis*, is found in a valley of the upper reaches of the Olifants River above the Loskop Dam to the north-west of Middelburg, a habitat shared with *E. lanatus*. Both plants are seen on the Middelburg "Cycad Trail" (see ENCEPHALARTOS No 2, page 17). Both the Waterberg and Middelburg localities experience very cold winters and fairly low rainfall.



E. eugene-maraisii subsp. *eugene-maraisii* in habitat on the Polala Plateau, with Craig Munro. The trunk of this specimen is 1,5 meters tall.

Photo : Neil Munro.

4 DESCRIPTION

(a) The Waterberg form :

E. eugene-maraisii Verdoorn subsp.
eugene-maraisii Lavranos & Goode.

Mature plants have trunks about 2 m in height, taller stems generally becoming procumbent. Trunk diameter is about 30 - 45 cm and branching at the base is not uncommon. Leafbase scars are small and regular. Leaves are typically just less than 1,0 m long with a bare petiole of some 12 cm which is circular in cross section. The leafstalk is fairly straight but the upper one-third or tip curves upwards. The leafstalk is held more-or-less horizontally.

Leaflets are bluish-green, with a silvery bloom, 11 - 27 cm long by 1,0 - 2,3 cm broad, with entire margins or occasionally bearing 1 or 2 small teeth on the lower margin. The leaflets are set into the rachis forming a V angle. Leaflet size is reduced toward the apex and the base but the lowermost leaflets are not reduced to spines or prickles. Leaflets overlap upwards. An unusual feature which *E. eugene-maraisii* shares with several related species is that of similar anatomy. Leaflets from both species are amphistomatic (have stomata on both upper and lower surfaces) and isobilateral (symmetrical in cross section without well-defined upper and lower tissue).

The cones, which emerge in November and reach their maximum size after 11 weeks, are greenish-grey in colour and overlaid with a dense layer of maroon hairs which result in an overall russet-brown colour to the cone. Male cones are 22 - 42 cm long and 6 - 8 cm broad. The egg-shaped female cones, usually borne in pairs, are 30 - 50 cm long and 16 - 20 cm broad and are supported on 5,0 cm peduncles.

Cones weigh about 10 kg and each contains about 200 seeds which are 3,5 - 4,0 cm long by 2,3 - 3,0 cm in diameter. The flesh is amber-coloured, sometimes tinged with red.

Like most other cycads, *E. eugene-maraisii* has well-developed coralloid roots which are usually infected with the symbiotic cyanobacterium *Nostoc commune*.

(b) The Middelburg form :

E. eugene-maraisii Verdoorn subsp.
middelburgensis Lavranos & Goode.

The Middelburg cycad, also known as the Olifants River Valley form, is closely similar to the Waterberg plants; a useful comparative Table of these two forms being found in Cynthia Giddy's text. Essentially, the somewhat more robust Middelburg plants are taller, sometimes up to 6 or 7 m in height with procumbent stems reaching up to 10 m, and with leaf base scars which are large and more rounded. A bare petiole about 20 cm long and triangular in cross section subtends a straight leafstalk which does not curve upwards at the apex but is reduced to a point. The leaf, typically 1,3 m in length, is held in an erect position and the leaflets, which are set in an acute V formation, overlap one another downwards and rarely have teeth. The green cones are often overlaid with hair which results in an overall brownish-green colouration. About 4 or 5 female cones are borne on each fruiting trunk and are supported by 8,0 cm peduncles.



A striking picture of *E. eugene-maraisii* subsp. *middelburgensis*, in habitat on the "Cycad Trail".

Photo by Nat Grobbelaar.

5 AFFINITIES AND HYBRIDS

The two subspecies of *E. eugene-maraisii* share a number of features in common with *E. dolomiticus*, *E. dyerianus* and *E. cupidus* in the Transvaal as well as with *E. lehmannii* and *E. princeps* from the Eastern Cape. An inter-relationship of all these species with *E. munchii* from Mocambique is also possible. A careful consideration of all the vegetative and cone characters is necessary to distinguish the plants one-from-another.

Once again the evidence from further biochemical and micromorphological studies will be invaluable. These studies will also do much to show the validity of the new taxonomy.

Since the Middelburg subspecies of *E. eugene-maraisii* is associated with *E. lanatus* it might be expected that a number of natural hybrids could be present. The fact that none has ever been recorded may be due to non-synchrony of coning times. Unsubstantiated reports have been received that successful artificial crosses have been made between *E. eugene-maraisii* and *E. lehmannii* and between *E. eugene-maraisii* and *E. concinnus*.



E. eugene-maraisii subsp. *eugene-maraisii* : a fine specimen in cultivation in the Lowveld Botanical Garden.

Photo : Roy Osborne.

6 CONSERVATION AND CULTIVATION

Sheryl Gilbert reported in 1984 that the Threatened Plant Unit of the International Union for the Conservation of Nature and Natural Resources has classified *E. eugene-maraisii* as "vulnerable". However, a re-evaluation of this status seems justified, particularly in view of the revised taxonomy of the complex. The number of plants at both the Waterberg and the Middelburg localities seems low, although no quantitative data are available.

Perhaps the most distressing observation is that no regeneration of young plants seems to be occurring in either of the two habitats. Add to this the effect of plant removal by unscrupulous collectors and it may be necessary to "upgrade" the conservation status of both subspecies from "vulnerable" to "endangered".

Plants of the *E. eugene-maraisii* group grow well in cultivation, are frost-hardy and should be kept in full sun to preserve their attractive leaf colouration. It is hoped that those fortunate enough to have specimens of these plants will make every effort to propagate their stock from basal suckers and that female cones will be pollinated. Only by consistent efforts in this direction will others be able to share in the joy of these plants.

As far as is known, only 10 botanic gardens have specimens of *E. eugene-maraisii* in their collections. The first plant to be established "in captivity" is thought to be the Waterberg specimen planted at Kirstenbosch which is known to have produced 3 female cones in 1945. In South Africa, other plants have been established in the Botanic Research Institute's Pretoria garden and the nearby Pretoria University collection. The plant is listed in the collection of the Ewanrigg gardens near Harare in Zimbabwe. In Europe, specimens are growing at the "Les Cedres" Botanic Garden, St-Jean-Cap-Ferrat in France, at the Naples Botanic Garden and at Kew.

In America, plants are listed as being in the collections at Fairchild Tropical Garden, the Foster Botanical Gardens and at the Berkeley campus garden of the University of California.



A striking group of Middelburg subspecies in a Pretoria garden.

Photo : Roy Osborne.

8 ACKNOWLEDGEMENTS

I am grateful to Prof T J R Botha, Prof P J Robbertse, Dr Piet Vorster, Dr Steven Compton and Douglas Goode for their assistance in the preparation of this text and to the members who kindly submitted photographs.



E. eugene-maraisii subsp. *middelburgensis* in habitat near the Klein Olifants River. Note the female cones on the plant in the foreground. The trunk to the rear in the picture is 2,5m tall. The tree with the group is a *Cussonia*.

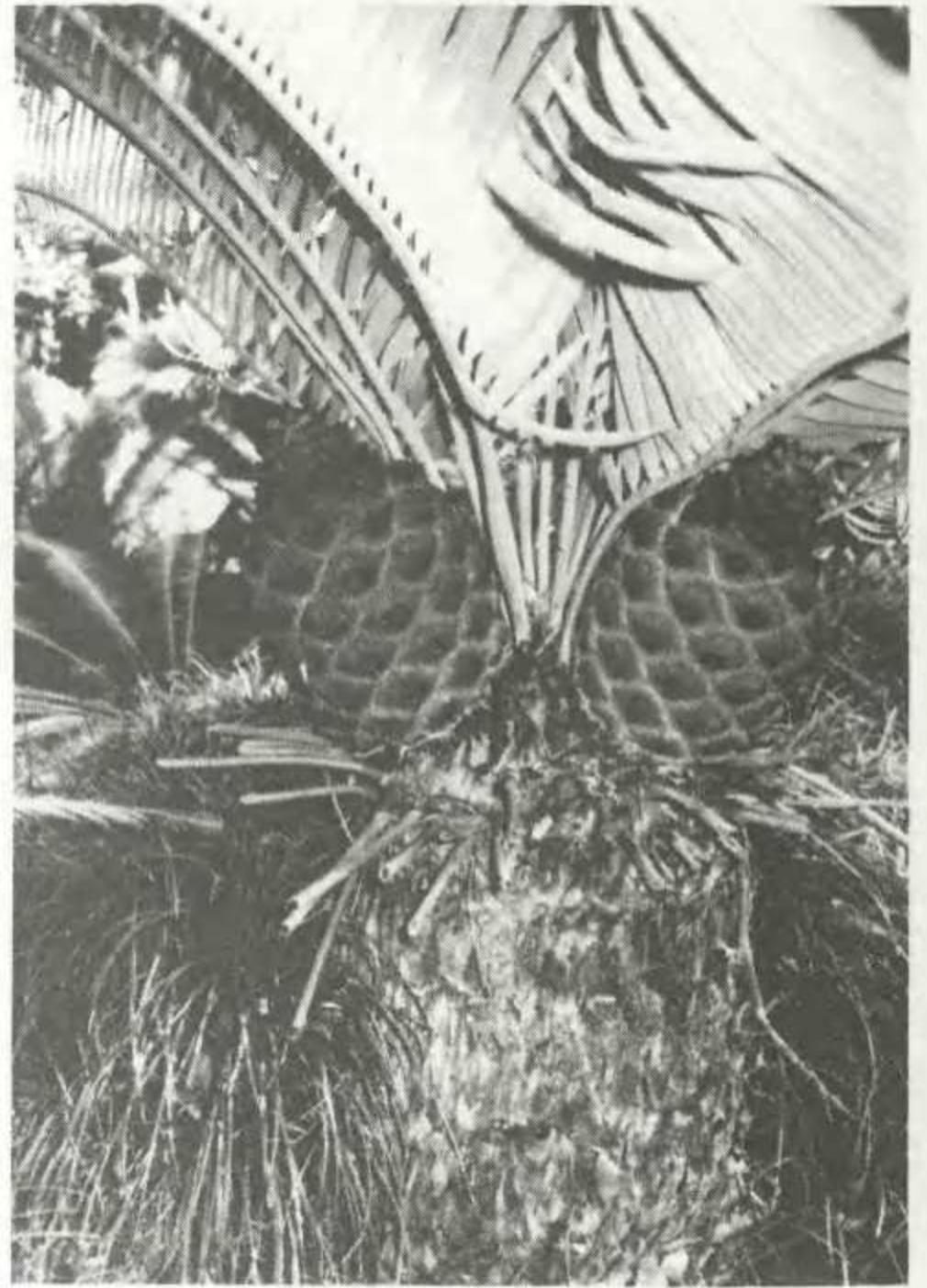
Photo : Neil Munro.

7 TOXICITY

Reference has already been made to the note that Eugene Marais sent to Dr Marloth in 1925, when he observed that the roasted seeds cause giddiness when eaten. The Waterberg locals know the seeds as "Wildedadels" (wild dates) and it is believed that their consumption has been responsible for some illnesses in children. No deaths to humans or stock have been directly attributed to *E. eugene-maraisii*. Veterinary researchers have shown that the fresh seeds cause acute liver toxicity of experimental rabbits, about 15 g of the material being lethal.

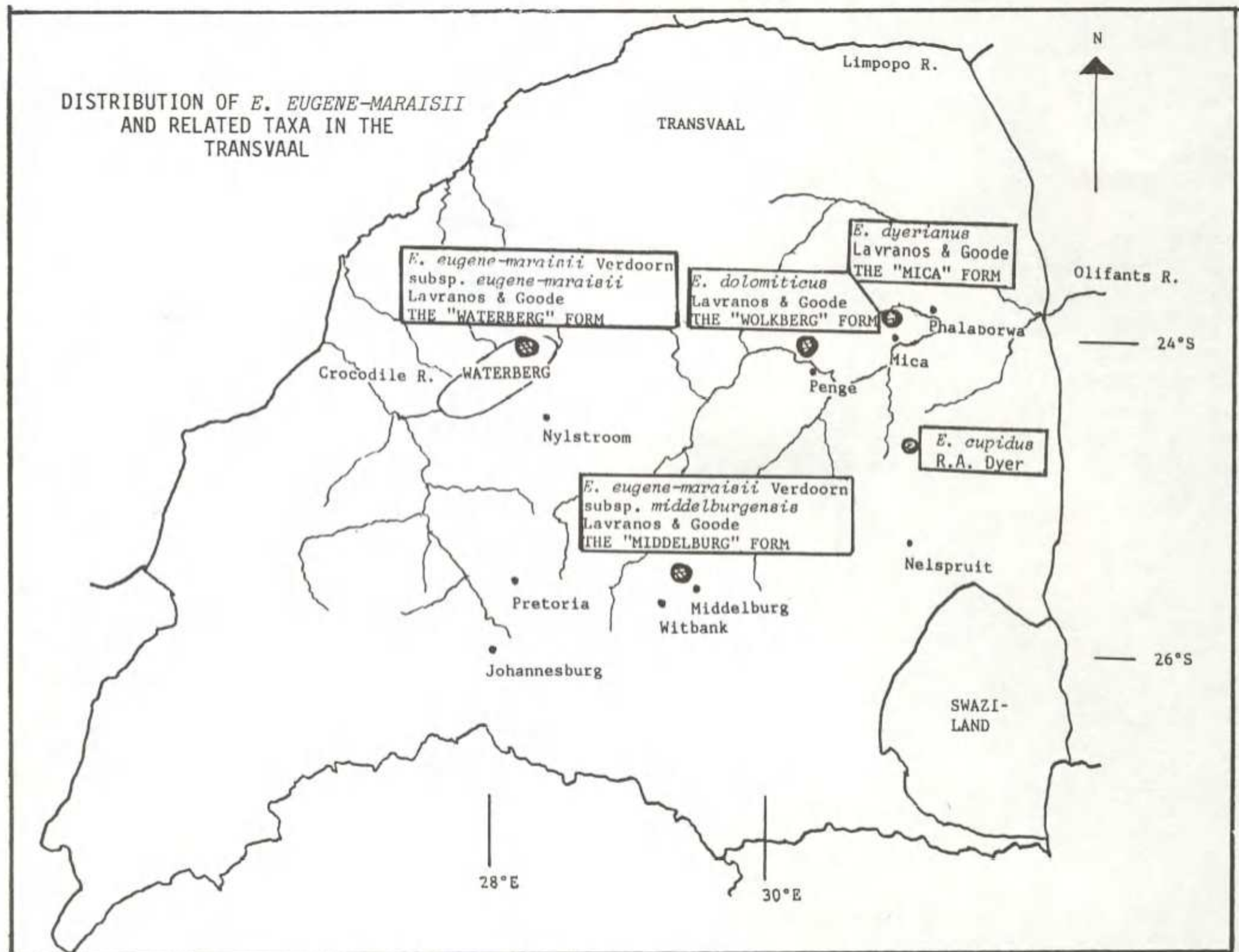
Two female cones on
E. eugene-maraisii
subsp. *eugene-maraisii*
growing in Foster
Botanical Garden,
Honolulu, Hawaii.

Photo : Leland Miyano.



Delores Munro seen pollinating a cone of *eugene-maraisii* subs. *eugene maraisii* at the end of January 1989.

She has offered to donate the seeds of one cone to the seed bank when ready.



E. eugene-maraisii* subsp. *eugene-maraisii

Leaves glaucous with bluish bloom, yellowing with age, straight with markedly recurved tip; median leaflets with occasional 1-2 teeth on lower margin; leaflets rarely reduced to more than one prickle on petiole, in upward V position from the rachis.

E. eugene-maraisii* subsp. *middelburgensis

Leaves bluish green with persisting silvery bloom, becoming grey with age, rigid and straight tapering towards the apex; petiole smooth; leaflets smooth with occasional tooth on lower margin, in V position from the rachis.

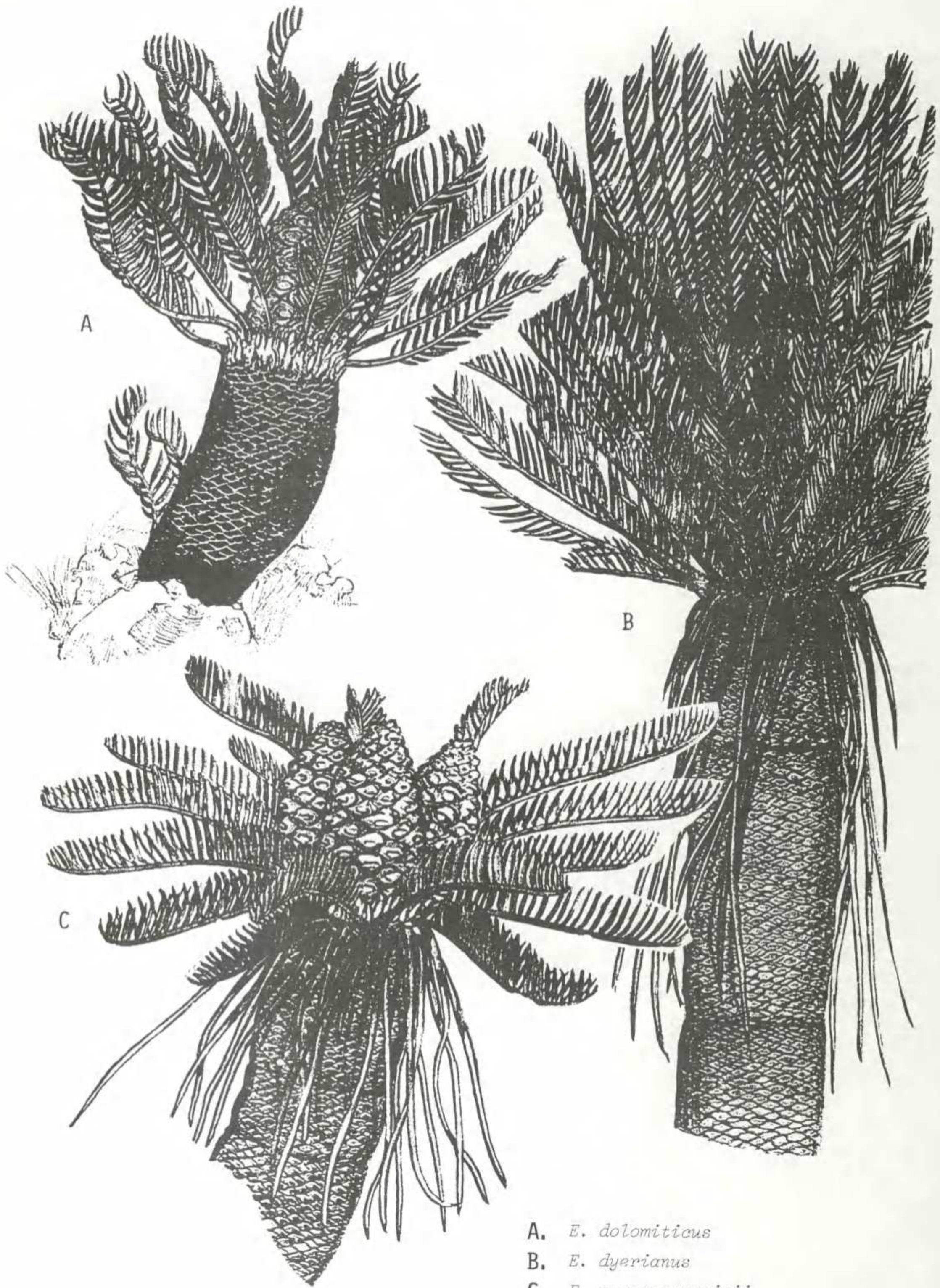
E. dolomiticus

Leaves mostly twisted and recurved, glaucous green with silvery bloom, becoming grey with age; median leaflets widely spaced with occasional 1-2 teeth on lower margin; petiole nude for a considerable distance from its base; leaflets in V position directed slightly upwards towards apex.

E. dyerianus

Leaves straight, somewhat twisted towards apex, bluish green at first, becoming yellowish with pale yellow rhachis; median leaflets with 1-2 teeth on both upper and lower margin; leaflets in V position, overlapping towards apex, narrowed gradually to the base with brown collar.

A brief diagnostic list of vegetative features which may assist in distinguishing the two subspecies of *E. eugene-maraisii* and the two "new" species, *E. dolomiticus* and *E. dyerianus*. From Lavranos & Goode (1988).



- A. *E. dolomiticus*
- B. *E. dyerianus*
- C. *E. eugene-maraisii*

Reproduced from the poster "Please Protect Transvaal Cycads", by permission.

ANTHRIBID BEETLES

- A note by Stephen Compton

Reference is made in the accompanying article on the *Encephalartos eugene-maraisii* complex to the beetle named *Apinotropis verdoornae*, discovered in 1944 by Inez Verdoorn. In the description of the species, Karl Jordan writes

"The species is new and of great taxonomic interest ... it is particularly distinguished by the rounded prothorax being devoid of a carina and bearing in the middle of the side a conical tooth".

Anthribid beetles are close to weevils, but are put in a separate family, Anthribidae. The insect is therefore distinct from the cone-feeding weevils which I have seen. The only anthribid I have collected from cycads was in East London, where a larva was feeding in the unhealthy young leaves of *Encephalartos transvenosus*. This larva appeared to be feeding on fungi. The adult I reared does not fit the description in Jordan's paper, and is a different species.

Reading around, it is known that some anthribids are pollen feeders as adults. It is therefore quite possible that both species would be attracted to male cones to feed. If the Jordan species also had larvae which bred in female cones, then it would be a good contender for being a potential pollinator. We need to know whether adults ever visit female cones before we can even guess.



E. eugene-maraisii seedlings at the TPA Nursery at Hartebeeshoek. The TAP has raised many hundred of these plants in an effort to reduce the pressure on habitat plants by unscrupulous collectors.

Photo : Roy Osborne.

9 REFERENCES

- COATES PALGRAVE, K. 1983. *Zamiaceae*. In: *Trees of Southern Africa*. Second Revised Edition, C Struik Publishers, pp.44-55.
- DYER, R A. 1965. *The Cycads of Southern Africa*. *Bothalia* 8: 405-515.
- DYER, R A. and VERDOORN, I C. 1966. *Zamiaceae*. In: *Flora of Southern Africa* 1: 3-34.
- GIDDY, C. 1984. *Cycads of South Africa*. Second revised edition. C Struik Publishers, Cape Town.
- GILBERT, S. 1984. *Cycads: Status, Trade, Exploitation and Protection 1977-1982*. World Wildlife Fund, US.
- GROBBELAAR, N., SCOTT, W E., HATTINGH, W. and MARHSALL, J. 1987. The identification of the coralloid root endophytes of the Southern African cycads and the ability of the isolates to fix dinitrogen. *SA Journal of Botany* 53: 111-118.
- JORDAN, H E K. 1945. Description of a new anthribid beetle from Transvaal. *Proceedings of the Royal Entomological Society of London*, Series B, 14: 111-112.
- KOELEMAN, A., ROBBERTSE, P J and EICKER, A. 1981. Die anatomie van die pinna's van die Suid-Afrikaanse spesies van *Encephalartos* Lehm. *Journal of SA Botany* 47: 247-271.
- LAVRANOS, J J and GOODE, D L. 1988. Notes on southern African Cycadales. *Bulletin of National Botanical Gardens of Belgium* (*Bull. Jard. Bot. Nat. Belg.*) 58: 219-224.
- LUCAS, G. 1980. The botanic gardens list of cycads. Threatened Plant Committee Report to the I U C N, Kew.
- MARAIS, E N. 1914. Notes on some effects of extreme drought in the Waterberg. *Agricultural Journal of the Union of South Africa* 7. Reprinted in "The Road to Waterberg" (collected essays) Human and Rousseau.
- ROBBERTSE, P J., VORSTER, P. and VAN DER WESTHUIZEN, S. 1988. *Encephalartos graniticulus* (*Zamiaceae*): a new species from the north-eastern Transvaal. *South African Journal of Botany* 54: 363-366.
- ROBBERTSE, P.J., VORSTER, P. and VAN DER WESTHUIZEN, S. 1988. *Encephalartos verrucosus* (*Zamiaceae*): a new species from the north-eastern Transvaal. *South African Journal of Botany* 54: 487-490.
- STEYN, D G., VAN DER WALT, S J and VERDOORN, I C. 1948. The seeds of several species of *Encephalartos* - a report of their toxicity. *SA Medical Journal* 22: 758-760.
- VAN DER WESTHUIZEN, S. 1976. 'n morfologiese studie van *Encephalartos eugene-maraisii* Verdoorn. MSc thesis Univ of Pretoria.
- VERDOORN, I C. 1945. A new species of *Encephalartos* from the Waterberg. *Journal of SA Botany* 11: 1-3.
- VORSTER, P. 1986. Hybridization in *Encephalartos*. *Excelsa* 12: 101-106.

BOTANICAL LITERATURE

We offer a comprehensive selection of southern African botanical and horticultural literature ex stock at regular market prices. Write for price list to:

Messrs Honingklip Nurseries & Book Sales, 13 Lady Anne Ave., 7700 NEWLANDS, Cape.

STANGERIA - A BOTANICAL WATCHDOG ?

A December 1988 supplement to Natal newspapers, DURBAN FOCUS (No. 23) featured an interesting 3-page write-up with colour illustrations on Durban's "Muthi" Nursery. The project, based at the Silverglen Nature Reserve in Chatsworth, is directed at restoring the opposing balance between the herbal medicine trade and the philosophy of floral conservation. One of the statements made in the text is that *Stangeria* plants will keep burglars away. Has anyone any background information on the tribal folklore on which this must have been based? Write to the editors if you can help.

DR. ROY OSBORNE

DOCTORATE FOR PRESIDENT

We are pleased to announce that Roy Osborne, President of the Society, has been awarded the degree of Doctor of Philosophy by the Science Faculty of the University of Natal in Pietermaritzburg. This follows the submission of his thesis entitled "An investigation into in vitro culture and phytochemical aspects of some members of the order Cycadales" and represents the summation of research work over the period 1984 - 1988.



PANT'S FOSSIL PAPER

Professor Divya Darshan Pant, Honorary Life Member of the Society and Emeritus Professor of Botany at the University of Allahabad, has recently been honoured with the award of the International Medal of the Palaeobotanical Society. His acceptance speech comprised a comprehensive review lecture on "The Fossil History and Phylogeny of the Cycadales" and is published in the journal *Geophytology* (17: 125-162, 1987). A photocopy of the text is available from the President.

FIJI'S CYCAD

The Pacific Island of Fiji is the home of a cycad which is named *Cycas rumphii* forma *seemannii* but goes under the perhaps more romantic name of "longolongo" in Fiji. A paper which describes this plant appears in *Flora Vitiensis Nova*, published by the Pacific Tropical Botanic Garden in Hawaii. The paper also raises the question of the relationship between certain *Cycas* species, particularly *C. thouarsii*, *C. circinalis* and *C. rumphii*, a matter which will probably not be entirely resolved until a full revision of the genus *Cycas* is carried out. A copy of the text on Fiji's cycad is available from the President.

CYCAD LEAF WAXES

Roy Osborne, Maria and Antonio Salatino have presented a report on the distribution of the alkane hydrocarbons from *Encephalartos* leaf waxes. Titled "Distribuicao de alcanos de ceras foliares de *Encephalartos*", this was a contribution to the Seventh SBSP/UNESP Congress in Rio Claro, Brazil, September 1988. A summary - in Portuguese - is available from Dr. Osborne.

CYCAD 90

THE SECOND INTERNATIONAL CONFERENCE ON CYCAD BIOLOGY
Townsville, Queensland, Australia : 22-27 July 1990

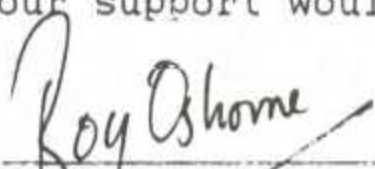
African representative on the Organising Committee :-
Dr Roy Osborne, 20 Maryvale Road, 3630 WESTVILLE.

Dear Members of the Cycad Society of Southern Africa.

CYCAD 90, the Second International Conference on Cycad Biology will be held at Coutts' Burdekin Resort, Townsville, Queensland, Australia, over the period 22-27 July 1990. An exciting programme of lectures, panel discussions, poster presentations and social events is being planned. One or more tours of several days will be arranged for those who want to visit important cycad localities after the Conference.

We would like to see a strong representation from Southern Africa. If you are at all interested in attending, please complete the form below and return it to me as indicated.

The travel costs are unfortunately high. Several of our members who would like to participate by presenting lectures or posters at the Conference will be unable to attend without financial support. May I appeal to members to consider if they can possibly assist with *any* donation towards these costs? Your support would be truly appreciated.



Roy Osborne
for CYCAD 90 Organizing Committee

REPLY FORM

TO: Roy Osborne, 20 Maryvale Road, Westville. 3630.

I am interested in attending CYCAD 90. Please send me details of the Conference programme, travel costs, registration fees and accommodation expenses.

I would like to contribute towards the costs of sending delegates from Southern Africa to CYCAD 90 who will be presenting material at the Conference and who would not otherwise be able to attend. I enclose my cheque/postal order/cash to the value of R..... (Cheques to be made out to CYCAD 90)

Name:

Address:

.....
.....Code:

Signed _____ Telephone No. _____ Date: _____

By John Donaldson - National
Botanic Gardens Kirstenbosch.

'Conservation through research, horticulture and education in botanic gardens' was the title of a conference held in Cape Town from 28 August to 2 September 1988. Hosted by the National Botanic Gardens and the Botanic Gardens Secretariat of the International Union for the Conservation of Nature and Natural Resources (IUCN), the conference was attended by about 80 delegates with a sizeable representation from abroad. Invited speakers addressed the three main issues i.e. research, horticulture and education with one day allocated to each topic. A keynote speaker gave an overall perspective of each topic and we were fortunate to have extremely well qualified people for this task. Professor Vernon Heywood, Director for the Botanic Gardens Conservation Secretariat of the IUCN set the scene for the first day's deliberations on the role of research; Mr Gren Lucas, acting Director of the Herbarium at Kew, provided an overview of the role of horticulture, and Mr Charles de Haes, Director General of World Wildlife Fund, gave us some insights into the enormously important field of conservation education.

Considering the broad topic covered by the conference, it is not surprising that many varied subjects were tackled including, management of a Botanic Garden, priority listing of endangered plants, systematics, reproduction biology,

population genetics, seed banks tissue culture, ethnobotany, rural development, record keeping, propagation, survival in cultivation, re-establishment in nature, publications, child education, adult education and outreach programmes. In addition to the invited contributions, posters covering similar topics, but usually with a more local flavour, were also presented.

It is obviously impossible to include details from each of these talks, but one of the outstanding features of the congress was the pragmatic approach of most of the speakers faced with a depressing scenario massive extinctions within the next several decades and the daunting prospect of trying to save as many species as possible, delegates avoided the trap of self-pity and tackled the problems with great enthusiasm. One speaker provided the stunning statistics of ca. 40 000 species currently in need of ex situ conservation, but immediately went on to show how, through co-ordinated use of all the world's botanic gardens as well as the use of private collections, each garden may need to focus on only 200 to 400 species. Readers of *Encephalartos* are probably well aware of the conservation value of their own cycad collections especially when these form part of a co-ordinated programme for exchange of pollen and seed.

The innovations of some of the speakers gave us confidence for the future of conservation. Mr Tom Muller, Director of the National Botanic Garden in Zimbabwe, overcame the loss of his luggage (including notes and slides) and kept us glued to our seats with a fascinating account of how he created a tropical forest in a botanic garden with only 600mm annual rainfall. Wendy Strahm, an IUCN employee working in Mauritius gave an equally vivid account of re-establishment programmes in that country. The local flora is threatened by the introduction of various herbivores and invasive plants, but threatened indigenous flora have been re-established on selected islands where all alien biota could be eliminated. Closer to home, Dr Tony Cunningham of the Institute for Natural Resources (Pietermaritzburg) provided some practical solutions to the exploitation of medicinal plants. He urged botanic gardens and local authorities to follow the example of the Durban Parks and Recreation Department who are cultivating one of the bulbs most sought after by traditional healers (this is an area that may interest cycad enthusiasts since the roots of *Stangeria eriopus* are traditionally used for medicinal purposes). Prof. Earl Graven from the University of Fort Hare showed how impoverished rural farmers could be encouraged to grow indigenous plants for their essential oils instead of persistently failing to raise agriculture crops on marginal land.

Perhaps the most extraordinary local effort in terms of conservation education, centres on the ECCO project of Mr Peter Slingsby (Kleinmond, Cape). Here, children who come largely from poor rural communities are incorporated into clubs where they are encouraged to explore, experience and conserve their natural surroundings. Thus these disadvantaged children who are denied a more formal education may still gain inspiration and knowledge from nature herself and could in the future provide a basis for conservation awareness in their communities. All these efforts give us hope for the future.

Although cycads featured in several of the presentations, as would be expected at a conference on the conservation of plants, only one dealt specifically with these plants. That was my own poster on weevil predation of cycad seeds. The biology of the weevil, including ovipositional behaviour and larval development were covered. I also indicated which seeds in a cone of *Encephalartos altensteinii* were most likely to be attacked by weevils. (I hope to write a fuller account of this once I have enough data for a scientific publication). Most conservationists have a soft spot for cycads so this poster was generally well received.

All in all the conference was very stimulating and should provide further impetus for the conservation of threatened plants, including cycads.

CYCADS OF AUSTRALIA

by Len Butt

BOWENIA - THE PSEUDO FERN

Undoubtedly, the most unique and interesting genus of the Australian cycads is *Bowenia* from the eastern coastal areas of Queensland with two species. *Bowenia spectabilis*, and *Bowenia serrulata*. Both are fern-like in appearance, habitat and growth pattern.

The *Bowenia* species are low growing and often mistaken for ferns by people who come across them in their habitat. The most used common names bear evidence of this. *Bowenia spectabilis* is called "Zamia fern" and *Bowenia serrulata* is known as "Byfield fern". For many years the fronds were collected and sold in florist shops and also used on the walls of butcher shops as decoration. They have an added advantage over real ferns as they last much longer when cut. In appearance, *Bowenia* seem to have a closer relationship to the American *Zamia* and the African *Stangeria* than to any other genus.

BOWENIA SPECTABILIS - ZAMIA FERN

The type form of *Bowenia spectabilis* has a hidden or subterranean caudex which is no more than 10 cm long and elongate in shape. The tap root is also elongate and even in semi-mature specimens goes to depths of 60 cm. The fronds appear at the end of a long narrow petiole stem, the rachis branching fan-like, sometimes into as many as seven branches. Pinnules are arranged evenly along each branch of the rachis giving the appearance of a circular or semi-circular shiny green fan on a long stem.

fronds appear only once a year, and this pattern is only changed if fire damage, roving animals, or cultivation destroys the existing stems. Largest specimens I have seen are in the grounds of Paronella Park at Innisfail. The stems numbered seven, up to 1.5 metres in length, the branching fan of pinnae at the top having a diameter of approximately 1.25 metres. The stems had first risen erect then flattened out into a rough circle. In cleared spaces among the rainforest edges I found several plants with male cones emerging from the ground within 5 to 15 cm from petiole bases. Cones were ovate, green, and already opening to shed their pollen grains. There was no sign of female cones in the area.

What may also be a distinct form is reported from near Mission Beach. The plants have completely different pinnules, being longer and narrower than is usual for *Bowenia spectabilis*, and the linear form of the pinnules is quite distinct from the usual wider pinnules of *Bowenia spectabilis*.

There were more pinnules to each side of the rachis, with the usual petiolate condition being present, and although the leaf was obovate-lanceolate, the falcate curve was more pronounced. This is a condition I have noticed in *Bowenia serrulata*, but these pinnules were entire, not serrated as in *Bowenia serrulata*.

BOWENIA SERRULATA - THE BYFIELD FERN

There would appear to be a number of distinct forms of *Bowenia serrulata*. A form described by Chamberlain in 1912, in "The Living Cycads" has marked differences. Firstly, the subterranean caudex is ovoid to roughly spherical (not elongate), and all of the pinnules on the branching rachis are serrate along the edges of the pinnae. These fine saw tooth edges are very distinctive. The stems are far more prolific than in the case with *Bowenia spectabilis*, and the rough circle formed is much more flattened and fern-like. Differences of habitat are also very clearly marked as *Bowenia spectabilis* occurs on the edges of dense rainforest and does not form in great hedgelike stands in any area where it inhabits. *Bowenia serrulata* grows in open eucalypt forest along with some treefern species and stands of the Piccabeen palms. It forms dense and extensive stands in and about Byfield and in the *Bowenia* National Park and grows bracken-like in density.

The left hand photograph by Merv Hodge shows the fruiting cone at ground level, typically green in colour. The seed is swelling as it matures.



BOWENIA SERRULATA

You would be excused for thinking this was a true fern.

The photograph on the right hand side by Don Arien shows how the seed matures to a red/brown colour, thrusting the sporophyllis aside.



REGIONAL NEWS STREEKNUUS

REGIONAL REPORTS : NATAL SECTION

A evening meeting on 18 November 1988 was attended by 16 members and 7 guests. A show of slides of Madame Ganna Walska's famous Lotusland Garden in California was presented. The slides were kindly donated to the Society by our overseas member and good friend, Douglas Atwater and were shown on his behalf by Roy Osborne. We were pleasantly surprised to see many specimens of Encephalartos including 3 E. woodii, doing well in the USA.

There was a discussion about growing cycads from seed with demonstrations by Danie Nel and contributions from the floor.

A novel feature was an exhibition of cycads in containers. Prizes were awarded to Roy Osborne for his Stangeria eriopus, to Dirk Esterhuizen for his Encephalartos trispinosus and a Zamia furfuracea. Bill and Avis van der Vyfer showed another Z. furfuracea which was highly commended.

Danie Nel
Natal Chairman.



One of the specimens of Z. furfuracea on show at the Natal Section meeting.

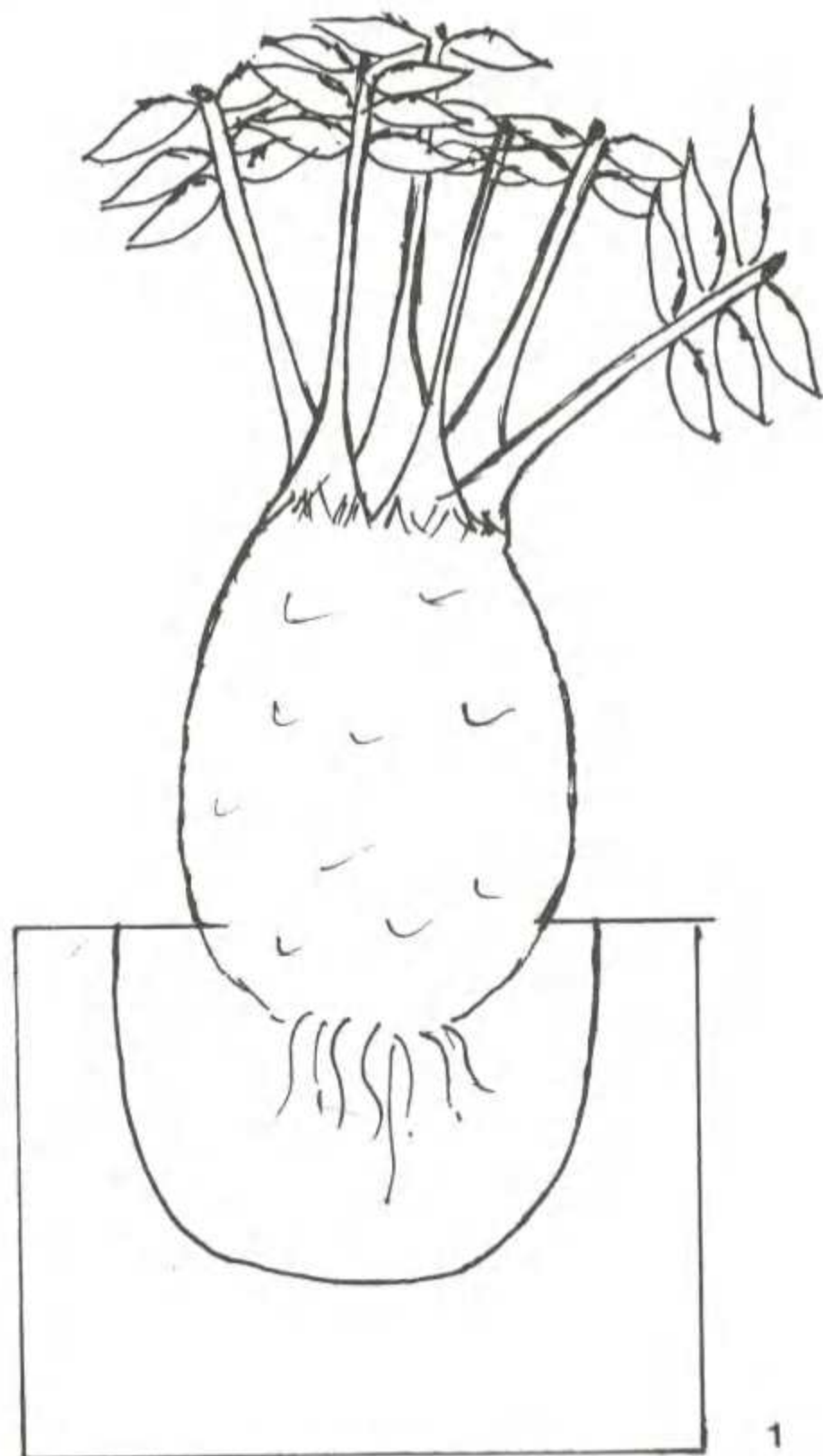
Photo by: Avis van der Vyfer.

Koos Oosthuizen of the Transvaal Provincial Administration Nursery at Hartbeeshoek gave the Eugene Marais Regional Branch a very interesting talk and slide show last year. A method he uses to pollinate cones has been used with great success by several members.

Pollen from a male cone is sifted through a tea strainer before being mixed with approximately 250ml of water. It is sucked into a douche and then forced into the receptive female cone, this method ensures that the pollen is injected into the cone and very little is wasted.

Another hint he gave us was how to transplant a mature cycad successfully,

Firstly remove 50% of the leaves by cutting the leaf stalks in half. Now dig out the soil approximately 30cm away from the stem, dig until under the roots and then carefully remove the plant (Figure 1).



1

Prepare the new hole filling the bottom with clean broken clay bricks, put a plastic pipe into the hole to line up with the bricks, by watering through the pipe you avoid shallow watering which of course is detrimental and actually stunts growth, watering need only be done once a month.

The bricks absorb many times their weight in water and this percolates upwards, at the same time rapidly attracting the roots downwards to where the soil will always remain cool and damp. (Figure 2).



2

Asked about fertilizer Koos recommended 3-1-5- (26), using this mixture corrects any potash deficiency. Potash is responsible for bright leaf colour and vigorous growth.



CYCADS OMITTED IN SCHOOL BIOLOGY

SYLLABI

I recently had occasion to inspect nine textbooks covering the "New Syllabus" for Biology as taught in South African schools. These books collectively comprised 2891 pages of text. I was distressed to see that there is virtually no mention of cycads. In the Standard 9 syllabus, pupils are expected to know details of the structure, nutrition, reproduction and ecology of gymnosperms; each of the Standard 9 books deals extensively with the life-cycle of *Pinus*, a plant not indigenous to our country. The passing references to cycads (made in 3 of the 9 books) are pitiful, e.g. "Cycads are palm like (sic) plants with cones; there are many types in South Africa", alongside a rather odd drawing of a cycad cone of unspecified sex and a 5cm high diagram of a cycad plant, (followed by 18 pages on the life cycle of the pine tree). (Discovering Biology, Std. 9, by THIENEL, PELLEW, GREEN-THOMPSON, AYERST & CARSEN, Shuter & Shooter, 1986). Similarly, in another we find the single statement "Order Cycadopsida. Two genera, *Encephalartos* and *Stangeria*, are indigenous to South Africa", with two rather poor line drawings, in a 20 page chapter on gymnosperms. (Senior Secondary Biology, Std. 9, by SMITH & 5 co-authors, Maskew-Miller-Longman, 1988). Finally, we see "To evaluate the economic importance of gymnosperms, we must distinguish between the 3 large groups, cycads, pines and *Welwitschia*" followed by no further mention of either cycads or *Welwitschia*! (Senior Biology, Std. 9 by DU TOIT and 7 co-authors, Nasou Ltd., 1986).

Another aspect where one may be critical is the section on conservation of flora, which forms part of the Standard 8 syllabus. Cycads aren't even mentioned.

However, let us not be over-critical of the authors' work : they are hamstrung in the constraints of the syllabus. The question of how we expect the future generation to appreciate fully our cycad heritage

is one we might address to those who design the school syllabi.

I might also add that an offer to present a lecture on cycad biology - made to every school in Natal in 1988 - met with zero response.

Roy Osborne.

FURTHER RESEARCH IN CORALLOID ROOTS

Researchers at the University of Pretoria continue to lead in the field of cycad coralloid root studies. The most recent publication "SEM observations on cyanobacteria-infected cycad coralloid roots" appears in the October 1988 issue of the SOUTH AFRICAN JOURNAL OF BOTANY (Vol. 54, No. 5, pp. 491-495). This report, by Nat Grobbelaar and Jan Coetzee in association with Dr Doris Chang of the National Taiwan University, gives details of scanning electron microscope studies of coralloid roots from *Encephalartos transvenosus* and *E. paucidentatus*. The authors report on cyanobacteria both between and within the root cells, the distribution of phenolic compounds in these cells and the occurrence of other bacteria-like micro-organisms. This is a technical paper of interest mainly to academics concerned with this field of work. A limited number of reprints may be obtained from Prof. Nat Grobbelaar, Department of Botany, University of Pretoria, 0002 PRETORIA.

IN MEMORIAM : MICK HUNTLEY

It is with great sadness that we record the death of Natal member Mick Huntley. Mick and cousin John lost their lives in a fishing tragedy on 30 November 1988. Mick's regular and enthusiastic support of the Society will be sorely missed. Sincere condolences are expressed to his wife Lynn, family and friends.

BITS AND PIECES STUKKIES EN BROKKIES

FROM THE BOOKSHELF

The very useful general gardener's book "GARDENING MADE EASY" is published by the Durban and Coast Horticultural Society. Edited by Vernon Rippon, the 352 page text contains a wealth of information on numerous topics of interest to gardeners in tropical and sub-tropical climates. There are numerous illustrations and sixteen colour plates. Of special interest to cycad enthusiasts is a short chapter on cycads by Cynthia Giddy and three colour plates of *Encephalartos* in cone.

This book is quite outstanding value at the very modest current price of R7.00 which includes G.S.T., packing and postage by certified mail to any address in South Africa. (Overseas orders should include the cost of postage of a 1 Kg parcel by printed paper rate). Orders may be placed directly with The Secretary, Durban & Coast Horticultural Society, P.O. Box 2266, Durban 4000.

A three day course on cycad biology is to be run by the National Botanical Gardens at Kirstenbosch as part of a new adult education programme. The date is tentatively set for 20-22 July 1989. Persons interested in attending should contact Dr Fiona Getliffe-Norris at Kirstenbosch. (Phone 021-771166).

Maans Kemp's feature "Cycads and the Law" (*Encephalartos* 14) is available in english from the editors.

Any suggestions? Write to Neil and Bunny and let us make this the most exciting year of *Encephalartos* to date.

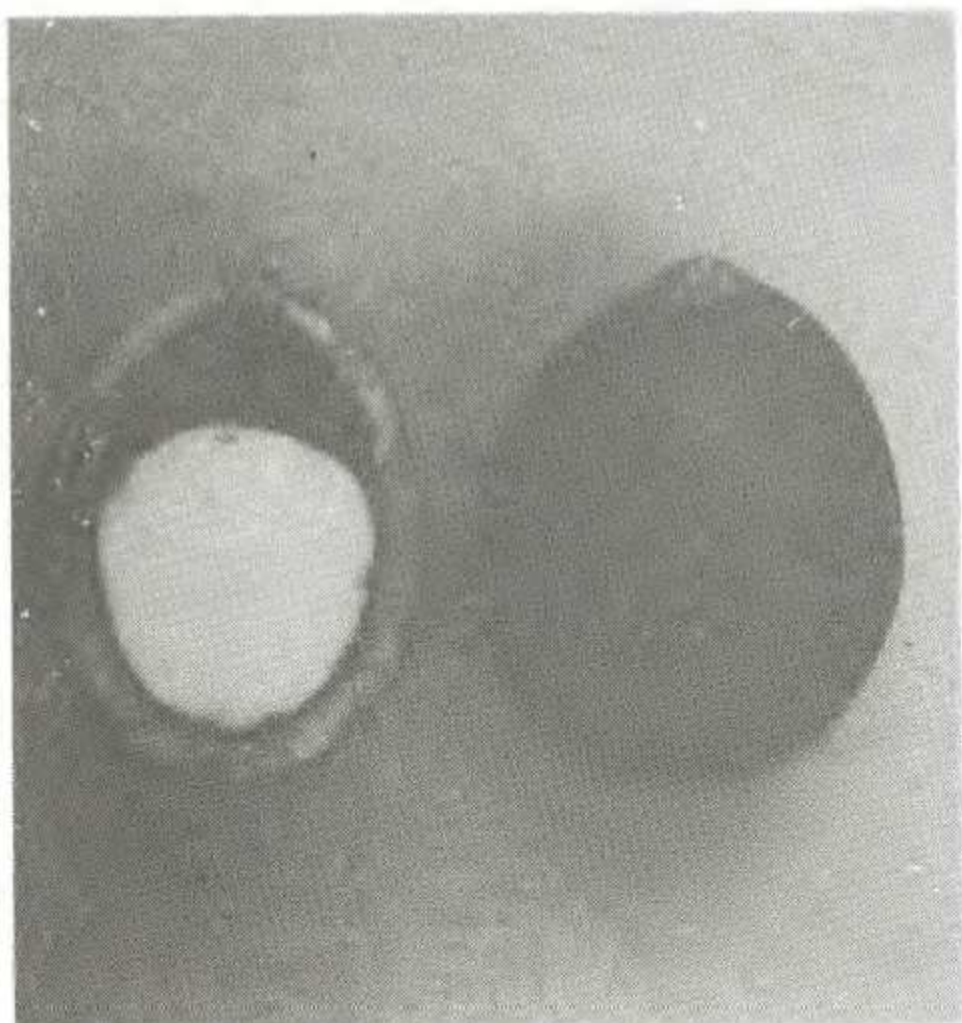


Dr Roy Osborne with new editors on a recent trip to Modjadji Nature reserve. May we expect another fine article on *Encephalartos Transvenosus* from him?

FLOATING CYCAS SEED

Most of our readers will know that a good indication of the viability of "Encephalartos seed is that "good" seed sinks in water and those that float can usually be discarded. This simple test does not apply to all cycads. The photo below shows a picture of a ripe seed of Cycas thouarsii and the seed in longitudinal section. These seeds differ from Encephalartos in two important respects.

Firstly only the fertilised seeds develop to full size. Secondly, as shown in the sectioned seed, about a quarter of the internal volume is filled with low-density, fibrous, spongy, matter which makes the seed float in water. This indeed appears to be a special feature of many Cycas spp. which are thought to have been distributed from one Indian Ocean Island to another by floating across the seas - much like the way coconuts are distributed. The moral is - don't throw away Cycas seed if it floats !



LOWVELD BOTANIC GARDEN

Several cycad projects are underway at the Lowveld Botanic Garden, Nelspruit, under the capable direction of their enthusiastic Curator, Mr Johan Kluge. A large planting of about 50 E. lebomboensis is now well-established and a second area has been set aside for a similar large planting of E. paucidentatus. The existing large collection of E. humilis is to be moved to the Highveld Garden when the climate will be more consistent with its requirements. These large-scale plantings constitute vital long-term genetic reservoirs for these species.

We were dismayed to hear of the theft of 2 of the 3 specimens of E. latifrons from the Garden. It is hoped that the criminals responsible will be brought to justice.

Finally, members are reminded that the Garden offers a good selection of Lowveld indigenous plants - including cycads - for sale to the public at very reasonable prices. The telephone number of the Garden is 01311 - 25531. (See also ENCEPHALARTOS 15, p.3).

SAAB CONGRESS 1989

The 15th Annual Congress of the South African Association of Botanists was held in Pretoria in January this year. Amongst the 300 delegates were 12 members of the Cycad Society. Considerable interest was shown in the cycad research work: presentations were given by John Donaldson (Physical and chemical interactions between cycads and seed-feeding weevils), Jeanne Marshall and co-workers (comparative studies on cyanobionts of Encephalartos transrenosus), Nat Grobbelaar's team (Stomatal densities of cycad leaves; mechanism of Encephalartos cone break-up) and Roy Osborne and co-workers (cycad leaf waxes in taxonomy). In addition, a poster advertising the Cycad Society resulted in some 30 new membership enquiries.

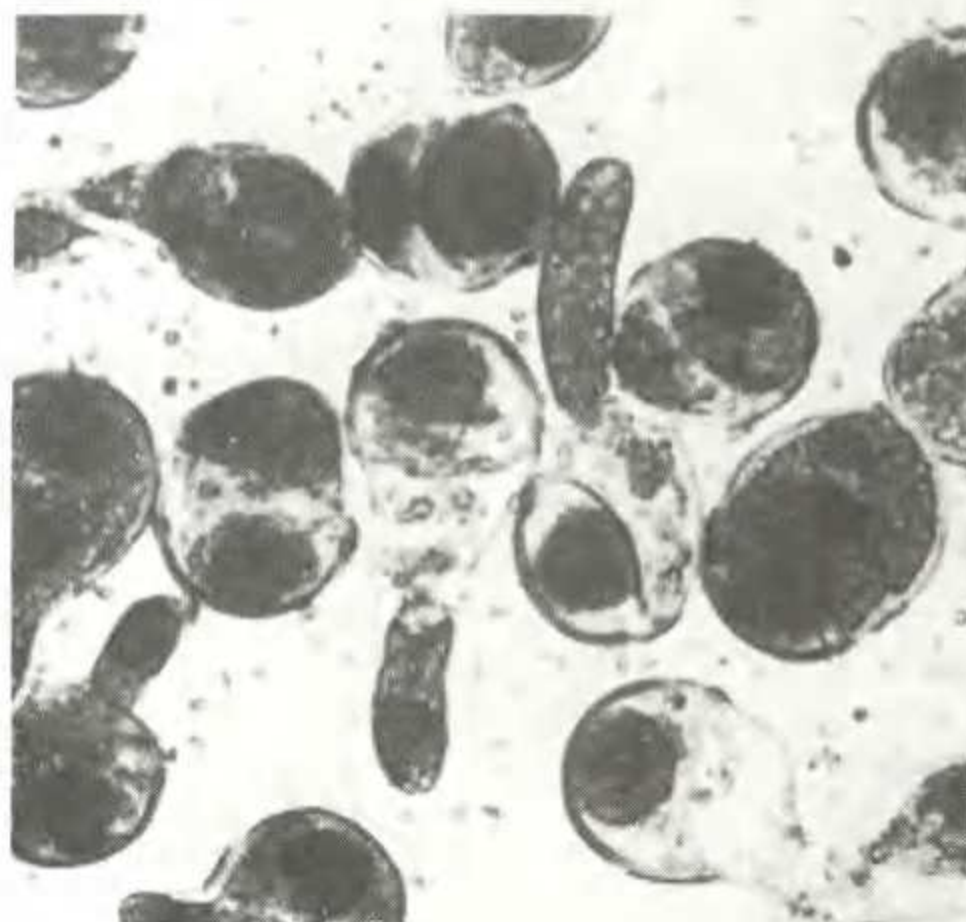
Following the write-up on *E. lanatus* in ENCEPHALARTOS No. 16, Mr G.J. Engelbrecht, Assistant Chief of Parks, Sport and Recreation of the Middelburg Town Council, has kindly sent us two photographs of interest. The one above depicts a grave at Botshabelo where *E. lanatus* leaves have been used decoratively. The picture on the right is taken in the old church at Botshabelo where plants of *E. lanatus* have been used in the Christmas decorations. Both pictures were taken circa. 1907.



DECORATIVE USE OF *E. LANATUS*

CYCAD POLLEN SURVIVES ULTRA-LOW TEMPERATURE

Research currently under way at the University of Natal (Roy Osborne) and the University of Pretoria (Hannes Robbertse) is directed at assessing optimal storage conditions for cycad pollen. This work will appear in publication in due course. An interesting observation at an early stage was that *Encephalartos* pollen can be stored at minus 196°C (the temperature of liquid nitrogen). The technique employed is similar to that used for long term storage of stock semen for artificial insemination purposes. Pollen stored in this manner is almost 100% viable after testing. It is now believed that cycad pollen could be stored indefinitely in this way.



Encephalartos woodii pollen germinating in culture after 3 months' storage at -196°C. Magnified 300 times.

Photo: R. Osborne.

CYCAD MUTANTS

by Roy Osborne

In past issues of ENCEPHALARTOS we have featured several unusual growth forms of cycads. Much interest has been shown in the cases where vegetative outgrowths arise at the top of otherwise-normal male and female cones, as has now been reported for *Zamia furfuracea*, *Encephalartos longifolius* and *E. transvenosus* (ENCEPHALARTOS 11, p.16; 12, p.4; 13 pp. 18-19; 14, p.20). An unusual "twin seed" for *E. natalensis* has been reported (ENCEPHALARTOS 13, p.42). To this list one must also consider the freakish and controversial incidents relating to sex-changes (ENCEPHALARTOS 2, pp. 20-22 & 24, p.34; 12, p.29; 13, p.42).

All the above abnormalities can be rationalised in terms hormonal imbalances in plants which are normal to begin with, i.e. they may be referred to as "physiological abnormalities". In this article, we focus on an entirely different type of freakishness, the cycad mutants, i.e. plants which are abnormal from conception (presumably due to mishaps in the process of meiosis when the chromosomes undergo reduction-division processes to make the sperm or egg cells). The resulting mutants may thus be referred to as "genetic abnormalities".

1. UNUSUAL LEAFLET FORMS

The first plant we report on was observed as a single oddity amongst several hundred apparently normal specimens of *E. natalensis* in habitat in the Umgeni Valley near Howick. This particular plant (Fig. 1), estimated at about 10 years old, had every leaflet tip rolled up into a tight coil to give a highly unusual and rather attractive overall effect.

A similar mutation was isolated by Cynthia Giddy from a batch of habitat-collected *E. natalensis* seed. Here, one plant in several hundred seedlings gave rise to a specimen with spirally coiled leaflets, giving a "ringlet" effect (Fig. 2). Certainly a conversation object, it is hardly

every gardener's cup-of-tea!

The third example of odd-leaflet forms was similarly grown by Cynthia Giddy from a bulk batch of *E. natalensis* seed. This abnormality was such that leaflet margins were inwardly curved to give a spoon-shaped effect (Fig. 3).

2. UNUSUAL TRUNK FORMS

The only unusual trunk form on which we can report is the fasciated form of *Cycas revoluta*. This "Cockscomb" form is comparatively common, so much so that it is often referred to as *Cycas revoluta* var. *cristata* (Fig. 4). This type of sideways extension of the growing apex is well-known to the cactus and succulent enthusiasts, but is not known in any cycads except *C. revoluta*.

3. VARIEGATED CYCADS

The only true, or naturally-occurring, variegated cycad is the Guatemalan species *Zamia muricata* var. *picta*. However, a number of other species sporadically develop variegated leaflets including *E. natalensis* (Fig. 5), *E. manikensis* (Fig. 6), *E. villosus*, *Cycas revoluta* and *Lepidozamia hopei*. The plants seen generally show this variegated effect on only some leaflets of some leaves. The resulting effect is certainly unusual but hardly aesthetically attractive!

4. DWARF CYCADS

The final genetic abnormality we report on here is that of dwarfism. These miniatures occur as isolated very slow-growing specimens from otherwise-normal seed batches - animal breeders would call them runts of the litter. They are quite distinct from the man-made *bonsai* forms, sometimes practised with *Cycas revoluta*. Examples have been reported of this true dwarfism in *E. altensteinii* (Fig. 7), *E. lebomboensis* (Fig. 8), *E. natalensis* (Fig. 9), *E. princeps* (Fig. 10) and *E. horridus* (Fig. 11).

CONCLUSION

This report is based largely on a very limited number of personal observations.

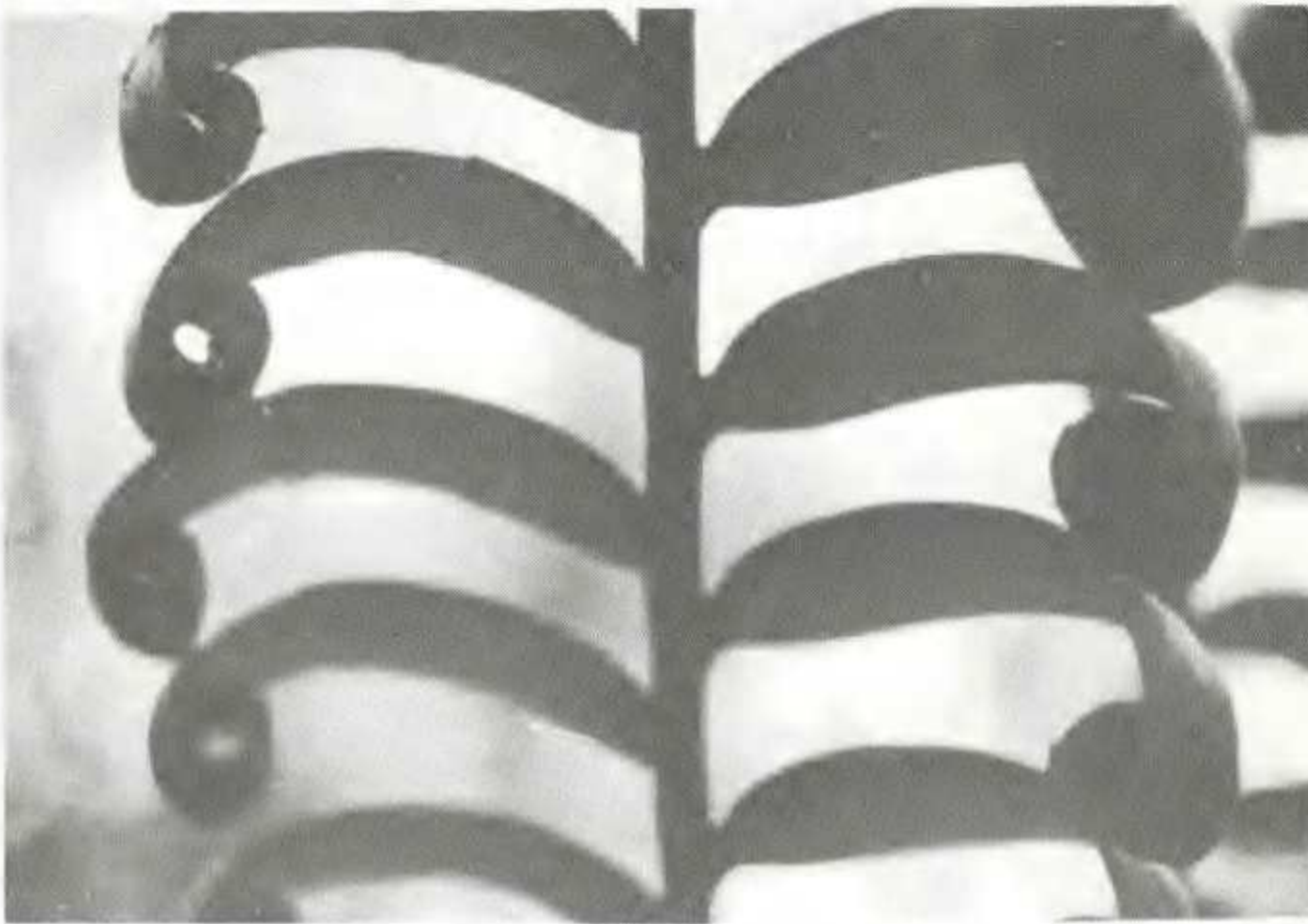


Fig. 1 : The tightly-coiled leaflet effect found in a single specimen of *E. natalensis* in habitat.

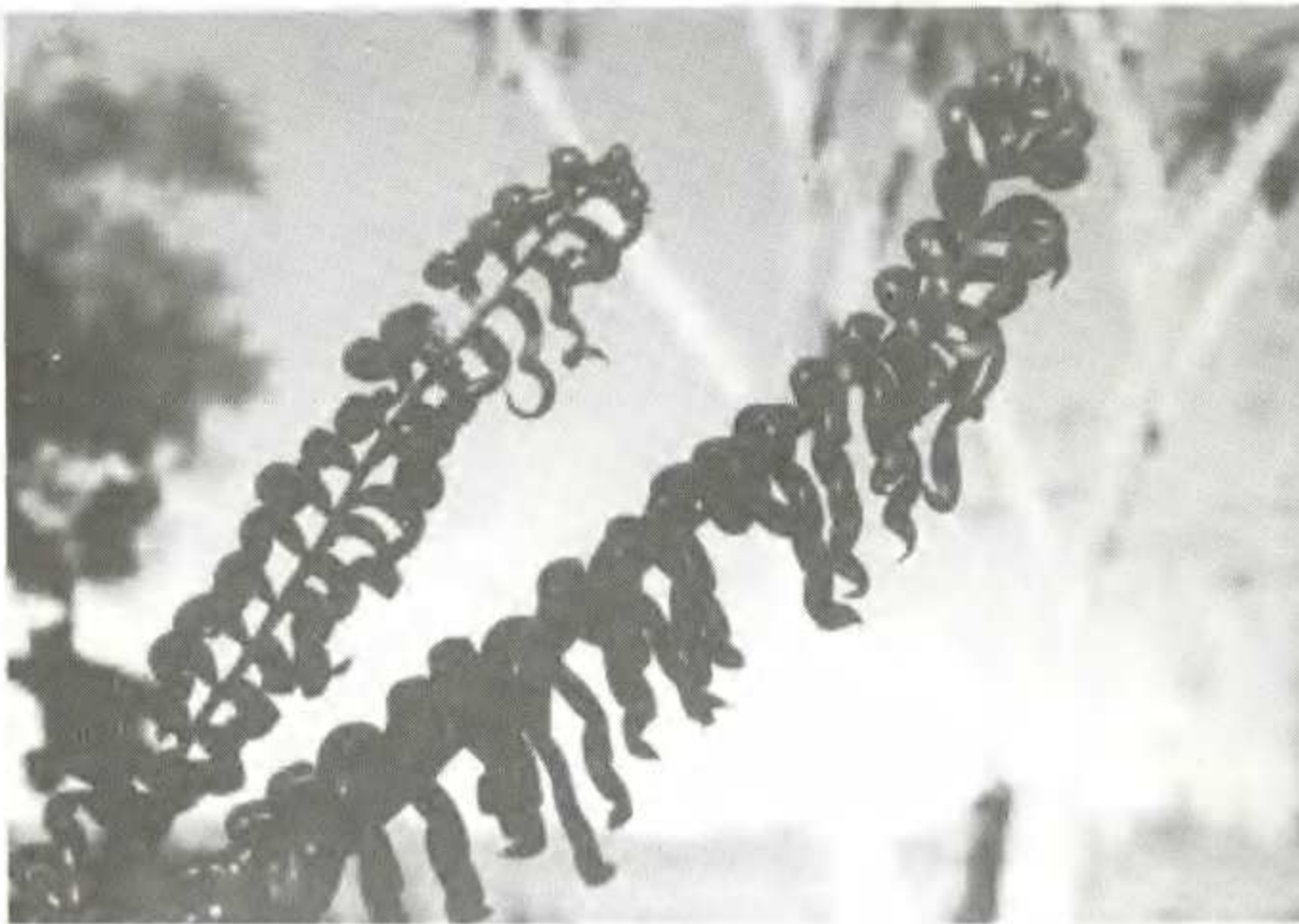


Fig. 2 : The loosely-coiled "ringlet effect" on a plant of *E. natalensis* grown from seed by Cynthia Giddy.



Fig. 3 : Curved leaflet margins of *E. natalensis* give a "spoon-shaped" appearance to these leaves. A plant in Cynthia Giddy's collection.



Fig. 4 : The fasciated trunk of *Cycas revoluta* of the form known as var *cristata*. This specimen was photographed in Lotusland Garden (California) by Douglas Atwater.

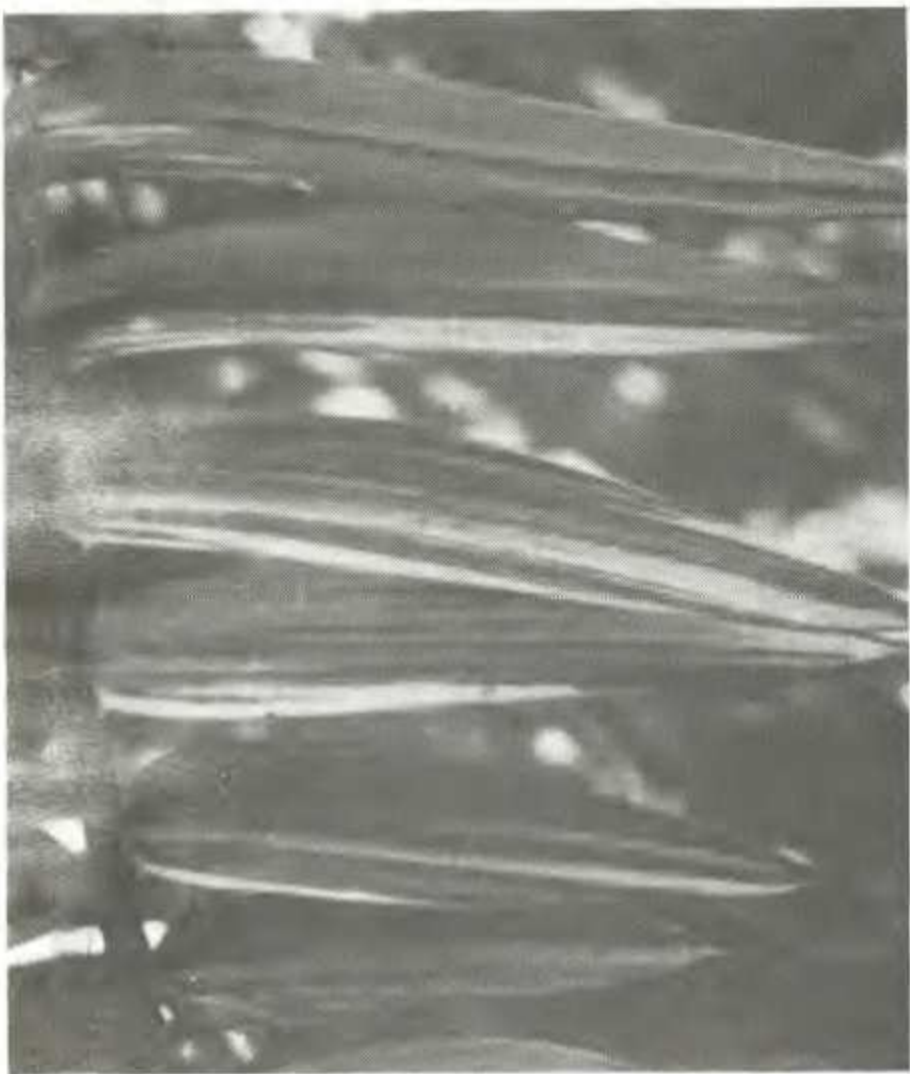


Fig. 5 : Variegated leaflets of *E. natalensis*. Photographed in a California garden by Douglas Atwater.



Fig. 6 : Variegated leaflets of *E. manikensis*. A plant in Ita van der Walt's Pretoria garden.

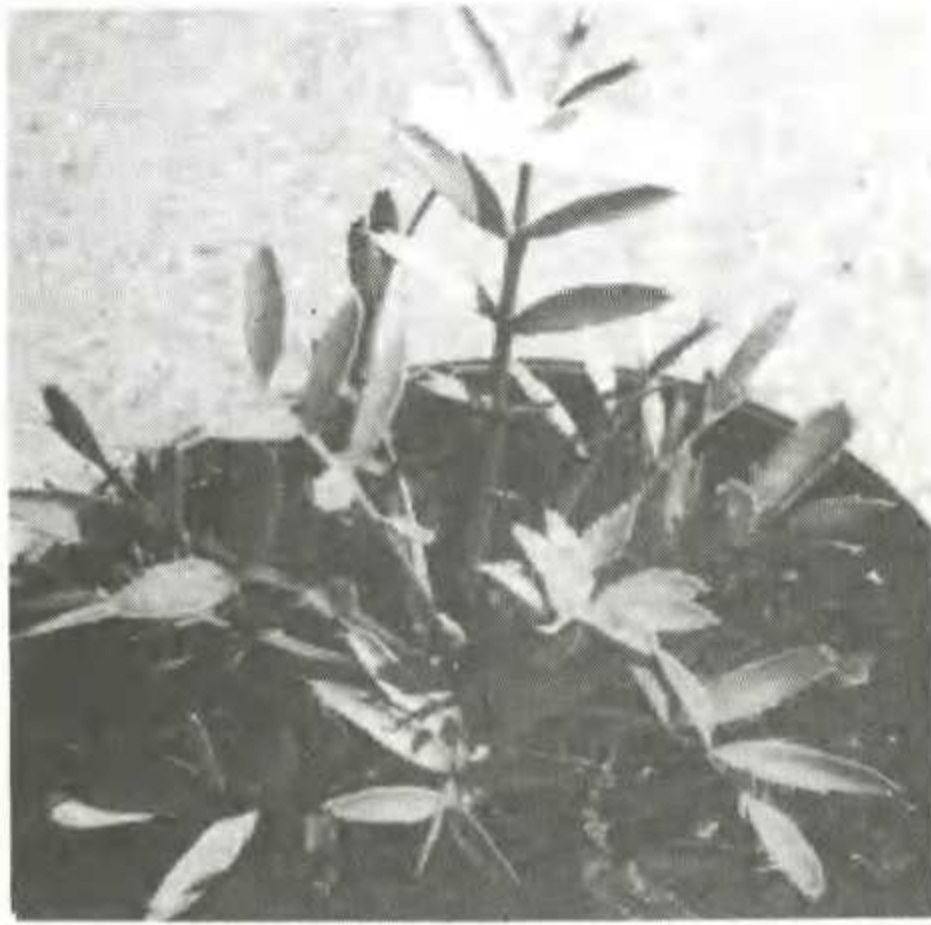


Fig. 7 : A "miniature" of *E. altensteinii*. Photo by Cynthia Giddy. (Tag = 5cm).



Fig. 9 : A dwarf specimen of *E. natalensis* from Cynthia Giddy's collection.



Fig. 8 : A dwarf version of *E. lebomboensis*. (Tag. = 5cm). Photo by Cynthia Giddy.

The plants in Figs. 7-10 have had the identical cultural conditions to "normal" seedlings which have leaves 60-75cm long.



Fig. 10 : A miniature plant of *E. princeps* in Cynthia Giddy's collection.



Fig. 11 : A dwarf form of *E. horridus*.
Photograph by Loran Whitelock.

Clearly, many of our readers may know of other cycad mutants - we would be pleased to hear from them in future issues of ENCEPHALARTOS. A question yet to be answered is what sort of progeny these mutants might produce, i.e. are these odd characters dominant or recessive in genetic terms?

ACKNOWLEDGEMENTS

I thank Cynthia Giddy, Piet Vorster, Douglas Atwater and Loran Whitelock for their assistance in preparation of this report.

FOR SALE

E. friderici Guilielmi seed @ R30.00 per 100 including postage and GST.

Delivery: June/July 1989

Apply: L Forrester
Riverside
Cathcart
5310

Tel: 04562-2003

Please advise membership officer Pieter Stroebel if you are changing your address.

SEEDBANK/SAADBANK

Die volgende saad is nou beskikbaar of verwag :-

The following seed is now available or expected :-

Encephalartos ferox, E. natalensis, E. villosus,
Macrozamia miquelii, Cycas kennedyana & C. media.

Although generally only 2-10 seed of each species are offered to members, we have sufficient stocks of E. natalensis & E. villosus (ex garden plants) to offer these to commercial growers at a price of R40.00 per 100 seed (excluding postage).

Please use the questionnaire published in ENCEPHALARTOS 15 (page 33-34) to let me know your requirements. This list gives the seed which may be donated to us or purchased by us in 1989, but note that we cannot guarantee availability. Seed will be distributed on the priority basis of (a) to seed donors and (b) on a first-come first-served basis.

Danie Nel
Seedbank Officer/Saadbankbeampte
Tel: 031-442505 after/na 17h00

Woman gets R90 000 from sale of cycads

Mrs Viva Durno, an 81-year-old Vryheid farmer and nature lover, auctioned her sizeable collection of cycad plants for nearly R90 000 and is to donate R42 000 of the proceeds to the Natal Parks Board.

Mrs Durno said: "From the time I was a little girl I have greatly loved indigenous plants. I want the Parks Board to use the money to train young people to appreciate our wonderful plants and wild animals."

Mr Stoffel de Jager, officer in charge of the Vryheid Nature Reserve, said the donation would help finance an environmental education centre at the nature reserve.

"We will put the money in a trust fund and hope that others will contribute. We are aiming for R100 000 before the end of the year and then we can start building."

Mrs Durno's collection of about 100 cycads was on a farm which she sold recently to a coal mining company. She decided to auction the plants because she did not want to start a new garden at the smallholding where she is now living near Vryheid.

The top price for one of the cycads was R6 000.

Mrs Durno said she was satisfied that her cycads had gone to good owners.

"They paid such high prices that they will naturally take great care of the plants."

New SANF director to take over in January

DR ALLAN Heydorn, one of South Africa's most respected conservationists, has been appointed as the new director of the SA Nature Foundation from January 3 1989.

He was formerly head of Marine Sciences of the National Research Institute for Oceanology at the CSIR and head of the SA Association for Marine Biology Research in Durban.

The present director, Mr Frans Stroebel, has accepted an appointment at Rupert International, after being with the SANF for eight years.

Dr Heydorn, who served on the SANF's Scientific Advisory Committee for 10 years, said:

"I am a great admirer of the philosophy and objectives of the SA Nature Foundation and look forward to contributing more actively to its work."

Dr Heydorn has helped develop a comprehensive strategy for coastal zone conservation through the Council for the Environment, as well as a pioneering series of reports on South Africa's major estuaries.

Dr Heydorn is an enthusiastic diver and surfer who also takes a keen interest in coastal flora.



DR ALLAN HEYDORN.

Reef gardens enlarged

THE Witwatersrand National Botanic Gardens have been doubled in size, up to 224,2 ha, making this South Africa's second largest botanic garden.

In this latest development, the town council of Krugersdorp recently added 120 ha, and a further 14 ha were bought by the National Botanic gardens.

During the past nine years the municipalities of Roodepoort and Krugersdorp, the National Botanic Gardens and the SA Nature Foundation have all helped to enlarge the Witwatersrand Botanic Gardens, situated between Roodepoort and Krugersdorp.

The Roodepoort city council set the project in motion in 1979 when it bought 42 ha of land to establish the garden in the Roodekranz valley.

In 1982 the National Botanic Gardens added another 6 ha when they took over the administration of the gardens.

The SA Nature Foundation granted R150 000 to increase the existing gardens by two-thirds in 1985.

The garden is a key conservation area for the bakenveld of the Transvaal highveld.

With the splendid 80-m Witpoortjie Falls as a centrepiece, the garden houses several mammal species, many indigenous plants and proudly protects a black eagle breeding pair.

The co-operation between Roodepoort, Krugersdorp, the National Botanic Gardens and the SA Nature Foundation illustrates the success a partnership can achieve in nature conservation.

Flora '88 a big success

"A TREMENDOUS success," is the unanimous opinion of the organisers and sponsors of Fleur du Cap Flora '88.

Reviewing the floral event of the year, executive organiser Di Webb ascribed the success of Fleur du Cap Flora '88 to the effort the exhibitors put into the show.

"Compared to Flora '83, this year we had a much more varied show. We had almost twice as many exhibitors and two of Cape Town's Twin Cities, Nice and Funchal, also participated."

The theme was Conservation through Education, and Eskom was awarded first prize by the Flora Conservation Committee for showing how it combats alien vegetation at Koeberg nuclear power station.

BEETLES AND POLLINATION IN
ENCEPHALARTOS ALTENSTEINII

by Mike Stobart (Rhodes University).

Sequential sampling of both male and female cones of Encephalartos altensteinii was carried out in Grahamstown from February to October, 1988. This provided an inventory of all coleopterous species occurring on the cones, and showed which, if any, species occurred regularly on both male and female cones. These species are the possible agents for pollen transfer from male to female cones. A series of trials to exclude: a) wind-borne, b) insect-borne, and c) all pollen, with a set of bare cone controls were also conducted to compare the numbers of fertile seeds produced in the presence or absence of insects.

From the sequential sampling we found nine beetle species occurring on either the male or female cones, eight of which were curculionids. Of these, four species occurred regularly on cones of both sex, and photographic evidence that pollen was transferred from male to female cones was obtained for two of the species. Contrary to popular belief, the long-snouted weevil Antliarrhinus zamiae was not one of them. The exclusion trials will continue until we can differentiate between fertile and infertile seeds.

TAILPIECE

Have you heard about the member who kept on trying to cross Encephalartos Munchii with Macrozamia Moorei?

He was hoping to get much moorei munchii.

TAILPIECE

Q. What is green,
subversive and
lives in Australia?

A. A communis plot.



Please send in curious or odd photographs to make your magazine more interesting. Can you identify the photo above? Note how the stem in a determined effort to grow has forced its way through a hole in the rocks.

THE CYCAD

The plant of wonder and mystery. A plant that has survived many centuries of myth and legend. From the time when strange, savage beasts roamed the earth, to the present age where it lives under the threat of extinction.

It is a plant that has not changed with time, but still remains in its gnarled and prehistoric form. It has witnessed the birth of man and his danger to nature, from many thousands of centuries ago when only the plants ruled the earth.

CRAIG MUNRO



(a)



(b)

Scanning electron microscope photographs ($\times 300$ magnification) of (a) the tip of the rostrum of a weevil and (b) the mouthparts of a beetle. Both insects were found inside female cones of *E. altensteinii*. The pollen grains are clearly visible on both insect structures and provide irrefutable evidence of pollen transfer by insects.

OFFICE-BEARERS

PRESIDENT

Roy Osborne
20 Maryvale Road/Maryvaleweg 20
3630 WESTVILLE
Tel. 031-866953

REGIONAL CHAIRMEN/STEEKSVOORSITTERS

- EASTERN CAPE/OOSKAAP

Frank Marx
20 Kurumankloof/Kurumankloof 20
Summerstrand
6001 PORT ELIZABETH
Tel. 041-532870

- NATAL

Danie Nel
120 Bowker Road/Bowkerweg 120
4093 ESCOMBE
Tel. 031-442505

- NORTH-EASTERN TRANSVAAL/ NOORDOOS-TRANSVAAL

John Burchmore
P.O. Box/Posbus 1335
0700 PIETERSBURG

- EUGENE MARAIS

Stef Schoeman
95 Erich Mayer Street/Erich
Mayerstraat 95
0182 PRETORIA NORTH/-NOORD
Tel. 012-552082

MEMBERSHIP OFFICER/LIDMAATSKAPBEAMPTE

Pieter Stroebel
P.O. Box/Posbus 189
6000 PORT ELIZABETH
Tel. 041-661816

SEED BANK OFFICER/SAADBANKBEAMPTE

Danie Nel
120 Bowker Road/Bowkerweg 120
4093 ESCOMBE
Tel. 031-442505

AMPSDRAERS

POLLEN EXCHANGE OFFICER/ STUIFMEELRUILBEAMPTE

Cynthia Giddy
P.O. Umlass Road/Pk. Umlaasweg
3730
Tel. 03325-478

ENCEPHALARTOS

- EDITORS/REDAKTEURS

Neil Munro/Bunny Wentzel
P.O. Box/Posbus 89101
2106 LYNDHURST

- PRINTING AND DISPATCH OFFICER/ DRUKWERK- EN VERSENDINGSBEAMPTE

Piet Vorster
Department of Botany/
Departement Plantkunde
University of Stellenbosch/
Universiteit Stellenbosch
7600 STELLENBOSCH
Tel. 02231-78909

- BACK COPIES OFFICER/ VORIGE UITGAWES-BEAMPTE

Roy Shooter
16 Benjamin Road/Benjaminweg 16
Fynnlans
4052 DURBAN
Tel. 031-4662002

OVERSEAS CORRESPONDENTS/ OORSESE VERTEENWOORDIGERS

- U.S.A./CANADA

Douglas Atwater
P.O. Box 3524
San Louis Obispo
CALIFORNIA 93403
Tel. 805-5431902(W)

- AUSTRALIA

Paul Kennedy
21 Sierra Road
Engadine
N.S.W. 2233

- NEW ZEALAND

Keith Boyer
70 Opanuku Road
RDI Henderson Valley
AUCKLAND
Tel. 837-0394