ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTHERN AFRICA

TYDSKRIF VAN DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA

NO. 26

JUNE/JUNIE 1991

ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTHERN AFRICA

TYDSKRIF VAN DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA

NO. 26

JUNE/JUNIE 1991

EDITOR/REDAKTEUR

NEIL MUNRO
P.O. BOX 2373
EDENVALE
1610

VOORBLAD/COVER

A HEALTHY E.cycadifolius
GROWING IN A JOHANNESBURG GARDEN

Photo: Willie Milford.

CONTENTS-INHOUD

FROM THE PRESIDENT

After a very pleasant and stimulating seven months in Taiwan, I am nevertheless glad to be home once more.

In the first place, I would like to thank Piet Vorster most sincerely for the hard work he put in on my behalf during my absence. It is most unfortunate that the printing of Encephalartos caused such a grave problem during this period. I can only hope that those members that discontinued their membership of the Society because of the delayed appearance of numbers 24 and 25, will reconsider their decision.

During my absence, Cynthia Giddy also resigned as Pollen Exchange Officer. Cynthia undertook this valuable work for the Society for many years. She also served on our Executive Committee for years and regularly contributed to the discussions. I would like to thank Cynthia for her contributions and hope that she will continue to share her rich cycad experiences with us.

A successor to Cynthia as Pollen Exchange Officer will probably be announced in the next issue of Encephalartos.

As usual, Danie Nel invites you to support the Seedbank whilst I would like to ask all members to encourage cycad lovers who are not members of our Society to enroll with us. By showing them a few copies of Encephalartos, half the battle should be won.

Nat. Grobbelaar

VAN DIE PRESIDENT

Na 'n baie aangename en stimulerende verblyf van sewe maande in Taiwan, is ek nogtans bly om weer tuis te wees.

Eerstens wil ek Piet Vorster van harte bedank vir al die harde werk wat hy namens my tydens my afwesigheid ingesit het. Dit is uiters jammer dat daar juis in dié tyd so 'n groot probleem met die druk van Encephalartos opgeduik het. Ek kan net hoop dat dié lede wat weens die vertraagde verskyning van nommers 24 en 25 besluit het om hul lidmaatskap van die Vereniging te staak, hul besluit in heroorweging sal neem.

Tydens my afwesigheid het Cynthia Giddy ook as Stuifmeelruilbeampte bedank. Cynthia het vir jare hierdie waardevolle werk vir die Vereniging gedoen. Sy was ook vir jare op ons Uitvoerende Komitee waar sy gereeld insette gemaak het. Ek wil Cynthia van harte bedank vir haar bydraes en die hoop uitspreek dat sy sal voortgaan om haar ryke ervaring met broodbome met ons te deel.

'n Opvolger vir Cynthia as Stuifmeelruilbeampte sal hopelik in die volgende uitgawe van Encephalartos aangekondig word.

Danie Nel nooi u soos gewoonlik uit om die Saadbank te ondersteun terwyl ek alle lede wil aanmoedig om broodboomliefhebbers wat nognie lede van ons Vereniging is nie, aan te moedig om by ons aan te sluit. Wys hulle net 'n paar uitgawes van Encephalartos en die stryd behoort half gewonne te wees.

Nat. Grobbelaar

FOCUS ON...

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:

FOKUS OP...

In elke uitgawe van ENCEPHALARTOS fokus ons op een Suider-Afrikaanse broodboomspesies, in die vorm van 'n in-diepte-artikel in leketaal. In hierdie uitgawe val die kollig op:

ENCEPHALARTOS CYCADIFOLIUS

by Maans Kemp

PLANTS IN HABITAT PHOTOGRAPHED BY MAANS KEMP.

INTRODUCTION

Encephalartos cycadifolius is one of those cycad species often referred to in negative terms : not very attractive, no outstanding features, not a tall species, yet those fortunate enough to have climbed to those elevated habitats of this unassuming Eastern Cape cycad, with its feathery, twisted leaves, would agree that there are few species of cycad which seem so much part of its habitat and so well adapted to the environment in which it grows. It is partly because of this close attachment to its natural habitat that E.cycadifolius is today, almost two centuries after its discovery and description, still one of the least known and least spoken about South African cycad species.

DISCOVERY AND CLASSIFICATION

One small plant of E. cycadifolius and one female cone were collected in the Eastern Cape by the Viennese collector-gardener, Georgius Scholl, before 1800. The plant, together with specimens of E. horridus and E. longifolius, was taken over land to Cape Town by Scholl, and from there by boat to Vienna in 1799, for cultivation in the Royal Garden at Schoenbrunn. Here the plant was described and illustrated in 1801 by the botanist, Jacquin, who named it Zamia cycadifolia, apparently because the leaves reminded him of those of Cycas revoluta. For the next 150 years the plant was virtually ignored in its habitat and specimens were only collected two or three times during this period, one of which was in 1895. The reason for this must be sought in the fact that the species occurs in areas away from the main roads and railways, and probably also in its inconspicuous nature.

When he created the genus Encephalartos in 1834, Lehmann transferred Jacquin's name to the new genus, and the species became Encephalartos cycadifolius. Lehmann at the same time described a new species, which he separated from E. cycadifolius, and which he called E. friderici-guilielmi. Lehmann made this decision on very limited information and over the years his decision was questioned. While authors such as Miquel (1842) and Thiselton-Dyer (1878) accepted the separation of the two species, others such as A. De Candolle (1868), Hutchinson and Rattray (1933) and Henderson (1945) rejected it. The authors supporting the latter view mostly used the name E. cycadifolius for the species we now know as E. friderici-guilielmi. Dr Inez Verdoorn also supported the latter view and introduced another complication when she described a new species in 1954, E. eximius, from specimens collected in the Bedford and Cradock districts by Dr. R. Story in April 1951. According to Dr. Verdoorn, "All efforts by interested botanists to find the species in the veld failed until 1951."

Dr Allan Dyer brought the debate to an end in 1965 when he confirmed E. cycadifolius as separate from E. friderici-guilielmi, which E. eximius had been based by Dr. Verdoorn.

DISTRIBUTION

E. cycadfolius has a restricted and narrow distribution range which includes a few areas on the Winterberg mountain range in the districts of Bedford and Cradock. After describing his visit to the Cathcart area in 1912, where he saw specimens of E. friderici-guilielmi, amongst others, Prof C.J. Chamberlain

writes about his visit to east London: "There are four cycads at East London, Stangeria, Encephalartos altensteinii, E. villosus and E. cycadifolius, all within east distance from the city. He then correctly describes the twisted leaves of the latter species as we know it today, and mentions that the "opportunity to study (these) four cycads in one locality was unusual". He also managed to "secure" one plant and a fully grown female cone. The vicinity of East London is so far removed from the habitat of E. cycadifolius in distance and nature, that one can only guess that Prof. Chamberlain's memory played him parts or that his notes got mixed up.

Plants grow on mountain sides, usually on exposed northern and eastern slopes, at altitudes of up to 1800m. Winter temperatures drop to -6 degrees C and lower, and snow and frost occur frequently. In this respect, the species share a similar habitat with other species with narrow leaflets such as E. friderici-guilielmi and E. ghellinckii. Rain falls in summer, at an average of 625 and 800mm per year. Lengthy periods of drought are not uncommon, however, plants are often hidden away in the grass and many grow inbetween rocks, which offer them shade and protection against cold, fire and porcupines.

The blackened stems of older plants attest to the occurrence of veld fires, to which the species is well adapted. There are strong indications that fire serves as a stimulus for leaf and cone development. In Bothalia, vol. 8, part 4 of 1965, Dr Dyer recounts the observations of Mr V.L. Pringle, who noticed that E. cycadifolius plants formed new leaves soon after a veld fire and were "looking better than ever before". Mr Pringle continues: There is scarcely one in hundreds which has not fruited."

1. STEM

The maximum height if the stem of E. cyadifolius is approximately 1,5m but more commonly less than 1m, with a diameter of approximately 25cm. In nature up to two thirds of the stem may be covered by soil. Numerous basal suckers are formed to create clusters of up to 10 or more stems from the same rootstock. Damage to the crown of the stem sometimes results in multi-headed stems.

2. LEAVES

The dark olive-green leaves are 60cm to 1m long, with bare petioles of 10 to 20cm long. The leaf stalk is usually slightly spiralled, giving the leaf a characteristic twist. The leaf stalks, especially the older ones, are yellow to orange in colour. The whole leaf is covered by fine white wool when young, but these are lost with age. The leaf stalks of dead leaves remain on the plant for many months and hang around the stem.

The median leaflets are 9 to 13cm long and 4 to 6mm broad. The leaflets have smooth, thickened edges and no thorns and are attached to the leaf stalk in the form of a wide V, with no or very little overlapping. The leaflets are reduced in size towards the base and the tip of the leaf.

3. CONES

One or two cones on short stalks are formed in male and female plants. The yellow cones are covered with a thick layer of greyish white hair, which becomes brown with age. In multi-stemmed plants, only one or two of the stems will form cones at the same time.

The male cone is more or less cylindrical in shape, 13 to 22cm long and 5 to 8cm in diameter. The nose of the cone scale projects only slightly. The mediam cone scales are approximately 2cm long and 1,8cm broad.

The more or less barrel-shaped female cone is 20 to 30cm long and 16 to 18cm diameter. The median cone scales are 4 to 4,5mm long and 4mm broad, with a flattened face. The seeds are orange-yellow through orange to amber-brown in colour.

AFFINITIES

E. cycadifolius is most closely related to E. friderici-guilielmi with which it has been confused in the literature for many years, and E. ghellickii. The three species share similar habitats.

It is impossible to confuse E. cycadifolius and E. friderici-guilielmi in nature, as their habitats do not overlap, the former being restricted to the Winterberg range in the districts of Bedford and Cradock, while the latter occurs in the districts of Cathcart and Queenstown and further east. Cultivated plants, and especially seedlings, may create confusion.

However, the following features distinguish the two species:

- The stems of E. friderici-guilielmi are tall and thick.

- The median leaflets of E. cycadifolius are narrower and shorter than those of E. friderici-guilielmi, which are up to 18cm long and 8mm broad.

- The leaf crown of E. cycadifolius is cup-shaped at all times, while in E. friderici-guilielmi the leaves are held at an angle of 45 degrees to the stem and drop down to a horizontal position when cones are produced.

- There is hardly any wool on the crown of E. cycadifolius at any time, while the crown of E. friderici-guilielmi has a thick wool at all times.

- E. cycadifolius produces only one or two cones at a time, while E. friderici-guilielmi can produce as many as twelve male and six female cones at a time.

The distribution range of E. cycadifolius is also far removed from that of E. ghellinckii, which occurs along the Drakensberg mountain range much further east. The following features can be used to distinguish plants in cultivation:

- E. cycadifolius has no wool on the crown, while E. ghellinckii has dense wool on the crown.

- The leaflets of E. cycadifolius are twice as broad as those of E. ghellinckii, which are only up to 4mm broad.

- The leaflet margins of E. cycadifolius are thickened while those of E. ghellinkii are rolled back.

To my knowledge, no natural or artificial hybrids involving E. cycadifolius have been reported.

CONSERVATION

E. cycadifolius is well adapted to its environment. It has turned veld fires into an advantage and it survives droughts by producing cones and leaves only when conditions are favourable. It suffers from *porcupines, which eat the female* cone scales and bite into exposed stems, and baboons, which pull out newly formed leaves and break off the cones. Despite these threats, sufficient numbers of these plants occur in its restricted habitat to ensure natural reproduction.

Numbers of plants have been removed from habitat by collectors, but the fact that it is notoriously difficult to transplant successfully has probably also made illegal collectors hesitant to run great risks to obtain plants which may die anyway. Other factors in favour of the survival of the species are that plants grown in areas not suitable for cultivation and road-building, and the fact that they grow far away from public roads.

On the negative side there is the fact that no populations fall within any protected areas such as nature reserves. As far as I know, all populations occur on privately-owned farms.

Many of these farmers are very conservation-conscious and value the presence of this interesting cycad species on their farms.

The species is classified as "vulnerable" by the Threatened Plant Unit of the International Union for the Conservation of Nature and Natural Resources and is therefore in need if stringent protection.

CULTIVATION

Mature plants of E. cycadifolius are difficult to transplant and, if they survive, up to five years may pass before they will form new leaves. Plants in cultivation also do not cone regularly. Despite these facts, there are specimens in many botanical and private gardens. Seeds germinate easily however, and seedlings grow without difficulty. They are hardy and should be planted in well drained soil. Plants require full sun *and are completely frost-hardy.*

BIBLIOGRAPHY

- Chamberlain, C.J. The Living Cycads. 1919
- Dyer, R.A. "New species and notes on type specimens of South African Encephalartos". Journal of South African Botany, vol. 31. 1965
- Dyer, R.A. "The Cycads of Southern Africa". Bothalia, vol. 8, part 4. 1965
- Dyer, R.A. and I.C. Verdoorn. "Zamiaceae". Flora of Southern Africa, vol. 1 1966
- Giddy, C. Cycads of S.A. 1974
- Goode, D. Cycads of Africa 1989
- Henderson, M.R. "Materials for a revision of the South African species of Encephalartos. Journal of South African Botany, vol. 11, 1945
- Hutchinson, J. and G. Rattray. "Cycadaceae", Flora Capensis, vol. 5, section 2, 1933
- Verdoorn, I. "Encephalartos eximius. Bothalia, vol. 6, part 2. 1954

CYCADS OF ASIA

by Divya Darshan Pant

Emeritus Professor of Botany, University of Allahabad, Allahabad, India

Abstract

This paper deals with the distribution of different species of Cycas *in various parts of Asia and adjoining regions. It is noted that some of the listed species have been regarded by a few authors as synonyms and it is pointed out that a thorough bio-taxonomic revision of all such species is necessary before such synonymy is accepted.*

Introduction

Cycads of Asia deserve our special attention since it is these cycads which led to the establishment of the Cycadales as a class of gymnosperms. The plants of this group had been taken to be palms until 1829 when Adolphe Brongniart showed that the stem structure of as Asiatic cycad, *Cycas circinalis* L., was very different from that of the palms. Similarly it was in the ovule of an Indian cycad, possibly also *Cycas circinalis*, that Griffith discovered a pollen chamber with pollen grains, the work being published posthumously in 1852. Finally, in 1896, Ikeno reported the existence of multiciliate motile sperms in the Japanese species *Cycas revoluta* Thunberg, confirming the distinctive gymnospermous character of the plants of this group.

Of the eleven genera in the Cycadales, only the genus *Cycas* occurs wild in Asia (Map 1). This paucity of genera is compensated for by the multiplicity of species over the continent. About 50 species of *Cycas* are named in the literature and about half of them and about 17 varieties and forms are reported from Asia and adjoining islands.

Species of the Indian subcontinent

Only four of the Asiatic species, viz. *Cycas beddomei* Thiselton-Dyer, *C. circinalis* L., *C. pectinata* Griffith and *C. rumphii* Miquel, are natives of India (Map 2). Of these, *C. beddomei* is confined to a small area in the Cuddappah Hills in southern India. Plants of this species are relatively small trees usually 60 - 120 cm in height (Fig. 1). Its leaves bear very narrow pinnae with recurved margins and have 1 - 3 mucilage canals on the phloem side of their midrib bundles (Pant & Nautiyal 1963, Pant 1973, Pant & Das 1990).

The three other Indian species are more widely distributed and also occur in neighbouring countries. *Cycas pectinata* is found in north-east India, Nepal, Sikkim, Bangladesh, Burma, China, Laos, Malaysia, Thailand and Vietnam. Indian trees of this species are very robust. Old trunks lack an armour of leaf bases (Fig. 2), so much so that the branched trunks of an old tree, without an apical crown of leaves and without megasporophylls or cones (Fig. 3), resembles a branched dicotyledonous tree.

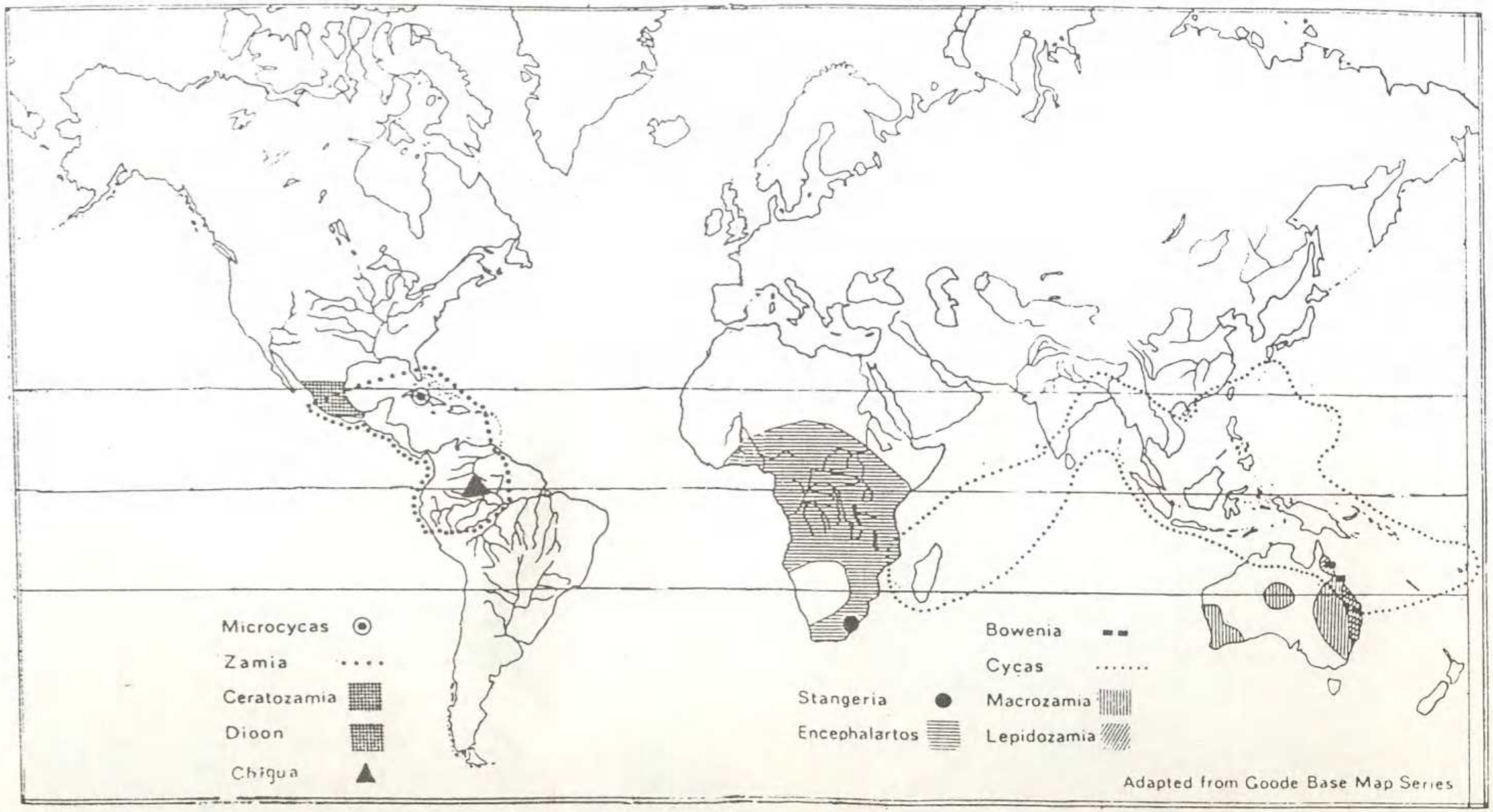
The third species, *C. circinalis* (Fig. 4A & B), is the type species for the genus. It occurs in India, Burma, Sri Lanka and Thailand. One of its varieties, var. *orixensis*, is confined to the Mals of Puri in Orissa in eastern India. A population of plants, described by Swamy (1948) from the Hassan District in Karnatak State (formerly Mysore), shows regular dichotomies of the stem where each successive fork is at right angles to the previous one (Fig. 5). These plants have other peculiarities and, although assigned to *C. circinalis* (Pant 1973), they may form a distinct variety or even a separate species.

The fourth Indian species, *C. rumphii*, is even more widely distributed in the islands of the Indian and Pacific Oceans, occurring as far as the Indian subcontinent is concerned only in the Andaman Islands and Sri Lanka. One of its subspecies or varieties, named *zeylanica* by Schuster, is possibly confined to Sri Lanka while the distribution of another, var. *bifida*, is unkown to me. A fifth species, *C. nathorstii* Schuster and is also reported confined to Sri Lanka. It is suspected to be a cross between *C. rumphii* and *C. circinalis* (Schuster 1932).

South-east Asian species

The species *C. siamensis* Miquel is peculiar among the genus in having a tuberous underground stem and a short columnar trunk. It is a native of Burma, China, Laos, Malaysia, Thailand and Vietnam. *C. inermis* Loureiro occurs in Vietnam and China.

Endemic species in Vietnam are *C. balansae* Warburg, *C. chevalieri* Leandri, *C. cochin-chinensis* Warburg ex Schuster, and *C. micholitzii* Thiselton-Dyer var. *micholitzii*. The latter variety is unusual among all species of *Cycas* in having repeated forked pinnae (Fig. 6). *C. micholitzii* is also but doubtfully listed among species occurring in Burma, China and Kampuchea. A second variety of the same species, *C. micholitzii* var. *simplicipinna* Smitinand, occurs in Laos, Thailand and also doubtfully in Vietnam. Yet another form, *C. tonkinensis* Hort., may also be from Vietnam.



Map 1: Distribution of cycad genera in the world.

Chinese species

Five endemic species of the genus, viz. *C. guizhouensis* K. Lan & R. Zhou, *C. hainanensis* C.J. Chen & C.Y. Chen, *C. panzhihuaensis* L. Zhou & S.Y. Yang, *C. szechuanensis* C. Cheng & L.K. Fu and *C. yunnanensis* as mentioned by Turner (1990), are confined to the mainland of China. A sixth species, *C. taiwaniana* Carruthers, occurs in Taiwan as well. As already mentioned, *C. micholitzii* and *C. inermis* extend their northward range into China from the countries of south-east Asia. Two more species which extend into China are the previously-mentioned Indian species *C. pectinata* and *C. rumphii*. The total number of species recorded from China is brought to ten by *C. revoluta*. Readers are referred to recent accounts of the Chinese species by Zhou *et al.* (1990) and Turner (1990).

Japanese species

The last-mentioned of the Chinese species, *C. revoluta*, is known mainly as a Japanese cycad. It is, of course, the most well-known and most widely cultivated species of the genus, if not of all cycads. It was the first cycad to come to the attention of the western world as "sotetsu", a tree providing a reserve of sago for food in times of famine. Its main wild occurrence is in the southern Japanese islands and Ryukyu. More than a dozen varieties and forms of the species have been named, viz. *binervis, robusta, planifolia, nana, cristata, diploifoliolum, corrugata, variegata, alba, aurea, hystrix, involuta* and *glabra* (Anonymous 1985).

Insular species

Four named species, *C. chamberlainii* W.H.Brown & Keinholz (also referred to as a form of *C. riuminiana* Porte), *C. hypoleuca* Presl, *C. riuminiana* Porte, *C. wadei* Merrill and a fifth unnamed species (*Cycas* sp. Foxworthy), are endemic to the Philippines.

The species which occurs widely in the islands of the Indian and Pacific Oceans, *C. rumphii*, also occurs in the East Indies. One of its varieties found in Timor Island has been named *C. rumphii* var. *timorensis* Miquel. Species which are confined to the East Indies are *C. celebica* Miquel, occurring in Sulawesi and the Celebes Islands, *C. papuana* F. Mueller from the Bismarck Archipelago, Irian Java, the Moluccas and Papua New Guinea, *C. schumanniana* Lauterbach and *C. seemanii* which both occur in the Caroline Islands, Fiji, Bismarck Archipelago and New Caledonia. In addition, *C. kennedyana* F. Mueller and *C. neocaledonica* Linden seem to extend their ranges into Australia. Ken Hill (pers. comm. via Len Butt) maintains that *C. rumphii* is also found at Australia's Cape York Peninsula in northern Queensland. If the identity and distribution of these three species is correctly reported, then they are the only species of the genus common to Asia and Australia.

Afro-Asian species

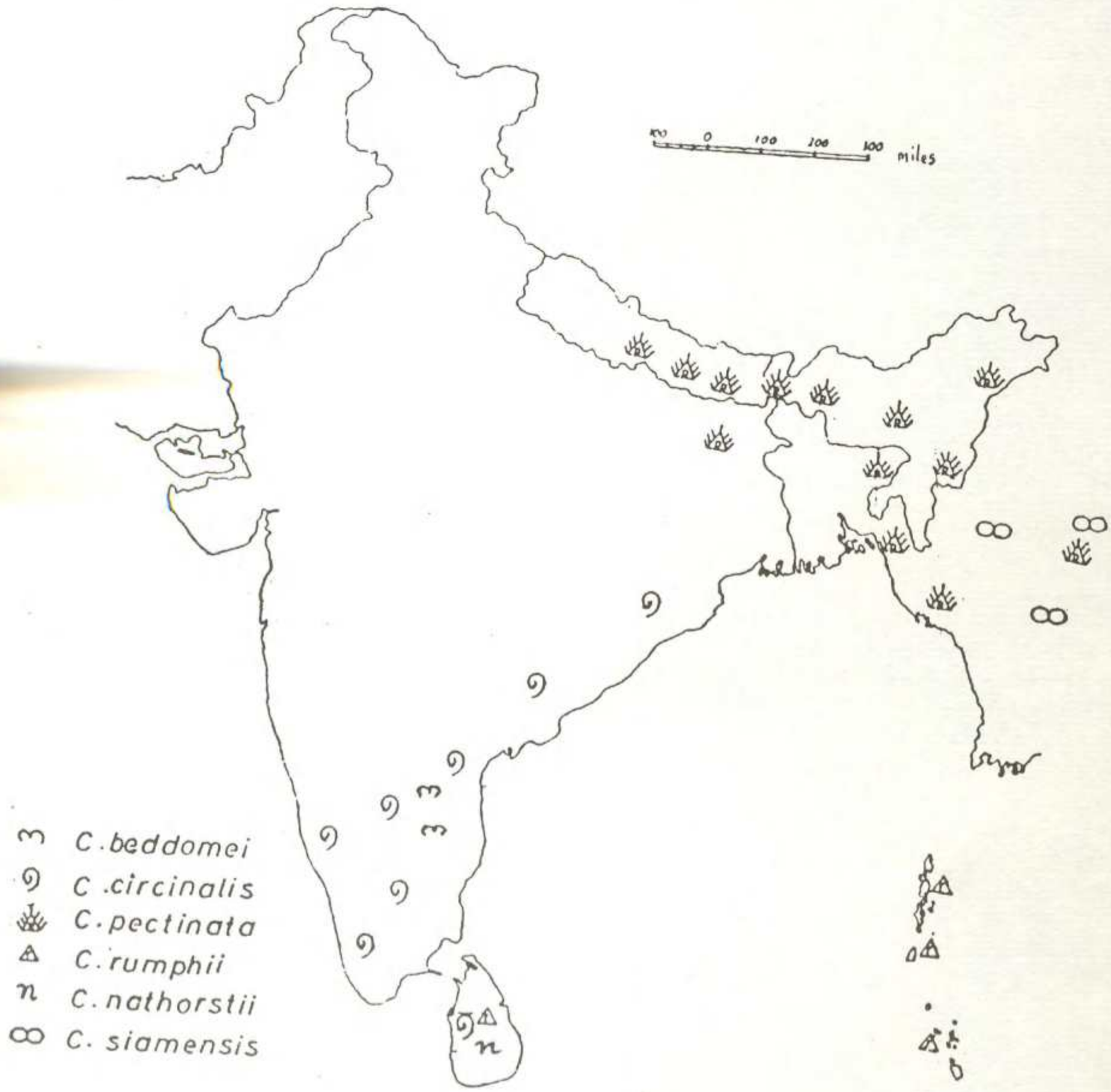
Three species of the genus extend its range westwards through the islands of the Indian Ocean to the African mainland. *C. comorensis* Bruant is found on the Comoro Islands, *C. madagascariensis* Miquel is from Madagascar and *C. thouarsii* (*thuarsii* Gaudichaud - Beaupre) R. Brown is reported from Madagascar and the African mainland along the Tanzanian coast and the Zambesi Delta. The latter species is remarkable for bearing the largest seeds of the genus, about 7 cm long by 5 cm wide.

Synonomy of Asiatic species

Many of the species mentioned above, and some others, are regarded as synonyms by various authors. For example, *C. inermis* Oudem and *C. taiwaniana* Carruthers are mentioned as synonyms of *C. revoluta* Thunberg. *C. dilatata* Griffith and *C. jenkinsoniana* have been claimed to be the same as *C. pectinata* Griffith, which is itself included by Schuster (1932) in *C. circinalis* L. *C. papuana* F. Mueller is believed by Kanehira to be a form of *C. rumphii* Miquel. *C. kennedyana* F. Mueller, *C. schumanniana* Lauterbach and *C. papuana* F. Mueller are said to be synonyms. *C. riuminiana* Regel is considered by Schuster (1932) to be a sub-species of *C. circinalis* L. and *C. chamberlainii* W.H. Brown & Keinholz is sometimes suggested to be one of its forms. Schuster's 1932 publication has indeed made fairly indiscriminate lumpings of so many taxa that he recognises only eight distinct species. In this connection it is pointed out that this author has mentioned *C. beddomei* Thiselton-Dyer as a synonym of *C. circinalis* L. but Pant & Nautiyal (1963) and Pant & Das (1990) have adduced strong evidence in favour of its being very different from that species.

Conclusions

In dealing with the nomenclature of the species of *Cycas*, it is important to point out that the taxonomy of the genus requires a thorough revision which has to be based on repeated collections of plants of different taxa from different localities and the study of their exomorphology, anatomy, cytology, chemistry and other characters. We do not even know the geographical areas and ranges of variations in many species of *Cycas*. For the present, it seems best to regard all named species as distinct (Pant 1973) unless they are shown to be identical on the basis of sound biosystematic evidence. We also need to look for new species that may have been overlooked, left unrecognised, unnamed or passed off as varieties or forms.



Map 2: Distribution of native *Cycas* species on the Indian subcontinent.

Acknowledgements

I am grateful to Dr D.K. Chauhan and my other colleagues, whom I like to mention as my students, for their kind help in writing this article.

References

Anonymous. 1985. World list of cycads. *Cycad Newsletter* 8: 8-11.

Gentil, L. 1907. Liste des Plantes cultivees dans les serres chaudes et coloniales du Jardin Botanique de l'Etat a Bruxelles / Pl. Cult. *Serres Jard. Bot. Brux.* pp 68, 194.

Pant, D.D. 1973. *Cycas* and the Cycadales. Allahabad.

Pant, D.D. & Nautiyal, D.D. 1963. Cuticular and epidermal studies of some modern cycadean leaves, sporangia and seeds. *Senck. Biol.* 44: 257-347.

Pant, D.D. & Das, K. 1990. Cuticle, epidermis and anatomy of some species of *Cycas* L. *Palms & Cycads* (in press).

Schuster, J. 1932. Cycadaceae, in *Das Pflanzenreich* 4: 1-168.

Read, R.W. & Solt, M.I. 1986. Bibliography of the living cycads (annotated). *Lyonia* 2: 33-200.

Stevenson, D.W., Osborne, R. & Hendricks, J. 1990. World list of cycads. *Mem. N.Y. Bot. Garden* 57: 200-201.

Swamy, B.G.L. 1948. Contributions to the life history of a *Cycas* from Mysore (India). *Amer. Jour. Bot.* 35: 77-88.

Turner, I. 1990. Cycads in China. *Encephalartos* 21: 11-14.

Zhou, L., Yang, S. & Zhou, Z. 1990. Investigations of a natural community of *Cycas panzhihuaensis* L. Zhou & S.Y. Yang. *Mem. N.Y. Bot. Garden* 57: 148-151.

Fig. 1: *Cycas beddomei* **in habitat in the Cuddappah Hills of southern India.**

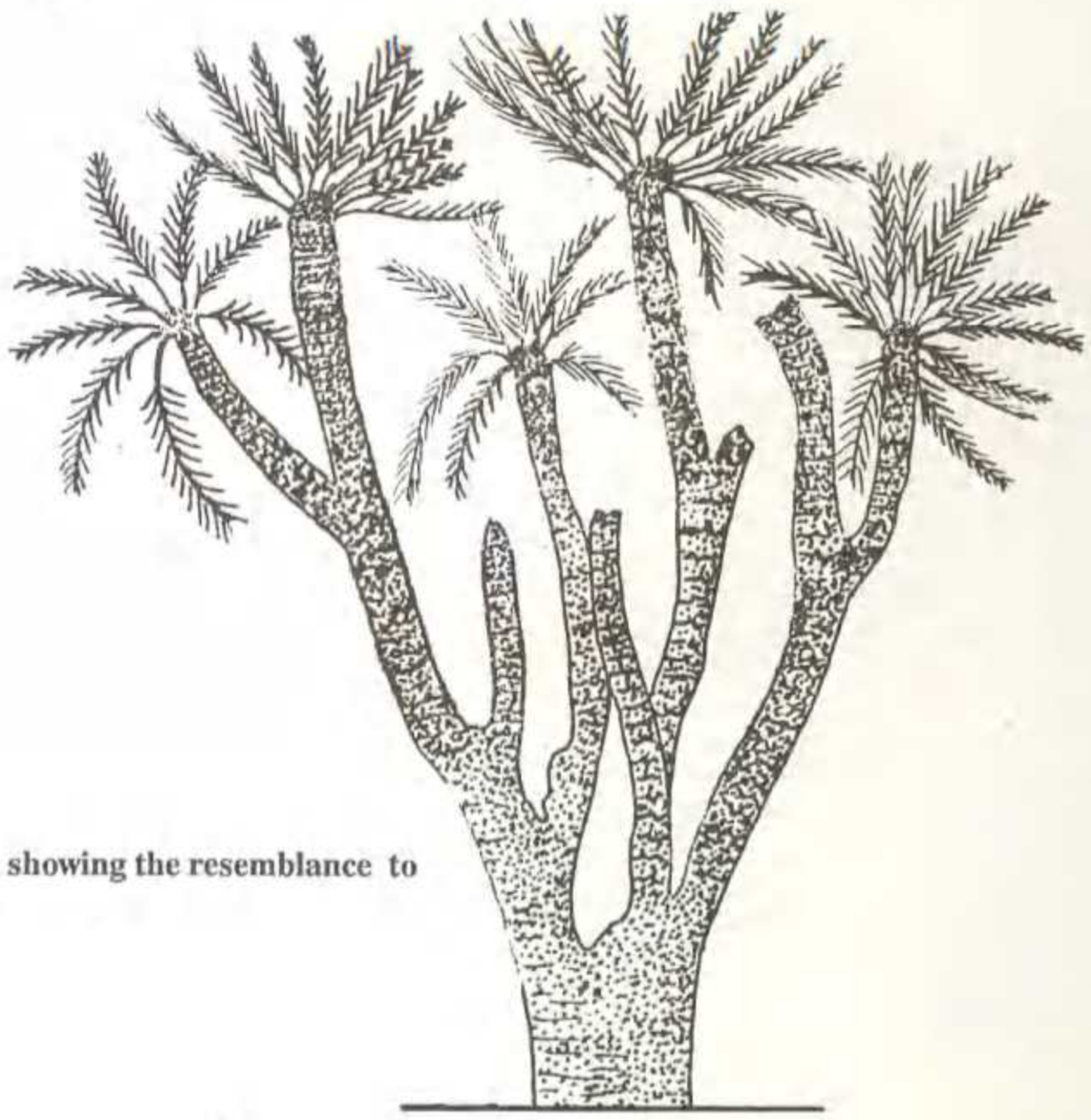


Fig. 2: A branched specimen of *Cycas pectinata*, **showing the resemblance to a dicotyledonous tree.**

Fig. 3: A male cone of *Cycas pectinata.*

Fig. 4A: Specimens of *Cycas circinalis* growing in the Alagarakoil Forest in Tamil Nadu State.

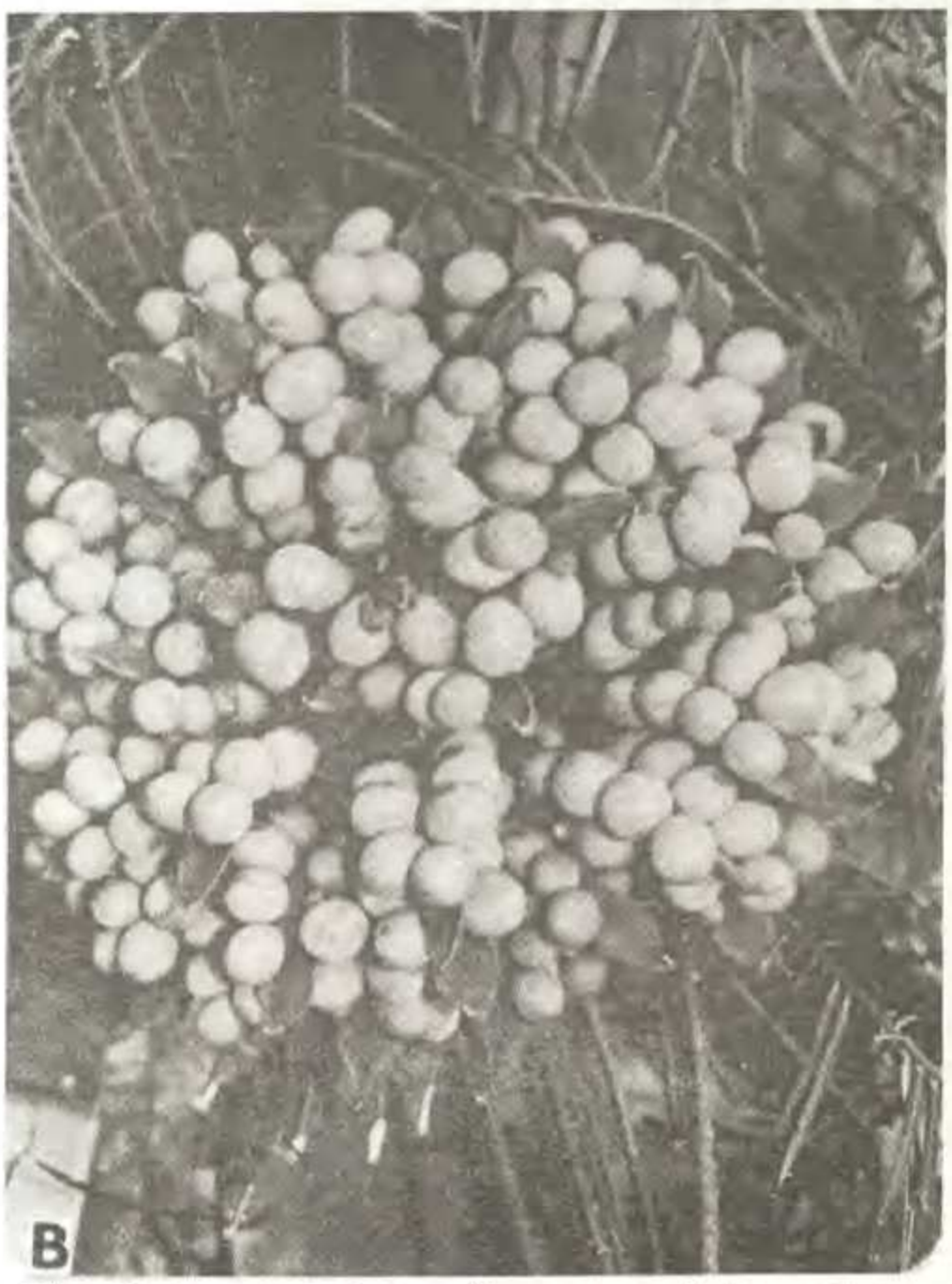


Fig. 4B: An apical cluster of megasporophylls on *Cycas circinalis* at Nagmangala in Karnataka State.

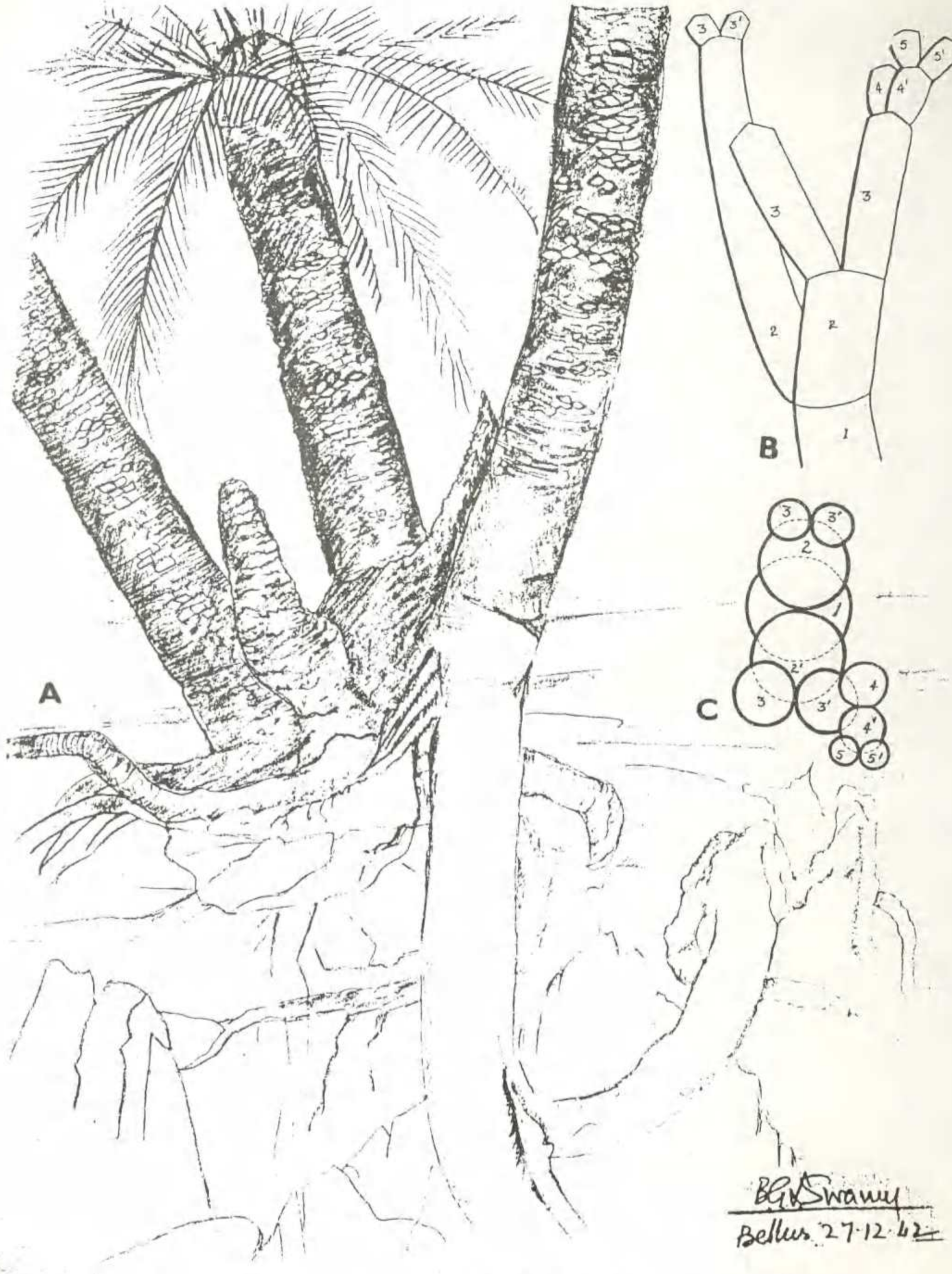


Fig. 5: **A. Branched tree of *Cycas circinalis* growing in Hassan district, Karnataka State. B. Reconstructed branching pattern of tree in A, side view. C. Same, reconstructed in top view. (Redrawn from Swamy 1948).**

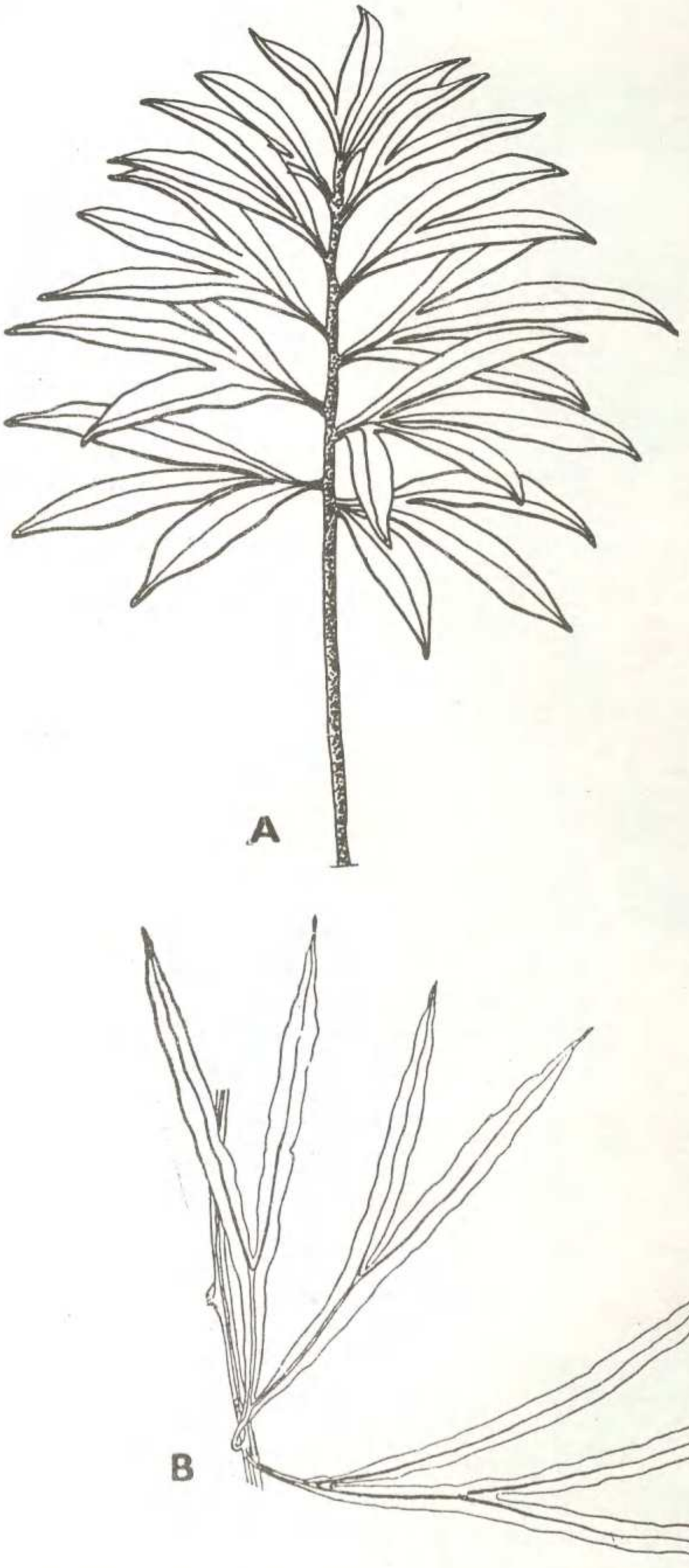
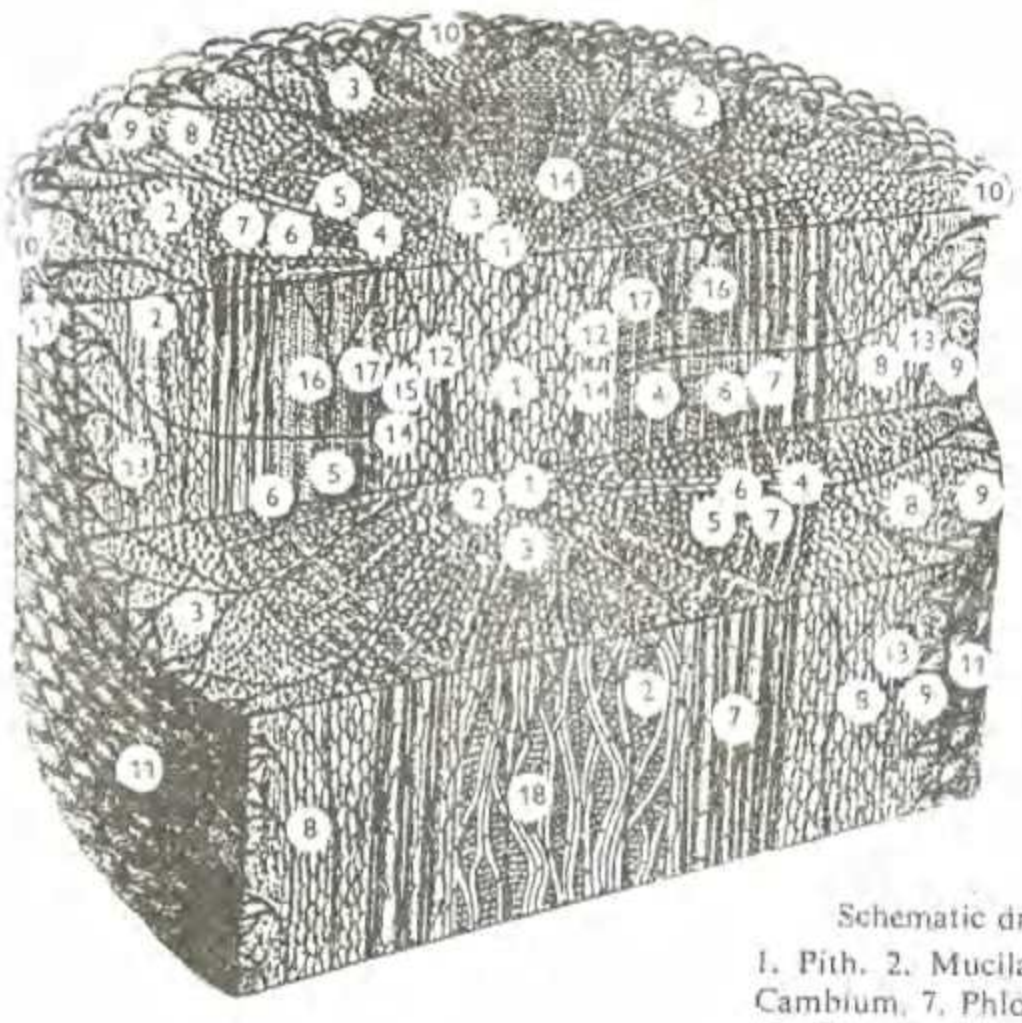


Fig. 6: Leaves of *Cycas micholitzii*. A. Forked pinnae of a seedling leaf (redrawn from a photograph by Turner). B. Portion of an adult leaf showing rachis and a repeatedly forked pinna (after Goebel, from Pant 1973).

GREGUSS, IN MEMORIAM

Our more "scientific" readers, especially those who have been involved with anatomical studies of cycad tissues, will know and revere the name of Pal Greguss (1889 - 1984), Professor of Botany of Szeged University, Budapest, Hungary. It was Greguss who, especially in the 1950's to the 1970's, did more to study the anatomy of living and fossil cycads - and other gymnosperms - than any other person before or since. We have just received a note from his son to say that he had died 7 years ago, at the age of 95, and having been working until the very last moment.

His published work (in Hungarian, German, Russian and English) was always accompanied by careful illustrations, e.g. in the schematic drawing of a *Cycas* stem in various planes from his 1968 book on xylotomy.



Schematic drawing of a *Cycas* stem in various planes of section.

1. Pith. 2. Mucilage canals. 3. Calcium oxalate druses. 4. Primary ray. 5. Xylem part. 6. Cambium. 7. Phloem part. 8. Cortex. 9. Periderm. 10. Vestiges of leaf bases. 11. Leaf scars. 12. Pith bundles. 13. The bundles in the cortex leaning out in the leaf bases. 14. The common bundles leaning out from the pith through the primary rays into the leaves. 15. Transfusion cells. 16. Tracheids with araucarioid pitting. 17. Tracheids with scalariform thickening. 18. Multiseriate rays. (Drawing by Z. Havas and P. Greguss)

Some of Greguss' publications are listed below:

1955. Xylotomische Bestimmung der heute lebenden Gymnospermen (Identification of living gymnosperms on the basis of xylotomy). Budapest. 308 pp.

1957. The leaf-epidermis of Cycadales. *Acta Biol.* 3: 151-164.

1958. Some recent data on the xylotomy of *Cycas, Zamia* and *Ginkgo*. *Acta Biol.* 4: 143-147.

1961. Cycadales and the structure of the leaf epidemis. *Acta Biol.* 7: 3-14.

1963. Determination of cycad genera as suggested by leaf epidermis structure. *Acta Biol.* 8: 59-61.

1963. The family relationships of Cycadaceae. Proceedings of the 5th Meeting of the Hungarian Biological Society. *Acta Biol.* 13 (supp. 5): 27 (abstract).

1964. Relationships of Cycadales on the basis of their xylotomy. *Acta Biol.* 10: 127-144.

1966. Transfusionsgewebe im Stumme der Cycadeen. Vorbragsauszuge des II Ungurischen Pflanzen Anatomischen Symposiums (abstract).

1966. The relationships of the Cycadales on the basis of their xylotomy, branching and leaf epidermis. *Palaeobotanist* 14: 94-101.

1968. Xylotomy of the living cycads, with a description of their leaves and epidermis. Akad. Kiado, Budapest. 260 pp, 185 pl.

1960. Transfusion tissue in the stems of cycads. *Phytomorphology* 19: 34-43.

1972. Xylotomy of the living conifers. Akad. Kiado, Budapest, pp. 23-35.

1975. Wood anatomy-xylotomy. *Acta Agron. Acad. Sci. Hung.* 24: 150-167.

IN MEMORIAM

EMBDEN PIENAAR

After experiencing poor health for a considerable period, Embden Pienaar passed away on 1991-01-12. Embden is well known to many cycad enthusiasts both within and beyond the South African borders. He has, over many years, built up a fine collection of cycads which he lovingly cared for on his smallholding on the outskirts of Pretoria and which he generously made available to local scientists for research purposes.

As one of the foundation members of the Cycad Society of Southern Africa, Embden was also actively involved in the creation of the Eugene Marais branch of the Society. In fact, Embden proposed the name for the branch which was accepted with acclamation by the members.

THE VAN ZYL COMMISSION OF ENQUIRY - PRESS RELEASE

The Minister of Planning, Provincial Affairs and National Housing, Mr Hernus Kriel, announced in December 1990 that the Administrators of the four provinces had introduced additional steps to exert better control over the export of rare fauna and flora. These steps follow the illegal export of 71 cycads to France and the 297 to Madeira in 1986 and 1988 respectively. The Commission of Enquiry, under the Chairmanship of Mr C F W van Zyl, into these exports, appointed on 17 May 1989, has found that irregularities had occurred but that the relevant officials acted in good faith and that no corruption had occurred. The Commission reported further that the Cape Province and the Transvaal, from where the cycads were exported, had not complied with the CITES regulations in that (a) no import permits were obtained from the importing countries, (b) the cycads were incorrectly described, (c) no reports or recommendations were obtained from scientific institutions in connection with the conservation status of the plants and (d) the actual exports were not monitored or controlled by scientific institutions.

In order to establish uniform legislation, policy and procedures, the Commission, among other things, made recommendations that (a) the four provinces should accept uniform legislation on conservation, (b) owner permits should be valid for an indefinite period and not the 12 months as presently the case in the Cape Province, (c) provincial administrations should select certain harbours and airports from which exports may occur to tighten control and to facilitate inspections, (d) officials who issue and sign CITES permits should receive special training and (e) strict control should be maintained on the export of wild plants and animals and foreign documents should not be accepted at face value.

Steps which had already been taken to improve control include (a) the Chief Director has personally to approve export permits for endangered flora to foreign countries, (b) in the case of sensitive applications for export permits, these will have to be referred to the Executive Committee to ensure uniformity of action, (c) the creation of a special task force to counteract illegal trade in endangered cycads and (d) the review of present policy, legislation and punitive measures in consultation with the other provinces and selfgoverning states to ensure uniform action.

Minister Kriel emphasised that the Government was committed to protecting South Africa's fauna and flora. In future strict action would be taken against officials who disregard instructions and against unscrupulous traders. The report of the Commission is being referred to the Minister of National Education and Environment Affairs for study and specifically to evaluate Mr van Zyl's recommendations concerning uniform legislation.

Prepared from a press release issued by the Directorate, Liaison and Media Services, of the Department of Planning, Provincial Affairs and National Housing, Pretoria, 11 December 1990.

THE VAN ZYL COMMISSION - CYNTHIA GIDDY COMMENTS

As a member of the Cycad Specialist Group of the IUCN Species Survival Commission, I was subpoenaed to appear before the Commission of Enquiry and to give evidence on the requirements of the Convention in International Trade in Endangered Species (CITES) regulations. It might therefore be helpful to document the relevant CITES regulations with regard to the export of Endangered Species:

1. Commercial trade in Appendix 1 plants is allowed only with respect to artificially propagated (i.e. nursery grown) material. CITES Art VII.5. The Commission therefore had to determine whether the 64 tons exported to Madeira were seedlings or mature plants.

2. Donations are only permitted between scientists or scientific institutions registered by a Management Authority. CITES Art VII.6. The Commission had to decide whether the exporters and the recipients were registered scientific institutions and whether the Botanic Gardens in question had received the plants. Non-commercial donations for research purposes are allowed. The question addressed was whether this was a donation or a commercial transaction. Botanic gardens *per se* are not exempted. Using the plants merely for public display does not rank as research. In both cases the botanic gardens were municipal gardens with no scientific affiliations.

3. An export permit shall only be granted when the Scientific authority of the state of export has advised that such export will not be detrimental to the survival of that species. CITES Art III.2a. In the case of the 696 plants exported to Madeira, the following species are so rare that their export could threaten the survival status of the species in the country of origin:

E. latifrons (31)
E. inopinus (13)
E. eugene-maraisii (26)
E. arenarius (29)

Before export permission was granted it would therefore be necessary for a scientific institution to determine their conservation status. The question was, had this been done or not?

4. The Management Authority of the State of export must be satisfied that the specimens were not obtained in contravention of the laws of that state for the protection of flora. CITES Art III.2b. This means that prior to export permits being granted, steps had to be taken to determine that all 698 plants were legally in the possession of the seller and that all documentation relating to the import and export from other provinces had to be verified.

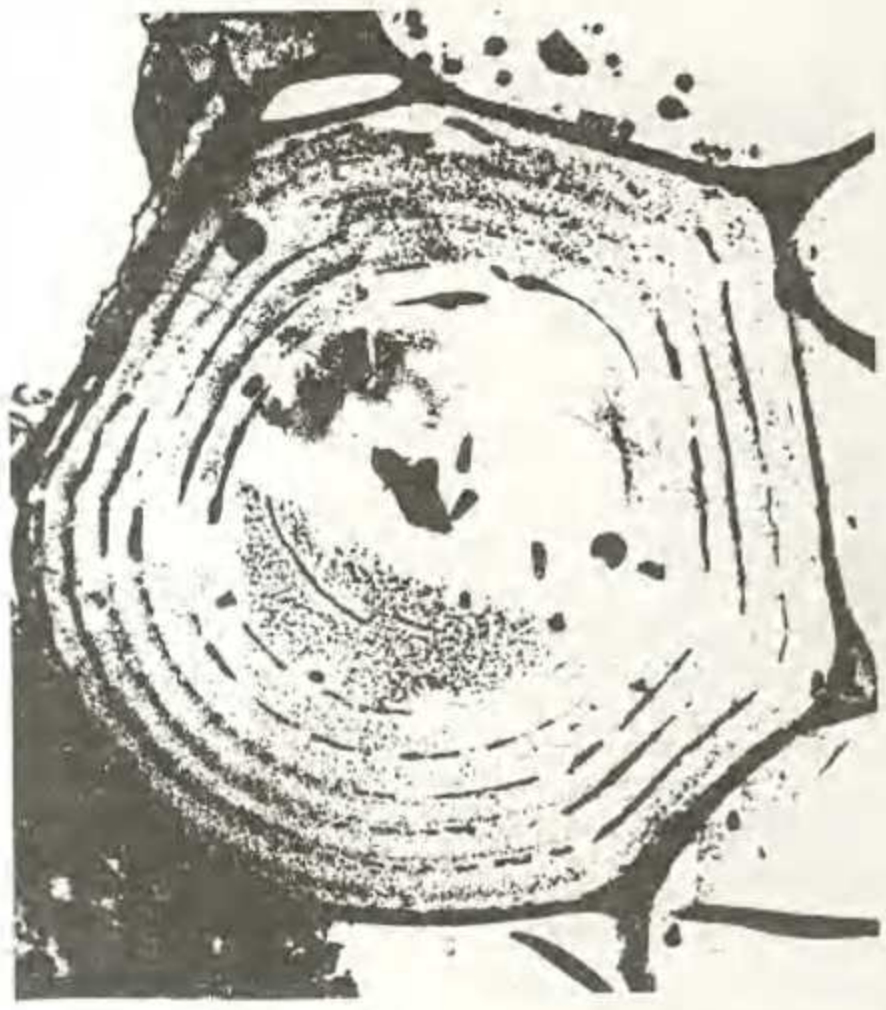
In addition to my evidence, two other members of the Cycad Specialist group of the IUCN also contributed their expertise. Dr Piet Vorster accompanied the Commission to Madeira were he made an *in situ* inspection of the plants. Dr Roy Osborne submitted written recommendations on a strategy for cycad conservation in future.

CYCAD MICROSCOPY REVEALS A WHOLE NEW WORLD

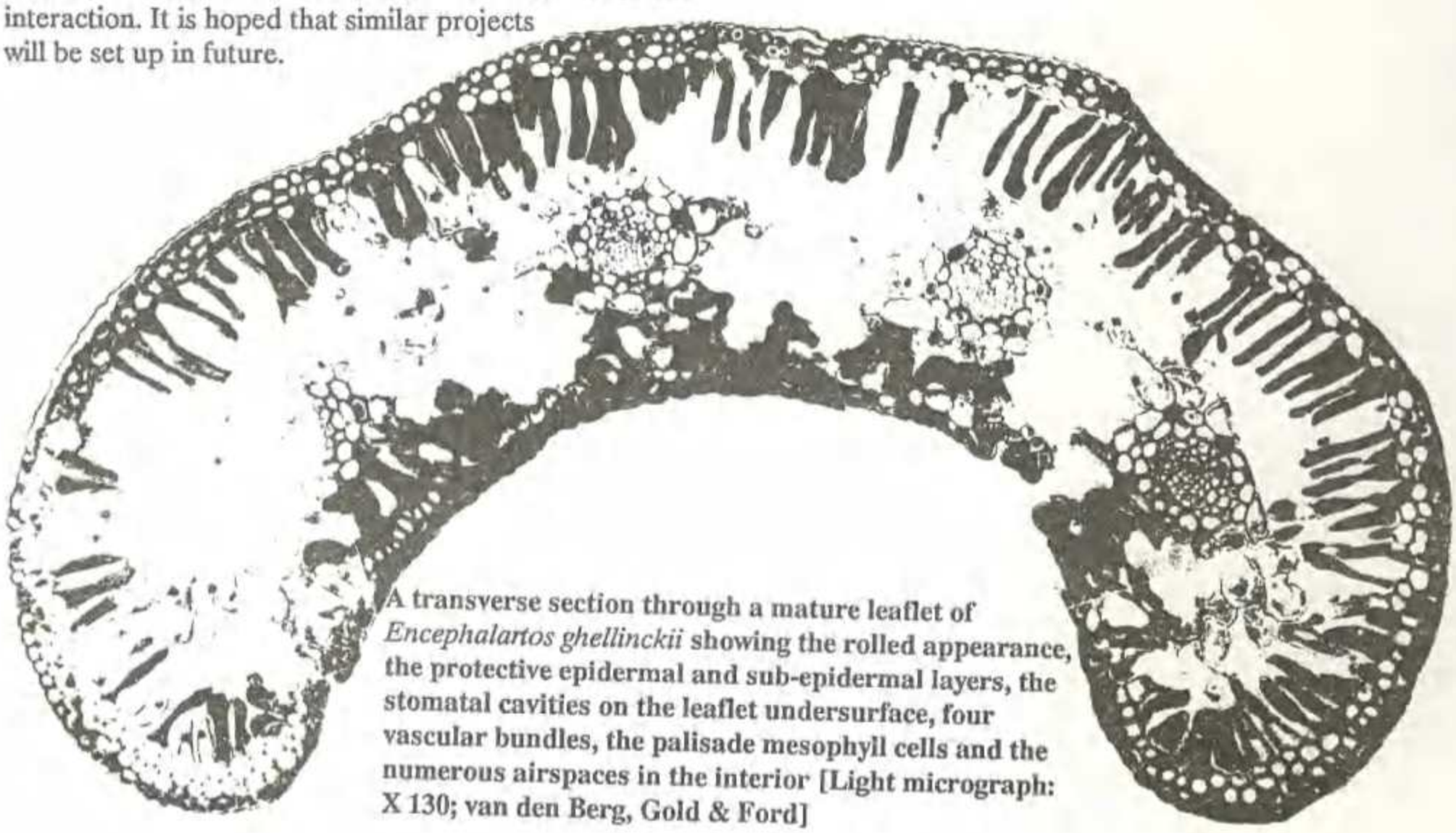
Final year biology students at the University of Natal in Durban were set a special challenge in 1990. Under the expert direction of the staff of the University's electron microscopy (EM) unit, the 31 students were allocated a species of cycad and were required to study its leaf development from emergence to maturity. Techniques used ranged from conventional bright field light microscopy with differential staining processes to sophisticated transmission and scanning electron microscopic techniques. Students were asked to prepare a report on the relation of leaf structure and ultrastructure to its function, a favourite and important brief for trainee biologists.

The work was carried out with great enthusiasm by the students who made much reference in their reports to the work of **Dennis Stevenson** and **Prof D D Pant**. A general theme emerged of juvenile leaves and leaflets which were densely pubescent but poorly differentiated in terms of cellular organisation, without many stomata and with only a thin cuticle. Various forms of leaf and leaflet unfolding were noted. As the leaves matured, the hairs were shed, the stomata took on a species-specific distribution pattern, and cellular organisation progressed in various ways. Some examples of the various micrographs accompany this text.

Commenting on the project reports, **Roy Osborne**, who provided the plant material for the investigations, congratulated the students and their supervisors, and said that this was yet another illustration of how cycad enthusiasts and scientists could co-operate to mutual benefit, in that both sides learned much from the interaction. It is hoped that similar projects will be set up in future.

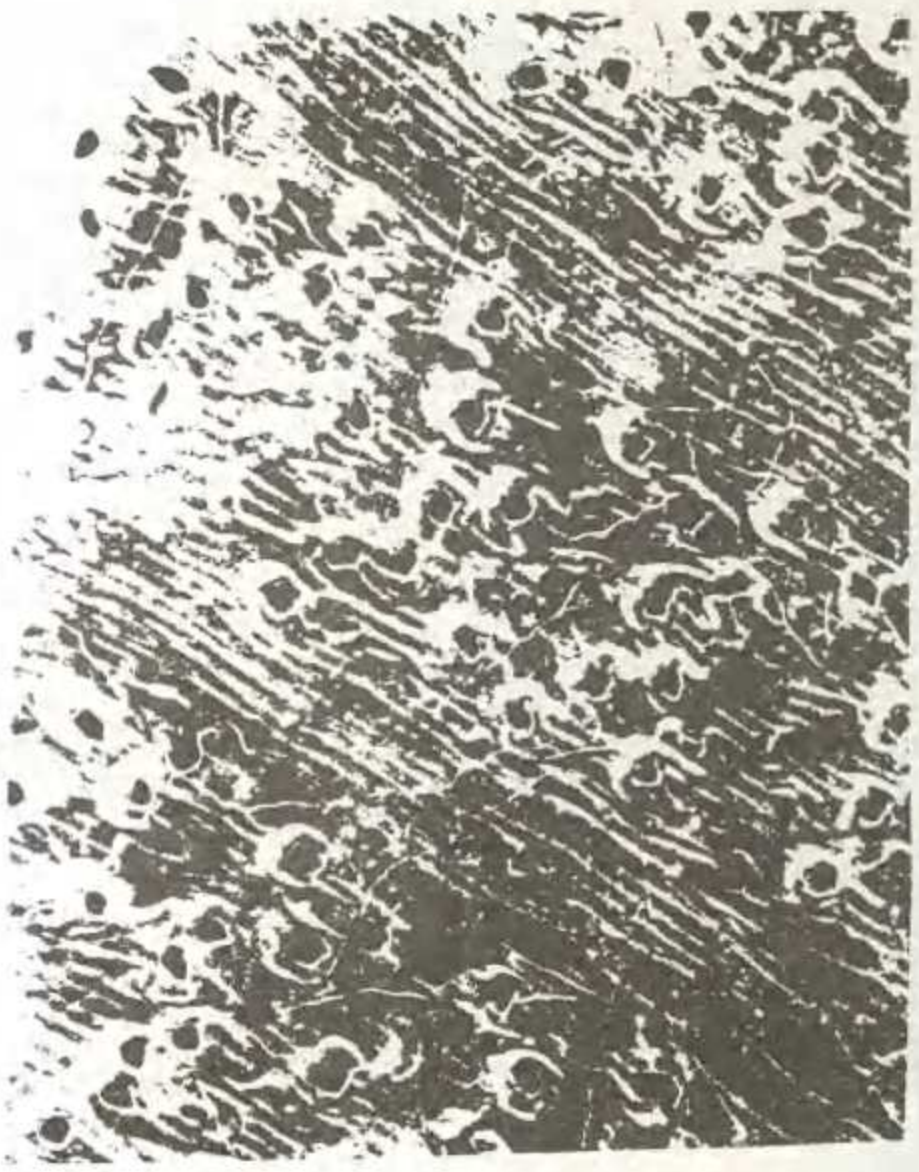


A cross section through an unusual type of fibrous cell in a mature leaflet from *Dioon edule* showing concentric layers of reinforcing material deposited against the cell walls, a structure which may explain the leaflet rigidity of this species. [Transmission electron micrograph X 2500; Gazzard, Ward & Pollock]

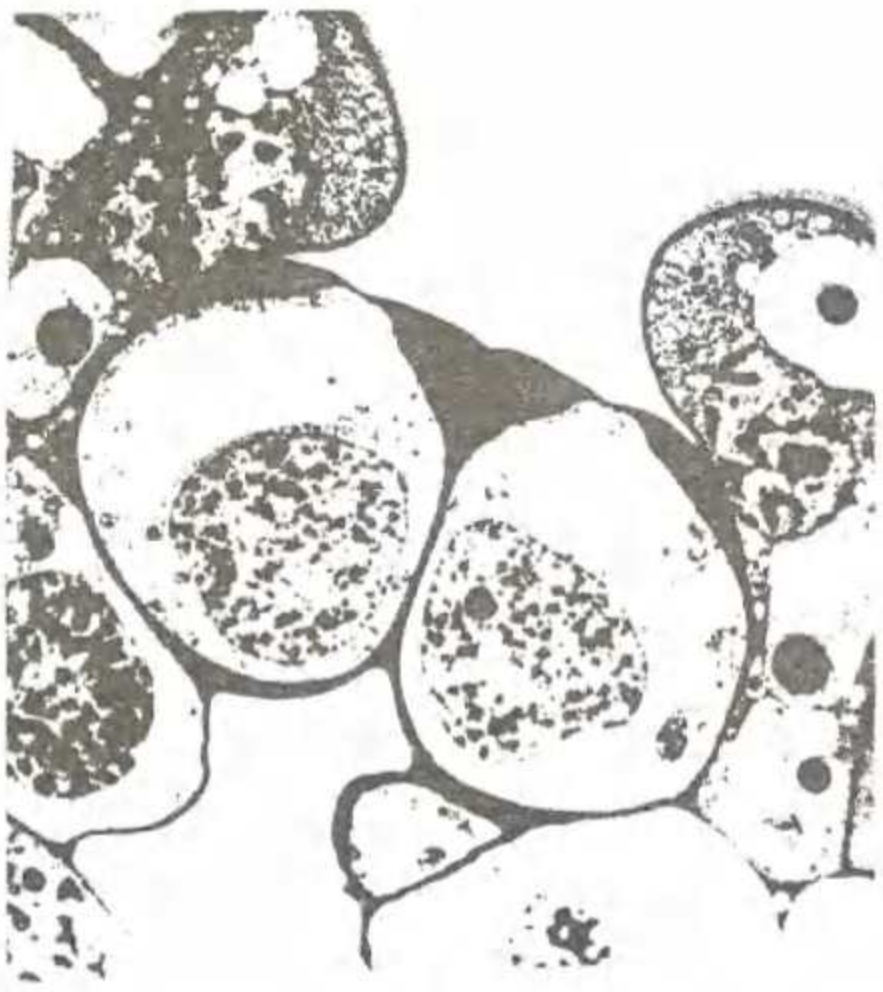


A transverse section through a mature leaflet of *Encephalartos ghellinckii* showing the rolled appearance, the protective epidermal and sub-epidermal layers, the stomatal cavities on the leaflet undersurface, four vascular bundles, the palisade mesophyll cells and the numerous airspaces in the interior [Light micrograph: X 130; van den Berg, Gold & Ford]

An unusual sideways-on view of a very young whole leaf of *Cycas taiwainiana* showing the coiled appearance, similar to that of a fern, and the dense protective covering of leaf hairs. [Scanning electron micrograph, X 90; Bartel, Farman & Ferguson].



The stomatal distribution pattern on the leaflet surface of *Dioon edule* showing also the characteristic longitudinal surface ridges. [Scanning electron micrograph, X 600; Gazzard, Ward & Pollock]



A cross section through one of the many stomata on a leaflet from *Dioon edule*. [Transmission electron micrograph: X 2000; Gazzard, Ward & Pollock]

Numerous simple two-celled epidermal hairs (trichomes) on the undersurface of an emerging leaflet of *Stangeria eriopus*. [Scanning electron micrograph: X 100; Easson, Moscrop & van Es]

SKUKUZA NURSERY
BY NEIL MUNRO

It is rather ironic that of the 33 species of Encephalartos that grow in the Republic of South Africa, none are present in the Kruger National Park.

This magnificent Park nearly 1 945 528 ha in extent 350 km from North to South and 60 km wide, would afford the now many endangered species of Encephalartos maximum protection. Well managed with regular patrols and fully fenced in it would have made the veld robbers task extremely difficult.

However an excellent nursery has been established 11 km from the main camp Skukuza where visitors can make some excellent purchases of indigenous trees and shrubs that occur in the Park as well as Cycad seedlings. When I visited the nursery in December 1990 4 species of Encephalartos were for sale namely, E. lanatus, E. lebomboensis, E. paucidentus and E. transvenosus. All were growing in plastic nursery bags and prices ranged from R12-R45 depending on size and species. According to the staff working at the nursery all the seedlings are grown from seed most of which is obtained from the Lebowa homeland, they also have an exchange system swopping E. transvenosus for E.lebomboensis.

So readers, next time you visit the Kruger National Park keep some space in the car and visit the nursery which is open from Monday to Friday (closed week-ends)

SKUKUZA NURSERY OFFICE

PHOTOS - NEIL MUNRO

INFORMATION CENTRE WHERE A WELL
ILLUSTRATED WALL CHART SHOWS
HOW CYCADS REPRODUCE

LARGE SELECTION OF SEEDLINGS
FOR SALE

GIDDY'S NURSERY

PO BOX 45
PO UMLAAS ROAD
3730 SOUTH AFRICA

CHANGE OF TELEPHONE NUMBER

Our new number from 26th January 1991 will be

0332-510473 Ted and Cynthia Giddy

DOMESTIC GROWING OF CYCADS FROM SEED TO HOUSEPLANT SIZE

by Helmut Schlegel

The cycad hobby, hardly existent in temperate climates, where private use of such plants is restricted to the house and winter garden, already has become a problem. More than one-third of known species are subject to the most severe protective regulations, and the remaining, including their seeds, are governed by the second category of restrictions. Therefore *cycad seeds are precious* in two respects: they are not only expensive but, with few exceptions, are difficult to acquire. So, not only on grounds of economical use of endangered nature, *one has to treat every individual seed* in such a way that losses are minimized, in other words, *so as if you had only this one*.

Cycads are dioecious plants. Because at most of their natural locations they exist in a small number of individuals only, vicinity of both sexes sufficient for wind- or insect-borne pollination is not always guaranteed. This *problem of reproduction*, moreover, becomes complicated by the fact that many if not all cycads may develop normal looking seeds without fertilization. Alien pollen, even from conifers, is supposed to be able to stimulate the ripening of sterile seeds. That is why one must always take into account that a few up to all pieces of a lot will not germinate, because there is no embryo.

Regrettably there is no reliable method to test the *germinative faculty* of cycad seeds. With certainty, result would be much better if one could make a floating test beforehand in order to purchase - at a special price, of course - the non-floating ones only. In the past there have been sporadic offers bearing the note "floating-tested", with the addition affirmation that both sexes were present at the site of collecting. By such a procedure, however, sometimes fertile seeds would be sorted out and discarded, as we shall see in the following way. To salvage these can only be up to the grower. He should take the risk, if he really means to deal sparingly with the treasures of endangered nature.

In consequence, first thing we do with newly purchased seeds is to put them to the *floating test*. Remnants of the fleshy seed-coat must be softened by soaking the seeds overnight and then removed carefully, because they can make a seed buoyant and, moreover, with moist storage will attract fungus. We should remember that the seeds of some *Cycas* species, e.g. *C. circinalis* and its near relatives, will float normally by means of a special air containing tissue within their shells.

To perform the test, we drop the seeds one by one into a transparent vessel with horizontal bottom. In this, they should sink quickly and come to rest with their long axis, which is nearly always definite, parallel to the bottom. Seeds resting more or less steeply with one pole only, as well as those which persistently will turn one of their long sides up, are to be classified like floating ones.

What is the *meaning of buoyancy* of a cycad seed? It can be loss of humidity of its contents, air or other gases inside it, or a combination of these causes. Mostly, floating seeds are dead, more or less mouldy or simply dried up. Such "kernels", botanically spoken the endosperm (fig. 1), should not be discarded. We cut it lengthwise, in order to see whether and embryo (fig.) was present. This can give us valuable hints about the germinative chances of non-floating pieces of the batch.

If the endosperm of a floating seed appears to be normal, i.e. coloured like pale butter and firm as a kernel but not hard like wood, one should put it on sterilized sand or another medium prepared in the same way. Growers accustomed to the use of fungicides will apply them on the surface of the endosperm. The "naked" seed, however, is not as prone to fungus infection as one should think. The endosperm, normally the nutrition reserve of the embryo, beyond this has an individual existence, as one could say. Even deprived of its hard shell (fig.) it can live and sometimes grow green up to 2 or 3 years, provided that its has not been hurt. Artificial opening of seeds should therefore be done with the utmost care. A nutcracker would not be the instrument of choice. Professional growers may use a small electrical drill or circular saw. For home purposes, a kitchen knife with saw grinding will do. With *Cycas* seeds, we follow the normally marked line of spontaneous fracture which runs over the micropylar end (fig.). Other seeds are better sawed open along an "equator" marked with a lead pencil. The precaution will especially be rewarding if it reveals an already germinated embryo which could not find the normal way out, because the seed contents, essentially the endosperm, failed to develop the pressure necessary to break the shell at the provided point or line. This phenomenon occurs now and then with *Dioon*, not infrequently with *Macrozamia*, but very often with *Lepidozamia*. Many of these seeds can be salvaged if the operation takes place early enough. Even if not only the embryo germinating out of the endosperm but, moreover, the primary root breaking through its tip, has sprouted inside the still closed shell in a sometimes strange manner, artificial uncovering may result in a normally growing seedling.

A different judgement applies to a *rattling of seeds*, audible or at least sensible when shaken. Surely this is a sign of a lost contact between the shell and its contents which, nevertheless, must not be dead. Not infrequently such seeds eventually may germinate. It may be assumed that dry storage leads to a loss of water which can be restored prior to the death of embryo and endosperm. On the other hand, dead seeds may take up water, which stops rattling, even may suspend buoyancy. From this it follows for the *storage* of seeds that they should not be kept wet but only moist, more exactly spoken, after an initial watering of 24 hours they should be prevented from loosing water. Dry storage is not advisable, even for seeds originating from very dry locations! Exceptions must be allowed for the dealer who cannot arrange it otherwise. The desirable method would be to store cycad seeds upon a dry substratum but with a maximum of atmospheric humidity. The best place to this end would be a greenhouse for rainforest plants. It is up to our skill to imitate such conditions as good as possible.

One should think that such a procedure - as with other plants - will provide for the necessary germinative conditions. With cycads, the remnants of plant life bygone in a distant past, this is different. Their seeds undergo no fixed resting period, i.e. a state of latent life, in which they could survive for years or even decades. They will germinate, one could say, as soon as the embryo is fully developed. Therefore, now and then we shall encounter individuals in a newly acquired batch of seeds.

It is not impossible, nevertheless, that cycads, too, are subject to *influences hampering germination*. Assumedly, the fleshy outer seed coat may contain agents acting along this line; that is why it should be removed as soon as possible. Further causes of germinative drawback may be dry storage and/or low temperatures. To guarantee best conditions prior to germination, seeds should be stores at 20-30 deg C in a container (preferably transparent) or other surrounding which prevents desiccation completely. It should never be forgotten, however, that their "internal clock" cannot be influenced.

How to proceed with stored seeds? The one initial floating test on arrival of seeds will not do; we should repeat it in weekly intervals, especially with batches containing first germinations. Initially non-floating seeds which become buoyant during storage must be opened immediately. As stated above, the cause could be intraseminal germination with a failure of spontaneous opening of the shell, a condition which calls for "obstetrics". Much oftener the seed content will be dead and more or less decayed. A longitudinal cut through the endosperm in most cases will disclose whether or not a degenerated embryo or even none at all has been present. Unfertilized seeds, however, may take more than one year until they show their condition by becoming floaters. Further signs of decayed contents are a development of a foetid smell or loss of weight in moistly stored seeds.

Seeds floating from the start and all the time afterwards, which nevertheless, will germinate seemingly only occur in *Zamia* species. This may depend on their small size; the ratio between the specifically lighter shell and its contents may be higher than with large seeds. Therefore, some weeks of patience are recommended with floating *Zamia* seeds, the more so as there seems to be no intraseminal germination in this genus.

The repeated floating tests will show, too, whether or not the prepared openings of the seeds remain closed (lengthwise as with walnuts in *Cycas* or star-shaped at the micropylar pole in the other genera). If the germ does not show within a fortnight following a spontaneous opening of the seed, one should assist! In such cases the micropylar region of the endosperm must be laid open.

The particular mode of spontaneous opening of *Cycas* seeds, i.e. lengthwise including the micropylar pole, is no reliable sign of imminent germination. If it occurs in a non-fertilized seed it results solely from an increased volume of the endosperm which, as mentioned above, can lead to an individual existence. Of the same meaning are longitudinal cracks of the shell of *Zamia* seeds, the micropyle of which is still closed; this does not hold for such cracks starting from a micropyle burst open spontaneously beforehand. Open seeds, which do not germinate forthwith, should be kept in a moist and warm surrounding. With such precious objects it makes sense to hope for a miracle now and then!

Apart from the longitudinal opening (family Cycadaceae) and the bursting open of the micropylar region, resulting in a little crown of crenations around it (Zamiaceae), there exists a third mode, i.e. the lifting off of a little round operculum, which results in a neat hole at the micropylar site in *Stangeria*. With this family, too, lengthwise bursting open of the shall - irregular, as no preformed opening exists - represents no normal mechanism preceding germination but solely an autonomous manifestation of life of the endosperm.

Normal germination in the living genera of cycads, which represent a medley of more or less accidental remains of an order once dominating world-wide, has just as much variants. All have in common, that the embryo will break forth of the micropylar end of the endosperm (fig.). First thing to show will be the radicle-pole of the embryo which - in a horizontal position of the seed - will curve in a right angle towards the surface of the substratum. Being evident by now is not yet a primary root, the tip of the embryo with the lowermost part of the cotyledons, recognizable by the cleavage between them. Out of this "radicle pole" of the embryo the radicula, the true primary root, will break forth; and afterwards the primary shoot will emerge out of the cleft between the cotyledons (fig.).

There are considerable variations in the intervals between all of these events, not only between the genera and species, but between the specimens of a batch of identical seeds as well. The cycad grower should be armed with the patience of Job! Again and again it will occur, that single seedlings of a series, for obscure reasons, will, pause for weeks or even months between the steps of the germination process. This must be accepted as a peculiarity in plants which are "peculiar" in all respects.

On the contrary we can experience the uninterrupted germination of seeds in a few days following the storage under "germination conditions", *just as is the rule with many "modern" plants. More* frequently, one has to wait weeks or months until germination will start in rapid succession. In both cases one can assume that the seeds in question were fertilized at the same time, perhaps in one and the same cone. For certain, there will be batches of seeds from mixed origin, and this would explain why the individuals germinate at more or less great intervals. With regards to the quality of the seedlings, however, remarkable retardations of development in the long run seem to be detrimental. These are, it must be stressed, experiences based on domestic growing of cycads. Imported plants, brought up under habitat conditions in subtropical countries by commercial growers, will develop faster, provided that the difficulties of acclimatization, which are sometimes considerable, have been overcome. At any rate the most problematic ones in a cycad collection are represented by the won seedlings which did not develop normally and/or with artificial assistance.

Substrata best suited for the rearing of seedlings are Vermiculite or Perlite, out of which the transfer to hydroponic cultivation, too, will take place without problems. Conventional cultivation is best in a standard mix, to which we may add up to as much as 50% of sharp sand. An optimal drainage function of the substratum is essential. In no case it must cake together; therefore addition of loam, even in small proportions, is not recommendable. Besides of sand, the artificial substrata mentioned above as well as fine-grained lava are suited to loosen the soil.

Watering, more than once a week only on special conditions (much solar heat, position over a radiator), are best done from blow; wick-watering devices, too, have been proved. *Fertilizing* likewise should be done sparingly. Nearly all the cycads suited as houseplants originate from habitats with stony and/or poor soils.

The *container* should be more high than broad; with hydroponics, the ideal proportion is 15/17 cm. The space requirement of the turnip-like stem and the taproot we can never satisfy, but one should try to at least give the young plant the space it needs for the development of its subterranean organs. Later on one has to put up with the emergence of stems normally remaining underground. This will occur in such species which in the wild, too, will do so on shallow ground; it is therefore, no unnatural phenomenon.

Planting in tufts, popular with young palms, because it will give fullness, in effect the same with cycads, nevertheless is not recommendable, as the subterranean stems may clinch together inseperably. If the partners will develop differently, correction later on will prove impossible.

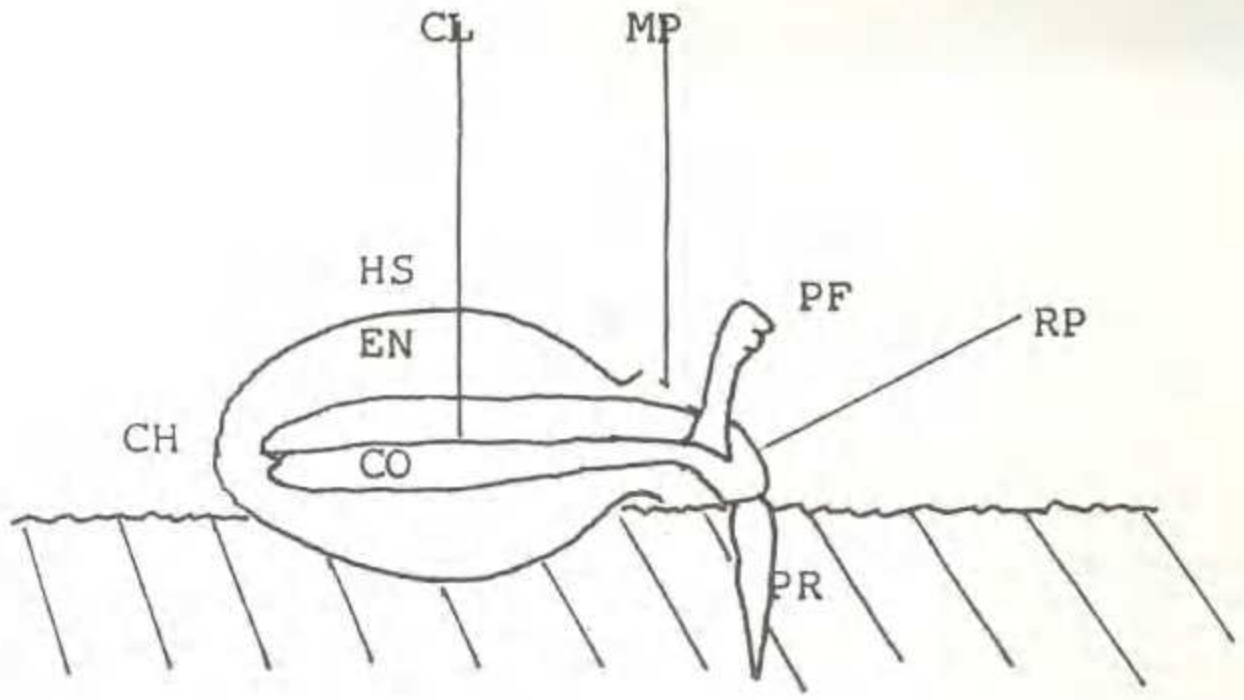
Growth of new fronds, in some species one by one, in most species, however, with advancing years in batches forming a "crown", originates out of the centre of a more or less marked bulb of cataphylls, which will appear alternating with the fronds. Sprouts are put forth the year round, during the winter months more rarely than in summer, with a marked peak in July (in Central Europe). This may, in different species, happen several times or once in a year, or even every second or third year only.

Maturation of new fronds can take months. During this time the tissue is tender and vulnerable, especially to grow deformed. Therefore they should in no cases be hampered by a window-pane, not even by a curtain. If matured, the tissue will be very firm and elastic, and therefore no longer correctable if deformed during growth. We cannot avoid this with densely growing fronds, but this corresponds to natural conditions.

Light requirements are high all-year in the glaucous species only. To prevent their turning green, one should try to satisfy them as much as possible. The naturally green species, on the other hand, are sensitive to sunburn, which leads to an ugly, rusty brown discolouration in the upper side of the leaflets. Much light as on a northern or eastern window-sill, however, is essential for a good development of new fronds in all species; a position under skylight, if feasible, is ideal for that purpose.

Pests don't figure large. Most important threat are shield-louses, particularly because their agents may cripple growing fronds and especially their leaflets. Non-toxic and therefore harmless leafshines will control them easily and persistently.

Dr Helmut Schlegel writes from Wilhelm-Haspel Strasse 30/2, Sindelfingen, West Germany.



Germinating cycad seed:

CH CHALAZA (former attachment to the cone)

HS The HARD SHELL, deprived of its fleshy coat

EN The ENDOSPERM, female tissue of the seed precursor, afterwards nutrition reservoir for the growing embryo a seedling

CO The COTYLEDONS, the part remaining within the endosperm in order to exhaust the nutritions out of it

CL The CLEFT between the (normally) two cotyledons

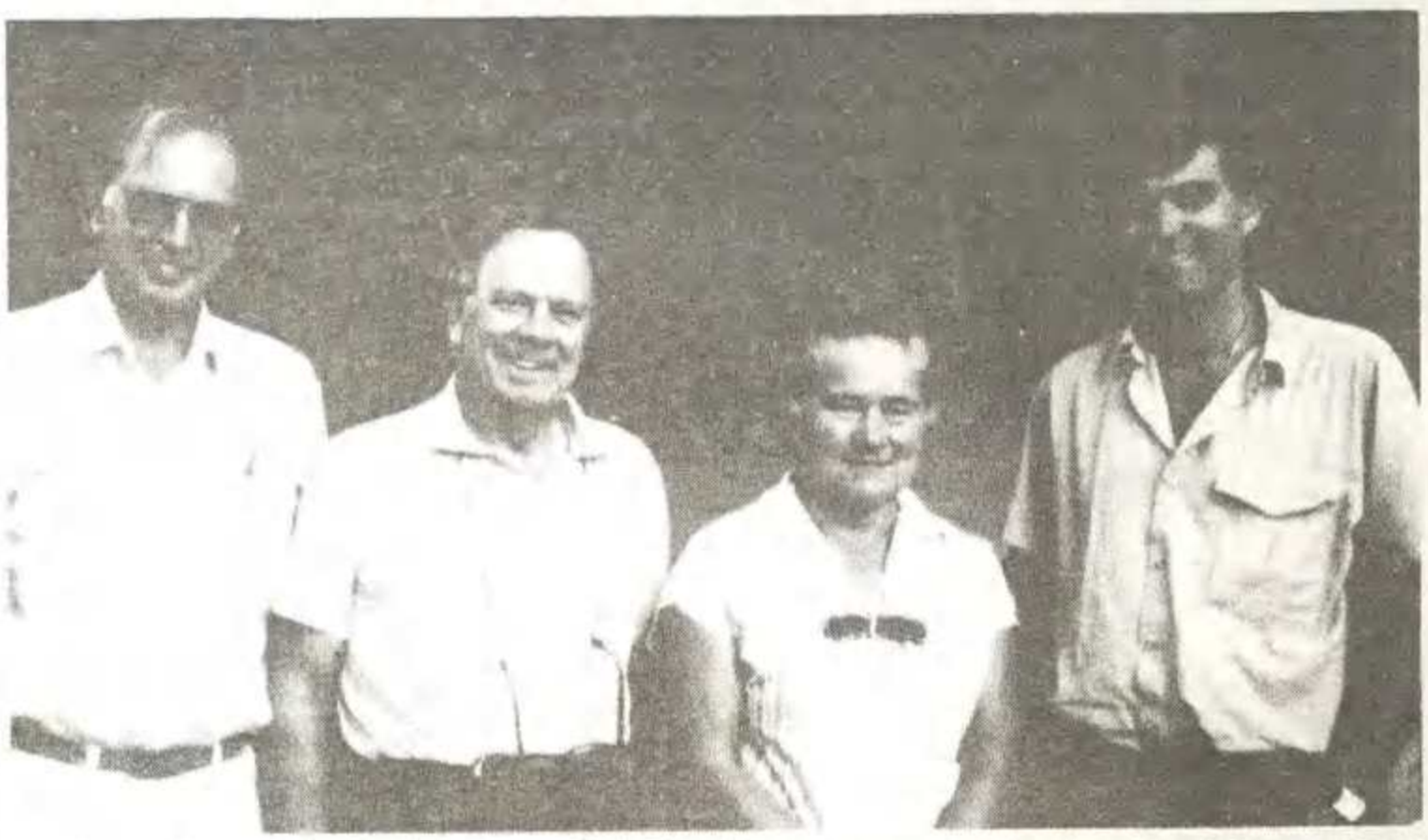
PF Sprout of PRIMARY FROND emerging out of the lowermost part of the cleft between cotyledons

RP RADICLE POLE of the embryo

PR PRIMARY ROOT (the radicula) breaking through the tip of the radicle pole of the embryo

MP Opening at the MICROPYLAR POLE of the shell

Rhodians attend cycad conference Down Under



Against all statistical odds, four Old Rhodians met in the 'outback' of Queensland, Australia in July. The occasion was the Second International Conference of Cycad Biology, attended by some 110 international cycad experts. The four Old Rhodians, Professor Nat Grobbelaar (1947), Cynthia Giddy (Theron 1952), Dr Roy Osborne (1962) and John Donaldson (1979), contributed a total of twelve lecture and poster presentations at the Conference. All are actively concerned about the present and future conservation status of cycad plants.

THE EWANRIGG BOTANICAL GARDENS OF ZIMBABWE

by Charles Chakavarika, Curator

Ewanrigg, one of Zimbabwe's National Parks and most notable for its collection of aloes and cycads, lies approximately 40 km north-east of Harare and a short distance off the main roads leading to Shamva and Nyamapanda. The garden owes its origin to the late Harold Basil Christian who, during the greater part of his time (1871-1950), devoted his energy and his boundless enthusiasm almost exclusively to its creation and development.

Harold Basil Christian was born in Port Elizabeth, South Africa, in 1871. He was the youngest son of Henry Bailey Christian DSO, a prominent farmer, merchant and race-owner of that town. Basil's grandfather first came to the Cape as a midshipman on the flagship of his uncle, Admiral Sir Hugh Christian.

The father of Harold Basil had four sons, Owen Smith, Ewan, Henry Courtney and Harold Basil, and four daughters, Ada, Maud, Hilda and Mary. The members of the Christian family who settled in South Africa and Zimbabwe were of the Cumberland branch of an old Manx family whose members had been deemsters or judges in the Isle of Man for many years. Harold Basil Christian was educated at Eton College in South Africa, where he distinguished himself as a sportsman. He also had an aptitude for science which later manifested itself when he became such an enthusiastic student of the genera *Aloe* and *Encephalartos*. Basil also saw action in the Boer War.

Until about 1910, he was apparently employed by De Beers Consolidated Mines Ltd in Kimberley and by a mining company on the Witwatersrand as an engineer. While in the service of De Beers and undoubtedly having heard of the country to the north of the Limpopo River, coupled with the fact that his first cousin Harold Henry Dunell Christian settled in Zimbabwe in 1896 and owned land near Harare since 1899, caused him to emigrate to Zimbabwe in 1911 or thereabouts.

On 18 May 1914, he purchased the farm *Mount Shannon*, 40 km from Harare, for the sum of five thousand pounds. He immediately set about developing a garden. At first, Christian concentrated on the cultivation of imported European alpines, plants which are at their best when growing at high altitudes in cool conditions and which require considerable water. Needless to say, these plants did not adapt well to the conditions in Harare.

Spacious lawns had been laid out for the provision of a suitable setting for the alpines, but one large rock interfered with the continuity of the lawn. When the surveyor engaged in landscaping the farm could not remove the large unsightly rock, he removed a clump of *Aloe cameronii* from a nearby hill and planted it close to the boulder so as "to hide the stark appearance of this unsightly rock". The following year this aloe flowered without ever having been watered, so much to the delight of Christian that he immediately abandoned the alpines and their problems and devoted his attention to aloes. It was from that humble beginning, in about 1916, that rockeries and more rockeries, were constructed and aloes and more aloes were collected or otherwise acquired.

During the latter part of his life, Christian devoted much of his attention to the collection, cultivation and propagation of cycads, particularly the genus *Encephalartos*. A very comprehensive and representative collection of the African species of these ancient and fascinating plants was created, and today large and healthy specimens of all but a few of the known African cycads may be found at Ewanrigg.

On 5 June 1948, Harold Basil Christian bequeathed "The Ewanrigg Collection" to the people of Zimbabwe. On Friday 12 May 1950, Harold Christian died at St Anne's Hospital, Harare, aged 79.

From the time of Christian's death till now, considerable development has taken place with more land having been placed under cultivation. The collections of aloes, cycads and many other succulent plants, that have been acquired and added to the original collections, have been planted with considerable care and particular attention in several cases to geographical arrangement. Ewanrigg presently houses over 200 species of *Aloe* and some 30 species of *Encephalartos*. The gardens extends over 283.4 hectares. They are open to the public throughout the year, making the need for expansion and sustenance of visitor's interest a priority. With this in view, further garden expansion is in progress and more land is being brought under cultivation incorporating several features including spacious lawns, with grouped trees and shrubs, a water garden, a herb garden and collections of cacti and of bougainvillea. The garden area under cultivation is now over 80 hectares. Ewanrigg continues to gain popularity worldwide, especially in the field of plant exchange with other institutions and numerous plant collectors.

Ewanrigg - General information:

Entrance fee: $1.00/adult, 50c/child
Opening hours: 0800 - 1800
Picnic sites: There are two picnic sites on the north side of the gardens where drinking water, firewood and toilet facilities are available. There is no provision for caravans or for camping.
Dogs: are allowed but must be kept on a leash
Address: The Curator, Ewanrigg Botanical Gardens, P O Box 8119, Causeway, Harare, Zimbabwe.
Telephone: 174-23720 (Arcturus)
Office hours: 0800 - 1700

References:
KIMBERLEY, M.J. Harold Basil Christian (1871 - 1950) of Ewanrigg (1916 - 1972).
REYNOLDS, G.W. 1950. The Aloes of South Africa.
REYNOLDS, G.W. 1966. The Aloes of Tropical Africa and Madagascar.
FOTHERGILL, R.J. 1953. The Monuments of Southern Rhodesia.

Cycad list at Ewanrigg Gardens:

1. Encephalartos species:

E. altensteinii
E. arenarius
E. caffer
E. chimanimaniensis
E. concinnus
E. cycadifolius
E. eugene-maraisii
E. ferox
E. friderici-guilielmi
E. gratus
E. hildebrandtii
E. horridus
E. humilis
E. laevifolius
E. lanatus
E. latifrons
E. lebomboensis
E. lehmannii
E. longifolius
E. manikensis
E. munchii
E. natalensis
E. ngoyanus
E. paucidentatus
E. poggei
E. princeps
E. pterogonus
E. transvenosus
E. villosus

2. Cycas species:

C. revoluta
C. thouarsii

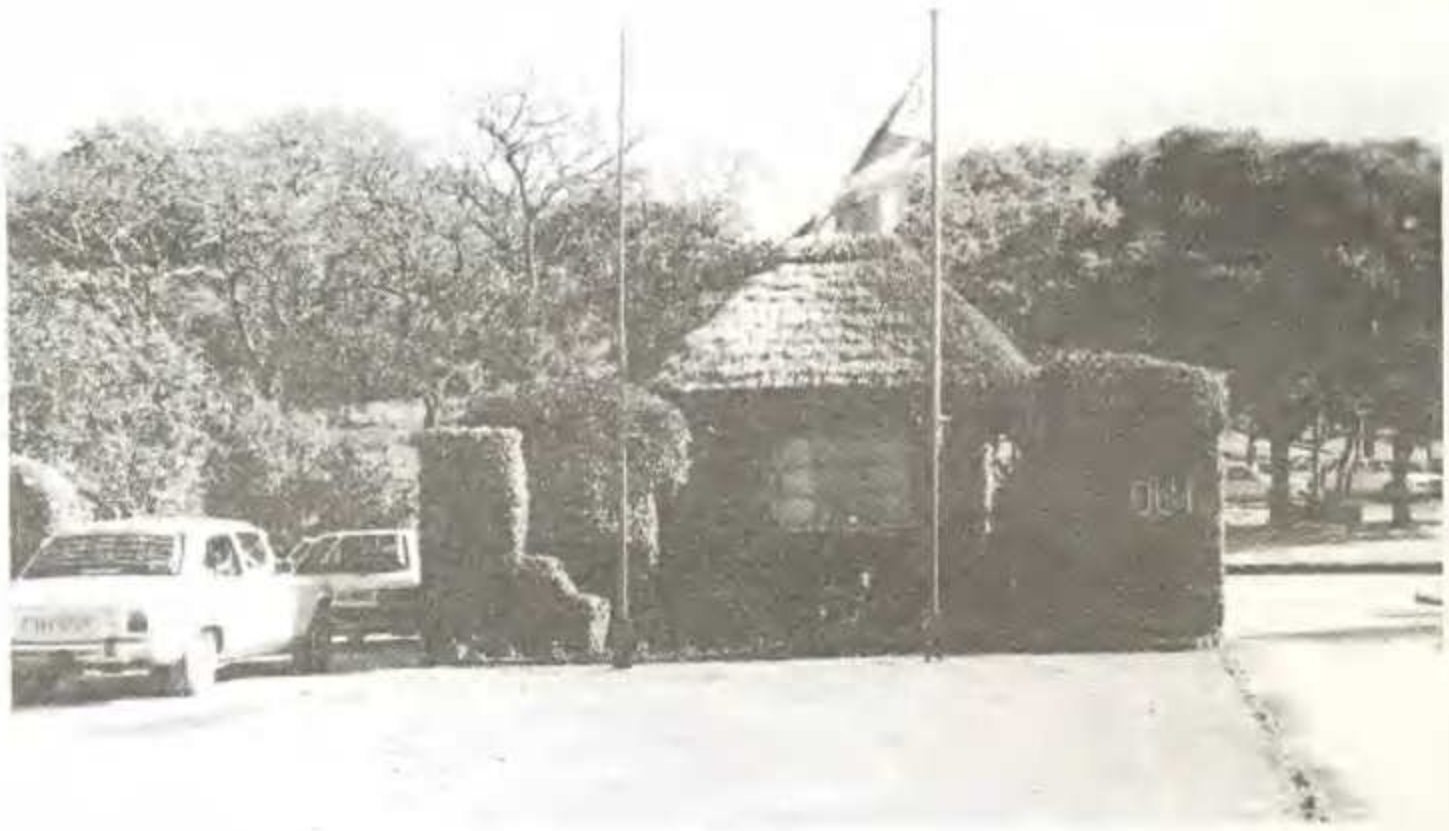
3. Macrozamia species:

M. riedlei
M. secunda
M. spiralis

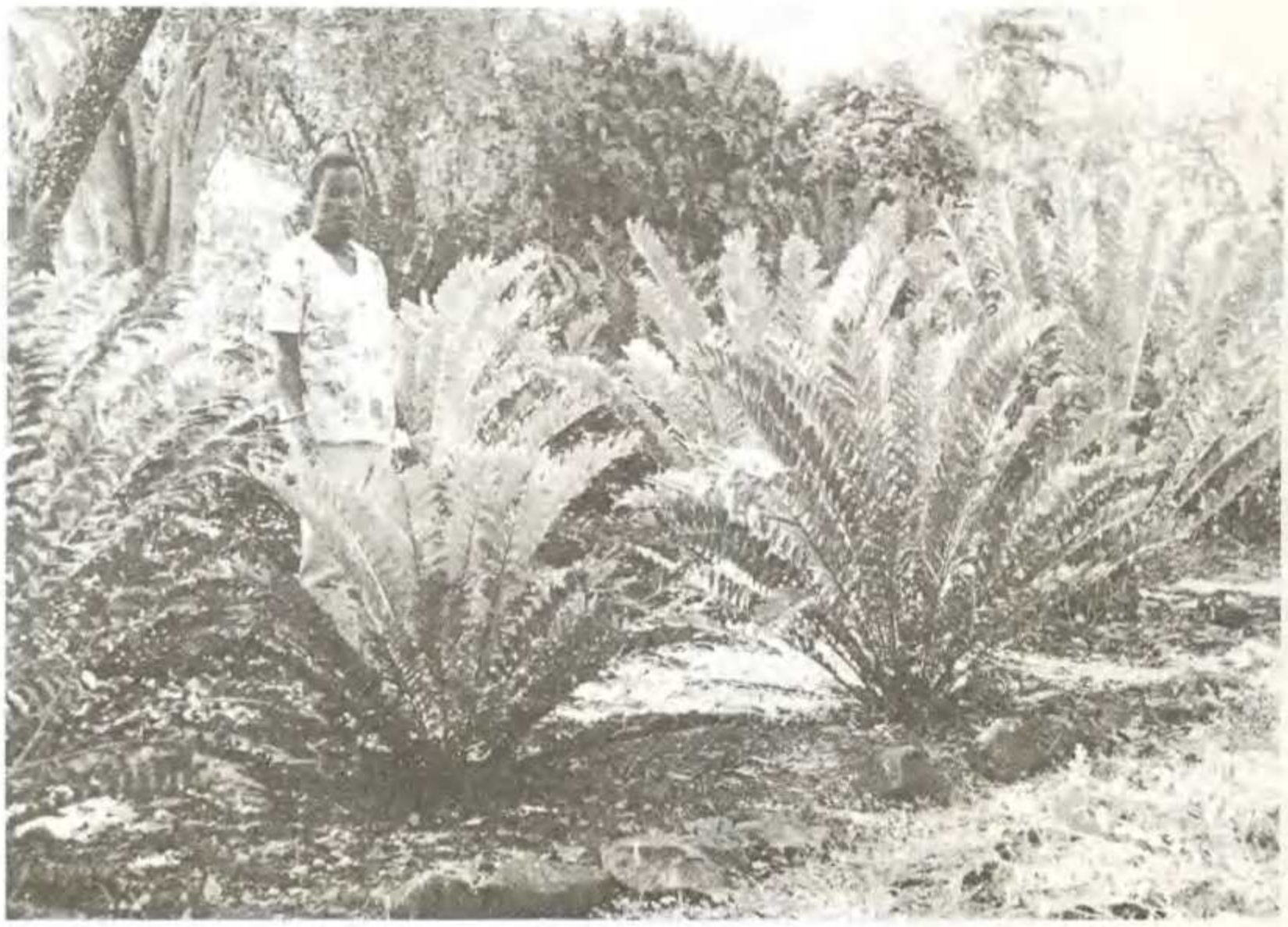
4. Zamia species:

Z. furfuracea

***E. woodii* is a special feature in the Ewanrigg cycad collection**



The main entrance gates to Ewanrigg Botanical Gardens (photo: R. Osborne, July 1990)



Charles Chakavarika, Ewanrigg Curator, amongst a fine planting of *Encephalartos ferox* in the gardens (photo: R. Osborne)

The combination plantings of Aloes and cycads are a feature of Ewanrigg. The specimen on the right is *E. manikensis*

This general view shows the spacious lawns, indigenous trees and aloe, succulent and cycad plantings which are so much the essence of the Ewanrigg Gardens.

Relatively new plants of various *Encephalartos* spp. on grassy slopes at Ewanrigg (photo: R. Osborne)

KAAPSEHOOP PROJECT COMPLETE

One of the most important of the Eastern Transvaal cycads is *Encephalartos laevifolius* (see ENCEPHALARTOS 19: 2-8). Yet this species has suffered the combined effects of expansion of commercial forestry activities, decimation by illegal traders and, more recently, the damages of a microbial cone pathogen which causes all the seed to rot - and the attacks of the leopard moth. Kevan Zunckel, previously with the Department of Forestry but now with the Nature Conservation section of the Transvaal Provincial Authority, has been studying these plants for several years. His studies have lead him to produce a thesis entitled "The Ecology and Management of the Kaapsehoop Cycad, *Encephalartos laevifolius* Stapf and Burtt Davy" for which he has just been awarded the Degree of Master of Science in the Department of Environmental and Geographical Science of the University of Cape Town. Kevan plans to produce two or three scientific papers which will focus on key aspects of his work.

In Kevan's own words...."*it is vitally important that the [management] recommendations made be seriously reviewed by those responsible for the conservation of this cycad. If this study is imply put on the shelf after it has achieved its academic goal, the possibility of* E. laevifolius *becoming extinct is very real.*"

We congratulate Mr Zunckel on his academic success and look forward to reviewing his papers in a future issue of our magazine.

REPRODUCTION IN A POPULATION OF ZAMIA PUMILA - MORE WORK FROM WILLIE TANG

Willie Tang, research associate working from Fairchild Tropical Gardens, continues to publish results of his studies in the ecology and population dynamics of *Zamia pumila*, the native cycad of Florida, USA. His latest work is entitled "Reproduction in the cycad *Zamia pumila* in a fire-climax habitat: an eight year study" and appears in the *Bulletin of the Torrey Botanical Club* 117: 368-374 of 1990. The survey reveals that 87% of the non-seedling plants coned during the study period and that the plant sex ratio was 1.8 male-to-female. Coning sex ratios were different and varied from 2.7 to 12 male-to-female. On average, the male plants coned every 1.6 years and produced 1.45 cones per year. Females coned every 3.7 years with a mean of 0.35 cones per year. Energy investment over the whole period was 3.4 times greater for females than for males.

Reprint requests should be addressed to Willie Tang, Fairchild Tropical Garden, 10901 Old Cutler Road, Miami, Florida, 33156 USA.

SAAB 1991 CONFERENCE

The 17th Annual Congress of the South African Association of Botanists was held at the University of Natal's Pietermaritzburg campus over the period 14 - 18 January 1991. Three hundred delegates attended; 130 papers were delivered and 60 posters were displayed. **John Donaldson** lectured on the topic "Host Specificity in Cycad Insects and its relevance for Cycad Pollination". His talk commenced with a review of insects known to be associated with cycads and was followed by a discussion of *Encephalartos* host specificity, special reference being made to the insect genera *Antliarhinus* and *Porthetes*. **Roy Osborne, Nat Grobbelaar** and **Leszek Vincent** jointly presented a poster on the numerical phenetics of *Encephalartos*, showing that all but three species of the genus fall into well-defined groups which are named ALTENSTEINII, CYCADIFOLIUS, EUGENE-MARAISII, LEHMANNII and VILLOSUS.

Overseas visitor **Mari Kellersjo** reported on the DNA sequencing studies she had carried out at the Department of Biochemistry, Louisana State University at Baton Rouge: the evidence presented supports the view that the Cycadales are a monophyletic group (i.e. all arise from one common ancestor) and that there is an evolutionary advance from *Cycas* to *Encephalartos* to *Zamia*.

Nature Conservation officials were well-represented at the Conference. Amongst these were **Sonnette Krynauw** and **Wayne Boyd** from the TPA. They presented a poster of the Transvaal Threatened Plants Programme, initiated in 1976 with the objectives of identifying plants, determining their status and recommending action. Cycads featured prominently in this project and an excellent photograph showed how a helicopter could be used to survey *Encephalartos* populations in rugged terrain much more efficiently than alternative methods.

We were pleased also to welcome Professor **Carmine Guarino**, a Neopolitan colleague of Paolo De Luca and Aldo Moretti, as a visitor to the meeting. Prof. Guarino used the Conference to make contact with a number of South African botanists who may be able to assist him recreate a section of Cape Flora in his Mediterranean garden redevelopment project at Naples.

NORSTOG VIDEOTAPE : CYCAD REPRODUCTION

(Previewed by Roy Osborne)

Knut Norstog has gone to some lengths to produce a videotape on "**Cycad Reproduction**", a topic on which he is undoubtedly one of the world's experts. The 22-minute full colour tape, filmed at the Fairchild Tropical Gardens in Florida, introduces cycads with shots of *Encephalartos ferox, E. gratus, E. horridus, Macrozamia moorei, Microcycas calocoma, Stangeria eriopus* and *Zamia furfuracea* in the garden and with frames showing the USA native cycad, *Zamia pumila*, in its local slash pine/palmetto habitat.

One of the many fascinating shots is that of the enormous pollen cloud liberated from a male cone of *Cycas rumphii*, which Norstog uses to pollinate a female cone and achieve a seed crop - all shown on the video.

To me, the most dramatic of the sequences was that of the germinating pollen grains of *Microcycas calocoma* and *Zamia pumila* showing the huge (microscopically) motile spermatozoids being propelled around by their spiral bands of beating flagellae, a sight which (to my knowledge) has not previously been captured on film.

The frames showing the swarming activity of snout beetles, on the male and female cones of *Zamia furfuracea*, provide vivid testimony to this insect's role in pollination.

This film will fascinate the cycad enthusiast and will also be invaluable as an audiovisual aid to high-school and university biology teachers. **Copies are available in either the PAL (South African) or the NSTC (American) format; enquiries as to price and availability should be addressed to: Mrs Lou Hickman, Bookstore Manager, Fairchild Tropical Garden, 10901 Old Cutler Road, Miami, Florida 33156, USA.**

ENDANGERED WILDLIFE - CYCAD ARTICLE

The relatively new, high-profile, glossy, conservation-oriented magazine *Endangered Wildlife* has, in its March 1991 (No. 5) issue, published a 7-page article entitled "The Southern African Cycads - and proposals for their more effective conservation". Written by Roy Osborne, it is based largely on his recent scientific paper on the subject in the *South African Journal of Science*. There are six excellent colour plates and the author's 7-point cycad conservation action plan is clearly set out.

Enquiries in connection with this article should be addressed to:
The Editor, Endangered Wildlife, Private Bag X11, Parkview 2122, telephone (011)-486-1002.

Na aanleiding van 'n artikel deur prof. Nat Grobbelaar onder die titel "UNCONVENTIONAL PLACEMENT OF SEED KERNELS FOR GERMINATION" in ENCEPHALARTOS no. 23, wil ek graag kommentaar oor my ondervinding in verband met die plantmetode lewer.

Ongeveer 'n jaar gelede het ek gesien dat prof. Grobbelaar Encephalartos manikensis-sade op genoemde manier geplant het. Ek het toe besluit om die metode te probeer, aangesien daar dan meer sade in 'n saaibak inpas en mens dan dadelik kan sien as 'n saad se worteltjie verskyn. Ek het hier by die Universiteit asook van my eie sade tuis op die manier geplant en wel in riviersand, in 'n mengsel van riviersand en leemgrond en in kompos onderskeidelik. Saad van verskeie spesies is geplant, onder andere **E. altensteinii, E. lehmannii, E. natalensis** en **E. transvenosus.** Goeie resultate is verkry met sade van **E. lehmannii** en **E. transvenosus** Sade van **E. altensteinii** en **E. natalensis** het egter vanaf die punt wat in die substraat gesteek was begin oopbars en bevrot. Al die sade wat oopgebars het, is later deurgesny en die meeste het goed ontwikkelde embrio's bevat. Nadat die sade omgedraai is sodat die mikropilumpunt in die substraat gesteek het, het daar nie weer van hulle oopgebaars nie. Veral die **E. transvenosus**-sade se saadhuide is opvallend harder en dikker as by die ander sade wat geplant is, maar ek weet nie of dit die rede is waarom hulle nie ook oopgebars het nie. Dit sal interessant wees om te verneem of ander lede van die Broodboomvereniging meer sukses met hierdie plantmetode ondervind het.

Met betrekking tot Gerrit Prinsloo van Rustenburg se brief oor die **E. lanatus**-saad waarvan die wortel tydens ontkieming nie deur die mikropilum gegroei het nie maar binne die saadhuid ontwikkel het, het ek dieselfde verskynsel by saad van **E. lebomboensis** en **Stangeria eriopus** gevind. In my gevalle het die saadhuid egter oopgebars voordat daar 'n blaartjie gevorm het. In albei gevalle is die saad afkomstig van plante in my tuin. Dit was die derde stel keels van die betrokke E.lebomboensis-plant maar die eerste keer dat van die sade op die manier ontkiem het.

Met vriendelike groete,

Dr. M. I.Claasens
Department Plantkunde
Universiteit van Pretoria
Pretoria.

UNUSUAL MALE CONES IN E. altensteinii (HYBRID)

The photograph shows an **E. altensteinii** (?) with six male cones, five of which appeared approximately three months after the first cone during 1989.

The first cone appeared totally different at the time of shedding pollen from the five that followed. The photographs were taken when the first started shedding pollen and shows this male cone which has some overwhelming **E. villosus** characteristics in both colour, smell and morphology although not typical in all aspects.

The five cones that followed some three months later had more of an **E. longifolious** appearance in shape, scale appearance and colour than that of **E. altensteinii.** These differences remained right to the point of shedding pollen.

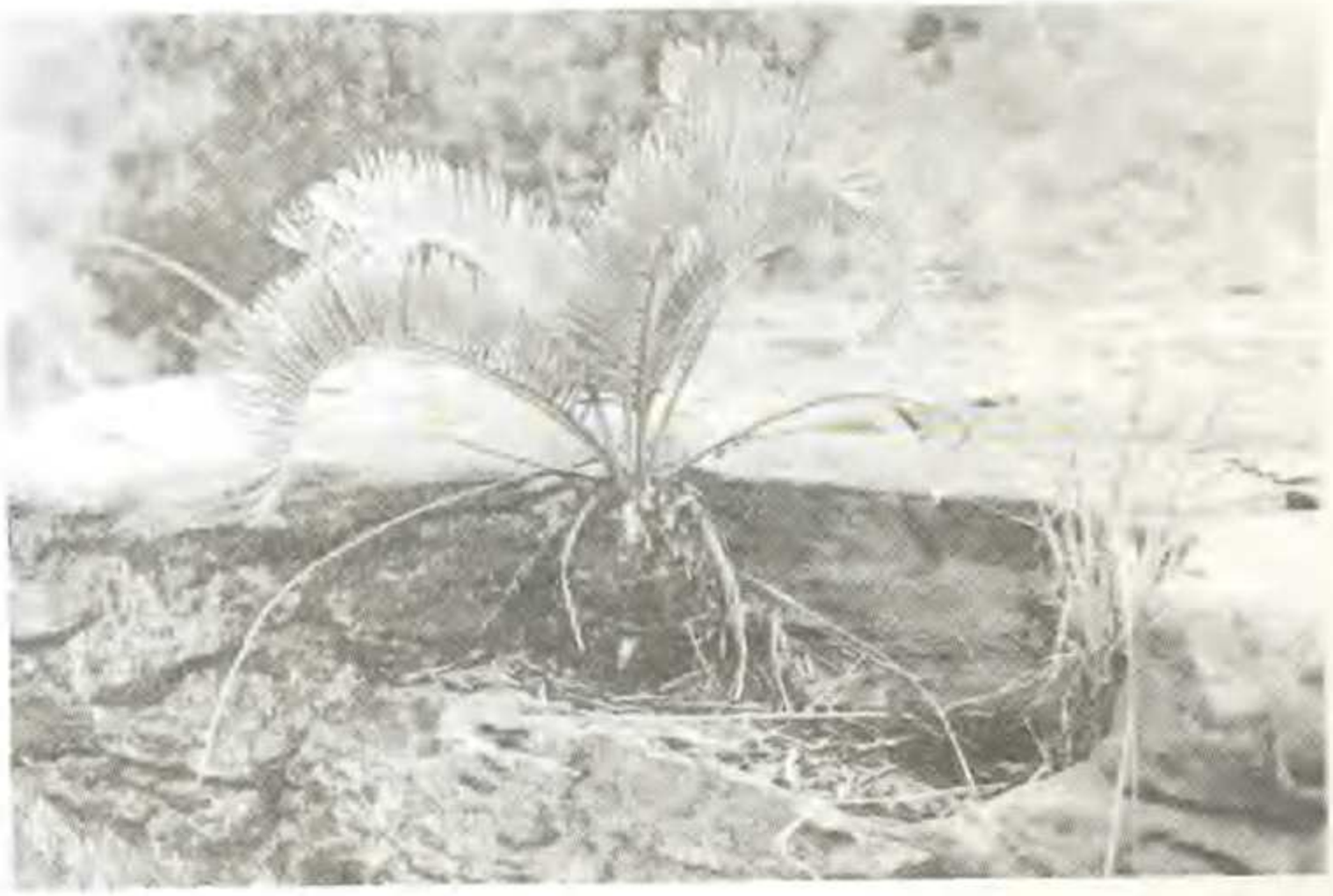
Previous cones of this particular plant showed no difference as far as could be established from the owner.

The specimen is some 600mm high with straight leaf stalks. Leaves show the typical E. **altensteinii** teeth on both margins with leaves reducing in size to a series of prickles in only some of the leaf stalks. The majority of leaf stalks are bare on the lower 200 to 300mm.

It was not possible to establish the locality from which this specimen originated as it was moved to the present garden in Port Elizabeth some 15 years ago by the present owners husband who has since passed away.

Has anyone observed this phenomenon before?

M.R. SCHHWELLNUS
P O BOX 7045,
NEWTON PARK
PORT ELIZABETH
6055



CRAIG MUNRO PHOTOGRAPHED THIS E.lanatus AT BOTSHABELO AND HAVING SEEN THE OLDEST POT PLANT IN THE WORLD (SEE ENCAPHALARTOS NO. 24 PAGE 9) HE NOW CLAIMS THAT THIS IS THE MOST POT BOUND CYCAD IN THE WORLD, AS IT IS GROWING ON A LUMP OF SAND STONE 3M THICK.

UNUSUAL SCALES/LEAVES IN E. arenarius

During December of 1990 I noticed that one of the male **E. arenarius** plants in my collection was at the point of producing new frond. The crown was very woolly and I awaited the new fronds with great expectation.

To my surprise the fronds soon appeared to be abnormal in that they were more like leathery scales with no indication of any leaflets or rachis. (photograph 1) The outside of the "scales" had a woolly appearance consisting of very short fibres displaying a pattern very similar to the crimp found in natural Merino wool fibres. The original wool produced at the onset remained on top of the"scales".

The inside of the "scales" had a smooth leathery texture of a beige colour at the start.

As time passed (three weeks) the inside turned to a dark brown colour while the "scales" shrunk in width from approximately 2.5 to 3 cm to 1 cm and rolled in from the sides. The wool on top of the scales had completely disappeared thanks to the gale force winds that we experienced in Port Elizabeth during the early part of December. The "scale" tips had dried off to hard thorny stubs. The crimp pattern on the outside remained. (photograph 2)

By the end of December all that remained of the "scales" were the thorny stubs which had by then progressively lost all the woolliness and crimp pattern from the top, right to the point where the "scales" met the crown of the plant.

By the middle of January 1991, the plant proceeded to produce a solitary male cone through the centre of the remaining stubs indicating that the "scales" were not part of the cone peduncle (stalk) that was formed.

Can anyone of the boffins please explain?

1

2

M.R. SCHHWELLNUS
P O BOX 7045,
NEWTON PARK
PORT ELIZABETH
6055

UNUSUAL MALE CONE IN E. trispinosus

During the last part of April/beginning of May 1990 I had the privilege to assist Mr. Don Giese of King Williamstown in selling his collection of Cycads as his health did not allow him to continue with it.

In the collection I noticed a male **E. trispinosus** which had an abnormal cone/s. The cone had a single peduncle (stalk). The base of the cone appeared to be a normal single cone. Slightly above the base, the cone divided into two separate cones. The division was complete with cone scales completely around each of the two peduncles. The most unusual of this particular cone however was the fact that the peduncles re-united at the top of the cone to form a single peduncle.

The cone was, as far as could be established, visually normal in all other aspects and was at the point of shedding pollen.

According to Mr. Giese he had not used any systemic weed killer in the garden which rules it out as a possible cause.

The particular plant was *purch*ased by Dr. F.W.Wessels of Phalaborwa and it would be of interest if he could report on this particular plant when it cones again although the chances are very slim that it would produce another unusual cone.

M.R. SCHHWELLNUS
P O BOX 7045,
NEWTON PARK
PORT ELIZABETH
6055

Andrew Shaw, a young biology student at the University of Leeds, has made a request from local members to assist him in his cycad germination project.

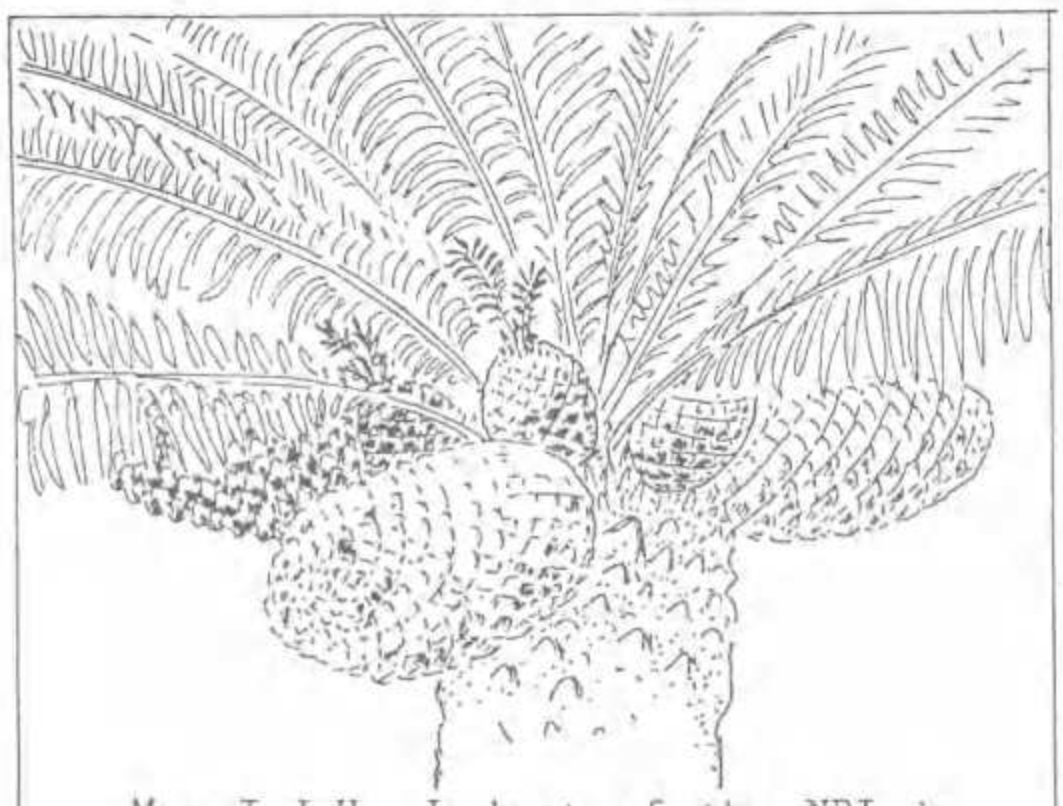
He would be grateful to receive any seed of **Stangeria eriopus** which he wants to concentrate on.

Can any member help him?

His address is:

15 Ancona Rise
Darfield,
Barnsley,
S. Yorkshire
S73 9PS
ENGLAND

Anomalous cones in Encephalartos



Mrs I.J.H. Joubert of the NBI in Pretoria brought to my attention a specimen of Encephalartos transvenosus with anomalous cones. growing in her garden. During about April-May 1989 it produced three large cones borne laterally, followed in about July by five small ones. The drawing was copied from a photo taken by Mr W.S. Joubert during March 1990. The cone on the right had started dehiscing.

Here is the same tree on 13 June 1990, some time after the three large cones had fallen. The locals apparently kept asking whether they may purchase the 'pineapples'. The cones were removed on 1 November 1990, as the leaves on the cones had turned brown and their axes had become infected with fungi. They are now housed at the NBI in Pretoria.

The cone with the most leaves (about ten) was dissected out to show the series from a normal ovuliferous scale with two seeds to a miniature frond.

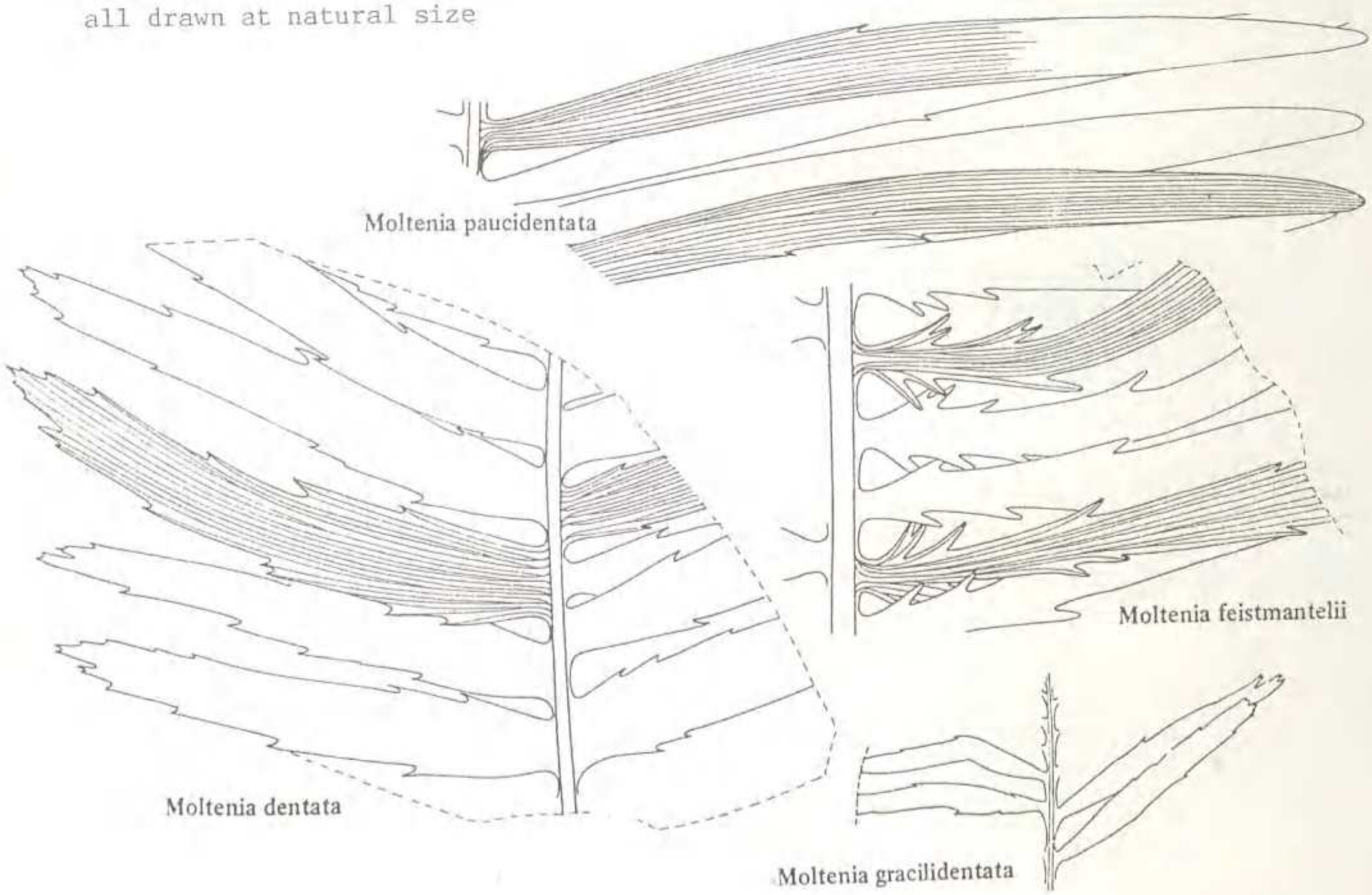
As a palaeobotanist working on fossil cycads from the Molteno Formation (Triassic 200 my), it is always interesting to observe these quirks of *nature* that show transitions. In the Molteno Formation, the Cycadales comprise five genera and 21 species. The genus Moltenia looks most like the modern genus Encephalartos. In size (up to 300 mm long), the fronds in Moltenia are close to the juvenile leaves and fronds on these anomalous cones of E. transvenosus.

The book in which the review of the fossil cycads has been published, is available from the NBI, Private Bag X101, Pretoria 0001:

ANDERSON J.M. & ANDERSON H.M. 1989 Palaeoflora of southern Africa Molteno Formation (Triassic) Volume 2 (Gymnosperms excluding Dicroidium). A.A. Balkema, Rotterdam. pp. 567.

Other anomalous cones have been recorded in 'Encephalartos' numbers 11(16), 12(4), 13(18 - 19), 14(2) and Robbertse et al. 1988 in S. Afr. J. Bot. 54(4) 394 - 6.

Fossil Cycads
all drawn at natural size



DR. H.M. ANDERSON.

NBI
Nasionale Botaniese Instituut
Privaatsak X101, PRETORIA, 0001 Suid-Afrika

NATAL SECTION NEWS - UMGENI VALLEY EXCURSION

Sixteen hardy Natal Section members braved some rather damp weather on Sunday 17 March 1991 to visit the Wildlife Society's Umgeni Valley Project near Howick in the Natal midlands. After some useful transport provided by WLS officer Bruce Ducasse, members set off on the trail from the plateau down to the appropriately named "Camp Cycad" near the Umgeni River. Here we saw many specimens of *Encephalartos natalensis* growing in surprisingly dense shade and characterised by widely spaced leaflets. At the campsite, accompanied by a vociferous trumpeter hornbill, we saw the unusual "coiled leaflet" specimen which has been featured in this magazine previously (ENCEPHALARTOS 17: 27). A foray up the hillside allowed us to see more, and bigger, plants. One disturbing feature was the evidence of cycad predation by the leopard moth - even at this comparatively high altitude. A bonus of the day was the opportunity to see some game, including giraffe, zebras and several species of antelope.

On the return trip from Howick, members made a detour into the Natal Parks Boards' Queen Elizabeth Park at Pietermaritzburg where some very fine cycad specimens have been relocated.

UMGENI VALLEY PROJECT

Below: Natal Section members had the benefit of transportation by the Wildlife Society during their excursion to the Umgeni Valley Project. Photo R. Osborne.

Commission critical of cycad exports

Daily News Correspondent

PRETORIA: The "lackadaisical" attitude of nature authorities towards the illegal exporting of cycads to France and Madeira had caused considerable damage to South Africa's conservation reputation abroad, a commission of inquiry has found.

The Van Zyl Commission of Inquiry on the Export of Certain Cycads, appointed last year to investigate the illegal export of 71 endangered cycads to Nice and 297 to Funchal in Madeira, found that the granting of permits for the export of these plants had been irregular.

The plants were valued at more than R400 000.

Although the officials involved had acted in good faith and no corruption had occurred, "immediate remedial steps should be taken", the commission found.

The Transvaal and Cape Provincial Administrations had not complied with the regulations of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in granting the export permits, the chairman and sole member of the commission, Mr C.F.W. van Zyl, said in his report, released on Tuesday.

The commission had investigated only two consignments of cycads sent out of the country, the report said.

These investigations revealed "several omissions" by the conservation authorities "and in particular the Cape Department of Nature Conservation".

"If the ineptitude of this department in regard to the Nice and Madeira consignments is typical of the attitude displayed towards other consignments of cycads leaving the country, then immediate remedial steps should be taken," the report said.

The report cleared the buyer and exporter of the cycads, Mr Joe Berardo, of criminal activity in the export of the cycads.

Mr Berardo, a leading figure in the South African Portuguese Community, is a former chairman of the Johannesburg Mining and Finance Corporation and a former member of the State President's Economic Advisory Council.

The cycads were shipped out of South Africa on the pretence that they would be donated to the Botanical Gardens in Funchal, Madeira.

However, they were planted at a private guest house belonging to a company of which Mr Berardo is a director.

The other consignment of cycads was shipped to Nice, ostensibly to be planted in the Nice Botanical Gardens. They found their way to a private development scheme, the Arenas Floral Park, in Nice.

Permits were granted for the exports, although the applicants had failed to obtain import permits from the countries of destiny; wrongly listed the cycads; and failed to obtain reports or recommendations from a scientific institution, as required by law.

Reacting to the report, the Minister of Planning, Provincial Affairs and National Housing, Mr Hernus Kriel, said the Administrators of all four provinces had already taken steps "to exert better control over the export of rare fauna and flora".

Export permits now had to be personally approved by the Chief Director of Nature Conservation in a province, while "sensitive applications" for export permits had to be referred to the Executive Committee.

A special task force had been created to counter illegal trade in endangered cycads, while review of present policy, legislation and punitive measures was under way between the provinces to ensure uniform action.

"In future strict action will be taken against officials who disregard instructions and against unscrupulous traders in fauna and flora," Mr Kriel said.

He added that the report would be referred to the Minister of National Education and Environmental Affairs, Mr Louis Pienaar, to study the commission's recommendations regarding uniform legislation.

Amptenare loop deur oor broodbome

DIE BURGER 12/12/90.

Bewaringsowerhede skerp gekritiseer in verslag

Van Ons Politieke Redaksie

PRETORIA. – Die bewaringsowerhede in Suid-Afrika, en veral die Hoofdirektoraat Natuur- en Omgewingsbewaring in Kaapland, word skerp gekritiseer in die verslag van die Van Zyl-kommissie na die uitvoer van groot besendings broodbome na Nice, Frankryk, en Funchal, op die eiland Madeira, wat voorverlede jaar groot opslae in die Parlement gemaak het.

Mnr. C.F.W. van Zyl, voorsitter en enigste lid van die Kommissie van Ondersoek na die Uitvoer van Sekere Broodbome, wat in Mei 1988 deur die Staatspresident aangestel is, het onder meer bevind dat die beleid van die Kaaplandse Departement van Natuur- en Omgewingsbewaring nie kerngesond is nie en hersien behoort te word.

Hy het voorts bevind dat die bepalings van die Boswet, wat onder meer bepaal dat die Minister toestemming moet gee vir die verkoop en verwydering van sekere broodboomsoorte, deur geeneen van die vier provinsiale bewaringsowerhede nagekom is nie en dat dit op nalatigheid dui.

Sakeman

Die ondersoeke was oor die uitvoer van 297 broodbome, waaronder uiters skaars en bedreigde spesies, in Augustus 1988 van Oos-Londen na Funchal en 71 bome in 1985 uit Transvaal en Kaapland na Nice.

Daar is ook bevind dat, hoewel die nodige permitte deur die betrokke bewaringsowerhede uitgereik is:

- Daar in albei gevalle veel meer plante uitgevoer is as wat nodig was;
- Onreëlmatighede soos die nie-nakoming van wetlike en ander bepalinge voorgekom het;
- Daar nie ooreenkomstig Suid-Afrika se internasionale verpligtinge (Cites-konvensie) opgetree is nie; en
- Die broodbome ná vier en twee jaar ná die uitvoer, steeds in private tuine in Funchal en Nice gestaan het.

In die Funchal-geval het 'n bekende Portugeessprekende Suid-Afrikaanse sakeman van Johannesburg, mnr. Joe Berardo, 297 broodbome van R285 000 van 'n broodboomversamelaar en -handelaar in Oos-Londen gekoop onder die voorwendsel dat hy dit in Johannesburg wou plant.

Later het dit egter geblyk dat hy dit na Funchal wil uitvoer. Mnr. Stephan van Blommestein, 'n terreintuinier van Sandton, was sy agent.

Toe mnr. Michael Fryer, eerste natuurbewaarder van Oos-Londen, agterkom dat twee permitte wat deur die Direktoraat Natuurbewaring in Oos-Londen uitgereik is vir die "uitvoer" van die broodbome na Transvaal, gebruik gaan word om die besending na die buiteland uit te voer, het hy dit gekanselleer.

Hy het egter nagelaat om die oorspronklike dokumente van mnr. Van Blommestein terug te neem.

Dié ongeldige permitte is egter daarna gebruik om aansoek te doen om 'n Cites-permit by die Hoofdirektoraat Natuur- en Omgewingsbewaring in Kaapstad wat hom sou magtig om die besending na Funchal te vervoer.

Die kommissie het ook bevind dat mnr. Berardo met dié permitte by die Reserwebank in Pretoria aansoek gedoen het om magtiging vir die skenking van broodbome aan die botaniese tuin in Funchal. Hy het ook die waarde van die bome aangegee as R22 300, die waarde waarvoor dit deur mnr. Van Blommestein verseker was.

Die kommissie het bevind dat sowel die Reserwebank as die hawe-owerheid van Oos-Londen mislei is deur die "uitvoerpermitte" vir die bome.

'n Cites-permit is later deur die Hoofdirektoraat: Natuurbewaring in Kaapstad uitgereik sonder ministeriële toestemming verkry is vir die uitvoer van talle spesies wat ingevolge die Boswet beskerm word.

Die kommissie het bevind dat die permitte wat deur die natuurbewaringsbeamptes uitgereik is, ultra vires was sover dit die 297 broodbome na Funchal betref.

"Die betrokke amptenare het nie oor die bevoegdheid beskik nie om toestemming te verleen wat alleenlik deur die Minister of 'n persoon deur hom aangewys, verleen kon word. Die verkoop, uithaal en vervoer van die betrokke broodbome was dus onwettig."

Beide die verkopers, asook mnre. Berardo en Van Blommestein, het die bepalinge van die Boswet oortree. Die kommissie het egter bevind dat geen vervolgings aanbeveel word nie, omdat almal bona fide opgetree het en prosedures gevolg het wat deur almal reeds oor 'n tydperk van baie jare gevolg is.

Die kommissie het getuienis aangehoor dat daar sedert 1968 nog geen aansoek om ministeriële toestemming vir broodbome ingedien is nie. Dit beteken dat die bepalings van die Boswet in geeneen van die provinsies nagekom word nie. Dit dui op nalatigheid aan die kant van die *bewaringsowerhede*, het die kommissie bevind.

"Die feit dat die aansoek van mnr. Berardo om 'n Cites-permit nie na die wetenskaplike instansie verwys is nie en dat geen verslag, aanbeveling of advies verkry is nie, kom neer op 'n afwyking van die voorwaardes en vereistes van die Cites-ooreenkoms."

Die kommissie het hom skerp uitgespreek oor die getuienis van dr. J.H. Neethling, Direkteur van die Hoofdirektoraat: Natuurbewaring in Kaapland, en mnr. G.N. van Wyk, assistentdirekteur, oor dié instansie se bewaringsbeleid rakende broodbome.

Rampspoedig

Dr. Neethling het onder meer getuig dat dit vir hom beter is dat hierdie plante oor die res van die wêreld versprei word in verskillende botaniese tuine, waar dit dan kan voortplant, en waarvandaan dit "altyd weer (kan) terugkom". Sy departement se besorgdheid oor plante in die natuuur is veel groter as oor plante in private tuine en kwekerye, het hy gesê.

Die kommissie is van mening dat die beleid van die Kaapse departement in verband met die uitvoer van skaars broodbome, soos weerspieël in die getuienis van dr. Neethling en mnr. Van Wyk, nie kerngesond is nie. "Die beleid behoort in hersiening geneem te word."

Die kommissie het bevind dat die uitvoer van die broodbome na Funchal nie alleen onversoenbaar was met Suid-Afrika se internasionale verpligtinge nie, maar ook "rampspoedig". "Die uitvoer van sulke groot getalle van die plante moes nooit toegelaat gewees het nie."

Pik's man welcomes Joe Berardo

By MARTIN WELZ

JOE BERARDO, controversial millionaire friend of cabinet ministers, was met by a senior official of the Department of Foreign Affairs when he returned to South Africa recently after two years of self-imposed exile in Madeira.

Awie Marais, former ambassador to Uruguay and now Foreign Minister Pik Botha's media liaison officer, said yesterday he had met Mr Berardo in an "entirely unofficial capacity".

Johannesburg Portuguese-language newspaper O Seculo reported that Mr Marais had conveyed Mr Botha's welcome to Mr Berardo and offered any assistance he might require.

Mr Marais said he might at one stage have said "the minister would like to see you and would be happy to hear from you now that you are back — just chatter".

It was exactly two years and a day earlier that Mr Berardo left, reportedly to escape a scandal surrounding his exported cycad collection and controversy about company tax affairs and some of his business deals.

In a report written by his former public relations officer Jose Ramalho and published in O Seculo this week, Mr Berardo is quoted as saying he stayed away so long because he had felt "saddened and hurt" by the way inquiries involving him had been conducted "for political reasons".

At their Dunkeld, Johannesburg, mansion, a large banner bid the Berardos welcome home.

But on Wednesday this week, the registrar of companies released a report critical of yet another of Mr Berardo's company deals — his takeover of mining company Wit Nigel in 1985.

The report has been referred to the attorney-general for possible prosecutions for contraventions of the Companies Act.

JOE BERARDO
'Saddened and hurt'

On Thursday, Mr and Mrs Berardo left their Dunkeld home again. They had gone to Durban "to get away from it all", a member of the household said.

They could not be contacted for comment.

The controversies that have raged in Mr Berardo's absence concern the export of a R2-million collection of rare South African cycads to Madeira; his involvement in the sale of a Johannesburg office block to the Johannesburg Municipal Pension Fund and the collapse on the Johannesburg Stock Exchange of his large mining and industrial empire.

When Mr Berardo arrived in SA from Madeira he started out as a greengrocer.

Since then, the wealth and connections he has built up have made him politically influential in southern Africa, Portugal and Madeira.

When a permit was granted for the cycads to be exported to Madeira and France, they were valued at R22 000 and were described as a gift to Madeira's Funchal Botanical Gardens and the botanical gardens in Nice.

In fact, they were worth R2-million on the international market and were planted in the garden of Mr Berardo's Monte Palace, in Madeira, and at a private housing development in Nice.

... their personal safety in ... on the evening of ...

7 large cycads donated to zoo

Daily Dispatch Reporter

EAST LONDON — Seven of the largest known cycads in the Eastern Cape have been donated to East London's Queens Park Zoo.

The cycads, thought to be about a thousand years old, are the Encephalarus altensteinii species found only in this region.

Of seven "clusters" (groups) of cycads, the tallest stem measures about seven metres, which, according to the East Cape branch chairman of the Cycad Society of South Africa, Mr Martin Schwellnus, is the largest known specimen of this species.

The plants are valued at approximately R15 000 each.

They have been donated by a Macleantown farmer, Mr Arthur Richter, who recently sold his farm to Department of Development Aid, who will use it as part of the Newlands extension.

The city's director of cultural and environment services here, Mr Albert Janse, yesterday confirmed the donation of the plants. He enthused that this would be a great start to the Queens Park cycad collection.

The Cycad Society first became aware of these plants "years ago", Mr Schwellnus said.

When they learnt the farm had been sold and the land was to be developed, they approached Mr Richter for his permission to move these giant cycads to a non-threatening position.

Further permission was obtained from the city council to relocate the plants to the Queens Park Zoo, and the conservation division here issued permits for the removal of the cycads, without which the operation would have been illegal.

The exacting operation of transplanting the cycads is presently underway, assisted by Eskom which has provided labour and a truck bearing a crane suitable for the task.

The relocation has been funded by East London Friends of the Zoo, Mr Richter said.

As to the safety of the new venue, "these cycads will be thief-proof" Mr Janse said, explaining that minute electronic chips would be embedded in the plants.

Each cycad is specifically numbered and, via the chip, can be identified by means of a computer sensor.

In addition to this, Mr Schwellnus said the single stems and clusters weighed between three and seven tons — suggesting "anyone who wants to steal them had better bring along their own crane".

THE NATAL MERCURY 23/3/91

Cycad sucker investigation launched

DURBAN North Police are investigating the alleged theft of a 'sucker' from one of the rarest cycad plants in the world.

The investigation has been launched following an incident when a prospective buyer allegedly removed a sucker from the stem of a Woodii cycad belonging to a Durban North seller.

The Woodii cycad is unique because only one clump has ever been found. All specimens are descended from the original male plant found in 1895. — (Mercury Reporter)

THE NATAL MERCURY 3/4/91

Man in court over rare cycad

Court Reporter

A WESTVILLE man facing a charge of illegally gathering the 'sucker' of a very rare, protected cycad appeared briefly in the Durban Magistrate's Court yesterday.

Appearing before Mr C Knoetze was Mr Thomas Victor de Villiers, 59, of Neptune Road, Westville, who was arrested last Thursday following an investigation by Durban North police into the disappearance of the sucker from the stem of a *Woodii* cycad.

The sucker was allegedly found to be missing after a prospective buyer had examined the plant.

Mr de Villiers faces a main charge of gathering a specially protected indigenous plant, belonging to Mr F A Jackson at Northway, Durban North, without a permit.

He also faces an alternative charge of theft of the sucker.

He was not asked to plead to either charge.

All specimens of the *Woodii* cycad are descended from the only known clump, which was discovered in 1895.

THE DAILY NEWS 3/5/91

Cycad collector admits his guilt

A CYCAD collector admitted to a Durban magistrate yesterday that he illegally gathered a sucker of the specially protected plant from a garden at Umhlanga.

Thomas Victor de Villiers (59), of Neptune Road, Westville, pleaded guilty before Mr C. Knoetze to a charge that he removed a sucker from a cycad encephalartus woodi in the garden of a home in Umhlanga Rocks Drive on March 24 this year.

In a statement read to the court by his attorney, Mr J.Booysens, he said that as a cycad collector he knew the cycad was a specially protected indigenous plant and knew he had no permit to remove the sucker from the tree.

He knew he was committing an offence.

The case was adjourned to May 6.—Daily News reporter

THE DAILY NEWS 6/5/91

MAN WHO TOOK CYCAD SUCKER IS FINED R2 000

Court Reporter

THE flora and fauna must be preserved, a Durban magistrate said today when he imposed the maximum fine of R2 000 (or 12 months in prison) on a collector who unlawfully took a sucker from a specially protected cycad.

Thomas Victor de Villiers of Neptune Road, Westville, pleaded guilty before Mr C. Knoetze.

He admitted that on March 24 this year he removed a sucker from a cycad encephalartus woodi in the yard of a home in Umhlanga Rocks Drive.

A member of the Natal Parks Board, Mr Michael Milton, said this was the rarest cycad in the world. Only one male plant had been found. It could be propagated only by suckers and not by cross pollination. One of these cycads would fetch more than R100 000.

Passing sentence, the magistrate said it was clear De Villiers was a collector who knew this was a very rare plant. He knew taking the sucker was unlawful. If he had been an uninformed person it could have made a difference.

De Villiers committed a deliberate act and knew what he was doing was wrong. He knew it was valuable. Fauna and flora had to be protected and people could not be allowed to take protected plants without permission. He said in De Villiers's case he was imposing the maximum fine.

THE NATAL MERCURY 7/5/91

Cycad offence

A WESTVILLE man was fined R2 000 (or 12 months) yesterday for taking a sucker from a Woodii cycad — the rarest cycad species in the world.

Mr Thomas Victor de Villiers of Neptune Road was arrested after the disappearance of the sucker from the stem of a plant belonging to Mr F A Jackson of Durban North.

Giving evidence yesterday a Natal Parks Board official said there were only a handful of fully grown plants in the world. — (Mercury Reporter)

THE CYCAD SOCIETY OF SOUTHERN AFRICA.

BALANCE SHEET AS AT 31ST DECEMBER 1990

	NOTES	1990 R.	1989 R.
CAPITAL EMPLOYED			
CAPITAL FUND ACCOUNT	2	23226	15132
EMPLOYMENT OF CAPITAL			
FIXED ASSETS	3	12	24
NET CURRENT ASSETS		23214	15108
CURRENT ASSETS		29495	19131
Bank		9991	15600
FIXED Deposit in BANK		15000	-
PETTY CASH		5	5
Debtors		1085	657
Stock	4	3414	2859
CURRENT LIABILITIES		6281	4013
Prepaid Subscriptions		731	4013
Creditors		5550	-

I hereby declare that I am not a member of the Society and that I have no interest in the financial Affairs of the Society. The Cash Book and the Ledger of the Society has been written-up from documents and information provided by the President and the Acting President of the Society.

I therefore certify that the attached Income and Expenditure Statement and the Balance Sheet is in accordance with the information provided and reflects a true and fair representation of the income and expenditure and the financial position of the Society as at 31st December, 1990.

PRETORIA
6TH APRIL 1990

Signed: L.M.D. Vorster
L.M.D. VORSTER

THE CYCAD SOCIETY OF SOUTHERN AFRICA

INCOME STATEMENT FOR THE YEAR ENDING 31ST DECEMBER 1990

	NOTES	1990 R.	1989 R.
INCOME		24546	27723
Donations		508	1249
Donations - Seedbank		1757	3966
Encephalartos - Back Copies		1480	2411
Interest Received		2623	1184
Posters Sold	5	-	69
Subscriptions		18181	18846
EXPENDITURE		16455	22363
Bank Charges		117	235
Depreciation		12	12
Commission		-	12
Encephalartos - Newsletter	6	11413	14071
Encephalartos - Back Copies	7	647	1914
Entertainment		-	130
General Expenses	8	3130	938
Postage		75	337
Stationery		132	397
Seedbank	9	910	4096
Telephone		19	81
Travelling		-	18
Typing		-	22
NET SURPLUS For the year		8094	5460
UNAPPROPRIATED SURPLUS - Beginning of year		15132	9672
UNAPPROPRIATED SURPLUS - end of year		23226	15132

The Cyread Society of Southern Africa

Notes to the financial Statements for the year ending 31st December, 1990

1. Accounting Policy

The accounting policy of the previous years was adhered to during 1990.

2. Unappropriated Surplus

	1990	1989
	R	R
Society	19883	12636
Cyread Bank	3343	3496
	23226	16132

3. Fixed Assets

Fixed Assets consist of Educational equipment Cyread slides.

Cost Price	64	64
Less: Depreciation	52	40
	12	24

4 Stock

Encephalartos - News Letters	3414	3859
	-	67

5 Posters sold.

6. Encephalartos - Cost

Printing	6373	9370
Postage	5695	5444
Stationery	-	320
Plus: Opening Stock	3859	1996
Less: Closing Stock	3414	3859
	11413	14071

7. Back Copies

Postage	595	1786
Printing	17	-
Stationery	35	128
	647	1914

	1990 R	1989 R
8. GENERAL EXPENSES		
Administrative Expenses	630	938
Special Grant to "Cycad 90"	2500	-
	3130	938

9. SEED BANK EXPENSES		
Seeds Purchased	364	2306
Postage	528	1751
Stationery	12	33
Permits	6	6
	910	4096

DIE BROODBOOMVERENIGING VAN SUIDELIKE AFRIKA
THE CYCAD SOCIETY OF SOUTHERN AFRICA

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: 041-312032

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 DURAN
tel: 031-423616

CO-OPTED/GEKO-OPTEER

MEMBERSHIP OFFICER/LIDMAATSKAPBEAMPTE
Pieter Stroebel
PO 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
c/o 45 Anleno Rd/-weg
Montclair
4001 DURAN
tel: 031-423616

PRINTING & DISPATCH OFFICER/ DRUK & VERSENDINGSBEAMPTE

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

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

SEEDBANK OFFICER/SAADBANKBEAMPTE

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