

ENCEPHALARTOS

JOURNAL OF THE
CYCAD SOCIETY OF
SOUTHERN AFRICA

NO. 6

TYDSKRIF VAN DIE
BROODBOOMVERENIGING
VAN SUIDELIKE AFRIKA

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VOORBLAD/COVER

Cycas thouarsii

EDITORIAL

"I'm too old for seedlings" declared a cycad-lover the other day. This type of prejudice towards cycad seedlings is unfortunately sometimes found amongst people. And that is a pity.

Although everyone would agree that a large, majestic cycad in nature or in a botanic garden is an impressive sight, it is just as true that a cycad cultivated from seed can be as attractive and can provide as much pleasure to its owner.

One reason for some peoples' lack of interest in seedlings is the exaggerated idea about how slowly cycads grow. It is certainly true that the stems of most cycads lengthen very slowly, but as far as the leaves are concerned (and is this not, after all, the most attractive part of a cycad?), a five year-old plant can already possess beautiful long leaves, provided it received the correct treatment from the start. If such a plant is then transplanted in the correct manner and in the right place, it can become an impressive specimen in the garden within another few years.

REDAKSIONEEL

"Ek is te oud vir saailinge" sê 'n broodboomliefhebber nou die dag. Hierdie soort vooroordeel teenoor broodboomsaailinge word ongelukkig soms by mense aangeref. En dit is 'n jammerte.

Alhoewel almal sal saamstem dat 'n groot majestieuse broodboom in die veld of in 'n botaniese tuin 'n indrukwekkende gesig is, is dit net so waar dat 'n broodboom wat van saad gekweek is net so mooi kan wees en net soveel plesier aan sy eenaar kan verskaf.

Een rede vir sommige mense se gebrek aan belangstelling in saailinge is die oordrewe idee van hoe stadig broodbome groei. Dit is sekerlik waar dat die stamme van die meeste broodbome baie stadig langer word, maar wat die blare betref (en is dit nie tog maar die aanskoulikste deel van 'n broodboom nie?), kan 'n vyf jaar-oue plant reeds pragtige lang blare hê, mits dit van die begin af reg behandel is. As so'n plant daarna op die regte manier en op die regte plek uitgeplant word, kan dit binne nog 'n paar jaar 'n indrukwekkende

EDITORIAL

— CONTINUED —

There are numerous cycad-lovers who possess beautiful plants which were cultivated from seed five to ten years previously. And anyone who does not expect to live for another five to ten years should surely also not be interested in obtaining a "mature", large cycad!

A tragic result of some collectors' obsession to possess "large" cycads at all costs, is the fact that many cycad species have virtually been wiped out in nature. In this process thousands of plants died. Even seedlings and very young plants were and are removed from their natural habitat, despite the fact that cultivated seedlings of the same species may be freely available.

We would like to encourage our readers to look at cultivated cycads through new eyes. Many people can testify of the pleasure derived from plants which were obtained as seedlings. Nobody should feel inferior because his or her collection is built up in the form of seedlings. Support the growers of cycads, especially those who are members of the Cycad Society. They are performing a great task by enabling us to collect cycads without having to carry the burden of a guilty conscience.

Opinions which are expressed in the editorial are those of the Editor and do not necessarily represent the policy of the Cycad Society. Likewise are opinions expressed in articles published in ENCEPHALARTOS those of the authors and not necessarily those of the Cycad Society or the Editor.

REDAKSIONEEL

— VERVOLG —

plant in die tuin wees. Daar is baie broodboomliefhebbers wat pragtige plante het wat vyf tot tien jaar tevore van saad gekweek is. En enigiemand wat nie verwag om nog vyf tot tien jaar te leef nie, behoort sekerlik ook nie daarin belang te stel om 'n "volwasse", groot broodboom te bekom nie!

'n Tragiese gevolg van die beheptheid van sommige versamelaars om ten alle koste "groot" broodbome te besit, is dat baie broodboomspeesies in die natuur feitlik uitgeroei is. In die proses is duisende plante dood. Selfs saailinge en baie jong plante is en word uit die natuur verwyder, terwyl gekweekte saailinge van dieselfde spesie vryelik beskikbaar is.

Ons wil graag ons lesers aanmoedig om met nuwe oë na gekweekte broodbome te kyk. Daar is baie wat kan getuig van die plezier wat verskaf word deur plante wat as saailinge verkry is. Niemand behoort minderwaardig te voel as sy of haar versameling in die vorm van saailinge opgebou word nie. Ondersteun die kwekers van broodbome, veral dié wat lede van die Broodboomvereniging is. Hulle doen 'n groot werk deur ons in staat te stel om broodbome te versamel, sonder om met skuldige gewetens rond te loop.

Menings wat in die redaksionele artikel uitgespreek word, is dié van die Redakteur en verteenwoordig nie noodwendig die beleid van die Broodboomvereniging nie. In gelyks is menings uitgespreek in artikels wat in ENCEPHALARTOS gepubliseer word, dié van die skrywers en nie noodwendig dié van die Broodboomvereniging of die Redakteur nie.

FOCUS ON... FOKUS OP...

In elke uitgawe van ENCEPHALARTOS fokus ons op een Suider-Afrikaanse broodboomspezie, in die vorm van 'n in-diepte-artikel in leketaal. In hierdie uitgawe val die kollig op die enigste lid van die genus *Cycas* wat op die vasteland van Afrika voorkom.

In each edition of ENCEPHALARTOS we focus on one Southern African species, in the form of an in-depth article in layman's language. In this edition the spotlight falls on the only member of the genus *Cycas* which occurs on the African continent.

CYCAS THOUARSII

by Piet and Elsa Vorster

SUMMARY

IT may come as a surprise to some people to learn that the mainly oriental genus *Cycas* is represented on the African mainland by one relatively little-known species. It is the purpose of this article to supply information about this species.

INTRODUCTION

The genus *Cycas* belongs to an ancient order of plants, the Cycadales, popularly known as "cycads". The group flourished in the Carboniferous period, 50 to 60 million years ago when the vast coal beds were formed and a large part of the earth experienced a warm, humid climate. Today only 10 genera and probably not many more than 150 species survive. At present they occur in the tropical and subtropical regions of both hemispheres, although conspicuously absent from areas such as South America and many Pacific islands. It is noteworthy that only the more primitive genera are today confined to their traditional warm, humid habitats, while the more advanced genera are found in drier and harsher habitats to which they adapted themselves. Although the fact that few species and individuals survive today indicates that they are becoming extinct, the very fact that they did survive for such a long period of time suggests an immensely indestructible constitution.

Formerly all the living genera were classified under one family, the Cycadaceae. However, in 1959 Johnson pointed out in the "Proceedings of the Linnaean Society of New South Wales" that the genera are so

dissimilar that they should rather be placed in three separate families. According to his system only the genus *Cycas* remains in the family Cycadaceae. The genus *Stangeria* is placed in the family Stangeriaceae while the remaining genera, *Zamia*, *Dioon*, *Ceratozamia*, *Microcycas*, *Macrozamia*, *Lepidozamia*, *Bowenia* and *Encephalartos*, are placed in the family Zamiaceae. In Africa three genera occur naturally, namely *Cycas*, *Stangeria* and *Encephalartos*, thus representing all three families.

DESCRIPTION

Cycas thouarsii, for this is the name of the African *Cycas*, is a palm-like, perennial, evergreen tree (Figure 2 on page 5). It has a cylindrical, mostly unbranched trunk 4-10 m high, which is 12-20 cm thick when formed, but increases to 45 cm in time. The trunk is covered with alternating series of scale leaves and persistent leaf bases, the latter constituting a protective coat of armour. It has a long swollen tap-root which is persistent, but does not regenerate when destroyed during transplanting operations. It also has a mass of thin but fleshy secondary roots which originate in both the tap-root and the underground portion of the stem. A peculiar feature, present in most cycads, is a mass of small, roundish tubercles formed at the soil surface and termed coralloid roots. Their function is uncertain, but as they contain a blue-green alga in symbiosis, it is thought that they may bind atmospheric nitrogen in a way similar to that of the bacterial nodules of leguminous plants.

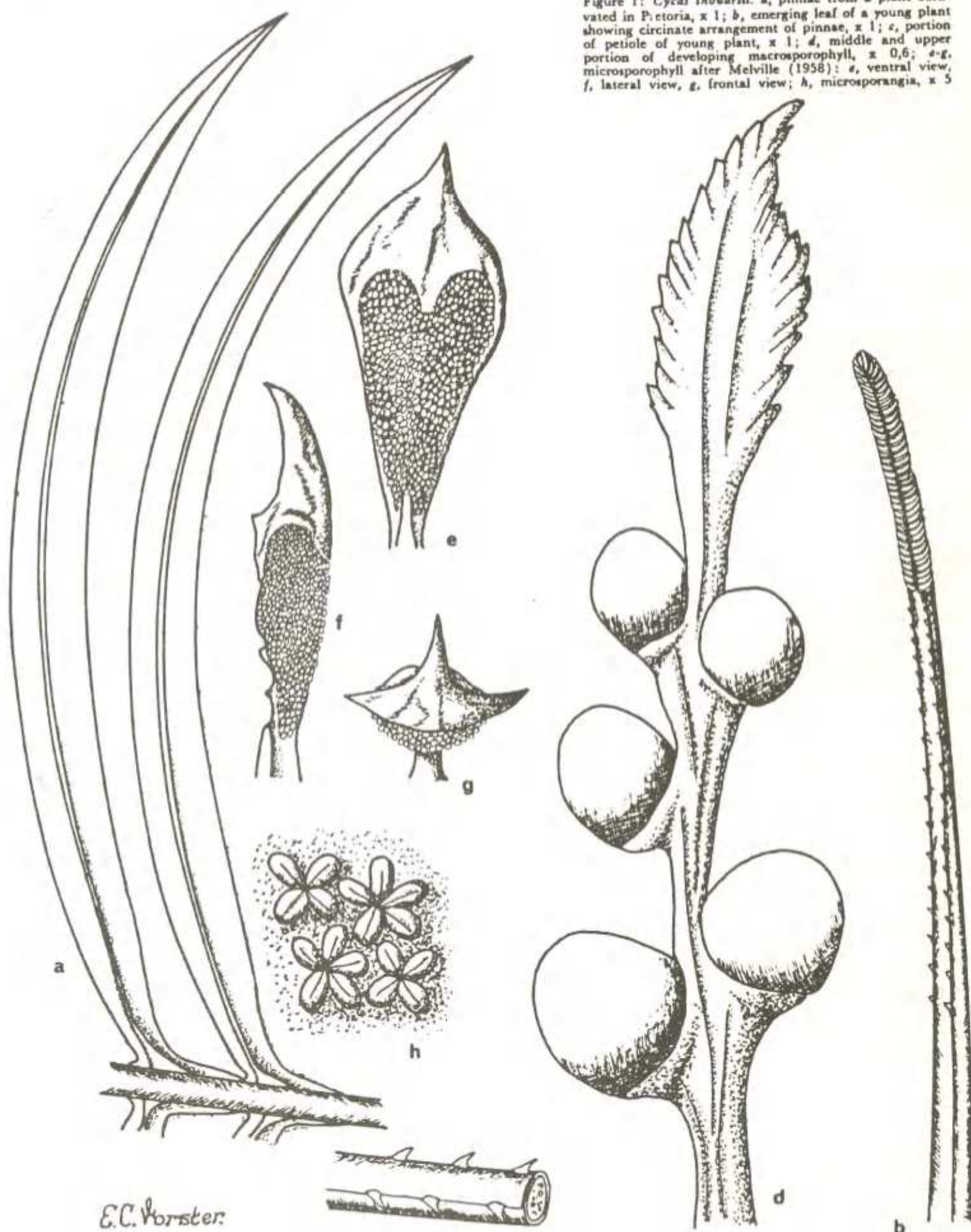
Apically the trunk bears a crown of up to 40 palm-like pinnate leaves, which are 1,5 - 3,0 m long and 30 - 60 cm wide. The leaves are spirally arranged as can be seen by studying the leaf-scars on the trunk. However, as the leaves do not appear continuously but in clusters at intervals of some months, one gets the impression that they are arranged in whorls (Figure 3 on page 7). The leaves are compound, each consisting of 60 - 70 subopposite pairs of pinnae (leaflets) (Figure 1a on page 4). The leaflets are subfalcate to linear, gently curved with a spinulous-acute apex; with the margin entire, thickened and slightly recurved. The lower margin of the pinnae is slightly decurrent on the rachis. Each pinna has a prominent midrib but no secondary nerves, a character by which the genus *Cycas* can easily be distinguished. The pinnae are leathery in texture, glabrous, bright green

above but paler below, 20-38 cm long and 0,7-2,0 cm wide. Along the petiole the pinnae are abruptly replaced by 5 mm long thorns (Figure 1c in page 4). The petiole is 30-40 cm long and, along with the rachis, cylindrical in shape. The scale leaves are simple with deltoid bases and linear cusps, velvety below but smooth above, brown in colour and up to 6 cm long and 3 cm wide at the base.

A feature common to all cycads is that the plants are dioecious, which means that separate male and female inflorescences are borne on different plants.

The male inflorescence (Figure 4 on page 7) is a compact, oblong-cylindric, yellowish-orange cone, 30-60 cm long and 11-20 cm in diameter. It is borne on a very short peduncle that is usually less than 5 cm long and sparingly velvety in texture. The

Figure 1: *Cycas thourarii*. a, pinnae from a plant cultivated in Pictoria, x 1; b, emerging leaf of a young plant showing circinate arrangement of pinnae, x 1; c, portion of petiole of young plant, x 1; d, middle and upper portion of developing macrosporophyll, x 0,6; e-g, microsporophyll after Melville (1958): e, ventral view, f, lateral view, g, frontal view; h, microsporangia, x 5



scales or microporophylls (Figure 1e to g on page 4) of the male cone are spirally arranged along a central vertical axis, and are horizontally spreading. They are obdeltoid, 3.5-5.0 cm long and 8-16 mm wide, tapering to a pedicel which is 2-5 mm long. The barren scale face, which is visible on the outside of the cone, is triangular and acuminate with the tip sharply upturned; it is velvety in texture and 2 cm wide. The numerous microsporangia in which the



Figure 2: A female *Cycas thouarsii* at the Durban City Hall

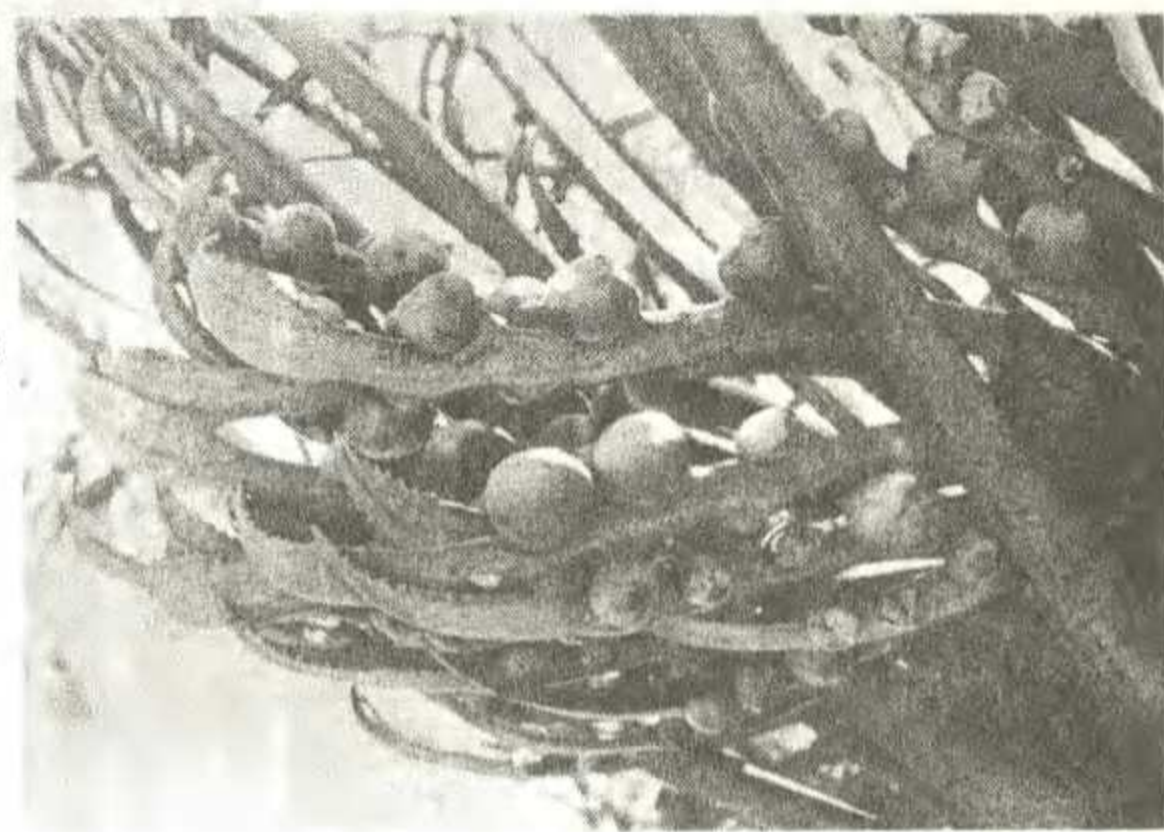


Figure 6: Development of the female inflorescence in *Cycas thouarsii* growing in Durban Botanical Gardens

pollen is stored are borne on the undersides of the microsporophylls, occupying a definite area (Figure 1e on page 4). The hemispherical microsporangia (Figure 1h on page 4) are about 1 mm in diameter, and are arranged in groups of 4-5. They open with slits to release the pollen which is carried away by wind.

The female inflorescence (Figures 5 and 6 on pages 8 and 5) looks very different from the male inflorescence on account of its loose structure. However, on close examination it proves to be essentially similar, consisting of a number of spirally arranged scale

leaves (macrosporophylls) bearing female spores or ovules. The number of ovules per sporophyll is much less than the number of male spores (pollen grains), and the ovules are borne along the margins of the macrosporophyll, not below. A macrosporophyll (Figure 1d on page 4) is linear in outline, up to 35 cm long, including a long velvety stalk. The tip is expanded, ovate to lanceolate-acuminate, its margin being subentire to crenulate or irregularly dentate. This tip is 7-10 cm long and up to 3 cm wide. Along the median portion between the stalk and the scale tip, 4-5 pairs of ovules are borne. When the ovules are ready for fertilization, a drop of fluid appears at an opening, termed the micropyle, situated at the one end of the ovule. Pollen from a nearby male plant is deposited on the drop by wind, and when the drop evaporates the pollen is drawn into the ovule where fertilization is affected. The fertilized ovule develops into a fruit, which is sessile, ovoid to subglobose, 5.7-6.2 cm long, 4-5 cm wide and slightly less in height at maturity. The fruit consists of a hard, smooth kernel (Figure 7b on page 8) which is covered by a thin, smooth, green fleshy coat that becomes wrinkled and brick-red

at maturity (Figure 7a on page 8). Unlike *Encephalartos*, unfertilized ovules do not grow to full size, but shrink and eventually fall off.

HOW TO RECOGNIZE *CYCAS THOUARSII*

When female inflorescences are present, the genus *Cycas* can easily be recognized by the loose structure of the inflorescence, as in all the other genera the female inflorescences are compact cones. In the sterile condition *Cycas* can be recognized by the single, prominent midrib of the pinnae. In *Stangeria* the pinnae also have a single prominent midrib but, in addition, secondary nerves branching from the midrib, are present. The soft, herbaceous texture of the leaves and the subterranean stem further distinguish *Stangeria* from *Cycas*.

As few *Cycas* species are generally cultivated, the only species with which *C. thouarsii* is likely to be confused, are *C. rumphii* and *C. circinalis*, both from India. From descriptions it is not easy to pinpoint the difference between these three species.

In 1916 Stapf published an excellent account of *C. thouarsii* in which he compared it with *C. rumphii* and *C. circinalis*. This comparison forms the basis of Table I, which has been amplified from information published since 1916. It is thought that Stapf's measurements of the seed were made from herbarium specimens in different stages of development, and that the rather large measurements for *C. circinalis* may indicate that at least some measurements included the fleshy seed covering. In Table I the authors' own measurements were therefore substituted for those of Stapf, from

batches of mature seed of *C. thouarsii* received from Florida in the U.S.A., and *C. rumphii* and *C. circinalis* received from Ceylon. The measurements of the Florida specimens compare well with measurements made on *C. thouarsii* in the Durban Botanical Gardens. In all cases the fleshy seed covering was removed prior to the measurements being taken. These measurements are graphically compared in Figure 8 (on page 9). From Table 1 it is clear that the microsporophylls of the three species are different, while the illustration of the macrosporophyll of *C. circinalis* furnished by Raizada & Sahni (1960) shows it to be distinct from that of *C. thouarsii*.

The vegetative parts of the three species are so much alike that it would be unwise to attempt naming specimens of unknown origin in the absence of inflorescences. The shape and size of the leaflets in the three species are not only very similar, but the amount to which they vary is confusing. Thus the leaflet illustrated in Figure 1a (on page), from a specimen of *C. thouarsii* cultivated in Pretoria, is much more falcate (curved) than those figured by Melville (1958), Lewis (1960-61) and De Laubenfels (1972). At the other extreme the illustrations of leaflets of *C. rumphii* and *C. circinalis* in Raizada & Sahni (1960) are indistinguishable from one another.

TABLE I

CHARACTER	<i>C. thouarsii</i>	<i>C. rumphii</i>	<i>C. circinalis</i>
Height of stem	Up to 6 m, occasionally up to 10 m	Up to 6 m, occasionally up to 15 m	Up to 5 m, occasionally up to 12 m
Length of leaves	1,5-3,0 m	1-2 m	1,5-2,5
Distance between spines on petiole	1,0-1,5 cm	2-3 cm	1-2 cm
Number of pinnae	60-70	50-70	80-100
Distance between pinnae	1 cm	1,2-1,5	Unknown
Shape of pinnae	Linear, gently curved	Linear, rather straight	Linear, gently curved
Dimensions of pinnae	20-38 x 0,7-2,0 cm	20-30 x 1,5-1,7 cm	18-24 x 0,9-1,3 cm
Midrib of pinnae when dry	Grooved above	Grooved above	Not grooved above
Microsporophylls	Cusp short, abruptly recurved	Cusp reflexed or recurved	Cusp long, gradually tapering
Macrosporophylls	Blade ovate-lanceolate, crenulate	Blade short, oval, sparingly and minutely toothed or serrate, rarely lobed, from a terete claw	Blade long acuminate, serrate with numerous sharp narrow teeth, from a flat broad claw
Length of Seed	5,7-6,2 cm, average 5,9 cm	4,7-5,7 cm, average 4,9 cm	3,0-3,1 cm, average 3,1 cm

It is significant that Greguss (1968) demonstrated differences between the leaf anatomy of *C. thouarsii* and *C. circinalis*. However, people who are quick to draw conclusions from such evidence should note that Pant & Nautiyal (1963) found differences between the leaf anatomy of *C. thouarsii* and *C. comorensis*, which are considered to be one and the same species.

From Table 1 it seems as if Stapf (1916) was correct in maintaining that *C. thouarsii* resembles *C. rumphii* more than it does *C. circinalis*, with which it has been confused. As *C. thouarsii* is geographically, as well as on the basis of the reproductive structures, well isolated from *C. rumphii* and *C. circinalis*, it seems practical to give it full specific status rather than consider it a subspecies of one of the Indian species.

ITS NAME

The correct name for the African *Cycas* is *Cycas thouarsii* Gaudichaud, sometimes misspelt "thuarsii". It was first described and figured in 1804 by Thouars, who misidentified it as *C. circinalis*, an Indian species. In 1829 Gaudichaud recognized it as a separate, new species and named it *C. thouarsii* in honour of Thouars.

Synonyms of *C. thouarsii* include —

- C. circinalis* in the sense of Thouars, not of Linnaeus;
- C. thuarsii* R. Brown, *nom. nud.*;
- C. madagascariensis* Miquel;
- C. comorensis* Bruant;
- C. circinalis* Linnaeus subsp. *thouarsii* (Gaudichaud) Engler; and
- C. circinalis* Linnaeus subsp. *madagascariensis* (Miquel) Schuster.

"*Cycas*" is the Greek word for a palm tree.

Vernacular names include Mtapu or Mtapo and Mpapindi (Tanzania: Swahili); Mtapu (Zanzibar: Wasuahelis); Samble, Faux sagoutier (Madagascar: French); Fahou or Fahu (Madagascar: Betsilea); Voafako (Madagascar: Hova); Voafaho (Madagascar: Betsilea); Fatzon, Fato, Fatra and Batsimisaraka (Madagascar). "Batsimisaraka" means "Man-eating plant", after a legend in which the leaves are blood-sucking tentacles (Schuster, 1932).

DISTRIBUTION and ECOLOGY

Cycas thouarsii occurs naturally on the east coast of Madagascar and on the neighbouring Comores and Seychelles island groups, as well as on the east coast of Africa at the Zambesi delta and further north in the

neighbourhood of Dar-es-Salaam, where it also occurs some 80 km inland (Figure 10 on page 10).

The natural presence of *C. thouarsii* on the African mainland has been debated. It is surprising how little is known about such



Figure 3: A pseudowhorl of leaves emerging from a *Cycas thouarsii* cultivated in Pretoria

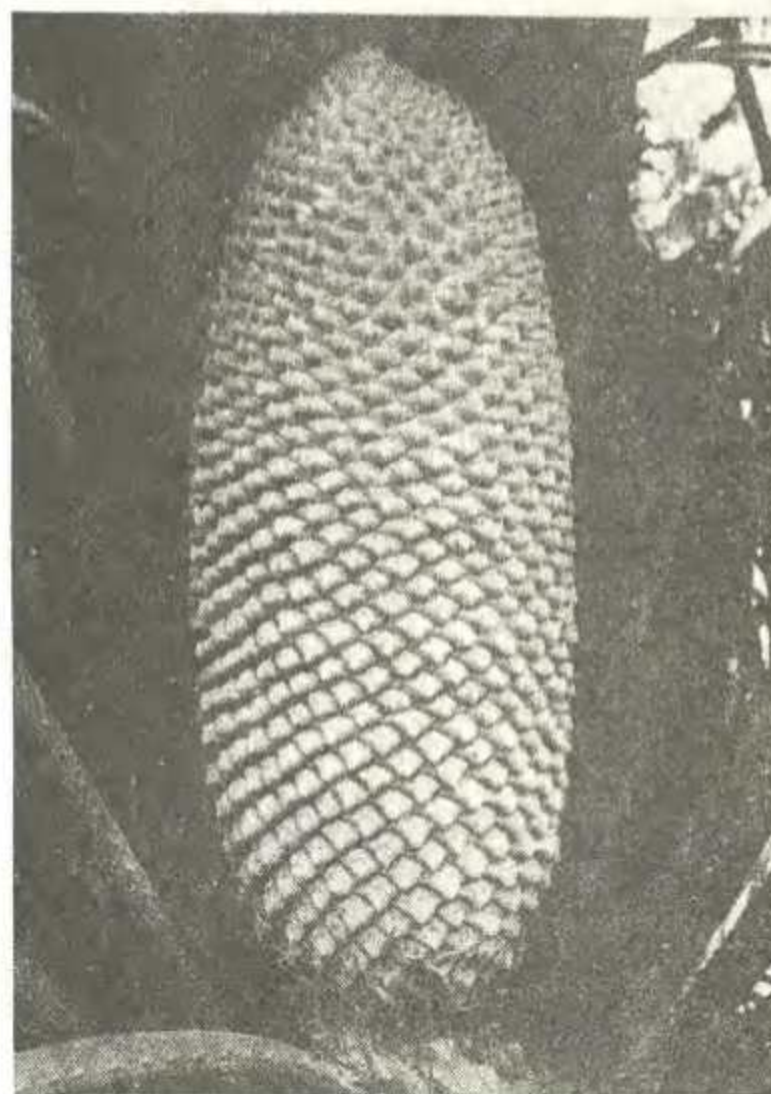


Figure 4: Male cone of *Cycas thouarsii* in Durban Botanical Garden

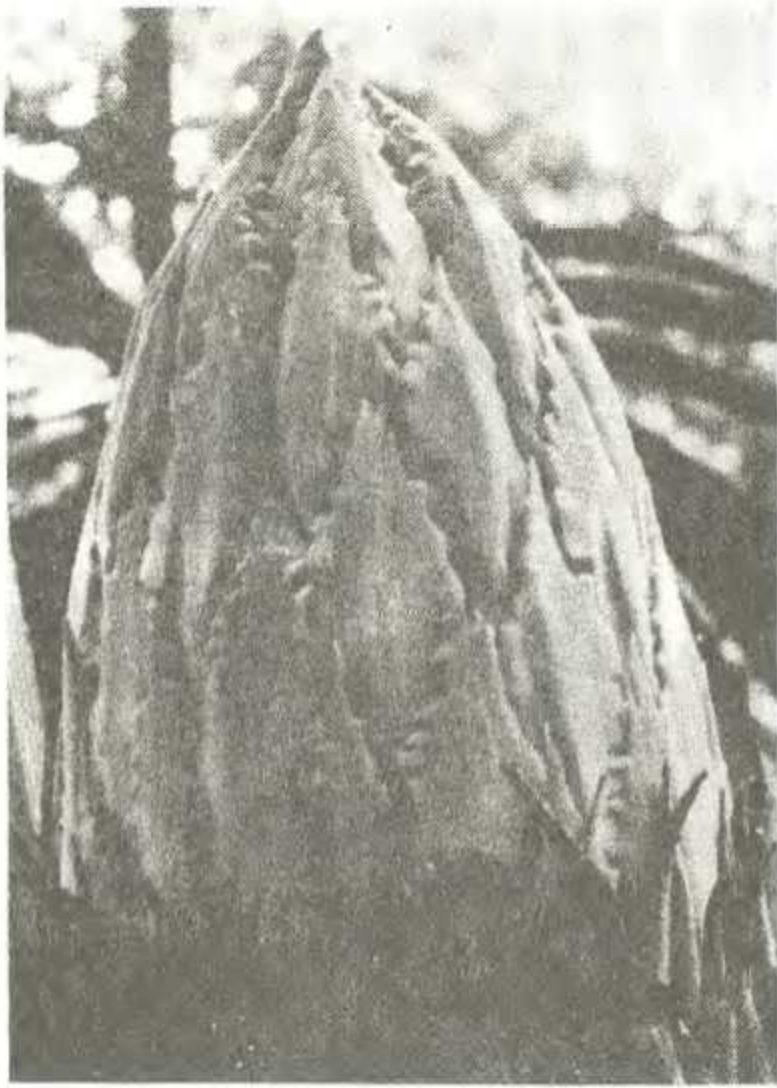


Figure 5: Development of the female inflorescence in *Cycas thouarsii* growing in Durban Botanical Gardens

a large plant, and the vast gap in its distribution on the African coast is difficult to explain. As it has some economic value as a food plant (see below) and as an ornamental plant, some people argue that it was spread in remote times by Arab traders. Indeed, it is practically certain that it was introduced into Mauritius by human agency. Where it does occur on the African mainland, it seems established and has the appearance of an indigenous species. Phytogeographically its presence on the mainland does not present difficulties. Although most other Cycadales show an extremely restricted distribution, the range of *C. thouarsii* is comparable to those of for example *C. circinalis*, *C. rumphii* or *C. media*. It is notable that Madagascar and the East African Islands have a high percentage of endemic species, but representing an ancient group, *C. thouarsii* probably occupied its present distribution area before the islands became separated from the mainland.

The habitat of *C. thouarsii* is open woodland or forest margins, usually near the coast, where they occur sparsely as individuals or as small groups. They are confined to areas with rather high annual rainfall: 2 000 - 3 000 mm or even more on the east coast of Madagascar, although the populations in Africa and on the south-eastern coast of Madagascar experience only 1 000 - 2 000 mm per annum. Summer temperatures are relatively high, and the winters completely frost-free. It usually grows on sand or coral formations. It is said often to be associated with the mangrove *Barringtonia speciosa* L.f. in Madagascar, while D. Hardy told the writers that he saw it growing in water furrows on that island. It is said to be characteristic of the littoral belt in areas where it occurs. It seems to grow best in light shade where the atmospheric humidity is higher, but it survives direct sunlight. From experience with cultivated plants it seems as if this species does not thrive in dense shade.

CULTIVATION

Advice on cultivation can only be offered from experience gained in Pretoria. Plants are seldom seen in inland gardens, although they are not uncommon in centres along the east coast of Africa. Of great importance is a hot, humid atmosphere. The authors therefore keep their plants in partial shade or dappled sunlight, such as is afforded by *Acacia* trees. If this is not available, plants are placed just under the canopy of a dense tree so that they get the morning sun but are shielded from the midday and afternoon sun. Under fairly dry atmospheric conditions such as found at Pretoria, the sun scorches the leaves, or else the leaves take on a sickly yellowish colour and remain stunted. The leaves are somewhat tender to frost and should be protected from severe cold. With cycads one must always be cautious of stem rot, therefore a fine, sandy soil containing a considerable amount of humus is used. To maintain this humus at a high level, droppings of woodlice are constantly added. If

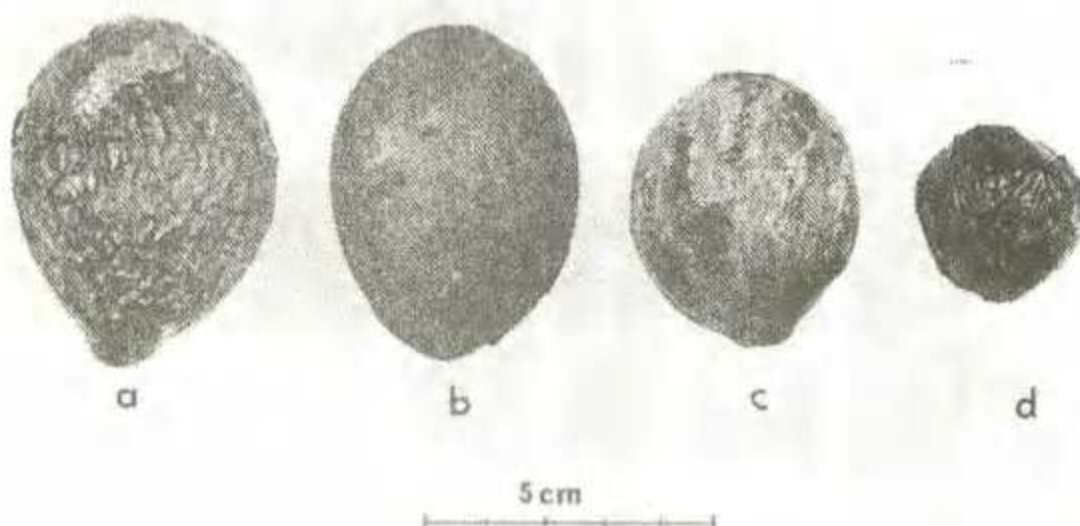


Figure 7: Comparison of seed in different *Cycas* species: a. *C. thouarsii* from Durban, still including seed flesh; b. *C. thouarsii* from Florida, U.S.A.; c. *C. rumphii* from Ceylon; d. *C. circinalis* from Ceylon

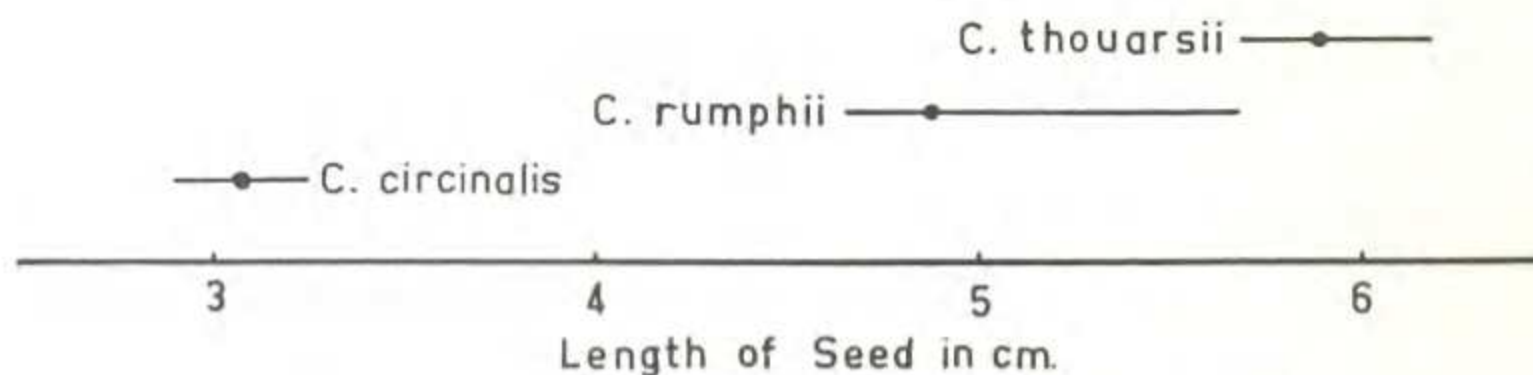


Figure 8: Graphical comparison of seed lengths in *Cycas thourarsii*, *C. rumphii* and *C. circinalis*. The dots indicate average measurements

the soil is alkaline, the pH should be lowered by mulching with used tea leaves. The authors water their plants from a fish pond, which is sometimes slightly enriched with soluble fertilizer. The plants are quite sensitive to raw manure and an excess of fertilizer, so that these should be avoided. In spite of the hard, leathery leaves the plants use large amounts of water. They do not come to visible harm if dried out for some weeks, but it is desirable to keep the soil moist. The authors have never had trouble with insect pests on their plants, but some growers complain about scale insects and mealy bugs. These can be removed by one of the chemicals prescribed against these pests, or brushed off with a stiff paint brush dipped in methylated spirits. If temperatures are high enough, plants grow remarkably fast. Even in Pretoria a plant produced three sets of leaves in one summer, and every set may mean an increase of 2-4 cm in the length of the stem.



Figure 9: Lateral buds with leaves but restricted growth in *Cycas thourarsii* in the collection of the Botanical Research Institute, Pretoria

Plants can be propagated from stems, off-shoots or seed. Stems and off-shoots should be planted in soil such as described above, after the wounds have been treated with a fungicide and the leaves cut off. It is desirable not to keep the stem too dry. New leaves will usually be produced within a year. Propagation from seed is even more successful because the long tap-root is not damaged. The fleshy covering should be removed and the seed pressed halfway into moist sand so that the longitudinal axis is parallel to the soil surface. Never cover the seed completely. Although the seed can stand some amount of desiccation, it is better to plant it immediately, and keep the sand moist. The embryo has no resting period, but there may be a lapse of up to 18 months before any signs of germination becomes visible. On germination a horizontal slit appears in the region of the micropyle and spreads in both directions. Eventually the seed is split almost all around, and from this split appears a flattish, radicle that bores into the soil. As soon as this radicle appears, the seed should be transplanted into pots which are at least 30 cm deep so that the long tap-roots won't be damaged later. It is of the greatest importance that the radicle should be protected from the scorching rays of the sun. After the tap-root has developed, the first leaf appears through a slit on the bend of the radicle.

ECONOMIC IMPORTANCE

In India *C. circinalis* is of considerable economic importance. The trunk yields a sago of sorts, as well as a medicinal gum. The leaves are plaited into mats, the juice of the tender leaves is used against flatulence and vomiting, and the young leaves can be eaten. A flour is obtained from the seed, which are also fermented and then roasted as a starch-rich food. The bark and seed are ground to a paste with coconut oil to be used as a poultice for sores and swellings. The seed is poisonous in the fresh state, but

it is claimed that the poisonous glucoside pakoein and an associated poisonous cholesterol-like phytosterine can be removed by pounding followed by repeated washing in water. The pollen is said to be narcotic.

As *C. thouarsii* has so often been confused with *C. circinalis*, it is difficult to decide whether authors, in citing economic uses of *C. thouarsii*, in fact got their information from sources relating to *C. circinalis*. As the two species are so closely related, *C. thouarsii* can probably be utilized for the same purposes as *C. circinalis*. Watt & Breyer-Brandwijk (1962) and Brenan & Greenway (1949) state that the seed is eaten in Tanzania, but only in times of famine. They state that the seed, seed flesh and shoots of *C. circinalis* are poisonous, but that there is no indication that this is the case with *C. thouarsii*. Prain (1917) said that the plant is a source of sago in Madagascar and perhaps in Mauritius, but not on the African continent. De Laubenfels (1972) states that both the seed and the trunk are utilized for starch. Greenway (1941) states that the plant yields a tragacanth-like gum, insoluble in water but able to absorb a considerable quantity of water to become a mucilage.

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Figure 10: Known distribution of *Cycas thouarsii*

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BITS AND PIECES STUKKIES EN BROKKIES

DR VERDOORN TURNS NINETY

Dr Inez Clare Verdoorn, Honorary Life Member of the Cycad Society (see ENCEPHALARTOS No. 1, page 14) turns 90 on 15 June 1986. Members of the Society will undoubtedly join the President, Editor and Committee Members in congratulating Dr Verdoorn and wishing her a very sincere 'Alles van die beste' on this occasion.



Dr Inez Verdoorn

MANLIK/VROULIK : GETALVERSKILLE?

Is daar meer manlike as vroulike broodbome? Nadat verskeie persone so'n bewering teenoor hom gemaak het, het Maans Kemp besluit om ondersoek hierna in te stel. Op 26 Maart 1986 het hy 3 openbare en 8 privaat-tuine in Port Elizabeth besoek en al die broodbome met keëls getel. Hierdie tuine sluit van die grootste versamelings broodbome in Port Elizabeth in. In geen gevalle is enige plante spesifiek op grond van hulle geslag verkry nie. Die ondersoek is net in Port Elizabeth gedoen om die effek van klimaatverskille uit te skakel. Sestien spesies was betrokke. Die uitslag was as volg: 150 plante met keëls is getel, waarvan 109 manlik en 41 vroulik was.

Enige verdere inligting in hierdie verband van die kant van ons lesers sal verwelkom word en kan aan die redakteur gestuur word. Dit sal interessant wees om soortgelyke opnames tussen broodboomkolonies in die natuur te maak.

KWEKERSLYS

ENCEPHALARTOS wil graag op 'n gereelde basis inligting aan sy lesers verskaf oor kwekerye wat broodboomsaailinge verkoop (sien "Redaksioneel"). Ons beoog om van tyd tot tyd 'n lys van sodanige kwekerye te publiseer, met die nodige besonderhede. Ons kan uiteraard slegs kwekerye by so'n lys insluit waarby lede van die Vereniging betrokke is. Dit sal dus waardeer word as lede van die Vereniging wat geregistreeerde kwekers van broodbome is, of by sodanige kwekerye betrokke is, volle besonderhede aan die redakteur sal stuur. Inligting wat verlang word sluit die volgende in: naam van kwekery, posadres, telefoonnommer en spesies wat gewoonlik beskikbaar is.

NURSERY LIST

ENCEPHALARTOS is keen to supply information to its readers on a regular basis concerning nurseries which sell cycad seedlings (see "Editorial"). We envisage publishing a list of such nurseries from time to time, together with essential information. We can obviously only include nurseries in such a list in which members of the Society are involved. It would therefore be appreciated if members of the Society who are registered growers of cycads, or who are involved in such nurseries, could provide full particulars to the editor. Information required includes the following: name of nursery, postal address, telephone number and species which are usually available.

OPEN DAY DISPLAY

In a recent open day at the Department of Botany of the University of Natal, Pietermaritzburg, the foyer was attractively decorated with, amongst other displays, both preserved and living specimens of cycads and related plants. Professor Chris H. Bornman, former Head of the Department of Botany at Pietermaritzburg, is well-known for his book on Welwitschia - that fascinating plant from South West Africa - and Welwitschia material was prominent in the display. Equally prominent, we were pleased to note, were recent copies of ENCEPHALARTOS. Thanks to Fiona Getliffe-Norris for the publicity!

CULTIVATED CYCADS

We would like to publish photographs of and/or information on cycads which have been cultivated from seed and are now well-established plants in the garden, in pots, etc. (see "Editorial"). If you possess such cycads, please send a photograph to the editor, together with information regarding the species, age, etc. We would be particularly interested in plants which were grown from seed and have formed cones. If you so wish, your name will not be published with the information.

GEKWEKTE BROODBOME

Ons sal graag foto's van en/of inligting oor broodbome wou publiseer wat van saad gekweek is en nou goed-gevestigde plante in tuine, potte, ens. is (sien "Redaksioneel"). As u sulke broodbome besit, stuur asseblief 'n foto aan die redakteur, tesame met inligting betreffende die spesie, ouderdom, ens. Ons sal besonder geïnteresseerd wees in plante wat van saad gekweek is en keëls gevorm het. Indien u so verlang, sal u naam nie saam met die inligting gepubliseer word nie.

NEW MEXICAN CERATUZAMIA

Dr Dennis Stevenson, Professor of Botany at Barnard College of Columbia University and Honorary Curator of the New York Botanic Garden, has written to tell us that Ceratozamia euryphyllidia, a new cycad from Mexico, has now been officially 'written up'. The botanical text appears in Brittonia, Volume 38, No. 1 of 1986, pages 17 to 26 and the authors are Dennis Stevenson, Sergio Sabato of Naples University and Mario Vásquez Torres of the University of Veracruz. (The World List of Cycads in ENCEPHALARTOS No. 3 included this new species but inadvertently the name was mis-spelled as C. 'euriphyllida'.)

The scientific text includes the statement that "C. euryphyllidia is perhaps the most distinctive species in the genus. Its more pronounced morphological characters are the enormous leaves and translucent leaflets with undulate margins." Closely related to C. miqueliana, the new species occurs in a very limited distribution near the Oaxaca-Veracruz border. Only 30 plants have been discovered and the exact locality is being withheld in order to prevent eradication by commercial collectors.

In the same publication, the authors discuss general relationships in Ceratozamia. The nine species are classified into two groups; the 'broad-pinnate' species are C. euryphyllidia, C. hildae, C. latifolia, C. microstrobila and C. miqueliana, while the 'narrow-pinnate' species are C. kuesteriana, C. matudae, C. mexicana, C. norstogii, C. robusta and C. zaragozae.

CYCADS GROWN FROM LEAVES?

It is known that a few growers have had success in propagating cycads from leafbases with small pieces of stem attached, but few details are available and it seems the 'technique' is not well-developed. ENCEPHALARTOS would like to hear from members who can report any interesting details.

One such report comes from member Gert du Plessis of Durban. Gert tells of a mature leaf of Encephalartos lehmannii (with no stem portion attached) which he planted about 15cm deep into sandy garden soil. Very definite roots, about 10cm long, had formed within the first year but there was no evidence of any potential leaf or shoot formation.

Gert also reports on a similar observation on E. villosus leaves, which after being cut off the parent plant, have sometimes made roots when placed in leafmould or on the compost heap.

KWAZULU CYCAD PROJECT

The Director of the KwaZulu Bureau of Natural Resources, Mr R.A. Conant, has written to let us know that the Bureau is very conscious of the importance of the cycads occurring in KwaZulu, and has become increasingly concerned about the disappearance of specimens from certain areas. To try and reverse this situation, the Bureau is collecting seed for propagation and re-establishment in the wild. Mr Conant has promised to keep us informed of developments in this regard.

The Society fully supports the Bureau in its endeavours and wishes them every success with their project.

CYCADS OF AUSTRALIA

Persons ordering copies of "Australian Plants" Vol. 13, no. 101, December 1984 which contains Len Butt's excellent feature "Cycads of Australia" (see ENCEPHALARTOS no. 5, page 17), are requested to pay him in Australian dollars only and not in US dollars. Len is suffering a loss because of the drop in the value of the US dollar. If anyone is interested in obtaining one of the few remaining copies, please send 3,85 Australian dollars to Len Butt at 25 Ortive Street, Yeronga, Queensland 4104, Australia.

Cynthia Giddy has kindly offered to place a joint order on behalf of South African members who are keen to obtain copies. Members who are interested must please contact Cynthia (P.O. Umlaas Road, 3730; tel. no. 03325-478) within two weeks of receiving their copy of ENCEPHALARTOS no. 6. She will then send in one consolidated order, with the consequent savings on back charges and postage.

WETGEWING T.O.V. BROODBOME

ENCEPHALARTOS is baie bly om te kan rap= porteer dat 'n brief van die Direkteur, Departement van Natuur- en Omgewings= bewaring, Provinsiale Administrasie van die Kaap die Goeie Hoop ontvang is na aanleiding van die redaksionele artikel in ENCEPHALARTOS no. 5 (Maart 1986). Die brief meld onder andere dat konsep= wetgewing op 6 Desember 1985 gepubliseer is "waarin die beginsel van die bevoorde= ring van die kweking van bedreigde en beskermde spesies flora vervat word en daar voorsiening gemaak word vir minder beperkende maatreëls ten opsigte van gekweekte eksemplare van bedreigde spe= sies". Die brief meld verder dat "daar reeds op interprovinsiale vlak aandag gegee word aan eenvormige wetgewing vir sover dit moontlik is". Die betrokke Direkteur word bedank vir die spoedige reaksie en vir bogemelde goeie nuus. Verdere korrespondensie word met die Kaaplandse en ander owerhede gevoer oor hoe huidige en beoogde wetgewing brood= boomliefhebbers raak en inligting wat verkry word sal in toekomstige uitgawes van ENCEPHALARTOS gepubliseer word.

SEEDBANK NEWS

The following seeds are now available: Encephalartos villosus, E. natalensis, E. ferox, Macrozamia pauli-guilielmi subspecies flexuosa and Bowenia specta= bilis. Seeds of South African and exotic cycads are urgently needed. Cash dona= tions are most welcome. See ENCEPHALAR= TOS no. 5, page 11, for full details on the seedbank. Contact Danie Nel, 120 Bowker Road, Escombe, 4093; tel. no. 031-442505.

SAADBANK - NUUS

Die volgende saad is nou beskikbaar: Encephalartos villosus, E. natalensis, E. ferox, Macrozamia pauli-guilielmi subspecies flexuosa en Bowenia spectabilis. Saad van Suid-Afrikaanse en buitelandse broodbome word dringend verlang. Kon= tantdonasies is baie welkom. Sien ENCEP= HALARTOS no. 5, bladsy 11, vir volle besonderhede oor die saadbank. Tree in verbinding met Danie Nel, Bowkerweg 120, Escombe, 4093; tel. no. 031-442505.

CYNTHIA GIDDY ON S.A.B.C.

Interviewed by Roy Holtzhausen on the po= pular Radio South Africa programme, 'Talkabout', Cynthia Giddy once again de= monstrated her fundamental knowledge and wide experience of cycad matters during a half-hour discussion on 14 March 1986. Speaking in collaboration with Tony Hitchcock of Durban Botanic Gardens, Cynthia briefly discussed the cultivation of cycads and the conservation of cycads in this country and then went on to deal with 'phone-in' queries from listeners around the country. The interview closed with a mention of the Cycad Society's activities, particularly ENCEPHALARTOS, the seedbank and the pollen exchange ope= rations. A number of enquiries about membership of the Society arose from Cynthia's talk.

VAN DIE PRESIDENT

Dit is vir my aangenaam om te rapporteer dat daar 'n volgehoue toename in lidmaatskap gedurende die eerste helfte van 1986 was en dat lidmaatskapnavrae steeds elke week ontvang word. Ons is dank verskuldig aan Marion Debruyne vir haar pligsgetroue werk in hierdie verband. Nog goeie nuus is dat die Vereniging se fondse op 'n gesonde basis is; ons verwag dat die onvermydelike toename in druk-, posgeld- en ander onkoste sonder probleme geakkommodeer sal kan word. In hierdie verband is ons baie dankbaar vir die baie lede wat so gaaf was om geldelike donasies tot ons fondse te maak.

Die saadbank- en stuifmeelruilfasiliteite is nou goed gevestig. Danie Nel rapporteer 'n goeie reaksie op sy oproep om saad, sommige saad is aangekoop en lede is in die algemeen baie gelukkig met die pakkies saad wat hulle ontvang het. Ons sê dankie aan Danie vir sy entoesiasme en ook aan die groot aantal mense wat gehelp het om die saadbank-onkoste te bestry deur middel van hulle kontant-skenkings. Cynthia Giddy sit haar baie waardevolle werk aan die 'huweliks-buro'-skema voort, maar maak daarvan melding dat verskeie broodboomtoesiate met groot versamelings nog nie hulle stuifmeelruilvraelys teruggestuur het nie.

Die aantal lesers wat geskryf het en positiewe kommentaar gelewer het oor die kwaliteit van ENCEPHALARTOS, getuig van Maans Kemp se pogings. Die sukses van hierdie tydskrif hang af van 'n volgehoue vloed van materiaal vanaf lede. Maans sal enige broodboom-nuusitem, kort of lank, verwelkom, asook foto's en briewe aan die redakteur.

Opwindende nuus is die stigting van 'n Noordoos-Transvaal-streek, wat nou aansluit by die Natalse en Oos-Kaapse streeksgroepe. Die krediet vir die aanvoer van hierdie ontwikkeling gaan aan Marion Debruyne en Jack van der Merwe en John Burchmore word gelukkig met sy verkiesing tot nuwe Streeksvoorsitter. Ons wens hulle alles van die beste toe. Die komitee wag nog vir iemand in die Suidelike Transvaal om na vore te kom en 'n plaaslike groep daar te vorm. Pretoria, byvoorbeeld, is 'n sentrum met 'n baie hoë aantal Broodboomvereniginglede.

FROM THE PRESIDENT

I am pleased to report that there has been a steady increase in membership during the first half of 1986, and that membership enquiries are being received every week. We are indebted to Marion Debruyne for her diligent work in this regard. More good news is that the Society's funds are in a sound condition; we anticipate that the inevitable increases in printing, postage and other costs can be accommodated without difficulty. In this connection we are grateful to the many members who have kindly made monetary donations to our funds.

The seedbank and pollen exchange facilities are now well established. Danie Nel reports good response to his seed requests, some seed purchases have been made and members are generally delighted with the seed parcels they have received. Thanks are due to Danie for his enthusiasm and also to the large number of people who have helped offset seedbank expenses through their cash donations. Cynthia Giddy continues her most useful work on the 'marriage bureau' operation, but points out that there are several cycad enthusiasts with large collections who have not yet returned a pollen exchange questionnaire.

The number of readers who have written in with positive comments on the quality of ENCEPHALARTOS is testimony to Maans Kemp's efforts. The success of this magazine depends on a steady flow of material from members. Maans will welcome any cycad news item, long or short, and also photographs and letters to the editor.

Exciting news is the formation of the North-Eastern Transvaal section, which now compliments the Natal and Eastern Cape regional groups. Marion Debruyne and Jack van der Merwe get the credit for initiating this development and John Burchmore is congratulated on his election as the new Regional Chairman. We wish them well. The committee still awaits someone in the Southern Transvaal area to come forward with proposals to form a local group there. Pretoria, for instance, is a centre with a very high number of Cycad Society members.

Die wette wat op natuurbewaring betrekking het word tans gekonsolideer tot een oorhoofse nasionale beleid. In opvolging van die redaksionele kommentaar in ENCEPHALARTOS no. 5, het ons 'n brief geskryf aan mnr. John Wiley, die Minister van Omgewingsake en Toerisme, om die Vereniging se gewilligheid te vermeld om aan konsultasie oor broodboomsake deel te neem. Lede sal oor enige ontwikkelinge ingelig word.

ROY OSBORNE

The laws relating to nature conservation are presently being consolidated into one overall national policy. Following the editorial comment in ENCEPHALARTOS no. 5, we have written to Mr John Wiley, Minister of Environmental Affairs and Tourism, to let him know of the Society's willingness to participate in consultations on cycad matters. Members will be kept informed on any developments.

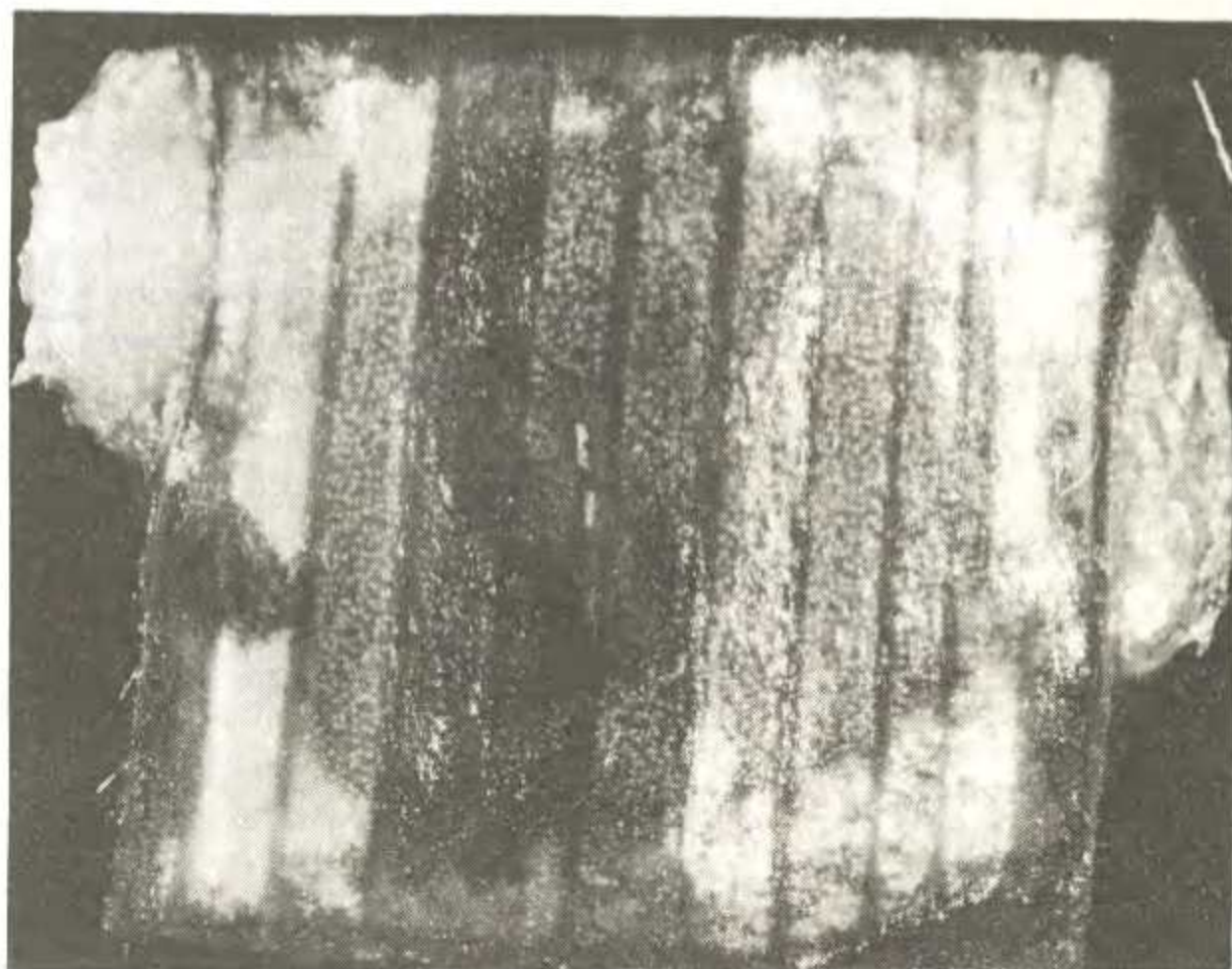
ROY OSBORNE

TISSUE CULTURE

Recent experiments with the use of cycad root material in tissue culture were mentioned in ENCEPHALARTOS no. 5. Further researches have re-explored and confirmed the work carried out by Dr Nicholas Henson at Kew Gardens some 5 years ago. Henson reported that "young leaf tissue offers the most promise for the future culture and propagation of cycads". Following Henson's work, Roy Osborne has now established a technique for growing callus from small sections of leaflets and good news is that Encephalartos woodii responds well to this treatment (see photograph).

This project will continue with attempts to 'persuade' the callus to generate leaves and roots.

Further news on the tissue culture front is that Dr Hannes de Lange, previously of the Citrus and Subtropical Fruit Research Institute at Nelspruit, has recently been appointed to the research staff of the National Botanic Gardens at Kirstenbosch. He and assistant Sandra Tennant will also be investigating micropropagation techniques in cycads.



FROM THE AUTHOR'S MOUTH

Reprinted from Lawrence G. Green's book, "These wonders to behold", (1981 reprint), chapter 16, with kind permission from the publishers, TIMMINS of Cape Town.

One Sunday morning I was walking along a ridge in Johannesburg, the nature reserve known as The Wilds, with my old friend and shooting partner A.P. Cartwright, when I saw a clump of tall-stemmed Mujaji cycads with dark green leaves. They were named after the "rain queen" of the Soutpansberg, and they are among South Africa's most ancient plants.

I suppose the great fascination of these survivals lies in the picture they give us of our world before man appeared on the scene. Darwin called such plants "living fossils", and nowadays any living creature of the dawn world, such as the coelacanth, is described in this way. Cycads are the most interesting ancient relics clinging to life in the plant kingdom, for they still look very much as they did millions of years ago, when dinosaurs touched their leaves. They rank as the most primitive of all the seed-bearing plants; and they are interesting, too, as rarities; for only one species is common and some species in the Union are almost extinct. In recent years they have received the protection they deserve. Only since World War II have most of the sparse, remote, scattered cycad groves of South Africa been located by experts and mapped.

Miss M. Courtenay-Latimer, director of the East London Museum, was a member of an expedition in 1947 which travelled thousands of miles to compile the first accurate classification of South African coastal cycads. Among the extremely rare cycads which she identified was Encephalartos caffer, thought to have been lost for ever because native witchdoctors once used it in their medicines and almost exterminated it. The species had not been reported since 1902, and only a few tiny colonies have survived. Veld burning and the plough have killed off many rare cycads.

Pollination of cycads is still something of a mystery. Wind was responsible, according to an old theory; but Miss Courtenay-Latimer found weevils in all the cones she examined. Baboons and toucans distribute the seeds.

No doubt some of you have seen cycads growing in public gardens and thought they were palms. Dr Carl Thunberg, the old Swedish traveller, was the first to describe cycads at the Cape, and he made that mistake. "The bread-tree is a species of palm which grows on the hills below the mountains in these tracts" (in Langkloof), wrote Thunberg. "It was of the height and thickness of a man at most, very much spread and single. I have sometimes seen two or three stems spring from one root. It is out of the pith (medula) of this tree that the Hottentots contrive to prepare their bread... I observed that the tree stood in dry, sterile places between stones and grew slowly."

Indeed it grows so slowly that no one thinks of sowing the seed. Many specimens have been uprooted, and that is why certain species have become uncommon in their natural habitat. However, there is something to be said for placing a few selected cycads where they can be seen by the general public. One remarkable specimen grows outside the Commissioner's office at Stegi in Swaziland, its story inscribed on a bronze plate: "Cycad Encephalartos lebomboensis. This indigenous tree was growing at the time of Queen Elizabeth (1568-1603) and replanted here to commemorate the Coronation of Queen Elizabeth II - 2nd June, 1953."

Kirstenbosch has the finest collection of cycads, and they are to be found in the red soil behind the so-called "Lady Anne Barnard's bath". Most of the South African species are there, one eleven feet high. One rare Encephalartos latifrons is probably many centuries old and the largest known specimen. Three species of the Stangeria cycads are also on view,

and these resemble ferns, with underground stems and small cones just above the surface. One of them was named Stangeria paradoxa to show how surprised the old botanist was when the plant he had identified as a fern turned out to be a cycad.

Incidentally the Encephalartos species (from the Greek, "cake in the head") received that name because the seeds are used as food. Baboons are great raiders of cycad trees, for they know when the cones are ripe. Encephalartos horridus, the spiky cycad, repels invaders easily enough, but it is in danger of becoming extinct.

Cycads love moist places. When that inspired naturalist, the late Eugene Marais, reported cycads in the dry Waterberg area of the Transvaal, the botanists thought he had made a mistake. However, he had sent a specimen to Dr Marloth and that

was placed in the national herbarium in Pretoria. Long afterwards Miss I.C. Verdoorn, a niece of Marais, found it there and went in search of the cycad. Sure enough, hundreds of cycads were growing on the mountain where Eugene Marais had studied the ants and the baboons. So his niece named the species after him, Encephalartos eugene maraisii.

Botanists estimate that the first cycads appeared on earth about two hundred million years ago. They remained with us because they resisted drought, insects and disease, while they poisoned those plant-eating animals which might have destroyed them. Once there were great cycad forests, which turned into coal. Now the cycads survive only in little patches, usually far from densely-populated areas. They are rare, but they survive.

FROM THE BOOKSHELF

"EXCELSA" - JOURNAL OF THE ALOE, CACTUS AND SUCCULENT SOCIETY OF ZIMBABWE

Although cycads are not expressly included in its name, The Aloe, Cactus and Succulent Society of Zimbabwe caters quite extensively for cycad enthusiasts.

Mike Kimberley, National Chairman of the Society, tells us that they have back-copies of most numbers of their excellent journal, EXCELSA, for sale. Most issues cost Z \$ 7,50. The ones of interest to cycad people would be issue No. 4 (1974), which has an article 'Wanton Destruction of an Old Cycad' by Piet Vorster and Richard Watmough,

issue No. 5 (1975), which gives details of Plant Protection Legislation in Zimbabwe, and issue No. 9, in which Mike Kimberley has a feature on Cycads of Zimbabwe and also a list of Specially Protected Plants.

Any correspondence about these and other publications under their auspices, or enquiries about membership of their Society, should be addressed to:

The Secretary, Aloe, Cactus and Succulent Society of Zimbabwe, PO Box 8514, Causeway, Harare, Zimbabwe.

ROY OSBORNE

VISITING N. S. W. MACROZAMIAS

WITH LORAN WHITELOCK

by Paul Kennedy

Early on Friday, 8 August 1985 Loran Whitelock arrived in Sydney from Los Angeles. (Loran Whitelock is Research Associate at the Los Angeles Botanic Gardens - Editor.) I met him at the Airport and conveyed him to the Botanic Gardens where he did some homework in the Herbarium on our various *Cycas* species. Shortly after 5.00a.m. on Saturday morning we met Greg Durney and Craig Thompson and set off for Coonabarabran via Capertee, Mudgee and Premer. By the time we reached Lithgow, on the inland side of the Blue Mountains, the temperature had dropped appreciably and we struck a very heavy frost; so heavy, in fact, that we saw some horses in a paddock near the side of the road with frost on their manes. A cup of coffee and the sight of some cycads had the effect of regenerating Loran. He, nevertheless, remarked that he was so cold that he could hardly hold his camera steady enough to take photos.

At Capertee we saw a dwarf *Macrozamia communis* with glaucous fronds. At Mudgee we saw a similar *M. communis*, though with conventional green fronds, as well as *M. secunda*. The *M. communis* and *M. secunda* populations were probably half a mile apart and, although neither variety was in abundance, both were reasonably plentiful. At the *M. secunda* location there were quite a few *M. communis* growing and also some obvious hybrids. At the *M. communis* location there were a few *M. secunda* but these could virtually be counted on one hand. We continued on to Premer where we found a large but fairly scattered stand of *M. diplomera* and also some seeds. We hunted for seeds until dark descended on us. While wandering through the bush, Loran found one *M. heteromera*-type plant but time precluded looking too far from the spot where we originally stopped.



Macrozamia moorei in habitat

After an overnight stay at Coonabarabran (where we linked up with Stan Walkley and his party from Brisbane), we travelled to a second location where M. diplomera grows. Here there were no seeds at all, even though there was a much larger population of plants than at Premer, albeit in a much smaller area. To my knowledge the plants at Coonabarabran have not coned for the past 4 years and showed no sign (in the way of emerging cones) that they would cone next year. The M. diplomera plants we saw at both locations were virtually the same height as the M. communis we had previously seen but had many more fronds. In addition, the plants at Premer had more fronds with divided leaflets than those at Coonabarabran, where we saw some plants with a majority of the fronds having undivided leaflets. In close proximity to the Coonabarabran M. diplomera we saw another very common but scattered cycad which no one could positively identify. This plant seemed to be a hybrid or some intermediate form of M. secunda/diplomera/heteromera. We saw some plants with M. secunda-type fronds, others with M. heteromera-type fronds, while interspersed through the area were isolated M. diplomera. Everyone was confused as to the correct identification of this particular plant.



Macrozamia fawcettii with male cone

From Coonabarabran we continued on to a location in the Pilliga State Forest near Narrabri, where one of Stan's friends had located some M. heteromera in seed. The Pilliga State Forest occupies an area in excess of 380 000 hectares and we drove some 30km along forest tracks before we reached the stand of M. heteromera. The stand of M. heteromera seemed to be confined to a very narrow belt. We saw some plants which had fronds which were a light steely-blue when new, but a faded steely-green when aged. Coning appeared to have been prolific with numerous male plants having had 3 to 4 cones and many female plants having 2 cones. By the time of our arrival all the female cones had completely disintegrated and there was strong evidence by way of crushed seeds, complete with gaping teeth marks, that wild pigs had been eating the seeds, or more probably had been eating the outer flesh of the seeds and had engaged in a certain degree of overkill. This stand of M. heteromera had by far the least canopy cover of any New South Wales cycad I have ever encountered. Next stop was nearby Mount Kaputar where we saw M. stenomera growing at an elevation of approximately 4000 feet. Unfortunately we could find no evidence that



Macrozamia fawcettii with female cone

coning had occurred this year. M. stenomera is somewhat unique in so far as it produces divided pinnae as a one year-old seedling.

After an overnight stay at Moree we headed off. Some 5 hours later we reached Dal-morton where we saw the New South Wales variety of M. moorei which both Loran and Stan were convinced was a distinctly different species from the Queensland M. moorei. The obvious differences are the height of the trunks, the colour of the leaves and the size of the seeds. The plants we saw had trunks averaging 3 to 5 feet in height as opposed to the Queensland variety which can range up to 20 feet. The M. moorei grows on steep hillsides in a narrow valley divided by a fast flowing river. The area is very picturesque and is virtually uninhabited. Seeds were plentiful, both underneath the plants and also in cones which had not fully disintegrated and were still sitting in the crowns awaiting seed removal by the marsupials. Reaching into the crown to collect seeds almost assured you of being 'stabbed' by the very sharp spines at the base of the rhachis. Most of the female plants which coned seemed to have produced up to 4 cones. I have found M. moorei cones to be a very uniform 8 inches in diameter, 22 inches long and 25 to 27 pounds in weight.

Our next stop was in the Coffs Harbour area where M. fawcettii grows. M. fawcettii is probably the most attractive of our Section Parazamia Macrozamia and has very broad glossy pinnae which, because of the spiralling of the rhachis, seem to grow at a 360 degree angle around the rhachis. Despite an intensive search in a fairly large stand of M. fawcettii, only a handful of seeds were found near some completely disintegrated cones and, as we were just about to cease looking, I stumbled across one solitary intact cone which was almost on the verge of disintegrating. Loran was ecstatic as he photographed it from numerous angles.

At 3.30 p.m. we called it a day and Stan, Loran and party headed off to Brisbane (where Loran would continue on to far-North Queensland) while Craig, Greg and I headed off in the opposite direction towards Sydney. Summing up; a great time was had by all!

A LAYMAN'S GUIDE TO THE MACROZAMIA SPECIES SIGHTED EN ROUTE

-Macrozamia stenomera is a true mountain-dweller which grows at altitudes exceeding 4 000 feet. Has a subterranean caudex. The pinnae are multi-divided giving a bushy effect to the frond. The fronds are generally upright with a slight twisting of the rhachis towards its tip. The number of fronds averages 6 to 8 and they attain an average height of approximately 2 feet. Unlike most other New South Wales Macrozamia which have seeds with vermilion/scarlet-coloured flesh, M. stenomera has lemon-yellow-coloured flesh with a greenish segment where the cone has opened up as the seeds have matured.



Emerging frond of Macrozamia stenomera



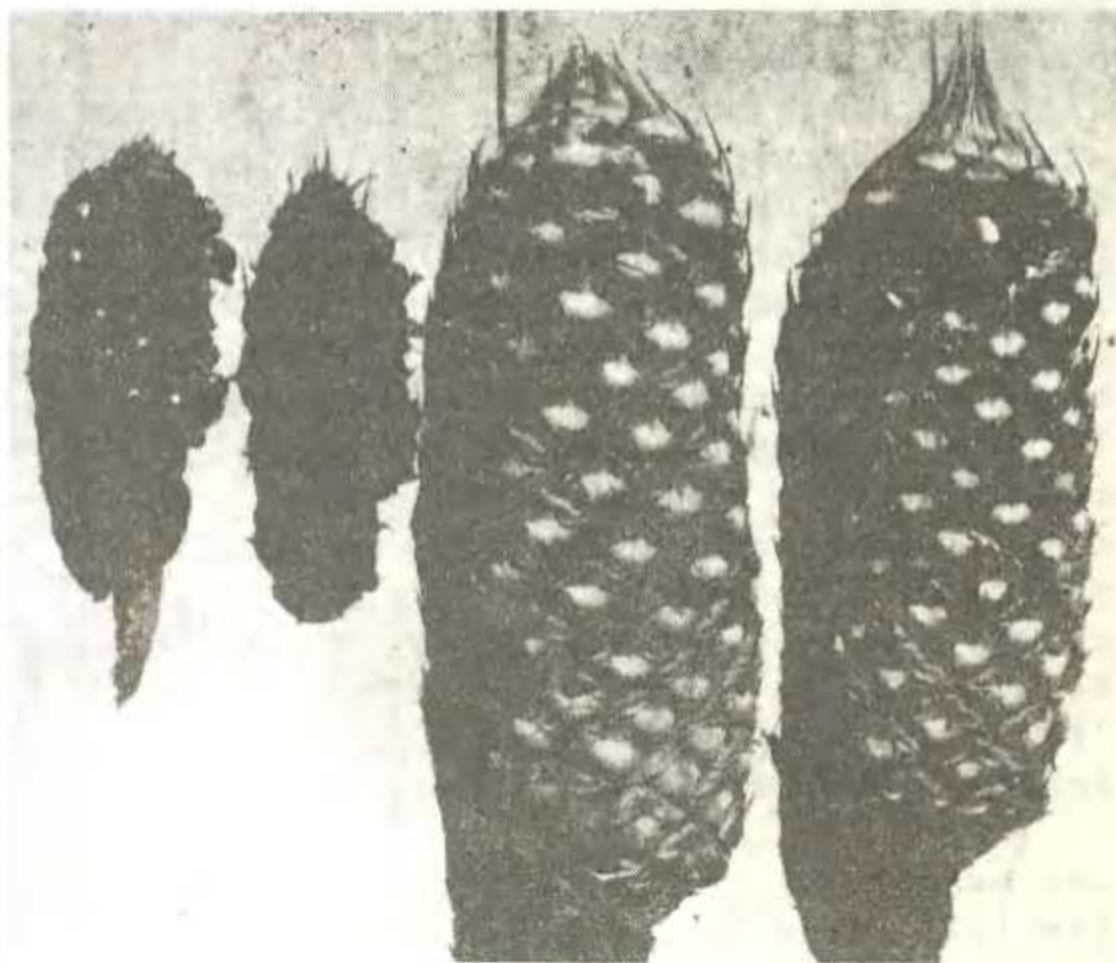
Macrozamia heteromera in a container

-M. diplomera has a subterranean caudex. At first sight appears to be a mid-sized M. communis, but upon closer inspection can be seen to have divided pinnae. The pinnae extend horizontally from the rhachis and divide once to three times. The number of fronds averages 15 to 20 and they attain a height of up to 3 feet. Some fronds have pinnae which are all divided while others were sighted on the same plant with no divided pinnae. Some fronds were sighted with a combination of divided and undivided pinnae.

-M. heteromera has a subterranean caudex. The pinnae are divided and rise in a "V" shape from the rhachis. Like M. diplomera there were pinnae variations on individual fronds on the same plant. This species had marked variations in frond colour; some plants had fronds which were a light steely-blue when young but these seemed to turn to a faded steely-green with age. The number of fronds averaged 6 to 8 and these attained an average height of approximately 2 feet.

-M. fawcettii has a subterranean caudex. The pinnae are undivided and are quite broad when compared with other Section Parazamia species. The pinnae are a most attractive glossy dark-green in colour. The rhachis has multiple spiral twists giving the impression at first glance that the pinnae are growing at a 360 degree angle around the rhachis. The number of fronds averages 4 to 6 and these attain a height of up to 2 feet.

-M. secunda has a subterranean caudex and is the smallest of the Section Parazamia species. The pinnae are undivided and rise at an acute angle from the rhachis to form a very narrow "V" shape when viewed end-on. The rhachis is not twisted but is very sharply re-curved near its tip, giving a sickle-shaped effect when viewed side-on. The number of fronds averages 4 to 6 and these attain a height of approximately 18 inches.



Female cones of Macrozamia fawcettii (left) and Macrozamia moorei (right)

M. moorei is the largest of the New South Wales *Macrozamia*s. Mature plants have trunks which are 3 to 5 feet tall and up to 2 feet in diameter. The pinnae are undivided and extend horizontally from the rhachis. The number of fronds exceeds 50 on mature plants and these grow erect at first before drooping. Individual fronds grow to 10 feet in length and these are very sharply spined at the base (making seed collection from the crown of the plant a very hazardous process).

SOIL CONDITIONS AND RAINFALL AND TEMPERATURE PATTERNS FOR THE NEAREST TOWN FOR WHICH WEATHER BUREAU RECORDS ARE AVAILABLE

Soil Conditions:

M. diplomera and *M. heteromera* grow in bush sand in very flat country. *M. moorei*, *M. stenomera*, *M. secunda* and *M. fawcettii* generally grow in nutritionally poor soil on stony hillsides.

Note: New South Wales *Macrozamia*s (and *Lepidozamia peroffskyana*) normally grow under a eucalypt canopy.

Rainfall and Temperature Patterns:

Species	*A	*B	*C
<i>M. heteromera</i>	662	11,1/26,1	-1,1/37,8
<i>M. secunda</i>	667	8,4/22,6	-1,7/35,6
<i>M. diplomera</i>	730	7,8/23,2	-3,9/35,0
<i>M. moorei</i>	839	7,2/19,7	-4,4/28,9
<i>M. fawcettii</i>	1645	13,6/23,1	2,3/28,6
<i>M. stenomera</i>not available....		

*A - Average Annual Rainfall (mm)

*B - Yearly average Min./Max. Temperatures (in Centigrade)

*C - Min/Max temperatures reached at least once per week in winter/summer

CYCADS ARE TOUGH

Readers who possess a copy of Dr Dyer's monograph on cycads in *Bothalia* (Vol. VIII, Part 4, 1965) will be familiar with the picture of a crown of leaves from a plant of *Encephalartos friderici-guilielmi* breaking through the surface of a national road near Cathcart after the plant had been completely buried during the road construction. Professor Esmé Hennessy of the Department of Botany at the University of Durban-Westville, and a keen member of the Society, is interested in the question of just how tough cycads are. She has drawn our attention to two reports in H.C. de Wit's book 'Plants of the World' (Thames and Hudson, London, 1966) which are summarised below:

One example illustrating 'survival potential' comes from the Herrenhausen rock gardens in Hanover, Germany. A trunk of a specimen of *E. altensteinii* was extricated from a bombed glasshouse in 1944, stored for two years and re-planted in 1946. It stood dormant for

10 years but in 1956 produced three leaves and, a few years later, a complete crown of leaves.

Perhaps the most remarkable of all survival stories concerns the trade in cycad foliage for wreaths and 'Palm Sunday' events in Europe in the latter part of the 19th Century. Cycad leaves from Africa were much favoured for this purpose and it is believed that whole trunks were towed by ships from African ports to Europe, the sea water keeping the foliage 'fresh'. Several of the trunks were planted after this harrowing marine experience and survived. It is thought that some of the older specimens in European glasshouses originated in this way.

ENCEPHALARTOS is keen to find out if anyone can provide any further information, particularly with respect to the latter story, e.g. where the plants came from, what species were involved, what the sea route was and where examples of any such plants occur nowadays. Can anyone help?

GIVE AND TAKE GEE EN NEEM

The exchange of plants is illegal in terms of the Plant Improvement Act. This act has however no bearing on the exchange of pollen and seeds and the unconditional donation of plants. Members are invited to use this column for offers and requests in this connection.

The Nature Conservation Ordinances of the various provinces may however control the exchange and donation of seeds and plants and members are advised to contact their local provincial nature conservation office for information, permits, etc.

Persons who want to arrange overseas exchanges should consult the Department of Agriculture, Division of Plant and Seed Control. In this case import and export permits are usually required and a phytosanitary certificate is generally necessary.

The 'Give and Take' column is also available for requests concerning any other items of interest to members, e.g. books, photographs, etc.

Die ruil van plante is onwettig in terme van die Plantverbeteringswet. Hierdie wet het egter geen betrekking op die ruil van stuifmeel en saad en die onvoorwaardelike skenking van plante nie. Lede word genooi om hierdie kolom te gebruik vir aanbiedings en versoeke in hierdie verband.

Die Natuurbewarings-ordonnansies van die verskillende provinsies mag egter die ruil en skenking van saad en plante beheer en lede word aangeraai om met hulle plaaslike provinsiale natuurbewaringskantoor in verbinding te tree t.o.v. inligting, permitte, ens.

Persone wat oorsese ruilings wil reël moet met die Departement van Landbou, Afdeling Plant- en Saadbeheer in verbinding tree. In hierdie geval is invoer- en uitvoerpermitte gewoonlik nodig en 'n phytosanitêre sertifikaat word algemeen vereis.

Die 'Gee en Neem'-kolom is ook beskikbaar vir versoeke t.o.v. enige ander items wat vir lede van belang mag wees, bv. boeke, foto's, ens.

-Roy Osborne (20 Maryvale Road, Westville, 3630; tel. no. 031-866953) would like to obtain small quantities of infertile seed, or whole infertile female cones, of Encephalartos heenanii, E. cupidus and E. inopinus. These are thought to be useful sources of tissue for tissue culture experiments, but any such material must be very fresh to be successful.

-Copies of Sherryl Gilbert's book "Cycads - Status, Trade, Exploitation and Protection, 1977-1982" are available from Koeltz Scientific Books, PO Box 1360 and 1380, D-6240 Koenigstein, West Germany.

-Mary Collins, Horticulturalist at Fairchild Tropical Garden, Miami, Florida, has written to say that FTG will be able to assist the Society with seed of Ceratozamia mexicana. She goes on to say:

"I recently read an article in the South African Panorama about indigenous Bauhinia species. We would like to try growing Bauhinia bowkeri, B. petersiana ssp. macrantha and subsp. petersiana, B. urbaniana and B. natalensis."

If any members could help FTG with these seeds, the gesture would be much appreciated. Contact Roy Osborne at 20 Maryvale Road, Westville 3630; tel. no. 031-866953.

Oos-Kaap / Eastern Cape

Tien Oos-Kaapse lede van die Vereniging en hulle families het op 19 April 'n uitstappie na die Van Stadens-reservaat naby Port Elizabeth onderneem om na Encephalartos longifolius - plante in hulle natuurlike omgewing te gaan kyk. Na die aangename staptog, is saam piekniek-etes geniet.

Die volgende Oos-Kaapse byeenkoms word vir 24 Julie beplan.



Sommige van die Oos-Kaapse lede wat die uitstappie meegemaak het, met volwasse Encephalartos longifolius in die agtergrond en jong voorbeelde van Homo sapiens (van saad gekweek) in die voorgrond.

Die lede is, van links na regs, : Leon Meiring, Marius Meiring, Pieter Stroebel, Hannes Slabbert en John Boshoff.

Natal

The excursion to the Moyeni Estates, High Flats, which was originally scheduled for May, has now been postponed until Sunday, 8 June.

Noordoos-Transvaal /

North-Eastern Transvaal

On Saturday, 3 May about 40 enthusiastic members and guests of the newly-formed North-Eastern Transvaal Region of the Cycad Society met to visit the nursery of the Lebowa Conservation Department at Modjaji and then to explore the well-known Encephalartos transvenosus forest at the nearby reserve.



Some of the members who visited the Modjaji Reserve. From left to right: Franz Wessels, André Topham, Marion Debruyne and John Burchmore



A giant specimen of Encephalartos transvenosus at the Modjadji reserve

The officer-in-charge of the nursery operation, John Burchmore, explained the activities. Some 45 000 specimens of the 'Modjaji Palm' were on display in the nursery - all in peak condition. These plants are available to members of the public at very reasonable prices.

At the reserve itself, members were free to explore the various trails which John had pointed out. As one member put it: "Words cannot describe the sight before us. We were dumbfounded at the size and quantity of these majestic plants, many of which were 7 m in height. It is a veritable forest of cycads, preserved for hundreds of years under the decree of the three successive Rain Queens of the Levubu people."

At a meeting at the Modjaji Reserve the new North-Eastern Transvaal Section was constituted and the following office-bearers were elected:

- Chairman: John Burchmore
(PO Box 1335, Pietersburg 0700;
Officer-in-charge of the
Modjaji cycad nursery)
- Secretary/Treasurer:
Loren Bronkhurst
(PO Box 3226, Pietersburg 0700)
- Additional committee members:
André Topham, Annetjie Thomas,
Franz Wessels

The committee and members would like to record a special vote of thanks to Mr Jack van der Merwe for his work in planning and organising this meeting, and to Mr John Burchmore for his enthusiastic assistance.

CYCAD RESEARCH IN THE 80'S

BY ROY OSBORNE

Although this newsletter is not set out to be an in-depth scientific journal, it is clear that many of our readers are deeply interested in current technical projects involving cycads and thus it is appropriate to highlight some of the cycad-related research work which has been carried out over the past few years. This article is not intended to be a comprehensive review of the literature, indeed only about one-half of the total number of 'cycad' publications is mentioned. To avoid making this too involved, I have not for instance covered the current work on palaeobotany such as that of Delevoryas (1982). I have also not included specific comments on the many more popular-style articles such as those featured in the magazines of the four cycad societies, nor the several excellent cycad articles published in Fairchild Tropical Garden Bulletins. Nevertheless, this article does show something of the great deal of scientific work currently in progress.

TAXONOMY AND SYSTEMATICS

Dr. Dennis Wm. Stevenson (1981,1985) of Columbia University in New York has proposed significant classification changes within the Cycadales on the basis of known and suspected relationships in the order. In his current hypothesis, the order is divided into two sub-orders, the Stangerineae (families Stangeriaceae and Boweniaceae) and the Cycadineae (families Cycadaceae and Zamiaceae). The family Zamiaceae is split into sub-families Diooideae (*Dion*) and Zamioideae with tribes Zamieae (*Ceratozamia*, *Microcycas*, *Zamia*) and Encephalarteae (*Encephalartos*, *Lepidozamia*, *Macrozamia*).

The rather confused taxonomy of the genus *Zamia* has been reviewed by James Eckenwalder (1980) who consolidated 35 taxa from the West Indies into the single species *Zamia pumila*, a proposal which has

met with some dissent and may become modified. New species in the genus are *Z. fairchildiana* and *Z. pseudomonticola* (Gomez, 1982), *Z. inermis* (Vovides & Rees, 1983a) and *Z. splendens* (Schutzman, 1984). Schutzman and Vovides (1985) have collaborated on a systematic study of the broad concepts of *Z. loddigesii* and *Z. furfuracea*.

An impressive amount of taxonomic research has been carried out by the Italian team headed by Prof. Paolo De Luca at the University of Naples, with associates Sergio Sabato, Aldo Moretti and Mario Vazquez-Torres and others. The efforts of about 15 years field work in Mexico have resulted in six new *Dion* species being described: *D. califanoi* (1979), *D. caputoi* (1980a), *D. rzedowskii* (1980b), *D. merolae* (1981a), *D. holmgrenii* (1981b) and *D. tomasellii* in two varietal forms (1984). Two varieties of *D. edule*, var. *edule* and var. *angustifolium* are now recognized (1982).

The Italian school was responsible for changing the name from 'Dioon' back to the original *Dion* (1982), a move opposed by Andrew Vovides and Nancy Moreno (1983) but resubstantiated by De Luca, Sabato and Stevenson (1984). The work on *Dion* has very recently been summarised by Sabato and De Luca (1985) in a most informative paper on distribution, ecology and morphology of the genus in which three natural groups are recognized and which includes a key to the genus.

Four new species of Mexican *Ceratozamia* have been described: *C. hildae* (Vovides and Rees, 1980), *C. kuesteriana*, closely allied to *C. zaragozae*, re-discovered by Aldo Moretti and colleagues (1982), *C. norstogii* (Stevenson, 1982) and *C. microstrobila* (Vovides and Rees, 1983b) although the rank of the latter species is under review. Future re-classification of several taxa, presently varieties of *C. mexicana*,

is imminent.

A comprehensive work on the distribution (with maps) and ecology of the New World cycads has been published by Balduzzi, De Luca and Sabato (1982) and includes a discussion on the origin of these cycads on the basis of fossil records and continental drift. A pertinent observation for growers is that most *Dion* species normally favour dry conditions, *Zamia* is consistently heat-loving while *Ceratozamia* is restricted to areas where moisture is high.

Whilst there has thus been substantial work on the New World cycads, little has been published on the African or Australasian species. Two new *Cycas* species are added:

C. panzhihuaensis (Cheng *et al.*, 1980) and *C. guizhouensis* (Lan & Zou, 1983), both from China.

The relatively new science of karyotyping, characterisation of the individual chromosomes and chromosome pairs, has proved to have useful taxonomic significance in cycad systematics. Dr. Knut Norstog of Fairchild Tropical Garden has been the leader in this area of research and has shown that the situation is not as simple as was first thought. Dr. Norstog (1980, 1981) investigated the chromosome numbers of 14 species of *Zamia* and found considerable variation. In *Zamia chigua*, considered to be one of the primitive members of the genus, the chromosome number varies from 22 to 26. Less variation is observed with the chromosome numbers of West Indian *Zamias* and *Z. pseudoparasitica* which are thought to be more advanced. Andrew Vovides (1983) is also active in the field of *Zamia* karyotyping while Moretti and Sabato (1984) make reference to chromosome evolution in presenting evidence for the advanced status of *Z. paucijuga*. John Hendricks (1982) discusses aspects of chromosome evolution in the broader concept within the order as a whole.

Aldo Moretti (1982) has carried out a chromosome study of several Australian cycads using a fluorescence-staining technique which showed clear differences between *Macrozamia* on one

hand and *Bowenia* and *Lepidozamia* on the other. This observation supports the taxonomic separation of *Lepidozamia* as a genus distinct from *Macrozamia* with which it had previously been included. Additional evidence in this connection is given later in this text. However, Moretti also found that *Macrozamia communis* and *M. pauli-guilielmi* subsp. *pauli-guilielmi* are karyotypically similar despite their present classification into the *Macrozamia* and *Parazamia* sections of the genus respectively,

Even more detailed in the microscopic sense is the painstaking mapping of the information on the genes themselves. Buran Kurdi-Haidar and co-workers (1983) from the American University of Beirut have reported on the DNA sequencing in the genome of *Cycas revoluta*.

Work in the cycad taxonomy continues and it is hoped that some of the loose ends in the *Cycas* and *Zamia* genera will be tied up soon. Some long-known species like *Encephalartos 'archeri'* from Voi in Kenya are yet to be properly written up and several 'new' species like the *Encephalartos 'msinga'* from Northern Natal/Kwazulu will be described in forthcoming literature.

POLLEN GENESIS AND DISPERSAL

Because of their unique evolutionary position, the cycads continue to attract interest in developmental studies and this is especially true with respect to pollen grain ontogeny. Paolo de Luca, Vincenzo la Valva and Sergio Sabato (1980) have investigated the process of sperm formation in *Ceratozamia mexicana* and *Cycas revoluta*, while the French worker, Jean-Claude Audran (1981), similarly reported details of pollen grain development in *Ceratozamia mexicana*. Osama Terasaka (1982) from Tokyo has reported his results on the development of the nucleus inside pollen grains of various gymnosperms including *Cycas revoluta* and *Bowenia serrulata*, while Stuchlick and Moncada (1983) have written up the pollen morphology of Cuban gymnosperms, including *Zamia* and *Microcycas*. Michael Zavada (1983) from Indiana University has published a report on the pollen wall development of *Zamia floridana*. A current report by Dehgan and Dehgan (1985) on the pollen morphology of

cycads provides valuable insights into taxonomic relationships, and supports current re-classification proposals within the order.

Karl Niklas has been involved in a joint project with Knut Norstog (1984) in which they make detailed measurements of pollen transport in aerodynamic terms from the source to the female cone surface. The implications of their findings in the reproduction of *Cycas*, *Dion* and *Zamia* are discussed. Little work has yet been done on the insect vector aspect in cycad pollination, one publication of relevance being a description by Gary Breckon and V.N. Ortiz (1983) on the pollination of *Zamia pumila* through the agency of fungus gnats. There is a real need for more studies on the relative importance of wind and insect factors in pollination of cycad species in habitat.

LEAF MORPHOLOGY, ANATOMY & PHYSIOLOGY

Baijnath, Naidoo and Ramcharuy (1980) from the University of Durban-Westville in Natal have used electron microscopic techniques to examine in detail the leaf surfaces of several cycad species, while Koeleman, Robbertse and Eicker (1981) from the University of Pretoria have produced an extensive paper on the anatomy of leaflets of South African *Encephalartos* species, together with an identification key based on leaf anatomy. Leaf surface morphology has also been investigated by Professor Bijan Dehgan and Bart Schutzman (1984) of the University of Florida. Karatela and Gill (1984) from Bendel State University in Nigeria have similarly reported on the leaf surface character of their local species, *Encephalartos barteri*.

The detailed examination of certain structures within cycad cells has been carried out by Dr. David Webb (1982a) of Queen's University in Canada, who reported on the differences in plastid structures between light-grown and dark-grown seedlings of *Zamia floridana*. The structure of plastids from leaves of *Macrozamia moorei* received the attention of Bonatti and Sabato (1984).

Investigations into the structure of the ovule include the report on

storage cells in the ovule of *Cycas revoluta* by Rene Rohr (1980), while Japanese workers, Hiraoka, Wada and Takada (1981) have found evidence in the same species of interaction between the nucleus and cytoplasm by means of an intranuclear canal system.

Dennis Stevenson, whose taxonomic work was referred to earlier, has also been concerned with growth and development studies of cycads, demonstrating the radial growth pattern in 8 genera (1980a) and reporting on leaf bud and subsequent leaf growth processes (1981); on the basis of the latter findings, the recommendation was made to separate out the Boweniaceae as a family apart from the Zamiaceae, a proposal which is supported by evidence from chemical constituents (see later).

Little work has been published on cycad physiology, one study of interest being the investigations into the photochemical properties of *Cycas circinalis* and *C. beddomei* by Prabhakar and Rao (1981, 1984).

SEED MORPHOLOGY, DISPERSAL AND GERMINATION

Professor Bijan Dehgan and his co-workers in Florida have been very active in research into cycad seed morphology and its implications in dispersal and evolution. In 1983 Dehgan and Yuen showed the buoyancy in sea-water of seeds of *Cycas rumphii* and *C. thouarsii*, a property arising from an internal spongy layer within the seed. Because of their flotation it is probable that these seeds can travel from one island to another in Indian Ocean currents. Another interesting topic covered by Dehgan and Johnson (1983) has been the effect of sulphuric acid followed by gibberellic acid, on seed germination. When *Zamia floridana* seeds were treated in this manner, a remarkable 90% germination was found within 6 weeks.

Seed germination in cycads is dependent on the interaction of time, moisture content, humidity and temperature. C. Forsyth and 'Hannes' van Staden (1983) of the University of Natal's Pietermaritzburg campus have investigated this interaction in *Encephalartos natalensis*. Optimum germination (90%) was found when the seeds were stored in

moist conditions for 3 months at 20°C and then incubated at 30°C. The process of germination seems to be associated with enzymes known as peroxidases which were studied by Esperenza Pena and co-workers (1983) at the University of Havana in *Cycas circinalis* seeds.

Seed dispersal by animals presents an important avenue for research. Allan Burbidge and Robert Whelan (1982) have studied and quantified the transportation of *Macrozamia riedlei* seed by the possums, nocturnal marsupials of Australia.

ROOT MORPHOLOGY AND CORALLOID ROOTS

The formation and development of cycad root nodules or coralloid roots has been an area of much research. De Luca and Sabato (1980) and Schneider (1984) have studied the situation in *Cycas revoluta*. Numerous publications from the team lead by Dr. David Webb of Queen's University have explored the interaction between light and root nodule development in such plants as *Bowenia serrulata* (1981), *Zamia floridana* (1982b), *Z. pumila* (1983a), *Macrozamia communis* (1983b), *M. diplomera* (1983c), *Dion edule* (1984), *Cycas revoluta*, *Encephalartos altensteinii* and *Zamia furfuracea* (1984 ref. 99). The different nodulation traits in different taxa could provide additional criteria for taxonomic decisions. Webb (1982c) has also reported on the effect of the gametophyte and cotyledons on root growth of *Zamia floridana* embryos, partial or complete excision of these organs reducing both primary and secondary root elongation.

Within the root nodules are the Cyanobacteria (previously blue-green algae), *Nostoc* as reported by Grilli Caiola (1980) and *Anabaena* as detailed by Cheng Zhu (1982) with respect to *Cycas revoluta* nodules. Extracts from the coralloid roots of this species appear to have anti-viral properties, at least with respect to the control of tomato viruses, an interesting observation from Rao and co-workers (1984). Another physiological aspect has been the seasonal change in phenolic substances; Obukowicz and colleagues (1981) of the University of Wisconsin believing that these com-

pounds may serve as a natural defence mechanism against undesirable microorganisms. The Swedish workers, Lindblad, Hällbom and Bergman (1985) are currently exploring the metabolic activity of *Zamia* coralloid roots in relation to the heterocyst cells in the filamentous strands of Cyanobacteria.

Dennis Stevenson (1980b) has researched the growth of cycads with subterranean stems, using *Zamia pumila* and *Stangeria* as typical examples. In both these plants, the stem and root progressively contract as new growth occurs at the apex, effectively pulling the stem underground.

TISSUE CULTURE

The propagation of viable plantlets by means of tissue culture techniques may well be the key to protection of endangered cycad species. Dr. Nicolas Henson (1980) working at Kew Gardens, investigated 35 species and found that the establishment of callus growth from tissue explants is relatively easily obtained. Furthermore, promising indications of the induction of shoot and leaf growth from callus stages was obtained in some *Zamia* cultures. Arthur Koeleman and Professor J.G.C. Small (1982) managed to obtain quite vigorous callus growth from stem and root tissue of several *Encephalartos* species, but subsequent organogenesis was disappointing.

The differentiation stage from callus to plantlet appears to be controlled by a critical auxin-cytokinin interaction. David Webb and colleagues working at the University of Puerto Rico have investigated the influence of the auxin, NAA, the cytokinin, BAP, and the amino acid, L-glutamine, on the *in vitro* development of *Zamia pumila* embryos. In this work by Webb, Rivera, Starszak and Matos (1983), callus growth led to either shoot or root development, and embryo-like structures were formed depending on the treatment programmes employed. However, plantlets capable of growing in soil were not obtained.

Esperenza Pena and Emma Grillo (1982) of Havana University have cultured the particularly endangered species *Microcycas calocoma* to a callus stage with some evidence of root formation. In Montreal, Sylvie Laliberte, Charles

Bertrand and Joachim Vieth (1983) report on callus formation and some degree of differentiation in megagametophyte cultures from *Encephalartos villosus*. Michel Monnier has collaborated with Knut Norstog (1984) studying the development of immature embryos of *Zamia* in culture.

Like much research, there is an element of good luck in this field. With sufficient work it is almost certain that a suitable technique for the propagation of cycads *en masse* by tissue cloning will be perfected.

CHEMICAL CONSTITUENTS

The toxic constituents of cycads have been further explored. Jack Cannon and colleagues (1980) from the University of Western Australia have determined the crystal structure of the toxic compounds macrozamin and sequoyitol from *Macrozamia riedlei*. De Luca, Moretti, Sabato and Siniscalco Gigliano (1980) have reported on the ubiquity of cycasin and the latter three authors (1981, 1983) have since shown both toxins to be present in all cycad genera but not in other plants. Macrozamin is generally more abundant than cycasin, occurring at levels from 0.2% in *Cycas cairnsiana* to about 5% in *Bowenia spectabilis*, the different concentration being largely genus dependent. The evidence now available supports the previously-mentioned proposal to separate *Bowenia* from the Zamiaceae; indeed, *Bowenia* may be closer to *Stangeria* than originally thought. Professor R.C. Tustin (1983) from the Onderstepoort Veterinary Research Unit has published details of the toxicity and carcinogenicity of the South African cycads, especially *Encephalartos lanatus*, while George Hoffman and R.W. Morgan (1984) comment on the implication of cycad materials as a source of foodstuff.

Professor de Luca's team (1982, ref. 21, has investigated the sugar composition of the hydrolysed mucilage from different cycads and has found that there is also a broad range of differences between Australasian, African and American genera. In their analyses, *Lepidozamia* appears to be quite distinct from *Macrozamia*, reinforcing the justification for its

separate generic status.

P.A. Gadek (1982) of the University of New South Wales explored the class of compounds known as biflavonoids which accumulate in the brightly-coloured testae of cycad seeds as ripening occurs. Again, different genera have different chemical patterns. Interestingly the compound cupressuflavone, previously known in other gymnosperms like the Cupressaceae, Auracariaceae and Podocarpaceae, was found in two *Macrozamia*s, *M. macdonnellii* and *M. communis*. Gadek, Quinn and Ashford (1984) later reported on the biflavonoids in cycad leaves where it is thought to act as a deterrent to leaf-eating insects and microbial invasion.

Other chemical substances recently isolated from cycads include some unusual fatty acids from *Cycas revoluta*, found by Japanese workers from Toru, Takagi and Y. Itabashi (1982), certain proteins which occur in the pollen tube of *Cycas armstrongii*, demonstrated by J.M. Pettit (1982) from the British Museum and the novel storage globulin named macrozim, isolated from the seeds of *Macrozamia communis* by R.J. Blagrove, Lilley and Higgins (1984) from the CSIRO in Australia.

ECOLOGY

The effect of spontaneous or accidental fires on cycads in habitat has been considered by various Australian scientists. T.S. Grove, A.M. O'Connell and N. Malajczuk (1980) from the CSIRO in Wembley, Western Australia, have investigated the effects of burning cycles on growth, nutrient content and rate of nitrogen-fixation in populations of *Macrozamia riedlei* and found that fire stimulates leaf growth and coralloid root activity. This plant makes a significant contribution to the biosystem of eucalyptus forests where it fixes about 35 kg of nitrogen per hectare in each 5-7 year interval between burnings. June Dolva and John Scott (1982) have studied the effect of fire on the mealybug/cycad association and found both respond favourably to increased fire frequency. A fascinating paper by J.M. Beaton (1982) discussed the fire aspect with respect to Australian aboriginal cycad "farming", while Beth Gott (1982) has written on

the usage of *Macrozamia moorei* roots by the indigenous people of South Australia.

Another traumatic incident to plants in habitat is the effect of severe cold. Rita Hummel (1984) from the University of Florida has published a paper on the freezing tolerance of cycads.

Occasional reports of spontaneous sex-changes in cycads continue to appear. Van Wyk and Claassen (1981) have produced the most thorough such report with respect to *Encephalartos umbeluziensis*, and Maans Kemp (1985) records a male to female change in *Cycas revoluta*. In all cases, these sex reversals appear to be associated with some traumatic environmental incident. A current publication by Ornduff (1985) deals with the topic of sex ratios in cycads, reporting on field studies on *Macrozamia riedlei* and *Zamia pumila*.

Hungarian workers, Borhidi and Muniz (1980), have discussed the separation in geological time of Cuba from the continental landmass, and the consequent evolution of an endemic flora including *Microcycas*; a similar and broader theme is found in the paper by Balduzzi *et al* mentioned previously. More recently, Elenevskii (1984) from Moscow University, has reviewed features of Cuban flora and includes a discussion of their indigenous cycads.

Sandra J. Newell, now at the Indiana University of Pennsylvania, has published papers (1983, 1985) arising from her earlier field studies on *Zamia pumila* in habitat in Puerto Rico, in which interesting aspects of leaf morphology and reproduction are discussed.

CONCLUSION AND ACKNOWLEDGEMENTS

There is a surprising amount of research work currently in progress and it is clear that the centres of such projects are in the U.S.A and Europe. Countries like South Africa and Australia have the real benefit of large endemic cycad populations which provide ideal opportunities for many projects, the outcome of which could add significantly to our knowledge of the plants. It is hoped that academics and teachers will thus motivate students

in this direction more in the future than in the past.

I would like to thank Professor Nat Grobbelaar, Dr. Dave Webb and particularly John Hendricks, for their helpful comments on an early draft of this paper.

Roy Osborne
University of Natal
January 1986.

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A MOVING EXPERIENCE

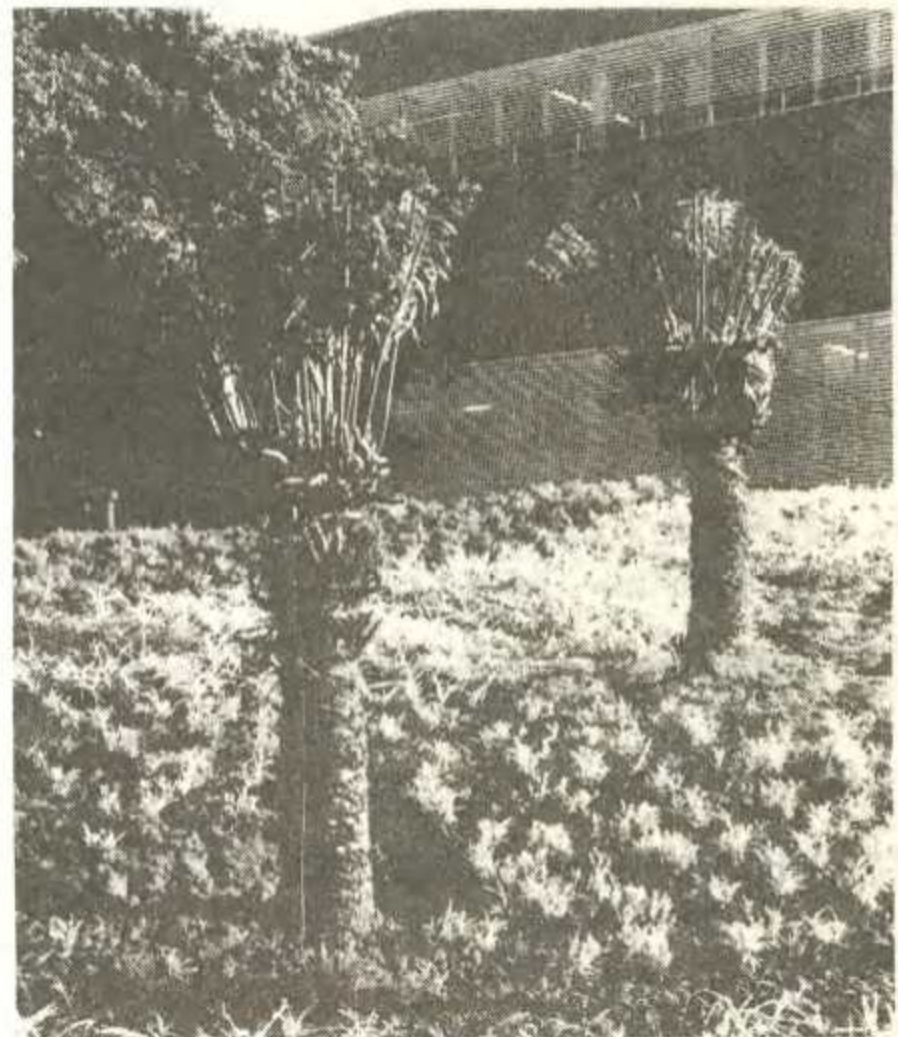
Question: What is three meters high, green, and jumps 10km in three days?

Question: How do you rescue a giant cycad from a bulldozer?

The answers

Durban member, Roy Shooter, raised these questions when he spotted a giant *Cycas thouarsii* plant directly in the way of a new roadway development near his home. Hastly calls to a few co-operative friends rustled up (a) a labour force, (b) miscellaneous digging equipment and (c) a 10 ton truck ... and the job was on. Three days (and a lot of sweating and cursing) later the mission was accomplished. The main stems of this grand old specimen have found a welcome new home on the University of Natal's Durban campus where they will be carefully tended in the years to come and, it is hoped, provide a useful supply of seeds for propagation.

(Special thanks to Roy, Roy, Bruce and Kevin.)



The specimens of *Cycas thouarsii* after the move

LIVING FOSSILS IN CULTIVATION

by Ken Wyman

- CONTINUED -

Whilst walking among the cycads in the Botanic Gardens one would half expect to meet the ghosts of some long forgotten dinosaurs lurking under the leaves and one perhaps saying to the other, "Rex, don't you think we're in the wrong century?"

Having ascertained the legal requirements, it is advisable to ensure that one obtains only those plants which are suited to local climatic conditions.

FOR THE COAST AND WARM INLAND AREAS

- Encephalartos ferox grows up to 1m in height with glossy dark-green leaves up to 2m in length. The female cones, which are usually a brilliant scarlet, are up to 50cm in length. This is one of the most decorative species and prefers light shade.
- E. altensteinii is found in the Eastern Cape. It has a stout trunk, 2m in height, bearing a crown of pinnate leaves up to 2m long.
- E. lebomboensis. This species is very closely related to E. natalensis, from which it differs mainly in the leaflets, which are shorter and narrower and overlap slightly. The leaves are up to 1,5m in length and the plants attain a height of up to 4m.
- E. longifolius is found in the Cape Province and grows up to 3m in height with leaves up to nearly 2m long. The seed cones of E. longifolius are the largest of the genus, with a female cone weighing up to 35kg and of a greenish-brown colour.
- E. natalensis. As the name implies, this is one of our local cycads (Natal) and consequently very common. It is a most handsome species, growing up to 6m in height. The leaves, which are up

to 3m in length and straight, are dark green in colour. It is a variable species, some forms having narrow leaflets and others having much broader leaflets.

- E. transvenosus. This is the tallest species, growing up to 13m in height. The leaves, which are up to 2,5m long, have a markedly yellow midrib. The leaflets are reflexed and overlap quite markedly, and are a dark glossy green. This species will enjoy slightly shady conditions.
- E. villosus. This stemless species is by far the most common in this locality. It is a most variable species with both narrow- and broad-leaved forms. Some forms have straight leaves, whilst others recurve gracefully and may be up to 4m in length. It suckers freely and very often forms large clusters. It is a very useful subject for planting in very shady areas, although it will tolerate full sun.
- E. paucidentatus. Although this species is closely related to E. transvenosus, it is easily distinguished from the latter because the leaflets, although reflexed, do not overlap. The stems are up to 6m in height and the leaves are up to 2,5m in length. It prefers light shade.

-Stangeria eriopus. This species also occurs locally (Natal). It has tough, pinnate fern-like leaves. This most decorative species also varies from short-leaved forms, growing in grassland, to long-leaved forms, occurring in forests. Light shade will produce luxuriant growth, up to 2m in height.

All the former species are represented in the Durban Botanic Gardens where their habit and aesthetic appeal can be studied at leisure. In addition, there

are many very decorative hybrids, both natural and man-made, which are very worthwhile subjects for cultivation, but are unfortunately not yet represented in the Botanic Gardens.

The following exotic species may however also be seen and are worth cultivation:

-Cycas thouarsii. This species, which is indigenous to Malagassy, was incorrectly known as E. circinalis previously. It can grow up to 8m in height, with its graceful arching leaves up to 3m in length. It is very fast growing and suckers very freely.

-Lepidozamia peroffskyana from Queensland in Australia grows a trunk up to 7m high and leaves about 4m long, with comparatively small cones. It is commonly known as the Palm fern.

-Zamia furfuracea, the Jamaica Sago-tree, originates from Mexico. It bears a profusion of metre-long leaves on prickly stalks.

FOR COLD AND FROSTY AREAS

-E. ghellinckii is the Drakensberg cycad from Natal. The grey-green leaves resemble the exotic Cycas revoluta from Japan.

-E. lanatus is a small cycad reaching a height of only 1m and occurring in sheltered valleys along the upper reaches of the Olifants River. The leaves are 1m long, and bluish-green when young, turning green with age.

-E. friderici-guilielmi is a rather stout-stemmed plant growing up to 4m in height. It is commonly called the white-haired cycad because of the whitish woolly under-surface of the young leaves.

-E. lehmannii is a short cycad of up to 3m in height at most and often branched. It originates in the Karoo and likes dry, extreme conditions.

-E. horridus. This is a small species which seldom exceeds 50cm in height. With its glaucous-blue leaves which are sharply recurved and spined, and up to 1m in length, this is also a very decorative species.

-E. trispinosus. The stems of this species seldom exceed 1m in height. It is also a variable species with green and glaucous-blue-leaved forms. The leaves, which are up to 1,25m in length, are slightly recurved at the tip and the leaflets have two prominent lobes on the lower margins.

-Cycas revoluta. This species is indigenous to Japan and is very decorative. It is a small species, growing up to 2m in height. The leaves have narrow hard leaflets, which are recurved and dark glossy-green in colour. The leaves are up to 1,25m in length.

-Dion spinulosum. This handsome species is indigenous to Mexico. The recurved leaves are up to 2m in length, with glossy light-green leaflets. The stems may reach up to 10m in height.

Apart from the various commercial nurseries which offer cycads for sale, the Nature Conservation Division of the Transvaal Provincial Administration is propagating most of the species on a large scale for sale to the public, in an attempt to curb the theft of plants from their natural habitat. It is to be hoped that the public will avail themselves of these facilities.

Provided that their basic requirements are satisfied, cycads should prove to be valuable assets in the garden landscape. Once they are successfully established, do not disturb the soil adjacent to the stems, as cycads produce aerial or "breathing roots" near the surface of the soil and these will be damaged.

There are few pests which attack cycads. The only one to cause great damage is the cycad caterpillar, Zeronopsis leopardina. The orange and black-spotted Leopard moth lays its eggs on the new foliage when it emerges. The young caterpillars can destroy an entire new crown of leaves in a few days. This pest is easily controlled if a close watch is kept for the first signs of eggs or young caterpillars.

(Ken Wyman is Curator of the Durban Botanic Gardens)

LETTERS BRIEWE LETTERS BRIEWE

Readers are invited to write to the editor (See address elsewhere.) Where applicable, experts will be asked to deal with specific questions.

Lesers word genooi om aan die redakteur te skryf (sien adres elders). Waar van toepassing sal kenners gevra word om spesifieke vrae te beantwoord.

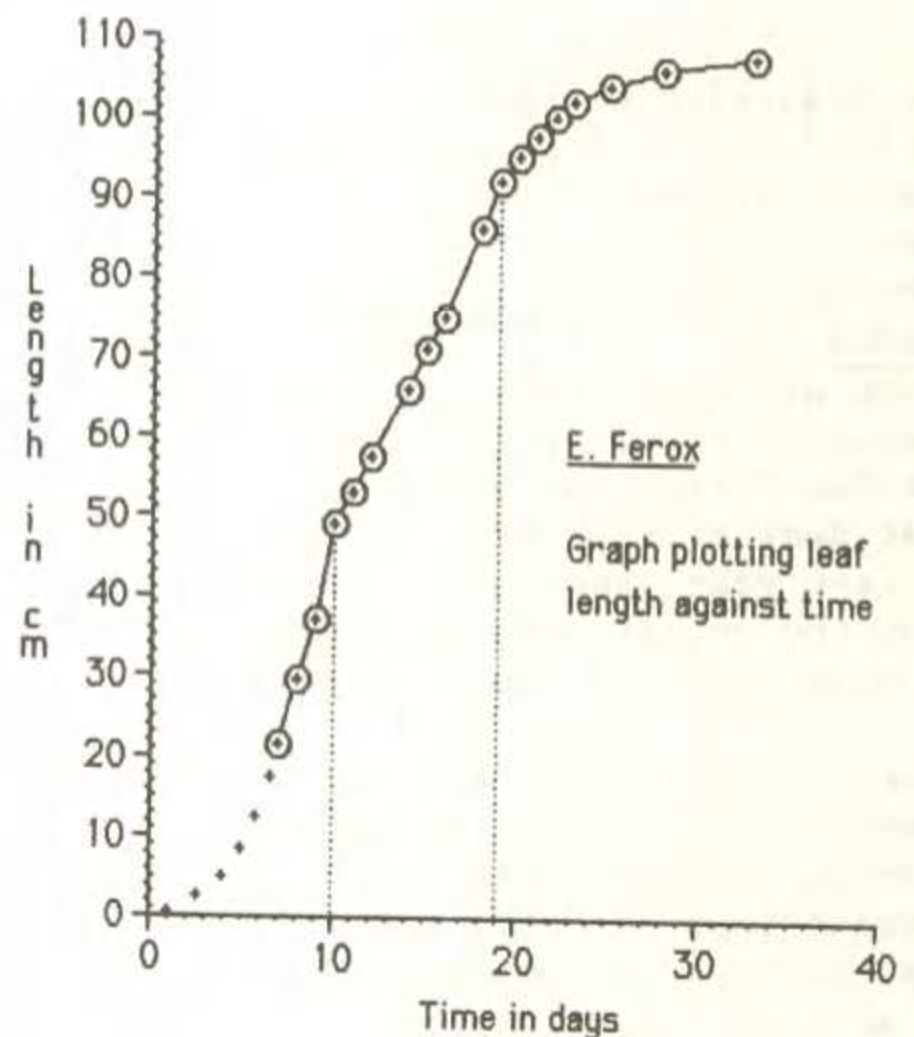
Dear Sir

I was interested to read Roy Osborne's article on the growth rate of cycads in ENCEPHALARTOS no. 5, in which the growth rate of a fairly young Encephalartos natalensis was reported. By coincidence I have recently made a similar study of an E. ferox. This plant, estimated to be about 20 years old, had been regarded by its owners as something of an unattractive, spiky weed and it was offered to me in May 1984.

Transplanting the cycad was an awkward experience and, despite my care, most of the leaves subsequently died. After eight months of inactivity two male cones were produced and nine months later, in October 1985, the first new crop of leaves appeared.

Having noticed in other cycads the rapid leaf growth, I decided to observe this event more closely and chose one of the first of the 16 emerging leaves as the test leaf. The length of this leaf was measured daily and a graph plotting leaf length against time is given below.

Data for the first 6 days was not recorded so the initial dotted portion of the graph is an approximation. As mentioned in Roy's article, there appear to be three stages of growth (delimited by the vertical dotted lines on the graph):



- from day 0 to day 10 when the growth rate steadily increased from 0 cm/day to 11 cm/day;
- from day 10 to day 19 when the growth rate stayed fairly constant at an average of 4,9 cm/day;
- from day 19 onwards when the growth rate began decreasing.

The cycad was growing so fast around day 9 that I was measuring the length of the leaf twice a day. In a 10-hour period from 6.30 a.m. to 4.30 p.m. on day 10, the leaf grew 6 cm which represents a growth rate of 0,1 mm/minute, 2,5 times the fastest growth rate of Roy's E. natalensis.

Finally, I should like to say how much I appreciate and enjoy reading ENCEPHALARTOS. One has only to write a letter such as this to realise how much work goes into the production of such a journal.

CHRIS AMMANN
NEW GERMANY

LETTERS BRIEWE LETTERS BRIEWE

Sir

I am enquiring whether any of the members of the Cycad Society could furnish any further information on my observation of a particular pest. I acquired about a dozen specimens of Encephalartos altensteinii for the establishment of a cycad garden at Beacon Bay. As I was not ready to plant them, I stored them in a well-ventilated room for 3 months. We had a great deal of rain over October and November last year, and I was rather worried about the cycads rotting, especially with the high relative humidity about.

After my groundwork had been completed, I was ready to plant the cycads. On removing the dry roots with a hacksaw I came across numerous holes in the cross-section of the tap root. I probed with a screwdriver and retrieved a number of maggot-like larvae feeding on the root tissue. I treated the plant with an insecticide dusting powder as well as a fungicide, as the pulpy excreta of this maggot looked an ideal place for fungal attack.

I then proceeded to probe in the other cycads and I removed segments of root at a time to prevent too much damage to the plant, yet to see that there were maggots present. I found a beetle in some of the less advanced tunnels up the centre of the tap root. I surmised that the beetle actually bores through into the centre pith where it mates and lays eggs and upon the hatching of the eggs, these maggots eat out the pith causing an ideal condition for fungal attack, thereby causing the persistent leaf bases to fall off, resulting in eventual collapse of the plant.

I then proceeded to treat the other cycads in precisely the same manner, i.e. probing, removing the beetles and larvae and applying insecticide and fungicide. I thought I had the problem solved, when the following day, upon inspection of the cycads, I noticed a core of excreta around the leaf bases near the base of the stem. I probed with a screwdriver and found that the leaf bases just fell away quite easily.

Where the leaf base had fallen away, I found a number of these beetles and maggots. I scraped the rotting material away, together with larvae and beetles and almost immediately the plant started repairing itself with the exudation of gum. Where possible I left a thin corky layer of tissue as not to expose the centre pith.

The beetle in question is about 2 cm long and 0,6 cm wide. It is light brown with noticeable black markings on the thorax and abdomen. It has a hard proboscis (0,5 cm) and, attached to the base of the proboscis, are the antennae.

The antennae are very similar to those of the rhinoceros beetle, suggesting some distant relationship there. The larvae of the beetle grow to adult length but are twice as wide. They have a brown head and are white in colour. The beetle seems to be the primary cause while fungal attack seems to be the secondary cause of destruction of the stem.

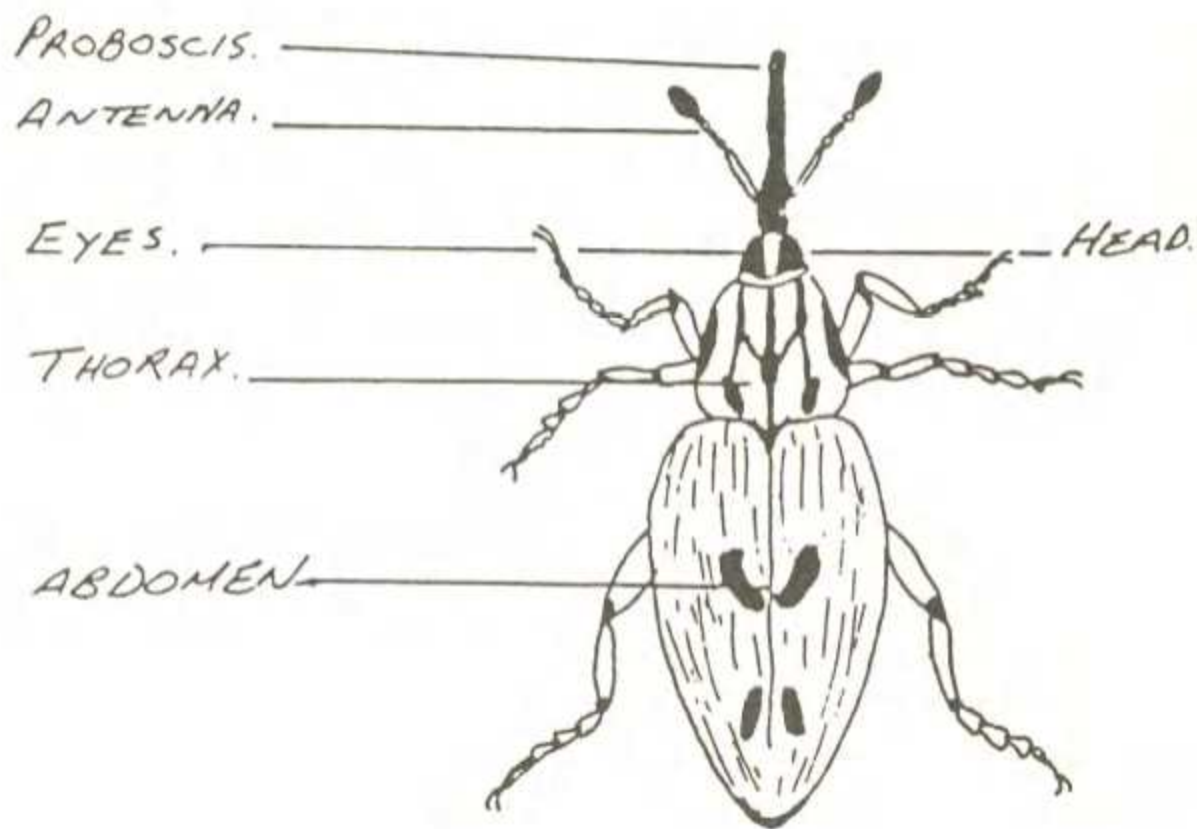
Furthermore, may I go as far as to ask the readers whether they have a few cycads to donate to the Municipality of Beacon Bay, as we are developing a botanic garden with the accent on cycads. If any readers can help me in this regard, they are kindly asked to contact me.

D.H. Landy
Superintendent of Parks
PO Box 2001
Beacon Bay 5205
Tel. no. 0431-472471

See the article "Entomologist joins Society" elsewhere in this edition.

EDITOR

LETTERS BRIEWE LETTERS BRIEWE



ENLARGED ADULT



LARVA



ACTUAL SIZE: $\pm 2\text{ cm} \times 0,6\text{ cm}$.

ENTOMOLOGIST JOINS SOCIETY

Dr Stephen Compton, an entomologist at Rhodes University, Grahamstown, is a very welcome new member of the Society, and brings with him a keen interest in cycad-attacking insects. He will be very pleased to help any members with insect problems. He asks that adult insects or healthy larvae are sent to him at the Department of Zoology and Entomology, Rhodes University, PO Box 94, Grahamstown 6140.

Dr Compton has been concerned with the problems recently experienced by two Eastern Cape members and has the following observations to make:

-The pest that has been causing the problems to Owen Sanders' plants (see ENCEPHALARTOS no. 5, page 34) seems to be the larva of a gall midge fly (family Cecidomyiidae). These larvae were very numerous at the damage sites

and Dr Compton had seen similar attacks to plants in Grahamstown. Unusually heavy infestations can occur when there are large numbers of plants together (such as in a nursery or a large collection of cycads) where the insects can move from one 'flush' of leaves to another. The damage is made worse by the presence of a moth larva and two species of beetle larvae also feeding on the damaged leaves.

-The insect which is attacking the cycads of Mr Landy, as identified from his excellent drawings (see letter elsewhere in this edition), seems to be Phaeocorynus sommeri which is known to have attacked cycads in East London previously. A related insect from the same genus killed several cycads at the Albany Museum during the course of a transplantation exercise. Fortunately, healthy plants are less prone to attack.

Since the first request to members last July to complete a questionnaire concerning male cycad plants in their possession, 31 completed pollen questionnaires have been received to date. As the Society has a membership of 446 (408 in the RSA), I consider an 8,33% return a little disappointing. Added to the 31 members who have responded positively, 3 members have sent in nil returns explaining that their collections are still immature. We are grateful for even these replies as it helps to establish whether a pollen bank is necessary.

In evaluating these responses it is interesting to note that the members who responded collectively own 234 male plants of known sex, representing 26 Encephalartos species as well as Stangeria and 1 Cycas species. The most common plants in collections are E. altensteinii, E. ferox, E. friderici-guilielmi, E. horridus, E. lebomboensis, E. lehmannii, E. natalensis, E. trispinosus, E. villosus and Stangeria. Of these there are 24 to 50 male plants per species of cone-bearing age. We have pollen records of most other Encephalartos male plants with the exception of E. ghellinckii, E. heenanii and E. woodii.

Several members have sent 1986 updates after their initial response in July last year. I would like to request that members who are interested in using the pollen bank and in contributing pollen, advise us whenever they have new information on their collections. Likewise those requiring pollen should contact me as soon as the female cone appears so that both of us have lots of time to find a pollen source. Many people still phone requiring pollen immediately.

Since early April I have had more than 20 requests for pollen, and have tried to put members in touch with others in their area who have male plants. At this stage it might be useful to explain that the pollen bank merely serves as a communication centre. I do not hold stock of pollen for distribution, but can assist members to trace likely sources.

After that it is up to members to make further arrangements between themselves, e.g. establish when and how they will collect the pollen and what bargaining will take place, e.g. pollen for a share of the ensuing seeds or a cash adjustment or a braai-at-my-place-next-Sunday if you bring the pollen.

However, such is the enthusiasm for a pollen bank that I have had two very informative letters from overseas members. Jane and Stan Walkley of Burpengary, Queensland, Australia sent details of 63 male plants of 11 different species Bowenia (2 species), Cycas (1 species), Macrozamia (4 species) and Zamia (4 species). I have not included these numbers in our statistical returns as I am not too sure whether we can actually use their offer as the post takes 5 days to do the 60 km between Umlaas Road and Durban on occasion!

Alois Holsbauer and Gunther Nogrsek who founded the Botanical Society of Graz in Austria last year, wrote to say that they sent 350 letters to Botanical Gardens and Institutions in Europe and received 32 replies. (This % seems to be the average for pollen replies, so I am beginning to feel better about our response!) They established that there were 55 male plants of coning size and known sex in Europe in 22 different species and 6 genera. (For the record, also 38 mature females in the same 6 genera.) At this stage I am delighted with the overseas interest but am not sure whether we will be able to operate internationally until more research on pollen storage has been done.

Finally a further request to members to please update the information you have sent in last year and to those who have not sent in their returns, please to do so. An unproductive female cycad in cultivation does not serve the conservation cause! By growing seeds of cycads we are helping to save an endangered plant group.

CYNTHIA GIDDY (PO Box 45, Umlaas Road,
3730; tel. no. 03325-478)

Old giant cycad stolen

A 90-year-old giant cycad, believed to have been planted by the late William Bazley, was stolen from a farm in Port Shepstone yesterday.

Mr Bazley built the now-disused wharf at Port Shepstone.

The owner of Mapou Sugar Estate, Mr Carl Wichura, said it was dug up from his farm.

"A neighbour reported

he had seen three police vehicles and men dressed in police uniforms dig up the cycad," said Mr Wichura. "It was about 2,5 metres high."

Miss June Payn, public relations officer for the Natal Parks Board, said cycads were specially protected plants and a permit was necessary when moving a cycad.

Daily News (Durban), 3 April, 1986

Giant tree replanted after being dug up

Crime Reporter

A 1000-YEAR-OLD giant cycad which a policeman allegedly removed from a farm near Port Shepstone has been replanted.

A police spokesman said yesterday that the matter was being investigated and a report would be sent to the Attorney-General.

"It is up to him to decide whether or not to prosecute," the spokesman said.

A close watch is being kept on the plant as it has been damaged.

The 3 m cycad, a protected plant, was dug up on Wednesday at Mapou Sugar Estate, near the ruins of the home of the late William Bazley, a prominent man in the area.

Natal Mercury
(Durban),
5 April, 1986

Giant cycad found —at policeman's home

THE 90-year-old giant cycad taken from a Port Shepstone farm on Wednesday has been found at the home of a policeman.

Mr Carl Wichura, owner of Mapou Sugar Estate, from where the protected *Encephalartos Natalensis* cycad was stolen, has laid a charge of theft.

The cycad was dug up from the farm in which the ruins of

Crime Reporter

the home of the late William Bazley stand.

Mr Bazley built the now disused wharf at Port Shepstone. Bazley Street is named after him.

Mr Wichura said that after reporting the matter to the police at Port Shepstone and upon investigation it was found that a

policeman had allegedly taken the cycad, using a police vehicle to take the plant to his home.

"When I spoke to the policeman concerned he told me he had confiscated the cycad, but he had no business to do it. It was on my property and furthermore one needs permission from the Natal Parks Board to move a cycad.

"In addition, if something is

confiscated it must be taken to the police station, and not to someone's house," said Mr Wichura.

He said three-metre cycad had been returned to him.

Miss June Payn, public relations officer for the Natal Parks Board, said cycads were specially protected plants and that a permit was needed when moving one.

Daily News (Durban), 4 April, 1986

Man charged with theft of bread-fruit trees

HERALD REPORTER

A MAN who allegedly gave five bread-fruit trees to a Uitenhage police sergeant, yesterday appeared in the Port Elizabeth Regional Court on charges of theft and possession of an endangered plant without the necessary permit.

Mr Leon Els, 22, of the SA Police station at Wolwefontein, between Uitenhage and Klipplaat, was not asked to plead and was released on warning.

He is accused of the theft of five bread-fruit trees

from the farm Soutpansnek near Jansenville, owned by Mr M R Viljoen, on November 30 last year.

He is also charged with illegally being in the possession of endangered flora or picking and transporting the trees from the farm to Uitenhage and presenting them to a Sergeant Alwynn Victor Casely without authorisation.

The case was postponed till May 15.

Mr J Kotze was on the Bench. Mr M J de Jager appeared for the State. Mr Els was not represented.

Eastern Province Herald
(Port Elizabeth),
19 April, 1986

Missing cycad found at police officer's home

A GIANT four-metre cycad was allegedly dug up from its 80-year resting place and transported to the home of a senior police officer on Wednesday last week. The plant was located by its legal owner and an investigating police officer in the garden of the senior officer later that day.

According to Mr Wichura, he saw two police vehicles arrive on his farm and drive up the track towards the now derelict house built in 1902 by William Bazley. He assumed that they were on official business and noticed that they returned from the direction of the old house some two hours later, he said.

A neighbour told him that he had seen and recognised the giant cycad from the Bazley house in the back of one of the vehicles. Mr Wichura immediately drove up the rough track to the old house. He found fronds from the cycad and a large hole where it had stood.

Mr Wichura drove to the Port Shepstone Police Station and reported the theft. Statements were taken from him and from witnesses before an investigating officer and Mr Wichura set out to find the plant. He said that they found it lying in the garden of a senior officer's home.

Apart from the sheer size of the cycad, Mr Wichura was able to identify the plant by the cuts made in the outside skin by blacks removing it for "muti".

A police spokesman said that the case is being investigated.

PROTECTED PLANTS

All cycads are protected plants. To dig one up and transport it one must have a gathering permit issued by Natal Parks Board. Plants in the wild are normally only permitted to be taken if they are endangered by new constructions such as dams, roads or railways, said an NPB spokesperson.

According to Mr Leon Scholtz, owner of one of the few cycad nurseries

in the country, mature cycads, such as the one in question, do not transplant successfully. With the number of fronds that had been cut off, he felt that without expert care, this specimen would have died.

Mr Wichura gratefully accepted Mr Scholtz' assistance in replanting the recovered cycad. A hole with proper drainage was prepared, the cut off roots were treated with fungicide to prevent diseases attacking the plant and a special healing compound applied to the cuts in the trunk.

It took nine people to lift the giant but now it is in place and lined up as nearly as possible in the direction it was originally growing.

"This is the largest Natalensis that I have ever seen," said Mr Scholtz, "and I hope that it will survive the shock of translocation. After all it is probably over 400 years old."

South Coast Herald (Natal), 11 April 1986

Lasbrief vir SAP-man oor broodbome

Hofverslaggewer

'n LASBRIEF is gister in die streekhof in Port Elizabeth deur landdros J. Kotze gemagtig vir die inhegtenisneming van 'n blanke polisieman van Wolwefontein.

BROODBOME

Deon Els (22) moes voor landdros Kotze op aanklagte van diefstal en 'n oortreding van Ordonnansie 19 van 1974 verskyn het, maar was nie teenwoordig toe sy saak voor die hof geroep is nie.

Die staat beweer dat Els op 30 November 1985 vyf broodbome op die plaas Soutpansnek in die distrik Jansenville gesteel het. Na bewering het hy ook op 30 November in die distrik Uitenhage sonder 'n permit bedreigde flora in sy besit gehad, dit as 'n skenking oorhandig, gepluk of vervoer deurdat hy vyf broodbome (*Encephalartos lehmanii*) verwyder het van Soutpansnek, na Uitenhage vervoer en toe aan sers. Alwyn Victor Caseley geskenk het.

LASBRIEF

Els is nog nie gevra om op die aanklagte te pleit nie. Landdros Kotze het gelas dat die uitvoering van die lasbrief oorstaan tot 11 Junie wanneer Els weer voor die hof moet verskyn.

Mej. Antoinette de Jager kla aan.

Oosterlig (Port Elizabeth),
16 Mei 1986