ENCEPHALARTOS

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TYDSKRIF VAN DIE BROODBOOM VERENIGING VAN SUID-AFRIKA

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COVER / VOORBLAD : Male cone of ***Encephalartos trispinosus***

Photo: Piet Vorster

CONTENTS / INHOUD

CONTENTS / INHOUD (continued / vervolg)

FROM THE PRESIDENT

It is gratifying to be able to report that a Cycad Branch has been created under the aegis of the Aloe, Cactus and Succulent Society of Zimbabwe. The Chairman of the Branch is Mr Brian Schlachter with Mr M.P. Childes as Honorary Secretary. We wish the Cycad Branch every success and your COUNCIL, on request, recently agreed unanimously to the affiliation of the Branch with the Cycad Society of South Africa.

Foreign members that are interested in attending CYCAD 93 need not worry about the widely publicised relative high frequency of crime in South Africa in recent times. It is all relative and should not affect the conference or the tours in any way.

Cycad-lovers the world over learnt with shock about the devastation that hurricane Andrew caused to the cycad collection at the Fairchild Tropical Gardens in Miami, Florida, U.S.A. on August 24, 1992. Fortunately the cycads withstood the onslaught much better than the palms and it is gratifying to hear that some of the severely damaged plants were readily made available to scientists for research purposes. Luckily, the buildings suffered only minor damage and the 7 000-volume botanical library and the 65 000-sheet herbarium were saved.

In "*Encephalartos*" no 32 Osborne and Grove reported on "The magical and medicinal usage of *Stangeria eriopus* in Natal". A distressing aspect of the report is the relevation about the large scale of veld-collected tubers of *S. eriopus* by black herb vendors on the open market. Even more distressing is the fact that this is taking place with the full knowledge of the relevant nature conservation authority whom, in other cases are well-known for the strict application of the law regarding the collection and sale of field-grown cycads. The double standards applied in this instance is completely unacceptable. Naturally, one has sympathy for the fact that the trade forms part of a long tradition. However, this does not entitle the culprits to breach the law and to act in a way that could lead to the extinction of at least some ecotypes of the species in the wild. The sensible thing to do, before it is too late, is to conserve representative samples of all ecotypes in existing nature reserves where they can't hybridize. The plant should also be cultivated on a large scale specially for the black herbal trade whilst the laws relating to field plants should be applied stringently irrespective of race or tradition.

With best wishes

Nat Grobbelaar

VAN DIE PRESIDENT

Dit is verblydend om te kan berig dat 'n Broodboomtak onder beskerming van die "Aloe, Cactus and Succulent Society of Zimbabwe" gestig is. Die voorsitter van die Broodboomtak is mnr Brian Schlachter terwyl mnr M.P. Childes die ere-sekretaris is. Ons wens die Broodboomtak sterkte toe en u RAAD het onlangs op hul versoek, eenparig ingestem tot die affiliëring van die Broodboomtak by die Broodboom Vereniging van Suid-Afrika.

Buitelandse lede wat belangstel om CYCAD 93 by te woon, hoef nie bekommerd te wees oor die relatiewe hoë frekwensie van misdade wat Suid-Afrika tans beleef nie. Dit is alles relatief en behoort nie die konferensie of die toere enigsins te skaad nie.

Broodboomliefhebbers wêreldwyd was geskok om te hoor van die verwoesting wat orkaan Andrew op 24 Augustus 1992 aan die broodboomversameling van die Fairchild Tropiese Tuin in Miami, Florida, V.S.A. aangerig het. Gelukkig het die broodbome die storm beter as die palms oorleef en dit is verblydend dat party van die ergste beskadigde plante vryelik aan wetenskaplikes vir navorsingsdoeleindes beskikbaar gestel is. Gelukkig is min skade aan die geboue aangerig en die 7 000-volume plantkunde biblioteek en die 65 000-vel herbarium is gered.

In "*Encephalartos*" nr 32 berig Osborne en Grove oor "The magical and medicinal usage of *Stangeria eriopus* in Natal". 'n Verontrustende aspek van die berig handel oor die grootskeepse verkoping van veldversamelde risome van *S. eriopus* deur swart handelaars op die oop mark. Nog erger is die feit dat die betrokke natuurbewaringsinstansie ten volle bewus is van die toedrag van sake - 'n instansie wat andersins die wette aangaande die versameling en verkoop van veldversamelde broodbome baie streng toepas. Die dubbele standaarde wat in hierdie geval toegepas word is heeltemal onaanvaarbaar. Die ou tradisionele gebruik van die plant deur swartmense kan nie goedsmoeds geïgnoreer word nie. Nogtans gee dit nie aan die booswigte die reg om deur hul onwettige optrede die uitsterwing van minstens party van die spesie se ekotipes in die natuur te veroorsaak nie. Voordat dit te laat is behoort voldoende eksemplare van alle ekotipes in bestaande natuurreservate aangeplant te word waar hulle nie kan verbaster nie. Die plantsoort behoort ook op groot skaal spesiaal vir die swart kruiemark verbou te word terwyl die wette aangaande die versameling en verkoop van veldplante streng toegepas behoort te word sonder inagneming van ras of tradisie.

Met vriendelike groete

Nat Grobbelaar

FOCUS ON ...

In each edition of ENCEPHALARTOS, we focus on one southern African species, in the form of an indepth article in layman's language. In this edition the spotlight falls on:

FOKUS OP ...

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

ENCEPHALARTOS TRISPINOSUS (Hooker) R.A. Dyer

Maans Kemp
51 Constance Road, Broadwood, 6070 Port Elizabeth

INTRODUCTION

The Eastern Cape cycad species, by and large, are clearly distinguishable and their classification is generally not in doubt. Despite minor variations within some species, there is a general acceptance that relationships are well understood and that their classification is logical and based on clearly defined characteristics. Unless some dramatic new discoveries are made, there does not seem to be any reason to review the existing classification.

The one exception is *Encephalartos trispinosus*. Very few people who have made some study of specimens of this species, in nature and in cultivation, have not ended up somewhat confused and with the feeling that there are still a number of unresolved questions concerning this attractive cycad species. The considerable variety of characteristics within the species, together with the complicated hybridization process which appears to have taken place over many years, have led to a bewildering variety of characteristics within the broad *E. trispinosus* concept. It is no wonder that Dr. Allen Dyer, in his monograph on South African cycads ("*Bothalia*" 1965), came to the conclusion that "Of all the [South African] cycads, *E. trispinosus* is the most difficult to define." It is evident that some intensive scientific investigation is needed if the many unresolved issues concerning this species are to be clarified.

CLASSIFICATION AND NAME

The first clear reference to plants now classified as *E. trispinosus* was made in 1863 by Hooker in Curtis's Botanical Magazine. He referred to a specimen he had studied, and wrote: "I can only come to the conclusion that it is one of many varieties of *E. horridus*; with a great tendency to have, on the inferior margin of the pinnules, two large spinescent laciniae, which in conjunction with the terminal spines, justify the application of the term var. *trispinosa*". There appears to be no record of where Hooker's specimen was collected and by whom.

Figure 1 *E. trispinosus* specimens growing amongst tropical plants in a garden in Honolulu, Hawaii. Note the recurvature of the leaf tips.

Some years earlier, in 1852, Karl Zeyher wrote on Eastern Cape cycad specimens in the publication "*Phytologist*". He wrote about specimens of *E. altensteinii* near the Bushman's River and then referred in passing to "*E. tridentatus* also, but sparingly, in that neighbourhood". This may have been a reference to the present *E. trispinosus*, but possibly also to the species now known as *E. arenarius*.

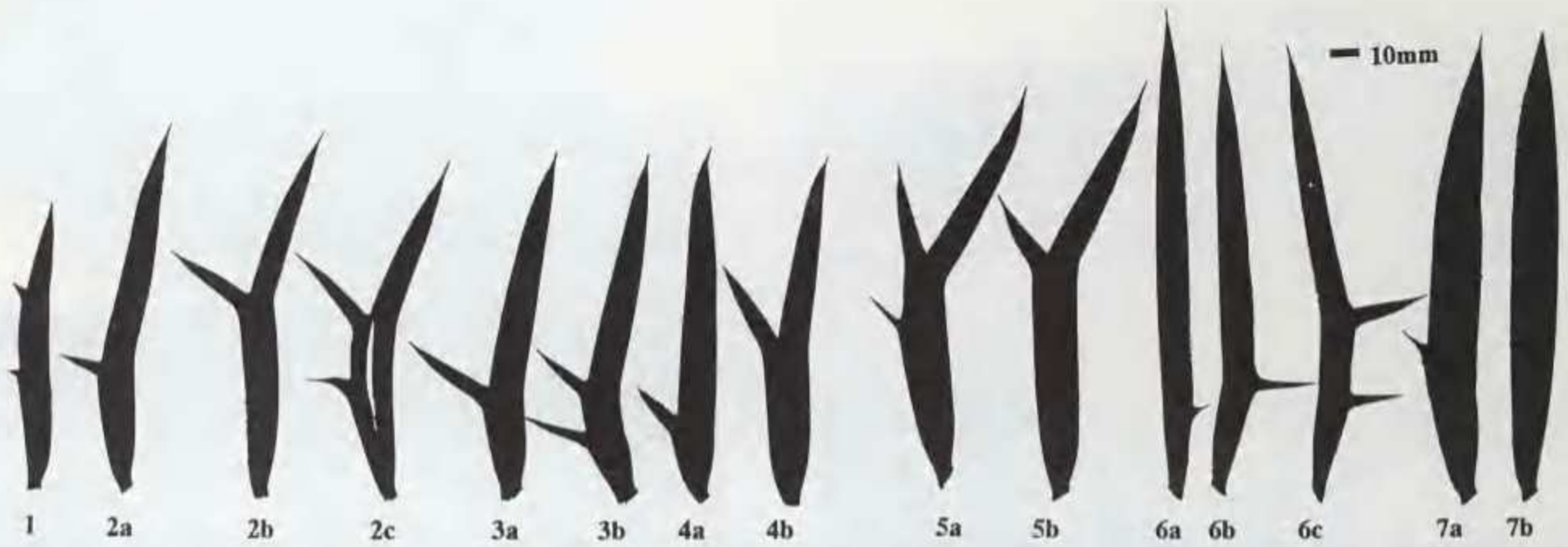

Figure 2 Photostat copy of leaflets of seven *E. trispinosus* specimens to illustrate some existing leaflet varieties. 1: Leaflet with short spine-like lobes (sucker of a female plant). 2a-c: Leaflets strongly twisted, with one to two lobes (male plant). 3a-5b: Leaflets with one to two slightly twisted lobes (3: female plant; 4, 5: male plants). 6a-c: Narrow leaflets with reduced to well-developed lobes (male plant, see Figure 4). 7a, b: Most leaflets of a leaf without lobes or spines, only one to three leaflets with a single thorn-like spine (male plant).

Figure 3 *E. trispinosus*: side-view of upper part of leaf; broad leaflets with well-developed lobes (male plant). Photo: M.I. Claassen.

Earlier still, in 1847, Miquell described a specimen in "*Linnaea*" as *E. lehmannii* var. *spinolosus*. This may also have been a reference to a plant that would currently be classified as *E. trispinosus*.

After relating his visit to localities of *E. princeps* (then still known as *E. lehmannii*) near Cathcart in 1912, Prof. Joseph Chamberlain continued: "At Grahamstown, about a hundred miles south-west of Cathcart, *E. lehmannii* has such jagged leaves that one risks injury to hands and clothes in getting material. The leaves also have little of the grayish color so characteristic of the Queenstown and Cathcart specimens". There appears to be little doubt that the plants he was referring to here, were specimens of the present *E. trispinosus*.

Later authors, including Hutchinson and Rattray (1933) and Henderson (1945), treated these plants as specimens of *E. lehmannii*, whereas Schuster, like Hooker, regarded them as a form of *E. horridus*.

In 1965 Dyer classified these plants as a separate species in the "*Journal of South African Botany*", and he called the new species *E. trispinosus*. The name refers to the three sharply-pointed lobes (this includes the leaflet apex) which occur on typical leaflets of this species.

Figure 4 *E. trispinosus*: side-view of upper part of leaf; widely spaced narrow leaflets with well developed lobes (male plant). Photo: M.I. Claassen.

DISTRIBUTION

E. trispinosus occurs in the lower valleys of the Great Fish River, the Kowie River and the Bushman's River in

the Eastern Cape districts of Albany, Bathurst and Alexandria, and in the independent homeland of Ciskei. Plants usually grow amongst the wooded karroid scrub vegetation, often in hard, rather dry soil. Some grow in the shade, while others may occur on rocky outcrops in full sun. The rainfall in the distribution area ranges between 600 and 725 mm per year, and occurs mainly in summer.

Figure 5 *E. trispinosus*: face view of leaf; most leaflets without lobes (male plant). Photo: M.I. Claassen.

DESCRIPTION

1. STEM

Plants may be unbranched, but usually occur in the form of clusters of stems of various lengths, branching from a common base. Individual stems are up to 1 m tall and 250 to 300 mm in diameter. Stems often lean over and may be curved.

2. LEAVES

The greatest variation within the species occurs in leaf characters. A number of different leaflet varieties can be distinguished, while there are also variations in

Figure 6 *E. trispinosus*: face view of leaf; leaflets with short spine-like lobes (female plant). Photo: M.I. Claassen.

Figure 7 Wideley spaced leaflet form of *E. trispinosus* in habitat. Photo: M. Kemp.

leaflet spacing and leaf colour. Leaves vary in length from 0.7 to 1.35 m and are usually spreading and recurved (Figure 1). Some may be slightly twisted towards the tip.

Median leaflets may be 100 to 180 mm long and 15 to 25 mm broad, with one or two large, twisted lobes on the lower margin (Figures 2-4). The lobes are often twisted out of the plane of the leaf axis. The apex of the leaflet, as well as the lobes, are sharply pointed. Leaflets without lobes, or with only short thorn-like spines, are sometimes found amongst the lobed ones (Figures 2, 5, 6). Some forms have no lobes or spines at all (Figures 7, 8, 12). The leaflets become shorter and narrower towards the base of the leaf and these are not lobed. The leaf stalk is 120 to 250 mm long and is attached to the stem by means of a pale cream collar.

The leaf colour varies considerably from locality to locality, ranging from bluish-green to greyish-green to bluish-grey, with a silvery bloom. In bluish-coloured forms, the leaves tend to become greener with age, sometimes with a yellow tinge. It would appear as if the specimens in the Fish River valley tend to be more blue in colour, whereas those in the Bushman's River area tend to be greener.

Figure 8 Leaf detail showing wide leaflet spacing and entire nature of leaflets in one form of *E. trispinosus*. Photo: M. Kemp.

3. CONES

There is much less variation in cone characters. Male and female plants bear solitary cones, although plants with two male cones have been observed.

Male cones (Figure 9) are sub-cylindrical in shape, 250 to 350 mm in length and 70 to 80 mm in diameter. They are usually bluish-green when young and bright yellow to orange when mature. They are borne on short stalks. The median scales are about 25 mm long and 25 mm broad, with a protruding beak of about 7 mm.

Figure 9 *E. trispinosus*: mature male cone. Photo: P.J. Vorster.

Female cones (Figures 10-12) are sub-cylindrical to barrel-shaped, 400 to 500 mm long and 180 to 200 mm in diameter, and are borne on short, stout stalks. They are also usually bluish-green when young, becoming yellowish-green to pale yellow with age. The median cone scales are 70 to 90 mm long, 60 to 70 mm broad and about 35 mm thick. The face of the scale protrudes

about 25 mm and is characteristically deeply wrinkled and warty.

Figure 10 Typical female cone, with deep wrinkles on the cone scales. Photo: M. Kemp.

Figure 11 Typical yellow female cone. Photo: M. Kemp.

Figure 12 Unusual light olive-green female cone in form of *E. trispinosus* with widely-spaced, entire leaflets. The cone scales are totally smooth. Photo: M. Kemp.

4. SEEDS

The seeds are reddish-orange or yellowish-orange in colour, about 50 mm long and about 20 mm in diameter.

VARIATION WITHIN THE SPECIES

A bewildering variety of leaf characteristics occurs within the *E. trispinosus* concept. Apart from the variation in leaf colour, a number of forms can be distinguished on the basis of leaflet structure and arrangement, even in the same locality. One form has closely spaced leaflets with well-developed lobes, often of more or less equal size. Another form has closely spaced leaflets with much smaller, spine-like lobes. Sometimes leaflets with well-developed lobes occur on the same plant with leaflets with reduced lobes and sometimes even with leaflets that have no lobes or spines.

A form which often creates confusion, especially in cultivation, is one with very widely spaced leaflets, most of which have no lobes or spines. In some of these plants all the leaflets are totally entire, as shown in some

of the accompanying photographs (Figures 7, 8, 12). They resemble *E. lehmannii*, except for the much wider spacing of the leaflets. It would appear as if this is the form referred to by Dyer and Verdoorn in their treatment of the Zamiaceae in "*Flora of Southern Africa*" (1966).

There is one more or less stable distinguishing characteristic which seems to unite all these various forms - the deeply wrinkled and warty nature of the female cone scales (Figures 10, 11), although the accompanying photograph of an unusual cone seems to indicate that there may be exceptions (Figure 12).

Figure 13 Leaf detail of suspected *E. trispinosus* x *E. altensteinii* hybrid. Photo: M. Kemp.

HYBRIDIZATION

To complicate matters even further, there has obviously been considerable hybridization involving *E. trispinosus*, especially in localities along the Kowie and Bushman's Rivers. This hybridization has been between *E. trispinosus* and *E. altensteinii* (Figures 13-15). At one Kowie River locality visited, it is possible to find typical *E. trispinosus* and *E. altensteinii*, as well as apparent hybrids with a variety of intermediate characteristics within a 10 m radius. Some of these hybrids appear to be first generation hybrids, with intermediate characteristics, while others tend to resemble one of the parent species, suggesting second or even third generation hybridization. One fairly distinctive hybrid form has the broader leaflets and green colour of the *E. altensteinii* parents.

In the Bushman's River area, *E. arenarius* occurs within close range of the *E. trispinosus* habitat, and may have been involved in hybridization. In other areas *E. latifrons* used to occur close enough to have been involved in the process.

Piet Vorster (1987, p. 13) mentions a number of artificial hybrids involving *E. trispinosus*, namely *E. lebomboensis*

Figure 14 Female cone on suspected *E. trispinosus* x *E. altensteinii* hybrid. Photo: M. Kemp.

Figure 15 Detail of female cone on suspected *E. trispinosus* x *E. altensteinii* hybrid. Photo: M. Kemp.

x *E. trispinosus*, *E. trispinosus* x *E. altensteinii*, (*E. trispinosus* x *E. altensteinii)* x *E. horridus*, *E. trispinosus* x *E. ferox* and *E. trispinosus* x *E. villosus*. [Cones of female *E. lebomboensis* (Jozini type) and *E. natalensis* plants were pollinated with *E. trispinosus* pollen and the

resulting hybrids obtained from the two female species are very similar in appearance, but quite dissimilar to my artificial *E. trispinosus* x *E. altensteinii* hybrids (see Vorster's comments under *E. lebomboensis* x *E. trispinosus* in *"Encephalartos"*: 10: 13) - Editor.]

Figure 16 A male *E. trispinosus* plant, at the University of Pretoria, suspected to be the form closely related to *E. horridus*. A specimen with similar leaves has been noticed in a private cycad collection in Rietfontein, Pretoria. Photo: M.I. Claassen.

RELATIONSHIPS

E. trispinosus appears to be most closely related to *E. horridus* and *E. lehmannii*, and possibly also to *E. princeps*. The forms with strongly lobed leaflets (Figures 16-19) sometimes do not differ considerably from some forms of *E. horridus*, suggesting a closer relationship with *E. horridus* than with *E. lehmannii*. The forms with entire leaflets, on the other hand, seem to be closer to *E. lehmannii*. Interestingly enough, neither *E. horridus* nor *E. lehmannii* currently occurs near any of the *E. trispinosus* localities.

Dyer and Verdoorn (1966) suggested that both *E. horridus* and *E. lehmannii* had evolved from *E. trispinosus* stock in the far distant past. (When he defined *E. trispinosus* as a separate species in 1965, Dyer referred to *"E. tridentatus* stock" as the origin of the two species.) According to this suggestion, the stem was reduced in length and the lobing of the leaflets was

Figure 17 Face view of a leaf of the plant depicted in Figure 16. Note, as contrasted with the leaves shown in Figures 5 and 6, the leaflets are twisted in such a manner with regard to the rachis, that their upper parts are nearly erect with the lobes projecting side-wards. Photo: M.I. Claassen.

Figure 18 Leaves of the plant depicted in Figure 16 in side-view (left) and backview (right). Note in the side-view the nearly vertical arrangement of the upper parts of the leaflets. Photo: M.I. Claassen.

accentuated in the evolution of *E. horridus*, while in the case of *E. lehmannii* the stems became more robust and the leaflets mainly entire. Occasional tall stems in *E. horridus* and teeth on the lower margins of some *E. lehmannii* specimens, are seen as possible examples of part-reversion in these specimens to their *E. trispinosus* origin.

Figure 19 Photostat copy of leaflets of the *E. trispinosus* plant depicted in Figure 16. Each leaf has a series of 26-34 leaflets on both sides of the rachis, and in a series only the leaflet adjacent to the apex (a) and the lowermost 1-6 leaflets (i) are without lobes. Most leaflets have large, well-developed lobes (c-f, h), but some have reduced, spine-like lobes (b, g).

No confusion can arise in distinguishing between *E. trispinosus*, *E. horridus* and *E. lehmannii* in nature, as their habitats do not overlap. In cultivation, confusion is possible, however. The following characteristics can be used in distinguishing between the three species, if the identity is not obvious at first glance:

- The female cone scales of *E. trispinosus* are deeply wrinkled and warty, while those of *E. horridus*, although warty, do not have deep wrinkles. In *E. lehmannii* the cone scales are smooth.

- The colour of the cones in *E. trispinosus* is yellowish-green to orange, while that of *E. horridus* and *E. lehmannii* is brownish-red or blackish-red.

- The leaflets of *E. trispinosus* are usually lobed, but not as constantly and uniformly as in *E. horridus*. The leaflets of *E. lehmannii* are usually entire.

- The leaflets of *E. trispinosus* are usually narrower than those of *E. horridus*.

- The leaflets of *E. trispinosus* are not lobed down to the base of the leaf, as is the case in *E. horridus*.

CONSERVATION

E. trispinosus is classified as "vulnerable" by the Threatened Plant Unit of the International Union for the Conservation of Nature and Natural Resources. It is protected in the Bathurst State Forest, which falls under the control of the Cape Provincial Directorate of Nature and Environmental Conservation.

The very large number of mature specimens in private collections indicates that the natural status of this species is indeed threatened. In its favour is the fact that it rarely occurs in areas where its presence conflicts with the cultivation of crops or the building of roads. The main threat remains illegal collecting and trade. In this connection the populations on the Ciskeian side of the Great Fish River appear to be particularly vulnerable. There was a time when it was common to see local Ciskeian inhabitants, mainly children, offering *E. trispinosus* specimens of all sizes for sale, together with pineapples, next to the road on the Ciskeian side of the bridge over the Great Fish River, between Grahamstown and Peddie, for as little as R5,00 each. Stricter law enforcement by the Ciskeian and South African police and nature conservation officers, appears to have curtailed this trade, but many hundreds of plants must have been involved in this illegal trade.

The different forms of *E. trispinosus* are well-represented in botanical gardens and other public gardens in South Africa.

CULTIVATION

The species grows well in cultivation and mature specimens usually form leaves and cones annually. Plants are hardy and grow best in well-drained positions, in full sun. The numerous suckers formed at the base of well-established cultivated plants, provide an easy means of reproduction.

Female cones are easily pollinated artificially and seeds germinate well. Seedlings are available from registered nurseries and these grow easily.

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ARTICLES / ARTIKELS

CYCADS IN DUBLIN: THE COLLECTION IN THE NATIONAL BOTANIC GARDENS, GLASNEVIN

E. Charles Nelson
National Botanic Gardens, Glasnevin, Dublin 9, Ireland

Cycads are grown in most European botanic gardens; in those with a cool, temperate climate such as the National Botanic Gardens, Glasnevin, Dublin, these plants must be confined indoors throughout the year, and therefore the size of each collection is usually limited. There are 60 specimens in Glasnevin today, representing perhaps about 30 taxa.

The Botanic Gardens at Glasnevin was established on 25 March 1795, funded by the Irish parliament, and nominally controlled by the Dublin Society; at the time it was the largest publicly-supported botanic garden in the world (for a comprehensive history see Nelson & McCracken 1987). No expense was spared in the first few years to fill the new garden with the best and scarcest plants. The earliest published catalogues, dated between 1800 and 1804, indicate that four cycads were acquired, and that they were accommodated in the greenhouse. *Cycas revoluta*, *Zamia integrifolia* (cf. *Z. florida*), and *Z. debilis* (cf. *Z. media*) were listed in 1801 but the latter plant died before 1804 and was replaced by *Zamia cycadis* (cf. *Encephalartos longifolius*). (Figure 1).

Unfortunately, during the two centuries since foundation, no other catalogues have been published, and the accessions records for the first century are particularly sketchy, often noting little more than, for example, "30 July [1862] From C. Moore Esq., Director Botanic Gardens, Sydney, Wardian case of rare plants". An unpublished manuscript catalogue, prepared in 1838 by David Moore when he took over as curator, lists *Cycas circinalis*, *C. revoluta*, *Zamia pumila*, *Z. horrida* and *Z. pungens*. The lacunae in our knowledge of Glasnevin's cycads are filled, in part, by comprehensive accession

Figure 1 Unidentified cycad (possibly *Encephalartos longifolius*) in cone (male), photographed in the Palm House, National Botanic Gardens, Glasnevin, c. 1910.

records, listing all new plants by name which commenced

about 1880; these contain notices of cycads but extracting their names is a tedious and lengthy task as the unindexed manuscript record books have to be searched page by page, and line by handwritten line.

The first "director" of the Dublin Society's Botanic Gardens at Glasnevin was Professor Walter Wade, who died in 1825; John Underwood was head gardener from foundation until 1833. Professor Samuel Litton was appointed in Wade's stead but took little constructive part in managing the garden. Underwood's replacement was Ninian Niven who revitalised the general collections but resigned in 1838 (incidentally, he was not the son of James Niven, who collected at the Cape of Good Hope in the 1790s and early 1800s).

David Moore became curator in November 1838 - the native Natal lily, *Crinum moorei*, commemorates him, as does *Agapanthus mooreanus*. Moore was a Scot, with both horticultural and botanical expertise, and gradually he assumed more and more control over the Gardens until he was given the title "Director"; Dr. Moore died in 1879 and was immediately succeeded by his son, Frederick. One of David's brothers, Charles, was appointed curator of Sydney Botanic Gardens, in New South Wales, in 1848 and the Glasnevin accessions records indicate that Charles Moore sent several cycads to Dublin in the latter half of the nineteenth century - the Wardian case (already mentioned) received on 30 July 1862 evidently contained plants of *Macrozamia dennisonii*, "supposed to be the first, or at least among the first of the species which reached Europe" (Moore 1862). Charles Moore is commemorated in *Macrozamia moorei*.

No entire list of the cycad collection during David Moore's decades has survived, but as well as *Macrozamia dennisonii* and the cycads recorded in the 1838 manuscript, there was at least one cycad in Glasnevin which Moore believed might be a new species. On 18 March 1878, Moore read a paper to an evening meeting of the Royal Dublin Society "On a supposed new species of *Ceratozamia*", and at the same event displayed female plants of *Encephalartos villosus* and *Stangeria eriopus*. The pricipal subject, a *Ceratozamia* plant, had been "brought direct to Ireland from Havana, and ... [was] said to be native in Cuba; but I cannot find that it has been noticed among the plants of that island." Moore suggested it may have been imported from Mexico into Cuba, and added that it had been in Glasnevin "about thirty years". The particular cycad was a female. Moore sent herbarium specimens to Dr Eduard Regel in St Petersburg for his scrutiny, and Regel, writing on 26 February 1878, pronounced that it was *Ceratozamia longifolia* (= *C. mexicana*):

> Your Cycadea is the Ceratozamia longifolia Miq. We have specimens with similar pinnulae and petiolior basi tenore aculeatior [illegible] in the specimen of which you have send "pinnulae rhachis et petioli basior". In consequence I have no any doubt that it is the veritable C. longifolia. C. masteriana is a very different species, of which you can receive in the summer a living plant. In the next time I will dispatch to your address the demanded seeds and I am my dear colleague
> yours faithfully
> E. Regel.

Moore disagreed, and provisionally named the Glasnevin cycad *Ceratozamia fusca-viridis* [recte *fuscoviridis*] (Figure 2). The fact that he explicitly stated that "I propose to name it, provisionally ..." means that in his paper is not the place of valid publication of that name.

Figure 2 The original plant of *Ceratozamia fuscoviridis* photographed in the Palm House, National Botanic Gardens, Glasnevin, c. 1910.

Figure 3 The Great Palm House (built 1884), National Botanic Gardens, Glasnevin, c. 1950.

Ceratozamia mexicana f. *fuscoviridis* is still cultivated in the Palm House (Figure 3) at Glasnevin - there is one old plant and two smaller offsets. I cannot be certain that the present plants are directly descended from the original - the chances are high that this is so, but when researching this paper I discovered an entry in the accession books which indicates that a single plant of

Ceratozamia fuscoviridis was purchased in 1903, half a century after its original acquisition (*fide* Moore 1878), from William Bull & Sons for two guineas (perhaps Glasnevin was merely buying back stock?).

Frederick Moore came to Glasnevin in July 1879 from Trinity College Botanic Garden at Ballsbridge, Dublin. He had been educated in Hanover and trained in continental horticultural establishments; for several months in 1876 he was a student at the botanic garden attached to the University of Leiden. Frederick's passion was epiphytic orchids and within a few years of assuming the curatorship at Glasnevin, he began to purchase rare and unusual species from auction rooms and nurserymen in England (there were no suppliers of orchids based in Ireland). With the orchids, he often purchased cycads. Moore was prepared, within reason, to pay substantial sums for both orchids and cycads. In 1894, for example, one *Encephalartos friderici-guilielmi* cost 10 guineas - almost all cycads were priced in guineas - a hard-won bargain price because the nursery had wanted more. Packed in a basket (costing five shillings and six pence) this cycad was shipped to Dublin:

15 August 1894

Dear Sir
My son is anxious that you should have the Encephalartos so have sent it at the price you offered, and trust it will reach safely. It is forwarded per L & N W R[ailway] via Holyhead c/o Messrs Jno Wallis & Son, Dublin.
Yours faithfully
William Bull.

A second plant, purchased under the name *Encephalartos friderici* and costing £7 10s 0d [one of the few not priced in guineas], came from Sander in 1907. Three years earlier, Sander & Sons charged 10 guineas for *Katakidozamia macleayi* (= *Lepidozamia peroffskyana*) - this plant is still in the National Botanic Gardens. Most of the bought-in cycads were acquired between about 1890 and 1915, and the standard prices were one guinea and two guineas for common species. Most of Glasnevin's plants came from two suppliers, William Bull & Sons, "Establishment for New and Rare Plants", King's Road, Chelsea, and Sander & Sons of St Alban's, "Growers, Importers and Exporters of Orchids" which firm also had a base at Bruges in Belgium.

David Moore had bequeathed a reasonable collection of cycads, and we know from the papers of Professor William R. McNab, Scientific Superintendent of the Royal Botanic Gardens, Glasnevin (1879-1890), that "one of the large plants cultivated ... under the name of *Macrozamia Denisonii* (also labelled *M. perowskiana* [= *Lepidozamia peroffskyana*]) coned at Glasnevin in April 1885 - towards the end of May the cone was 14 inches long, 22 inches in circumference and measured about 10 inches in diameter from the tips of the bracts." It is very likely that this cycad is the one which came from Sydney in July 1862 (as noted above). McNab had the plant photographed, and gave copies of the photographs to Dr William Thiselton Dyer, Director of the Royal Botanic Gardens, Kew:

Mr dear McNab
I am sorry I missed seeing you. I am seldom away from Kew now. But having taken over the charge of the Botanic Gardens I am not always to be found in my office except by appointment. Many thanks for your photographs. No doubt the *Macrozamia* has developed since June as the cone was obviously immature. I have a life-size photograph of a cone from Mueller which is 18 inches long by 9 in. broad. I suppose the correct name is *Macrozamia Perowskiana* Miuel. But the synonymy is profuse ...
Yours sincerely
W.T. Thistelton Dyer

In September the cone was detached, photographed, and then McNab studied its phyllotaxis - "two very well marked series of secondary spirals are observable". McNab read papers on "the flowering [sic] of *Macrozamia Denisonii* Moore and Müller, at the Royal Botanic Gardens, Glasnevin", and on "the Phyllotaxis of *Macrozamia Denisonii*" to meetings of the Royal Dublin Society in 1885 - alas the photographs of the plant and cone have not been traced.

Frederick Moore's earliest acquisitions were not purchases. In 1882, Dr Melchior Treub, director of the Botanical Garden at Buitenzorg on Java in the Dutch East Indies (now Bogor, Indonesia), sent six cycads to Dublin including one labelled *Macrozamia perowskiana*; most of the names applied are now regarded as synonyms of *Macrozamia miquelii*. Treub was at Leiden in 1876 when Moore was a student there, so personal friendship must have motivated his substantial gift. Frederick's uncle, Charles Moore, still active in Sydney, also augmented the Glasnevin collections with gifts of plants. Kew was another major donor.

Figure 4 Interior of Great Palm House showing some of the cycads, c. 1970.

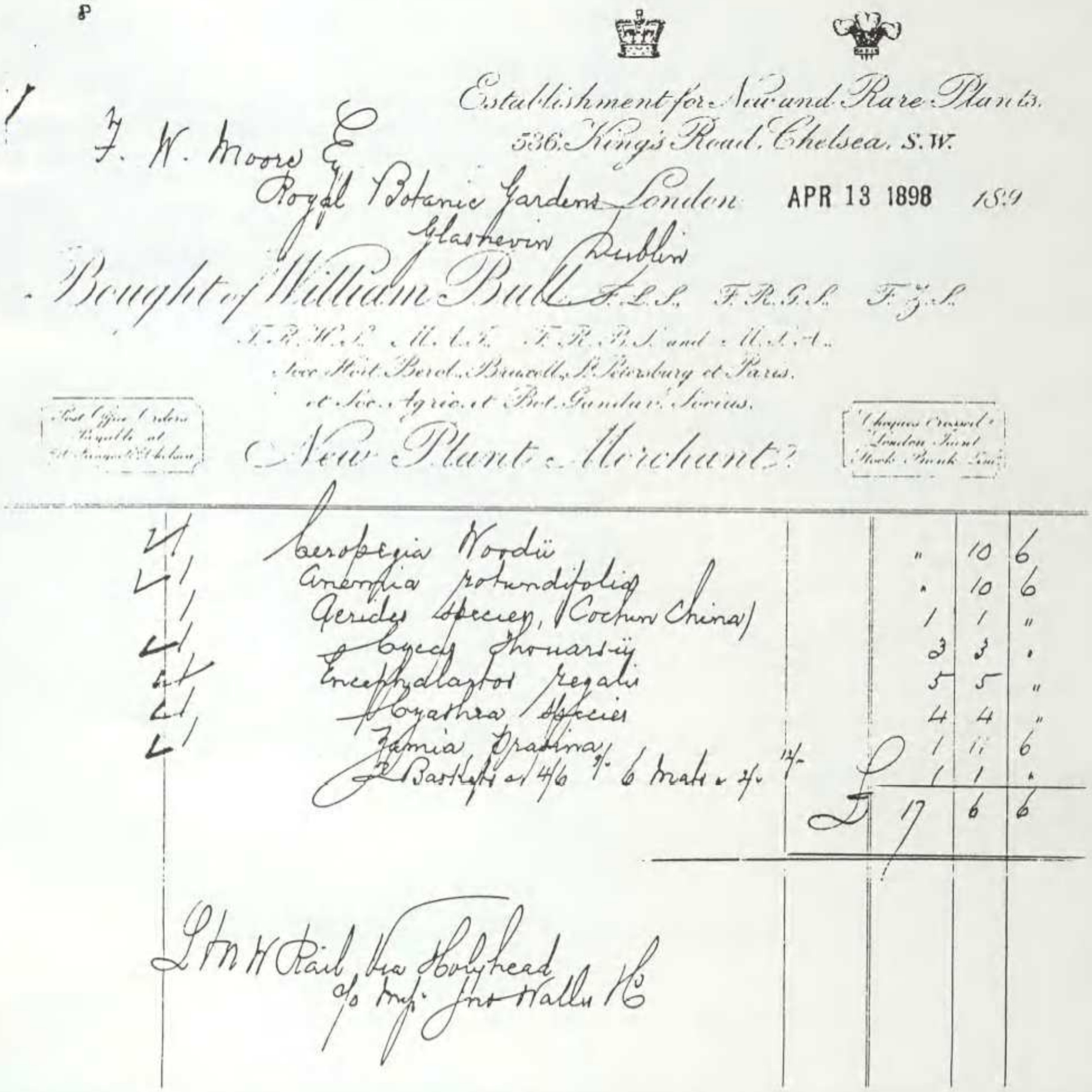

Figure 5 1898 invoice from William Bull documenting the sale to the Glasnevin Gardens of *Cycas thouarsii*, *Encephalartos regalis* (= *E. transvenosus*), *Zamia prasina* (= *Ceratozamia* sp.) together with two orchids, one fern and a *Ceropegia woodii*. (National Botanic Gardens Archives, Glasnevin).

By the mid-1910s Glasnevin was growing in its collections, or at least at some stage had acquired over 50 different cycad taxa (represented by more than one hundred separate plants) - some of these were minor variants, but given the complexity of cycad taxonomy, they had separate binomials. The present day collection of 60 specimens (Figure 4) includes some of the original nineteenth century acquisitions, some offsets from these, and a small number of recently acquired seedlings. Among the older specimens is *Encephalartos woodii*, a single-stemmed individual, now about two metres tall (to caudex apex). I believe that the accessions register entry of April 1905 reading "*Encephalartos* way of *E. alten[teinii]*" is this plant. *E. woodii* was displayed by Sander & Sons at the centenary exhibition of the Royal Agricultural and Botanical Society of Ghent during April 1908, and was then described as growing "well under cultivation ... a strikingly handsome plant" ([Sander] 1908). If my supposition is correct it was a rather cheap plant (most probably a small offset), costing just one guinea, but at the time its rarity was probably not fully appreciated; after all, the exhibitor tentatively stated that "Whether the plant ... will be accepted as a good species, distinct from the variable *E. altensteinii*, we are not at present able to say ..."

Other old cycads are an unnamed *Ceratozamia*, originally labelled *Zamia prasina*, which can be traced to a

purchase from William Bull in 1898, (one and a half guineas) and a large *Encephalartos transvenosus* (purchased as *E. regalis*), also from Bull at a cost of five guineas (see Figure 5). In 1907, Sander and Sons supplied *Macrozamia mackayi* (= *Lepidozamia peroffskyana*) - this is now a handsome cycad.

The most interesting cycad in Glasnevin is perhaps *Cycas micholitzii* which, while thriving, makes little growth. This particular plant is the only one recorded in cultivation according to the survey of the Botanic Gardens Conservation International Cycad Survey. This species, indigenous in south-eastern China and north Vietnam, where it grows in sub-tropical forests, is listed endangered by IUCN. *Cycas micholitzii*, distinguished by bifurcating pinnae, was brought to the attention of the Western World by Wilhelm Micholitz, a professional orchid collector employed by Sander & Sons. Micholitz sent plants to his employers, and also gave material to Henry Ridley of Singapore Botanic Garden. The Glasnevin records indicate that Moore acquired two, probably three, plants of this species in 1906 - the species was named in 1905 - two are entered in the accessions register, but there is also an entry for April 1905 reading "1 new cycad from Micholitz" - this is almost certainly a reference to *Cycas micholitzii*. The earlier (unnamed) plant cost three guineas, in 1906 one cost two guineas and the second of that year was a gift.

Cycads have formed an important component of the collections in the National Botanic Gardens, Glasnevin, for at least one and a quarter centuries, being most significant during Sir Frederick Moore's keepership. Current work on the collections includes the long overdue recording of the sex of each plant - only six of the individuals have coned since the survey began. The older specimens now dominate the palm house, and in a few years time, when the magnificent iron conservatories by Richard Turner, the Curvilinear Range, has been restored, it is hoped to display the finest specimens in the less crowded conditions in the splendid central pavilion.

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MACROZAMIA FAWCETTII C. Moore

Paul Kennedy

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Macrozamia fawcettii (Figure 1) is a small (Section *Parazamia*) cycad that is endemic to New South Wales and which has a subterranean caudex.

M. fawcettii has a limited distribution range which is confined to the New South Wales far north coast (and adjacent ranges) and which extends roughly from near the coastal city of Coffs Harbour, north to near Casino and then west to areas surrounding the town of Tabulam (which is situated on the Richmond Range at an elevation of 555 metres).

M. fawcettii can be found growing on undulating hillsides on the foothills of the Coast Range, near Coffs Harbour, in areas of dry to semi-wet sclerophyll forest.

Coffs Harbour (elevation 5 metres) has an annual average rainfall of 1708 mm (spread over 144 rain days) with winter minimum and summer maximum daily temperatures (reached at least once per week during July and January) of 2.6°C and 28.9°C respectively. Frosts occur on an average of six days per year - though a higher incidence of frosts could be expected on the nearby ranges.

Two-thirds of the annual rainfall covering the overall distribution range of *M. fawcettii* falls in summer and autumn. The percentage seasonal rainfall pattern is as follows - Summer: 37%, Autumn: 29%, Winter: 15% and Spring: 19%.

The principal characteristics of *M. fawcettii* are as follows:

- a subterranean caudex,

- a more or less straight rachis, despite turning through multiple spiral twists (Figure 2),

Figure 1 *M. fawcettii*: plant in habitat; note how the fronds rise from the caudex in a more or less upright manner. Photo: C. Thompson.

- glossy, mid to dark green coloured fronds,

- broad, normally flat-surfaced pinnae - usually with apical toothed edges on adult plants,

- pinkish-red callouses at the point where the pinnae join the rachis, and

- seeds with a finely ribbed outer shell.

At first glance, the pinnae on *M. fawcettii* fronds seem to spread from the rachis in a whorl - that is, they appear to extend radially from the rachis (in a similar manner to which the branches of a tree extend from the trunk).

Upon closer inspection, however, it becomes obvious that the pinnae do not actually extend radially from the rachis, but that the rachis itself spirally twists through 2-5 (or sometimes more) complete 360° revolutions.

In effect, because of the twisting of the rachis, the pinnae extend in various directions and ultimately form the basis of a frond structure with a more or less spirally ascending 360° spread of pinnae.

Figure 2 *M. fawcettii*: side-on profile of frond. Photo: P. Kennedy.

The pinnae are normally angled slightly forward (from the rachis), with the apical pinnae often being inclined at a more acute angle to the rachis. The angle between the rachis and the median pinnae is usually about 60°.

Despite extending in various directions from the rachis, the normally flat-surfaced pinnae seem to twist slightly at the base and, generally, face uniformly upwards (Figure 3).

M. fawcettii normally has an average of 4-6 fronds ranging up to a maximum of 8-10 fronds. Plants with one or two fronds are not uncommon. The fronds generally rise from the caudex in a more or less upright manner (Figure 1), though it is not unusual to find plants with fronds extending from the caudex at various angles, ranging from being almost vertical to spreading at an angle of 30-45° (to the perpendicular).

In near-coastal areas, the fronds of *M. fawcettii* normally grow up to an average length of 600-700 mm, though the

fronds on some plants reach up to 1 m in length. On the inland ranges, however, the plants are generally more robust and can have fronds which grow up to 1.3 m in length.

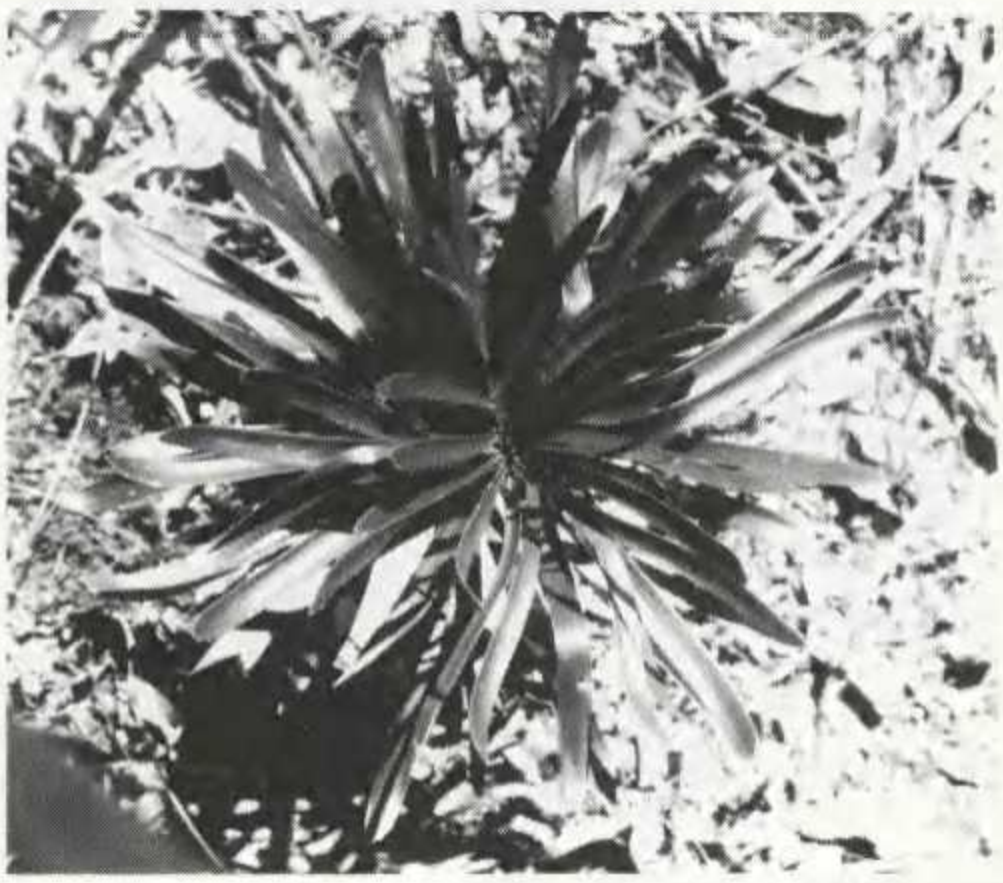


Figure 3 *M. fawcettii*: end-on photograph of plant to emphasize the frond/pinnae detail. Photo: P. Kennedy.

M. fawcettii normally has an unbranched caudex and grows under a eucalypt canopy in a pattern of scattered individual plants or small clumps or small groups of plants. A view is held by certain cycad enthusiasts, however, that some of the small clumps of plants could actually be multi-headed individual plants.

Cones on both male and female plants are usually solitary, but plants with two cones are not uncommon.

Coning occurs on an irregular basis, though undoubtedly on a more frequent basis than most of the drier-habitat inland *Macrozamia* species. I have seen *M. fawcettii* cone on a large scale basis in successive years at one particular habitat location (though the same plants were probably not involved in successive conings).

The flesh on *M. fawcettii* seeds can vary in colour from orange to red to dark red and often adheres strongly to the outer shell. On a comparative basis, *M. fawcettii* seeds are generally the most difficult New South Wales *Macrozamia* species seeds to remove the flesh from, unless the seeds are left soaking in water for a long period of time.

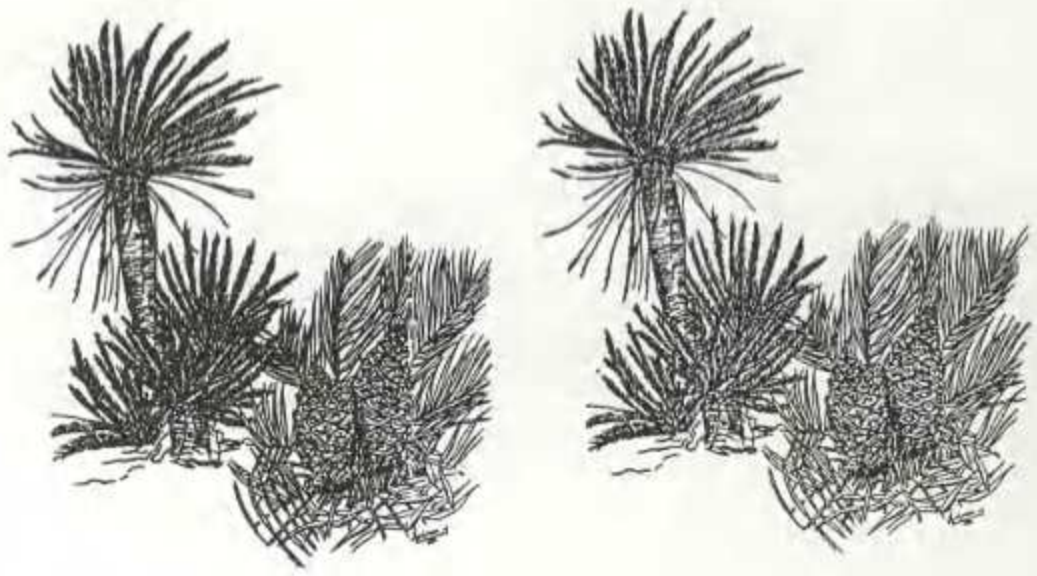
M. fawcettii seedlings grow reasonably quickly from seed, unlike most other New South Wales Section *Parazamia* species which grow extremely slowly from seed.

Despite being small, *M. fawcettii* is a very attractive cycad - principally due to its broad, glossy pinnae. With age, the pinnae on new fronds undergo a colour transformation and change from an initially bronze (or sometimes light green) to a dark green colour. As the fronds grow older they sometimes deteriorate due to insect predation.

Unlike *M. diplomera* caudices, which can have a 1.5 m long whipcord-like tap root, the caudices of *M. fawcettii* sometimes do not have a root system at all as they seem to rot away at the point where they encounter a water-table which is relatively close to the surface.

On an affinity basis, *M. fawcettii* is closely related to the newly named Queensland species, *M. lomandroides* (which was formerly known as the "Bundaberg form" of *M. pauli-guilielmi*). The features which readily distinguish the two species are that *M. fawcettii* has very glossy pinnae and a round petiole, whereas *M. lomandroides* has dull coloured pinnae and a petiole with a flat upper surface. In addition, the caudices of the two species are dissimilar with *M. fawcettii* being basically ovoid or "egg" shaped, while *M. lomandroides* has a longer, narrower, "turnip" shaped caudex.

In respect of New South Wales cycads, *M. fawcettii* is related to two other *Macrozamia* species, *M. flexuosa* and *M. plurinervia* (both of which have multi-twisted rachises), but is easily distinguished from these particular species, with their unusual concave-surfaced pinnae, by its glossy and much broader, flat-surfaced,



THE WORLD LIST OF CYCADS

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Our first "World List of Cycads" was published in **Encephalartos** (Journal of the Cycad Society of Southern Africa) (Osborne & Hendricks 1985) with minor amendments in a supplementary list in a subsequent issue of the same journal (Osborne & Hendricks 1986). An update then followed which was presented at the **First International Conference on Cycad Biology** in 1987 (CYCAD 87, Nice, France) and which was published in the **Memoirs of the New York Botanical Garden** (Stevenson, Osborne & Hendricks 1990). Changes in taxonomy and in outlook, especially in the genera *Cycas, Encephalartos* and *Zamia*, made the previous lists obsolete and hence we presented a further update at the **Second International Conference on Cycad Biology** in 1990 (CYCAD 90, Queensland, Australia) (Stevenson & Osborne, in print). In that list we gave the names of taxa, the authors (without abbreviations) of the original descriptions and the date of their publications, followed by the countries or provinces where the plant is known to occur. Further taxonomic progress has been made, especially in the Australian *Cycas* and *Macrozamia* representatives, and hence another update is justified.

The list which follows gives all currently valid taxonomic names of known extant species and includes a number of locality or other names in common usage. A number of synonyms is given in the *Zamia* listing, together with supplementary notes. The type species for each genus is indicated by an asterisk, while the presentation is alphabetical by family according to Stevenson (1992). The abbreviations AUS, MEX and RSA represent Australia, Mexico and the Republic of South Africa, the three main centres of cycad endemism. The total number of validly-published species in our list, not including synonyms or *species dubia*, is 187.

1 Family Cycadaceae

1.1 CYCAS Linnaeus 1753 (39 species, Australasia)

C. angulata	R. Brown	1810	N. Territory & Queensland (AUS)
C. arenicola	K. Hill	(in press)	
C. armstrongii	Miquel	1868	N. Territory (AUS) & Papua New Guinea
C. baguanheensis	L.K. Fu & S.Z. Cheng	1981	China
C. balansae	Warburg	1900	Vietnam
C. basaltica	C.A. Gardner	1923	Western Australia
C. beddomei	Dyer	1883	India
C. brunnea	K. Hill	1992	N. Territory & Queensland (AUS)
C. cairnsiana	F. Mueller	1876	Queensland (AUS)
C. calcicola	J.R. Maconochie	1978	Northern Territory (AUS)
C. chamberlainii	W.H. Brown & Keinholz	1925	Phillipines
C. chevalieri	Leandri	1931	Vietnam
*C. circinalis**	Linnaeus	1753	Asia
C. conferta	Chirgwin	(in press)	Northern Territory (AUS)
C. couttsiana	K. Hill	1992	Queensland (AUS)
C. furfuracea	W.V. Fitzgerald	1918	Western Australia
C. guizhouensis	K. Lan & R. Zhou	1983	China
C. hainanensis	C.J. Chen & C.Y. Chen	1975	Hainan Island & S. Coast (China)
C. media	R. Brown	1810	Queensland (AUS) & Papua New Guinea
C. megacarpa	K. Hill	1992	Queensland (AUS)
C. micholitzii	Dyer	1905	
var. *micholitzii*			Vietnam & China
var. *simplicipinna*	Smitinand	1971	S.E. Asia
C. ophiolitica	K. Hill	1992	Queensland (AUS)
C. panzhihuaensis	L. Zhou & S.Y. Yang	1981	China
C. papuana	F. Mueller	1885	Papua New Guinea
C. pectinata	W. Griffith	1854	S.E. Asia
C. platyphylla	K. Hill	1992	Queensland (AUS)
C. pruinosa	J.R. Maconochie	1978	Western Australia
C. revoluta	Thunberg	1782	Ryukyu Islands (Japan)
C. riuminiana	Porte ex Regel	1863	Phillipines
C. rumphii	Miquel	1839	S.E. Asia & Pacific Islands

C. seemannii	A. Braun	1876	Fiji, Tonga & Vanuata
C. scratchleyana	F. Mueller	1885	New Guinea
C. schumanniana	Lauterback	1901	Papua New Guinea
C. siamensis	Miquel	1863	S.E. Asia
C. silvestris	K. Hill	1992	Queensland (AUS)
C. szechuanensis	C. Cheng & L.K. Fu	1975	China
C. taiwaniana	Carruthers	1893	Taiwan & S.E. China
C. thouarsii	Gaudichaud	1829	E. Africa & Indian Ocean Islands
C. wadei	Merrill	1936	Phillipines

Note: We have choosen to ignore Schuster's (1932) work in view of the resulting confusion and considerable criticism of his treatment of the genus.

Major progress has recently been made by Hill (1992) with respect to the Australian *Cycas* representatives; six new Queensland species, previously known by locality names, have been properly described and the circumscriptions of *C. media* (now including *C. gracilis, C. kennedyana* and *C. normanbyana*) and that for *C. cairnsiana* have been convincingly defined. Publications of *C. conferta* and *C. arenicola* are *in press* and the resolution of the taxon from the Fog Bay, Finniss River, Cox Peninsula and Bynoe Harbour localities is presently in preparation, as is work on the plants from the Port Keats and Wingate localities. Useful information on the Australian representatives is provided in a popular booklet by Butt (1990).

The situation with respect to the Asian and Pacific Island *Cycas* representatives is much less near resolution. Much field work remains to be done, especially in respect of the broad concepts of *C. circinalis* and *C. rumphii* and also to clarify the status of several other taxa. Work is presently in hand by Stevenson and colleagues which will address the issue of typification and valid publication of names in the genus as a whole. A revised edition of Pant's "Cycas and the Cycadales" (1973) is nearing completion.

2 **Family Stangeriaceae**

2.1 **BOWENIA** Hooker ex Hooker f. 1863 (2 species, Australia)

B. serrulata	(W. Bull) Chamberlain	1912	Queensland
*B. spectabilis**	Hooker ex Hooker f.	1863	Queensland

Note: While the treatment by Johnson (1959) remains valid, it is possible that the *Bowenia* population in the Tinaroo (Queensland) locality may be described as a separate species.

2.2 **STANGERIA** T. Moore 1853 (1 species, Southern Africa)

*S. eriopus**	(Kunze) Baillon	1892	E. Cape, Natal, kwaZulu (RSA) & Transkei

3 **Family Zamiaceae**

3.1 **CERATOZAMIA** Brongniart 1846 (11 species; Mexico, Guatemala & Belize)

C. euryphyllidia	Vazquez Torres, Sabato & Stevenson	1986	Veracruz (MEX)
C. hildae	G. Landry & M. Wilson	1979	Queretaro & San Luis Potosi (MEX)
C. kuesteriana	Regel	1857	Tamaulipas (MEX)
C. latifolia	Miquel	1848	Hidalgo, Queretaro & San Luis Potosi (MEX)
C. matudae	Lundell	1939	Chiapas, Oaxaca (MEX) & Guatemala
*C. mexicana**	Brongniart	1846	Hidalgo, Puebla & Veracruz (MEX)
C. miqueliana	H. Wendland	1854	Veracruz (MEX)
C. norstogii	D. Stevenson	1982	Chiapas (MEX)
C. robusta	Miquel	1848	Mexico, Belize & Guatemala
C. sabatoi		(in press)	
C. zaragozae	Medellin-Leal	1963	San Luis Potosi (MEX)

Note: There is some support for the opinion that *C. latifolia* and *C. robusta* should revert to varietal status of *C. mexicana* (e.g. Vovides 1983). However, we have followed the more recent review of species concepts, ecology and distribution of this genus as provided by Stevenson, Sabato & Vazquez Torres (1986).

3.2 **CHIGUA** D. Stevenson 1990 (2 species, South America)

C. bernalii	D. Stevenson	1990	Colombia
*C. restrepoi**	D. Stevenson	1990	Colombia

Note: This genus has recently been described by Stevenson (1990).

3.3 **DIOON** Lindley 1843 (10 species; Mexico, Honduras & Nicaragua)

D. califanoi	De Luca & Sabato	1979	Oaxaca & Puebla (MEX)
D. caputoi	De Luca, Sabato & Vazquez Torres	1980	Puebla (MEX)
*D. edule**	Lindley	1843	
var. *edule*			Veracruz (MEX)
var. *angustifolium*	Miquel	1868	Nuevo Leon, San Luis Potosi & Tamaulipas (MEX)
D. holmgrenii	De Luca, Sabato & Vazquez Torres	1981	Oaxaca (MEX)
D. mejiae	Standley & Williams	1951	N. Honduras & Nicaragua
D. merolae	De Luca, Sabato & Vazquez Torres	1981	Chiapas (MEX)
D. purpusii	Rose	1909	Oaxaca (MEX)
D. rzedowskii	De Luca, Moretti, Sabato & Vazquez Torres	1980	Oaxaca (MEX)
D. spinulosum	Dyer	1884	Oaxaca & Veracruz (MEX)
D. tomasellii	De Luca, Sabato & Vazquez Torres	1984	
var. *tomasellii*			S.W. Coast (MEX)
var. *sonorense*	De Luca, Sabato & Vazquez Torres	1984	N.W. Coast (MEX)

Note: The taxonomy of *Dioon* is fairly complete and no significant changes are anticipated. A comprehensive review of the genus is given by Sabato and De Luca (1985).

3.4 **ENCEPHALARTOS** Lehmann 1834 (54 species, Africa)

E. aemulans	Vorster	1990	N. Natal (RSA)
E. altensteinii	Lehmann	1834	E. Cape (RSA) & Transkei
E. arenarius	R.A. Dyer	1956	E. Cape (RSA)
E. barteri	Carruthers ex Miquel	1868	
subsp. *barteri*			Nigeria, Ghana & Benin
subsp. *allochrous*	L.E. Newton	1978	Nigeria
E. bubalinus	Melville	1957	Tanzania & Kenya
E. caffer	(Thunberg) Lehmann	1834	E. Cape (RSA)
E. cerinus	Lavranos & Goode	1989	kwaZulu (RSA)
E. chimanimaniensis	R.A. Dyer & Verdoorn	1969	Mocambique & Zimbabwe
E. concinnus	R.A. Dyer & Verdoorn	1969	Zimbabwe
E. cupidus	R.A. Dyer	1971	E. Transvaal (RSA)
E. cycadifolius	(Jacquin) Lehmann	1834	E. Cape (RSA)
E. delucanus	Malaisse, Sclavo & Crosiers	1992	Tanzania
E. dolomiticus	Lavranos & Goode	1988	E. Transvaal (RSA)
E. dyerianus	Lavranos & Goode	1988	E. Transvaal (RSA)
E. eugene-maraisii	Verdoorn	1945	W. Transvaal (RSA)
E. ferox	Bertolini fil.	1851	N. Natal, kwaZulu (RSA) & Mocambique
*E. friderici-guilielmi**	Lehmann	1834	E. Cape (RSA) & Transkei
E. ghellinckii	Lemaire	1867	Natal (RSA) & Transkei
E. gratus	Prain	1916	Malawi & Mocambique
E. heenanii	R.A. Dyer	1972	E. Transvaal (RSA) & Swaziland
E. hildebrandtii	A. Braun & Bouche	1874	Kenya & Tanzania
E. horridus	(Jacquin) Lehmann	1834	E. Cape (RSA)
E. humilis	Verdoorn	1951	E. Transval (RSA)
E. inopinus	R.A. Dyer	1964	E. Transvaal (RSA)

E. ituriensis	Bamps & Lisowski	1990	Zaire & Uganda
E. kisambo	Faden & Beentje	1989	Kenya
E. laevifolius	Stapf & Burtt Davy	1926	E. Transvaal (RSA) & Swaziland
E. lanatus	Stapf & Burtt Davy	1926	Central Transvaal (RSA)
E. latifrons	Lehmann	1837	E. Cape (RSA)
E. laurentianus	De Wildeman	1903	Zaire & Angola
E. lebomboensis	Verdoorn	1949	N. Natal, S.E. Transvaal (RSA), Swaziland & Mocambique
E. lehmannii	Lehmann	1834	E. Cape (RSA)
E. longifolius	(Jacquin) Lehmann	1834	E. Cape (RSA)
E. manikensis	Gilliland (Gilliland)	1939	Zimbabwe & Mocambique
E. marunguensis	Devred	1958	Zaire
E. middelburgensis	Vorster, Robbertse & v.d. Westhuizen	1989	Central Transvaal (RSA)
E. munchii	R.A. Dyer & Verdoorn	1969	Mozambique
E. natalensis	R.A. Dyer & Verdoorn	1951	Natal & kwaZulu (RSA)
E. ngoyanus	Verdoorn	1949	N. Natal, kwaZulu, S.E. Transvaal (RSA) & Swaziland
E. paucidentatus	Stapf & Burtt Davy	1926	E. Transvaal (RSA) & Swaziland
E. poggei	Ascherson	1878	Zaire
E. princeps	R.A. Dyer	1965	E. Cape (RSA) & Transkei
E. pterogonus	R.A. Dyer & Verdoorn	1969	Mocambique
E. schaijesii	Malaisse, Sclavo & Crosiers	1992	Zaire
E. schmitzii	Malaisse	1969	Zaire & Zambia
E. sclavoi	De Luca, D. Stevenson & Moretti	1989	Tanzania
E. septentrionalis	Schweinfurth	1871	Uganda & Sudan
E. tegulaneus	Melville	1957	Kenya
E. transvenosus	Stapf & Burtt Davy	1926	N. Transvaal (RSA)
E. trispinosus	(Hooker) R.A. Dyer	1965	E. Cape (RSA)
E. turneri	Lavranos & Goode	1985	Mocambique
E. umbeluziensis	R.A. Dyer	1951	Swaziland & Mocambique
E. villosus	Lemaire	1867	E. Cape, Natal, kwaZulu, S.E. Transvaal (RSA), Transkei & Swaziland
E. woodii	Sander	1908	(kwaZulu) (RSA), extinct in nature

Note: The taxonomy of *Encephalartos* is near complete but several potentially new taxa require further investigation. The treatment of the then-known South African taxa by Dyer (1965) remains valid and the popular works by Giddy (1984) and Goode (1989) serve as useful references. Names presently in common usage which need proper assignment are *E.* sp. "Msinga" (kwaZulu, *affinis E. natalensis*), *E.* sp. "Piet Retiefii" (S.E. Transvaal, *affinis E. lebomboensis*) and *E.* sp. "venitus" (E. Transvaal, *affinis E. cupidus*).

3.5 **LEPIDOZAMIA** Regel 1857 (2 species, Australia)

L. hopei	Regel	1876	Queensland
*L. peroffskyana**	Regel	1857	N.S.W. & Queensland

Note: The treatment by Johnson (1959) remains valid.

3.6 **MACROZAMIA** Miquel 1842 (21 species, Australia)

Section *Macrozamia* Miquel

M. communis	L.A.S. Johnson	1959	N.S.W.
M. diplomera	(F. Mueller) L.A.S. Johnson	1959	N.S.W.
M. douglasii	F. Mueller	1883	Queensland
M. johnsonii	D. Jones & K. Hill	1992	N.S.W.
M. macdonnellii	(F. Mueller ex Miquel) A. de Candolle	1868	Central Australia
M. miquelii	(F. Mueller) A. de Candolle	1868	N.S.W. & Queensland
M. moorei	F. Mueller	1881	Queensland
M. mountperriensis	F.M. Bailey	1886	Queensland
*M. riedlei**	(Gaudichaud) C.A. Gardner	1930	Western Australia

Section *Parazamia* Miquel

M. fawcettii	C. Moore	1884	N.S.W.
M. fearnsidei	D. Jones	1991	Queensland
M. flexuosa	C. Moore	1884	N.S.W.
M. heteromera	C. Moore	1884	N.S.W.
M. lomandroides	D. Jones	1991	Queensland
M. lucida	L.A.S. Johnson	1959	Queensland
M. pauli-guilielmi	W. Hill & F. Mueller	1859	Queensland
M. platyrachis	F.M. Bailey	1898	Queensland
M. plurinervia	(L.A.S. Johnson) D. Jones	1991	N.S.W. & Queensland
M. secunda	C. Moore	1884	N.S.W.
M. spiralis	(Salisbury) Miquel	1842	N.S.W.
M. stenomera	L.A.S. Johnson	1959	N.S.W.

Note: Johnson's (1959) treatment has been partially revised by Jones (1991) and several taxonomic problems have been resolved; further changes, however, may still be necessary. Useful notes are provided in a publication by Butt (1991) on the Zamiaceae in Australia.

3.7 **MICROCYCAS** (Miquel) A. De Candolle 1868 (1 species, Cuba)

*M. calocoma**	(Miquel) A. De Candolle	1868	W. Cuba

3.8 **ZAMIA** Linnaeus 1763 (44 species and 10 synonyms; South, Central & North America)

Z. *acuminata*	Oersted ex Dyer	1884	Nicaragua, N. Panama & Costa Rica
Z. *amazonia*	D. Stevenson	(in press)	Brasil, Colombia & Venezuela
Z. *amblyphyllidia*	D. Stevenson	1987	Puerto Rico, Cuba & Jamaica
Z. *amplifolia*	Masters	1878	Choco (Colombia)
Z. *angustifolia*	Jacquin	1791	Bahamas & Cuba
Z. *boliviana*	(Brongniart) A. De Candolle	1868	N. Bolivia
Z. *chigua*	Seemann	1854	Choco (Colombia) & Panama
Z. *cremnophila*	Vovides, Schutzman & Dehgan	1988	Tabasco (MEX)
Z. *cunaria*	Dressler & D. Stevenson	(in press)	Panama
[Z. *cupatiensis*[1]	Ducke	1922	Brazil & Colombia]
Z. *dressleri*	D. Stevenson	(in press)	Panama
Z. *fairchildiana*	L.D. Gomez	1982	Costa Rica & Panama
Z. *fischeri*	Miquel	1845	Nuevo Leon, Queretaro, San Luis Potosi, & Veracruz (MEX)
Z. *furfuracea*	Linnaeus fil. in Aiton	1789	Veracruz (MEX)
Z. *herrerae*	Calderon & Standley	1924	Chiapas (MEX), El Salvador, Honduras & Guatemala
Z. *inermis*	Vovides, Rees & Vazquez Torres	1983	Veracruz (MEX)
Z. *integrifolia*	Linnaeus fil. in Aiton	1789	Florida, Georgia (USA), Bahamas, Cuba & Caiman Islands
Z. *ipetiensis*	D. Stevenson	(in press)	Panama
[Z. *jirijirimensis*[1]	R.E. Schultes	1953	E. Colombia]
[Z. *lawsoniana*[2]	Dyer	1884	Oaxaca (MEX)]
Z. *lecointei*[1]	Ducke	1915	Bolivia, Brazil & S. Venezuela
[Z. *lindenii*[3]	Regel ex Andre	1875	Ecuador]
[Z. *lindleyi*[4]	Warszewicz ex A. Dietrich	1851	Panama]
Z. *loddigesii*[2]	Miquel	1843	Mexico
Z. *manicata*	Linden ex Regel	1876	N. Colombia & S. Panama
Z. *montana*	A. Braun	1875	N. Colombia

[Z. *monticola*[5]	Chamberlain	1926	Mexico]
Z. *muricata*	Willdenow	1806	Colombia & N. Venezuela
Z. *neurophyllidia*	D. Stevenson	(in press)	Panama
[Z. *obidensis*[1]	Ducke	1922	Brazil]
Z. *obliqua*	A. Braun	1875	Choco (Colombia) & S. Panama
Z. *paucijuga*	Wieland	1916	W. Mexico
[Z. *picta*[6]	Dyer	1884	Chiapas (MEX) & W. Guatemala]
Z. *poeppigiana*[3]	Martius & Eichler	1863	Peru
Z. *polymorpha*	D. Stevenson	(in press)	Campeche, Quintana Roo, Yucatan (MEX) & Belize
Z. *portoricensis*	Urban	1899	Puerto Rico
Z. *pseudomonticola*	L.D. Gomez	1982	W. Costa Rica
Z. *pseudoparasitica*	Yates in Seemann	1854	N. Panama
Z. *pumila**	Linnaeus	1763	Domican Republic, Puerto Rico & Cuba
Z. *purpurea*	Vovides, Rees & Vazquez Torres	1983	Oaxaca & Veracruz (MEX)
Z. *pygmaea*	Sims	1815	W. Cuba & Isla de la Juventud
Z. *roezlii*	Linden	1873	Choco (Colombia) & Ecuador
Z. *skinneri*	Warszewicz ex A. Dietrich	1851	Nicaragua, N. Panama & Costa Rica
Z. *soconuscensis*	Schutzman, Vovides & Dehgan	1988	Chiapas (MEX)
Z. *spartea*	A. De Candolle	1868	Oaxaca (MEX)
Z. *splendens*	Schutzman	1984	Chiapas (MEX)
Z. *standleyi*	Schutzman	1989	Honduras
[Z. *sylvatica*[2]	Chamberlain	1926	Oaxaca (MEX)]
Z. *tuerckheimii*	J. Donnell Smith	1903	Guatamala
Z. *ulei*[1]	U. Dammer	1907	W. Brazil, Colombia & Peru
Z. *variegata*[6]	Warszewicz	1845	Guatemala
Z. *vazquezii*	D. Stevenson, Moretti & Sabato	(in press)	Veracruz (MEX)
[Z. *verschaffeltii*[5]	Miquel	1869	Mexico]
Z. *wallisii*	A. Braun	1875	Colombia

Notes:
(i) In the localities for *Zamia* above, we have sometimes used provinces or countries; readers should thus note that Choco, for instance, is a province in the western coastal region of Colombia and that Campeche, Chiapas, Nuevo Leon, Oaxaca, Queretaro, Quintana Roo, San Luis Potosi, Tabasco, Veracruz and Yucatan are Mexican provinces.
(ii) The taxonomy of *Zamia* has always presented difficulties and is discussed by Eckenwalder (1980) and Stevenson & Sabato (1986). Further revision is required, especially with respect to those taxa superscripted. The names which are likely to be dropped are given in parentheses.

[1]It is clear from the three papers on Amazonian Zamias by Ducke (1915, 1922, 1935) that he had a misconception concerning Z. *ulei*. In 1915, he described Z. *lecointei* and mentioned another probable new *Zamia* which he described as Z. *cupatiensis* in 1922. The type, illustration (Ducke, 1915, Planche 1) and description of Z. *lecointei* all show linear-lanceolate leaflets and he considered the juvenile plants with somewhat broader leaflets to be similar to Z. *ulei*. Ducke's (1915) concept of Z. *ulei* is presented in Planche 2 of the same paper; this bears little resemblance to the type or description (Dammer, 1907) of Z. *ulei* which has ovate-lanceolate to elliptic leaflets. As a result of his misconception, Ducke described Z. *cupatiensis* in 1922. The description and photograph of Z. *cupatiensis* (Ducke, 1922, Planche 2) are identical to the photograph and isotypes of Z. *ulei*. In the same paper, Ducke (1922) also described Z. *obidensis* which was intermediate between his Z. *lecointei* and his Z. *cupatiensis*. Because Ducke mistakenly thought that Z. *ulei* had linear-lanceolate leaflets, he (1935) considered Z. *lecointei* to be a subspecies, Z. *ulei* subsp. *lecointei*. This problem was compounded by Schuster (1932). As a result, Schultes (1953) redescribed Z. *lecointei* as Z. *jirijirmensis*. However, the type specimens for these two names are identical. Thus, Z. *cupatiensis* is a synonym of Z. *ulei* and Z. *jirijirimensis* is a synonym of Z. *lecointei*. Moreover, Z. *obidensis* is most likely a shade and juvenile form of Z. *lecointei*.

[2]Because Z. *loddigesii* has considerable variability in leaf and leaflet morphology (perhaps as a result of introgressive hybridization between Z. *furfuracea* and Z. *spartea*), cycadologists with narrow species concepts have attributed species level names to the variants of some nebulous form. Z. *lawsoniana* and Z. *sylvatica* are thus probably synonyms of Z. *loddigesii*.

[3]There has been much confusion regarding Z. *lindenii* and Z. *poeppigiana*. The descriptions and type material for both names are identical and they are considered conspecific. This is supported by the fact that specimens collected by Andre in Ecuador in 1885 (more than ten years after he described Z. *lindenii*) bear labels in his handwriting with the specific epithet *Zamia lindenii* Andre. These specimens are identical to the type specimen of Z. *poeppigiana* which has nomenclatural priority.

[4]Z. *lindleyi* was described by Dietrich (1851) from notes and sketches of Warszewicz and the species was typified by an illustration. It has some resemblance to Z. *chigua* and to Z. *roezlii* but no confirmatory collection has ever been made and the taxon is now considered a *species dubium*.

[5]Both Z. *monticola* and Z. *verschaffeltii* are enigmatic. Type specimens for both names are extant (Stevenson & Sabato, 1986) and the original descriptions (Chamberlain, 1926; Miquel, 1869) are based on horticultural material that presumably originated in Mexico. However, no known Zamias in Mexico conform to the specimens or the descriptions. Either the species are extinct or confusion exists as to their origin. In fact, both specimens closely resemble South American species of *Zamia*, in particular Z. *muricata* from Venezuela. The confusion arising with horticultural material is not uncommon; for instance Miquel (1847, 1869) was unsure whether Z. *fischeri* was from Mexico or the West Indies. The conclusion is that Z. *monticola* and Z. *verschaffeltii* are synonyms for Z. *muricata*.

[6]From the account of the nomenclatural history of Z. *picta* and Z. *variegata* (Stevenson & Sabato, 1986), it seems almost certain that these two names are based on the same material collected by Warszewicz in Guatemala and thus the names are conspecific. Since Z. *variegata* has nomenclatural priority, Z. *picta* is the synonym.

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HURRICANE ANDREW AND FAIRCHILD TROPICAL GARDEN

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As I'm sure most cycad enthusiasts know, Hurricane Andrew struck southern Miami a powerful blow this past August, doing billions of dollars damage and making thousands homeless. Fairchild Tropical Garden was caught by winds a bit to the north of the hurricane's "eye" and the result was shattering both to the vegetation and to the human eye. Dr. William Klein, the Garden's Director, issued a call to botanical gardens throughout the U.S. asking for volunteers to help salvage what was salvageable and to utilize for scientific purposes what could not be saved. A crew from New York Botanical Garden, for example, collected parts of many ruined plants to be screened later for potentially useful drugs. We also came to the Garden to look at the cycad situation.

Figure 1 A large, male *Microcycas* appeared relatively undamaged.

Initially, we thought that if the trunks of any *Encephalartos* and *Macrozamia* specimens had been broken off we might section them and look for cone domes. As you may know, whether these two genera have true terminal strobili or only lateral strobili has been controversial and can only be settled by cutting longi-sections of the trunks looking for pith bundles (i.e., cone domes). We are most happy to report to you that we did not find a single specimen in these two genera sufficiently damaged to be suitable for sectioning. Although battered, nearly all of the Garden's cycads came through in good shape. We predict visitors to the Garden in six months, or so, will find most of the cycads looking much as before the storm. The fine old *Microcycas calocoma* had lost some fronds but looked as if it would revive in time (Figure 1).

To us the real surprise was *Cycas revoluta*. One large clump in front of the research laboratory was partially buried under an enormous *Enterolobium* which had been blown over (Figure 2). Yet the cycads underneath seemed relatively unscathed. A pair by the lab entry look untouched. They reminded us of Cinderellas -- coming through all this mistreatment still looking as lovely as ever and ready for the ball.

Figure 2 *Cycas revoluta* partly under a fallen *Enterolobium* is still fresh and green.

The wind velocities of Andrew probably will never be known for sure. Wind meters at the Hurricane Centre and the Turkey Point Reactor, failed at velocities of about 200 mph. All electric lines blew down and at Turkey Point the cooling water pumps were switched to emergency generators. There were three backup generators; the first failed after some hours, the second did not start having being drenched by thousands of gallons of fuel oil when a storage tank collapsed, and it fell to the third, and last, backup generator to carry the burden of cooling the reactors until electric service was restored.

At Fairchild Garden, all of the wind came from the east since only its north side passed over Coral Gables. It was

interesting to see that the east-facing sides of the stem apices of many of the larger *Encephalartos* specimens were hidden behind a dense shield of bent, broken and interwoven fronds. The tough pinnae had not blown away at all and in order to examine the stem apex, we had to cut away this lattice of bent fronds. Within, we found that even pollen cones, halfway along in development, looked to be in perfect health. Is this one of Nature's protective devices?

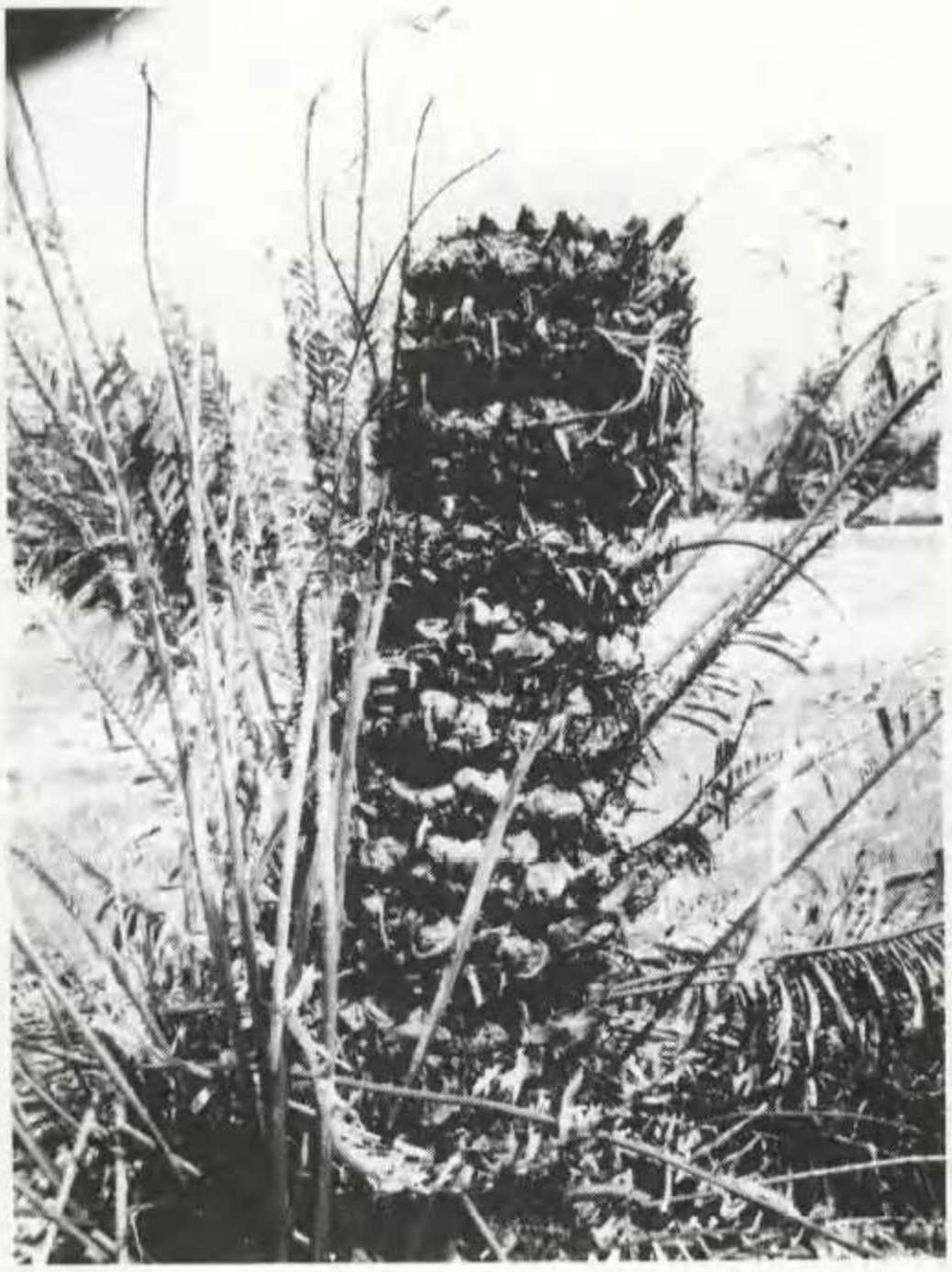


Figure 3 *Cycas circinalis* trunks often were broken cleanly just below the crown.

Cycas circinalis was the cycad that suffered the most damage. Many larger specimens had been broken off cleanly, usually about a foot or so below the crown, leaving a bare stump (Figure 3). We wondered about this. Why was the break so cleanly transverse without the usual splintering one sees when tree trunks are broken off? So we cut many cross- and longitudinal-sections, staining them with phloroglucinol to show the vascular strands. We found that almost invariably the breaks had come at the cataphyll zones (Figures 3, 4). These are zones of weakness, apparently because the vascular traces to cataphylls are direct rather than girdling and, furthermore, are quite delicate (Figure 5). Above and below the cataphyll zones, the girdling traces to the foliage leaves are larger and probably add mechanical support to the stem. We had always thought that the enormous amount of pith

Figure 4 Priscilla points to the cataphyll zone of a trunk of *Cycas circinalis* -- the weak link!

Figure 5 Longitudinal section of trunk of *Cycas circinalis*, stained with phloroglucinol, shows weak vasculature at the cataphyll zone (midway down the section).

and cortical parenchyma in a cycad stem made them rather weak. Mistakenly, we assumed that these tissues would be crisp and crunchy, like a raw potato. We were wrong! The pith and cortex of *Cycas* is really rather rubbery and an excised slab can be bent and twisted without breaking. Interlaced with girdling vascular strands, it is just as tough as a Michellin tire! We suspect that this species and possibly some other forms of it have evolved an "escape mechanism" to enable them to survive frequent tropical monsoon winds, typhoons and hurricanes. Rather than being uprooted (as were many palms at FTG), why not just snap off cleanly below the crown? Then, by regeneration of one or more new shoots, recovery is underway. Perhaps, the snapped off crown, carried along by accompanying flood waters also can survive, partly buried and producing new roots.

We recall statements to the effect that the function of girdling leaf traces is quite speculative. Speculate no more! No wonder cycads have lived so long! Trunks built like radial ply tires; poisonous leaves and seeds; freedom from nitrogen deficiency! How could they lose!

Fairchild Tropical Garden will once again look as it should, a magnificent showplace of subtropical vegetation. But it will not be the same place it was before Andrew. Crews from Disney World and elsewhere have re-erected many of the toppled palms, using great building cranes. Only the cycads will look pretty much as they used to, and that is good news to all who have delighted in this priceless collection.

P.S. Just the other day we received "The Cycad Newsletter" for September, 1992, in which Willie Tang has given an in-depth appraisal of damage to the cycads at FTG. His analysis which is not as sanguine as ours has the advantage of relying on a longer period of observation than was available to us. Apparently, some necrosis is showing up here and there and especially in some smaller plants. Nevertheless, we stand by our report that the prognosis for survival of cycads in this important collection is quite favourable. We have been informed that many larger specimens now are producing new leaf flushes, which leads us to think that the damage to most of the Garden's cycads was largely non-lethal. The few uprooted specimens reported by Willie, and which we also saw, seemed to us quite salvageable.

KN & PF

SHORT COMMUNICATIONS / KORT MEDEDELINGS

NEWS FROM YOUR COUNCIL

Nat Grobbelaar
Box 15357, 0039 Lynn East

Council recently took several decisions concerning "*Encephalartos*" that will be of interest to members:

(a) that small advertisements or notices occupying up to one third of a column, concerning cycads or related matters, may be inserted into "*Encephalartos*" free of charge by any paid up member of the Society. Even if the wording remains unaltered, such advertisements must be submitted anew to the Editor for each issue of the magazine. A fee will be charged for larger advertisements. The tariff will be R50 per quarter page or part thereof, i.e. R200 per full page per magazine issue. The larger advertisements can be spread over either one or both columns. The fee for publishing the advertisement must be sent to the Editor together with the advertisement. Payment by local members may be made by crossed cheque or postal order and should be made out to the Cycad Society of South Africa (or "Broodboom Vereniging van Suid-Afrika"). Overseas members should arrange a bank draft. Arrangements can be made initially with the Editor to publish the advertisement in more than one issue of the magazine. The Editor will decide on the placement of all advertisements in the magazine on condition that it will never appear on any of the sides of the front or back covers.

(b) that the Editor will limit reproduction of newspaper clippings in "*Encephalartos*" to the minimum and will publish a maximum of one report on a particular matter.

(c) that scientific articles which have appeared in recognized scientific journals will not be reproduced in "*Encephalartos*". It will, however, be appreciated if short reports about such papers could regularly be published in "*Encephalartos*". Such reports should include the addresses from where a reprint of the paper could be

requested. This decision was prompted by the large increase in cycad-related publications in international scientific journals, especially taxonomic papers. Members that could use these, often very technical papers to advantage should request a reprint of the paper from the author(s) or arrange with one of the State Libraries to have a photocopy provided. In the last resort, the Editor can provide a photocopy at a small fee.

CYCAD 93

Roy Osborne
20 Maryvale Road, 3630 Westville

Final arrangements for CYCAD 93, the Third International Conference on Cycad Biology, to be held in Pretoria over the period July 5-9, 1993, are going according to plan. The South African hosts are particular looking forward to renewing acquaintances with International friends and an active and enjoyable programme has been planned. Early submissions on the programme have included poster and paper presentations on such diverse topics as tissue culture of *Macrozamia*, morphology of Chinese *Cycas*, population and comparative morphology of *Stangeria*, several presentations on cycad-insect relationships, toxins in the pollen, pollination process, *in situ* and *ex situ* conservation aspects, the current world list and the recent cycad census report.

Late applications for registration and participation in the pre- and post-conference field trips may be possible and enquiries in this respect should be addressed to Nat Grobbelaar (tel. 012-8080995).

MAJOR ADVANCES IN *CYCAS* TAXONOMY: REVIEW OF A RECENT PAPER BY KEN HILL

Roy Osborne

In what will undoubtedly become a standard taxonomic reference work on the genus, **Ken Hill** of the Royal Botanic Gardens, Sydney, Australia, has published "A preliminary account of *Cycas* (Cycadaceae) in Queensland" (*Telopea* 5(1): 177-205, 1992). The work, a continuation of studies initiated by the late John Maconochie, resolves many of the issues of the status of Australian *Cycas* species. In his paper, Hill describes six new species and redefines the concept of several existing taxa.

The new species are as follows:

Cycas silvestris ("from the forests") is distinguised from other Australian species by the broader and relatively thinner adult pinnae and is known from a few small stands near the northeastern tip of Cape York Peninsula. It has some superficial similarities with the *C. circinalis* and *C. rumphii* complexes.

Cycas megacarpa ("large seeds") has green fronds and large non-glaucous seeds and occurs in the Port Curtis district between Rockhampton and Brisbane, with well-developed stands near Mt. Morgan. It is distinguished from *C. media* by its larger seeds.

Cycas ophiolitica (from serpentinite-derived soils) is one of the "blue" Australian species. Occurring in the Port Curtis district near Rockhampton, this taxon has been known under the name "Marlborough Blue".

Cycas platyphylla ("broad megasporophyll tip"), another of the "blues", is found near Petford on the northwestern Atherton Tableland. This taxon has been known informally as the "Petford Blue".

Cycas couttsiana (in honour of Pat and David Coutts), yet another of the "blues", refers to the populations at Chudleigh Park station and a few other areas in the southern Gregory Range. This species has been referred to informally as the "Glen Idle Blue".

Cycas brunnea ("brown hairs") is found near the northern border between Queensland and the Northern Territory and is most similar to *C. angulata*.

The work redefines existing species as follows:

Cycas media R. Br., with glabrous glossy green fronds, flat pinnae and relatively small seeds, is widespread along the northeastern Queensland coast and extends also into Papua New Guinea. Fairly variable in character, it includes the taxa previously referred to as *C. gracilis*, *C. kennedyana* and *C. normanbyana*. [A complication, however, is that the plant often cultivated under the name *C. kennedyana* is not in fact within this group but is more correctly placed as *C. megacarpa*.]

C. cairnsiana is redefined as from two populations in the Newcastle Range (near Forsayth and at Mt. Surprise) in the drier country of northeastern Queensland. One stand comprises the plant informally known as "Champion's Blue Surprise". This species is distinguished from other Australian taxa by an orange hairiness on new growth, the very waxy pale blue leaves and seeds and by having very narrow pinnae with strongly recurved margins.

In addition to the eight species mentioned above, Hill's work also addresses the issue of intermediates or hybrid swarms, e.g. *C. media* - *C. ophiolitica* near Irvinebank, *C. megacarpa* - *C. ophiolitica* between Mackay and St. Lawrence and *C. platyphylla* - *C. media* between Rockhampton and Mt. Morgan. The paper also refers to the unresolved issues of the Asian *E. circinalis* and *C. rumphii* species concepts. More Australian *Cycas* species are yet to be described from the Northern Territory. One is presently *in press* and the others are under investigation, with possibly up to eight new species involved.

In his paper, Hill draws attention to the conservation status of each taxon described. It is alarming to note that several species have been extensively reduced by the activities of collectors and that *C. silvestris*, *C. megacarpa*, *C. ophiolitica*, *C. platyphylla* and *C. cairnsiana* are considered to be "at risk" from collection pressure.

Ken Hill is known not only for his cycad interests, but is an internationally-acclaimed expert on *Eucalyptus*. He is contributing extensively to the *Flora of Australia* project, commenced in 1985, and hopes to be presenting papers at the forthcoming CYCAD 93 Conference.

CYCAD 90 : PROCEEDINGS

Roy Osborne

Due to a number of factors and a large amount of editorial correspondence, publication of the CYCAD 90 Proceedings is regrettably delayed. **Knut Norstog** and **Dennis Stevenson** inform us that the Proceedings will, however, be printed before the CYCAD 1993 Conference.

SAAB CONFERENCE

Roy Osborne

The 19th Annual Conference of the South African Association of Botanists was held at the University of the Western Cape in January 1993 and attended by some 250 delegates.

There were two cycad-specific presentations at the conference. Danie Spreeth of the University of Stellenbosch gave a lecture "Anatomie van die pinna van grysblarige spesies van *Encephalartos*" in which he compared and contrasted leaf anatomy of several Cape and Transvaal species. This work will be published in due course.

Roy Osborne concluded the Conference with a talk "The other woodii's" in which he presented evidence of a possible second population of *Encephalartos woodii* in a locality some 180 km distant from the site at Ngoye where Medley Wood found the first specimen in 1895. The results of this investigation will be published later this year, and further investigations are to be carried out to check the species status of these plants.

DURBAN BOTANIC GARDENS - CYCAD PROJECT NEARS COMPLETION

Roy Osborne

The reorganization of the cycad plantings at the Botanic Gardens (see "*Encephalartos*" 28: 22) has proceeded well-ahead of schedule, with most of the plantings being done over the cool winter month in 1992. The layout of the cycad collection now comprises seven separate groups: the Cape, Natal, Transvaal and Central African

Encephalartos plantings, a Central American and an Australian area, and the extended *Cycas* collection. The plantings collectively comprise 401 mature plants and 52 taxa are represented. The reorganized collection now ranks the DBG as amongst the world's most important and scientifically-valuable cycad gardens. The gardens will be on the itinerary of the CYCAD 93 post-conference tour.

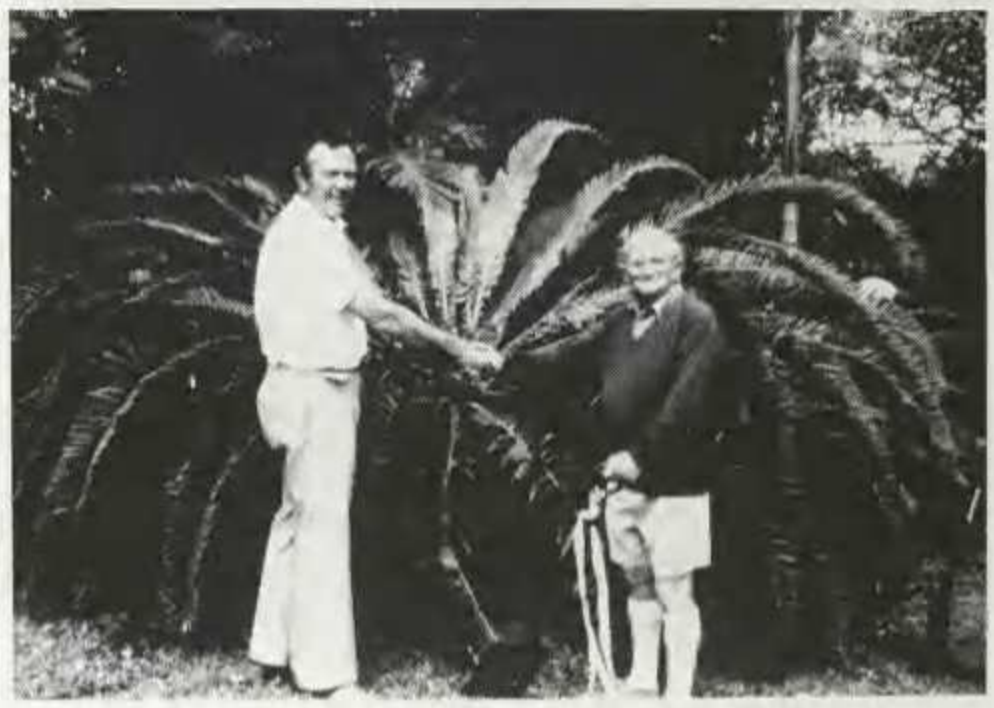
Chris Dalzell, Special Collections Officer of the Durban Botanic Gardens, supervises the planting of a specimen of *Encephalartos friderici-guilielmi* at the gardens. Photo: R. Osborne.

ENCEPHALARTOS WOODII RETURNS TO ZULULAND

Christopher G.M. Dalzell
Durban Botanic Gardens, Botanic Gardens Road,
4001 Durban

The Durban Botanic Gardens in accordance with its policy to distribute cycad seed and plants around the world, has donated a large specimen of *Encephalartos woodii* to Mr Ian Garland of "Twin Streams" in Mtunzini in Zululand. Mr Garland has over the years been a great supporter of the DBG and made a substantial contribution to the existing collection.

The cycad is an off-shoot of the original specimen discovered in the Ngoye forest in Zululand by John Medley Wood in 1895. Dr Medley Wood was curator of the Durban Botanic Gardens from March 1892 to December 1903 and made many trips to the Ngoye forest during his curatorship. Unfortunately only male plants of *E. woodii* are in existence, so the plant can be reproduced only through asexual means. Over the years the Durban Botanic Gardens has removed suckers from the larger specimens in the garden in order to keep the species in cultivation. These rooted off-shoots have been donated to major Botanic Gardens around the world - including Kew Gardens in England, Longwood Gardens in Pennsylvania, U.S.A. and Fairchild Tropical Gardens in Florida, U.S.A.



Errol Scarr (left), Director of the Durban Parks Department, congratulating Ian Garland on his acquisition of an *Encephalartos woodii*. Photographed at the "Twin Streams" arboretum, September 1992, by Chris Dalzell.

The plant itself stands approximately 3 m in height and was removed from the parent site plant in July 1979 together with five other suckers. The plant was removed from its site in the Durban Botanic Gardens on Tuesday 29 September and transported to Mtunzini on Wednesday 30 September 1992.

Mr Garland has a 20 acre arboretum called "Twin Streams" in Mtunzini where local Zululand and Natal flora has been planted. This arboretum came into existence when Mr Garland sold his farm to the Mondi Paper Company. An agreement was made that 20 acres would be kept as an arboretum and is to be maintained by Mondi in the event of his death. The cycad has been planted near his house and the DBG feels honoured in donating this rare and endangered plant to Mr Ian Garland. May he enjoy it for many years to come.

U.S.A. VISITORS

Roy Osborne

Michael Perry (centre), together with Byron and Libby Besse, well known cycad enthusiasts and members of the Society from Florida, U.S.A., toured cycad habitats and cycad gardens in South Africa in September 1992. The party spent time in the Transvaal, Natal and the Cape, also renewing acquaintances with many local cycad friends. The three American visitors are pictured here inspecting the type specimen of *Encephalartos natalensis* at Monteseel, Natal. Note the female cones at the apex of one of the many stems of this impressive specimen. Photo: R. Osborne.

NATAL SECTION NEWS - CYCAD "MICROCHIPING"

Natal Section Committee
45 Anleno Road, Montclair, 4001 Durban

A group of about 30 members of the Natal Section of the Society met at the Durban Botanic Gardens on Saturday 5 September 1992 for a "double feature" event

Firstly **Roy Osborne** described the planning behind the reorganization of the Durban Botanic Garden's cycad collection. Members then toured the garden seeing the Cape, Natal, Transvaal and Central American and Australasian plantings. The general feedback was very positive and those involved were congratulated on the success of the project.

Mr **Nico Kotzé**, Product Manager of Babcock Identification Systems (Pty) Ltd (telephone number - Bloemfontein 051-480792 or 4083722) then demonstrated his company's microchip implanting system which serves as an anti-theft measure. The technique involves drilling a 3 mm diameter hole into the cycad trunk at a 45° downwards angle. The glass microchip, sealed in a plastic casing, is then pushed into the cycad trunk. A hand-held radio-frequency scanner then detects the unique unalterable 10-11 digit code for each chip.

The scanner has a memory facility and data can be "dumped" to a PC programmed to read and organize the data for display, storage or hardcopy printout.

Nico Kotzé, Product Manager of Babcock Identification Systems (Pty) Ltd, using the hand-held radio-frequency scanner to check the installation of a microchip into a specimen of *Encephalartos heenanii* at the Durban Botanic Gardens. Photo: R. Osborne.

The ID system has previously been tested in the Cape and the Transvaal and appears to have the support of Nature Conservation authorities. Several of the more important specimens at the Durban Botanic Gardens were implanted with microchips and proposals are being considered to safeguard the entire collection this way.

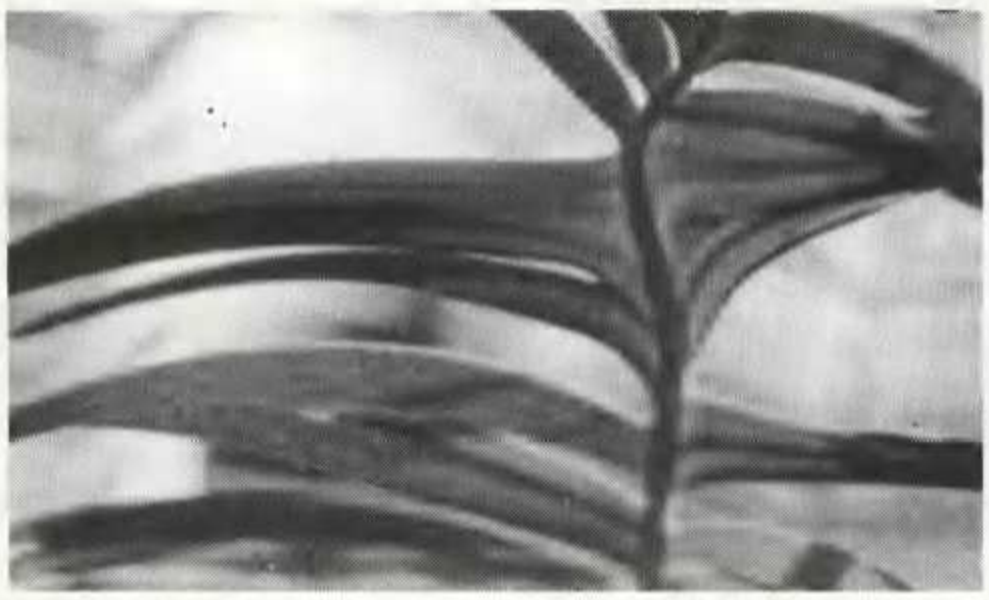
FUSED / DEFORMED LEAFLETS IN *ENCEPHALARTOS INOPINUS*

Martin Schwellnus
P.O. Box 7045, Newton Park, 6055 Port Elizabeth

The photograph shows the fused leaflets of a 0.5 m *Encephalartos inopinus* that had been planted in a drum in Bloemfontein and had been exposed to extreme temperatures of -10°C.

The plant showed very little signs of black frost damage although all the other exposed cycad specimens in the area, with the exception of *Cycas revoluta*, had their leaflets turn blue/black or had lost them.

The median leaflets of this specimen was 150 to 170 mm long and 14 to 22 mm broad. Fusion of groups of two to as many as five leaflets, however, occurred in the top third of the rachis. In the majority of cases the fusion occurred along the entire length of the leaflets with small thorns on the tip of the fused leaflet. The width of some of the fused leaflets were as much as 86 mm as measured against the rachis.



Fusion occurred in a Venetian blind overlap fashion with the top margin of the lower leaflet slightly above that of the bottom margin of the next. The fusion-overlap resulted in a creased/ridged appearance of the fused leaflets. There was no indication of fusion-overlap of the leaflet bases.

As a result of the fusion the rachis ended up contorted and bent in the plane of the leaflet bases in a number of S's. The reason for this appeared to be the non-parting of the leaflets.

This fusion only occurred in the last whorl of leaves produced after transplanting to Bloemfontein. One can only guess at the cause for the fusion but it may be possible that a shortage of water during the formation stage of the leaflets, when the plant still had not developed new roots, resulted in some disfunction of the formation process.

SOMETHING SPECIAL - SOMETHING SAD

Martin Schwellnus

This exceptional specimen of *Encephalartos altensteinii* paid the ultimate price for being something special. It was hauled out of nature with little concern and transplanted into a private garden some years ago.

On the photograph Elke Schwellnus is with this plant in better days.

The new locality was out in the open in an area where severe frost is the rule rather than the exception during winter. It was therefore exposed to annual black frost for a number of years. The problem was compounded by a lack of further care when the owner apparently lost interest in his collection and later left the country.

By the time the owner could be convinced to allow someone to take care of the plant it was beyond salvaging - rotten from root to tip and fallen apart.

All that now remains is a photograph of what once must have been a magnificent sight.

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Dear Editor

THE SOCIETY AND CONSERVATION

This letter is written in my personal capacity, not that of an elected official of this Society, and therefore it does not necessarily reflect the policy of the Council.

The fifth of the six aims of the Society, as listed on the membership application form which appears with this issue, reads "To promote all aspects of cycad conservation". What does this really mean, and to what extent does it force me as member of either the Society or its Council to take certain actions?

As one of the earliest members of the Society, who was in fact responsible for the initial constitution of the Society which has only undergone a few minor modifications in subsequent years, I joined the Society for the express purpose of gaining access to information and to exchange information on cycads. To my mind this is still the primary function of the Society, and as such "*Encephalartos*" is a manifestation of our aim. At a certain stage we were criticized because so many of our members were said to either contravene the conservation laws, or else are in possession of field-collected plants which goes against the spirit of conservation. Accordingly we added to our constitution a clause that we would promote all aspects of cycad conservation. **It means that members of the Society, and especially members serving on the executive committees of the Society and therefore symbolizing the Society, are expected to act not only in accordance with the law, but in accordance with the spirit of conservation. It should also be clear that we are under obligation to make *technical* information available where needed for conservation purposes, in accordance with our primary aim. It does NOT mean that either the Society or its individual members should start taking part in law enforcement or pressure groups. The latter activities are foreign to the main purpose of the Society, and will only weaken our primary effort.** There are, apart from provincial nature conservation bodies funded by us taxpayers for this very purpose, a multitude of private organizations who act as watchdogs of conservation and rightly or wrongly indulge in exerting pressure on the authorities to get their views accepted and acted on. As far as plants are concerned, this task is ably performed by the Flora Conservation Committee of the Botanical Society of S.A. If we *do* want to take action on a conservation-related matter, it would be preferable to work through the said Flora Conservation Committee and strengthen their hand, rather than doing our own thing and just add to the general level of noise.

For us cycads are the most important plants in the world, but this is not the whole truth. Cycads form but a small fraction of the world's plants which are in dire peril. Our official conservation bodies have a mandate to protect all our plants, however rare or common they may be. No amount of campaigning on behalf of cycads only is likely to succeed, because the resources of the official conservation authorities are taxed to the limit, and they cannot have a different strategy for each group of plants. Cycad conservation can only succeed if it is treated as a component of a general conservation plan for all plant species and vegetation types, if necessary with a few special provisions for special groups such as the cycads.

While on the subject, I for one would also like to see in "*Encephalartos*" far fewer press clippings reporting on cycad-related misdeeds, whether perpetrated by our members or outsiders. It does not constitute pleasant reading (and I am in the cycad game principally for the pleasure which I derive therefrom), the information is useless because no-one can do anything constructive with it, and it constitutes too large a proportion of the cost of producing "*Encephalartos*". I invite other members to write to the Editor and state their views on these press clippings.

Piet Vorster, Botany Department, University of Stellenbosch, Private Bag X5018, 7599 Stellenbosch.

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Dear Sir

TRADE IN CYCAD SEEDS: CITES REGULATIONS

It was with great interest that I followed the recent debate in your publication on the possible export of cycad seeds.

The KaNgwane Parks Corporation is responsible for nature conservation and associated development in KaNgwane. Our mission statement is to develop conservation areas and conservation ideals within KaNgwane in such a way as to contribute towards the upliftment of communities through resource utilization strategies whilst at the same time conserving the environment for posterity.

The region of KaNgwane faces considerable pressure on its natural resources from its burgeoning population. Conservation *per se* is seldom held in high esteem as daily requirements in fuel wood, fodder, building material, etc., must be met. In addition, unemployment is high. We have therefore always advocated a policy of controlled sustainable utilization of our resources and the creation of employment as part of our conservation action.

Three species of *Encephalartos* are known to occur within KaNgwane. A large colony of *E. lebomboensis* occurs in the Nkomazi region near the Swaziland-Mocambique border. We have for a number of years been collecting seeds and are propagating thousands of seedlings yearly in a local nursery. *E. paucidentatus* and *E. heenanii* occur in the 51 000 Songimvelo Game Reserve. Seedlings of *E. paucidentatus* are already being produced and sold, while we started this year with an artificial pollination program of *E. heenanii*. Hopefully, we will be able to sell seedlings of this species within the next few years as well as returning plants to those areas which were plundered by unscrupulous collectors.

The local market for *E. lebomboensis* seems almost saturated as we are experiencing difficulty in selling our yearly production despite our advertising and low prices. The export of seeds would therefore represent an attractive source of income. Local production of plants would be scaled back to market demands. The export of these seeds would not have any additional impact on the present population. From our point of view the export of seed from this particular species would not be detrimental to its conservation status. Certain controls, such as the registration of approved seed suppliers, would of course be needed.

The *E. lebomboensis* colony is situated on tribal land in a poorly developed area with very few job opportunities. *At this* stage the people see the cycads in a positive light as half of the income of the cycad nursery has been set aside for community development projects. If the market falls away the poaching of adult plants will regain momentum.

With law-enforcement only, we cannot hope to conserve our species in the long run. It is only when people appreciate the importance and value of their heritage (be it in financial, aesthetic or ethical terms) that lasting conservation will be achieved. As we have increasing difficulty in selling seedlings and are prevented from marketing seeds we foresee that our efforts to undertake appropriate management and conservation of this population might come to an end.

***Dr J.L. Anderson**, Director, KaNgwane Parks Corporation, P.O. Box 1990, 1200 Nelspruit.*

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Dear Editor

MACROZAMIA JOHNSONII

Piet Vorster in a letter in the December 1992 issue ("*Encephalartos*" 32: 28) refers to my article on the Australian cycads and writes: "I would like to ask her to tell us something more about *Macrozamia johnsonii*: where and under what conditions does it grow, where was it described, and in what publication."

The conditions under which they grow was stated in my article in "*Encephalartos*" No. 31 on page 13, paragraph 2, ".....*Macrozamia johnsonii* should be freely watered as they occur in high rainfall woodland ....."

The species was described by D.L. Jones and K.D. Hill in *Telopea* Vol. 5(1): 31-34, 1992 in an article titled "*Macrozamia johnsonii*, a new species of *Macrozamia* section *Macrozamia* (Zamiaceae) from northern New South Wales."

I am surprised that he does not recall this species as I was present on a field trip when he photographed it in Dalmorton State Forest in August 1990 after CYCAD 90. Perhaps it is just a case of the Absent Minded Professor!

It should be noted that some of the *Cycas* species mentioned in the article ("*Encephalartos*" 31: 12-17) have since undergone a name change. K.D. Hill in his revision of the genus "A preliminary account of *Cycas* (Cycadaceae) in Queensland" in *Telopea* Vol. 5(1): 177-205, 1992 has recognized nine species in Queensland, six of them newly described. *Cycas kennedyana* from Mount Morgan which is pictured on page 15 should now be referred to as an intergrade of *Cycas ophiolitica - Cycas megacarpa*.

Cynthia Giddy, P.O. Box 45, 3730 Umlaas Road.

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Dear Editor

A CAUTION AGAINST THE CONTROL OF LEOPARD MOTHS IN NATURAL POPULATIONS OF CYCADS

Defoliation by leopard moth caterpillars often has devastating consequences for leaf production, and possibly also reproduction, in some cycad species. It is not uncommon to find stands of cycads where all the leaves have been consumed, where the apex of the trunk has been excavated or where young cones have been partly (or occasionally entirely) destroyed. It is therefore not surprising that the leopard moth is generally regarded as a pest by cycad enthusiasts and even by conservationists. Moreover, because the leopard moth is widespread in South Africa and colonizes a wide range of cycad species, its effects are often observed and it is almost regarded as a plague in some quarters.

One consequence of this negative image of leopard moths is that many people are of the opinion that they should be controlled in cycad populations where moth damage is perceived to have deleterious effects on reproduction. However, I would like to caution against the control of leopard moths since it is possible, perhaps even probable, that successful control of leopard moths could come at the cost of the unintended eradication of potential insect pollinators. Many of these potentially beneficial insects are specific to cycads and are found on the cycad plant even when cones are not present. For instance, one of the weevils belonging to the genus *Porthetes* feeds on the male cone scales of *Encephalartos lehmannii*, but is found in the rachis of old leaves between coning events. Similarly, beetles belonging to the Cucujoidea which appear to be involved in the pollination of *E. cycadifolius*, *E. friderici-guilielmi* and *E. ghellinckii* take refuge in the apex of the crown between coning events. The indiscriminate use of broad spectrum insecticides to control leopard moths will almost certainly kill off these insects since they would be situated directly in the path of the "insecticide rain" that would result from any attempt to spray the new leaves.

The application of insecticides can also have other unwanted side effects. For instance, in some areas the use of insecticides appears to increase the abundance of a gall midge which deforms and often destroys young leaves. At present the gall midge appears to cause significant damage only in cultivation where it is likely that natural parasites have been eliminated. It would be a tragedy if the use of insecticides in natural cycad populations resulted in a "plague" of gall midges to replace the "plague" of leopard moths.

In any event it is debatable whether it is necessary to control leopard moths at all. Most natural populations of insects experience fluctuations in abundance and are usually controlled by natural factors such as disease, parasitism, and predation or by increased vigour in the host plant. Outbreaks typically occur when insect herbivores temporarily "escape" from predators and parasites or when the host-plant is unusually susceptible to attack (such as may occur when plants are drought stressed). It is therefore possible that the present "plague" of leopard moths merely represents a temporary phenomenon that will pass long before it has any long term effects on cycad survival.

There is no doubt that the damage caused by leopard moths should be carefully monitored to determine whether they pose a long term risk to cycad survival. However, for the present, it appears to be ill-advised to advocate the control of leopard moths using insecticides.

***John Donaldson**, Conservation Biology Research Unit, National Botanical Institute, Kirstenbosch, 7700 Claremont.*

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Dear Sir

TRADE IN CYCAD SEEDS: CITES REGULATIONS

In response to the letter by Cynthia Giddy in "*Encephalartos*" no 31, I would like to make the following points:

(a) CITES has jurisdiction only over plants from the **wild** as its name, "CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA" implies. The local authorities do, however, claim that it is impossible for them to distinguish between seed collected from the wild and seed collected from garden plants. Consequently they refuse to provide this Society with permits for the export of **small** packages (about ten seeds) of garden-grown material annually to those of our foreign members that requests same.

(b) Paradoxically the very same local authorities annually issue permits for the commercial export of large numbers of cycad seedlings many of which may have been grown from seed collected in the wild because, by their own admission, it is not possible for them to distinguish between seed collected from the wild and garden-grown seed.

(c) Although this Society does not sell seed but merely tries to recuperate its handling costs when making seeds available to its members, this kind of transaction is still considered to fall under the term trade as far as CITES is concerned. In fact even a straight gift or exchange of material is considered to be **trade** by CITES.

From the above it should be clear that the present state of affairs is quite illogical and unacceptable and as a prominent member of the Cycad Specialist Group of the

IUCN's Species Survival Commission, I would like Cynthia Giddy to use her influence to work towards a more equitable and reasonable dispensation.

In the original letter published in "*Encephalartos*" 29, the plea covered a wider field than that touched upon now. In that letter we were also concerned about the threatened local status, especially in developing countries, of rare cycad species. The conservation of these plants is very low on the priority list of the local governments for obvious and understandable reasons. The export of small quantities of seed from such countries could therefore be about the only short term practical means of conserving the species although we would all agree that it would be far better to conserve the plants *in situ*.

Nat Grobbelaar, P.O. Box 15357, 0039 Lynn East.

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Geagte Redaktrise

HERDRUK VAN BESKRYWINGS VAN NUWE BROODBOOMSOORTE IN "*ENCEPHALARTOS*"

Ek stel intens belang in die Sikadeë en probeer voortdurend om soveel as moontlik oor hulle uit te vind. As pensoenaris is dit egter nie vir my moontlik om op al die plantkundige tydskrifte, waarin inligting oor hulle moontlik kan verskyn, in te teken nie. Ek is hoofsaaklik op "*Encephalartos*" aangewys daarvoor.

En wat 'n puik tydskrif is dit nie! Vir al die leesgenot wil ek graag baie dankie sê.

Is dit dan nie moontlik dat beskrywings van nuwe soorte, inheems sowel as uitheems, in "*Encephalartos*" gepubliseer kan word nie? Dit geld ook vir die verandering van name.

Ek vertrou u sal dit gunstig oorweeg.

Die uwe

H.C. Kennedy, Panoramastraat 2, 7646 Paarl.

[Kyk "NEWS FROM YOUR COUNCIL" (c) op bladsy 28 in hierdie uitgawe - **Redaktrise.**]

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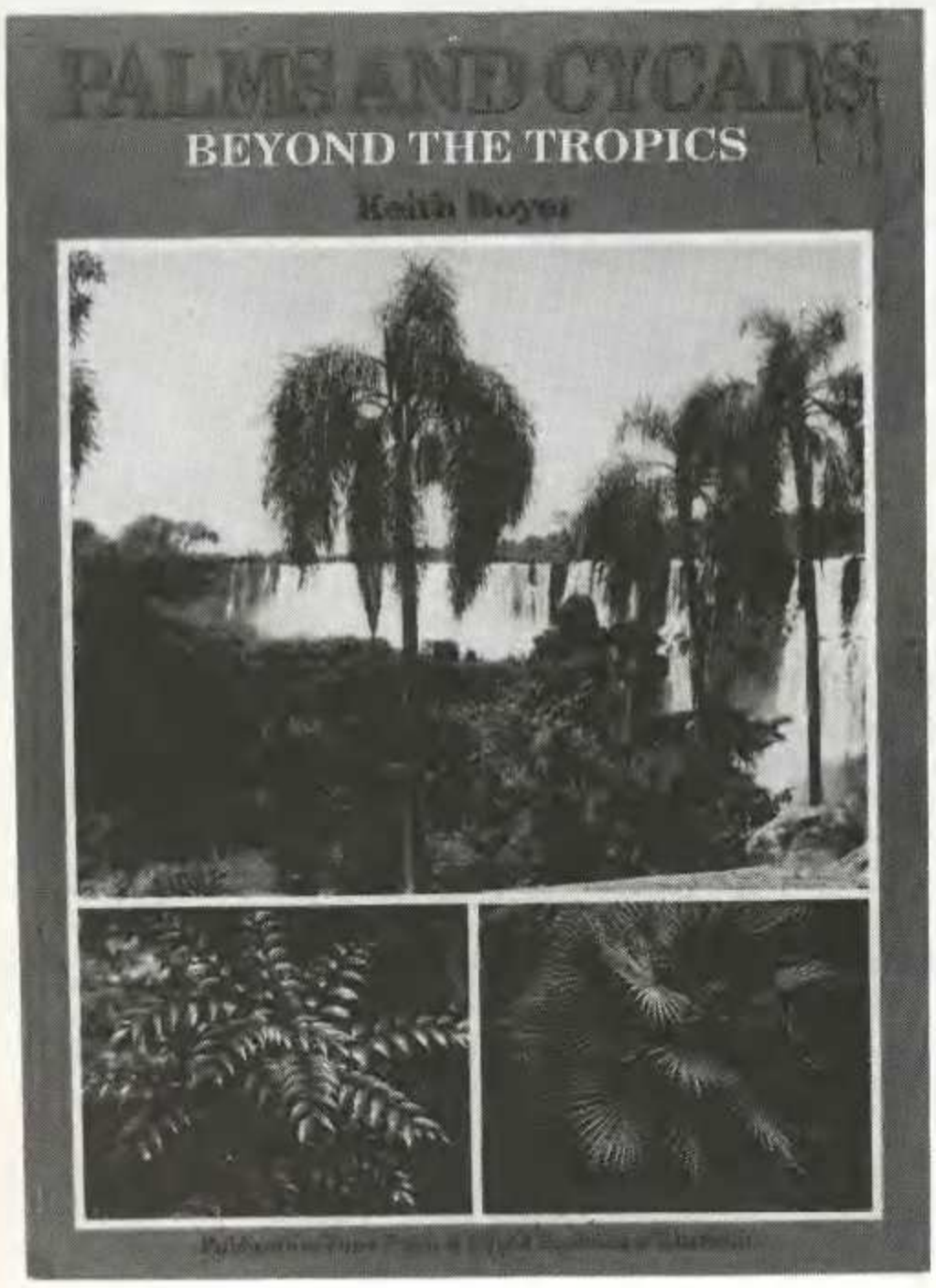
BOOK REVIEW / BOEKBESPREKING



PALMS AND CYCADS BEYOND THE TROPICS

Keith Boyer
Published by the Palm and Cycad Societies of Australia (P.A.C.S.O.A.) 1992
149 pages, 137 colour and 13 monochrome plates

Most books on palms and cycads focus on their tropical connotations: palms fringing white sandy beaches bathed in sunshine and cycads in tropical forests. But in this handy 149-page publication, Keith Boyer's long experience of growing palms and cycads at his home near Auckland, New Zealand, has lead him to fill an important niche in the horticultural literature. It is a well-balanced coverage with emphasis on the 200-odd species of palms and cycads *which can be grown outdoors in cooler climates*. The selection of suitable candidates in such climates is not just a matter of frost-tolerance; temperature and rainfall aspects must also be considered. The author has classified climates as warm

moist, warm Mediterranean, cool moist, cool Mediterranean, temperature-subtropical or cold and provides a species selection table for plants which will perform best in each area. Apart from this, there are useful notes on history, users, cultivation, pests, diseases, landscaping, and conservation. The genera are listed alphabetically in 90 pages with 137 colour plates. The cycad coverage comprises: *Bowenia* (2 spp.), *Ceratozamia* (2 spp.), *Cycas* (4 spp.), *Dioon* (9 spp.), *Encephalartos* (9 spp.), *Macrozamia* (18 spp.), *Stangeria* (1 sp.) and *Zamia* (3 spp.). Further useful information is provided in four Appendices, a glossary and a bibliography.

Roy Osborne
20 Maryvale Road, 3630 Westville

[Copies of Keith Boyer's book may be obtained in South Africa from The Cycad Centre, P.O. Box 4726, 4000 Durban (R78,00 plus R4,00 packing/postage). Overseas members should place orders with PACSOA Bookstore, P.O. Box 1134, Milton, Q 4064, *Australia.*]

NEWSPAPER CLIPPING / KOERANTUITKNIPSEL

Award for Danie

Queensburgh News Reporter

LOCAL resident, Danie Nel has received a conservation award from the Cycad Society's Natal Chapter for his work with these protected plants.

Danie has spent the past six years propagating cycads by building up a 'seed bank' and has distributed more than 66 298 seeds all over the world.

He has also been involved in re-introducing cycads into areas where they have long since ceased to grow.

Danie also gives talks and a slide show for various organisations in which he encourages people to grow these plants. He offers his expertise and knowledge to anyone who would like to grow plants.

Through these efforts he hopes to prevent people from taking cycads from the veld but rather to encourage them to grow from seeds and seedlings.

In fact Danie even keeps a 'pollen bank' which is kept to pollinate the female cycads by hand.

It is easy to see why Danie has received an award as his devotion to cycads is obvious!

LOCAL resident, Danie Nel with his conservation award he received from the Cycad Society.