ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTH AFRICA

TYDSKRIF VAN DIE BROODBOOM VERENIGING VAN SUID-AFRIKA

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COVER / VOORBLAD : ***Ceratozamia mexicana*: male cones, about ⅔ life-size.**

Normally only a single cone is produced, because the cone is formed by the growing tip while stem growth continues from a lateral bud. Did this growing tip split in two, or was one of the cones formed from a lateral bud? President Hannes Robbertse, an expert on plant anatomy, would dearly like to make a longitudinal section through the stem apex of this plant to find out, but we are not going to tell him where this plant stands.

Photo: Piet Vorster

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CONTENTS / INHOUD (continued / vervolg)

FROM THE PRESIDENT

Several letters have been received from members complaining about aspects concerning the administration of the Society. These letters are very welcome, since after all it is your Society and correspondence is the only means of communication between us. We are dependant upon these letters to guide us, so please go on writing.

One of the complaints was about the announcement of membership renewal. The renewal form enclosed in "*Encephalartos*", reads as follows: "We remind you that ..... Should you fail to do this, your membership will automatically be terminated". Members feel that the wording is a bit harsh and offending. The matter was taken up by the Council, and although there was no unanimous feeling about this, new proposals will be submitted to the Council and we will change the wording to make it more acceptable to members. The fact is, however, that the Society is dependant upon membership fees to continue with the compiling and distribution of "*Encephalartos*" and to cope with other expenses and we must in some way try to persuade members to pay their fees to keep our Society going.

Another complaint goes about the availability of pollen, seed and seedlings of scarce *Encephalartos* species. Members feel that nurseries are getting high prices in foreign countries and would rather export material of scarce species that selling them to local collectors for lower prices. They feel that in accordance with our Constitution, two of the aims of the Society, namely, "To encourage the cultivation of and propagation of cycads" and "To arrange legal exchange of plants, seedlings, seed and pollen of different cycad species between members", are not complied with by such conduct. It is very difficult for the Council to express any opinions on this matter and I would like to invite members who might have suggestions, to write to me in this regard. You can also send your letters to the Editor for publication.

Complaints have also been received from members who applied for and not getting back copies of "*Encephalartos*". This matter has been brought under the attention of the back copies officer. He had some health problems, but is busy catching up with the arrears. The process of supplying "*Encephalartos*" back copies of the current year to new members who join the Society later during the year has also been streamlined. They will now receive them together with their first letter from the secretary.

Hannes Robbertse

VAN DIE PRESIDENT

Verskillende briewe is van lede ontvang wat kla oor een of ander aspek van die administrasie van die Vereniging. Hierdie briewe is baie welkom aangesien dit na alles u Vereniging is en korrespondensie die enigste manier is waarvolgens ons met mekaar kan kommunikeer. Ons is baie afhanklik van hierdie briewe om aan ons leiding te gee en daarom sal dit goed wees as u aanhou om te skryf.

Een van die klagtes het gehandel oor die hernuwing van lidmaatskap. Die bewoording op die hernuwingsvorm lees soos volg: "Ons herinner u daaraan dat ..... As u in gebreke bly om dit te doen sal u lidmaatskap outomaties verval". Lede voel dat die bewoording bietjie dreigend klink en aanstoot mag gee. Die saak is deur die Raad opgeneem, en alhoewel raadslede nie eenstemmigheid bereik het nie, sal nuwe voorstelle aan die Raad voorgelê word en sal die bewoording tog verander word om dit vir lede meer aanvaarbaar te maak. Die feit bly egter dat die Vereniging van die lidmaatskapgeld afhanklik is om te kan voortgaan met die samestelling en versending van "*Encephalartos*" en om ander uitgawes te dek. Ons moet op een of ander manier 'n metode vind om lede aan te moedig om hul lidmaatskapgeld te betaal sodat die Vereniging kan voortgaan.

'n Ander klagte het gehandel oor beskikbaarheid van stuifmeel, saad en saailinge van skaars *Encephalartos* spesies. Lede voel dat kwekerye hoë pryse vir dié materiaal in ander lande behaal en daarom verkies om eerder materiaal van skaars soorte uit te voer as om dit vir laer pryse aan plaaslike versamelaars te verkoop. Hulle voel ook dat die twee doelstellings van die Vereniging, in ooreenstemming met die Grondwet, naamlik, "Om die kweek en vermeerdering van broodbome aan te moedig" en "Om die wettige uitruil van plante, saailinge, saad en stuifmeel van broodbome tussen lede te reël", nie deur dié soort optrede bevorder word nie. Dit is vir die Raad baie moeilik om oor hierdie saak 'n uitspraak te gee, en ek sal bly wees as lede wat voorstelle het om die saak op te los, aan my sal skryf. Lede kan ook hul briewe vir publisering aan die Redakteur stuur.

Klagte is ook ontvang van lede wat vorige uitgawes van "*Encephalartos*" bestel het maar dit nie ontvang het nie. Hierdie saak is onder die aandag van die beampte vir vorige uitgawes gebring. Hy het gesondheidsprobleme ondervind, maar is besig om die agterstand in te haal. Die proses om vorige uitgawes van die huidige jaar te voorsien aan nuwe lede wat later in die jaar aansluit, is ook meer vaartbelyn gemaak. Hulle sal nou die eksemplare saam met hul eerste brief van die sekretaris ontvang.

Hannes Robbertse

FOCUS ON ... FOKUS OP ...

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

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

MICROCYCAS CALOCOMA (Miq.) A. DC.

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INTRODUCTION

In the unlikely event that you might sometime be wandering around in the Sierra del Rosario range in the western part of Cuba, you will be forgiven for thinking that you were inexplicably transported back to the Eastern Transvaal and had stumbled across a population of *Encephalartos inopinus*. Indeed, *Microcycas calocoma* shares a remarkable but superficial resemblance to *E. inopinus*. These two species have another common factor in their rarity. A closer inspection would reveal that your Cuban find is quite different to any *Encephalartos* species and is, in fact, botanically much closer to the genus *Zamia*. *Microcycas calocoma*, the *palma corcho* of the Cubans, is an outstanding ornamental and much sought-after cycad, prized as much for its beauty as its rarity.

DISCOVERY

In 1851, only 29 cycad species, representing 6 genera, had been described botanically, *Cycas, Encephalartos* and *Zamia* being the best known. The Belgium horticultural firm, Louis Van Houtte's, importers and distributors of rare plants, had acquired some unusual small plants from foraging collections in the Caribbean, and these were recognised in Amsterdam by the distinguished Dutch botanist Friedrich Miquel as being new to science. He thought of them as a dwarf *Cycas*-like plant related to the genus *Zamia* (*rappelle parfaitement le port d'un petit* Cycas revoluta) and hence named the species *Zamia calocoma* ("calo" = beautiful, "coma" = crown of leaves). Aware that it was different to other known taxa in the genus, at the same time he proposed a new section, section *Microcycas*, in the genus *Zamia* (Miquel 1851). Miquel was however incorrect in reporting the origin of the plant as from Cuba's Isla de Pinos (Isla de la Juventud), an error which seems to have been perpetuated by numerous other writers. In a second description, based on a plant brought to Leningrad from Cuba, Eduard von Regel (Regel 1857) stated that the plant varied so widely from *Zamia* that it might constitute a new genus.

Herbarium specimens, including reproductive material, collected by the American botanist, Charles Wright (1811-1886), filed at the Wright-Sauvalle herbarium (HAC) in Ciudad Habana (Herbarium of the Academia de Ciencias de la Habana), provided sufficient evidence for the Swiss botanist, Alphonse de Candolle, to classify the plant in a separate genus, and hence *Microcycas calocoma* (Miq.) A.DC. was officially recognised in 1868 (De Candolle 1868). The first description in which the authors quote field work experience, including observations on coning and vegetative material in the higher regions of the Sierra del Rosario in western Cuba, was that of Professor Otis Caldwell and C.F. Baker (1907); this being extended later by the first author (Caldwell 1909). Since that time, the species has become increasingly better known in all respects and recent distributions of seedlings propagated at Fairchild Tropical Garden, Miami, have resulted in this plant becoming slightly more readily available than in the past. A most useful overall profile of *Microcycas calocoma*, in laymen's terms, is given by Garrie Landry, is his "portrait of a species" which appeared in the November 1991 issue of *The Cycad Newsletter* (Landry 1991).

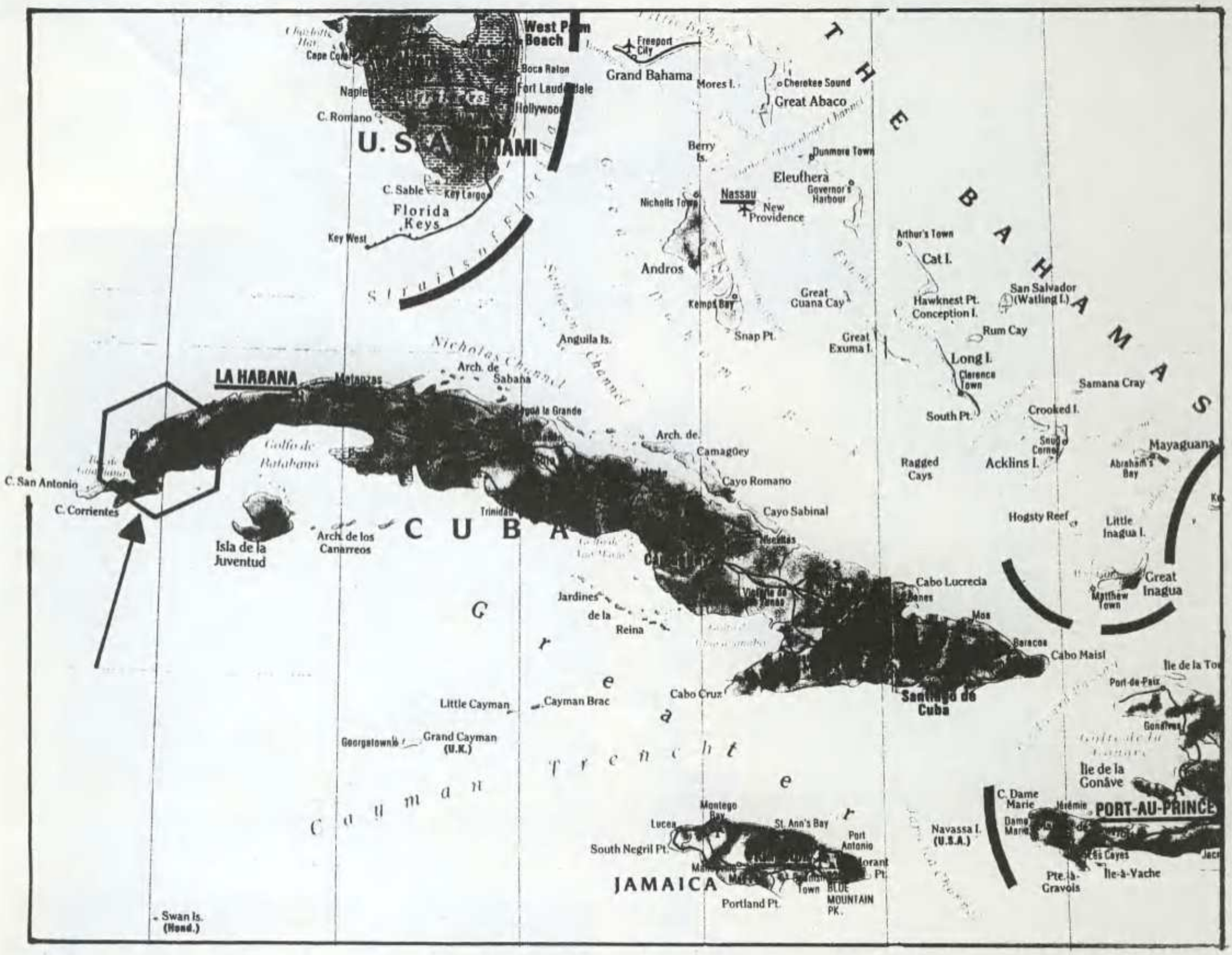

Figure 1 **The Republic of Cuba, largest of the Caribbean islands, is about 115,000 km² in extent and lies just south of the Tropic of Cancer. The *Microcycas calocoma* populations are confined to the extreme western end as indicated by the hexagon.**

DISTRIBUTION & ECOLOGY

Microcycas calocoma is confined in its natural distribution to the Cuban western province of Pinar del Río, from San Diego de los Baños in the east to Sumidero in the west (Figure 1). Populations are scattered in both lowland and montane sites, the latter being in very rough terrain at altitudes from 85 to 240 m, although one population, at Loma de Escalona, is reported to be at 665 m (Del Risco & Morell 1984). The plants grow in three types of soils, jurassic alkaline limestones, more-or-less sandy acidic soils underlay with slate, and siliceous clays with a pH between 5.4 and 6.9. The habitats vary from grassland but more commonly pine or semi-deciduous forest and conditions range from full sun to deep shade. Ambient humidity is high and the plants are often located on the sides of *arroyos* (ravines and gullies), frequently near streams. Often there is only very little soil, just a little leaf litter which accumulates over the rocky substratum. Ferns, bromeliads (e.g. *Tillandsia*), orchids (e.g. *Vanilla* and *Oncidium*) and philodendrons are common components of the local flora, especially in the lowland sites, and these plants are sometimes found as epiphytes on the cycads (Landry 1991). Royal palms are often found in association with the lowland cycads. The wooded canopy is dominated by *Bursera simaruba, Bombacopsis cubensis, Gaussia princeps, Clusia minor, Savia sessiliflora* along with *Erythroxylon havanensis* and *Thrinax morrisii* in the understory. All but the tallest *Microcycas* plants are apparently unaffected by the strong winds which frequent Cuba during the hurricane season. The ability of this species to adapt to quite different ecological conditions is undoubtedly a reason for its survival to the present time (Del Risco & Morell 1984).

Figure 2 A container-grown *Microcycas calocoma* specimen at the Orto Botanico, Naples, Italy. Photo: Aldo Moretti.

Figure 3 A male specimen of *Microcycas calocoma* at the Cienfuegos Botanical Garden, Cuba. Photo: Rolf Kyburz.

Cendrero (1940) and Foster and Rodríguez San Pedro (1942) described colonies with more than 100 individuals although stands of 25-45 plants were more common in their experience. Since that time, some of these populations have disappeared and disjunct colonies of 10-25 are now more typical. These have disparate sex ratios and regeneration is, unfortunately, almost non-existent. One larger stand at La Pimienta near Santo Tomás comprises 70 plants and is in slightly better shape as regards potential for regeneration. Isolated individual plants, probably relics rather than new colonisers, are found between the populations. In 1988 several new stands were discovered in the Mil Cumbres protected area and vicinity. Landry (1991) mentions one colony comprising 200 specimens. The total number for the species is now estimated as approximately 600 individuals.

Microcycas calocoma is not well represented in botanical gardens and is in the hands of only very few private collectors. Single specimens are located in the Severoceská Botanicá Zahrada (Liberec, Czechoslovakia), the Muséum National d'Historie Naturelle (Paris, France), the Orto Botanico (Naples, Italy) (Figure 2), the Royal Botanical Gardens (Kew, England), the Missouri Botanical Garden (USA), the

Figure 4 A female plant of *Microcycas calocoma* at Fairchild Tropical Garden, Miami. Photo: Michael Perry.

Atlanta Botanical Garden (USA) and the Rockhampton Botanical Garden (Australia). The New York Botanical Garden (USA) has several specimens and six plants are in the collection at Kobenhavens Universitet Botaniske Have (Denmark). A few seedling plants are in the possession of one or two South African collectors.

Figure 5 ***M. calocoma*** **plants at Fairchild Tropical Garden, Miami. Photo: Cynthia Giddy.**

The species is not abundant in botanical gardens in Cuba itself; in an excellent write-up of his recent palm-orientated visit to Cuba, Rolf Kyburz (1994) reports seeing only a few specimens at the Cienfuegos Botanical Garden (Figure 3); similarly only a limited number are known to be present at the Jardín Botánico Nacional in Havana (Scott Zona, *pers. comm.*). The only breeding colony outside Cuba is the group of plants at Fairchild Tropical Garden (Miami, USA) (Figures 4, 5) (see later).

DESCRIPTION

1. STEM

Despite its generic name, *Microcycas calocoma* is an arborescent cycad with stems 6-8 m in height (but occasionally up to 11 m) and 200-300 mm (sometimes up to as much as 700 mm) in diameter at the base but becoming narrower towards the apex. Unlike the case in *Encephalartos*, the leaf bases of *Microcycas* are not persistent on the trunk (Figure 6). Stems are usually unbranched but may branch as a response to damage. Two particularly well-known and very old plants in Cuba have been referred to as *el Abuelo* (the grandfather), a huge grotesquely-branched male with a trunk 500 mm in diameter and four enormous branches, and *la Abuela* (the grandmother), a female, also branched and with a basal diameter of 700 mm (Landry 1991). A detailed investigation into the stem anatomy of this species has shown it to have the very wide pith, narrow xylem and phloem, and wide cortex typical of all cycads (Chrysler 1926).

2. LEAVES AND LEAFLETS

Mature plants of *Microcycas calocoma* have a crown with up to 40 bright to dark green leaves at its apex (Figure 7). Leaves are covered with fine hairs in the juvenile stage. Mature leaves are straight or slightly curved, 0.6-1.0 m long, and have leaflets reflexed gracefully from the light yellow-green rachis. The petiole is about 80-100 mm long, swollen to a shield-like shape at the base and completely devoid of any spines or prickles. The evenly-spaced leaflets are about 150-250 mm long, 8-10 mm wide, prominently veined, straight or slightly curved, with a blunt tip and entire or slightly revolute margins. Leaflets do not reduce in size towards the apex, giving a very characteristic and abrupt end to the leaf, as though it has been cut off at right angles.

Figure 6 *M. calocoma*, **trunk detail. Photo: Cynthia Giddy.**

3. REPRODUCTIVE STRUCTURES

The male cones of *Microcycas* are cylindrical, 250-300 mm long, 50-80 mm in diameter (up to 100 mm in cultivated plants), with a short peduncle, the whole structure being yellowish brown and densely hairy (Figure 8). The microsporophylls are about 20-25 mm long by 15-20 mm wide and are prominently ridged.

Female cones are broadly cylindrical, tapered from the base with a short peduncle, 500-700 mm long, 130-160 mm in diameter, yellowish brown and densely hairy (Figure 9). Female sporophylls are 45-55 mm long and 30-40 mm wide with 2-4 ridges. Seeds measure 35-40 mm by 20-25 mm and have a pink to red sarcotesta.

Although coning is infrequent in the wild, observations have revealed that cones emerge in May and are fully developed about 4 months later (Landry 1991). Receptivity is indicated by cracks running vertically along the cone (Tang 1985). The cone size increases rapidly after fertilization and it takes about 10 months for seed maturation. Details of seed maturation, morphology and germination were studied by Peña *et al.* (1986). In this respect, Chuck Hubbuch (Fairchild Tropical Garden, *pers. comm.*) confirms these observations: "Females are receptive in August and September in Miami. Splitting of the female cones (occurring near the cone apex) is as obvious as in any other cycad. Our males release pollen at virtually the same time that the females become receptive, causing us some anxious moments wondering if the pollen will be available in time! Males do not exhibit much change and must be watched very closely or the pollen will be lost. We always have very good results with manual pollination. Seeds are mature around the end of May and germinate in about one month."

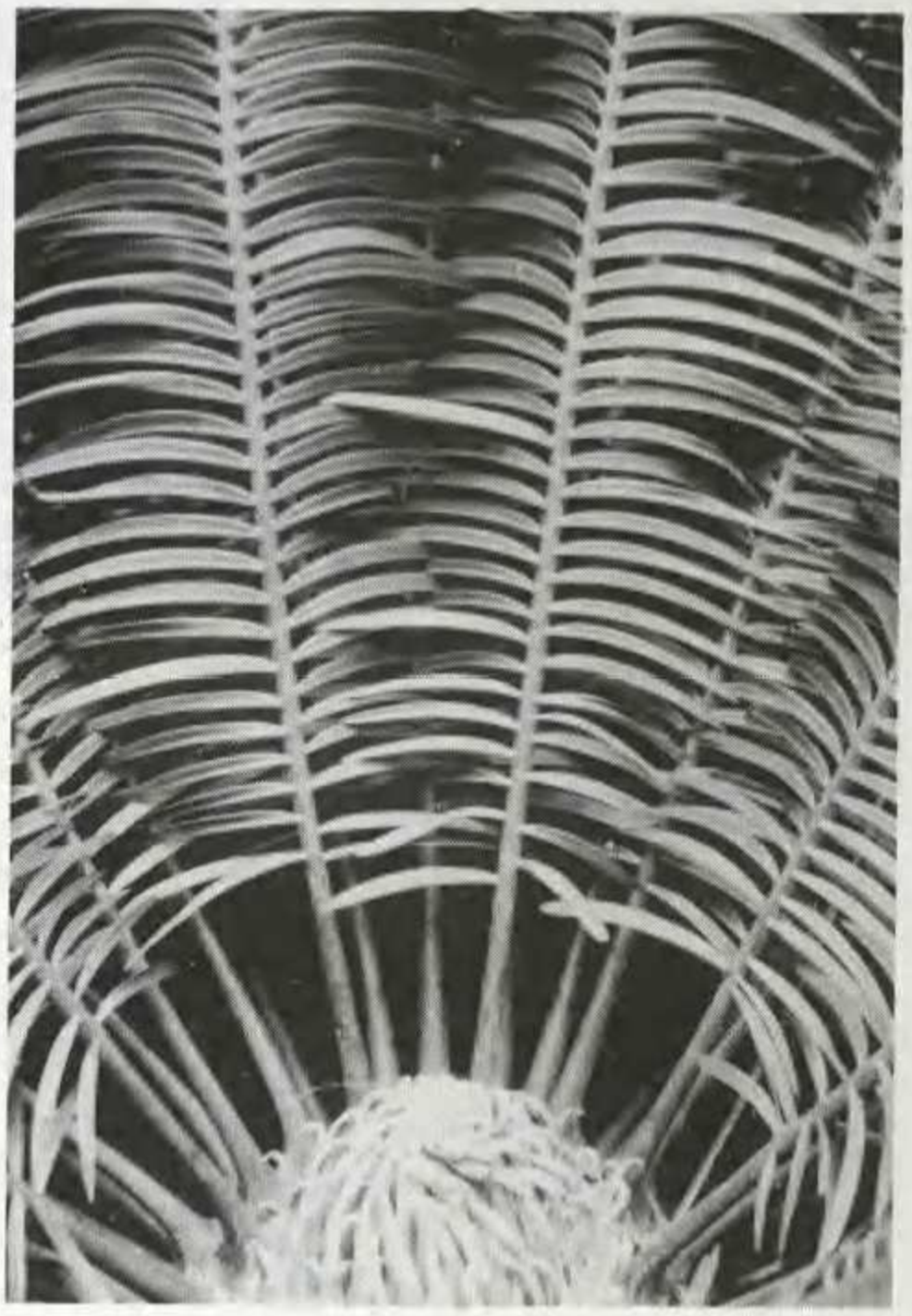

Figure 7 *M. calocoma*, **trunk apex and leaf detail. Photo: Cynthia Giddy.**

AFFINITIES

Microcycas calocoma, the only species in its ineptly-named genus, is in the family Zamiaceae. Its nearest allies are species of *Zamia*, but it is distinguished from this genus and other Zamiaceae by its abruptly truncated leaves bearing reflexed leaflets, the leaflets being articulate (jointed) at the base, and the absence of prickles on the petioles and rachises. At the microscopic level, the very numerous archegonia and spermatozoids, considered by most (but not all) researchers to be primitive features, distinguish *Microcycas* from all other

Figure 8 *M. calocoma*, **male cone detail. Photo: Michael Perry.**

Figure 9 *M. calocoma*, **female cone detail. Photo: Michael Perry.**

cycads. Dennis Stevenson (*pers. comm.*) suspects that there is prolonged juvenility in the developing male gametophyte, a process which would lead to additional sperm. Furthermore, he points out that the numerous archegonia and their position is probably another feature unique to this plant; however, since there is no way for the male gametes to reach them, these structures are essential non-functional.

Biochemical work on *Microcycas calocoma* has shown this species to have the same profile of secondary metabolites as *Zamia furfuracea*, but different to other *Zamia* spp. and other cycads generally (Peña *et al.* 1985). The hydrolysed mucilage from *Microcycas calocoma*, however, gives a monosaccharide pattern which is clearly distinct from *Zamia* (Siniscalco Gigliano 1990).

Despite all this evidence, considerable doubt remains as to the relationship between this taxon and other Zamiaceae. Eckenwalder (1980a) points out that when De Candolle named the genus, it was clearly separable from all known species of *Zamia*; since then however, studies of an increasing number of new *Zamia* species from central and South America have eliminated many of the apparent differences between *Microcycas* and *Zamia*. In similar context, karyological studies reveal that the chromosome complement of *Microcycas calocoma* (2n = 26; 2M + 2A + 22T) is very similar to that of some *Zamia* spp., *e.g.* at least one population of *Zamia paucijuga* (2n = 26, 2M + 2S + 2A + 20T) (Moretti 1990). Eckenwalder's (1980b) comment is pertinent: "Far from being a very ancient cycad, almost extinct because of reduction of a former larger range, *Microcycas* may actually be a relatively young cycad which was prevented from expanding its original small range because of lack of dispersal agents and later human interference". The truth is we just don't know enough to make anything other than what we hope are intelligent guesses.

Perhaps one can close this discussion by referring to Dennis Stevenson's recent review of cycad morphology and systematics (Stevenson 1990). Various cladistic analyses, based on 30 morphological and anatomical characters, consistently result in a grouping together of *Ceratozamia, Microcycas* and *Zamia*. A key unifying character in the "*Zamia* clade" is the presence of vestigial stipules on the leaves. The new genus, *Chigua*, was not included in the analysis, but would undoubtedly also fall

into the same group, this being recognised in Stevenson's proposal of a subfamily, Zamioideae, which comprises all four genera.

CONSERVATION

The present estimated total number of 600 wild plants is consistent with an "endangered" conservation status (Osborne, in print). The populations have suffered decline from a number of sources, principally exploitation of the forests for lumber, clearing for agricultural use, destruction of seeds and young plants by pigs, and removal of plants by collectors. Use of the roots by locals as a rat poison may also be a contributing factor. The present situation is exacerbated by an imbalance in the sex ratios of the populations and probably by a decline or even absence of putative insect pollinators. The widespread use of pesticides used in the sugar farming areas may be a reason for the latter effect (Michael Perry, *pers. comm.*) but this observation is not confirmed. Cuban authorities are aware of these threats and forestry officials are now carefully monitoring the remaining plants, most of which are in designated conservation areas. A population of plants on Mogote Moncada has been tagged and is being monitored by the staff of the Jardín Botánico Nacional in Havana; news so far is that coning is by-and-large infrequent and recruitment is very limited (Scott Zona, *pers. comm.*). Recommendations in respect of conservation proposals have been made by Del Risco *et al.* (1984). An encouraging artificial pollination experiment has been reported in which one or two scales were removed from some 50 females cones in one wild population and freshly-collected pollen inserted; in every case all the seeds developed (Landry 1991). Chuck Hubbuch (*pers.comm.*) maintains it is not necessary to remove female cone scales to achieve pollination.

The initiative of the Fairchild Tropical Garden in establishing an *ex-situ* breeding colony of *Microcycas calocoma* is a fine example of what can be done in this regard, and was related by FTG superintendent (Kiem 1963). The garden's founder, Colonel Robert H. Montgomery, had acquired two plants from Cuba in the 1930's but both proved to be male. In 1959, Stanley Kiem mounted an expedition to Cuba to search for female plants and was able to acquire stems of some female plants (and more male plant material) at two of the more accessible sites near Consolacion del Sur in the foothills of the Sierra Organos. One of the female trunks was successfully rooted at FTG and first coned in 1975. Artificial pollination ensured that this and each successive cone was utilised for seed production and the garden has raised and distributed many hundreds of seedlings as a result. The garden has now a "second generation" of 30 plants, the males of which commenced coning a few years ago; three females coned in 1994 and these were pollinated to achieve seed crops. Sadly, the original mother plant and one of the larger male plants were destroyed by lightning in 1991 (Hubbuch 1991) but two large male specimens, also struck by lightning in the same storm, have since resprouted from the base.

Attempts at propagating this species through tissue culture techniques have, so far, proved unsuccessful. Peña and Grillo (1982) managed to proliferate haploid female gametophytic tissue *in vitro* and even obtained some root development, but plantlets were never produced. It is believed also that embryos have been successfully established *in vitro* but that differentiation of the resulting callus, here too, remains elusive (Scott Zona, *pers. comm.*).

CULTIVATION

Those fortunate enough to have specimens of *Microcycas calocoma* report that the plant grows well, albeit slowly for the first few years, in cultivation in tropical and subtropical regions. As expected from observations of the wild plants, the species is tolerant of a variety of soil and climatic conditions. It grows in full-sun or semi-shade, responding well to occasional light fertiliser applications and mulches. It requires a well-drained soil and needs watering during dry periods. It is not particularly frost tolerant, although plants at FTG have survived several severe freeze with only leaf burn symptoms. Chuck Hubbuch (*pers. comm.*) comments that *Microcycas calocoma* seedlings are susceptible to root-rotting fungi if they are overwatered or if drainage is inadequate; a well-drained medium with regular irrigation giving best results. In his experience, although seedlings are slow-growing, mature plants can extend their trunk length by more than 20 cm with each new leaf flush.

ACKNOWLEDGEMENTS

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ARTICLES / ARTIKELS

TWENTY FIVE YEARS OF FIELD STUDIES ON CYCADS AT THE BOTANICAL GARDEN OF NAPLES, ITALY

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The first botanical expedition devoted to cycads by researchers at the Botanical Garden of Naples dates back to 1969. Because 1994 was the 25th anniversary of that trip, we would like to summarise the numerous expeditions that have followed that one, as well as reporting briefly on the people who took part in them and the cycad species which were examined in the field.

The first expedition was based on sites in Florida, Mexico and Costa Rica. It was financed by the "Accademia Nazionale dei Lincei" (the Italian equivalent of the Royal Society) and organized by the Academician Luigi CALIFANO (1901-1976), a prominent Neapolitan physician and enthusiastic botanical amateur. Califano was also the team leader of the expedition. The participants were Aldo MEROLA (at that time Director of Botanical Garden of Naples), Ruggero TOMASELLI (at that time Director of Botanical Garden of Pavia, Italy) and Luciano GIUGNOLINI (Botanical Garden of Florence, Italy). Young researchers, such as Paolo DE LUCA (present Director of Botanical Garden of Naples), Alberto BALDUZZI (Botanical Garden of Pavia) and Mauro RAFFAELLI (Department of Plant Biology of Florence), also took part in the expedition as their first field experience. The goals of the expedition were both the collection of tropical plants, in order to

Figure 1 *Dioon tomasellii* **var.** *tomasellii* **(Guerrero, Mexico). From the left, Sergio Sabato, Héctor Gonzales and a local.**

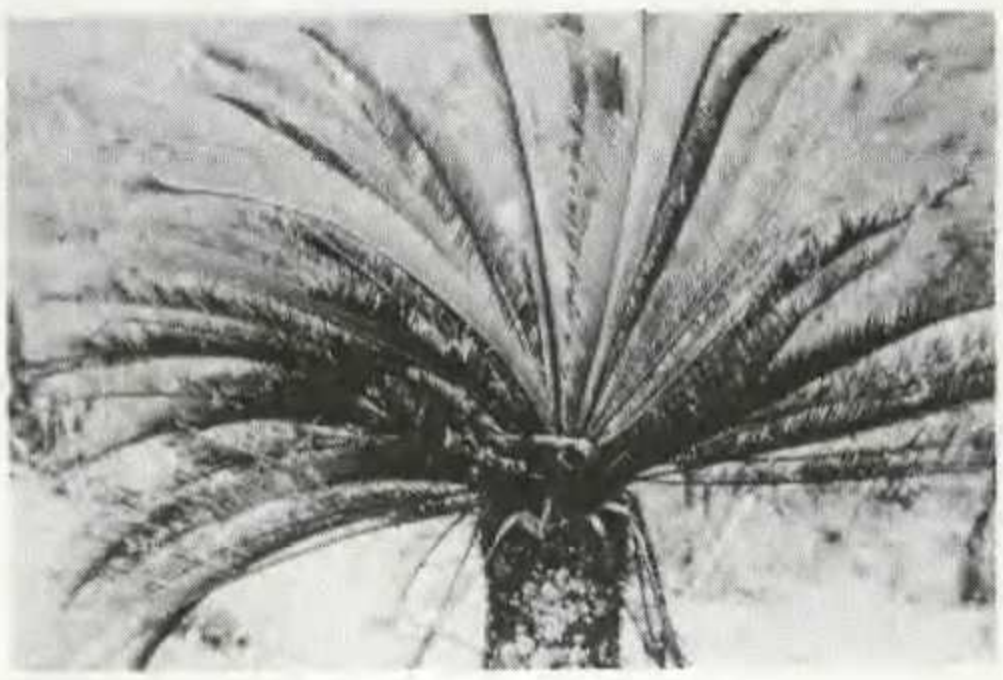

Figure 2 *Dioon califanoi* **(Oaxaca, Mexico).**

enrich collections of Italian botanical gardens, and the field training for the young researchers. The expedition was very successful and was followed, in 1971 and 1974, by another two trips. Apart from the countries visited in 1969, Peru and Cuba were two new areas for field studies. The young Sergio SABATO (of blessed memory, formerly of the Department of Plant Biology of Naples) (Figure 1) joined the group which took part in the first trip.

These three missions led to the knowledge of many cycads. Among others, the first specimen of *Microcycas calocoma* was introduced in the Botanical Garden of Naples and taxonomic information on Mexican *Dioon* species was gathered. The description of the new species *D. califanoi* (Figure 2) was one of the numerous scientific results of these trips.

Figure 3 *Dioon spinulosum* **(Oaxaca, Mexico) with Mario Vázques Torres.**

Figure 4 *Zamia paucijuga* **(Nayarit, Mexico) with Héctor Gonzales.**

The set of data obtained for the taxonomy and distribution of *Dioon* in Mexico were the stimulus to intensify the study of this region and acted as the starting point for a long-lasting research line on cycads at the Botanical Garden and Department of Plant Biology of Naples.

Six other expeditions in Mexico were organized by Paolo De Luca in the period 1979 to 1984. Sergio Sabato was the expedition leader, and the young researcher Aldo MORETTI (Department of Plant Biology of Naples) took part in all of them. A very important scientific and logistic contribution to the success of this new series of trips was given by the Mexican botanist Mario VÁZQUEZ TORRES (Universidad Veracruzana, Xalapa, Mexico) (Figure 3), thoroughly conversant not only with cycads but also with other Mexican flora. Other participants were, in 1980 and 1981, Prof. Ruggero Tomaselli and Alberto Balduzzi; in 1981, Gesualdo SINISCALCO GIGLIANO (Department of Plant Biology of Naples); and, in 1984, Jean Pierre SCLAVO (Nice, France), a French amateur, already an expert in *Encephalartos*, who took advantage of this trip to increase his knowledge of other cycad genera. Numerous young people, at the time students at the Universidad Veracruzana, were also of great help in the field, the herbarium and the laboratory; amongst others, Héctor GONZALES (Figures 1, 4), Francisco ORDUÑA, Roberto ACOSTA and Jorge ALEJANDRE deserve to be mentioned.

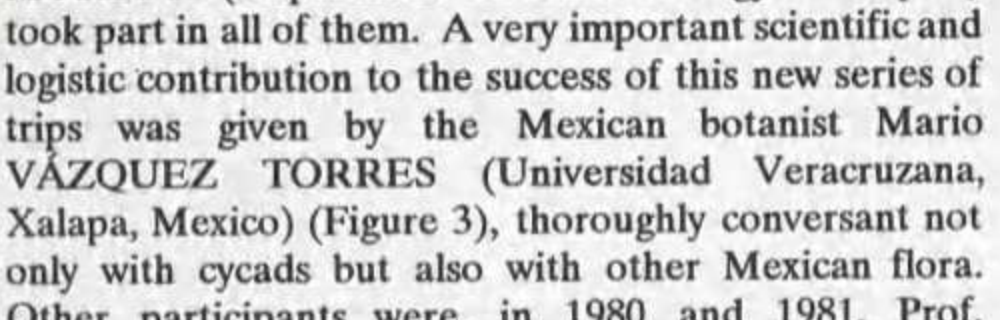

Figure 5 *Dioon caputoi* **(Puebla, Mexico).**

Figure 6 *Dioon holmgrenii* **(Oaxaca, Mexico).**

Figure 7 *Dioon merolae* **(Chiapas, Mexico) with a local.**

These trips covered fully the Mexican areas where cycads occur. Significant scientific progress was achieved on the knowledge of general biology of three Mexican cycad genera: *Dioon, Ceratozamia* and *Zamia*. Other new species of *Dioon* and *Ceratozamia* were described, i.e., *Dioon caputoi* (Figure 5), *D. holmgrenii* (Figure 6), *D. merolae* (Figure 7), *D. rzedowskii*, *D. tomasellii* (Figure 1) and *Ceratozamia euriphyllidia*. Furthermore, information was gathered on the distribution of species of these two genera as well as on most species of *Zamia*. The species studied in the field, besides the newly-described species listed above, were *Dioon edule* (Figure 8), *D. purpusii*, *D. spinulosum* (Figure 3), *Ceratozamia kuesteriana, C. latifolia, C. mexicana, C. miqueliana* (Figure 9), *C. norstogii, C. robusta, Zamia fischeri, Z. inermis, Z. loddigesii, Z. paucijuga* (Figure 4), *Z. purpurea, Z. spartea* and *Z. splendens*.

Moreover, in 1982, Aldo Moretti travelled to Puerto Rico to visit *Zamia portoricensis* localities and, in several

trips to Florida, he examined various populations of *Z. integrifolia*. During his trips to Florida, he profitably exchanged information on the biology of cycads with Bijan DEGHAN and Bart SCHUTZMAN (University of Florida).

Figure 8 *Dioon edule* **var.** *edule* **(Veracruz, Mexico).**

Figure 9 *Ceratozamia miqueliana* **(Veracruz, Mexico).**

Whereas *Ceratozamia* and *Dioon* are restricted to North America in their distribution, *Zamia* occurs in both American subcontinents. The study of the latter genus was therefore extended to South America. The first expedition to this region took place in Colombia, in 1984. Sergio Sabato took part in it together with Dennis STEVENSON (New York Botanical Garden) and Knut NORSTOG (at that time at Fairchild Tropical Garden, Florida, and presently associated with the Missouri Botanical Garden). Field collaboration with Dennis Stevenson and Knut Norstog represented the result of a long and fruitful scientific relationship started several years previously and being of paramount importance in obtaining results in various areas of cycad biology as well as in the training of various Neapolitan researchers. Results of this trip were manyfold and of great scientific importance. Firstly was the discovery of the new cycad genus *Chigua* (Figure 10). Examination of habitat populations of *Zamia chigua, Z. manicata, Z. roezlii* and *Z. wallisii* were also of great interest owing to the rarity and very poor field information on these species.

Figure 10 *Chigua restrepoi* **(Colombia), cultivated at Fairchild Tropical Garden, Miami, U.S.A.**

In 1986, 1987 and 1988, further explorations of Mexican areas and neighbouring Belize were dedicated chiefly to *Zamia* studies. Aldo Moretti and Dennis Stevenson organized and took part in them in collaboration with Mario Vázquez Torres. Occasional participants were Alberto Balduzzi and Luciano GAUDIO (Department

of Genetics of Naples), the latter being an important member of the Neapolitan team working on molecular biology of cycads. Specific results of the trips were the re-definition of species range of *Ceratozamia matudae* and *Zamia variegata* and the description of two new species of *Zamia, Z. polymorpha* and *Z. vazquezii* (Figure 11). During these trips, useful contacts and information exchanges took place with Andrew VOVIDES (Director of Jardin Botanico Clavijero, Xalapa, Mexico), a relationship strengthening greatly with time.

Figure 11 *Zamia vazquezii* **(Veracruz, Mexico).**

Additional trips to Mexico, completing the work started in 1969, were carried out. In 1990, Gioacchino VALLARIELLO (Botanical Garden of Naples) visited localities for *Zamia furfuracea, Z. loddigesii, Z. polymorpha* and *Z. vazquezii*. In 1991, Salvatore COZZOLINO (Department of Plant Biology of Naples) examined habitats of *Ceratozamia mexicana, C. miqueliana, Dioon edule, Zamia cremnophila, Z. furfuracea, Z. polymorpha, Z. splendens* and an unidentified *Zamia*. Finally, in 1991, Aldo Moretti devoted a trip to check on some species of the three Mexican genera whose distributional characters were still not clearly defined.

In the meanwhile, the study of *Zamia* in South America proceeded. Two expeditions, in 1988 and 1989, were organized by Aldo Moretti and Dennis Stevenson into the Amazonian forest. Other participants were Luciano Gaudio, Alberto Balduzzi, Jean-Pierre Sclavo and Francesco SARTORI (Botanical Garden of Pavia). The areas visited included Venezuela, Brazil and Peru. In Venezuela, part of field work was usefully supported by local botanist Basil STERGIOS (University of Guanare, Venezuela). Exploration of these areas resulted in the examination of *Zamia lecointei, Z. muricata* and *Z. amazonia* in Venezuela, and *Z. ulei* and a *Zamia* sp. in Peru.

In order to complete the examination of all neotropical cycad genera in habitat, a visit to the locality of *Microcycas* in Cuba was organized by Paolo De Luca and Aldo Moretti. Gioacchino Vallariello carried out the expedition in 1991. He examined *M. calocoma* populations and also contacted researchers at the Havana Botanical Garden obtaining useful information on the biology and growth requirements of *Microcycas* and receiving some plants of the species as a gift for the Naples Botanical Garden.

Laboratory research at Naples has always paralleled field work. As field data and plants reached Naples, the research team at the Botanical Garden and Department of Plant Biology, comprising mainly the same researchers involved in the field studies, has carried out research on various topics. The research has included taxonomy, phytogeography, phytochemistry, karyology, ultrastructure, reproduction and molecular biology.

Data derived from different research areas showed, inter alia, that a phyletic relationship occurred between *Dioon* and the African *Encephalartos*. In order to clarify this relationship, and in the light of a more general program tending to study extra-American cycad genera, the Neapolitan team chose the African continent as a new area of research. With this in mind, in 1987, an expedition was carried out to Zaire by Aldo Moretti in collaboration with Jean-Pierre Sclavo. The expedition was organized and directed by Francois MALAISSE (Faculty of Agronomy of Gembloux, Belgium), a very knowledgeable scholar of Central African species of *Encephalartos* who has spent more than twenty years in Zaire. The expedition resulted in the examination of populations belonging to the *E. poggei* complex, part of which were described as new species. Recently, in August 1994, Aldo Moretti and Luciano Gaudio, visited many South African areas with populations of *Encephalartos* (see "*Encephalartos*" 40: 19-20). The trip was organized and directed by Roy OSBORNE who has been continuously collaborating in the past years with the Neapolitan team. Species examined in the field were *Encephalartos natalensis, E. villosus, Encephalartos* sp. "Msinga" and *Stangeria eriopus*. The trip was also the occasion to meet and exchange information on cultivation and reproduction of *Encephalartos* with

Cynthia GIDDY and on various other aspects of cycad biology with Nat GROBBELAAR (ex the Department of Botany, University of Pretoria), John DONALDSON and Ingrid NÄNNI (National Botanical Institute, Kirstenbosch, Cape Town, RSA) and Johan HURTER (National Botanical Institute, Nelspruit, RSA) as well as with several members of the Natal Section of the Cycad Society of South Africa.

Under the direction of Roy Osborne, other expeditions in southern Africa are planned. The expeditions will have as a goal, the collection of plant material to be studied from a biomolecular standpoint, with the aim to gather information on *Encephalartos* phylogeny as well as on the relationships between *Encephalartos* and American cycad genera. Roy Osborne and Paolo CAPUTO (Department of Plant Biology of Naples) are directly involved in this project.

Expeditions and cycad species listed above show that the seven genera from America and Africa have been deeply studied by the Neapolitan team. The other four cycad genera from Asia and Oceania, however, have at least been field-inspected.

Aldo Moretti and Luciano Gaudio, during their participation to the Second Congress on Cycad Biology held in Australia in 1990, visited Australian localities with various species of *Bowenia, Cycas, Lepidozamia* and *Macrozamia*.

The Asian continent was visited in the course of a prior expedition to Indonesia in 1975 by Aldo Merola and Paolo De Luca, and, more recently, in 1992, by Carlo NAPOLITANO (Botanical Garden of Naples) who was in the Philippines. In both trips, habitat populations of *Cycas rumphii* were examined.

Most cycad species from the areas visited by Italian scholars in the four continents are today represented at the Botanical Garden of Naples. Thanks to people who organized and took part in the numerous botanical expeditions, the garden in Naples, the Orto Botanico di Napoli, represents today the foremost institution worldwide for the number of cycad taxa ("*Encephalartos*" 30: 25).

Such a large collection of cycads represents a good example of the *ex situ* protection and conservation of this endangered group of plants and is also a source of plant material for every researcher wishing to devote himself or herself to the study of cycads.

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THE CYCAD COLLECTION AT THE BOTANICAL GARDEN OF AMSTERDAM

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Received 23 March 1995

The history of the cycad collection of the Amsterdam Botanic Garden goes back more than 300 years. On 12 November 1682, the Hortus Medicus, or Kruidhof, was founded by a decree of the Amsterdam City Council. The Hortus was at the city edge in a new extension called 'De Plantage'. The town had its own medicinal garden since the beginning of the golden age, but it was not until 1682 that this garden was given its present location at the Plantage Middenlaan. The soil was wet and peaty and its area of one "morgen" (about two acres) had first to be elevated. Construction work and layout had made such progress by 1683 that planting was started. In 1684, the first medals were sold that gave admission to the garden for physicians, surgeons and chemists. At that time it was not yet a botanic garden ("Hortus Botanicus") but a medicinal garden ("Hortus Medicus Amstelodamensis").

The Hortus Medicus played an important role in early Cape botany. Plants arrived that year from the Cape of Good Hope, Ceylon, Brazil and the West Indies. The cultivation of medicinal plants was the first aim of the garden which played a role in the training of pharmacists and sold herbs to them. Education was provided for by Frederick Ruysch who was appointed Professor of Botany in 1685. A separate chair for exotic plants was created in 1701 for Caspar Commelin ("Praelector Exoticis"), nephew of Jan Commelin. The garden was in full operation in 1686, when seeds received in 1685 from a skipper from Ceylon as "Ceylonese red bells" (*Pentapetes phoenicea*) were sown. The plant flowered in 1686. In the early days, the garden was governed on behalf of the city by two "commissarissen", Joan Huydecoper van Maarsseveen (1625-1704) (Figure 1) and Jan Commelin (1629-1692) (Figure 2), both members of the Amsterdam City Council.

PLANT INTRODUCTIONS

When the Hortus Medicus Amstelodamensis was founded, many exotic and rare plant arrived in Amsterdam, thanks to the help of Joan Huydecoper. As Director of the V.O.C. (Verenigde Oostindische Compagnie, the Dutch East India Company) (1602-1799), he promoted botany, horticulture and scientific illustrations of material in the Company's domain. During his time as Director of the company, he urged V.O.C. officials, including Simon van der Stel, to send plants, as well as herbarium specimens and drawings, to Amsterdam. Consequently, many plants arrived in Amsterdam from the main V.O.C. centres at Batavia, Ceylon, Mauritius and the eastern Cape. Many of these exotics were completely unknown to the European botanists of the time, so that scientists from all over the world came to the Hortus Medicus Amstelodamensis to increase their knowledge.

Jan Commelin was less important in political supervision than Huydecoper, but his botanic knowledge was superior. Commelin was a merchant in medicinal herbs and drugs. In 1690, Jan Commelin received seeds of a

Figure 1 Joan Huydecoper van Maarssenveen (1625-1704).

Figure 2 Jan Commelin (1629-1692) (standing). Painting: "Spin en werkhuis" by Karen du Jardin (1669).

cycad for the first time. The ship's surgeon Batenburg collected fruits and seeds from *Zamia pumila*, which arrived in Amsterdam in 1690. Commelin successfully germinated the seeds. This success was the start of a cycad collection which became world famous during the 17th and 18th Century. Commelin not only collected new plant material, but he commissioned Jan and Maria Moninckx to make drawings of these plants.

Watercolours were made not only from *Pentapetes phoenicea* and *Zamia pumila* (Figure 3), but from more than 459 species, divided into nine books. The nine books with watercolour drawings are presently referred to as the "The Moninckx Atlas".

Figure 3 Drawing of *Zamia pumila* by Maria Moninckx (1690-1706). Library of the University of Amsterdam.

The vessels of the V.O.C. transported not only spices but also other plant material, like cycads. They were taken as exotics, but also as ballast to keep the ship balanced. Many plants were packed in bags or cloth. Mostly the plants arrived completely desiccated. Subsequently the plant material was packed into wooden boxes and the plants and seeds arrived undamaged in Amsterdam. But we had to wait until 1830, when a new box (the Wardian case, Figure 4) was developed by Nathaniel Ward. He developed a box which could be hermetically closed to give constant humidity and reduced temperature fluctuations. With the introduction of the Wardian case, many botanical gardens in Holland and elsewhere received their plant material in this manner. In 1840, the botanical garden of Amsterdam received a *Cycas circinalis* (almost certainly *C. rumphii*) trunk from Java. This specimen (No. A0035) (Figure 5) is still present in the garden.

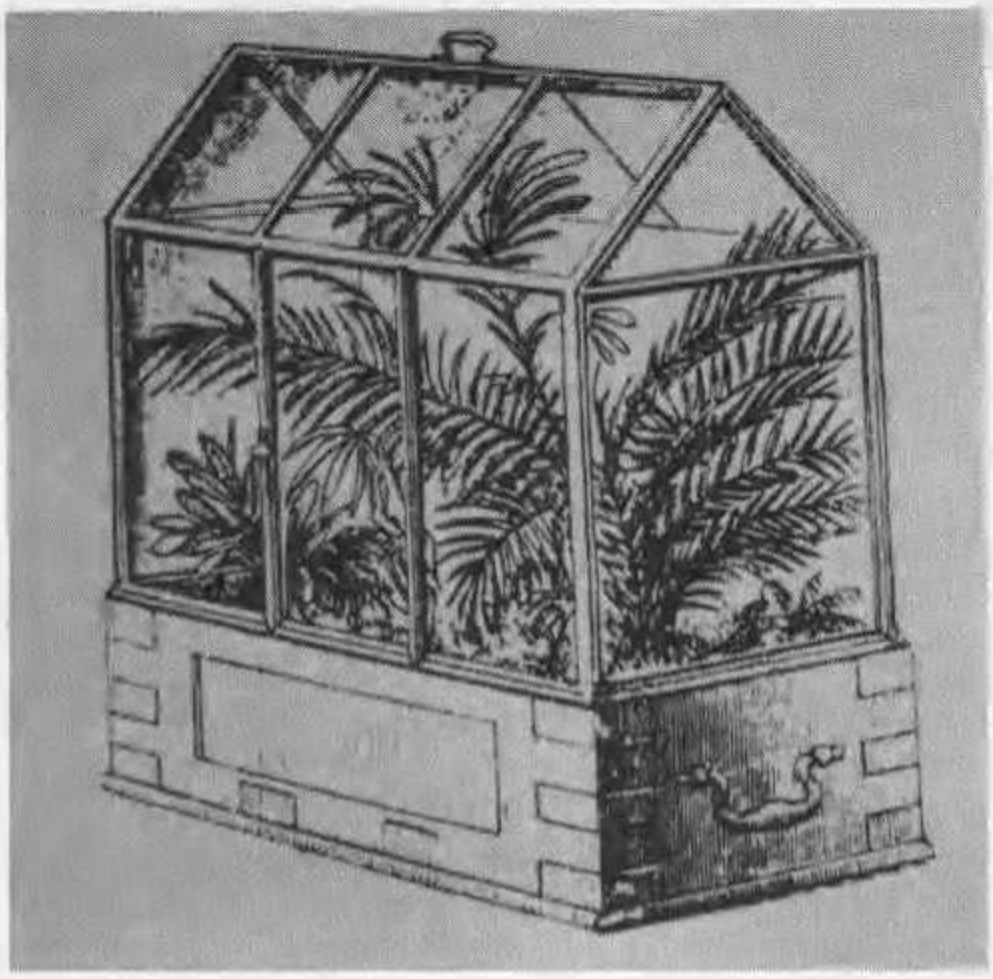

Figure 4 Drawing of Wardian case as developed in 1830 by Nathaniel Ward.

Figure 5 The specimen of *Cycas circinalis* (probably *C. rumphii*) received from "Lands Plantentuin in Buitenzorg" in Java and still present in the garden.

THE COLLECTION

Much of the information as to how and when cycads arrived in Amsterdam has unfortunately been lost during the passage of time. For the first time in 1689, a catalogue was produced by Jan Commelin (the Catalogus plantarum Horti Medicus Amstelodamensis) with 2200 numbers. In this catalogue, many specimens of the Cape were presented, but no cycads. From 1857, the collection was catalogued so that we now know the extent of the cycad component. In 1857 we had 35 taxa represented (17 American taxa, 7 African taxa, 11 Australian/Asian taxa), in 1898, 20 taxa (3 American taxa, 7 African taxa, 10 Australian/Asian taxa) in 1905, 22 taxa (7 American taxa, 8 African taxa, 7 Australian/Asian taxa), in 1975, 27 taxa (7 American taxa, 7 African taxa, 13 Australian/Asian taxa). When I catalogued the cycad collection for the World Cycad Census in 1992, 36 taxa were represented (9 American taxa, 16 African taxa, 11 Australian/Asian taxa). Before we built a new greenhouse (1400 m^2) in 1994, we catalogued all the greenhouse collections with the garden staff, and put it into a database. After months of hard work, I noticed that at that time 49 taxa (10 American taxa, 22 African taxa, 17 Australian/Asian taxa) were represented in our collection. All the new species had been germinated from seeds.

Since 1979, the garden has purchased 4 specimens of *Cycas*, 1 specimen of *Dioon*, 11 specimens of *Encephalartos*, 5 specimens of *Macrozamia*, 6 specimens of *Zamia*. Some of these were field-collected by special commission. In contrast to these purchases, the Hortus Botanicus has been able to increase its collection further by many donations from private sources and public institutions. In 1839, the botanic garden of Utrecht donated a specimen of *Cycas rumphii*. In July 1949, we received wild-collected *Encephalartos lebomboensis* caudices from the Department of Agriculture in Pretoria. In 1948, we received a specimen of *Encephalartos lehmannii* from Mr. Matthes' private collection at Queekhoven, Breukelen. In 1980, the botanic garden of the Vrije Universiteit van Amsterdam donated a specimen of *Cycas siamensis* and of *Encephalartos concinnus* (bought from Cynthia Giddy under No. 781400). In 1984, the botanic garden of Wageningen donated a specimen of *Encephalartos natalensis*. On 3 January 1986, Mrs Giddy verified this specimen as *E. natalensis* and not as *E. altensteinii*. In 1988, we received specimens of *Cycas thouarsii*, *Encephalartos lebomboensis* and *E. villosus* from Mr. van Donkelaar's private collection. In 1989, the Pinetum Blijdenstein at Hilversum donated a small specimen of *Stangeria eriopus* and also of *Zamia integrifolia*. In 1990, we received five specimens of *Cycas taiwaniana* (now *C. taitungensis*), which had been seized by the A.I.D. Furthermore we exchanged a female sucker of *Cycas rumphii* (No. A0008) for a male sucker of *Cycas rumphii* with the botanic

garden of Bonn in 1992. After we exchanged the suckers, unfortunately our mature plant, as well as the mature plant in the botanic garden of Bonn, died, so only the suckers of both plants stayed alive. During the time I was Curator of the garden, 5 specimens of Australian *Cycas*, 10 specimens of Asian *Cycas*, 1 specimen of African *Cycas*, 1 specimen of *Stangeria*, 2 specimens of Central American *Dioon*, 15 specimens of *Encephalartos*, 2 specimens of *Lepidozamia*, 12 specimens of Australian *Macrozamia*, 3 specimens of North American *Zamia* and 7 specimens of Central American *Zamia* were acquired by the garden.

Figure 6 Repotting *Encephalartos lehmannii*.

Figure 7 Removal of *Encephalartos lehmannii* to the palm greenhouse in January 1990.

REPOTTING THE CYCAD COLLECTION

In 1988, when I became Curator of the Amsterdam Botanic Garden, I noticed that most of the mature and juvenile plants did not regularly produce leaves and cones, and the wooden coopers (containers) were almost perished and too small. In co-operation with my dear friend Nico Schellevis (Curator of Pinetum Blijdenstein), we started a repotting programme in December 1988. Over 3 years we replanted most of the mature plants in new wooden coopers and new soil (Figures 6, 7). The seedlings were replanted into rose-pots. After we replanted the cycad collection, most of the specimens made leaves regularly and have continued to the present time. Only *Cycas rumphii* (No. A0008) and a specimen of *Ceratozamia mexicana* var. *longifolia* did not respond to being replanted and died after a fungus infection in 1993.

Figure 8 Specimen of *Encephalartos altensteinii*, purchased on the auction of King Willem II's plant collection in 1850. Note the changes in diameter reflecting various stages during its long history.

A SENSATIONAL DISCOVERY

One of the specimens we replanted was a male plant of *Encephalartos altensteinii* (No. A0011), the garden's oldest potplant (Figure 8). The lower part of the trunk is swollen and the upper part is smaller. Our taxonomist told me that this cycad was brought in during the V.O.C. period because the trunk of this specimen has a narrowing indicating when the plant first arrived. He told me that the estimated age of this specimen was 400 years. When Dennis Stevenson visited our garden he estimated the specimen less than 300 years old. This male specimen coned in 1862, 1959, 1963 and for the last

Figure 9 ***Encephalartos altensteinii*** **and other plants, as shown at the international plant exhibition in "het paleis voor Volksvlijt" in 1865.**

time in 1980, with two cones (1100 mm). But I was not satisfied, and started my own research, hoping to find more information about this specimen. After six years of research I found the information I was looking for. In June 1994, I found in "het verschotboek van de Hortulanus" (1850) the purchase of an *Encephalartos altensteinii* (for 150 guilders) and an *E. lanuginosus* (now *E. horridus*) (for 50 guilders). The two cycads were bought on a auction sale from the late King Willem II (1792-1849). More than 3667 plants were sold by auction, during 22 August - 31 August 1850. On 29 August, the cycad collection was sold and one day later the two cycads arrived in Amsterdam. In 1855, the Curator of that time ordered the carpenter to make wooden coopers for the cycads. During an international plant exhibition at "het Paleis voor Volksvlijt" in 1865, the cycads were shown to the public (Figure 9). With certainty, this *Encephalartos altensteinii* specimen was mentioned in "Verslagen en mededelingen der Koninklijke Akademie van Wetenschappen, afd. Natuurkunde" 16 (1864). In this article C.A.J.A. Oudemans gave the measurements from the trunk as:

trunk height	0.60 m
trunk diameter	0.45 m

In 1862, after 16 years the measurements were:

trunk height	0.70 m
trunk diameter	0.38 m

In 16 years the diameter has decreased by 70 mm (0.45 - 0.38 m).

On the 1 July 1994, I measured the trunk again, finding:

total length of the trunk	2.20 m
lower (swollen) part of the trunk	0.85 m
trunk diameter	0.25 m

Above the swollen part of the trunk (0.85 m), the diameter decreased even more to 0.13 m. With all this information I was sure, after I had measured the trunk, that this specimen is that obtained from the late King Willem II. After seeing the drawing made during the plant exhibition in 1865, and reviewing all the information I had gathered, I believe that the age of this specimen is less than 200 years.

Figure 10 The new cycad plantings in the previous palm greenhouse, October 1993.

At the end of 1992, we started to built a new greenhouse (cost 2.3 million guilders). In July 1993, we started to replant the three-climate greenhouse. The replanting of the new greenhouse was a dream come true for me, because we relocated the cycad collection into the empty palm greenhouse (Figure 10). In the palm greenhouse we made African and Australian/Asian sections. We used the side-tables for the smaller cycads. After we had finished replanting this palm greenhouse in November 1993, four members of the garden staff (including myself) were discharged for reorganization reasons. I'm sorry to say but, after we left the garden, the cycad collection deteriorated and many juvenile plants died.

With the discharge of four members of the garden staff, much of the expertise disappeared. My wife, who also worked at the botanic garden, was the supervisor of the propagation unit. She germinated and took care of the cycad seedlings. As Curator, I took care of the mature cycad collection, purchased cycad and other plant material, and kept in contact with botanic gardens all over the world. At the moment, as I'm writing this article, I hope that the historic cycad collection at the botanic garden of Amsterdam will survive and flourish as never before, and wish them well.

ACKNOWLEDGEMENT

I thank Roy Osborne for his assistance in promoting and editing this text.

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SHORT COMMUNICATIONS / KORT MEDEDELINGS

NUUS OOR DIE TRANSVAALSE STREEKTAK VAN DIE VERENIGING

Hanneke Grobbelaar
Posbus 15357, 0039 Lynn-Oos

Ontvang 30 Maart 1995

Nadat Susan Myburgh, Ruan Harris en Koos Oosthuyzen een na die ander oor die vorige agt maande uit die Streektakbestuur bedank het, het die voorsitter, Kobus Naude ook besluit om uit te tree. Die volgende nuwe Streektakbestuur is gevolglik op 11 Februarie 1995 vir die res van die jaar tydens 'n algemene streektakvergadering gekies:

Giel (M.J.) Fourie - Voorsitter en Streeksverteenwoordiger op die Raad. Hobsonstraat 9, Stilfontein, 2550. Tel.: (H) (018) 484 1565.

Hanneke Grobbelaar - Sekretaresse
Posbus 15357, Lynn-Oos, 0039. Tel.: (H) (012) 808 0995.

Johan (J.C.) du Preez - Tesourier
Posbus 5452, Onverwacht, Ellisras, 0557. Tel.: (H) (014) 763 4881.

Ian (I.H.) Greenaway - Saad- en stuifmeelbeampte
Southweg 80, Rewlatch, Johannesburg, 2197. Tel.: (H) (011) 435 4282.

Jan (J.C.) Deetlefs - Addisionele lid
Posbus 236, Halfway House, 1685. Tel.: (H) (011) 314 1300.

Dirk (D.J.) de Smidt - Addisionele lid
Californiastraat 90, Crosby, 2092. Tel.: (H) (011) 837 7503.

Nadat verskeie aanwesiges voorstelle gemaak het oor die samestelling van 'n moontlike program vir die res van 1995, is onderstaande program opgestel:

6 Mei - Dr Gerrie de Haas sal vanaf 14h00 by die hoofgebou van die Nasionale Botaniese Instituut in Pretoria deur middel van 'n skyfievertoning gesels oor die breëblaar grys broodbome van Transvaal (*E. cupidus, E. dolomiticus, E. dyerianus, E. eugene-maraisii, E. middelburgensis, E. "venetus", E. "decurrens", E. "reuse cupidus"*, ens.)

2 Julie - Besoek aan Kol. Jan Deetlefs se tuin om 14h00. Ry op die Ben Schoeman snelweg en neem die Olifantsfontein/Pelindaba afrit. Draai oos en gaan by verkeerslig oor die ou Johannesburg/Pretoria pad. Draai na ongeveer 1 km by die bordjie wat lees "Plot 11" links. Nat Grobbelaar sal ook tydens die byeenkoms vir veral die onervare lede 'n kort praatjie aanbied oor die bestuiwing van broodboomkeëls en die kieming van broodboomsaad.

2 September - Uitstappie na *E. eugene-maraisii* in habitat. Vergader om 09h00 in Naboomspruit op pad na Warmwaterbronne by "Wag-'n-bietjie" kwekery (8e Straat 56) vir reis na privaat natuurreservaat 33 km vanaf Naboomspruit. Moeilike terrein - trek goeie stapskoene aan. Pak eie piekniekmandjie. R.S.V.P. Hanneke Grobbelaar by (012) 808 0995 voor 25 Augustus.

4 November - Afsluitingsfunksie begin om 16h00 by Hollandhuis aan noordelike kan van rant in terrein van die Nasionale Botaniese Instituut, Pretoria. Mnr Bernard Fischer sal 'n skyfievertoning oor "*Zamia* species of the Americas" aanbied. Vir die braaivleis sal slegs pap en vleis gratis voorsien word. Persone met vanne wat op A-M begin moet asb mengelslaai saambring. Persone met vanne wat op N-Z begin moet asb vrugteslaai saambring. R.S.V.P. aan Hanneke by (012) 808 0995 voor 27 Oktober 1995. VERKIESING VAN BESTUUR VIR 1996/1997.

6 Januarie 1996 - Vergadering in hoofgebou van die Nasionale Botaniese Instituut, Pretoria om 14h00. Voorstelle vir 'n aanbieding by hierdie vergadering moet so spoedig moontlik aan Hanneke Grobbelaar by Tel.: (012) 808 0995 aanhangig gemaak word.

LEDE WORD UITGENOOI OM PLANTE EN/OF SAAD NA DIE BYEENKOMSTE OP 6 MEI, 2 JULIE, 4 NOVEMBER EN 6 JANUARIE TE BRING VIR UITRUILDOELEINDES.

NEW PRODUCT KNOCKS LEOPARD MOTH LARVAE

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Received 14 March 1995

A newly-released contact and stomach insecticide, Cypermethrin EC, has been found to be particularly effective against larvae of the leopard moth (*Xerenopsis leopardina*) on cycads. The product is made by Sanachem (Pty) Ltd, a Natal Company, and is a synthetic pyrethroid sold as an emulsifiable concentrate containing 200 g/l cypermethrin. It is of interest to note that the pyrethroid insecticides, being close analogues of natural products, are considered much more environmentally acceptable than the usual organophosphate-based products like Dursban, Chlorpyrifos, Malathion, Metasystox, etc.

The new product was first drawn to our attention by Durban member **Dennis Ross** who was most enthusiastic about the control he achieved with it. My own experience has been equally satisfactory - a one-off application at a low dilution (1.5 ml concentrate to 10 litres water with a few drops of liquid detergent) rapidly and completely destroyed a severe infestation of larvae with no apparent harmful effect to the cycad foliage. I have also found the product very effective against scale and mealy-bug infestations.

ANOTHER SEX CHANGE

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Received 14 March 1995

Much has been printed in this magazine on the subject of sex changes in cycads (*Encephalartos* **2**: 20-22, **2**: 24, **8**: 34-35, **13**: 42, **19**: 27, **21**:8, **23**: 18-20, **27**: 33, **40**: 20-21) and the theory has been put forward that ample resources favour femaleness but a deficit in water, light or nutrition, or some other type of stress, promotes maleness.

Figure 1 The male *Encephalartos lebomboensis* plant in a farm garden near Louwsburg which has given suckers which sometimes lead the plants to producing female cones. Photo: Roy Osborne.

A case I have observed may interest readers. A specimen of *Encephalartos lebomboensis* was removed from Jozini area about 40 years ago and relocated in a farm garden near Louwsburg in northern Natal. The plant proved to be a male, coning regularly, but also quite often producing basal suckers (Figure 1).

The owner, preferring the "clean" appearance of a single trunk, removed the suckers, rooted them and gave them to friends over the period 1982-1994. At least two of these suckers have now developed into apparently "normal" female plants, coning regularly as females over the last 4 years. This doesn't really seem to fit in with the resource limitation theory. Suckers from the same male parent plant, in very similar sites in the same garden, are usually male but two are (or have become?) female.

COMMENTS ON *CYCAS REVOLUTA*

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Received 16 February 1995

OSBORNE's & TOMIYANA's article on *Cycas revoluta* in *Encephalartos* **41**: 5-15 raised a number of interesting points on which I wish to comment:

1. I was most intrigued to learn that in nature plants occur invariably on limestone, which is an alkaline medium. In Florida, on alkaline coral soils, manganese deficiency is a common and serious problem, and is apparently directly related to the low acidity of these soils. In the Western Cape it is likewise a problem, usually in plants grown close to buildings or on building rubble where the lowering of the soil acidity is thought to be the cause. Because of the difficulty in changing soil acidity (which is well-buffered), the only effective preventive treatment (there is no cure for the permanently damaged leaves) is to apply manganese as a foliar spray. I think here is something which we don't understand. Previously I have reported on this malady in *Encephalartos* **37**: 15-16 (1994).

2. Wind-pollination of *Cycas revoluta*: in my paper delivered at CYCAD '93 and soon to be published in the Proceedings, I provided objections to pollination effected by wind. Briefly these are:

   a) Both male and female cones emit a strong odour and show a raise above ambient temperature at the time of pollination. These phenomena can only be explained as symptoms of insect-pollination.

   b) The pollen is sticky and can consequently not be effectively transported by wind.

c) No spontaneous pollination has ever been observed in cultivated groups of both sexes coning simultaneously within 1½ metres from each other in Stellenbosch.

3. Number of cones: it is certainly true that each stem bears only a single apical cone. In *Encephalartos* **37**: 16 (1994) and **40** (front cover) I reported and explained the phenomenon of multiple cones in *C. revoluta*.

4. Hybridizing: *C. revoluta* has successfully been hybridized with *C. micholitzii* var. *simplicipinna*, and I believe also with *C. taitungensis*, which indicates a close relationship between these species. All three have "closed" (compact) type female cones. There have been reports of hybrids between *C. revoluta* and *C. circinalis*, which I have not been able to verify. Attempts to hybridize *C. revoluta* with either *C. thouarsii* or unidentified material of the *E. rumphii* complex (with "open" female cones), as male as well as female parent, were unsuccessful, indicating a considerably more distant relationship.

5. Viability of seed: it is certainly true that in *Cycas*, like *Zamia* and *Ceratozamia*, the seeds only develop once they have been pollinated. However, here the problem is that "seeds" may be stimulated to develop when pollinated with a species too distantly related for viable fertilization to take place, so that the "seeds" develop to full size, but never germinate. This happens when *C. revoluta* is pollinated with a species in the *C. rumphii* complex.

6. Cold-hardiness: *C. revoluta* is acknowledged to be one of the more cold-hardy species, yet I have seen plants completely defoliated by severe cold on the escarpment to the south-west of Hartebeespoort Dam. On the other hand, I saw huge and beautiful specimens growing in Yokohama, Japan, where they reputedly get covered in snow every year.

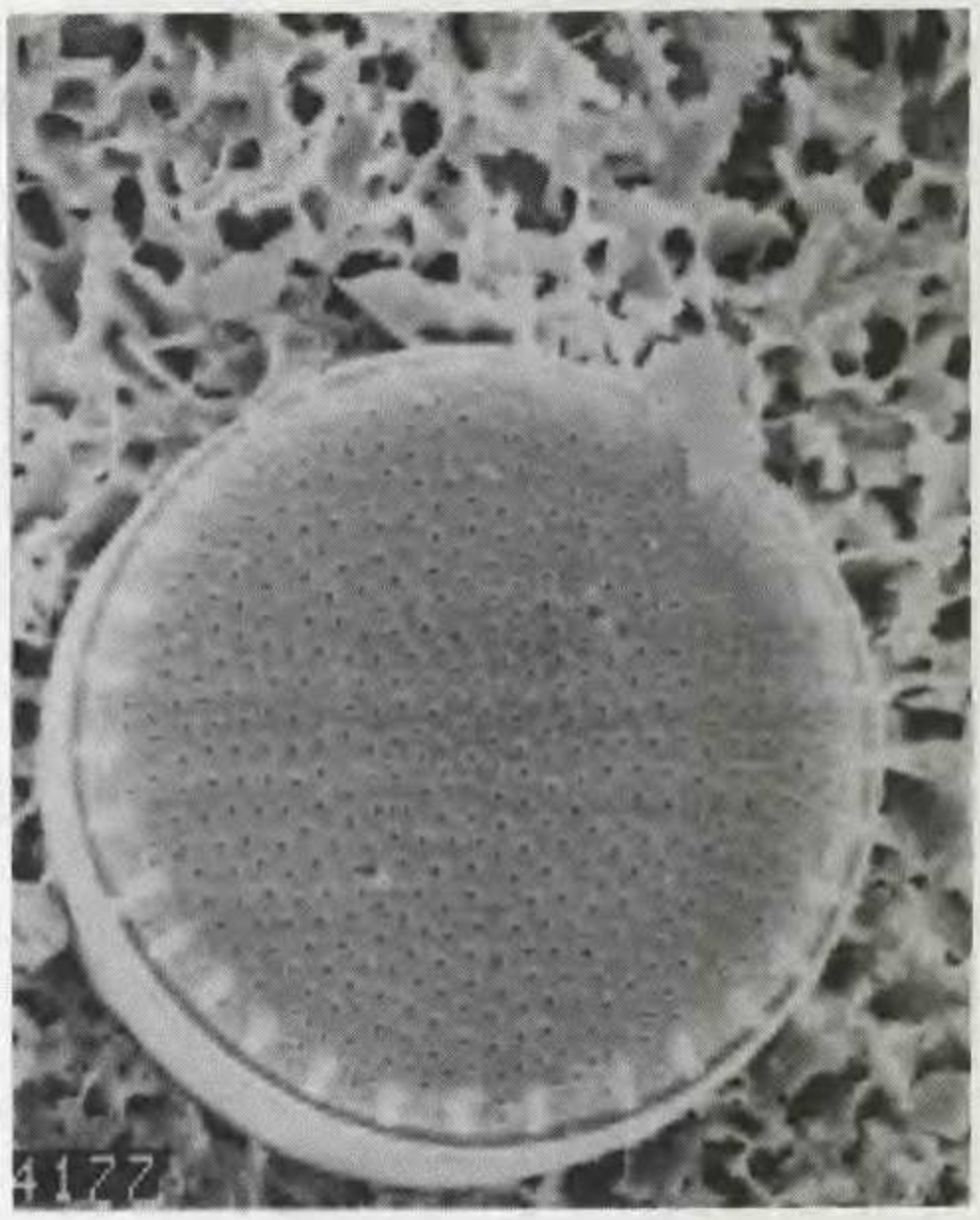

Figure 1 A scanning electron micrograph of the upper leaflet surface from *Encephalartos princeps*, magnified X5000. The biscuit-like structure is a diatom, trapped in a honeycomb-like matrix of leaf waxes. Photo by courtesy of the University of Natal's Electron Microscopy Unit.

viewed under high magnification. These tiny structures are believed to be air-borne diatoms which become trapped on the waxy deposits on the leaflet surfaces (Figure 1). Perfectly symmetrical, these unicellular algae with silicified cell walls might be considered as miniature "flying saucers" but measure only 13.5 micrometers in diameter. Roy Osborne and Fred Stevens (of the University of Groningen, The Netherlands) are continuing investigations into the chemical and micromorphological composition of cycad leaf waxes and anticipate publication of an important paper on the subject later this year.

MICROSCOPIC SPACE INVADERS

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Received 23 January 1995

During the course of investigations into the microscopic appearance of *Encephalartos* wax deposits, we noticed an occasional biscuit-like structure on leaflet upper surfaces

LETTERS TO THE EDITOR / BRIEWE AAN DIE REDAKTEUR

Dear Editor

CYCADOLOGISTS: RHODES UNIVERSITY VERSUS PRETORIA UNIVERSITY

I was prompted to write this note by the rash statement in *Encephalartos* **41**: 31 that Rhodes University produced more cycadologists than any other South African University.

Without wishing to belittle that institution of learning, I have to point out that the honours more properly belong to Pretoria University.

Firstly, of the Rhodes graduates mentioned, only John Donaldson was actually trained in cycadology at Rhodes - all the others became interested in cycads long after having completed their training at Rhodes. In fact, Nat Grobbelaar only started working on cycads after joining the cycad-enthusiastic staff of Pretoria University.

Research on cycads at Pretoria University was spurred by the infectuous enthusiasm of Prof. H.P. van der Schijff. Although he himself conducted no research on cycads, he inspired a whole generation of cycadologists, including Hannes Robbertse who, together with colleague and student At Koeleman did pioneering work on cycad anatomy; Isabella Claassen who over many years conducted phenological research; Suzelle van der Westhuizen who did the original research which enabled us to recognize *Encephalartos middelburgensis, E. dyerianus*, and *E. dolomiticus*; Johan Pretorius who worked on the life history of *E. lanatus* before specializing in other fields; Elsie Steyn who does research on fertilization biology; Johan Kluge who manages the National Botanical Institute's cycad seed orchards; and myself being interested in taxonomy.

Piet Vorster, Botany Department, Stellenbosch University, Private Bag X1, 7602 Matieland.

Received 16 February 1995

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Dear Editor

CYCAD HYBRIDS

I would like to hear from any members who have successfully hybridized the following species:

Cycas revoluta with any other species. As far as we know, the chromosome numbers of all *Cycas* species are the same, yet attempts to hybridize *C. revoluta* with species in the *C. rumphii* complex, failed repeatedly.

Encephalartos inopinus with any other species. This species does not seem to be able to hybridize with anything else, which raises interesting questions about its systematic position.

Encephalartos ferox with any other species. Such hybrids are known, but are few and far between. I would like to compile a list of species with which it can hybridize, as this may tell us more about its relationships. It does indeed seem to be taxonomically isolated.

Encephalartos cycadifolius, E. ghellinckii, E. friderici-guilielmi, E. lanatus, E. laevifolius or *E. humilis* with any of the other species of *Encephalartos* (with broad leaflets). These species seem to form a group of their own, and I have never heard of any hybrids with species outside this group.

Zamia with *Ceratozamia*. Such hybrids were reported many years ago by Chamberlain, but I have not been able to recreate them, even when using species with the same chromosome numbers (though the caryotypes are not identical).

Piet Vorster, Botany Department, Stellenbosch University, Private Bag X1, 7602 Matieland.

Received 16 February 1995

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Dear Editor

***ENCEPHALARTOS* SEEDS**

I have been the Director of the Cycad Society Seed Bank U.S.A. for the last two years. I have learned that trying to obtain *Encephalartos* seeds for our members is next to impossible. I realize that we must all abide by the CITES regulations, as well as local laws protecting cycads.

We are all engaged in one common goal, to save and propagate these endangered species of plants. With that in mind, is there any way that our seed bank, and your society's seed bank could exchange seeds on a seed-for-seed basis?

Now we have to take CITES into consideration. Is the law broken if we exchange seeds on a seed-for-seed basis? If I send you 100 seeds, and you send me 100

seeds, both countries still have the same amount of seeds, but of different species. When your seeds grow into plants, and our seeds grow into plants, we have done what our common goal is, increase the number of plants.

Here is a little something to think about. From 1919 to 1933 the United States enacted the Volstead Act. It was the total prohibition of alcohol of any kind. This act made the underworld (Gangsters) very rich. For every two bottles of beer confiscated, eight more were sold. The point of this is, if you continue to prohibit the sale, or the exportation of *Encephalartos* seeds, some of the more enterprising unscrupulous people will steal, and sell the seeds you so dearly are trying to protect.

We are not a business, nursery, or wholesaler. We are a seed bank, we distribute seeds to our members at cost. Only on rare occasions do we send more than one packet (1-8 seeds) to any one person. When we have excess seeds they are sent to our members only.

It is my sincere belief that we, at seed banks around the world, do more for the survival of cycad species than all the conservation authorities put together.

***Mike Michaelsen**, The Cycad Seed Bank, 1417 Hilgard Avenue, Simi Valley, CA 93065, USA.*

Received 14 March 1995

NEW SCIENTIFIC REPORTS

K.D. Hill. 1994. The *Cycas media* group (Cycadaceae) in New Guinea. *Australian Systematic Botany* 7: 527-541. [Two strikingly different *Cycas* species groups occur in New Guinea. In this paper the author gives an account of the *Cycas media* group, including a key to the species, a discussion of distribution (with maps) and pertinent illustrations. Three species in this group occur in New Guinea: *Cycas papuana* F. Mueller from the savanna woodlands in the western part of Papua New Guinea; *C. schumanniana* Lauterbach, a grassland species from the northern part of Papua New Guinea and a new species, *C. campestris* K.D. Hill from savanna woodland on the coastal plains in south-eastern Papua New Guinea. The relationships between the taxa are discussed with details of section and series circumscriptions.]
Author's address: National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Road, Sydney, NSW 2000, Australia.

K.D. Hill. 1994. The *Cycas rumphii* complex (Cycadaceae) in New Guinea and the Western Pacific. *Australian Systematic Botany* 7: 527-541. [In a follow-up to the paper described above, Ken Hill now gives an account of the *Cycas rumphii* complex in New Guinea and the western Pacific, including again a key to the species, distribution maps and illustrations. Of the six species in the region, three are known (*Cycas rumphii, C. scratchleyana* and *C. seemannii*) and three are new descriptions. These are *Cycas apoa* K.D. Hill from forested wet lowland areas in northern coastal New Guinea and in Indonesia; *C. micronesia* K.D. Hill from the Marianas Islands, including Guam, and *C. bougainvilleana* K.D. Hill from coastal sites in Bougainville, New Britain and the Solomon Islands.]
Author's address: As above

K.D. Hill. 1995. The genus *Cycas* (Cycadaceae) in the Indian region, with notes on the application and typification of the name *Cycas circinalis*. *Taxon* 44 (in press). [The author gives up-dated taxonomic treatments of *Cycas beddomei* Dyer, a distinctive Indian endemic from the Cuddapah Hills in Andra Pradesh state; *C. circinalis* L., a widely-misapplied name which should now be restricted to the plant which occurs in the southern part of India; *C. circinalis* var. *orixensis* Haines, from the northern Eastern Ghatz in the Indian state of Orissa; *C. pectinatata* Hamilton, widespread from north-eastern India and Nepal through Bhutan and Myanmar to Thailand and China; *C. nathorstii* Schuster, in Sri Lanka and possibly India, and *C. rumphii* Miguel, which in the strict sense is apparently restricted to Indonesia. A clear discussion of the erroneous interpretations of *Cycas circinalis* and its relation to *C. rumphii* completes this work.]
Author's address: As above.

Jäger, A.,* Osborne, R. and Van Staden, J. 1995. *In vitro* culture of cycads - somatic embryogenesis in *Encephalartos cycadifolius* (Jacq.) Lehm. Presentation at the Annual Conference of the South African Association of Botanists, Bloemfontein, January 1995. (Abstract only). [Half-embryos from the seeds of *E. cycadifolius* were cultured on a medium containing Gamborg 5B

major salts, Murashige and Skoog minor salts plus vitamins, supplemented with 400 mgl^{-1} casein hydrolysate, 100 mgl^{-1} arginine, 100 mgl^{-1} asparagine, 100 mgl^{-1} ascorbic acid, 60 gl^{-1} sucrose, 1 mg l^{-1} 2,4-D and 1 mgl^{-1} kinetin. The medium was solidified with 0.8% agar at pH 5.7. Cultures were maintained in the dark at 26°C. Callus appeared after 2 weeks and grew rapidly. The callus was yellow in colour. The above medium containing 2, 3, 4, 5, or 6% sucrose was tested, 4% resulted in the highest callus growth, and the callus was subsequently subcultured onto a medium containing 4% sucrose. After 5 months of culture the appearance of the callus changed to a translucent, embryogenic callus. Suspensors developed from this callus. Dicotyledonary embryos developed on the distal end of the suspensor. When transferred to 24 h light the embryos turned green. The embryos have to date not developed radicles. The effect of hormonal treatment (combinations of 2,4-D and kinetin) on embryogenesis is being investigated.]

Author's address: Dr Anna Jäger, Department of Botany, University of Natal, Pietermaritzburg 3201, South Africa.

Osborne, R. 1995. The world cycad census and proposed revision of the threatened species status for cycad taxa. *Biological Conservation* 71: 1-12. [The number of mature specimens of all extant cycad taxa in the wild, in public gardens and in private collections were estimated from a census carried out during 1991 and 1992. The data for the wild plants and those in public gardens appear to be comprehensive and reasonably accurate for most cycad genera except *Cycas* and *Zamia*. A low frequency of responses from private collectors has resulted in a significant underestimate of the number of specimens in private ownership. Abundance in the wild is extremely variable but, with some important exceptions, positively correlated with numbers in cultivation where large numbers of plants are held by a relatively small number of owners. Revisions of the previously listed conservation status for each taxon are suggested on the basis of wild number estimates in view of the lack of detailed population studies. Well-maintained and correctly accessioned cycad collections are important *ex situ* genetic resources of educational, research and conservation value; several botanic gardens are presently involved in cycad conservation projects. A major revision of the earlier threatened species assignments is proposed, in which taxa are placed into extinct, critical endangered, vulnerable and safe/low-risk categories on the basis of the wild number estimates obtained in the census. These assignments are based on species numbers in view of the lack of data at the population level.]

Author's address: Prof. R. Osborne, University of Natal, King George V Avenue, 4001 Durban, Republic of South Africa.

Compiled by ***Roy Osborne****, Department of Chemistry, University of Natal, Private Bag X10, 4014 Dalbridge.*

NEWSPAPER CLIPPINGS / KOERANTUITKNIPSELS

SUNDAY TIMES, April 9 1995

Hogarth

'I dunno why they make such a fuss about cycads. They always get on my nerves making such a racket in the bush at Christmas time

Dertig ton bome van R4 m. vir casino : ANC het glo sy verlof gegee

Michelle Pieters

IN een van die grootste broodboom-vondste nog in Suid-Afrika het die Polisie beslag gelê op 30 ton reuse-broodbome van meer as R4 miljoen. Van die bome is sowat 500 jaar oud.

Hulle was na bewering bestem om 'n nuwe casino in Sasolburg te "verfraai" en is glo met goedkeuring van die kantoor van die Premier van die Oos-Kaap en die ANC in die Vrystaat in die voormalige Ciskei uitgehaal.

'n Griekse man is met die vrag broodbome – 'n bedreigde spesie – by Grahamstad vasgetrek.

Twee valleie in die Pedi-omgewing in Ciskei is erg beskadig deurdat meganiese grawe gebruik is om die bome te verwyder. 'n Pad na die valleie is met stootskrapers oopgestoot en verwoesting is gesaai.

Mnr. Costas Guileas (34) van Welkom, wat gister in hegtenis geneem is, het twee amptelike briewe getoon waarvolgens hy toestemming by die kantoor van die Oos-Kaapse Premier en die ANC van Welkom gekry het om die bome te verwyder.

Kol. Piet Lategan, bevelvoerder van die Polisie se eenheid vir bedreigde spesies in Pretoria, het gister gesê sy eenheid en Oos-Kaapse Natuurbewaring het verlede week begin met 'n ondersoek na broodbome wat onwettig in die Pedi-omgewing in Ciskei uitgehaal word.

'n Vragmotor van 34 ton is kort daarna by Grahamstad voorgekeer.

"Die vragmotor was vol met van die grootste broodbome, sommige tot sowat 5 m hoog," het kol. Lategan gesê.

Mnr. Guileas het gistermiddag laat in die landdroshof in Grahamstad verskyn. Hy is op borgtog van R8 000 vrygelaat en moes sy paspoort indien.

Hy is na bewering deel van 'n broodbom-sindikaat.

Oos-Kaapse Natuurbewaring ontken dat 'n permit toegeken is om die bome uit te haal.

'n Vrou wat gesê het sy is van die Premier se kantoor het Oos-Kaapse Natuurbewaring eergister geskakel en gesê hulle moet die vragmotor "dadelik teruggegee". Die versoek is geweier, berig ons Korrespondent in Kaapstad.

● 'n Internasionale kenner van broodbome, mev. Cynthia Giddy, het gister in Suid-Afrika aangekom om te bepaal wat die skade is aan die ekologie en aan plante wat uitgehaal is.

Die vragmotor met die vrag reuse-broodbome van R4 miljoen wat in 'n beweerde grootskeepse plundertog in Ciskei uitgehaal is. Die Polisie het Maandag net buite Grahamstad op die vrag beslag gelé. Van die broodbome is sowat 500 jaar oud en hulle was glo bestem vir die "verfraaiing" van 'n casino by Sasolburg.

THE CITIZEN Saturday 25 March 1995

Cycad pillage: Call to sack ANC officials

Political Correspondent

CAPE TOWN. — The ANC should take "immediate steps" to sack its own officials who authorised and engineered the pillage of tons of priceless cycads in the Eastern Cape, the Democratic Party said yesterday.

This could include the Premier of the Free State, Mr Patrick Lekota, and the Premier of the Eastern Cape, Mr M R Mhlaba.

Documents implicating top ANC officers in both the Free State and the Eastern Cape are in the hands of Eastern Cape Nature Conservation officials.

Mr Errol Moorcroft, Democratic Party spokesman on environment, reacted angrily to the events yesterday: "This is like a political party going into Hluhluwe and poaching all the black rhino it can find," he said.

A letter issued on the letterhead of the ANC in the Free State suggested that the plundered cycads might be used at a buildng accomodating the Minister of Economic Affairs and the Reconstruction and Development Programme.

The letter claimed to authorise a Mr Konstantinos Giuleas to collect the cycads in the Eastern Cape Province.

A document issued by the office of the Premier of the Eastern Cape purported to "authorise the removal" of the cycads.

The documents authorised Mr Guileas to deliver the cycads to "the Masada Building, ANC Provincial Office" in the Free State.

Mr Moorcroft said he had information that political pressure from the Free State was placed on the Nature Conservation officials to release the consignment of cycads after the vandalism had been exposed.

Cycads, a sort of "living fossil" from an era before trees evolved on earth, were not only endangered species but were also protected under the International CITES Convention, to which South Africa is a signatory.

"What is just as horrifying is to learn that apart from plundering about 30 tons of cycads, about an equal number were left lying and damaged on the ground" said Mr Moorcroft.

"The illegal removal of massive quantities of these rare plants in the most destructive possible way is an act of unprecedented environmental vandalism.

"The fact that the recipient is a political party and that the authorisation was given by the office of the Premier of the Eastern Cape is equally unprecedented."

The DP demanded that all those involved in this act should be prosecuted. In addition, the ANC had to remove from office all those who authorised or engineered a reprehensible act.

"We congratulate the Department of Nature Conservation in the Eastern Cape for its vigilence, and for resisting the political pressures brought on it by the office of the Premier of the Free State to release the confiscated plants," said Mr Moorcroft.

SUNDAY TIMES, March 26 1995

Plundered cycads are doomed to die

By RYAN CRESSWELL

ONLY a fifth of about 330 endangered cycads stolen by a syndicate in the Eastern Cape and seized by police this week are likely to be successfully replanted.

The conservation officer for the Eastern Cape nature conservation department, Jaap Pienaar, said the cycad theft had been a "complete disaster for conservation".

Only about 20 percent of the ancient plants, confiscated in the largest cycad haul in South Africa, would take root again, he said.

Some of the plants were more than 500 years old.

Some were "uniquely large and strangely shaped".

Mr Pienaar said at least two rare species, E Altensteinii and Trispionsis, were among the plants.

The cycads were found at Tholumna near Grahamstown and at another site near the Fish River this week.

A man from Welkom, Konstantinos Giuleas, appeared in the Grahamstown magistrate's court on Thursday in connection with the theft. He was granted bail of R8 000 and the case was postponed to May 26.

Colonel Pieter Lategan of the Endangered Species Protection Unit said the unit was investigating ANC links with the plunder. The Free State and the Eastern Cape ANC branches had allegedly issued documents authorising the removal, saying the endangered plants were to be used in the reconstruction and development programme in the Free State.

"We will be speaking to some of the government officials in Bisho tomorrow," Colonel Lategan said.

A Free State ANC official said the cycads were actually destined for a new casino in Sasolburg.

Colonel Lategan said his unit was also on the trail of members of a "large syndicate" believed to be involved in cycad operations in Kwazulu Natal, Gauteng and the Northern and Eastern Transvaal.

No one in the government or in the Eastern Cape premier's office could be reached for comment yesterday.

The Associated Press

Ken Hill, a botanist at the Royal Botanical Gardens of Australia, inspects fronds from the Wollemi pine discovered recently in Wollemi National Park. Scientists are terming the discovery of 39 prehistoric pines — thought to have been extinct for 150 million years — "one of the most significant botanical finds of this century."

Botanists' 'find of century'

By PETER JAMES SPIELMANN
The Associated Press

SYDNEY, Australia — David Noble was out on a holiday hike when he stepped off the beaten path — and into the prehistoric age.

Venturing into an isolated grove in a rain forest preserve 125 miles from Sydney, the Parks and Wildlife Service officer suddenly found himself in a real-life Jurassic Park — amid trees thought to have disappeared 150 million years ago.

"The discovery is the equivalent of finding a small dinosaur still alive on Earth," says Carrick Chambers, director of the Royal Botanic Gardens.

To botanists, discovery of the 39 prehistoric pines is "off the planet," he said yesterday.

"This is probably one of the most significant botanical finds of this century. It's a very exciting find and it's a real living fossil," said botanist Ken Hill of the botanic gardens.

The trees were found in an almost inaccessible part of Wollemi National Park in the Blue Mountains. They have been named the Wollemi Pines.

"In one way it will be our own Christmas tree. It's been discovered at Christmas, it's a conifer, it's going to be the Australian Christmas tree," said Chris Hartcher, the environment minister for New South Wales.

The biggest tree towers 130 feet with a 10-foot girth, indicating it's at least 150 years old. They are covered in dense, waxy foliage and have nobby bark that makes them look like they are coated with bubbly brown chocolate.

"The fact that such a large plant can go undiscovered for so long is a clear indication that there is more work to be done before we can say we understand our environment," Hartcher said.

So far, only 23 adult trees and 16 juveniles have been found, making it one of the world's rarest plants. Their exact location is being kept secret to protect them while botanists take seed samples to propagate them.

Their home is a tiny 1.2-acre grove of rain forest in the 1.2 million-acre park, found by Noble during a weekend hiking holiday in August. The park service then worked with the botanic gardens to identify the pines.

The Wollemi Pines once covered vast areas of the world, but as the climate changed the few remaining trees survived only in this damp, protected gorge.

"This is a plant family that was widespread, including the Northern Hemisphere, before that great extinction ... when we lost the dinosaurs," Briggs said. "It's been in a very sheltered spot and I think it's escaped fire for a very long time."