ENCEPHALARTOS

JOURNAL OF THE CYCAD SOCIETY OF SOUTH AFRICA

TYDSKRIF VAN DIE BROODBOOMVERENIGING VAN SUID-AFRIKA

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EDITOR/REDAKTEUR

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VOORBLAD/COVER

Encephalartos dolomiticus *: female cone on a cultivated plant, 400mm long.*

Photo: P Vorster

CONTENTS-INHOUD

FROM THE PRESIDENT

Our Regional Branches have all appointed an Officer who would like to provide interested members of the Society with pollen and seed on request. These Officers can fulfill a very important function in the affairs of the Society if you will help to make this possible. They require donations of fresh pollen and seed which they will store for distribution to other interested members on request. The pollen and seed will be made available free of charge but donations to the relevant Regional Branches via its Pollen & Seedbank Officers will ensure the success of the project. Please consult the inside of the back cover for the address and telephone number of the Officers in question.

In response to several queries that I received concerning "CYCAD 93", the following:

1. The Organizing Committee will unfortunately not be able to assist participants with arrangements to visit cycad localities other than those that are covered by the official excursions.
2. All registered participants of the official tours have to travel together by bus.Persons using other transport can unfortunately not join the party *en route*.
3. Because of inflation reliable hotel tariffs could not initially be obtained. In the final announcement reliable tariffs for the best as well as some average hotels will be published. All indications are that the tariffs of a top class hotel will be substantially lower than was originally anticipated.
4. The topics of Sessions 2 and 4 as advertised will probably be swopped

Have you recruited a new member for the Society this year? Please use the perforated "Membership Application Form" at the back of your copy of "Encephalartos" for this purpose.

With best wishes
Yours sincerely

Nat. Grobbelaar

VAN DIE PRESIDENT

Elkeen van ons Streektakke het 'n beampte aangestel wat hom ten doel stel om die lede van die Vereniging van stuifmeel en saad te voorsien. Hulle kan 'n belangrike rol in die aktiwiteite van die Vereniging vervul as u hulle daartoe instaat sal stel. Hulle benodig vars stuifmeel en saad wat hulle sal berg om aan ander belangstellende lede op aanvraag te voorsien. Die saad en stuifmeel sal gratis aan die lede wat van die diens gebruik maak voorsien word maar geldelike skenkings aan die betrokke takke, via hul stuifmeelbank/saadbank beampte sal die sukses van die diens verseker. Vir die adres en telefoonnommer van die betrokke beamptes word u na die binnekant van die agterblad verwys.

Na aanleiding van verskeie navrae wat ek aangaande "Cycad 93" ontvang het, die volgende:

1. Die Reëlingskomitee sal ongelukkig nie hulp kan verleen in verband met besoeke aan ander broodboom habitatte as die wat deur die ekskursies gedek sal word nie.
2. Alle ingeskrewe deelnemers aan die ekskursies moet saam per bus reis. Persone wat hul eie vervoer gebruik sal ongelukkig nie tydens die ekskursie by die amptelike groep kan aansluit nie.
3. As gevolg van inflasie kon ons aanvanklik nie betroubare hoteltariewe vir Pretoria bekom nie. In die finale kennisgewing sal betroubare tariewe vir die beste sowel as middelslag hotelle aangekondig word. Volgens alle aanduidings sal die tariewe vir die beste hotelle heelwat laer wees as wat aanvanklik verwag is.
4. Die voorgestelde onderwerpe *van* Sessies 2 en 4 sal moontlik omgeruil word.

Het u al vanjaar 'n nuwe lid vir die Vereniging gewerf? Gebruik gerus die uitskeur aansoekvorm agter in "Encephalartos" vir die doel.

Met vriendelike groete
die uwe

Nat. Grobbelaar

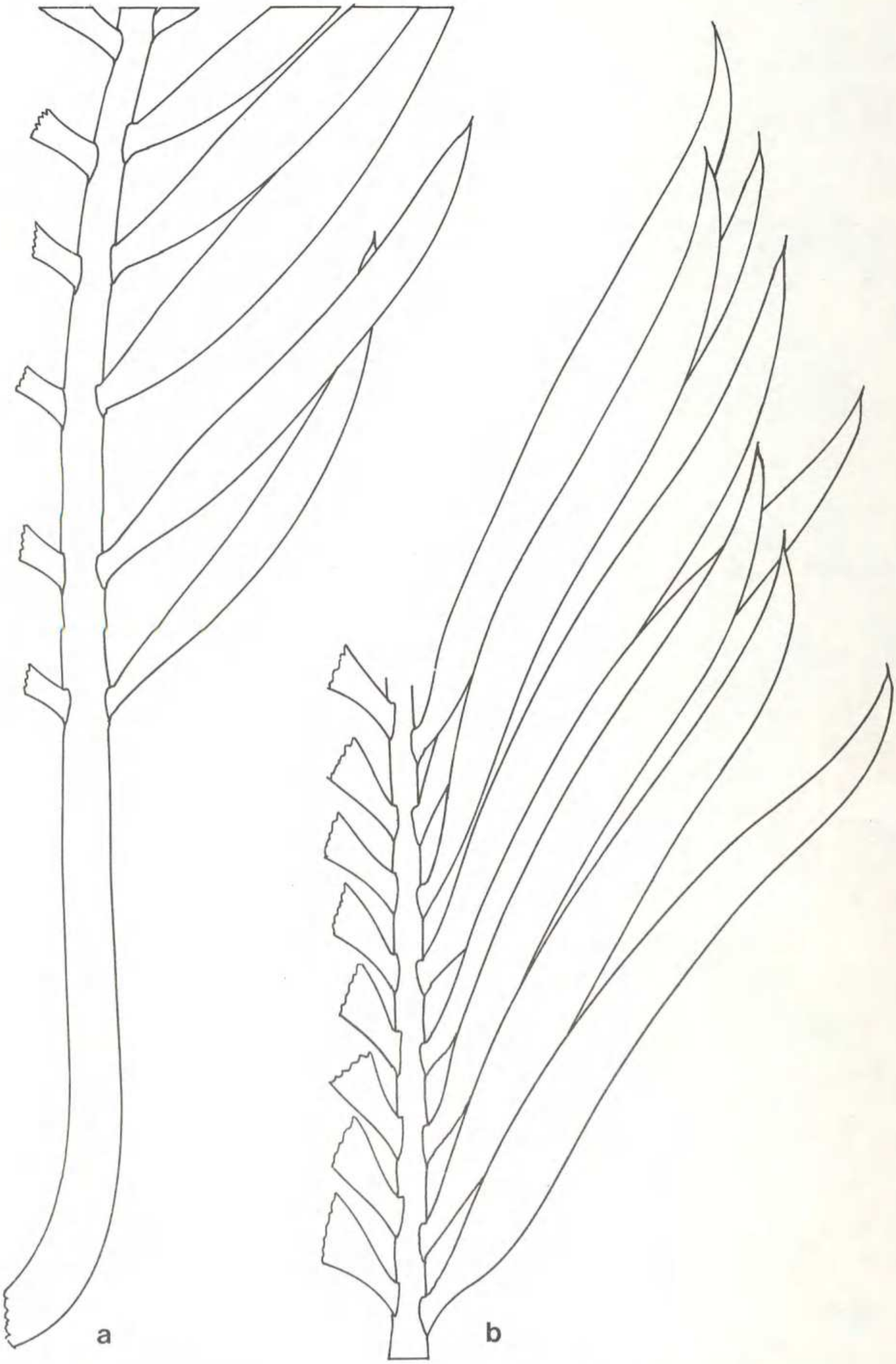


Figure 1 *Encephalartos dolomiticus*: (a) proximal portion of frond, showing well-developed petiole and well-spaced, only slightly reduced lower leaflets; (b) adaxial view of central portion of frond, showing overlapping leaflets; all x1. Del. E.C. Vorster.

FOCUS ON... FOKUS OP...

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:

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 DOLOMITICUS

by Piet Vorster

INTRODUCTION

The existence of this species has been suspected since the early 1970's, but information was so slow in coming forth that it was only described in 1988. To this day it remains extremely poorly known and it is unlikely that we will ever learn much about it, as it has practically been eliminated in nature. Those specimens which survived removal are scattered through private collections, often without any data about their origin, and often not recognized for what they are, because in the vegetative state this species is without strong distinguishing characteristics.

DISCOVERY

At the present distance in time it seems likely that material of this species was first collected by private collectors active in the at that time virtually unexplored Transvaal Drakensberg. Allerted by what they found, the area was subsequently visited by officers of the then Transvaal Division of Nature Conservation, to whom we are endebted for most of the extant herbarium specimens and photographs of plants in nature.

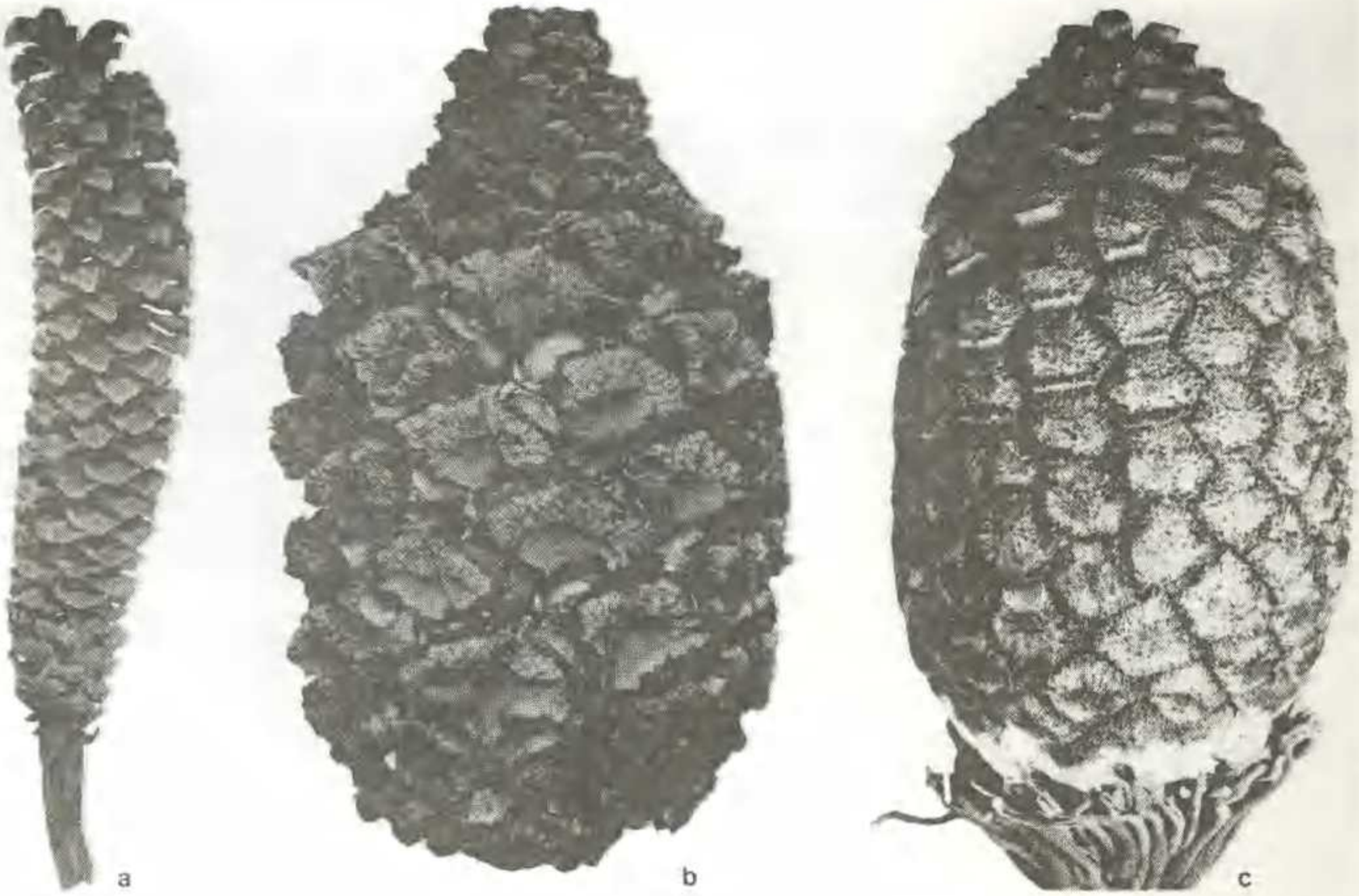
At first these plants were thought to represent an outlying form of *Encephalartos eugene-maraisii*, probably because of the glaucous fronds and geographical location. Once the cones were studied, it became clear that a distinct species was involved, and at this stage it is not at all certain that it is closely related to *E. eugene-maraisii*. As part of the so-called *E. eugene-maraisii* complex, this species was studied in detail during the mid-seventies by Miss Suzelle van der Westhuizen, for which research the degree of M.Sc. was awarded to her by the University of Pretoria in 1976. Research continued, but we hesitated to publish it as a new species because the available information was so meagre. In 1988 our own publication (Robbertse et al., 1988) was pre-empted by a paper by Lavranos & Goode which appeared a few months before ours and thus has nomenclatural priority according to the *International Code of Botanical Nomenclature*.

DISTRIBUTION

E. dolomiticus occurs (or perhaps more correctly, occurred) in the eastern Transvaal Drakensberg, where it is known from only a few sites. Here it was recorded in extremely rugged terrain. Miss van der Westhuizen found it in short grassland with scattered small trees, apparently always associated with dolomite outcrops, hence the specific epithet. There are no climatological data for this remote region; but judging from the vegetation the annual rainfall probably amounts to 600 to 800 mm, and occasional frost may occur in winter.

1. STEM

Well-developed, often suckering from the base, up to 2 m long and 250 to 400 mm in diameter, but mostly leaning or procumbent when longer than one meter (figure 3a).



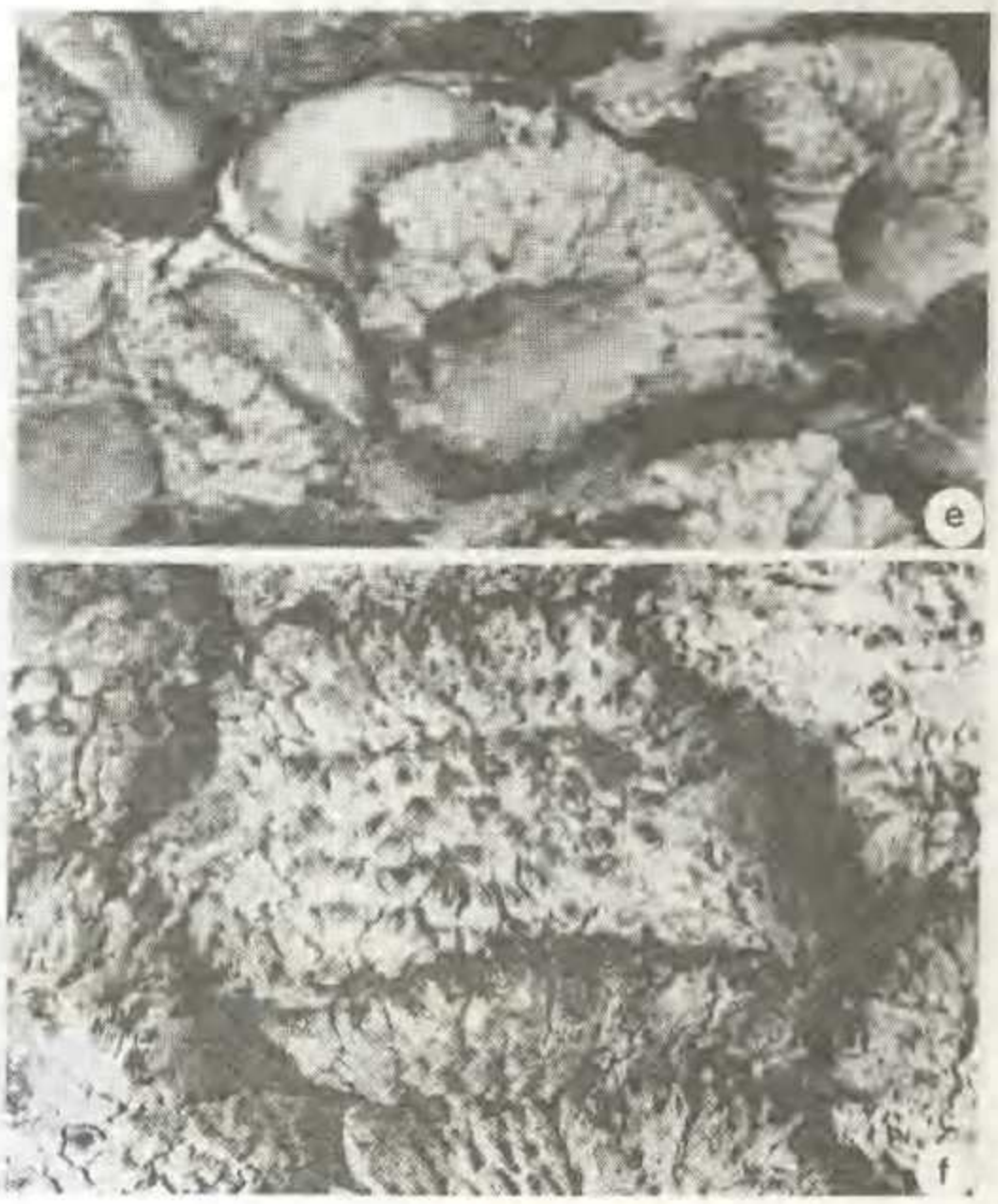


Figure 2 *Encephalartos dolomiticus*: (a) dried male cone, *ca.* 300 mm long excluding stalk (*Matthysen & Nitzsche 9b*); (b) female cone, probably prematurely picked and dried out, *ca.* 260 mm long (*Matthysen & Nitzsche 9c*); (c) fresh female cone, *ca.* 450 mm long (garden plant of indeterminate origin); (d) dried male cone scales showing surfaces drawn out into drooping lips, approximately life size (*Matthysen & Nitzsche 9b*); (e) immature and desiccated female cone scales, approximately life size (*Matthysen & Nitzsche 9c*) from (b) above; (f) fresh female cone scales showing fissured and verrucose surfaces, irregularly incised margins, and relatively large but poorly defined central facets, approximately life size [from (c) above]. Photos: a, b, d, e, S. van Jaarsveld/Botanical Research Institute; c, f, Suzelle van der Westhuizen.

2. LEAVES

The leaves are strongly glaucous ("blue"), straight but not very rigid (figure 3b) and sometimes spirally rotated around the axis to give the plant a rather untidy appearance. The petiole is about 120 mm long, and the complete frond about 800 mm. The leaflets (figure 1b) are directed towards the apex of the frond at an angle of about 45° with the rachis, with opposing leaflets set at an angle of about 90° to each other. The basal leaflets do not overlap, but the median and apical leaflets overlap so that the upper margins of the lower leaflets cover the lower margins of the leaflets in the direction of the apex of the frond, as seen from above. The lower leaflets are not, or only slightly, reduced in size towards the base of the frond (figure 1a). The median leaflets are very narrowly elliptic and slightly curved, tapering to both ends with the apices spinescent, the margins in mature plants having no spines, up to 170 mm long and 10 to 12 mm wide.

3. CONES

The male and female cones are very different in outward appearance. They are olive-green, and at a first glance they appear to be hairless, but when the cone scales separate when the cones fall apart, a dense hair coat around the margins of the scales become visible.

In mature plants up to three male cones per stem have been recorded (figure 4). These are very narrowly egg-shaped, 300 to 400 mm long and 60 to 100 mm in diameter, carried on a stalk which is about 80 mm long (figure 2a). The faces of the scales are drawn out into a conspicuous lip (figure 2d).

Up to three female cones per stem have been seen (figure 3b). These are egg-shaped, 300 to 450 mm long and 180 to 250 mm in diameter, apparently sessile but with an 80 mm long stalk hidden amongst the scale leaves at the apex of the stem (figures 2b, 2c, 5). Characteristically the female scale faces are conspicuously warty (figures 2e & f).

AFFINITIES

On account of of its glaucous fronds and geographical location in the Transvaal, this species is often confused with *E. eugene-maraisii*. There are, however, profound differences between the two species, as detailed below, and it is by no means a proven fact that it is all that closely related to *E. eugene-maraisii*.

On account of its stiff, glaucous fronds with spinescent leaflet apices, *E. dolomiticus* resembles not only *E. eugene-maraisii*, but also *E. dyerianus*, *E. lehmannii*, *E. middelburgensis*, *E. princeps*, and so some extent little *E. cupidus*, so that a trained eye is required to distinguish these species from each other when not in cone. Both *E. dyerianus* and *E. cupidus* are readily distinguished from *E. dolomiticus* by their very short or absent leafstalks, smooth female cone scale faces, and their male cone scale faces which are not drawn out

Figure 3 *Encephalartos dolomiticus*:(a) male plant in habitat, 17 km north of Penge (cf. *Richards s.n. sub PRE 32851*), photo: H.J. Richards; (b) cultivated plant of indeterminate origin bearing cluster of three female cones, photo: Mrs I. van der Walt.

into drooping lips. It differs from *E. middelburgensis* by its egg-shaped rather than cylindrical female cones (figures 2b & c, 3b, 5) of which the scale faces are warty (figures 2e & f) instead of smooth. *E. eugene-maraisii* and *E. lehmannii* differ from *E. dolomiticus* by their female cone scale faces having smooth faces, overlain to a greater or lesser extent with russet-brown hairs. The resemblance between *E. princeps* and *E. dolomiticus* is superficially much closer, both in the egg-like shape of the female cones and the warty surfaces of the female cone scales. The male cones of these two species also show some resemblance in that the scale faces are drawn out into a drooping structure, but in *E. princeps* it is a beak-like rather than a lip-like structure (figure 2d).

Collectors often claim that this species can be distinguished by its spirally twisted fronds, but this is not a feature of all plants (figure 3a).

Figure 4 *Encephalartos dolomiticus*: fresh male cones on a cultivated plant, 480 mm long. Photo: P. Vorster.

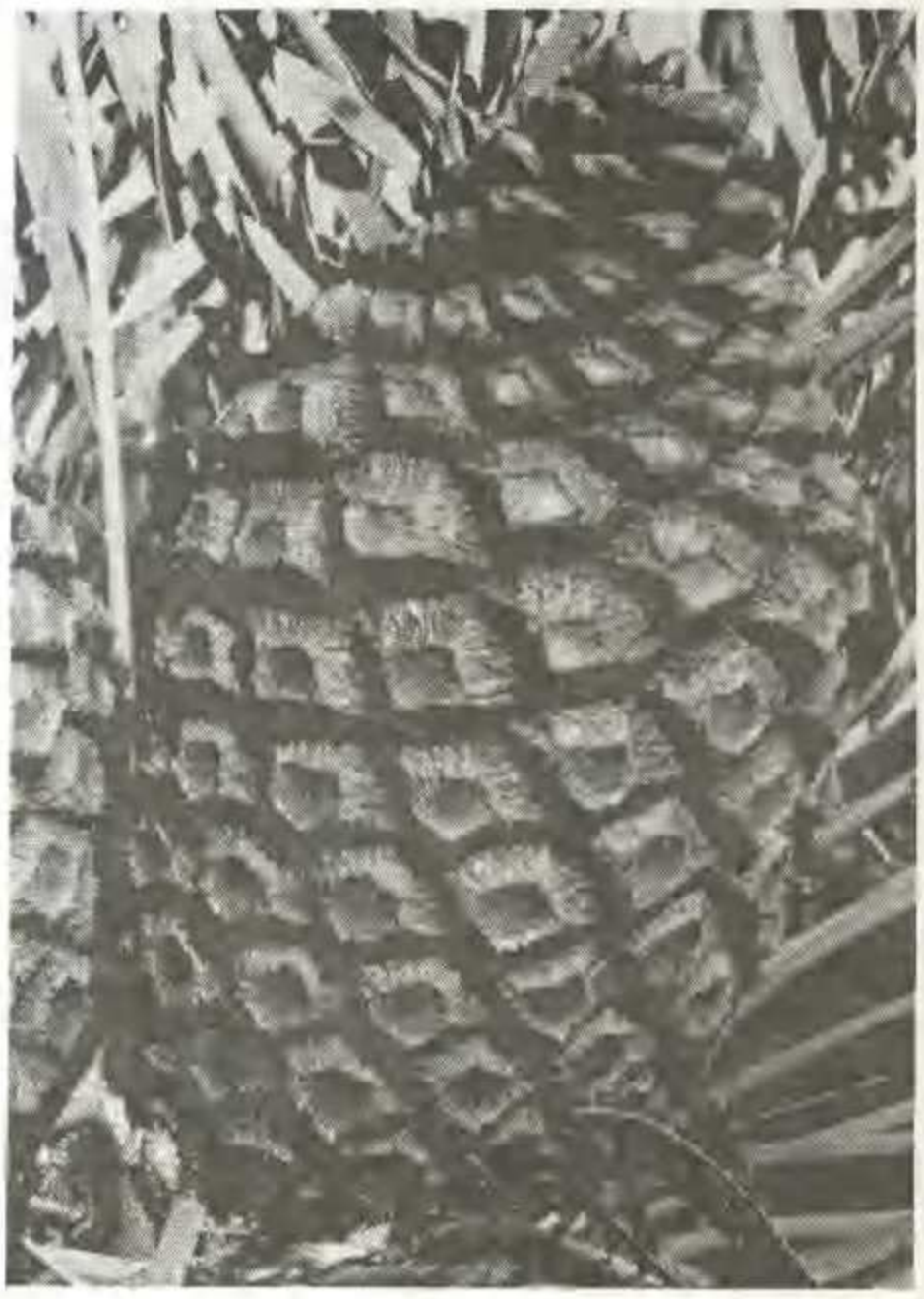


Figure 5 *Encephalartos dolomiticus*: female cone on a cultivated plant, 400 mm long. Photo: P. Vorster.

CONSERVATION

It seems as if this species never was plentiful, and that collecting has reduced it to near or complete extinction in nature.

Clearly this is an example of a species fighting for survival. The plants are much too valuable to be in private hands, scattered over the country and perhaps even abroad. Its only hope for survival is that all identified specimens should be brought together under the care of a body such as the National Botanical Institute, where a controlled breeding programme could be set up.

CULTIVATION

Very little information is available, but is seems as if this species is not a vigorous grower. Coming from a dry area, it is probably sensitive to over-watering, and transplantation either from the wild or from one garden situation to another is likely to be hazardous. It should always get as much direct sunlight as possible.

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PART OF THE PROMINENTLY-DISPLAYED CYCAD COLLECTION AT THE FAIRCHILD TROPICAL GARDEN. Photo: William Houghton

The evolution of a botanical garden collection: the cycads at Fairchild Tropical Garden

by Terrence Walters

Colonel Robert H.Montgomery's fascination with cycads began what was to become one of the world's largest and finest cycad collections. When Fairchild Tropical Garden opened in 1938, most of Colonel Montgomery's collections were represented by a single specimen. During that time, the focus of the plant collection was similar to that of other gardens and zoos around the world: to have a representative specimen of each species so that a "complete collection" of a group such as cycads could be displayed. Through the years, the demand from botanical gardens and cycad enthusiasts for seed from the extensive cycad collection at Fairchild Tropical Garden increased. Often the garden was and still is the only source of germplasm for certain species of this rare and unusual group of vascular plants. The great demands placed upon Fairchild Tropical Garden to provide germplasm changed the original focus of the cycad collection; it became necessary to acquire additional plants for each species so that seeds could be produced for distribution. Consequently, Colonel Montgomery's original collections were greatly augmented as a result of numerous worldwide collecting expeditions by scientists.

As times change, so does the focus of the cycad collection. During the latter half of this century, there has been increasing awareness that many plant species are at risk of becoming extinct. Approximately one-half of the 150 species of cycads are now considered endangered; many of these on the brink of extinction. Populations of the remaining species are considered vulnerable, rare, or their endangered status is still unknown. The number and size of populations of cycads have been drastically reduced because of habitat destruction and the increasing use of these plants as exotic ornamentals. Sadly, as a group, cycads are one of the least understood of all vascular plants.

Today, Fairchild Tropical Garden views itself as a resource centre for conservation, research, and education. Of the top 22 leading cycad gardens of the world (from a list recently compiled by Roy Osborne), Fairchild Tropical Garden ranks well towards the top with respect both to the diversity of taxa represented and the number of mature cycad plants in the collection. The garden has re-evaluated its cycad collection and has taken on the responsibility of conserving, both in nature and under cultivation, what remains of the morphological and genetic diversity of many cycad species. This new focus entails collecting plants from the wild that represent this diversity and maintaining them as healthy breeding colonies at the garden. These colonies are a means to an end and not an end in itself: they provide material for reintroduction into damaged habitats and depauperate populations as part of ecosystem management, for research and education, and new introductions into the nursery trade. They also take the pressure off of wild populations that would otherwise be subjected to collection by commercial horticulturists and cycad enthusiasts.

Note: An earlier version of this article was published in the April 1992 issue of *The Public Garden*.

Dr Terrence Walters writes from the Fairchild Tropical Garden, 10901 Old Cutler Road, Miami, Florida, 33156, USA.

THE CYCADS AT THE MUSEUM NATIONAL D'HISTOIRE NATURELLE, PARIS, FRANCE

by B. Du Puy & Y. Delange, Service des Cultures, M.N.H.N., 43 Rue de Buffon, 75005 Paris, France.

Introduction

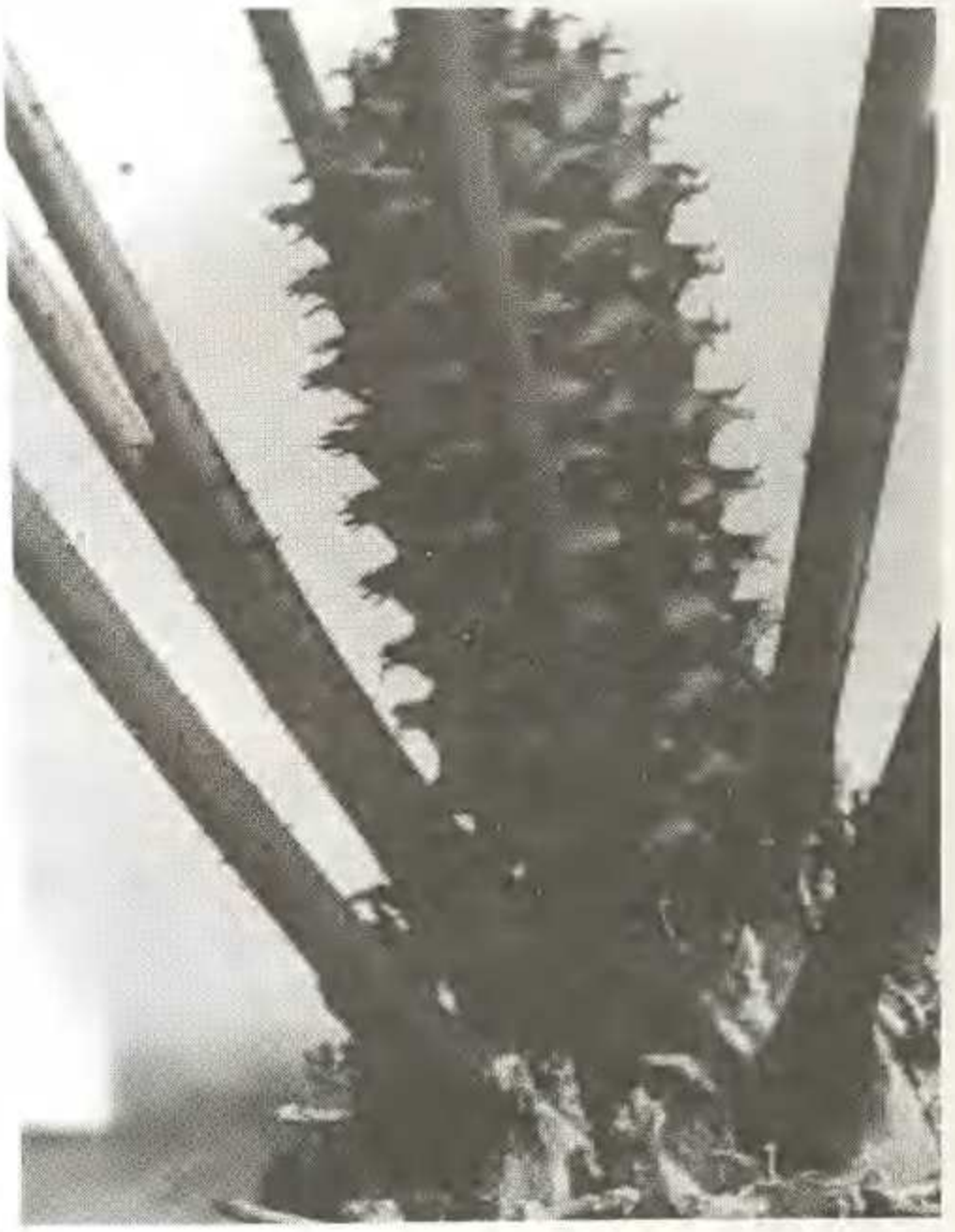
The Paris-based Museum National d'Histoire Naturelle comprises numerous scientific research laboratories and public display galleries. The living plants section of the Museum, known as the Service des Cultures, has developed from the Royal Medicinal and Herbal Garden created in 1636 by Guy de la Brosse, medical doctor to Louis XII. Today, due to the growing awareness of the importance of plants in living collections, the gardens serve the duel function of conservation and public education.

Cycad cultivation at the Jardin des Plantes

In Europe's temperate climate, with sub-zero temperatures possible for several weeks in winter, cycad cultivation requires the protection of a heated or frost-free glasshouse. The first metal-framed glasshouse or Winter Garden at the Jardin des Plantes, built by Rohault de Fleury in 1836, was to house the diverse and exciting collections arising from French exploration and trade. Restored in 1985, this glasshouse remains as a public tropical plant display house. Regrettably, records which detail plants grown in the glasshouse in the nineteenth century have been lost, but on the basis of similar collections of the time, we can guess at a wealth of orchids, palms, fruit trees and cycads.

The earliest documentation of cycad cultivation at the Jardin des Plantes is found in the Museum's collection of water-colour paintings on vellum. These include a painting by Gerard van Spaendonck, carried out between 1746 and 1822, of a plant in the collection named then as *Encephalartos caffer* (possibly *E. longifolius* since these two species were confused at the time). The vellums also included images of *Ceratozamia mexicana* by Alfred Riocreux, who painted for the Museum between 1843 and 1855, and *Macrozamia spiralis* by Louis Constans (1839-1853), both also of living plants in the collection. Written ledgers of plant accessions exist only from the 1930's. For example, a shipment of *Cycas circinalis* seeds sent from the Saigon Botanical Garden was accessioned in 1931 but only one plant was successfully produced. However, during the 1930's there are frequent references to seed accessions of *Cycas, Encephalartos* and *Zamia*. Unfortunately, not many of the seeds germinated.

With the 1939-1945 occupation of Paris, work at the Jardin des Plantes was reduced to a minimum.



This female specimen of *Ceratozamia mexicana* produced cones in 1975 and 1991. (Photo: Y. Delange).

Soon after the liberation of Paris, a particularly cold spell, when temperatures fell as low as -15°C, caused the loss of most tropical plants in the glasshouse.

The existing collection of Cycadales at the Jardin des Plantes includes representatives from *Cycas, Ceratozamia, Dioon, Encephalartos, Macrozamia, Microcycas, Stangeria* and *Zamia*. These plants have been obtained through the botanical garden system of plant exchange and from donations. For instance, large specimens of *Encephalartos lehmannii, E. latifrons* and *E. transvenosus* were given to the garden by the South African government after the International Flower Show held in France in 1964.

For cultivation purposes, all the cycads accessioned to the Jardin des Plantes are now housed in the new tropical glasshouses at the satellite arboretum of Chèverloup, outside Paris. These modern aluminium-frame houses cover a range of temperatures. Cycad seed is germinated (by the traditional method of placing seed uncovered on the soil surface) in the propagation house where the temperature is maintained between 24-28°C. Young plants are repotted, on production of the first or second leaf, into a general humus-rich compost mix. Subsequent placement of plants is determined by species requirement: the highveld species of *Encephalartos*, e.g. *E. laevifolius*, and the cool temperate plants like *Dioon edule* are grown in a cooler house where winter temperatures average 14°C and the plants are kept almost dry over this period. Over the summer months, larger plants are moved out of the houses into a sheltered full-sun position.

An unusual multiple-coning on a specimen of *Cycas revoluta*. (Photo: Y. Delange).

As a primary step towards contribution and involvement with national and international conservation projects, the accession details of the living plants in the garden are being transferred onto computer; taxonomic verification will be carried out as plants flower or fruit.

The specimen of *Encephalartos transvenosus* donated to the Jardin by the S.A. Government in 1964. It is kept under glass in winter and outside in summer. This female plant produced one cone in 1976 and two in 1992. (Photo: Y. Delange).

The Jardin has joined the international organisation of botanical gardens and parks, the Botanical Gardens Conservation International (BGCI), through which projects may be orchestrated. Following advice from BGCI, the computerised record system known as the International Transfer Format (ITF) has been adopted. This will facilitate the exchange of information on plants in collections, including details of their status and provenance, and should help to make *ex situ* plants dispersed throughout gardens and collections available to conservation programmes. As the pressure on gardens and *ex situ* collections increases due to costs and space restrictions, one of the criteria for selecting plants is the value of the plant or species in conservation programmes. Lack of source information, provenance details and cultivation or generation details associated with a plant, often reduces the value of a specimen in conservation programmes. This is particularly so when members of the species have been in cultivation for many years or if the species was originally geographically widespread. Further, if the species is short lived, frequent propagation may lead to erosion of initial genetic diversity due to artificial selection practices imposed by cultivation, and the real possibilities of hybridisation within collections if the material is not

maintained in isolation. This problem is only somewhat reduced for the Zamiaceae and Cycadaceae where there is the lamentable historical tradition of the collection of plants from their habitat and where individuals are long lived. Within the Cycadales, coning with seed production in cultivation is relatively unusual unless artificially assisted. Therefore plants produced from seed set in cultivation are true to species (or true to an intended hybridisation), albeit affected by artifically imposed selection pressures. The practice of vegetative propagation through the removal of offsets, however, can mean that a series of cultivated individuals are genetically similar. Plants of certain species for which no provenance details are recorded, e.g. *Encephalartos latifrons*, may still play a valuable part in *ex situ* conservation programmes. In this case we have a large plant which, given its slow growth rate, must be from natural source.

Some of the cycads in the collection:

African species:
Encephalartos bubalinus, E. laevifolius, E. latifrons, E. lebomboensis, E. lehmannii, E. transvenosus, E. villosus, Stangeria eriopus.

Asian species:
Cycas circinalis, C. neocaledonica, C. revoluta.

Australian species:
Cycas media, Lepidozamia hopei, L. peroffskyana, Macrozamia corallipes Hook.f. [? = *M. spiralis* (Salisb.) Miq.], *M. macdonnellii*.

Meso-American species:
Ceratozamia mexicana var. *latifolia* Schuster, *C. robusta* Miq., *C. zaragozae* Medellin-Léal, *Dioon edule, Microcycas calocoma, Zamia latifolia* Lodd.

A specimen donated to the garden in 1964 under the name *E. cycadifolius* but subsequently identified seperately by Smit and Osborne as *E. laevifolius*. (Photo: Y. Delange).

Reprinted with permission from "Conservation News", Issue No. 1, Royal Botanic Gardens, Kew, Dec 1991.

What is CITES and how does it work?

The Convention on International Trade in Endangered Species of Wild Fauna and Flora entered into force on 1 July 1975. 113 States are now party to the Convention, which has been described as "perhaps the most successful of all international treaties concerned with the conservation of wildlife".

The basic principles of CITES can be put simply - to control and monitor international trade in endangered and threatened species. The Convention establishes the international legal framework for such monitoring and control, providing the legal basis for co-operation between producer and consumer. The co-operation of the producer and consumer is essential for the conservation of species traded from the wild.

The Convention operates by means of a licensing system. At the core of the Convention are three appendices - in effect three species lists. Appendix I includes those species of animals and plants in which, with a few exceptions, trade in wild specimens is prohibited. International trade is allowed, subject to licensing, in artificially propagated or captive bred specimens of Appendix I plants and animals. Appendix II includes those species whose survival is not yet threatened but may become so. Here trade is allowed in both wild and artificially propagated or captive bred specimens - subject to licensing. Appendix III acts as a support mechanism to domestic legislation, where countries ask other parties to monitor trade in taxa not listed on Appendix II or Appendix I.

The parties to the Convention meet every two years to review the workings of the Convention, and vote on such matters as amendments to the Appendices of the Convention. The last Conference of the Parties was held in Lausanne in October 1989. That Conference was the most controversial to date with a heated debate on uplisting of the African elephant from Appendix II to Appendix I - the proposal to ban international trade in African ivory. The growing importance of the Convention was reflected in the attendance at the Conference of more than 300 delegates from 94 of the then 103 parties, some 500 observers (from 150 non-government organizations) and over 100 journalists, including crews from 16 television networks! Among the botanists present, the heated debate centred on the uplisting of Asiatic and South American slipper orchids to Appendix I, the first major commercial group of orchids, to be listed on Appendix I - banning their trade from the wild. The listing of the bulb genus *Galanthus* on Appendix II also gave rise to a lengthy debate.

The administration of the Convention is based on the requirement that signatories to CITES (Parties) should designate Management Authorities and Scientific Authorities. For example, the principal Management Authority in the United Kingdom is the Endangered Species Branch of the Department of the Environment. It deals with the management area of the Convention in Great Britain, covering licensing, general UK CITES policy and liaison with the two Scientific Authorities (The Joint Nature Conservation Committee is the UK Scientific Authority for animals), H.M. Customs and Excise and the CITES Secretariat. The Scientific Authorities supply the scientific information necessary for the operation of an effective licensing system and the scientific data and background required for informed policy making.

Overseeing the operation of the Convention is the CITES Secretariat based in Switzerland. As the Convention has matured, it has become more complex, with the addition of new taxa to the Appendices and the establishment of recommended methods of operation. Over 150 Resolutions have now been adopted and the combined Conference Proceedings exceed 6,000 pages!

THE CITES PLANTS OFFICER

The implementation and enforcement of CITES for plants took a major step forward in 1990 with the appointment of a CITES Plants Officer. The implementation of CITES for plants has always lagged considerably behind that for animals. The appealing image of cuddly animals always strikes home first! The fate of a rare habitat-collected cactus does not tug so dramatically at the heart strings - no cacti are cuddly! Dr Ger Van Vliet was seconded by the Government of the Netherlands to the CITES Secretariat early in 1990. Dr Van Vliet, former Scientific Director of Leiden Botanic Gardens has already had considerable success. His non-stop travels on an education and awareness programme has earned him the title of the "Flying Dutchman"!

The future

One of the problems with CITES in its application for plants, is ensuring that the control and regulation of trade in wild plants can take place with minimum effect on international movement of artificially propagated CITES plants. This is a dilemma that remains to be effectively resolved. The unscrupulous trader seeks to pass off habitat collected material as artificially propagated, while the scrupulous nurseryman trading in high quality artificially propagated material - material that takes pressure off wild populations - struggles with the paperwork. This is an area that cannot be ignored but must be addressed by expansion of nursery registration schemes which are effectively monitored. Registration of nurseries is one area that CITES will deal with at the 8th conference of the Parties in Japan in March 1992.

This decade will be critical in the continued development of CITES as a potent conservation tool for plants. The mechanism is in place; we must make it work effectively for the conservation of plant resources.

For further information on the role of the CITES Plants Committee contact Noel McGough, Conservation Unit, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, UK. Telephone 081-940-1171, Fax 081-332 0920, Telex 296694 KEWGAR.

MEXICAN CYCADS - 1991

by Knut Norstog and Priscilla Fawcett

Andrew Vovides has mentioned the sad plight of many species of Mexican cycads in the pages of this publication and has detailed some of the problems he has encountered in his assessments of the cycad situation in the major locales for many of these species (Vovides, 1989). We have not had the opportunities for almost daily encounters with the Mexican species that Andrew has enjoyed over the years, but we have, of course, a keen interest both in the biology of the Mexican genera and species and, even more importantly, their conservation. Mexico shares with Australia and South Africa the status of a major region of cycad diversity and thus, from Chamberlain's day onwards, has attracted the attention of many botanists from all parts of the world. We are no different and recently had the opportunity to spend about a month working with Andrew in his laboratory at INECOL (Instituto de Ecologia) in Xalapa, Veracruz.

Xalapa is in many ways ideal for the study of cycads. Populations of *Ceratozamia*, *Dioon* and *Zamia* are within a half-day's drive of this city of around one million inhabitants, and that may actually be part of the problem when it comes to conserving cycads. In Chamberlain's day Xalapa was much smaller, and if one wished to observe wild cycads one went by rail when possible and then travelled to more remote sites by horse and/or burro. We have often been intrigued by Chamberlain's description of his encounters via horse and foot with some of the more romantic-sounding locales. One that particularly strikes us is the following: "With directions furnished by Governor Dehesa, I found *Dioon edule* in great abundance at Chavarillo, a small station on the International Railway about an hour's ride east of Jalapa" (Xalapa). "Between the *Dioon* locality and Jalapa lies a wonderful region for botanical study. The forest is dense and varied. Ferns cover the ground and hang from trees, while magnificent tree ferns with trunks twenty and thirty feet high and leaves ten or fifteen feet long are not uncommon. The great coffee plantations of the Arbuckles give only a hint of its agricultural possibilities."

In April, 1991, Priscilla and I drew up to the station (Fig. 1) in Chavarillo in

Figure 1. The railway station at Chavarillo as it is today, little altered from Chamberlain's visit in 1904.

our Chevy pickup and descended for a brief inspection. Except for the ubiquitous Fanta and Coca Cola signs over the little shop across the tracks, we doubt any progress toward urbanization has taken place in the past 80 years -- perhaps even Coca Cola was on sale the hot July day Chamberlain stopped off. He immediately found dense stands of *Dioon edule* in the nearby foothills, then no doubt relatively undisturbed by slash and burn. A few miles away, on the steep, heavily wooded slopes near Naolinco, *Ceratozamia mexicana* flourished then as now. On this day in mid-April, we had arrived soon after the spring burning of pastures and woodlands. A few bedraggled specimens of *Dioon* were found, most showing varying degrees of fire damage (Fig. 2). It is our observation that a myth of cycad invulnerability to fire still persists. We think this is deplorable for, although many

Figure 2. A surviving specimen of *Dioon edule* in which regeneration of a rather puny shoot can be seen. Andrew Vovides estimates such specimens as these to be at least several hundred years old.

Figure 3. Priscilla holds a handful of thoroughly baked seeds of *Zamia loddigesii*.

cycads are fire-tolerant, which is quite another thing, some damage almost always occurs, especially if the fire is hot. We found roasted seeds, dead seedlings, and in older plants, damaged shoot tips and badly scarred trunks. Even though cycads can survive fire, we doubt very much if in most circumstances fire can be considered beneficial. True, nutrients are released by burning, but frequent burning completely destroys the humus, and leaves surviving plants existing on a purely mineral substrate. Both soil and vegetation had been badly damaged at the cycad sites at Chavarillo (Figs. 2, 3). We have recently been told by W. B. K. Holmes, an Australian geologist and palaeobotanist, that it takes nine years for nitrogen to reaccumulate following burning in similar habitats in Australia. Moreover, bursts of reproductive activity following a fire are more often than not a stress response which is quite familiar to fire ecologists, and not necessarily evidence of a beneficial effect. (Just after writing this, I read Roy Osborne's interesting but sad account of the stripping off of the trunks of *Encephalartos natalensis* by "muthi" collectors in the Elandskop area. Priscilla

interjects her suspicion that the "muthi men" may subscribe to the same superstition that fostered Lorenzo dei Medici's dependence on crushed pearls in wine for his gout -- the destructive use of something very valuable must certainly be powerful medicine! The destruction of these magnificent plants is a worldwide tragedy! However, what struck me most was Roy's statement that a prodigious coning follows on the heels of lethal or near-lethal damage to a mature individual cycad. I suspect similar episodes may be responsible for reports of the "beneficial" affects of certain actions by agronomists, range managers and sylviculturalists.)

Andrew, Priscilla and I had hoped to find enough coning individuals of *D. edule* to observe active populations of snout weevils, possibly *Rhopalotria bicolor*, which Andrew believes to be at least one of the pollinators of *Dioon*. It was not to be; we found just two individuals of *Dioon* with cones but these were from the preceding season, and none from the current year.

A far different picture was presented to us by several students of Mario Vazquez-Torres who took us to a large population of more than a thousand individuals of *Ceratozamia mexicana* distributed throughout an area of perhaps 10 hectares. (It will be recalled by some readers that Mario is a Professor at the University of Xalapa and is well known for his studies of cycad populations.) This population owes its survival to its existence on an almost vertical hillside some miles from Xalapa.

Mario's students were engaged in studying the pollination of *C. mexicana* by a species of *Pharaxonotha* beetle. There seems little doubt that this cycad is insect pollinated and ongoing exclusion experiments of one kind or another probably will bear this out. Unfortunately for the long-term, or even short-term survival of this population, the owner of the land was said to be negotiating its sale to a timber company. I asked what the land would sell for and was told about a million pesos per hectare (perhaps $350 per ha.). Thus for about $7,000 an absolutely marvelous population of *Ceratozamia* could be preserved.

Unfortunately for our purposes, Mario's *Ceratozamia* population stood in contrast to a rather dismal outlook so far as some other cycad populations we were able to visit during our trip. We have had a long interest in pollination of *Zamia furfuracea* and wanted to see some more-or-less undisturbed populations along the coast of the Gulf of Mexico in southern Veracruz. Andrew was not able to go with us on an excursion to some *furfuracea* locales but Jorge Alejandre-Rosas was an able substitute. As we drove south from Veracruz City along the coast, we stopped from time to time to look for the cycad. In several spots we did indeed find *furfuracea* but the populations were sparse and consisted mostly of a few individuals growing amidst grazing livestock in closely cropped pastureland (Fig. 4).

Figure 4. Pastureland south of Veracruz, about 10 km inland from the Gulf of Mexico. Plants of *Zamia furfuracea* survive here and there amidst severely overgrazed habitat. These individuals have less leathery leaves than those on the coastal dunes (cf. fig. 5).

We continued on towards the Gulf of Mexico in 4-wheel drive following some narrow trails into a region of coastal dunes. Even here we saw evidence of burning and damaged habitat, but as the trail became more and more difficult we reached a region near the shore where the vegetation seemed relatively undisturbed. Here we saw some beautiful clumps of pure, salt-tolerant *furfuracea* (Fig. 5).

Figure 5. A clump of *Zamia furfuracea* growing in pure sand in the midst of a thornscrub habitat. The Gulf of Mexico is perhaps a half kilometer distant. This ecotype has very thick, broad, grey-green leaflets. It is the form of Z. *furfuracea* called "Cardboard Palm" in the Florida nursery trade.

We think there are at least three ecotypes of *Zamia furfuracea*: the first is the dune form (Fig. 5) with thick, pubescent leaflets, sold in the nursery trade in Florida under the unimaginative name "Cardboard Palm;" a second is an inland form that has somewhat narrower and less glaucous and coriaceous pinnae (Fig. 4). This is the ecotype often distributed internationally by collectors and nurseries and the one we studied at Fairchild Tropical Garden in our investigations of insect pollination. A third ecotype with relatively thin leaflets is seen in mesic habitats and may, in fact, interbreed with *Zamia loddigesii*. In our interpretation of the nature of these populations we follow Turesson (1922) who formulated the concept of an ecotype as an ecologically adapted genotype within a species. When such ecotypes from different habitats are brought together and grown under uniform conditions, as in a botanic garden, their distinctive characteristics remain relatively unchanged. The concept was further elaborated by Clausen, Keck and Heisey in California (1948).

To stir up the flames of controversy a bit, we might add that it is not unlikely that a number of cycad "species" probably are ecotypes, not differing conceptually from those of the *Z. furfuracea* complex we have just alluded to.

A few days before our departure, we drove down with Andrew toward the city of Veracruz to the biological station at La Mancha operated by INECOL mainly for the study of coastal ecology. The station is quite attractive with modern facilities including a sizable dining hall and well-designed quarters for investigators and others. Andrew took us a short distance into the nearby mangrove zone where he had established some rescued specimens of *Zamia inermis* that he had transplanted from a nearly collected-out wild population. The plants were doing rather well and we found evidence of the activities of a *Rhopalotria* in several pollen cones. The specimens were not numerous enough to be used in a serious pollination study but suggested the possibility that the plants might be augmented through further rescue operations and employed in future research projects.

Our main reason for visiting La Mancha was to look at a sand-dune population of *Dioon edule* which Andrew had been keeping under surveillance. We plodded a considerable distance along the Gulf shore and finally worked our way

through shifting sands and thornscrub to where a nice clump of mature specimens of this cycad had survived for centuries despite hurricanes, saltspray and drifting sands (Fig. 6). What the future holds for such isolated populations is anybody's guess, but without some kind of effective protection long-term survival is doubtful.

Figure 6. A very old *Dioon edule* survives on a dune by the shore of the Gulf of Mexico.

We found time to drive a way into the next state, Oaxaca, to see a beautiful population of quite ancient trees of *Dioon spinulosum* (Fig. 7). They were truly magnificent, many being 5-8 meters tall and bearing mature cones. We did not do more than take a few photographs, reserving a more critical inspection for another time. Unfortunately the forest adjacent to these remarkable survivors was even then being clear cut. We would like to think someone will realize what a priceless heritage for Mexico and for the world these majestic specimens are, but those considerations don't seem to weigh very heavily against the short-term gain of a few pesos and another bit of submarginal pasture.

One dislikes to inject so much gloom into what should be a tale of exciting exploration, and we can't help think of Chamberlain's rosy vision of spreading coffee plantations. Little did he know that one day, these plantations would nearly wipe out his "forest of cycads."

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Figure 7. Priscilla Fawcett stands next to a large specimen of *Dioon spinulosum* in a somewhat degraded moist woodland in the State of Oaxaca, Mexico.

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Vovides, A. P. 1989. Problems of endangered species conservation in Mexico: cycads as an example. *Encephalartos* No. 20 (December): 29-35.

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CYCAD 93 UPDATE

With almost exactly one year to go before the CYCAD 93 Conference in Pretoria, the organizing committee report a very satisfactory preliminary response. Already well over 100 people have "signed-up", including a keen delegation of 32 Australians, 24 Americans, 53 South Africans and a sprinkling of delegates from Holland, Italy, England, Belgium, Spain, Germany, China and Indonesia. Over 60 delegates have expressed interest in going on each of the field trips and, at this stage, some 30 lecture and 25 poster presentations are being planned.

With this early enthusiasm, the Conference is undoubtedly going to be "the best so far".

Further announcements will be made in this magazine. Enquiries may be made to any members of the Organizing Committee [Nat Grobbelaar, Roy Osborne, Cynthia Giddy, Piet Vorster, Bob Ornduff (USA) and Ken Hill (Australia)].

Address for general enquiries:

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NEW SCIENTIFIC REPORTS

New cycad-related reports which have appeared in the scientific literature are:

***Pellmyr, O., Tang. W., Groth, I., Bergstrom G. and Thiens, L.** 1991. Cycad cone and angiosperm floral volatiles: inferences for the evolution of insect pollination. *Biochemical Systematics and Ecology* **19:** 623-627.
[*Author's address: Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006, USA.]

Stevenson, Dennis Wm. 1991. The Zamiaceae in the Southeastern United States. *Journal of the Arnold Arboretum, Supplementary Series* **1:** 367-384.
[Author's address: New York Botanical Garden, Bronx, New York, 10458 USA.]

Stevenson, Dennis Wm. 1992. A formal classification of the extant cycads. *Brittonia* **44(2):** (in print).
[Author's address: as above.]

Caputo, P., Stevenson, Dennis Wm. and Moretti, A. 1992. Sharpening Occam's Razor: an attempt to apply parsimony to competing hypotheses. *Brittonia* **44(3):** (in print).]
[Author's address: as above.]

VILLOSUS : FOR SALE

Approximately 50 large clumps of *Encephalartos villosus* are offered for sale by the Durban Botanic Gardens. These plants are being moved as part of the Cycad Garden re-organization. The plants are ideal as feature specimens in any garden landscaping project. Prices are by negotiation with the Curator, Durban Botanic Gardens, tel. 031-211303.

SUSPECTED CYCAD *(CYCAS REVOLUTA)* INTOXICATION IN DOGS

C J BOTHA*, T W NAUDÉ*, G E SWAN*, MARCELLA M ASHTON* and J F VAN DER WATEREN*

ABSTRACT

Three dogs which ingested part of the stem of a Japanese cycad *(Cycas revoluta)* vomited repeatedly within hours after ingestion, showed marked depression, severely congested mucous membranes, increased thirst and profuse salivation. Subsequent haematological and blood chemical investigation revealed elevated serum concentrations of alanine transaminase, an initial mild lymphocytopenia, thrombocytopenia and a leucocytosis. The dogs recovered uneventfully.

Key words: *Cycas revoluta,* Japanese cycad, dogs, cycad poisoning, vomition, hepatotoxicity

Botha C.J.; Naudé T.W.; Swan G.E.; Ashton M.M.; Van der Wateren J.F. **Suspected cycad *(Cycas revoluta)* intoxication in dogs.** *Journal of the South African Veterinary Association* (1991) 62, No. 4, 189-190 (En.) Depart-ment of Pharmacology and Toxicology, Faculty of Veterinary Science, University of Pretoria, Private Bag X04, 0110 Onderstepoort, Republic of South Africa

Cycads belong to the order *Cycadales* of which 3 families are recognised: Cycadaceae (with one genus: *Cycas*); Stangeriaceae (with only a single species: *Stangeria eriopus* (Kunze) Nash) and Zamiaceae (with 8 genera, including *Encephalartos, Zamia* and *Dioon,* amongst others)[6 10]. The indigenous cycads of southern Africa are *S. eriopus* and 28 species of *Encephalartos*[6 10].

In South Africa members of the genus *Encephalartos* are also known as "broodbome" (literally bread trees), Hottentot- or Kaffirbread[1 10]. The indigenous tribes used the starchy pith from the stems or trunks of *Encephalartos* species to bake bread. The pith was removed from the stem, wrapped in an animal skin and buried in the ground for a period of a month or 6 weeks to induce it to ferment partially[1 10 12]. The fibrous mass was then ground to a flour (meal or sago), mixed with water to a paste and finally baked or roasted[1 10 11 12]. Detoxification is probably due to fermentation and water-solubility of the toxin[10].

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The cycads are popular garden shrubs in South Africa, but due to strict nature conservation regulations to protect the indigenous cycads, the exotic cycads are frequently planted as substitutes. A further advantage of these exotic species is that they grow faster than the indigenous varieties.

The earliest and most well-known record of cycad toxicity occurring in South Africa was reported by Reitz[7]. He accounted his experiences in the eastern Cape Province during the Anglo-Boer war (1899-1902) after the hungry Boer soldiers ate the fruit (cone) of the "Hottentots bread" (*Encephalartos altensteinii*): "I had not eaten any, and returning to the firing-line, after going to tie up some horses that had broken loose, I was astonished to find more than half our men groaning and retching on the ground in agony, some apparently at their last gasp....." Dyer states that the species most likely to have caused this particular outbreak was probably *E longifolius* (Jacq.) Lehm.[1].

Wells as cited by Dyer (1966)[1] (and personal communication 1991; Botanical Research Institute, Pretoria) reported the death of 2 head of cattle in the Riebeeck-East district of the eastern Cape Province in 1965. The autopsies by Rossiter (State Veterinarian, Regional Veterinary Laboratory, Grahamstown, 1965) showed that the forestomachs contained many seeds of *E. longifolius.*

Cycad or zamia poisoning in cattle and sheep in Australia is well known and has been reported widely[3 4]. There are 2 distinct syndromes, viz: acute severe gastro-intestinal disturbance and liver necrosis; and chronic partial paralysis. In cattle the latter is better known and is caused by degenerative lesions in the spinal cord that lead to posterior ataxia, commonly known in Australia as "wobbles", "rickets" or "staggers"[2 3 4 12].

Nishida, Kobayashi and Nagahama as cited by Laqueur & Spatz[5] isolated an azoxyglycoside from the seeds of *Cycas revoluta* (Thunb.) and named the compound cycasin. Later the same group isolated new azoxyglycosides from *C revoluta* and named them neocycasins. Yagi & Tadera[13] determined the azoxyglycoside contents in various parts of *C revoluta* and reported that the pith contained slightly less cycasin than the seeds on a percentage fresh weight basis. After ingestion, intestinal bacteria enzymatically convert cycasin to the hepatotoxic and carcinogenic aglycone, methylazoxymethanol (MAM)[9]. MAM is the common aglycone of all the different azoxyglycosides isolated from various cycad species[2].

The only published report that we could find of cycad intoxication in dogs, is the article published by Senior et al[8]. Two dogs in Florida (USA) ingested seeds of *Zamia floridana* and died. Both dogs vomited persistently, and developed severe liver necrosis followed by icterus and a haemorrhagic syndrome.

Recently we investigated a suspected case of cycad poisoning in dogs after they ingested parts of the stem of *Cycas revoluta* (Thunb.).

Three Bull Terriers, a 3-year-old bitch and 2 of her offspring (a dog and bitch, 16 months old), uprooted and destroyed a potted exotic cycad, *C revoluta* (Thunb.) (Fig. 1). They tore off the leaves and chewed at the 30 cm diameter, fibrous stem and ingested an unknown quantity of plant material. Shortly after ingestion, the old bitch started vomiting. The male subsequently, ingested the vomitus (containing plant material) and then also started showing signs of nausea and vomited repeatedly. The other female started vomiting within an hour of ingesting the material. The dogs then became depressed and prostrated. They all salivated profusely and drank water repeatedly.

Four hours after exposure, the dogs were presented to the Department of Pharmacology and Toxicology, Faculty of Veterinary Science, University of Pretoria. On clinical examination, both

Fig. 1: **An example of *Cycas revoluta*, Japanese cycad or sago palm**

females were markedly depressed and the mucous membranes of all the dogs were severely congested. Although all the dogs had slightly elevated temperatures, we concluded that this was probably caused by transport during the heat of the day. The respiratory and heart rates were within normal limits. All 3 dogs were treated with magnesium sulphate (Elvet Epsom Salts, Elvet) as a laxative and were taken home.

The next day all 3 dogs were moderately depressed and their mucous membranes were still congested. The older bitch exhibited a tender abdomen on palpation. During the following days their habitus and colour of the mucous membranes returned to normal and they all made an apparently uneventful recovery. The young female showed proestrus 18 d after exposure and was later successfully mated. On Day 31 of gestation, pregnancy was confirmed by sonar scanning. On Day 60 of gestation one stillborn puppy with a cleft palate was born.

Haematological and blood chemical investigations revealed elevated serum concentrations of alanine transaminase (ALT), an initial mild lymphocytopenia, thrombocytopenia and a leukocytosis.

Increases in the serum concentration of ALT and in the total white blood cell count were the most prominent changes observed in all dogs. An increase in immature neutrophils and a mild lymphocytopenia and thrombocytopenia, in the female dogs only, also occurred. The haemoglobin and mean corpuscular haemoglobin concentrations and monocyte counts showed only slight deviations from the norm.

Morton as cited by Senior et al[8] observed vomiting, lethargy, anorexia and increased thirst beginning 2 h after a dog had ingested seeds of *Dioon edule*. All clinical signs disappeared within 12 h and no complications were reported[8]. Following ingestion of parts of the stem of *Cycas revoluta*, severe vomiting and prostration occurred, but was not fatal in this case and the dogs made an uneventful recovery. The conception and birth of a still-born puppy with a cleft palate to the young bitch subsequent to exposure, is probably incidental. In view of the known carcinogenicity of this plant family, the exposed dogs will be closely observed for possible future development of neoplasms.

The rise in serum ALT concentration encountered is indicative of possible liver necrosis and is consistent with that reported by Senior et al[8]. The increases in the white blood cell counts with the neutrophil left shift could denote an inflammatory reaction and was also reported by the same authors. In addition they also described a severe coagulopathy with thrombocytopenia and a lymphopenia[8]. In this case the 2 females also developed an initial mild thrombocytopenia and lymphopenia.

ACKNOWLEDGEMENT

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1992 SAAB CONFERENCE

The 18th Annual Congress of the **South African Association of Botanists** was held at the University of Durban-Westville over the period 13-17 January 1992. Some 250 delegates delivered about 100 lectures and about the same number of posters was exhibited. Amongst the delegates, we were pleased to welcome several overseas representatives, including Philip Ladd and his wife from Western Australia, who we met previously at the CYCAD 90 Conference.

Cycad interests were represented by the following. **Wayne Boyd** and **Steve Fourie** of the Transvaal Directorate of Nature and Environmental Conservation presented a lecture illustrating their work on assessing the conservation status of Transvaal cycads. **John Donaldson** from Kirstenbosch delivered a lecture on masting in cycads (the cycle of "good" years of reproductive effort interspersed with non-reproductive years) in relation to insect-induced seed mortality. In addition he displayed a poster on the interaction between cycad habitat change and insect activities. **Roy Osborne** (University of Natal), **Hannes Robbertse** and **Isabella Claassen** (University of Pretoria) presented the results of their four years of investigations into storage of pollen from *Encephalartos* and *Cycas* (see ENCEPHALARTOS 28: 10-13).

The conference ended with a formal meeting at which **Nat Grobbelaar** was presented the prestigious SAAB Gold Medal for Botany for his many and varied contributions to South African botany (see ENCEPHALARTOS 27: 12). Another distinguished award was that of the SAAB Certificate of Merit, which on this occasion was presented to **Tony Abbott** in recognition of his work in plant conservation (see ENCEPHALARTOS 27: 17-19).

A number of delegates attending the SAAB meeting have expressed their interest in attending the CYCAD 93 Conference in Pretoria.

Nat Grobbelaar, President of the Cycad Society, receiving the meritorious Gold Medal for Botany from Professor G.J. Bredenkamp, President of SAAB, at a formal occasion at the end of the SAAB Conference (Photo: R. Osborne)

Bryan Laughland of Auckland New Zealand sent in the photograph above of a Macrozamia moorei which he took growing in habitat near the town of Springsure Central Queensland.

The cycad is locally known as the "Zamia Palm" and it seems like this name has rubbed off on some of the businesses of Springsure as can be seen from the other 2 photographs below.

A FORMAL CLASSIFICATION OF THE CYCADS

The classification of the extant cycads proposed by **Dennis Stevenson** in 1990 (*Memoirs of the New York Botanical Garden* **57: 8-55**) has been formalised by Dennis in a publication dedicated to the memory of Sergio Sabato (*Brittonia* **44(2):** in press). The classification places the 11 genera and 3 families in a hierarchical structure based on cladistic analyses of morphological, anatomical, karyological, physiological and phytochemical data, and is summarised by the following diagram:

Order: Cycadales

Suborder: Cycadineae

Family: Cycadaceae

Genus *Cycas*
[Type: *C. circinalis* L.]

Suborder: Zamiineae

Family: Stangeriaceae

Subfamily: Stangerioideae
Genus: *Stangeria*
[Type: *S. eriopus* (Kunze) Baillon]
Subfamily: Bowenioideae
Genus: *Bowenia*
[Type: *B. spectabilis* Hook. ex Hook. f.]

Family: Zamiaceae

Subfamily: Encephalartoideae
Tribe: Diooeae
Genus: *Dioon*
[Type: *D. edule* Lindley]
Tribe: Encephalarteae
Subtribe: Encephalartinae
Genus: *Encephalartos*
[Lectotype: *E. friderici-guilielmi* Lehmann]
Subtribe: Macrozamiinae
Genus: *Macrozamia*
[Lectotype: *M. riedlei*(Fischer ex Gaudichaud) C.A. Gardner]
Genus: *Lepidozamia*
[Type: *L. peroffskyana* Regel]

Subfamily: Zamioideae
Tribe: Ceratozamieae
Genus: *Ceratozamia*
[Type: *C. mexicana* Brongn.]
Tribe: Zamieae
Subtribe: Microcycadinae
Genus: *Microcycas*
[Type: *M. calocoma* (Miquel) A. DC.]
Subtribe: Zamiinae
Genus: *Zamia*
[Type: *Z. pumila* L.]
Genus: *Chigua*
[Type: *C. restrepoi* D. Stevenson]

1991-1992 WORLD CYCAD CENSUS : NEWS AND PROGRESS

Work continues by Roy Osborne on the 1991-1992 World Cycad Census. The number of local and international private collectors who have recently sent in inventories of their collections are warmly thanked for their co-operation. (Further responses are still very welcome). The inventories of the world's major public gardens are nearing completion and a preliminary data-processing run has lead to the generation of the Table below.

Interesting features are that the Orto Botanico at Naples has the "best" cycad collection in terms of plant diversity, and also the most comprehensive representations of American and Australasian species. Ewanrigg Gardens in Zimbabwe has the widest spectrum of *Encephalartos* species. The greatest number of plants is to be found at the Lowveld Botanic Gardens at Nelspruit, largely due to their important initiatives in creating and extending the cycad "seed orchards". The complete world Cycad Census report will be presented at the forthcoming CYCAD 93 Conference.

TABLE 1 :LEADING CYCAD GARDENS OF THE WORLD

Name of garden or institution	Number of taxa represented	Number of American taxa	Number of African taxa	Number of Australasian taxa	Number of mature specimens
Orto Botanico, Naples, Italy	106	45	30	31	758
Royal Botanic Gardens, Kew, England	81	29	28	24	239
Fairchild Tropical Garden, Miami, USA	65	33	18	14	634
Ewanrigg Garden, Harare, Zimbabwe	64	16	37	11	516
Huntington Botanic Gardens, California, USA	56	20	20	16	200
Los Angeles Arboretum, California, USA	48	14	20	14	264
Durban Botanic Gardens, South Africa	40	3	32	5	350
Missouri Botanic Garden, USA	36	10	17	9	71
Lowveld Botanic Gardens, South Africa	33	2	31	-	884
Darwin Botanic Gardens, Australia	32	9	3	20	?
Pretoria University Garden, South Africa	31	1	28	2	106
Royal Botanic Gardens, Sydney, Australia	30	-	5	25	138
Kirstenbosch Botanic Gardens, South Africa	29	-	29	-	595
Royal Botanic Garden, Edinburgh, Scotland	29	6	12	11	49
Adelaide Botanic Garden, Australia	27	3	10	14	67
Munich Botanic Garden, Germany	25	8	12	5	35
San Diego Zoological Garden, USA	23	11	6	6	79
Queen Elizabeth Park, South Africa	22	-	22	-	134
Natural Botanic Garden, Meise, Belgium	21	5	9	7	84
National Botanic Garden, Pretoria, South Africa	19	-	19	-	132
National Botanic Garden, Glasnevin, Ireland	19	4	8	7	30
Rockhampton Botanic Garden, Australia	17	3	-	14	212

Note: Only reproductively mature plants (or plants of potentially reproductive age) of established identity as pure species and present in public gardens, are included in these statistics. While every effort has been made to check the quality of the information supplied, the author cannot guarantee the validity of all data.

THE CYCAD SOCIETY OF SOUTHERN AFRICA

Income and expenditure Statement for year ending 1991-12-31

	Notes	1991 Rand	1990 Rand
INCOME		32320	24549
Donations		1299	508
Donations - Seedbank		3909	1757
Interest received		2993	2623
Encephalartos - Back copies		504	1480
Subscriptions		23615	18181
EXPENDITURE		25478	16455
Bank charges		273	117
Depreciation		11	12
Encephalartos - Journal	5	17073	11413
Encephalartos - Back copies	6	921	647
General expenses	7	4859	3130
Postage		426	75
Stationary		126	132
Seed Bank	8	1523	910
Telephone		266	19
NET SURPLUS FOR THE YEAR		6842	9094
Unappropriated surplus - Beginning of year		23226	15132
Unappropriated surplus - End of year		30068	23226
CAPITAL	2	30068	23226
EMPLOYMENT OF CAPITAL			
Fixed assets	3	1	12
Net current assets		30067	23214
Current assets		30694	29495
Bank		11709	9991
Bank deposit		15000	15000
Petty cash		5	5
Debtors		266	1085
Stock	4	3714	3414
Current liabilities		627	6281
Prepaid subscriptions		608	731
Creditors		19	5550

THE CYCAD SOCIETY OF SOUTHERN AFRICA

Notes on the financial statements for the year ending 1991-12-31

1. Accounting policy:
The accounting policy of the previous years was adhered to during 1991.

2. Unappropriated surplus:	Rand	Rand
Society	24339	19883
Seed Bank	5729	3343
	30068	23226

3. Fixed assets:		
Educational equipment (cycad slides):		
Cost price	64	64
Less depreciation	63	52
	1	12

4. Stock:		
Encephalartos News Letters	3714	3414

5. Encephalartos News Letter - Cost:		
Printing	9390	6273
Postage	7980	5695
Plus Opening Stock	3414	3859
Less Closing Stock	3712	3414
	17072	11413

6. Encephalartos Back Copies:		
Postage	900	595
Stationary	21	35
Printing	--	17
	921	47

7. General Expenses:- Main Items		
Cycad 90 Fund	----	2500
Cycad 90 Fund	2000	----
Constitution and Circulars	1414	----

8. Seed Bank:		
Seeds Purchased	788	364
Postage	705	528
Stationary	30	12
Permit	---	6
	1523	910

I hereby declare that I am not a member of the Society and that I have no interest in its financial affairs. The Cash Book and the Ledger of the Society has been written up from documents and information provided by the Officials of the Society. I therefore certify that the attached Income and Expenditure Statement and the Balance Sheet is in accordance with the information provided and reflects a true and fair representation of the income and expenditure and the financial position of the Society as at 31st December 1991.

Pretoria, 10th March, 1992. Signed: L.M.D.Vorster

THE DAILY NEWS, THURSDAY, JANUARY 9, 1992

Conservation officials seize cycads due for sale on Rand

KEITH ROSS
Daily News Reporter

EAST LONDON: Nature conservation officers have seized 25 valuable and protected cycads in the East London area and believe the plants were earmarked for sale illegally to well-heeled collectors in the Transvaal.

They believe there is now a well-established illicit traffic in cycads between the Border region and a lucrative market in the Johannesburg area.

"This has obviously been going on for a long time," said a senior nature conservator in East London, Mr Deon "Div" de Villiers.

He would not disclose the value of the cycads recovered by his men, as he feared such information might encourage further theft.

"They are worth a lot of money," he said. "There is a big market for them in the Transvaal."

Mr De Villiers said his men had found 11 uprooted cycads in the Mount Coke area after receiving a tip-off from a concerned person.

"We rushed out there when we received the call and had to hike through some incredibly thick bush," he said.

"We kept finding evidence in the bush that the cycad operation had been going on for a long time — perhaps as long as six months.

"There were holes, fresh and old, and well-worn paths made by wheelbarrows."

Mr De Villiers said they were still hiking through the bush when they heard the sound of digging and this eventually led them to two men who were removing cycads.

His officers arrested the men who then took them to a house in the area where the rest of the plants were found.

Mr De Villiers said his officers had earlier found 14 uprooted cycads hidden behind a sand dune at Cefane, to the north of East London.

"We lay in watch there — day and night for nearly a week — hoping that the people involved would return to claim the plants," he said.

"Nobody came. Perhaps they found out that the cycads were being watched."

His men had eventually called off their watch and had replanted the cycads.

He said nearly all the cycads being stolen in the Border area were encephalartos altensteinii.

"This type of cycad is very popular as it has a large and impressive stem," he said.

THE WEEKLY MAIL, January 17 to 23 1992

Cycad thieves in court

By ERIC NAKI: East London

CONSERVATION officials suspect a ring may be behind the increase in theft of endangered cycads in the East London area, and that the plants are ending up as "status symbols" in Transvaal gardens.

Nature conservation officer Div de Villiers expressed concern at the increase in cycad thefts after the arrest this week of three men, who were caught digging up cycads on a farm near King William's Town. They are to appear in court today.

Eleven plants were confiscated from the men. The arrests followed just days after officials found 14 cycads that had been dug up in the veld and hidden in the dunes near the resort of Cefane.

De Villiers said cycad thefts remained common despite the increased fine of R100 000 for the removal and transportation of the plant.

He said the plants fetch substantial amounts and costs differ according to the species. The endangered plant was a status symbol: a cycad in the front garden went with "a posh house, a Mercedes Benz and a sparkling swimming pool".

In this week's incident, a man alerted officials on Tuesday that three men were digging up cycads on his brother's farm. They found chopped cycads "lying all over the place" and there were numerous dug holes and leaves.

De Villiers said they later heard a chopping sound. On investigation, they found the three men busy chopping the plants. They confiscated 11 plants. — Elnews

Letters

Cycads destroyed by leopard moths

SIR — During the Christmas recess, not having been to the Japanese Gardens for some time and previously having been delighted by its marvellous layout and the beautiful show of its varied and attractive vegetation, I decided to spend a morning there to enjoy the gardens once more.

The visit turned out to be very distressing. Virtually all the new growth of the Cycads and Cycases were reduced to their bare stems swarming with "leopard moth" caterpillars. The small stand of Cycas revoluta looked pathetic.

It seemed that the devastation of the "leopard moth" had gone unchecked. It is worrying that a public garden can become a breeding ground for this pest that could wreck havoc on the cycads growing in private gardens in Durban.

On my way to the central library I passed the two magnificent cycads that greet you at the entrance of the City Hall. Need I continue. There were at least five "beautiful" leopard moths flitting around the already destroyed new leaf stalks.

HASSIM SEEDAT
Durban

• A spokesman for the Durban City Council's Parks, Recreation and Garden section said: "We have managed to combat the leopard moth successfully in the Botanic Gardens, but sometimes they do escape our attention as they have obviously done in the Japanese Gardens."

He said that a request would be made to staff to become more observant and he assured the public the necessary control measures would be taken to eradicate the leopard moths.

Cycads can be problematic

In December I bought two five-year-old cycads marked Encephalartos natalensis from a fete at Pennington in Natal. They were grown as seedlings and I was given a permit for each specimen. I was told by gardeners on the South Coast that I should cut the branches off, leaving a stump. The stump would foam and it would take another six months for the plant to grow back again, by which time it would be well establishsed in the ground. I thought this advise a bit drastic, so am writing to you. What should I do?
— Mrs F Pittmann, Alberton.

□ Bringing subtropical plants to the Highveld is highly problematic. The cycads you brought up here grow wild (up to 4 m in height) at the south coast and will need extra special care if they are to survive. They are used to lots of water and will not survive dry heat or frost.

Do not cut the leaves off your cycad. Choose a cool spot in a half sun/half shade corner where no frost has ever occured. Morning sun is fine, but the burning rays of the afternoon sun can be problematic.

Dig a hole a week before planting and drench the entire area with water. When planting the cycad, ensure that the stem is in exactly the same position relative to ground level as it was in the bag (ie neither up or down).

Water well after planting and never let the soil around your cyrad dry out completely. If the dry heat of February continues, cool down the leaves of your cycads with a spray of water at midday.

Vier SA Infanteriebataljon op Middelburg

DIE "HALFWEGSTASIE" tussen Pretoria en die Laeveld, 4 Suid-Afrikaanse Infanteriebataljon op Middelburg, val ook onder die "Laeveldleeu", Kommandement Oos-Transvaal.

Die eenheid is amptelik op 1 April 1962 gestig en tot in 1981 het dit in Teeninsurgensie-verband funksioneer. Hierna het die omskepping van die eenheid in 'n gemeganiseerde bataljon 'n aanvang geneem.

Die eerste opgeleide gemeganiseerde troepe word van 1 Suid-Afrikaanse Infanteriebataljon ontvang. Daarna volg ook 'n Artilleriebattery en 'n Pantserkar Eskadron.

Van April tot Junie 1983 neem die eenheid aan sy eerste gemeganiseerde operasie in Angola, Operasie Dolfyn, deel. Daarna is ook onder meer aan Operasies Askari, Alpha Centauri, Modulêr en Hooper asook aan Oefening Thunder Chariot deelgeneem.

Hoewel verskeie lede in kontaksituasies gesterf het, spog die eenheid met minstens twaalf dapperheidsmedaljes.

Binnelandse operasies waaraan deelgeneem is, is onder meer Operasie Palmiet, Kharos en Pebble, dikwels ter ondersteuning van die Suid-Afrikaanse Polisie.

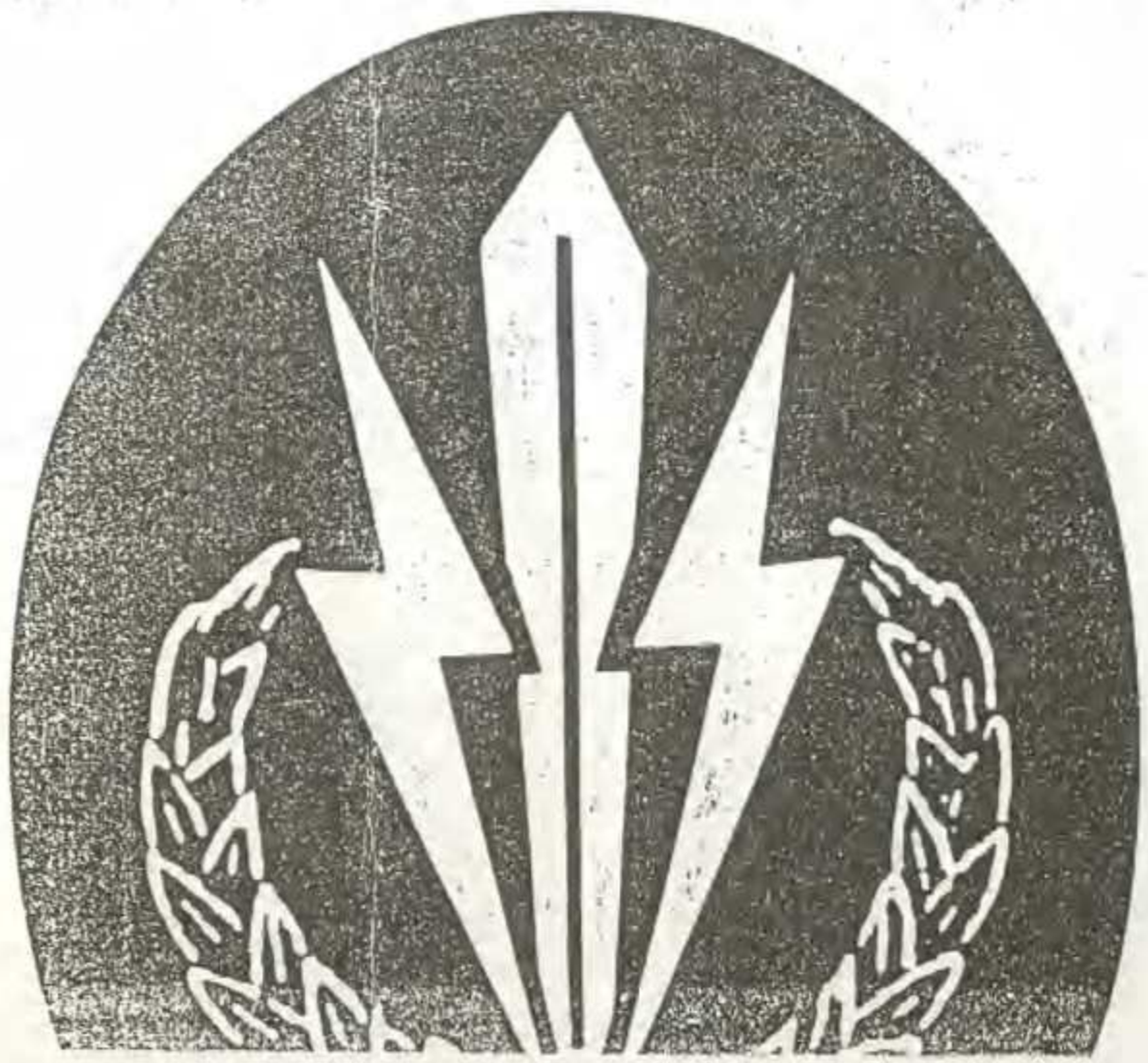
Hierby verdien genoem te word die eenheid se deelname aan die geskiedkundige ondertekening van die Nkomati Verdrag.

Sedert 1990 dien 4 SA Infanteriebataljon weer eens as 'n opleidingseenheid, nadat aan 'n totaal van elf operasies deelgeneem is.

Die eenheid word jaarliks vanaf Julie tot Desember in Oos-Transvaal ontplooi. In dié verband kan genoem word dat daar die afgelope tyd meer onwettige deurlopers op die Mosambiekse grens gevang en aan die S.A.P oorhandig is, as wat daar troepe ontplooi is.

Tydens dié optredes is daar ook op onder meer wapens, dwelmmiddels en gesteelde voertuie beslag gelê. Daar is ook 'n groot bydrae tot die stabilisering van KaNgwane gelewer.

Goeie vriendskapsbande is mettertyd met die mense van die Laeveld gesmee en die lede van 4 SA Infanteriebataljon ondervind die Laevelders as vriendelik, gasvry en behulpsaam.



Die broodboom word as kenteken op die vaandel en skouerflits van 4 SA Infanteriebataljon gebruik. Dié inheemse plant kom in sy natuurlike vorm slegs op Doornkop, die opleidingsgebied van die bataljon voor en is dus 'n uitstaande kenmerk van Middelburg.

CYCAD SOCIETY OF SOUTH AFRICA

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