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# CYCADS

Official Newsletter of IUCN SSC Cycad Specialist Group

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Mexican Cycad Congress



Feature Articles  
Research & Conservation News  
Report: 1st Mexican Cycad Congress  
Seed Grants Announcement



The Cycad Specialist Group (CSG) is a component of the IUCN Species Survival Commission (IUCN/SSC). It consists of a group of volunteer experts addressing conservation issues related to cycads, a highly threatened group of land plants. The CSG exists to bring together the world's cycad conservation expertise, and to disseminate this expertise to organizations and agencies which can use this guidance to advance cycad conservation.

Official website of CSG:  
<http://www.cycadgroup.org/>

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#### Cover photos

Front: Natural habitat of *Cycas elephantipes* in Thailand  
*Photo by Anders J. Lindstrom*

Back: *Zamia amplifolia* new leaf flush. Bajo Calima, Valle del Cauca, Colombia  
*Photo by Michael Calonje*

All contributions published in *Cycads* are reviewed and edited by IUCN/SSC CSG Newsletter Committee and members. IUCN/SSC CSG members can send contributions to [jskhuraijam@yahoo.com](mailto:jskhuraijam@yahoo.com)

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# MESSAGE

Dear Friends,

*A renewed commitment – no more cycad extinctions!*

Think about it: without us, who keeps these treasures alive? Just consider the full, official name of our network – We (IUCN) conserve nature internationally, by (SSC) committing to species survival, (CSG) *especially the cycads*. Tim Gregory and Cristina Lopez-Gallego RAISE THE CSG FLAG on page 4 -- and I ENTHUSIASTICALLY salute that clear call to action.

With that newly invigorated commitment, we need to align our work completely with cycad survival. This is a time of renewed vigor, not a break with our past; in truth, our work has always been for conservation. What does our mission say?

*The CSG brings together the world's cycad conservation expertise, and disseminates this expertise to advance cycad conservation.* The primary objectives of the CSG include: coordinating extinction risk assessments for cycads, maintaining up to date consensus taxonomy for this group, developing a network of genebanks for cycad conservation, promoting sustainable trade of cycads, and advancing understanding of this highly threatened plant group.

This guiding text is clear, but may only reach a small audience. Thus, John Donaldson again brings his leadership and experience to our table on page 6 -- a needed discussion of how to put our work in front of a broader audience, with straightforward goals and engaging ideas. Nathalie Nagalingum and her colleagues (page 8) show how newer forms of outreach find new cycad champions.

Reaching a new audience is vital! Equally important is basing our outreach on solid science. In this issue, articles on evolution of *Dioon* (page 9) and *Cycas* (page 11) move that science forward. I am also *thrilled* to see the great work brought together at the 1<sup>ST</sup> MEXICAN CYCAD CONGRESS (page 14) – that robust, engaged, cycad network is an excellent model for all of us.

Finally, I am excited to announce a **very important advancement** for cycad conservation – see page 17. Cycad conservation resources often do not match the needs. This new grant – for CSG Members – provides the support we need to move forward with our new commitment. The time is now – let's use that great opportunity to *prevent cycad extinction!*

Sincerely,

Patrick Griffith  
Co-Chair, IUCN/SSC Cycad Specialist Group  
Executive Director, Montgomery Botanical Center, Florida  
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Patrick with *Microcycas calbocoma* in Cuba





## No More Cycad Extinctions: A Line in the Sand

Tim Gregory & Cristina Lopez Gallego

The Cycad Specialist Group has done a great job over the last 30 years of monitoring the unrelenting decline of cycad species. In general things look bad in four of the five centers of cycad biodiversity; with only Australasia showing minimal to no decline in the Red List status of its species. Sixty four species are now listed as Critically Endangered and we can no longer simply monitor/document this decline. We must together formulate a new and creative strategy to actively intervene to save these species and the myriad other organisms that make up their habitats. The Conservation subcommittee of the Cycad Specialist Group is updating the Conservation Action Plan of 2003 and this is a call to action. Our goal is the establishment and maintenance of at least one viable natural population for each cycad species.

To triage the imposing list of threatened species we propose the following decision

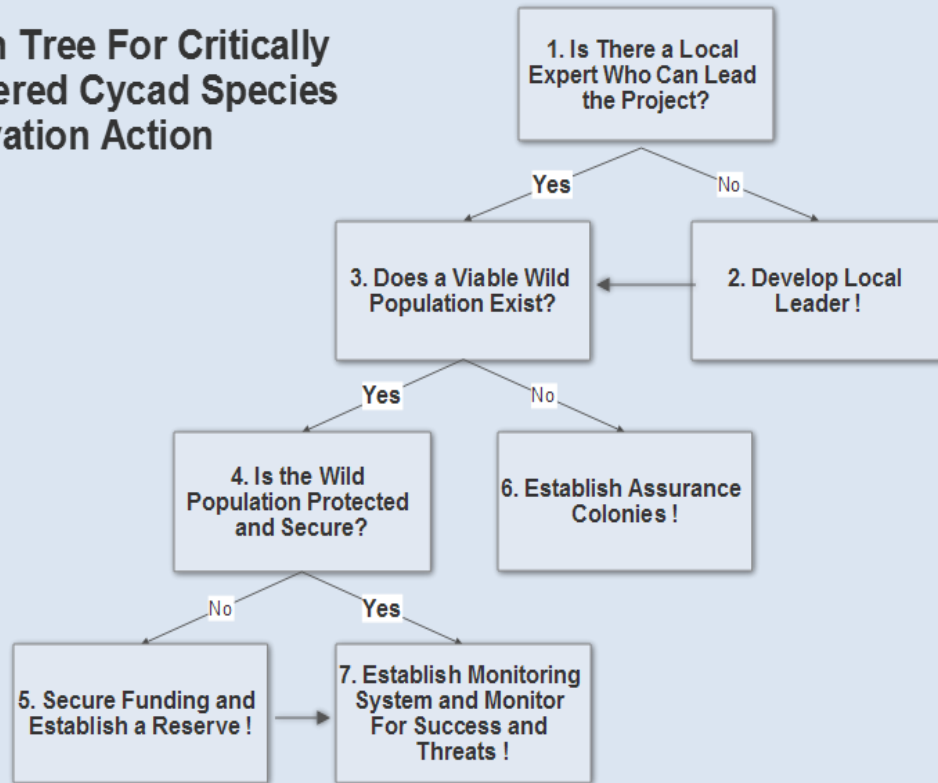
tree (and diagram below) focused on those species that are currently Critically Endangered, the highest priority.

1. We feel that long term success can only be achieved with the complete collaboration of all local community, scientific and governmental stakeholders, and local leadership. Is there an in-country organization or individual who can lead the conservation effort? If No, then go to 2. If Yes, then go to 3.
2. All resources devoted to saving this species should be focused on finding or developing an in-country advocate. Then proceed to 3.
3. If there is an in-country advocate/leader then does a viable wild population exist? If No, then proceed to 6. If Yes, proceed to 4.
4. Is (are) the wild population(s) protected and secure from further unsustainable exploitation and/or degradation? If No proceed to 5. If Yes then establish a conservation status monitoring system

and continue to monitor for conservation success or the need for further mitigation.

5. Secure funding to purchase land for a reserve, secure funding for security protection of a vulnerable existing reserve or secure a binding agreement with the landowners (e.g. a communal group) to protect the cycad population and habitat. This must include a conservation status monitoring system and continued monitoring for conservation success or the need for further mitigation.
6. If the species no longer exists in a wild population but still exists in cultivation (as in the 10 *Encephalartos* species that are functionally extinct in the wild) then we must establish Assurance Colonies in a secure location. Ideally there should be at least two of these, one in country and one outside to protect the gene pool from unanticipated catastrophes. The first priority of these Assurance Colonies is to maintain the existing genetic diversity.

## Decision Tree For Critically Endangered Cycad Species Conservation Action



They must be funded to maintain the genetic stock for a minimum of one hundred years or until a secure reserve is available where they can be re-established in the wild and continue on their evolutionary path. We, the members of the conservation subcommittee, propose to use this decision tree to establish a specific conservation plan for each of the 64 CR species. The focus on the CR species is only because they are in imminent danger of extinction and does not exclude work on any of the many other threatened species where action can blunt their rate of decline. These plans will be results and action oriented, and include every possible mitigation like habitat restoration and rescue/relocation if

needed. Funding for land purchases for cycad reserves is becoming available from several philanthropic conservation organizations that we have been in discussion with. Also private philanthropic funding is becoming available for cycad conservation projects. Several model projects are underway and will be discussed in more detail at the Cycad Meeting in August. We need results and we can do this if we work together.

This is a call for direct action for cycad conservation and we invite anyone who can help with ideas, constructive criticism and boots-on-the-ground support to participate.

Our motto is "No Cycad Extinctions" and we draw a line in the sand right now that extinction will not cross.

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# Reframing the work of the Cycad Specialist Group – a discussion document

John Donaldson (on behalf of the Chairs and Deputy Chairs of the CSG)

The Cycad Specialist Group has been in existence for ca. 30 years. During that time it has developed into a global network of cycad biologists and conservationists dealing with a wide range of activities. In the beginning there was a strong emphasis on taxonomy and understanding cycad diversity. That legacy remains, especially in the form of the World List. At the same time, the world has changed and the CSG has attracted people with other interests and expertise. They are drawn by their ongoing curiosity with these unique plants as well as a willingness to develop and apply new ideas for conservation in increasingly complex socio-ecological environments.

Many of the activities of the CSG arose from the Cycad Status and Action Plan published in 2003. This document has guided the CSG actions for more than a decade but new issues are constantly emerging that were not considered in 2003. The spread of the invasive *Aulacaspis* scale is an example of an impact that was not envisaged in 2003. The potential role of the CSG has also changed. In 2003, much of the focus was still on documenting the diversity of cycads and determining their threat status, so there was less attention on other types of information or on actions to save cycads from extinction. Since then, the CSG has grown organically to deal with a broader range of issues and it can be confusing to make sense of everything we do within the framework of the Cycad Status Report and Action Plan.

This document presents a strategic framework for the CSG that would enable us to contextualise our various roles and communicate what we do to other parts of the IUCN network, as well as to funders and people we are trying to influence. A rough draft was circulated to the co-Chair and Deputy Chairs of the CSG and to various other members. We agreed to publish it in the newsletter as way of introducing some ideas that the CSG members should think about and develop further leading up to the CSG meeting in August 2018.

### Organising around 3 major goals

As a specialist group embedded within the IUCN Species Survival Commission, the outcome we want is a secure future for the world's cycads and their habitats. That's an ambitious task that is bigger than the CSG but our contribution can be more easily understood by breaking it down into three goals.

- No cycad species will go extinct because they are preserved in representative *ex situ* collections
- Populations in the wild are viable and are maintained above key thresholds of threat.
- Key habitats are secured to provide wild habitat for cycad populations

After the 2015 Cycad Conference in Colombia, we were challenged to come up with more interesting ways of 'selling' our ideas to potential funders. As a start, we should ensure that the main goals are easy to communicate to stakeholders and donors. I propose that the CSG can articulate these three goals in a more interesting way by

focusing on the absolute intention that is inherent in each goal. The three goals can then be reframed in the following way.

### *Zero extinction*

This really is the bottom line where our goal should be that no cycad species will go extinct because they will be (at least) preserved in representative *ex situ* collections. This has been one of the CSG objectives in the past, but we need to strengthen our endeavours to achieve this goal. The CSG can learn from successes with other taxa, such as turtles, where a broader concept of assurance colonies has been used to secure genetic material and ensure that species don't die out altogether. This goal needs to be implemented by activities that recognise (i) that we need representative genetic collections, and (ii) that *ex-situ* collections are often critical for future restoration efforts. This is not new and the institutions linked to the CSG, such as the Montgomery Botanical Centre, Nong Nooch Tropical Botanic Garden and Fairy Lake Botanical Garden, have made significant progress in this regard and are even regarded as world leaders in this area of plant conservation. Nevertheless the goal has not been achieved and needs ongoing action.

### *250 Plus*

This addresses the goal of establishing and maintaining viable populations in the wild wherever this is possible. The goal name is derived from one of the thresholds in the categories used by the IUCN Red List. Species can qualify as Critically Endangered when populations decline below 250 mature

individuals, so “250 Plus” encapsulates the intention to get cycad species out of the Critically Endangered bracket by increasing population size. The name is not meant to be absolutely accurate because 250 should be a starting point and the CSG objectives and activities should include other steps to also shift species out of the Endangered bracket and here target numbers would be higher. Nevertheless, the goal should signal the intention to focus on those species where there is a realistic chance to change their threat status based on increasing population size.

To achieve this goal, we will need to develop/ support projects and activities linked to reintroductions and re-establishing populations, including improving genetic diversity and ensuring viable mutualisms.

### Habitat for 100

Habitat loss is one of the main drivers of cycad decline. Again, the IUCN uses various thresholds regarding habitat loss and the figure of “100” provides a punchy way to communicate the need to secure habitat. Under IUCN Red List criterion B, 100km<sup>2</sup> is the threshold for Extent of Occurrence, below which a species may be classified as Critically Endangered. Similarly, under Criterion A, decline over 3 generations or 100 years is also used as a temporal threshold for assessing risk. Labelling this goal as “Habitat for 100” captures the need

for both the spatial and temporal components of a secure habitat. In essence, the goal should be to ensure that at least a minimum amount of habitat (>100 km<sup>2</sup>) is secured for a meaningful time period (100 years). This goal will require us to engage more actively in initiatives to secure and manage land for cycad conservation. Cycads often occur in areas with other important biodiversity and we must work constructively with other organisations to protect habitat, such as organisations focusing on rainforest habitats. This will almost certainly require more national and local level representation, a point that is made strongly in a separate contribution to this newsletter by Tim Gregory.

### Everything is for a reason

All the other activities of the CSG should feed into the higher level goals. This is why the CSG differs from other networks, such as cycad societies or scientific communities, where the objective may be to simply enjoy cycads or engage in scientific research on cycads. Given the history of the CSG, it should not be difficult to align the activities with the proposed goals. They can be conceptualised as a continuum from foundational knowledge about cycads and their environments through to understanding the socio-ecological dimensions of uses and threats, and leading to specific actions to achieve higher level goals. This is presented in Fig. 1 where the

entire programme of the CSG can be presented in one diagram. In a more formal structure, these could be clustered into specific objectives such as (i) providing foundational information, (ii) building a knowledge base for conservation action, and (iii) undertaking and supporting conservation projects.

### Way forward

This document is not a strategic plan. That would be premature because this needs to be a plan we all contribute to and can all support. But, strategic planning takes time and we will have only limited time at the Cycad Congress in August 2018 and not everyone will make it there. The intention of this document is to present these ideas and to challenge us to think about the way we frame and organise our activities. We must continue with this discussion over the next few months leading up to the Congress in 2018 so that we can develop a strategic plan for the CSG that will take us forward for the next ten years. Members can communicate directly with me (j.donaldson@sanbi.org.za) acting on behalf of the leadership team so that we have a coherent process to develop our CSG strategy.

### Acknowledgements

Special thanks to Tim Gregory, Cristina Lopez-Gallego, Patrick Griffith and Michael Calonje for their support and inputs.

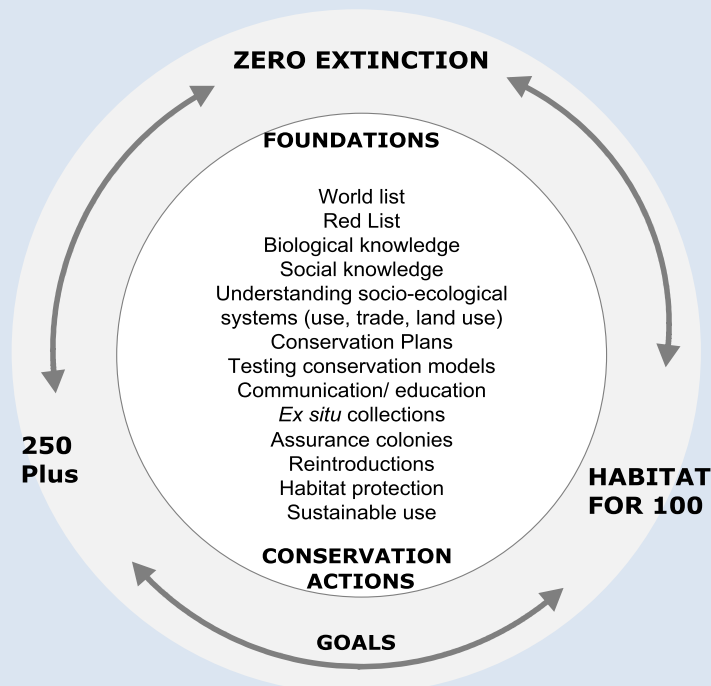


Figure 1. A diagram outlining a proposed framework for understanding the goals and activities of the IUCN/SSC Cycad Specialist Group.

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# Four new educational videos from the California Academy of Sciences

Nathalie Nagalingum, Molly Michelson & Kira Hammond

In collaboration with the science and the visual media staff at the California Academy of Sciences, we have made a series of four videos about cycads. All are available on YouTube and range in length from under one minute to approximately three minutes. Each video tackles a different topic, ranging from the age of cycads to cycad pollination and conservation. “The price of plant poaching” has captions and is a compelling introduction to the problem of cycad theft.

**Cycads: An Ancient Plant**  
[https://youtu.be/8wSqC\\_avxtl](https://youtu.be/8wSqC_avxtl)

Academy scientist Nathalie Nagalingum loves cycads—plants that have existed on Earth since before the dinosaurs. But exactly how old are the plants that we see today?  
Published Jun 12, 2017

**The Price of Plant Poaching**  
<https://youtu.be/OFp8yBHgkPE>  
Highly endangered cycads fetch a high price and the ancient plants are being stolen at an alarming rate. Academy scientist (and cycad expert) Nathalie Nagalingum explains what is being done to protect the plants from poachers.  
Published July 19, 2017

**Saving Cycads with Science**  
<https://youtu.be/oDtSx1qCB-M>  
Cycads—a plant that’s been around since the dinosaurs—are the most endangered group on the planet. Academy scientist Nathalie Nagalingum plans to save them using DNA.  
Published Jun 12, 2017

**Cycads and Friends**  
[https://youtu.be/e0Gun\\_accqQ](https://youtu.be/e0Gun_accqQ)  
Cycads rely on pollinating insects and nutrient-providing cyanobacteria.  
Published August 15, 2017



**Saving Cycads with Science | California Academy of Sciences**  
California Academy of Sciences • 266 views • 5 months ago  
Cycads—a plant that’s been around since the dinosaurs—are the most endangered group on the planet. Academy scientist Nathalie Nagalingum plans to save them using DNA. --- The California Academy...



**The Price of Plant Poaching | California Academy of Sciences**  
California Academy of Sciences • 436 views • 3 months ago  
Highly endangered cycads fetch a high price and the ancient plants are being stolen at an alarming rate. Academy scientist (and cycad expert) Nathalie Nagalingum explains what is being done to prot...  
CC



**Cycads and Friends | California Academy of Sciences**  
California Academy of Sciences • 335 views • 2 months ago  
Cycads rely on pollinating insects and nutrient-providing cyanobacteria. --- The California Academy of Sciences is the only place in the world with an aquarium, planetarium, natural history muse...



**Cycads: An Ancient Plant | California Academy of Sciences**  
California Academy of Sciences • 305 views • 5 months ago  
Academy scientist Nathalie Nagalingum loves cycads—plants that have existed on Earth since before the dinosaurs. But exactly how old are the plants that we see today? --- The California Academy ...

A screen shot of the videos, hosted on the California Academy of sciences page on YouTube

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## Mexico as a scene for the evolution of the genus *Dioon*

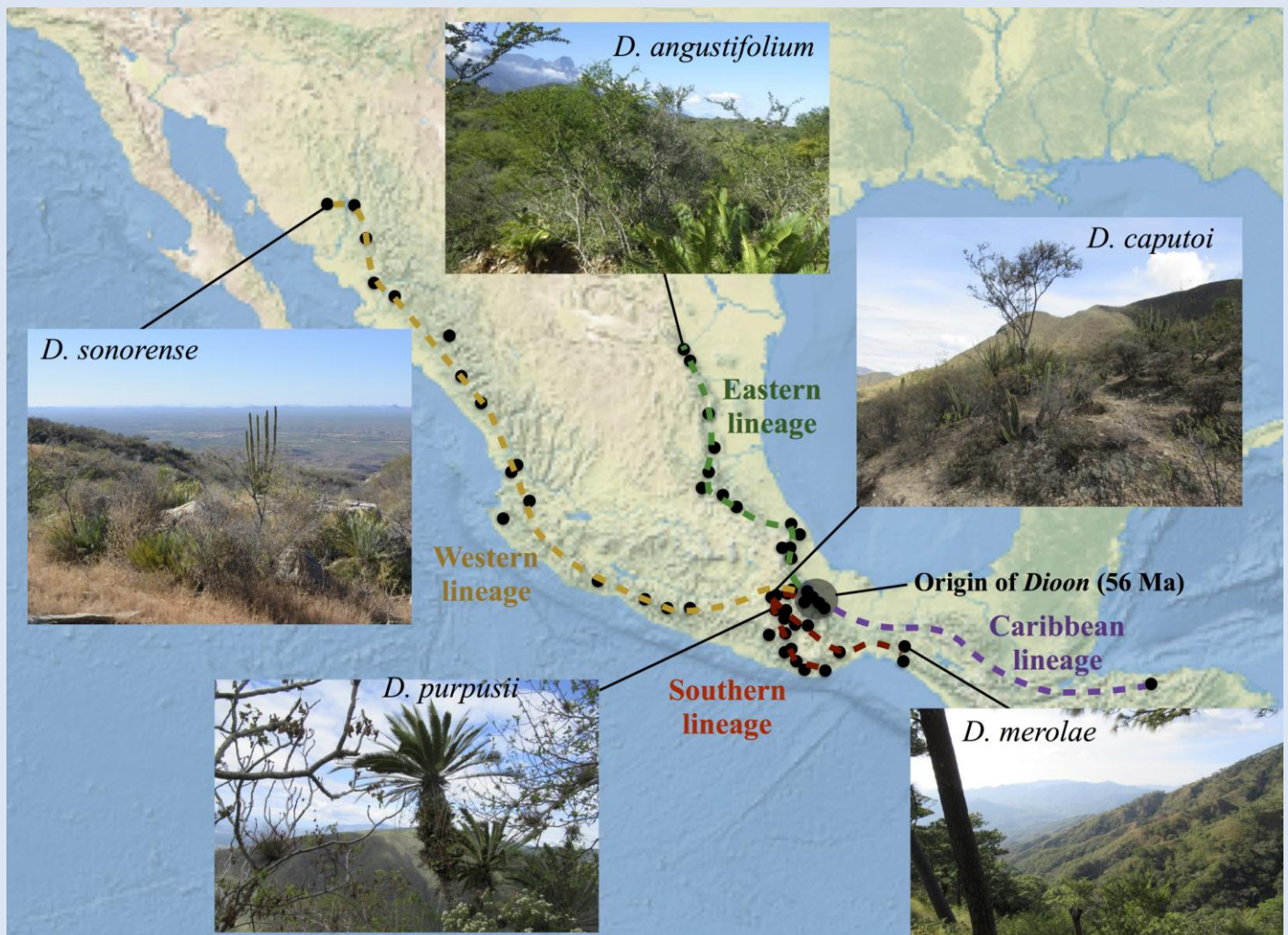
José Said Gutiérrez-Ortega, María Magdalena Salinas-Rodríguez, Miguel Angel Pérez-Farrera & Andrew P. Vovides

Mexico represents the second richest hotspot of cycad diversity in the world, just after Australia. This great Mexican cycad diversity is often attributed to a complex combination of topography and climate change. Undoubtedly, such abiotic factors have influenced the evolution of Mexican flora in general, but the evolutionary history and the mechanisms by which cycads were capable to evolve are some of the enigmas that still concern us. Thus, we are now trying to unravel the complex evolutionary scenarios that favoured the origin of

Mexican cycad species, particularly for the genus *Dioon*.

Among the three cycad genera occurring in Mexico (*Zamia*, *Ceratozamia* and *Dioon*), *Dioon* has the largest distribution range in the country, whereas one vicariant species occurs in Honduras. Such broad distribution might suggest that both geographic isolation and the heterogeneity of climates across Mexico were divergent forces that promoted the evolution of *Dioon*. This is supported by the fact that *Dioon* contains species in both

humid forests and deserts (Fig. 1). Therefore, if we assumed that *Dioon* was originated in tropical humid forests, a consequent expansion of the Mexican deserts might have reached some ancestral populations, which might have promoted speciation with adaptations to aridity. In consideration of this hypothesis, until now, we have responded to two main questions: 1) When and where was *Dioon* originated, and how did lineages reached their current distribution?; and 2) is the aridification of Mexico influencing the evolution of *Dioon*?



**Figure 1.** Although *Dioon* can be currently found in a wide variation of habitats, ranging from forests to deserts, *Dioon* lineages had a common origin in Southeast Mexico. Then, *Dioon* dispersed throughout Mexico and Central America by following different routes: the Caribbean lineage diversified during its expansion to Central America (purple dotted line); Eastern lineage diversified along the Sierra Madre Oriental mountain chain (green dotted line); Southern lineage diversified during its expansion in Oaxaca, Puebla and Chiapas (red dotted line); Western lineage diversified during its expansion through the Balsas Basin and the Sierra Madre Occidental mountain chain (yellow dotted line). While lineages achieved their current distributions, the expansion of deserts reached some species of the Southern lineage (for example, *D. caputoi* is in a desert, but their sister species *D. merolae* and *D. purpusii* are not), and the Western lineage (in *D. sonorensis*).

In our new paper “The phylogeography of the cycad genus *Dioon* (Zamiaceae) clarifies its Cenozoic expansion and diversification in the Mexican transition” (Gutiérrez-Ortega *et al.* 2017), we provide extensive genetic data that allowed us to answer to our first question. Our phylogeographic estimations suggest that *Dioon* was originated around 56 million years ago (Ma) in an ancestral mesic forest from southeast Mexico, probably in the areas where *D. spinulosum* and *D. rzedowskii* are now occurring. From there, four *Dioon* lineages (Caribbean, Eastern, Southern and Western) (Fig. 1), dispersed in synchrony with the rise of the main mountain chains of Mexico. In each region, disparate climates might have influenced speciation within lineages.

Our second question was responded in our other new paper, “Aridification as a driver of biodiversity: A case study for the cycad genus *Dioon* (Zamiaceae)” (Gutiérrez-Ortega *et al.* 2018). By using phylogenetic methods, we estimated the times when each lineage was reached by the expansion of the arid zones in México. The aridification affected especially the Southern lineage (in the States of Oaxaca and Puebla) due the expansion of deserts around 15 Ma. Moreover, *D. sonorensis*, the northernmost

species of Western lineage, was reached by the expansion of the Sonoran Desert around 2.5 Ma. Surprisingly, we found that species occurring in arid zones show clear epidermal adaptations to aridity. For example, in species from arid habitats, we found thick cuticles and deep stomatal chambers, which might be advantageous to avoid desiccation in such stressful arid conditions.

With these two recent studies, we contribute to reveal the mechanisms that have given shape to the current cycad diversity. Although there are still many interrogatives about the micro-evolutionary mechanisms driving evolution, we expect our studies can stimulate further studies on speciation, systematics and conservation of cycads worldwide, particularly in Mexico: a magnificent scene where cycads were able to evolve.

#### References

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# The molecular phylogenetic framework of the genus *Cycas* L.

Liu Jian & Anders J. Lindstrom

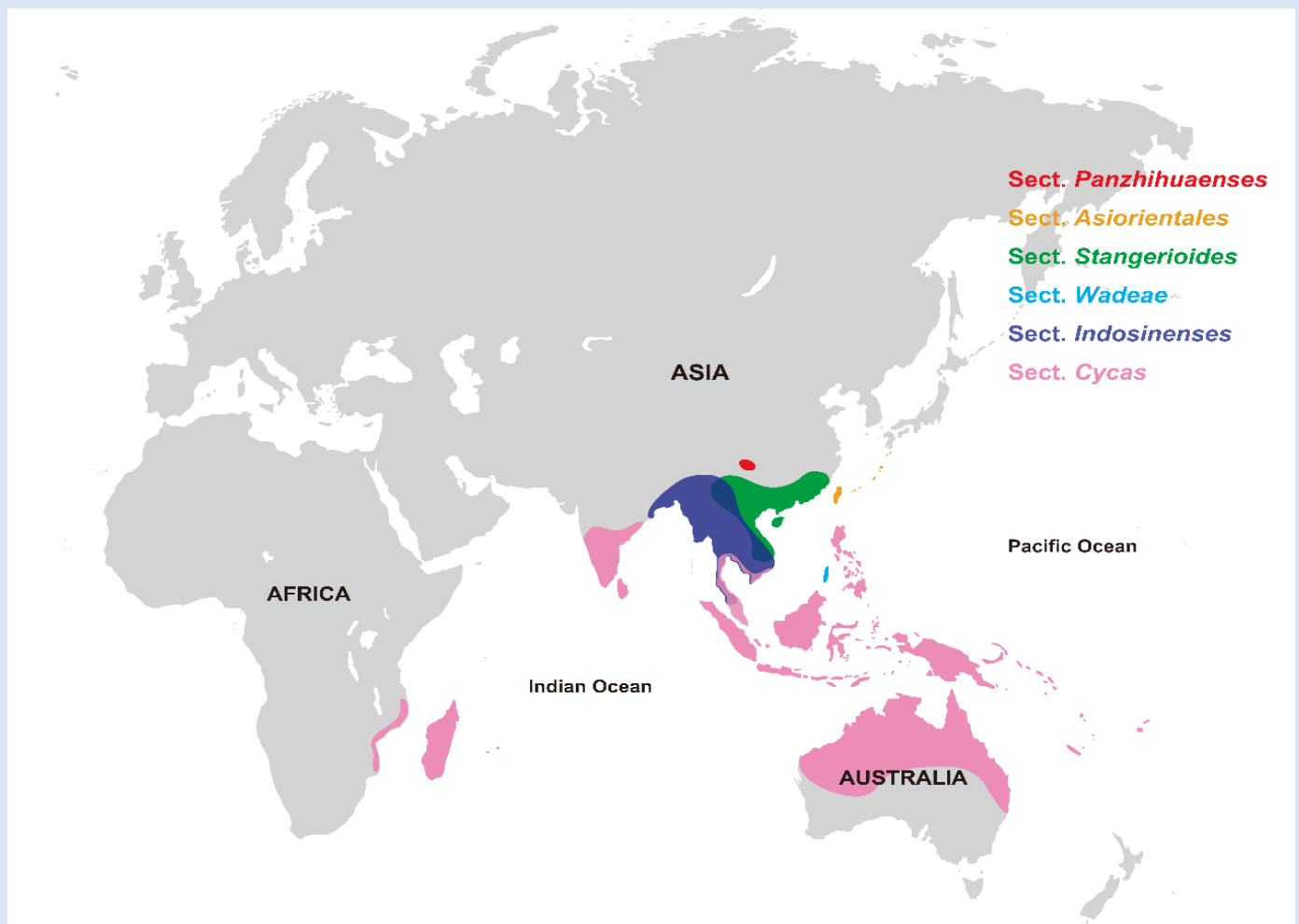
The gymnosperm genus *Cycas* is the sole member of Cycadaceae, and is the largest genus of extant cycads. There are about 115 accepted *Cycas* species mainly distributed in the paleotropics (Fig. 1). Based on morphology, the genus has been divided into six sections and eight subsections (Fig. 2), but this taxonomy has not yet been tested in a molecular phylogenetic framework. Although the monophyly of *Cycas* is broadly accepted, the intrageneric relationships inferred from previous molecular phylogenetic analyses are unclear due to insufficient sampling or uninformative DNA sequence data.

In a recently published study, we reconstructed the molecular phylogeny of *Cycas* by sequencing four chloroplast intergenic spacers and seven low-copy

nuclear genes of 90% extant *Cycas*. The maximum likelihood and Bayesian inference phylogenies suggest: (1) matrices of either concatenated cpDNA markers or of concatenated nDNA lack sufficient informative sites to resolve the phylogeny alone, however, the phylogeny from the combined ten cpDNA-nDNA marker dataset (three chloroplast intergenic spacers *trnL-trnF*, *trnS-trnG* and *psbM-trnD* and seven single-low copy nuclear genes *PHYP*, *RPB1*, *HZP*, *AC3*, *F3H*, *SAMS* and *GTP*) suggests the genus can be roughly divided into 13 clades and six sections that are in agreement with Hill's classification of the genus. Meanwhile, the short branches within *Cycas* is corresponding with previous studies, suggesting a recent radiation of this genus (Fig. 3); (2) although

with partial support, a clade combining sections *Panzhihuaenses* + *Asiorientales* is resolved as the earliest diverging branch; (3) section *Stangerioides* is not monophyletic because the species resolve as a grade; (4) section *Indosinenses* is not monophyletic as it includes *Cycas macrocarpa* and *C. pranburiensis* from section *Cycas*; (5) section *Cycas* is the most widely distributed section and also the most derived group, a total of seven well supported subclades were derived from this section and its subgroups correspond with geography.

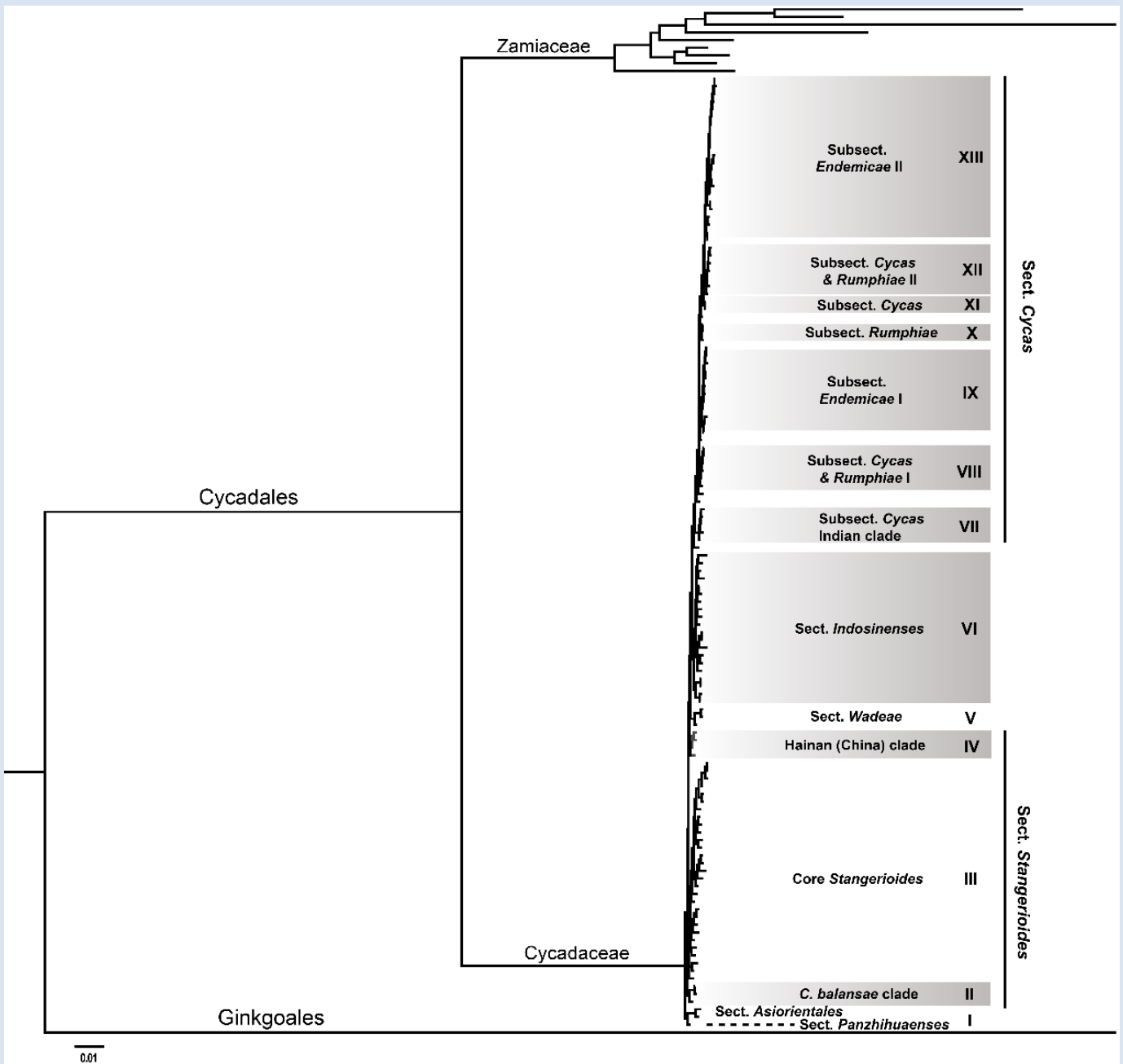
The above phylogenetic framework of the largest genus from cycads provides new insights into the taxonomy and the evolution of *Cycas* and will significantly promote further studies on other aspects of this genus.



**Figure 1** The distribution of extant *Cycas*. The classification of the genus into sections in this and other figures follow Hill's (2004) treatment.



**Figure 2.** Megasporophyll diversity of *Cycas* from different sections/subsections. **A:** Sect. *Panzihuaenses*: *C. panzihuaensis*; **B:** Sect. *Asiorientales*: *C. revoluta*; **C:** Sect. *Stangerioides*: *C. taiwaniana*; **D:** Sect. *Wadeae*: *C. wadei*; **E:** Sect. *Indosinenses*: *C. pachypoda*; **F:** Sect. *Cycas* subsect. *Cycas*: *C. circinalis*; **G:** Sect. *Cycas* subsect. *Rumphiae*: *C. rumphii*; **H:** Sect. *Cycas* subsect. *Endemicae*: *C. papuana*



**Figure 3.** Phylogram of *Cycas* inferred from combined seven single-low copy nuclear genes (*PHYP*, *RPB1*, *HZP*, *AC3*, *F3H*, *SAMS* and *GTP*) and three chloroplast intergenic spacers (*trrL-trrF*, *trrS-trrG* and *psbM-trrD*) based on Bayesian Inference.

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## 1<sup>st</sup> Mexican Cycad Congress: A Report

M. Ydelia Sánchez-Tinoco & Andrew P. Vovides

Under the motto "CYCADS: CONSERVATION, DEMOGRAPHY, STRUCTURE, ETHNOBOTANY AND GENOMICS / SYSTEMATICS, WHAT DO WE KNOW?". We celebrated our 1st MEXICAN CYCAD CONGRESS. This historic event was held in the City of Xalapa, Veracruz, Mexico during 26<sup>th</sup> – 27<sup>th</sup> October 2017 under the auspices of the Universidad Veracruzana's (U.V.) Biological Research Institute (IIB) and the Department of Evolutionary Biology of the Institute of Ecology, A. C. (INECOL).

Why Xalapa? This first congress was held in Xalapa for both historical and recent reasons. John Lindley in 1848 described *Dioon edule* (the type species for the genus) from a plant sent to him from the Chavarrillo area, not far from Xalapa. During the early twentieth century the worldwide renowned morphologist and scholar of cycads, Charles J. Chamberlain visited Xalapa and its surroundings in search of the tiotamal or *Dioon edule*. With the collaboration of the Governor of the state of Veracruz Teodoro A. Dehesa, he managed to locate a population in the area of Chavarrillo, about 30 km S.E. of Xalapa. Also, he made contact with Prof. Luis Murillo, botanist and teacher at the Escuela Normal Veracruzana (teacher training college), and with his collaboration, made observations of a *D. edule* plant of approximately five feet tall located in his garden, (now the Quinta de las Rosas, a senior citizens' facility). His observations were aimed at calculating the cycad's age. Prof. Murillo sent Chamberlain data on leaf production during a period of 11 years and total number of petiole bases on the trunk. By simple division of mean number of leaves produced per year between total petiole

bases Chamberlain came to an estimate of 970 years for that five-foot tall individual of *Dioon*. Chamberlain commented that this was a conservative estimate since he did not have leaf production data on the plant's earlier life-cycle stages. Currently, this specimen is alive and well on the grounds of the Quinta de las Rosas. Victor Luna of the Clavijero Botanic Garden rediscovered this plant during the 1990's during a project on the historic gardens of Xalapa.

On the other hand, Xalapa holds the Mexican National Cycad Collection. Initiated in the late 70s and formally registered as a national collection in the eighties, this collection is at the Francisco Javier Clavijero Botanic Garden of INECOL, from which numerous publications on this group of plants including new species descriptions have emerged. In this Garden, the visitor can not only see the native cycads of Mexico, but at least one species of the other world genera. Parallel to the establishment of the National Collection at the Botanic Garden, and working independently, a group of worldwide cycad scholars from the University of Naples, Italy, coordinated by Paolo de Luca and Sergio Sabato, contacted Dr. Mario Vázquez Torres, researcher now retired from the UV, and began collecting expeditions in Mexico. The group of Italian scholars discovered and described numerous new species in the genus *Dioon*, during the late 70's and the 80's.

Thus, the venues for this congress were chosen. Presentations took place in the Auditorium of the Faculty of Biology, of the Universidad Veracruzana and the UNIRA Auditorium, at the Clavijero Botanic Garden

of INECOL. The opening ceremony was presided by distinguished personalities presented by the congress president Ydelia Sánchez-Tinoco. The presidium consisted of representatives of the two organizing institutions; Alvar González Christen, Director of the IIB in representation of the UV Rector, Dr. Sara Ladrón de Guevara and Dr. Miguel Rubio Godoy, Director of INECOL. Dr. Andrew P. Vovides gave the inaugural presentation of the Congress, followed by the inaugural opening decree given by Dr. Clementina Barrera Bernal, Director of the Faculty of Biology, UV.

We had the valuable participation of two keynote speakers; the emblematic Dr. Dennis Wm. Stevenson, from the New York Botanical Garden, a worldwide renowned cycad personality, whose talk was an illustrative and impressive compilation on cycad studies, as only Dennis dominates, never better titled as "Cycad research: Where have we been, where we are, and where we might go"; and Dr. Michael Calonje, from the Department of Biological Sciences, Florida International University and Montgomery Botanical Center, who captivated us with his impressive wealth of information and field work on the New World genus *Zamia*, with phylogenetic, biogeographical and diversification implications.

The conferences were grouped into four working groups, chaired and moderated by renowned researchers, based on their experience and contribution to our knowledge of cycads in Mexico. The themes of the sessions and their respective moderators were: Conservation and Demography by Dr. Pablo Octavio Aguilar,



Ethnobotany and Systematics by Dr. Miguel Ángel Pérez Farrera, Structure and Physiology by Dr. Andrew P. Vovides and M.C. M. Ydelia Sánchez Tinoco and Genomics by Dr. Angélica Cibrián Jaramillo. Twenty-two oral

contributions and seven posters were presented, representing different institutions in Mexico such as: INECOL; Institute of Scientific and Technological Research, A.C. of San Luis Potosí; National Laboratory of

Genomics for Biodiversity (LANGEBIO) Advanced Genomics Unit; Center for Research and Advanced Studies of the National Polytechnic Institute; Autonomous University of San Luis Potosí; Autonomous

University of the State of Hidalgo; University of Sciences and Arts of Chiapas; University of Sonora; National Autonomous University of Mexico (Mexico City and Hermosillo, Sonora) and the Universidad Veracruzana. Participants attended from institutions such as: Chiba University, Chiba, Japan, Florida International University, Miami, FL, USA, The New York Botanical Garden, New York, USA and the University of the Ryukyus, Uehara, Yaeyama, Okinawa, Japan.

Andrew P. Vovides and Carlos Iglesias of the Clavijero Botanic Garden offered us a guided tour of the Mexican National Cycad Collection, as well as a workshop on Cycad Collecting and Cultivation, that was well attended. In the beautiful setting of the Botanic Garden, prior to the Congress closure, Mexican cycad scholars, group leaders and their disciples, gathered to pay homage and give a deserved acknowledgement to Dr. Andrew P. Vovides. This was the united call of all of us who have worked with this fascinating group, expressing our appreciation and recognizing the work that Dr. Vovides has dedicated to cycad studies in Mexico for more than 35

years, this call was heard by our Rector of the UV, Dr. Sara Ladrón de Guevara, and through the hands of the director of IIB, UV, Alvar González Christen, sent an official acknowledgement to our dear Dr. Vovides, for his contributions on the study and conservation of Mexican cycads, as well as for his career as a researcher and mentor, thus voicing opinions of several generations of cycad scientists.

We are proud of the success of this first meeting, thanking the efforts of all those who came from different parts of the country, and the keynote speakers who traveled from afar to attend our first event. Also, thanking the behind-the-scenes personnel for their contribution to the success of the event: the designer Luis Sánchez Ponce, Rotceh Gómez Díaz photographer, José Luis Llaguno computer technician, Gerardo Aburto, Atzin Arenas, Nestor Acosta students, Mireya Pino and Rolando Arboleda secretaries, Alvar González and José Martínez academics of the IIB, U.V. and INECOL staff, especially Carlos Iglesias from the Fco. J. Clavijero Botanic Garden who participated enthusiastically in the organization of the

guided tour and workshop. Also, we appreciate the financial support obtained through the Directorate of the Biological-Agricultural Area of the U.V., the Directorate of Foreign Affairs of the U.V., as well as the Directorate of the Institute of Biological Research and Academic Secretariat of the U.V.

This first and inaugural Congress on Mexican Cycads has laid the foundations for future events. The next is to be held in 2021 and we meet again in the City of Irapuato, Guanajuato, Mexico, where LANGEBIO will be the headquarters of the II Mexican Congress of Cycads.

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# CALL FOR APPLICATIONS

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## SEED GRANTS FOR CYCAD SPECIALIST GROUP MEMBERS

Rainforest Trust, a US-based conservation nonprofit, and the IUCN SSC Cycad Specialist Group are now partnering to offer seed grants specifically to specialist group members. This unique opportunity will allow members to further research efforts by facilitating the protection of the most important sites for threatened cycads.

Rainforest Trust's mission is to conserve important habitat for Critically Endangered and Endangered species through the establishment of new protected areas across the tropics. Rainforest Trust partners with local organizations to ensure that these irreplaceable sites are protected in perpetuity. Following the launch of Rainforest Trust's SAVES (Safeguarding Areas Vital to Endangered Species) Challenge at the 2016 World Conservation Congress in Hawaii, the organization has ramped up efforts to conserve habitat for lesser known species across all taxa.

As a highly threatened but lesser known taxonomic group, cycads are exactly the type of species that Rainforest Trust aims to protect. Several cycad conservation projects are currently being supported by Rainforest Trust, but bringing in the expertise of Cycad Specialist Group members to identify priorities will make it possible to ensure the survival of more species that are on the brink of extinction.



### Requirements

- The project must be based within the tropics or subtropics
- The site must contain IUCN Red Listed CR or EN species
- The site must be unprotected and undesignated as a Protected Area

### Project objectives may include the following

- Evaluate land ownership of unprotected sites where threatened species are found
- Evaluate the presence and abundance of Endangered or Critically Endangered species within unprotected sites
- Negotiate land prices and gauge willingness to sell privately owned land
- Assess community and government interest in Protected Area creation
- Identify a local NGO to lead Protected Area creation



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Cycad Specialist Group



## Cycad Specialist Group in partnership with Rainforest Trust

### Seed Grant Application Form

Rainforest Trust is partnering with the IUCN SSC Cycad Specialist Group to offer seed grants of up to \$5,000 to Cycad Specialist Group members. Applications must evaluate the suitability of potential sites for Protected Area establishment.

#### Requirements:

- The project must be based within the tropics or subtropics
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- Assess community and government interest in Protected Area creation
- Identify a local NGO to lead Protected Area creation

*To apply, please send a completed copy of this application form to Tim Gregory at [cycadtim@gmail.com](mailto:cycadtim@gmail.com)*

PARTNER BACKGROUND	
Partner Organization:	Partner Legal Status:
Partner Website:	Date Established:
Project Coordinator Name and Email:	
Partner Mailing Address:	
Qualification of Organization (Provide details about why your organization is best qualified to implement this project and list relevant experience (i.e. have you created PAs in the past?):	
What was the prior year's organizational budget?	
Has the organization ever been audited (YES or NO, and how often)?	
Can you accept wire transfers in the country where the project is located? YES / NO	
List of major financial supporters including name and email address of contact who is familiar with your work (max. 5):	
Please provide the names and email addresses of 3 professional references.	

APPLICATION DETAILS			
Amount Requested (USD):		Amount Requested (local currency):	
Currency Type:			
Region:		Country:	
Region/State/Province:		Nearest Town:	
Project Start Date:		Project End Date:	
Project Summary:			
OBJECTIVES			
Project Goal:			
Objective	Activities	Anticipated Start Date	Anticipated Completion Date
SPECIES & THREATS			
Will you conduct biological surveys? If so, what is your goal in doing so?			
Please list IUCN Red List of Threatened Species Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) species that are found in the area. Please check the official global Red List ( <a href="http://www.iucnredlist.org">www.iucnredlist.org</a> ) for the latest conservation status (e.g. CR) and state include below. Please include estimates (if available) of the population sizes of the most important species in the area. <b>The proposal will NOT be considered if Critically Endangered (CR) or Endangered (EN) species are not found in the area.</b>			

Please list any other species that are considered threatened, but have not yet been officially evaluated by the IUCN Red List. Include a proposed IUCN Red List status and justification (including qualifying criteria) for each species believed to be Endangered or Critically Endangered.

Describe the most important threats to the area.

### PROTECTED AREAS

What organization will be in charge of creating the new Protected Area after this feasibility study is completed?

Will the eventual PA be created by purchasing land?

Will the eventual PA be created by leasing land?

Will a new government PA eventually be created?

Will a government PA be expanded?

Who owns the land currently?

Will you investigate community interest in creating a new Protected Area? If so, how?

Will you investigate government interest in creating or expanding Protected Areas? If so, how?

Will you investigate land tenure? If so, how?

Will you investigate property prices? If so, how?

Please provide a summary of methods for each component of the study (e.g. biodiversity surveys, consultations with communities and property owners, meetings with local, regional, and national government).

### BUDGET & ADDITIONAL DOCUMENTS

- **REQUIRED:** Please submit a map that shows where the feasibility study will be undertaken. Suitable map formats are KMZ/KML (Google Earth) OR shapefile (ArcGIS) format. Ideally, the potential new Protected Area should be indicated on the map. Alternatively, GPS coordinates of proposed study sites can be given.
- **REQUIRED:** Budget in Microsoft Excel format that shows expenses in local currency and US dollars.
- Optional: Conservation or biodiversity reports of the project site (if available). For example, maps showing points where threatened species occur strengthen applications.
- Optional: Letters of support from relevant government agencies.

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Photo: James Clugston

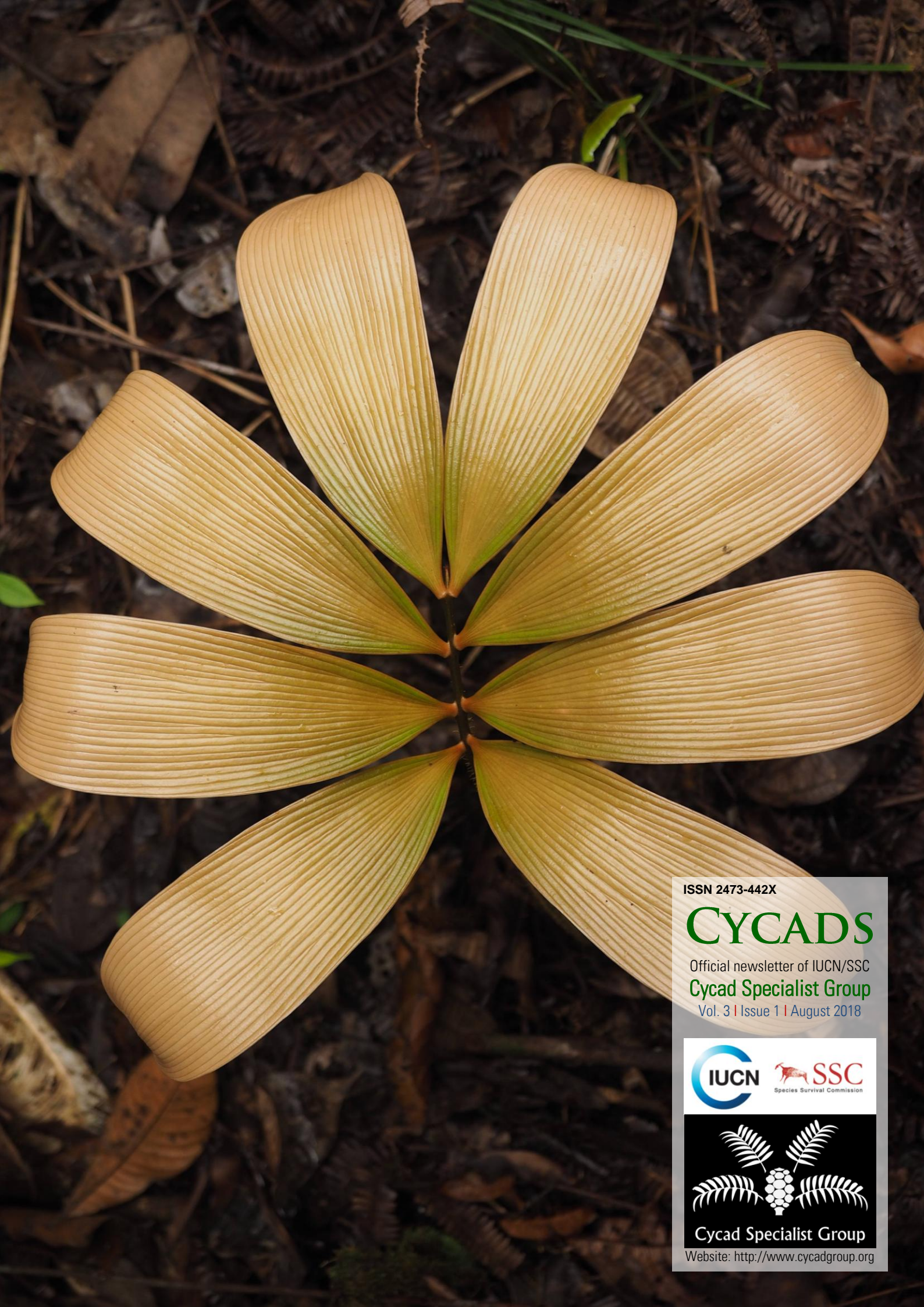


*Cycas lindstromii* S.L. Yang, K.D. Hill & N.T. Hiệp

Native: Vietnam

Conservation Status: Endangered

Photo by Anders J. Lindstrom



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