

SOCIETY FOR GROWING AUSTRALIAN PLANTS
CYCAD & ZAMIAD STUDY GROUP NO. 25
JULY - AUGUST, 1986

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SGAP QLD REGION
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Sub. Final reminder. After this issue no further newsletters will be sent to members with red dot in square. SGAP clubs excluded however -

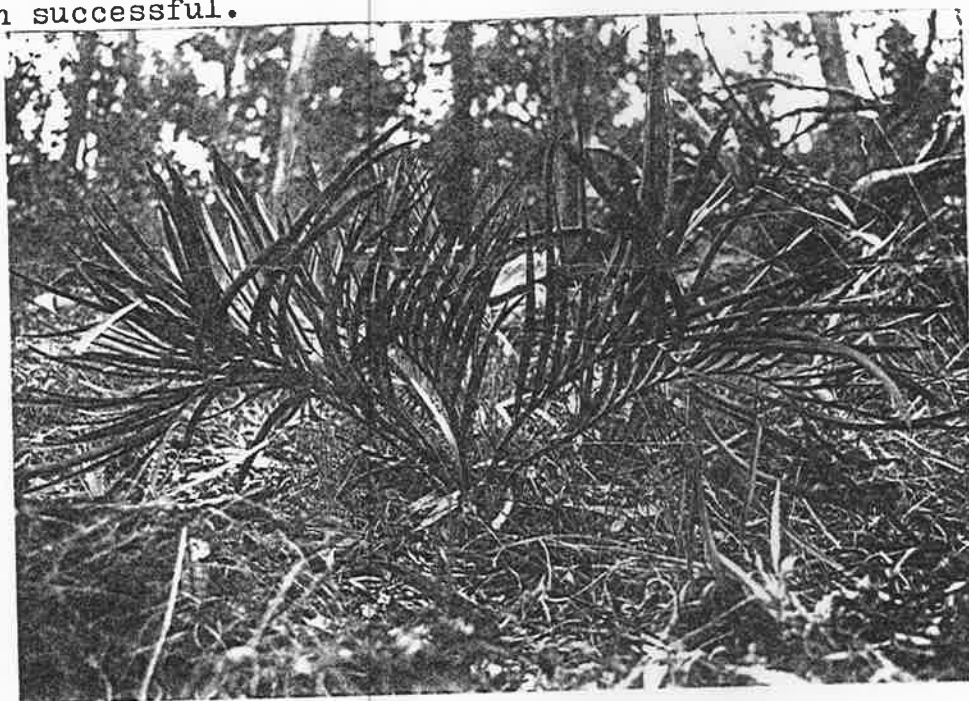
The smaller section parazamia cycads are of great interest to collectors and taxonomists and I must thank members who have come forward with seed and information about them.

The little platyrachis cycad from Blackdown Tablelands appears to be very well established in that small area and nowhere else. The latest group from the palm and cycad society to visit there reports how wet and generally dismal was their weekend, but how enjoyable to see both the strange Livistona palm of that area and good stands of the little platyrachis. All stands were within National Park so only photographs could be taken. Descent to a waterfall and swimming hole was quite precarious, but very worthwhile also.

Further information re the blue cycas "Glen Idle" reports it growing on private property at Hughenden, Qld.

I have been trying to contact the property owner to permit photographs and seed to be taken, but up till present date have not been successful.

TYPE SPECIES
 MACROZAMIA SECTION
 PARAZAMIA
 PHATYRACHIS IN
 HABITAT BLACKDOWN
 TABLELANDS, QLD.
 WELL WORTHY
 OF CULTIVATION.



John Hendricks

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6/6/86

Dear Len,

There is no concrete evidence that the Cycadales arose from the seed ferns. It is the currently favoured possibility and many of the early candidates have, quite properly, been rejected for sound reason. There are very few positively identified cycad fossils even from the Triassic - none earlier. The most recent of these - recently reported - was from Antarctica by several respected botanists specialising in Cycadales and Bennettales and the incorrect basis for comparing it with living Cycadales makes you wonder. Whatever the progenitor, a number of circumstances makes it very probable that the time of origin of the Cycadales was somewhat in excess of 300,000,000 million years ago.

The "only way" you can trace evolution in cycads (with "reasonably available facilities) is through combining data from morphology - internal and external, biochemistry, paleobotany and paleogeology. They all tell somewhat different stories but make sense when integrated.

Without going into a lot of details, cycads had migrated from Antarctica through S. America and Central America to North America and been there long enough and in sufficient quantity to provide fossils in divergent areas by early Triassic (and substantially later in England, Sweden). Routes from eastern Jordwana (Africa, India, Australia, Antarctica) were pretty well blocked to Asia from early Paleogaic into Permian of Paleozoic by South Pole in N.W. Africa and by the greatly enlarged Tethys Sea.

You can put reasonable dates on *Cycas* because it was in place before the continents split up. It went with India and with Australia when they drifted off. Chromosome karyotypes indicate that the *Cycas* of India underwent changes not shown in those remaining in Africa. If the *C media* karyotyped by a friend in Japan was from Australia (and I don't know if it was *C media* or from Australia) then they also underwent even greater chromosome changes. Unfortunately, few *Cycas* species have been karyotyped, otherwise this could be developed further.

.../3

Most of the biochemical data now known are useful primarily at the genus level - though I'm still writing on data done for me in England on many species all genera. Early data did show differentiations at the species level in *Encephalartos*.

It gets tricky analyzing data among species of a genus, especially in *Cycas* where variations in leaflet are very limited. In some taxa there are differences due to climate - as *C. siamensis* which is short-stemmed where it originates in arid Burma and Thailand - tall (ca 12') in its dispersion into wet Malaysia. I mention this as more common dispersion is from "wet" to "dry". In some cases the taxa manages to keep the "same" habitat - e.g. *C. rumphii* is a shore - habitat cycad almost exclusively in nature - but seed size varies with rainfall on different coasts - and even depending on whether cone developed in wet or dry season. Nevertheless the extent of tip of seed varies systematically with when a taxa originates - and in some cases there is reversal of order of membranes inside shell.

Changes in a taxa do not follow a set sequence of changes, rather priority of changes are determined by various factors - as local environment, genes, catastrophic changes, state of evolution, etc., etc. - depending in circumstances. This can provide different sets of trials to follow.

It all boils down to the necessity of a data bank if there is to be any reasonable attempt to trace lineage. One can't readily arrange karyotyping or specific biochem analysis, much as one might like to as this requires special facilities and trained people. It is feasible, however, to collect morphological data - actually, this can be done better by amateurs with a little guidance than professionals do it because the latter leave out a lot of critical information - and there is no better example of this than the descriptions of Australian cycas. And besides, the pro's aren't going to do it in the foreseeable future.

I've had to drop all my society memberships when my income stopped so I am confused re your study group - is it affiliated or part of the Australian Cycad Society or is it the Society or is it a separate group?

What I think needs to be done is to tabulate all the morphological data on the Australian cycads. While my own specific interests of the moment are descriptions and measurements of male and female sporophyll details (and seeds and leaflets), it would be a major mistake not to collect full data at the same time while the opportunity presents itself - and I'd be falling into the same trap others have.

For example, Loran Whitelock returned from several weeks in Australia and is sure there's only 3 species along the east coast to as far as he went - and he named them. Sounds reasonable except I know he has to be wrong from examination of the seeds I have obtained. There is at least one more - evolved from C. circinalis or C. rumphii - probably the latter, but I'm not sure yet as it has evolved considerably, while retaining positive evidence of its different origin. (This is different, Loran is a "splitter" and, while I'm far removed from being a lumper, I am more conservative than he is).

While I did obtain seed from John Maconochie that I hadn't obtained from collectors, it is evident that collectors can't have covered a great deal of the Cycas habitats.



FORM OF M. PAULI GUIELIEMI IN HABITAT NEAR
BUNDABERG. DEFINITELY NOT THE TYPE SPECIES
OCCURRING TIN CAN BAY AREA.

What I am thinking about is preparing a worksheet that could easily be filled in with observations and measurements plus collection of several male and female sporophylls and leaflets and seeds. The collected material for Botanical drawings and detailed analyses and measurements (with simple instructions). Obviously, in some cases they wouldn't be able to fill out all the spaces - but we could help be far ahead of where we are now. I'll be glad to draft such a worksheet, etc. - if this approach is of interest to you.

Analyses of the data so collected also would be tied into similar data being collected from other regions.

Analysis of the data is not always straight forward as I indicated before. To take some (ridiculous) examples, however, *C. media* could not have derived from *C. cairnsiana* because the former has many more ovules/sp than the latter; *C. normanbyana* couldn't have preceded *C. kennedyana* in linian descent as the former has shorter female sporophylls, its sterile female spor lamina is much narrower, it has fewer ovules/sp, etc. Similar analyses can be made from male sporophylls, of course. Female sp number and height (S) helping tracing Asian Cycas and probably can in the Australian as well. And despite its limitations, leaflets can help also in several details if analysed properly.

The thing is that in order to do any meaningful analyses, pretty detailed data on most taxa is necessary. It's possible I could get someone skilled in it to look at cuticles, etc. also. Can't check at the moment as he is out of the country.

This will have to do for now. I'm very interested to have your reaction to what I've suggested.

Before I left for Africa a few years ago, John Maconochie sent me seed of numerous habitats in Australia and these are undergoing biochem analyses, along with Cycas from other places, at Kew. There is a real need for chromosome karotyping, but that doesn't seem to be in the cards at the moment. There's also a need for biochem analyses for proteins not included in Kew work.

Cycas is difficult to nail down - mostly because more identification is done by leaflets than most botanists care to admit and an entire leaflet with a single midrib doesn't have to many distinct forms.

As a starting point, the descriptions of the Australian Cycas are very incomplete. I would think it would be an ideal project for your group to undertake such descriptions. The descriptions are not difficult to do. It won't work, though, if they just go out and try to describe them. They need to include things in each case that they wouldn't unless it was required - they wouldn't think of it. I can make up such a form if you are interested, and they would need to collect several male and female sporophylls and leaflets and seeds besides the measurements and counts.