



BROMELETTER

***THE OFFICIAL JOURNAL OF
THE BROMELIAD SOCIETY
OF AUSTRALIA INC.***

Issue: **Volume 51 Number 5- September/October, 2013.**

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**Bromeliad Society of Victoria. The Secretary, P.O. Box 5142, Studfield.
Vic. 3152.**

**Caboolture & Districts Brom. Society Inc.,
The Secretary, P.O. Box 748, Caboolture Qld. 4510.**

**Cairns Bromeliad Society Inc . The Secretary,
P.O. Box 28, Cairns. Qld. 4870**

**Gold Coast Succulent & Brom. Society The Secretary, P.O. Box 94,
Southport B. C., Southport Qld. 4215.**

The Hunter Bromeliad Society Inc., C/o 59 Barton St, Mayfield. NSW 2304.

**Townsville Bromeliad Study Group, c/- Mrs K Greenway, 10 Holstein
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**All other correspondence to:
The Secretary, Bromeliad Society of Australia Inc.,
P.O. Box 340, RYDE NSW 2112.**

Please Note

**BROMELIAD plants will be on sale at the Club
from 12.30 p.m. before the monthly meeting.**

MEETING VENUE AND TIME
SECOND SATURDAY OF EACH MONTH AT THE
BURWOOD R. S. L. CLUB,

Cnr. Shaftesbury Road and Clifton Avenue, Burwood.

**Meetings commence at 1.00 p.m. in the First Floor Conference Rooms/
Auditorium.**

MEETINGS PROGRAM

September 14, 2013 Special General Meeting at 1.00 p.m.
Ordinary Meeting & Show and Tell: Members, after
Special Meeting.
Talk. Guest Speaker.

October 12/13, 2013 BSA Spring Show Burwood RSL, Shaftesbury Rd.,
Burwood.
Talk: Carnivorous Plants. Ken Bradley.

EVENTS CALENDAR

October 12/13, 2013.	BSA Spring Show, Burwood RSL. Shaftesbury Rd, Burwood, NSW.
May 3/4, 2014	BSA Autumn Show, Burwood RSL Club.
October 18/19, 2014	BSA Spring Show, Burwood RSL.Club
April 16 to 19, 2015.	18th Australasian Bromeliad Conference, Parramatta. NSW.

Life Members:

• **Grace Goode O.A.M**
Bill Morris
Ruby Ryde
Keith Ryde
Andre Staelens
Ken Woods

Margaret Draddy
Ron Farrugia
Grahame Macfarlane
Eugene Morris

Editor:

Eugene Morris,
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(02) 9743 6443

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- Bankcard/Mastercard/Visa number and expiry date.
- **CARDHOLDER** signature (essential).
- Payment details (membership renewal, book purchase, postage, etc.) with \$A amounts for each item.



The Bromeliad Society of Australia Inc.

Spring Show

held at

Burwood RSL Club

96 Shaftesbury Road, Burwood

on

Saturday 12th October 2013 10am - 5pm

Sunday 13th October 2013 10am - 3pm

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BROMELIAD SOCIETY OF AUSTRALIA INC. *50TH BIRTHDAY PARTY.*

Our regular Saturday Afternoon meeting on July 13th was less of a meeting and more of a joyful mingling of many people who have been enjoying the growing of Bromeliads and talking about them with fellow enthusiasts for some years.

We had some of the founder members of our Society from back in 1963 and some of our younger members who have been with us for only a few months, but we were all there; many members had brought along some lovely food, sandwiches, biscuits and dips, cakes big and small, all supplemented with tea and coffee, so a good time was had by all of the sixty or so who made up the joyful party.

Long-standing members or former members who came along for the festivities included Bill Morris, now living in Williamstown, Bill Harland, Glenyss and Bob Larnach from Wyee; Cliff Norden, Pat Alton, Len Stewart, Eric and Joan Jordan.

There were those who could not make it on the day and sent apologies. These included Joy Marshall, Diane and Richard Cornale, Dion Fourie: "Apologies, unable to attend today. Please give my regards to all", Jackie and Andy Staelens, Dawn Williams, Ellen and Ray Sloss, Jan Townsend, plus Derek Butcher from Adelaide.

We received congratulations and cards from Moyna Prince and The Bromeliad Society of South Florida, Jackie and Andy Staelens, Margaret Draddy, Keith and Ruby Ryde, Debbie Kruger and the Fraser Coast Brom Society and the Illawarra Brom Society. Garden Clubs of Australia presented us with a Certificate of Congratulations.

A very large and beautifully decorated 50th Birthday Cake was made by Laila Istill and took pride of place on the main table.

Our President, Ian Hook, surprised at least four of us and probably everyone else, by announcing that, after a gap of some years, the Committee had decided to appoint four new Life Members:

Margaret Draddy, who has been a member for many years, attends just about every Conference both here and overseas, comes along to every meeting when her health will allow it and is always very generous with donations.

Ron Farrugia, who works tirelessly at every meeting, as he has done for so many years, looking after the Till and the many purchases made from the Sales Table, as well as setting up the Annual Trophies and organising engraving of winners' names. He also grows some very good Broms and wins competition points quite regularly;

Grahame Macfarlane, our Librarian, who is always there with the books set out on the Library Table and ready to give whatever help is needed, always without any fuss;

And lastly our Editor, Eugene Morris, who has been putting out the Bromeletter since taking it over at the end of the year 2000.

Ian presented us all with our Certificates and our Life Member badges, to resounding acclamation from everyone.

(Continued on Page 14)

THE BROMELIAD SOCIETY OF AUSTRALIA INC.

SPECIAL GENERAL MEETING

NOTICE IS HEREBY GIVEN

**For a Special General Meeting of the members of the
Society to be held at 1.00 p.m. on
SATURDAY, 14TH SEPTEMBER, 2013**

At

**Club Burwood (Burwood R.S.L.)
96 Shaftesbury Road,
BURWOOD.NSW 2134.**

The purpose of the meeting is to consider the following special resolution relating to the alteration of the Constitution:

That the wording of Clause 29 be adjusted by replacing the word "audited" with the word "inspected".

Clause 29 will now read:

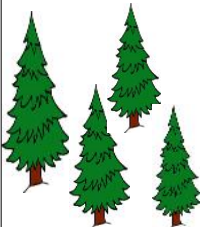
"The yearly financial Accounts made up to the thirty-first day of December of the previous year and duly inspected shall be submitted by the Treasurer to the meeting.

(See Rule 38.)

The normal monthly meeting of members will follow immediately on the closing of the Special General Meeting.

Only financial members of the Society will be permitted to vote at the Special General Meeting.

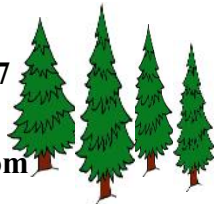
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Plant of the Month Competition

June 2013

Open

First
Second
Third

Judge's Choice.

Werner Raff *Vriesea poenulata*
No entries
'No entries

Open

First
Second
Third.

Members' Choice

Werner Raff *Vriesea poenulata*
No entries
No entries

Novice

First.
Second
Third

Judge's Choice

Lindsay Munro *Tillandsia belloensis*
Warril Evans *Billbergia* Unknown
Lindsay Munro *Tillandsia andreana*

Novice

First
Second
Third

Members' Choice

Lindsay Munro *Tillandsia andreana*
Lindsay Munro *Tillandsia belloensis*
.Warril Evans *Billbergia* Unknown

July, 2013

Open

First
Second
Third

Judge's Choice.

Owen Heaps *Neoregelia* 'Yin'.
Ron Farrugia *Tillandsia harrisii*.
Owen Heaps *Vriesea fosteriana* 'Megan'.

Open

First
Second
Third

Members' Choice

.
No Entries
.

Novice

First
Second
Third.

Judge's Choice

No Entries

Novice

First
Second
Third..

Members' Choice

No Entries

PITCAIRNIA INERMIS

by Derek Butcher July 2013.

To those of you who query what is on the label and look into anomalies, you often get that warm fuzzy feeling when you find a true anomaly. One such person is Ross Little, who flowered a plant from Peter Tristram called *Pitcairnia inermis* var *flava*, but the problem was that it had green petals and the petals had appendages. So he contacted me. In South Australia, Keith Bradtberg had already flowered a similar plant from Peter in the 1990's, only at that time we had different worries, as the following article written by me in 2004 shows:

Pitcairnia inermis* var. *flava by Butcher 2004.

This plant was imported from the USA as *Pitcairnia vargasiana* by Peter Tristram in the 1980's and an offset found its way to South Australia in 1989. I came into the picture in the mid 1990's and suggested the plant was wrongly named. I even took it to pieces in my search! In 1996 I took a photograph with me to the Orlando Conference and spoke to Harry Luther about my problem. Harry agreed it was not *P. vargasiana* but, because I spoke to him at the Conference and not when he was home at Selby Gardens, he was unable to advise further.

In June 1999 I again saw this plant in flower and was allowed to take it home for "homework".

Using the key in Smith and Downs, I kept stumbling across *Pitcairnia inermis*, but the sepals were pointed to my mind, but the description said obtuse! That was until I saw the line drawing of the sepal and it was the same shape as mine! Secondly, I was worried about the petals which were yellow not red and there was no appendage at the base. What was a surprise was the fact that these two criteria were how Lyman Smith differentiated between the type species and the variety *flava*. It was a surprise because on the one hand we had Lyman Smith splitting two genera, namely *Tillandsia* and *Vriesea* on petal appendages and here he was not splitting at species level! You are never too old to learn.

Everything clicked from then on, so I'm quite sure that the plant should have been identified as *P. inermis* var. *flava*. It comes from 2000 m. altitude in Central Peru and shares a similar habitat to the less-well documented *P. vargasiana*.

In June 2013 we again contacted Peter Tristram and got more information. The plant originally came from Rob Phillips, collected in Peru about 1985 and flowered in quarantine (Peter at that time had his own Quarantine house). Most of the fantastic stuff he collected took exception to the Methyl Bromide treatment and abruptly died. He grew on some seed. Harry named it *P. vargasiana*. (See P9)

Pitcairnia inermis; continued from Page 8.

Peter is still doubtful as to what it really is and it may be an undescribed species. He assumed at the time that Rob had collected it near Tarapoto or Moyabamba but he also went to Tingo Maria and the Machu Picchu area, with Lee Moore, the Adventurer.

Back to the books, because these days there is a wealth of information available to use, courtesy of the internet. Big problems! We have conflicting information. In the original description of *P. inermis*, Meyer says: "Petala angustissima calyce plus duplo longiora, basi squamis differte," but does not refer to colour. Baker in 1889 in Handbook of Bromeliaceae says petals are white but does not mention petal appendages. Mez in 1935 in Das Pflanzenreich does not mention colour but does mention petals are ligulate. Smith in 1974 Flora Neotropica we read "Petals scarlet, rapidly fading to white." And we can only assume that Smith got this information from Macbride 4077, 1946. But ligulate! As for leaves, Meyer originally was of the opinion they were spineless, hence the name but, from Mez 1935 onwards, we seem to have sheaths that are spiny and, as the leaves age, the blade is deciduous at this join.

In 1954 Smith created the variety *flava* and the protologue is as follows:

***Pitcairnia inermis* var *flava* var nova** L. B. Smith, Phytologia 5: 46. 1954.

A var. *inermis* petalis flavis differt.

Flowering plant 8 dm high; leaves serrulate below the abscission line; petals yellow, naked.

Type in the Museo de Historia Natural "Javier Prado" Lima, Peru, collected in tropical forest, at Cayumba, near Las Palmas, between Huanuco and Tingo Maria, Province of Huanuco, Department of Huanuco, Peru, altitude 800-900 meters, July 15, 1948, by R. Ferreyra (No. 4228).

It would seem that this species can have different coloured petals, with or without appendages, so this should not deter us from linking these seedlings of Peter's to *P. inermis* as well as being consistent in our approach. The chance of cross pollination in Peter's quarantine house seems remote. Therefore, I suggest that this new find be called *P. inermis* 'Green petalled' without it being registered because we do not know if it is a sole survivor. When more of this clone are available it may be opportune to register it as *P. 'Inermis Green'*. On a more positive note, we do know that Eric Gouda at the Utrecht University does have some of Peter's seedlings and is now eagerly awaiting their flowering. We may even see a different approach to identity!

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Peter Tristram – peter@bromeliads.com.au

TILLANDSIA MELANOCRATER

A Note from Derek Butcher.

Eric Gouda has decided that no longer is *melanocrater* a variety of *T. tricolor* but a species in its own right:

Tillandsia melanocrater L. B. Smith Emend E Gouda.

It was treated as a variety of *T. tricolor* Schlicht. & Cham. but the differences are good enough to treat it as a separate species.

Tillandsia tricolor has typical glabrous floral bracts with distinct lepidote apices, while *T. melanocrater* has glabrous bracts.

It is smaller with the inflorescence within the leaves, while in *T. tricolor* the peduncle of the inflorescence mostly exceeds the leaves.

By way of explanation the article also included the following Note: Some *T. tricolor* circulating in Sydney may actually be *T. botteri*. See note on www.bromeliad.org.au

DONATIONS.

"The Bromeliad Society of Australia Inc. would like to acknowledge, and thank, the Queensland and Northern Territory Societies for their 2015 Conference donations.

As you are aware running a Conference is a very expensive exercise. All donations are greatly appreciated and will be acknowledged in Bromeletter.

Thank you Northern Territory and Queensland."

Treasurer's Report – (1):

**Treasurer Alan Mathew gave the following details regarding our
Operating Account to May 31, 2013:**

Brought Forward	\$7,594.43
Plus Income:	6,923.50
Less expenses	4,685.50
Bank Statement as at 31/05/2013:	\$9,832.43

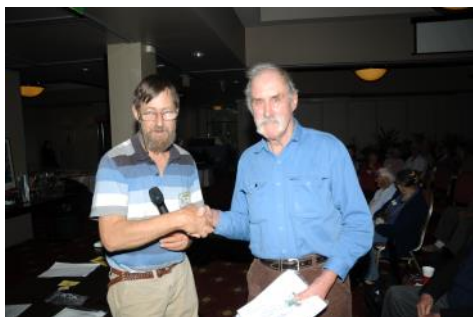
50TH BIRTHDAY PARTY PHOTOS.



Life Members Margaret Draddy & Ron Farrugia with President Ian Hook



Laila Astill's 50th Birthday Cake for the Society.



LIFE Members Grahame Macfarlane & Eugene Morris with President Ian Hook

50TH BIRTHDAY PARTY PHOTOS.



Bill Morris and Gabrielle Maitland cutting the cake.

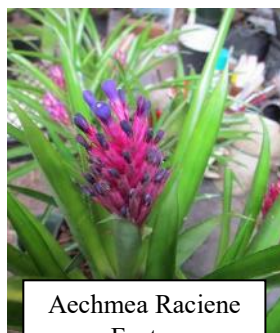


Cliff Norden and Graham Ross.



Aechmea Suenios

Aechmea Irene/Santa Catarina



Aechmea Raciene Foster

Pit. inermis flava *Pit. inermis green*
Derek Butcher photo Ross Little Photo
These refer to the article on pages 8 and 9..

Kerry McNicoll's plants.
See Show & Tell on Page 17.



BROMELIAD SOCIETY OF AUSTRALIA INC. 50TH BIRTHDAY PARTY.

(Continued from Page 5)

Graham and Sandra Ross, from Better Homes and Gardens and their own Garden Programs, also came along and Graham gave a very interesting address to the meeting, emphasising, among other things, that we all need to do more to arouse the interest of young people in gardening generally and in taking part in gardens and garden activities, instead of leaving it all to the older generation.

At about 2 o'clock in the afternoon, Ian called everyone to order and invited our longest-standing member to come forward to cut the Birthday Cake. And to follow on the injunction put forward by Graham Ross, Ian also invited our youngest member, Gabrielle Maitland, to join with Bill in this ceremony. To the clicking of many shutters and applause, Bill and Gabrielle accomplished this feat without any trouble and the cake was taken away to be cut up and distributed around the various tables and members. While all of this was going on throughout the afternoon, President Ian was calling for our Raffle Ticket distributor to hold Lucky Door Prize draws and the Prize table was gradually depleted quite successfully until there was only a bare table left. Everyone was very grateful to the volunteers who prepared the Lucky Door prizes.

Many thanks for all the yummy food that was brought in and to the hard-working volunteers who managed to serve it. The afternoon concluded with not a lot of food left and many happy memories and a good time was had by all.

Treasurer's Report – (2):

**Treasurer Alan Mathew gave the following details regarding our
Operating Account to June 30, 2013:**

Brought Forward	\$9,832.43
Plus Income:	553.40
Less expenses	416.55
Bank Statement as at 30/06/2013	\$9,969.28

Ellen Sloss.

Apology to 50th Birthday Get Together A note written by her Son, Ray.

Ellen has been a member of the Bromeliad Society of Australia for many years. She is also the second longest continuous member of the Cactus and Succulent Society of NSW. She was a member of the NSW Bromeliad Society, the Western Suburbs Cactus and Succulent Society, the Western Suburbs Bonsai Society, the Concord Garden Club and many others.

She deeply valued all the societies she was a member of and attended many Australian conventions as well as travelling to attend 18 overseas conventions. She made many life-long friends in the Bromeliad Society, contributed to articles in the Bromeleetter and books as well as participating in many events.

Ellen travelled to many countries in search of bromeliads and was at one stage the largest personal importer of plants into NSW and was, we believe, the only individual guest at the opening of the Quarantine Centre at Eastern Creek. The other invitees were nursery and commercial importers.

In 1974 she was the last winner of the Sydney Morning Herald Garden Competition, Western Zone. (see image below). One SMH judge said that Ellen had more varieties of plants in her small garden than the Botanic Gardens. She won many prizes at the Royal Easter Show, receiving the Bronze Medal (runner up to the Banksian Medal) for the second highest aggregate points, a major achievement for someone who didn't compete in roses and dahlias. She submitted entries in Bromeliads, Cactus and Succulents, Bonsai, Floral Art among other categories. She won the local Concord garden competition every year except the first year she entered. She was especially proud of beating Mr Cullen of Cullen Motors in the local competition because he employed a professional gardener 2-3 days a week.

Ellen lost her drive in the garden when she lost her dear husband Joe in 2000. It was Joe who persuaded her to join the many plant and garden societies which became a major part of her life. He was her keen supporter and the quiet force behind this passionate woman. They were a great team.

Ellen now lives in a Nursing Home in Concord, Redleaf Manor, surrounded by her awards and photographs of her plants and her family. Her daughter Paula has followed in her footsteps with a deep love of broms. Unfortunately Ellen is no longer able to attend functions and events because of her mental and physical infirmity; however we have maintained her membership of the Bromeliad Society and the Cactus and Succulents Society because they were her true loves and she always admired the growers who shared that love.

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SHOW & TELL

AUGUST, 2013

Kerry McNicol brought in three differently labelled plants but all being quite similar in appearance, wanting to know if anyone could make a definitive ID. Firstly a plant purchased from Ruby and Keith Ryde in 2002, an *Aechmea* which they collected in Brazil, but with no name. Next, a plant purchased from the Central Coast labelled *Aechmea Irene*, which in all growing conditions is identical to the first plant. I thought I had a name, however, this plant name has not been registered and so is not technically valid.

The next plant, VERY similar but with a slightly more 'flared' growth habit and almost identical flowers, is *Aechmea Suenios*, a hybrid (*recurvata* v. *benrathii* X *cylindrata* v. *micrantha*? - [*gamosepala*?](#)). Though this is very similar to the first plants, some differences are discernible so this is not the same as the first group.

The third plant is again very similar, with a slightly taller growth habit and deeper pink inflorescence and very deep violet flowers, This plant was purchased from Ellen Sloss in 2003, name *Aechmea Raciene Foster*, possibly because she obtained it from Raciene Foster. No other information can be obtained about this plant.

No-one could help with correct names so the investigation remains open, any information will be gratefully received.

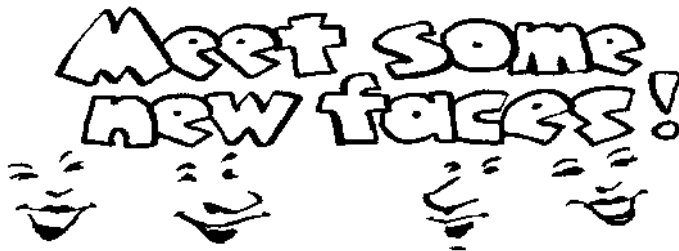
Peter Fitzgerald brought in an unknown *Aechmea* for identification. President Ian thought it could be *caudata*, going by some of the pumpkin color at the bottom of the leaves but some members doubted that. True *caudatas* come in three sizes: very big, medium and small, but these appear to be too rounded for a pure *caudata*; it is more likely to be a *caudata* hybrid. The second plant was a large *Neoregeleia* hybrid which would be difficult to identify without its label. There are so many hybrids and, more than likely, it would never be possible to find the correct name for this plant.

Malena della Porta presented an inter-generic plant which could have been a *Canmea* Bert, which is not registered. After some discussion on flowers and length of the leaves, *Canmea* Bert was rejected so the name still remains a puzzle.

Joy Clark's contribution to Show and Tell was an unnamed *Nidularium* species plant which she purchased from Marjory McNamara some ten years ago. Recently, she saw a similar plant on e-bay which looked very much like it, the description was excellent. It was named *Nid legro*, but she was unable to find any references to this name. A while back she was talking to well-known Brom grower Ross Little about another *Nidularium* which she had bought from John Buchanan and she mentioned this one. He asked Geoff Lawn, BSI Registrar, if he had seen this little plant in Marjory's Nursery and he had; he had also taken a photo of the plant and the label which bore the name "*Nidularium Species—lagris*" from the Rouse Nursery overseas. His plant survived but over the years the spelling of "lagris" has been corrupted, misspelt and mis-interpreted, so that eventually it ended up as "*legro*". Ross also did some investigating and thinks that it could be "*augustibracteatum*" or "*catarinense*". either of those two but still leading to some anomalies. It does start off being a lighter red, going to a deep maroon as it ages.

President Ian grabbed something in a hurry this morning, a very large plant with green leaves and a large red inflorescence. Tiny blue flowers pop out, they are doing just that at the moment and each morning there will be a couple more. Its name is *Aechmea aripensi*, most members will probably already have it; the spike has been coming out since January or February.

The afternoon concluded with our Guest Speakers, Susan and Rob Lewis, telling and showing us how to save and preserve flowers, using modern techniques.



WELCOME TO NEW MEMBERS.

We continue to attract new members into the Society and we would like to welcome Shaloo Sood, Malveena Sargeant, Kaiva Polis, Kevin & Paula O'Neill, Emine Muharrem, Fred Miranda, Ash Jabelli, Hendrik Grundling, Anthony Davis, Pattie Bradbury, Gladys Arizabaleta,, Annie Alarcon, Debra & Mark Hurst, John Henshaw, Richard Harper (The Brom Place, Bellbrook), Kathy & Peter Fitzgerald.

as our latest to come to admire, enjoy and learn about the wonderful world of Bromeliads.

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PHOTOSYNTHESIS FOR BROMELIAD GARDENERS

Part Three of a three-part article, presented to the Far North Coast Study Group, NSW.

Photosynthesis 3 by Don Beard.

CAM Plants and Their Characteristics

* Of the vascular plant species, some 7% or 15,000-20,000 species, 300 genera, and 40 families are CAM plants (this is considered an underestimate). As stated previously the majority of CAM plants are either epiphytes or succulents, although just about every other growing environment is represented. Most are angiosperms (flowering plants), and CAM species are five times more numerous than C4 species.

There are a number of factors which influence the degree of CAM photosynthetic pathway, and these include salinity; pollutants; these decrease the nocturnal CO₂ uptake; nutrient availability; increased CO₂, which increases the malate; the light level; oxygen; air vapour pressure; temperature; water stress, which influences the enzyme type and volume; nitrogen etc.

* CAM plants often show xerophytic characters which include; thickened and reduced leaves, which have a low surface to volume ratio; thickened cuticles; sunken stomata; trichomes; and many CAM plants shed their leaves in the dry season.

Because of the controlled use of CO₂ and water, the photosynthetic process is protected from CO₂ and water stresses; few other plants can survive such extended neglect ... my kind of plant.

The following characteristics belong to all CAM plants:

* CAM plants can separate the photosynthetic light and dark processes.

* Large vacuoles; reduced intercellular air-space; increased cell size.

* Because the CAM primary driver is the frugal use of water, CAM plants have meagre photosynthetic rates, and hence suffer a yield (growth) penalty. CAM plants need more energy to fix CO₂ than C3 or C4 plants. C4 plants have the highest growth rate of all land plants, whereas CAM plants are amongst the slowest growing on earth. C3 plants grow predominantly at night, but CAM plants' maximum growth rate is in the middle of the day.

* Net CO₂ exchange is inhibited by surface wetting. This is a clue on when not to water your CAM broms, since exchange occurs at night.

* The more the stress the higher the usage of CO₂ recycling, so that the photosynthetic process is little affected by drought.

* CAM plants fix CO₂ 15% more efficiently than C3 plants, but 10% less efficiently than C4 plants.

* The CAM pathway involves a temporal concentration of CO₂ around the RubisCo enzyme, whereas the C4 pathway involves a spacial concentration of CO₂ about Ru-BisCo.

(Continued on Page 20)

Bromeliaceae:

69% of the Bromeliaceae are CAM plants or CAM-C3 (meaning depending on the conditions can convert to either). Obviously then, 31% are C3 plants. There are no C4 plants in this family. The table highlights which broms are CAM within the family:

<p>Bromeloideae 91% Puya 24% Dyckia and relatives 100% Hechtia 100% Tillandsioideae 28% nearly all the atmospherics</p>
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There may well be some alterations/additions to this list as time passes, however because of the fairly clear determination process of whether a plant is C3 or CAM, they are unlikely to be numerous.

Note that the Orchidaceae has more CAM species than any other plant family. As a generalization, those bromeliads which are atmospheric Tillandsias, or tank bromeliads with trichomes and stiff leaves, are CAM plants. C3 plants have softer leaves and live in shaded and less stressful habitats. However there are many exceptions and the photosynthetic pathway is difficult to identify with morphology alone. The experts have done it by identifying the prevalent enzyme (major carboxylating agent) in the brom. RuBisCo for C3 broms and PEP for CAM broms. CAM is a means for successful colonization of different habitats, particularly the stressful habitats such as arid, sandy, salty, rocky, and high and low light, together with the habitats of epiphytes and lithophytes. It is probable that CAM is more of a survival mechanism than a biomass increaser. CAM is enhanced by drought.

A couple of interesting points regarding CAM broms, are that water on the leaves appears to prevent the uptake of CO₂ because the trichomes become bloated and flattened and block the stomata. Also the leaves contain a pigment called zeaxanthin that prevents photo-damage (sunburn) to the photosynthesis apparatus.

Evolution:

CAM has evolved convergently many times i.e. the same biological trait is the end result in different or unrelated lineages. In the Bromeliaceae it has evolved at least four times in response to climatic and geologic changes since the late Tertiary (2.5 million) years. Within the subfamily Tillandsioideae, C3 is plesiomorphic (ancestral) and CAM has developed later in most extreme epiphytes. In the subfamily Bromelioideae CAM predates epiphytism with subsequent radiation into less xeric habitats and with reversion to C3 in some taxa. Thus we have gained and lost CAM in evolutionary history. The evolutionary trend, terrestrial to epiphytic is closely linked to the elaboration of absorptive epidermal trichomes that are characteristic of the family .CAM broms come in all shapes and sizes, i.e. they are extremely diversified, from soil rooted terrestrials to rosulate tank broms which impound both water and nutrients, to rootless extreme epiphytes which are independent of the substrate.

(Continued on Page 21)

Photosynthesis.

(Continued from Page 20)

To sort out a more precise evolution of CAM within the Bromeliaceae, one needs a robust phylogeny (evolution) for the family, based on molecular (genetic) and morphological characteristics, something which needs more work and is unavailable at present. Consequently many taxonomic relationships remain controversial. Since it is not possible to assign precise chronology to the family's history, it is equally impossible to construct the history for CAM in the Bromeliaceae. However, one thing is clear and that is CAM is a 'Key Innovation' associated with the success of broms and their adaptive radiation into more xeric (arid) habitats.

The Bromeliaceae are relatively young but almost completely absent from the fossil record. There is a single report of a *Tillandsia* type pollen from the upper Eocene (approx. 35 m.y.). Because this is a fairly dubious piece of evidence, scientists have reverted to other means to establish a beginning and develop a history for the Bromeliaceae. Because of the neotropical distribution of broms, the conclusion is drawn that the beginning must have come some time after the western Gondwana break-up, and with the separation of South America and Africa sufficient to prevent biological exchange (approx. 85m.y.). There are plant fossils in other families related to the Bromeliaceae (Order Poales), perhaps also the Bromeliaceae emerged at this time in the early Tertiary (65 m.y.). All this is inconclusive and no date of origin or family history for the Bromeliaceae has as yet been established. Thus far it is all surmise.

However some help is gained by the mainly Andean distribution of *Puya* and the abundance of *Tillandsioideae* in northern Peru, Equador and Colombia suggesting diversification and radiation into new habitats formed during the Andean mountain building episodes from the Miocene to the Pliocene (23-2.5 m.y.). Certainly the declining concentration of CO₂ in the Tertiary would have favoured the emergence of the CAM pathway in broms, as it did for the C4 pathway.

It is appropriate at this stage to mention the remarkable epiphyte *Guzmania monostachia*. Appropriate because the plant may have evolutionary implications, and remarkable because it has an intermediate photosynthetic pathway between C3 and CAM Idling. There are other species of other genera which may possess this trait but as yet they are undocumented. *Guz. monostachia* when well watered is a C3 plant and when confronted with drought conditions reverts to the CAM Idling pathway. Suffice it to say there are functional differences along the length of its leaves and resultant divisions of labour which aid this process. CAM Idling is induced by drought stress very quickly (after seven days verses 150 days for an *Aechmea* species) and since this extremely efficient pathway is seen as a survival mechanism, we have one special plant.

(Editor's Note: There is still one more paragraph and all of the Reference data to be included, but there was not enough space for them in this issue. So they will be included in the next issue, but will only occupy one page.)

OFFICE-BEARERS:

Public Officer	Gary Lock
Book Sales	Ian Hook
Librarian	Grahame Macfarlane
Catering	Helga Nitschke, Lydia Hope
Raffle Sales	Helga Nitschke.
Pots, Labels, etc – Sales	Ron Farrugia
Plant of the Month	Terence Davis and Anne Bray
Show Registrar	Robyn Firth
Show Co-Ordinator	David Scott.

Treasurer's Report – (3):

Treasurer Alan Mathew gave the following details regarding our
Operating Account to July 31, 2013:

Brought Forward	\$9,969.28
Plus Income:	734.84
Less expenses	2,056.51
Bank Statement as at 31/07/2013	\$8,647.61

LITERATURE

<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLICATION COST (\$A)</u>	<u>POST/PACK (\$A)</u>
Growing Bromeliads - 3rd. Edition.	Bromeliad Society of Australia Inc.	\$10.00	\$6.00
Bromeliads for the Contemporary Garden. Completely Revised Edition.	Andrew Steens	\$35.00	\$6.00
Bromeliads, A Cultural Manual.	BSI	\$5.00	\$2.00
Bromeletter Index—Sept/Oct, 1979 -Nov/Dec 1989—Vols. 16 to 27.	Geoff Lawn / Derek Butcher	Contact Book Sales	
Bromeliads— The Connoisseur's Guide, 2007.	Andrew Steens	\$31.00	\$6.00



SEED BANK

The Seed Bank provides a service to members of the Bromeliad Society of Australia, supporters of the Seed Bank and other interested enthusiasts, for the collection and distribution of all types of Bromeliad seeds from local and overseas sources.

Seeds cost 50¢ per packet for Members and Seed Bank supporters (plus postage) or \$1 per packet (plus postage) for all other enquiries.

Enquiries for seeds should be directed, for the time being, to

Terry Davis

(02) 9636 6114 Or 0439 343 809

The following Seeds *are now available*:

Aechmea bromeliifolia var *albobracteata*, *Aechmea rubens*, *Aechmea warassii*, *Alcantarea geniculata*, *glaziouana* and *vinicolor*, *Guzmania sanguine* (Costa Rica form), *Puya mirabilis*, *Till. balbisiana*, *Till xfloridana*, *Till pohliana*, *Vriesea guttata*, *Vriesea saundersii*.

Thanks to Bob Hudson, Qld., Laurie Mountford, NSW, Chris Larson, Vic. Werner Raff, NSW and Terry Davis, NSW for their valuable contributions to the Seed Bank.

Thank you, Supporters of the Seed Bank.

A continued supply of fresh seed is constantly required by the Seed Bank to ensure that the Bromeliad needs of tomorrow will be met.

MEMBERSHIP APPLICATION:

ANNUAL SUBSCRIPTION: Renewal due January 1st for membership year January to December.

Membership: Australia A\$20

Overseas Membership: Asia/Pacific Zone A\$30. Rest of the World A\$35.

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