Bromeliaceae

VOLUME L **Second Quarter 2016**

The Bromeliad Society of Queensland Inc.

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MONTHLY MEETINGS of the Society are held on the 3rd Thursday of each month except for December, at the Uniting Hall, 52 Merthyr Road, New Farm, Brisbane, commencing 7:30 pm.
ANNUAL GENERAL MEETING is held immediately before the February General Meeting

Front Cover: *Tillandsia streptocarpa* (white flowered)	By: Peter Tristram
Rear Cover: *Tillandsia* 'Carmen Rose'	By: Bruce Dunstan

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CALENDAR OF EVENTS 2016

Monthly Meetings 7:30 PM at Uniting Church, Merthyr Road, New Farm

July Meeting	16 July
August Meeting	20 August
September Meeting	15 September
October meeting	20 October
November Meeting	17 November

Xmas Party 1 December Booroodabin Bowls Club, Newstead

Shows and Exhibitions

Exhibition 5th – 14th August
Spring Show 5-6 November at Table Tennis Centre

BSQ Logos

The BSQ logo was a hand drawn design (apparently by Len Butt) from many moons ago and our only copies have suffered by being copied and recopied over time. The Management Committee has had the logo reformatted as an electronic image which is sharp and can be manipulated electronically. The photo shows the comparison between old fuzzy and new sharp images.

Also shown is the logo to be used for the 50-year Anniversary in 2017.

The previous issue of Bromeliaceae asked for members to submit photos, notes and ideas to mark the event. To date little has been received.

The 50th Anniversary logo is proposed to be used for "merchandise". Please discuss what merchandise holds interest for you. Is it a coffee cup? An embroidered cap? And enamelled badge? A car sticker? ..or?

We need your support to make the Anniversary something special and a milestone event for the Society. Please flood us with information from your old photo albums, diaries, notes etc.

EDITOR NEEDS ASSISTANCE

I propose to feature the genus Aechmea in the next issue. I need photos aplenty to manage this. Please email files with plant names.

SUNNY BROMS CONFERENCE 31 March – 2 April 2017

19th Australasian Bromeliad Conference on the Sunshine Coast

OVERVIEW

- Two and a half days of plenary sessions (presented by Australian and Overseas speakers including –
  - Keynote Speaker – Chester Skotak
  - Eloise Beach – (Florida, USA)
  - Peter and Jocelyn Coyle (Auckland. NZ)
  - George Stamatis – (Elimbah, Queensland, Aust)
  - Peter Tristram – (Bonville, New South Wales, Aust)
  - Bruce Dunstan – (Brisbane, Queensland, Aust)
  - Dr.Theresa Bert – (Florida, USA)
  - Negotiations are continuing with several other speakers
- Two (2) half day tours of local Bromeliad Gardens and Nurseries,
- Banquet
- Optional Dinner – Followed by Rare Plant Auction
- Plant Sales,
- Plant Competition
- BSQ Golden Jubilee Lunch – Co Sponsored by BSQ, and
- Numerous social activities

The conference will be held at the Events Centre Caloundra situated on the southern part of the Sunshine Coast, Queensland. An ideal venue with ample space to accommodate plant sales and displays, numerous meeting rooms, Banquet room and a 300 capacity tiered theatre. The venue is fully licensed . There is plenty of accommodation to choose from within walking distance to the venue, from budget to luxury, motel, holiday units and apartments. Golf style also available. Prices range from A$85 to A$250 per night plus. IT IS GETTING CLOSE NOW TO THE CONFERENCE SO BOOK FOR BEST PRICES AND LOCATIONS!

REGISTRATION IS NOW OPEN

Registration will be limited to 300 Delegates. Considerable interest has been shown on a worldwide basis so early registration is recommended to avoid disappointment. Early Bird Registration Fees are set at $300-00 (AUD). This is a considerable discount for what is on offer. The close off date for Early Bird Registrations is 31st December 2016.
Registration Fees from 1 January 2017 will be $350-00 (AUD).

Full Registration covers all activities EXCEPT for the OPTIONAL DINNER. The Optional Dinner is an additional $50-00. Alternate options are available for Delegates / Partners: - Garden Tours at $20 each, Banquet at $70 per head and the Optional Dinner at $50 per head

Tillandsias

The genus is named for the Finnish botanist Dr Elias Tillands. Smith and Downs 'Flora Neotropica' provides the key enabling definition of the subfamily Tillandsioideae and of the genus Tillandsia within that subfamily -see p 665. Tillandsias are typically

- Epiphytes;
- with roots often functioning only as holdfasts;
- with capsular fruits with seeds having a plumose appendage at base or apex or both;
- without petal scales;
- and entire leaf margins- no spines!

The separation of the genus Vriesea from Tillandsia is based on the presence or otherwise of petal scales. Benzing noted

> "Perhaps the most arbitrary taxonomic boundary standing in Tillandsioideae today is that between members of its two largest genera.....If petal flaps are present, the individual belongs to Vriesea; if not, you have a Tillandsia. Petal scales are of an equivocal biological significance, consisting of nothing more than a pair of delicate flaps of tissue arising from the inner surface of each corolla member. There are tillandsias and vrieseas that, except for these petal claws, are much better suited to be in the other genus."

Researchers cannot leave a challenge like this sit so we can expect to see revisions of the subfamily. BSQ was a supporter of the funding drive to help get the subgenus Tillandsia phylogenetic (i.e. DNA) research underway. Advice from the principal researcher is that the work is complete and the initial paper has now been published. This activity is but one example of work ongoing which will surely provide some confusion initially as we get to revise grouping and potentially naming of species.

These plants evolved from tank bromeliads 5-10million years ago. The more interesting group of Tillandsias are what are colloquially named "Air Plants". That leads to a serious misunderstanding that they live on air. More accurately they are atmospheric bromeliads and number 300-400 species mostly tillandsias. These plants operate without leafy tanks or absorptive roots, subsisting instead on moisture and nutrients extracted from rain, mist and air borne particles.

There is a huge range of forms of Tillandsia among the over 600 species identified and as with the family Bromeliaceae are found from southern USA through Central America and into the northern parts of Argentina and Chile. Tillandsias are found from sea level to the high Andes and in both moist and dry habitats. Among the tank forming tillandsias are plants with leaves over 1m in length and inflorescences over 3m tall and 1m width (T longifolia, T grandis). The atmospherics are smaller and include some with leaves less than 1cm in length (*T minutiflora*) and with only 3 leaves comprising a plant (*T usenoides*).

Species of the large tank forming tillandsias sometimes available in SEQ include:

T grandis- a large green leaf plant with a grand spreading inflorescence to 3m tall. Mike Simmons brought the inflorescence of his *T grandis* to be the Xmas tree for the BSQ a few years back;

T krukoffiana – has darker leaves with a purplish tinge. The rachis of the inflorescence is mauve/lavender and about 2m tall although under the weight of the inflorescence tends to lean over;

T australis – a large green leaf plant with a pendulous pastel pink inflorescence about 1.2-1.5m long. I had to elevate my plant to bring the inflorescence above ground level;

T pamelae – somewhat rarer but more sought after as it is of a more manageable size (at about 70cm high and similar width) and with a spectacular pink pendulous inflorescence.

Some of the smaller tank forming species seen in SEQ include:

T deppeana – green leafed species in which the branches of the inflorescence come from between the leaves as well as a central peduncle. The bracts are a pinkish red and form a tall many spiked inflorescence. Petals are tubular.

T multicaulis – similar habit to *T deppeana* in that the inflorescence comes from between the leaves but in this case without a central spike. This species though has only 4 or 6 spikes to the flowering and each is shorter at around 20cm. It is not an easy plant to grow well, preferring a shady position. Petals are tubular.

T hamaleana – a green leafed plant with some spotting of the leaves. It has pale blue flowers with an open arrangement of the petals, different to the majority of tillandsias which have a tubular arrangement of the petals.

T dyeriana – a narrow rosette is formed with only 6-8 spotted leaves and a truly spectacular orange inflorescence and white flowers with open petals. Prefers a moist environment and said to be easier to grow potted.

T venusta – green leaves with some dark purple spots. The inflorescence launches from the centre of the plant and is branched with open white petalled flowers.

T wagneriana – a green leaved plant with a pastel pink inflorescence. Intolerant of cold.

The size and growing habits of the tank forming tillandsias mean that they are best suited to be grown in pots. A free draining potting mix is required and fertiliser can be added to the potting mix. These plants also appreciate foliar feeding.

The biggest group of Tillandsias grown in SEQ are the grey leaf species and their hybrids. The plants have a special mechanism designed to retain moisture. This CAM process fixes carbon dioxide during the night meaning the pores are closed in the day reducing transpiration. This process has allowed the grey leaf tillandsias to inhabit some hostile environments with low rainfall and low nutrient availability. A corollary to this efficiency is a somewhat slow rate of growth. Of course we speed the growth process in cultivation by a more generous supply of nutrients than the plants have in habitat, but a high degree of patience is still a prerequisite trait for a tillandsia fancier.

Clockwise from top R: *T australis, T krukoffiana(JO), T pamelae*(Tristram), *T grandis*(Dunstan)

Photos clockwise from top R: *T deppeana, T venusta (JO), T hamaleana(P Tristram), T dyeriana* (JO)

Typically, they grow best on "mounts" of some type. (Some grey-leaved tillandsias, for example *T fasciculata* and *T jalisco-monticola*, grow well in pots.).
Mount materials used include:

- Cork pieces (although they are relatively expensive);
- Wine corks whole or halved;
- Pieces of hardwood fence palings and flooring (but not material which has been painted, or treated with timber preservative). "Well weathered" wood is best, as it provides plenty of crevices and cracks for the plant's roots;
- 2 to 3 cm wide callistemon and melaleuca branches that have been dried in a shady place for about a year;
- Anodised aluminium wire which can simply be bent around the plant.

It is important plants are firmly secured to their mounts. If they are not, the plant is very unlikely to thrive. Methods for securing tillandsias to mounts include:

- Tying them on with strips of light- coloured hosiery.
- Glueing them on using a product such as All Clear, Liquid Nails, or a hot glue gun. The latter requires care not to burn the plant or the user. However, use solvent-based rather than water-based glues, as the latter product can disintegrate before the plant sends roots onto the mount.

A suggested starter pack of small to medium sized grey leaf Tillandsias would include:

T ionantha - comes in many forms discussed further in this issue – reddish plants more common, whole plant flushes red or in some cases soft yellow at flowering;

T gardneri - soft silver-grey leaves, regular flowerer with a pastel pink inflorescence, sets lots of seed. Grows to around 15cm tall. The multi branched spike is located at the end of a 15cm long stalk. The flowers have pink-red petals. Has some varieties/forms which are uncommon.

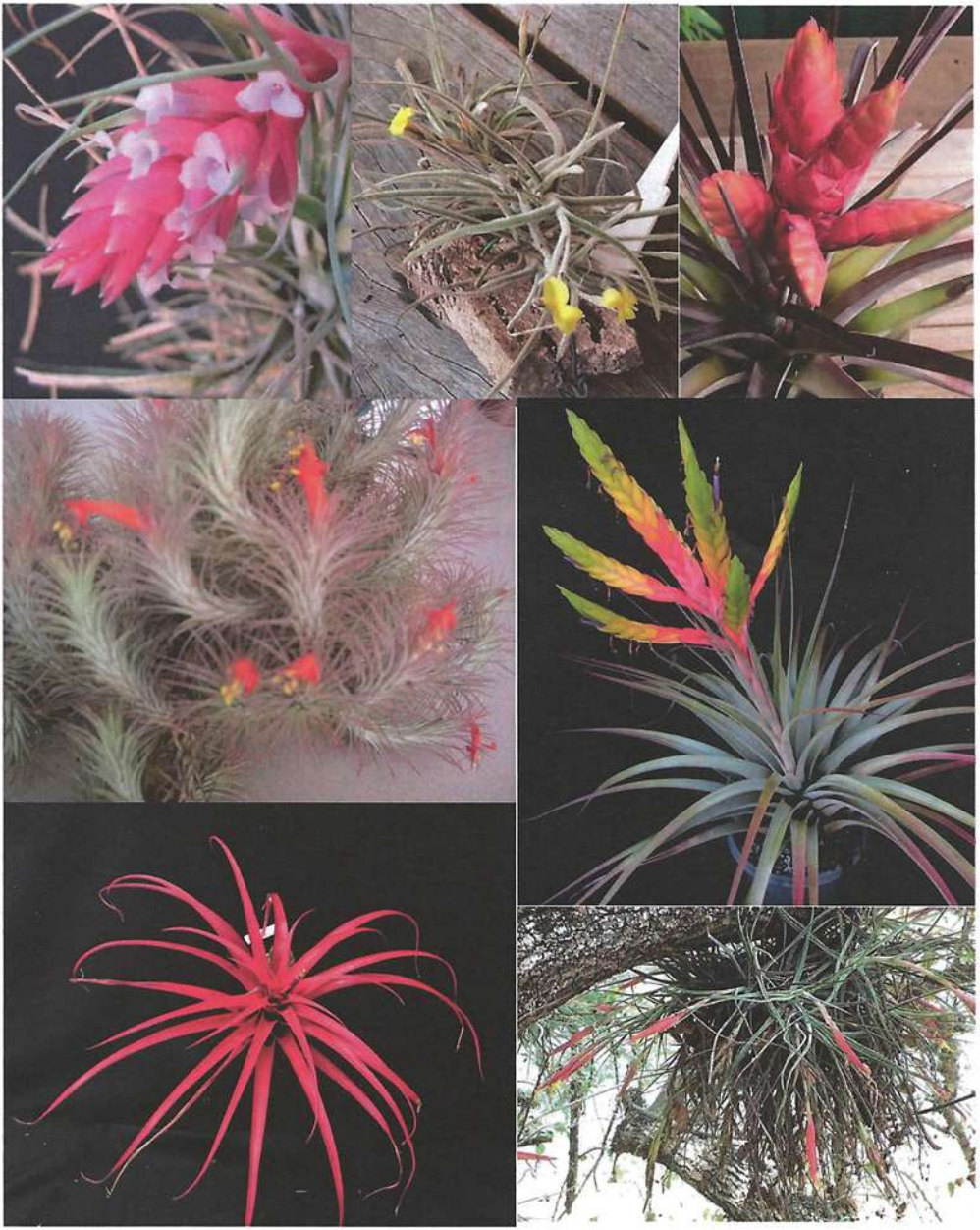
T stricta - forms a well-shaped squat rosette of typically grey-green leaves 10-20cm wide. *T stricta* has many forms which tend to flower at different times. The arching inflorescence forms at the end of a 5 – 10 cm long stalk and consists of up to ten blue or purple flowers surrounded by pink to red bracts.

T crocata - small plant 7-15cm high with 6-8 leaves usually arranged flat fan like, perfumed yellow flowers on a 10cm stalk, clumps well.

T schiedeana- small plant to 10cm with few leaves, quickly clumps, flowers well. Lots of seed. They have a red/yellow sword-shaped spike, about 10 cm long and 0.5 cm wide. The flowers usually have yellow petals and set lots of seed;

T tectorum - the thin leaves covered with trichomes makes this a favourite. Slow growing and has forms ranging from 5cm diameter to 50cm. Pink inflorescence on a 10-20cm spike – not cheap but you really need some!

T fasciculata- a larger plant with leaves typically 25cm and inflorescence to 75cm, can be potted, long lasting branched inflorescence which is candelabra like and typically red although gold, green and plum colours also exist.



Starter examples clockwise from Top L: *T stricta, T fasciculata* 'Dennis', *T fasciculata* 'Chacalapa', *T scheideana, T capitata*

T funckiana - a small caulescent plant with many thin leaves and will form clumps which flower reliably mid-summer. *T funckiana* has red tubular flowers which at 3cm length are large relative to the size of the plant. A flowering clump is quite spectacular.

T bulbosa - an example of the peculiar shapes of some tillandsias, *T bulbosa* has a small bulb and leaves in which the edges curl to almost form a tube. The plant is very variable in size, but typically reaches 15 cm in height and 12 cm in diameter at maturity. (However, there is a miniature form that only reaches 7 cm in height.) About six leaves form a "bulb" at their base, and then arch outwards. The leaves' colour is quite variable with some plants (clones) having grey-green leaves, others are a silvery-grey, while some are almost black. The inflorescence consists of a multi-branched cherry-red spike, with each "branch" typically being about 5 cm long. The flowers have blue petals. This plant readily forms a clump. The bulb is often colonised by ants.

T capitata - a species with many forms. In the commonest forms, the whole plant is normally red but deepens in intensity at flowering. There are forms with silver-grey scurfy leaves and a pink/peach coloured inflorescence. These peach forms are now known as *T riohondoensis*. Other forms have two coloured leaves at flowering with the outer half of the central leaves flushing yellow, red or orange to match the inflorescence.

There are a huge range of tillandsia hybrids available. Most are crosses of two species although we are now seeing a few which are crosses of hybrid parents. SEQ is home to Australia's most active tillandsia hybridists A quick check of the BCR showed 100 registered hybrids among the top three (M Paterson, B Genn, and N Ryan). I caught up one and asked about the origins of his enthusiasm for tillandsias.

Neville Ryan started his interest in bromeliads in the 1970s with his first bromeliad being *Aechmea* Foster's Favourite. He started with tillandsias in 1980 securing 3 plants (*T ionantha, T mallemontii, T tricholepis*) from Peter Sang who was a collector based at Moggill, and followed them up with seedlings principally from Olwyn Ferris. Asking Neville to explain his interest in tillandsias generated a wide ranging list of adjectives – variable species, bizarre shapes, interesting colours, characterful mountings (not sure if characterful is truly a word but I've heard it used a lot on UK property shows), easy to grow. His path to hybridisation sprang from tinkering to get seed to reproduce plants. To set seed one needs pollen, so the step to moving pollen from species to species was a natural progression into hybridisation. The Bromeliad Cultivar Register has 16 of Neville's hybrids.

The starter list above includes Neville's favourites – T ionantha and T tectorum (both are featured later in this issue). Neville grows most of his plants on mounts which he sees as adding character compared to potted plants. As many of his plants as can be accommodated are actually grown outside his shadehouse with an east facing aspect.

Changes to import requirements to protect against Xylella

The Xylella bacterium is limited to the xylem (water conducting elements of plants). Insects with piercing/sucking mouthparts that feed on xylem sap transmit the bacteria from diseased to healthy plants. Plants develop symptoms when the bacteria block the water conducting system and reduce the flow of water to affected leaves.

AQIS RESPONSE

The Australian Government Department of Agriculture and Water Resources is strengthening the import requirements for a number of plant species to safeguard Australia against the bacterial plant pathogen Xylella (Xylella fastidiosa)- a serious plant bacteria that affects a large number of common plants species including wine and table grapes, citrus, olives, forestry and amenity trees, almonds, cherries, peaches, plums, avocados, blueberries, coffee, pecans, alfalfa.

Xylella is not present in Australia but is of major concern to Australia's plant industries. If it gets into Australia it will be practically impossible to eradicate. This bacterial disease originated in the Americas and has spread to Europe with recent detections in France and Italy.

The changes will apply to host plants including tissue cultures, rooted plants, cuttings, budwood, some corms and bulbs being imported from the Americas, Europe and a number of countries in the Middle East and Asia, where the disease is known to be present. These will strengthen the existing import conditions that were put in place for Xylella in 2009. The additional import requirements came into effect on 19 November 2015 for high risk countries. Country freedom certification requirements for low risk countries will come into effect on 19 January 2016.

Key changes to import requirements will include:

- plant material coming from countries where Xylella occurs will need to be tested offshore and certified as free from Xylella by the government of the exporting country.
- Material that does not meet the above requirements may be held and tested in an approved post entry quarantine facility for 12 months or
- Nursery stock material may be hot water treated, followed by standard post entry quarantine screening arrangements.
- An approved arrangement in accordance with Australia's requirements needs to be in place for off-shore certification of nursery stock from high risk countries.

The volumes of some ornamental plant material and tree species permitted entry to Australia may be reduced, and the costs of importing might increase. This is because laboratory testing will be required and longer observation times in quarantine may be necessary.

[Ed: As far as bromeliad importation is concerned the changes appear to have effectively closed the door for now on import of bromeliads. Seed can still be imported. The basis for the decision is being challenged on the scientific basis for the decision and inconsistencies among plant families affected. Facts are scarce on what may eventuate. The above describes the current situation as seen by AQIS]

CHANGES TO SHOW COMPETITION SCHEDULE Barbara Murray

The Bromeliad Society of Queensland decided to offer a Judges Training Session under the auspices of Olive Trevor. The interest was overwhelming. Due to illness, Narelle Aizlewood (who had attended all but the last Judges Training session from the Bromeliad Society International{BSI}) stepped in to assist Olive.

It was decided during these judging schools that the old schedule was in need of updating and so Olive, Narelle, Pam Butler, Helen Moriarty and I met to consider the changes. A lot was done at the first meeting, due to Olive, Narelle and Pam having attended many BSI conferences. Helen went home and did a fine job of putting all the changes into a new schedule. Helen resumed study so left the group and Olive, Narelle, Pam and I continued. The final draft was nearing completion just in time for us to receive input from Charlie Birdsong who was a Judge from BSI visiting Australia. He scanned the document, gave us feedback and Pam has taken the latest Schedule to America for the BSI to review. Our show schedule will hopefully adhere to the basic ideas of BSI Judges Handbook Standard but is adapted to our society.

In Category I, the major change separates specimen and multiple, blooming and non-blooming. Before, all plants competed together making it very hard to judge but now they are 4 separate classes - single specimen blooming, single specimen non-blooming, multiple blooming, multiple non-blooming. Genera previously not included specifically were given classes or added together in classes e.g. Alcantarea, Deuterocohnia, Puya. We also alphabetised the classes to make it faster to find the right genus. The sizes of Neoregelia caused debate as we had varying feedback from members. We used measurements, then changed it back to mini, midi, large, then decided to reinstate the measurements and add a fourth size. Neoregelia – up to 250mm, up to 450mm, up to 800mm, above 800mm. Using the measurements assists in making instant decisions rather than discussing the value of mini, midi and large.

In Division III Horticultural Displays we have again separated single specimen and multiples and blooming and non-blooming to make 4 classes.

In Category II, Artistic Design there are very few changes from the current schedule.

The Awards section has been updated to include all the new Trophies.

Competitors may now choose to compete as a novice if they meet the requirements or they may choose not to be judged as a novice. This allows first time competitors who are experienced growers to compete for the Major Awards.

Conditions of Entry and Notes for Competition Schedule have been rewritten and it is the responsibility of the competitor to read these sections before the Shows. This part of the show schedule will be updated each show and the first show to use this schedule will be our 2016 Spring Show.

Variations on a theme -*T ionantha*

Among Tillandsias there are a number of species which exhibit wide variation in form. *T ionantha* is probably the one with the most variants. The genetic structure of *T ionantha* was investigated using electrophoresis (see Ref 1). [Ed: Electrophoresis is an analytical method frequently used in molecular biology and medicine. It is applied for the separation and characterization of proteins, nucleic acids and subcellular-sized particles like viruses and small organelles. Its principle is that the charged particles of a sample migrate in an applied electrical field.]. The conclusion there was that T ionantha is an outcrossing species.

Outcrossing introduces genetic variation in a species. Outcrossing is believed to be the "norm" in the wild. Outcrossing in plants is usually enforced by self-incompatibility- i.e mechanisms to prevent self-pollination. However, *T ionantha* is able to be self-pollinated.

Tillandsia ionantha has up to 40 leaves typically forming a dense rosette from 4 to 10 cm high and 2 to 5 cm wide. The leaves are normally silvery- green in colour (although the variety *stricta* has reddish leaves) until it flowers. At that point, the top half of the plant usually flushes red, although many clones turn red all over. Two to four flowers having violet petals emerge from the top of each rosette.

However, there are albino forms ('Sumo', 'alba', and 'Druid') with white petals, and leaves that turn yellow rather than red, at flowering. There is also a form understood to be a sport from Druid with pink champagne tips to the leaves at flowering.

This species is quite variable in size and appearance. Its long-lasting red colouration in the middle of winter (which is when many clones flower, although some flower in spring and early summer), and "no fuss" growing requirements, makes it a very popular plant.

The official Bromeliad Taxon List shows 6 accepted varieties in the species:
T ionantha
T ionantha var ionantha
T ionantha var maxima
T ionantha var Stricta
T ionantha var stricta f fastigiata
T ionantha var van hyningii.

Examples of the latter 4 are shown in photos following.

There is also a raft of variations which have now been recorded as named cultivars in the BCR. There are also a number of what may best described as 'nurserymen's names" used to inform customers of different forms available. The Table following provides a guide to cultivars.

T ionantha species varieties Clockwise from Top L:
T ionantha v stricta
T ionantha v maxima
Tionantha v stricta f fastigiata (on R note size of wine cork and L in flower)
T ionantha v vanhyningii (on left of text)

Ionantha Cultivars clockwise from Top L: 'Sumo' J Brittain photo; 'Fuego' P Tristram photo; 'Hamelula' ; 'Rosita' R Hudson photos; 'Orange' S Molnar photo; 'Curly Top' RH photo.

Tillandsia ionantha –a guide to its Cultivars Dec 2015.(D Butcher) See also JBS. 43(4):161.

Apretado	= v. *ionantha* a slow growing form and therefore large at flowering
Aurea Grandis	name used by Isley before changing to Sumo Size White
Christmas Pink	N Ryan
Cone Head	unknown origin
Corsa	A form being distributed by the company Corsa SA in Europe and quite widespread and named in Australia
Cup cake	A. Flower
Curly Top	
Druid	albino form
Fuego	from Guatemala, leaves stiffer than v. *stricta*
Fuego Yellow	see JBS Japan 2014
Gigante	from Isley 2010 seems similar to Apretado etc.
Hand grenade	from Honduras – Cathcart
Haselnuss	name used in Germany -? Peanut
Hedgehog	From Thailand
Huamelula	= v. *maxima* -photo held
Mayan Totem Pole	
Maui	Probably from Bob Okasawi
Mexican Pink	
Minnie	named by Bob Hudson of Cairns for a very small form selected from a seed batch. Flowers at 3cm tall
Minnie White	Named by Bob Hudson. Yet to be proved stable
Monstrose	By Isley.? links to Gary Hammer as Pachara Predator and the German 'Kristate'?
Pachara Predator	Monstrose
Peach	from Taxco Mexico
Peanut	= v. *stricta* fa. *fastigiata*
Penito	large form similar to 'Apretado', from Bromelifolia, Guatemala
Pine Cone	from Cathcart
Pink Champagne	ionantha x Druid
Pyramid	Isley
Renate	variegated form –Other names given which seem only to be a variation in the actual variegation such as 'variegata', albomarginata', and 'Yuko Johnson' in Taiwan for an almost albino
Ron	Isley
Rosita	= v. *stricta*
Rubra	from Guatemala – more soft open rosette with a fluffy silver appearance
Small Mexican	from Alfredo Lau in the early 1990's and widespread at in Australia & New Zealand. As the name implies, flowers when quite small.
Sumo Size White	A large white flowered form named by Isley
Tall Velvet	name from Tillandsia International

Totem Pole	from Isley – a large form similar to 'Apretado' Also known as 'Fuego Totem Pole'
Two Tone	
Zebrina	a cultivar with light cross markings on the leaves

1. GENETIC VARIATION IN THE EPIPHYTES TILLANDSIA IONANTHA AND T. RECURVATA (BROMELIACEAE) by SOLTIS, GILMARTIN, RIESEBERG, AND GARDNER in Amer. J. Bot. 74(4): 531-537. 1987.

Pots and Plant Physiology

by Les Higgins

(from FNCBSG Newsletter)

Glossary

Angiosperm: A seed-bearing vascular plant of complex reproductive structure containing a flower, ovule and anthers.

Cambium layer: Continuous sheath-like layer of meristem.

Cotyledons: Seed leaves formed from the seed prior to the first true leaves.

Dicotyledons: Flowering plants of which the embryos have 2 seed leaves.

Meristem: Tissue capable of division eg at the tips of roots or apex of shoots.

Mesophyte: A plant of optimum growth in conditions where temperature and moisture gradients are moderate and reliable.

Respiration: The energy releasing oxidation of biosynthesised products to simpler compounds.

Xerophyte: A plant that evolved by modification of form and/or function to survive in hostile conditions.

Vascular system: The arrangement of water and solute-conducting tissues.

One classification in taxonomy is Angiosperms, this embraces Monocotyledons and Dicotyledons. All Bromeliads are monocotyledons (abbrev. to monocots). Some of the characteristics associated to monocots are:

- The embryo is a single cotyledon (hence the name), usually with petals and sepals attached under the ovary;
- Floral whirls are in threes;
- The vascular system is scattered bundles (best described as having no cambium layer);
- Linear leaves with parallel leaf veins;
- Thickened basal stems known as rhizomes.

Very importantly, monocots have a fibrous root system that is best accommodated in pots that have a large surface area and shallow depth. However, there are various monocot root forms that need a specific style of pot for best accommodation. A shallow pot with slotted sides is a good design for a small monocot.

With respect to pot selection, the key Dicotyledon (dicots) difference compared to monocots is that dicots have a tap root and branched primary roots. (The standard pot gives depth for the dicots tap and primary roots to descend).

Bromeliads are classified according to their original habitat and may be Mesophytes or Xerophytes. There is a belief that plants breathe out oxygen during the day and carbon dioxide at night. The term breathing is incorrectly used. Breathing is the inhalation and exhalation of air by lung action. Plant equivalent to breathing is to respire by gaseous diffusion across a semi-permeable membrane. The skin of a plant is a semi-permeable membrane and can be described like a rubber sheet riddled with tiny holes. Leaves, stems and roots all have the semi-permeable membrane and respiration is continuous day and night.

Root respiration is very basic. As the oxygen in the pot diminishes more is required to enter into the root area. As CO_2 becomes more concentrated it flows out of the pot. The pot should not just hold the plant. It should be carefully selected to allow adequate respiration and drainage. To complement the pot, the potting mix must be below pH7, be of open texture and have good drainage while remaining moist. If respiration is limited, then the growth never reaches its full potential.

There are better pots for growing Bromeliads than pots with holes only in the bottom. Water can drain away but placed on a solid flat surface air movement is limited. Net-pots are excellent for monocots in that they allow adequate air diffusion but their disadvantage is in rapid drying out. Putting a net-pot into a plastic pot solves the problem and increases root humidity. Wire baskets lined with onion bag are good containers. Shallow, large diameters are best for monocots. Leave the deep bellied baskets for dicots. Exposure to summer sun has potential to make the wire very hot. Stolons and leaves that contact the wire are liable to be cauterised. Insulate the wire with a sleeve of rubber or plastic tube.

An earlier FNCBSG Newsletter (May 2014, p.9) shows a Tillandsia in a net-pot with roots growing through the net. This is a good way to grow roots on an epiphyte. Big chunks of bark or polystyrene can jamb an epiphyte into a net-pot, then put the net-pot into a standard pot. Wet substances such as paper, rag, rockwool etc. in the bottom of the standard pot will, as they dry, increase the humidity around the plant and stimulate root production.

There are pots in varied shapes, materials and sizes, all have their ideal uses. Outstandingly best for Cryptanthus is the plastic Vanda slotted basket available as 100 mm square, 200 mm square and 300 mm square, mesh lining is needed to contain the potting mix. Second and third choice could be either the net-pot or the wire basket. All three styles of container have the potential for good root aeration and excellent drainage. As a fourth choice there are plastic squat pots that have slots extending from the base to well up the side of the pot. A glazed pot is very low on the list of being a desirable container for plant growth.

It is said that Bromeliads have a preference to be under-potted rather than overpotted. This may be true but more logical is that bromeliads, as monocots, should be shallow potted rather than deep potted. The larger the surface area the more extensive the fibrous root can become. Ultimately what type of pot is selected affects the growth and appearance of the plant.

Charcoal

from Bromletter Sep/Oct 1989

"Charcoal" is a common form of carbonized wood which has many good garden uses. An understanding of its properties and functions will be helpful in the correct application of it, especially to house plants.

Charcoal itself has no food value. Its most important use to plants lies in its ability to collect and conserve ammonia. This remarkable function is one of the marvels of science and nobody has been able to explain it. If pieces of charcoal are in the soil it will be found that roots will cling to it to absorb the collected ammonia.

When organic fertilizer begins to decompose, one of the first products given off by the bacteria is ammonia gas. This gas is extremely volatile and easily escapes but if a grain of charcoal lies next to a grain of fertilizer, it will absorb 80 times its own bulk in ammonia and will hold it for the use of the plant roots. It is the ammonia forming capacity of bone meal, fish meal, natural manure, compost and such organic fertilizer that we pay for and the gas should not be allowed to escape.

Charcoal has other equally valuable properties:

- It is the world's most perfect purifier.
- It acts as a continuous factory for the destruction of injurious acids.
- Wherever evil organic gases are given off; charcoal will absorb the odour.

A sprinkling of charcoal over the compost heap or over the freshly fertilized lawn will not only prevent odours but will conserve the ammonia. For house plants it has many good uses:

- It sweetens the soil.
- Saves fertilizer.
- Checks damping-off of seedlings.
- It affects the soil texture and quality and neutralizes overly large doses of acid plant food.

Some tillandsias rare in collections and rarer in flower- clockwise from top L:
T funckiana (rare to see so many flowers!), *t latifolia enano, T ixioides. T esseriana* red leaved(all B Dunstan), *T gerdae*, and in centre *T* 'Blue Moon' so named as it flowers once in a blue moon!

Tillandsia tectorum

Along with *T ionantha* discussed earlier in this issue, *Tillandsia tectorum* is the basis for starting a tillandsia collection. Of course as any bromeliad enthusiast knows there come along later lists of "needs, wants or desires". (What the collector "needs" may be reduced to "desires" by household financial constraints). This is a relatively slow growing species and in addition is not easy to have set seed and then the seed is in limited quantity. These factors together with being highly sought after, take it out of the "budget buy" group.

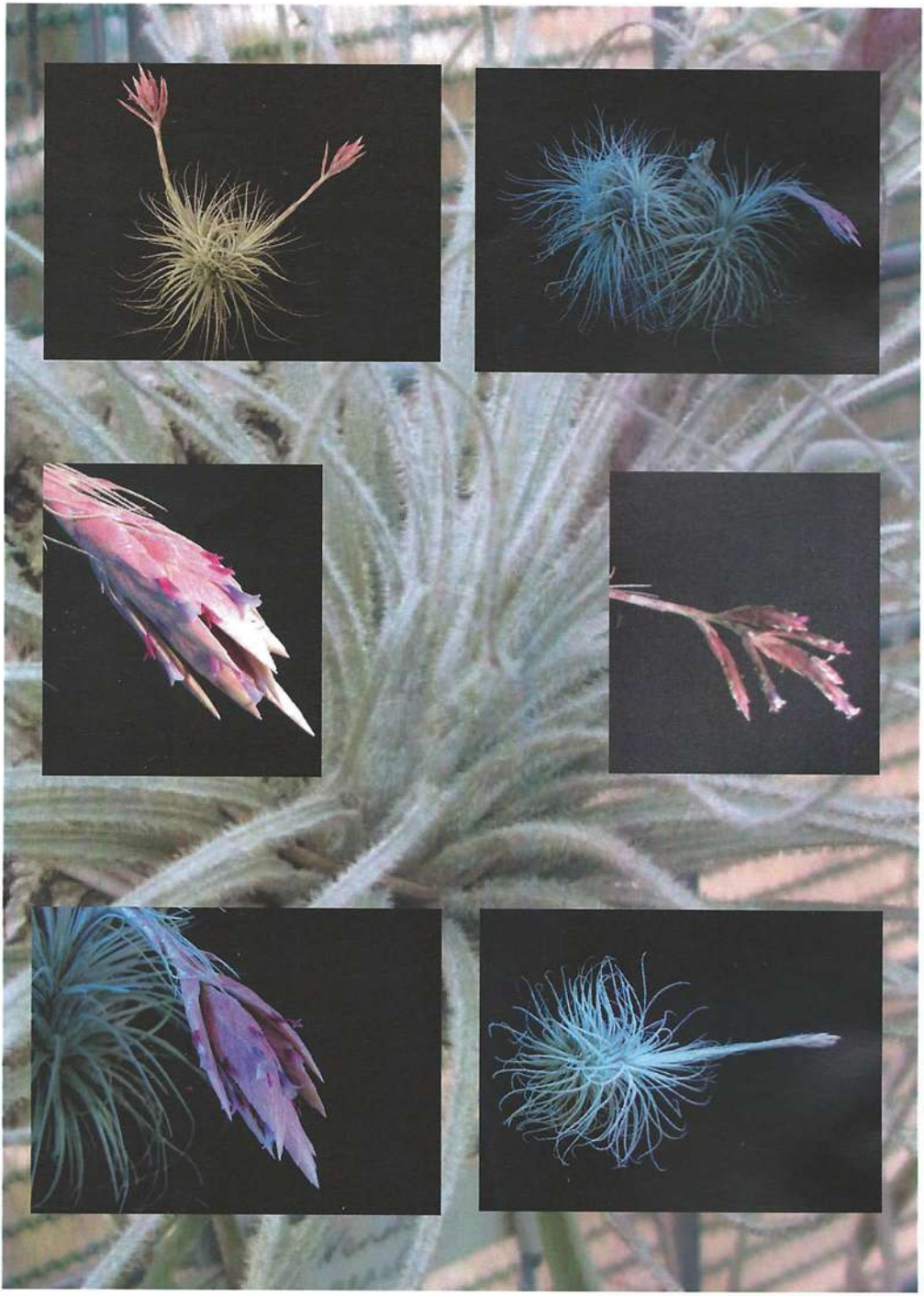
The species name makes reference to roofs (Latin tectum=roof), and was so named as the plant was cultivated on roofs in Peru and Ecuador. First identified in the 1860s, the plant was displayed in Europe under other names before being described as *T tectorum*. The Bromeliad Taxon List recognises three varieties and one form of *T tectorum*. These are: *var tectorum, var globosa,* and *var viridula* with *fa gigantea*. There are also a number of related species in the Tectorum complex (see Die Bromelie booklet: The *Tillandsia tectorum* Complex by L Hromadnik – copies are in the BSQ library).

The species is caulescent and grows in large populations on rock outcrops and cliffs in Peru and Ecuador at elevations from around 1000m to 2700m. The plants are also gathered to represent snow in the Christmas festivities in these countries and then discarded. This indifference of the locals to the beauty we perceive in the plant and collection pressures have made *T tectorum* less abundant in habitat. Paul Isley (*Tillandsia II*) has a useful discussion of the form of the species:

> "A few of the big special forms grow high in the Andes of Ecuador. These have the largest trichome wings of any Tillandsia, so the plants are almost fuzzy in appearance. The wings are elongated on one side and perpendicular to the leaf surface. This is why they are so visible and the leaf surface so coarse in appearance.
> At these high elevations, *Tillandsia tectorum* is exposed to more ultraviolet radiation and this requires the presence of larger trichomes that can reflect much of this radiation. At the same time the plants experience frequent thundery showers in the rainy season so they have to dry quickly."

This all points to *T tectorum* needing strong light, warmth and good air movement which gives the opportunity to dry quickly when watered. Place them high in the shadehouse. In SEQ this is an easy species to grow if these factors are kept in mind.

The flowers are carried on a stalk some 15-20cm long and have pink bracts and pale blue/white petals with a blue to purple band to the petals. The inflorescence is variable with some having a tight club form with the 5-7 spikes compact and others open the spikes quite widely. See Photos following.



A collection of Red (clockwise from top L:
Quesnelia variegated form (S Born),
Aechmea nidularoides,
Pitcairnia riparia,
Tillandsia 'Margarite' (JO),
Billbergia pyramidalis 'Kyoto' (L Baylis)

Culture Note- Root Baiting

by Peter Paroz

In a previous note some time ago, I described a procedure, borrowed from the local pineapple industry, for testing for common pathogenic fungi in soils; and which could be easily adapted to checking potting mixtures. That procedure can be described as Leaf Baiting and uses the white tissue at the base of a growing leaf.

This root baiting variation is more sensitive but requires a little preparation using a disposable offset which has not grown roots. Place the advanced offset in a container of boiled and cooled water so that the base is submerged about 30 mm. Wait until new white roots have grown 5-10mm.Place about 10 mm of soil or potting mixture in a clear jar; gently add boiled and cooled water to 50-60 mm and allow to settle. Pin the offset so that it is suspended 20-25 ml in the water with the new roots covered.

If phytophthora is present, a cottony mycelium will become apparent around the roots along with an offensive smell. If there is no effect after a week, the sample can be considered negative.

This test will also detect *Pythium* sp., which appear as brown lesions on the white roots. If both organisms are present, phytophthora will obscure the pythium.

Phytophthora are highly invasive and destructive organisms and should be tracked down and eliminated. Pythium is non-invasive (in pineapples) but can cause severe losses by secondary infection following root damage by symphylids or nematodes. *Phytophthora sp.* are reported to cause serious problems in a wide range of garden plants including shrubs and trees; often associated with limited aeration or water logging.

Watch the drainage of potted plants as potting mixtures age.

Glossary
Mycelium: the thread-like vegetative part of a fungus;
Phytopthera: root rot, a form of 'dieback' is an oomycete (water mould)
Phythium: a parasitic water mould particularly attacking root tips
Simphylids: soil-dwelling arthropods resembling centipedes, but smaller and translucent.
Nematodes: colourless, microscopic worm-like animals.

PLANT DISEASE MANAGEMENT WITH FUNGICIDES

Adapted from http://treedoctor.anr.msu.edu/May13_PlantDisMgmtFungicides.pdf By Dr D L Roberts
[Ed: Peter Paroz article above provides a means of identifying fungi in our plants. That then raises the question of what action to take. The following paraphrased article provides some principles stopping short of recommending products.]
Diseases can be managed by a variety of methods under Integrated Disease Management (IDM). IDM involves the use of all tools to counter the activity of disease agents that may instigate disease development. For example, most diseases require moisture to reproduce,

spread and infect plants; moisture in the form of excessive irrigation can exacerbate many diseases in the landscape. A vicious cycle is often perpetuated in the landscape and nursery when too much moisture results in disease development, necessitating the need for ever increasing applications of other management tools, especially chemicals. Most plant diseases are caused by fungi and hence, most chemical management involves fungicides.

A plethora of disease agents may attack the wide variety of plants utilized in our landscapes. It is very important to understand the target diseases on particular plants, whether preventative or curative strategies are implemented. In a very general sense, fungi and their fungal diseases can be categorized into two major groups, Primitive and Advanced. The primitive fungi, assumed to be more closely related to filamentous algae, include such pathogens/diseases as Phytophthora (Bleeding Cankers, Collar Rots), Pythium (Root Rots) and the Downy Mildews. The advanced group of fungi largely covers everything else. Generally, the fungicides that control the primitive group do not control the advanced group and vice versa. Hence, it is important to know the target organism and disease to be managed.

There are numerous environmental and economic justifications to achieve the most bang for the buck. One of the ways to achieve this is to use mixtures of chemicals. A systemic fungicide combined with a contact fungicide, perhaps called a magical "Elixir Mixture," represents a practical approach to achieve broader control than typically achieved with one chemical. The beauty of the "elixir mixture" of a contact and systemic fungicide is that, theoretically, multiple diseases can be managed quite efficiently. As noted, the "Elixir Mixtures" may provide very broad spectrum disease/pest management capabilities. For assurance that chemical reactions and precipitation and other bad things don't happen in that spray tank, compatibility charts are available to determine which chemicals can be safely mixed.

We commonly encounter resistance to systemic chemicals and rarely to contact chemicals (due to narrow and broad modes of actions on pathogen genes). In turf studies, combining two systemic chemicals has resulted in resistance to both chemicals. Likewise, alternating systemic chemicals (application to application) within the same season will probably result in resistance development to both systemic chemicals. We also know from experimentation that resistant pathogens and pests are probably already present in our landscapes and nurseries. Hence, it seems logical that in order to avoid resistance development, the best approach is to apply systemic chemicals in long rotations, say 4-5 years, before subsequently switching to another systemic chemical.

[Ed: I invite readers to send me details of the fungicides they favour (and why) for the next edition. Meanwhile I'll check what our big box hardware/garden outlets actually have available to us]

Aechmea 'Roehrs' by Derek Butcher

We first heard about this variegate in The Bromeliad Bulletin, Vol. 3, No. 5, 1953, p 39 by Alfred S. Graf

> "Another very elegant variegated bromeliad is an Aechmea, which came to us under the name of Aechmea Coelestis Albo Marginata, a slender type of plant growing to l ½ to 2 feet. The grey-green leaves are of hard and shiny texture, overlaid with silver scales. Along the edges runs a broad white margin which by its clear contrast gives a striking effect. We have not had this plant in flower, so do not yet know its true identity. It may quite possibly be a sport of *Aechmea coelestis* or of *Aechmea caudata*. It shows great promise because it is a very durable, leathery plant and should be ideal as a houseplant and in combination plantings."

4 years later Mulford Foster published the name as follows:

Aechmea coelestis var. *albo-marginatus* M. B. Foster var. nov. Bromel. Soc. Bull. 7: 91, *fig.* 1957.

A var. *coelestis* foliis albo marginatus longitudinaliter striatis differt.

M. B. Foster No. 3016 (Type in the U. S. Nat'l Herb.)

"This lovely variegated form of *Aechmea coelestis* has a charm and reserve that few variegated plants have. The rather wide white stripe that edges the margins of the grey-green leaves of this plant make it a really conservative but elegant plant.

We have had this plant in cultivation for at least five years. It was received from Europe where it apparently originated, but we have never learned who first saw this variegated form. It has been grown by the Julius Roehrs Co. of Rutherford, NJ. In the Bromeliad Bulletin, Vol. 3, No. 5, 1953, page 39, there was a photo of this plant shown in connection with an article by Mr. Alfred S. Graf who stated at that time that they had not seen the plant in flower so did not know its true identity.

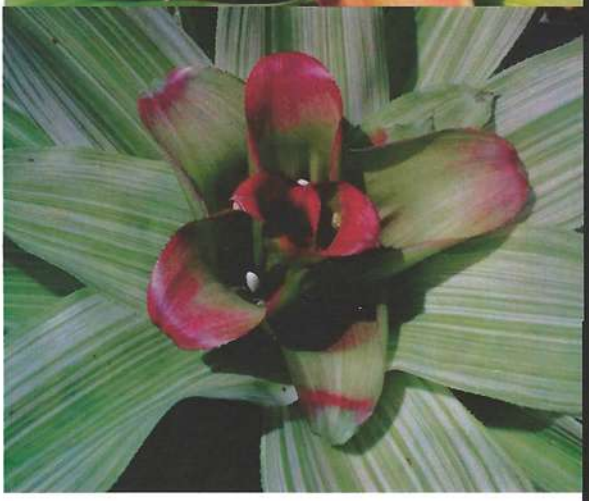
This new variety has flowered on several occasions in the Bromelario at Orlando; therefore, it can now be ascertained that it is a variety of *Aechmea coelestis*.

While the inflorescence is not showy the plant is at all times a modestly showy one. The flowers are of a very light caerulean blue; the fruit when ripe becomes rather grey-magenta in colour. The marginal bands are quite regular and consistent and are not variable as in so many other variegated plants. The average height of this plant when in flower is eighteen to twenty-four inches.

Then in Smith & Downs Bromelioideae Monograph (1979)

Aechmea coelestis var ***albo-marginata*** M. B. Foster, Bromel. Soc. Bull. 7: 91, *fig.* 1957. Leaves white-striped especially along the margins. Type. *M. B. Foster* 3016 (holotype, US), cultivated of unknown origin. Distribution. Unknown.

Current interpretation is that it should be treated as a cultivar. This is confirmed in The World Checklist of Selected Plant Families. As such this Culton will appear in the Bromeliad Cultivar Register as *Aechmea* 'Roehrs'.



Left hand side above:
Top: *Nidularium* 'Striatum'
Bottom: *Nidularium* 'Lineatum'

Right hand side:
Aechmea 'Roehrs'

Nidularium innocentii – variegate forms by Derek Butcher

Only *Nidularium innocentii* is accepted in the World Checklist of selected Plant families whereas Leme in Nidularium- Brom. Atl. Forest 144-153. 2000 included two variegates var. *lineatum* and var. *striatum.* I quote from the book:

"The variety *lineatum* differs from the other varieties in its variegated leaves with white or yellowish lines. This trait is seen occasionally in the wild, as in specimen Leme 23-B, but it apparently reproduces only vegetatively, not sexually. Although this case is an exception to the method used here, I decided to maintain the validity of this variety due to its huge popularity as an ornamental and to the fact that it is already widely cultivated and has been for almost 90 years.

LEAVES green with longitudinal white or yellowish lines, 13 mm wide.

Description from Smith & Downs (1979),'Leaf-blades green with numerous longitudinal white lines; primary bracts red near the apex and green elsewhere'.

The decision to maintain variety *striatum* as a valid taxon took into consideration the same arguments presented in relation to the previous variety. In this case, variety *striatum* has been cultivated for over 100 years and is one of the most popular taxa of this genus."

LEAVES green with white to yellow longitudinal stripes wider than 5 mm.

Description from Smith & Downs (1979), 'Leaves, or at least their blades, green; blades marked with longitudinal white lines; primary bracts wholly or mostly red-purple.'

Clearly Leme was uncomfortable in treating them under the ICN – International Code of Nomenclature (at that time ICBN) rules and yet they would have been comfortable if named under the ICNCP (International Code of Nomenclature of Cultivated Plants) rules. Here we have a dilemma. The ICNCP rules covering cultivated plants have been with us since 1953 but as far as I can trace are not acknowledged in the ICN rules BUT the ICN rules are acknowledged in the ICNCP rules. You would think that by now, botanists would accept that the ICN rules do not stand alone and that all naming must be linked to this code whether the plant originates in the wild or cultivation. We do know that this was Linnaeus's intention long ago. A recent example under Synonymies in *Ananas* by Coppens d'Eeckenbrugge and Govaerts, in Phytotaxa 239(3): 273-279. 2015 shows referral to both cultivated and wild plants and yet all are named as under the ICN system. In a similar scenario we are seeing varietal status disappearing for variations in colour of petals. Here again botanists should not be shy in that the ICNCP can cover such differences quite adequately.

Such is the reluctance to concede that there is such a thing as the ICNCP rules the only reference list on the internet acknowledging this is the New Bromeliad Taxon list http://botu07.bio.uu.nl/bcg/taxonList.php

Therefore, I am adding the names *Nidularium* 'Lineatum' and *Nidularium* 'Striatum' to the Bromeliad Cultivar Register. Please amend your labels to reflect their cultivar status.

COMPETITION SCHEDULE 2016

January - MINI SHOW

Class 1 – Aechmea species & hybrids
Class 2 – Vriesea species & hybrids
Class 3 – Dyckia species & hybrids
Class 4 - any other flowering bromeliad species & hybrids

Feb & Mar POPULAR VOTE – any genus species & hybrids + Decorative or novelty bromeliad display

April -MINI SHOW

Class 1 – Bromelioideae not listed elsewhere in Schedule, species & Hybrids (Acanthostachys, Ananas, Androlepis, Araeococcus, Bromelia, Canistropsis, Canistrum, Edmundoa, Fascicularia, Hohenbergia, Hohenbergiopsis, Neoglaziovia, Nidularium, Ochagavia, Orthophytum, Portea, Quesnelia, Ursulaea, Wittrockia)
Class 2 – Guzmania species & hybrids
Class 3 – Pitcairnia species & hybrids
Class 4 - any other flowering bromeliad species & hybrids

May & June POPULAR VOTE – any genus species & hybrids + Decorative or novelty bromeliad display

July - MINI SHOW

Class 1 – Billbergia
Class 2 – Tillandsioideae not listed elsewhere in Schedule, species & hybrids (Alcantarea, Catopsis, Mezobromelia, Racinaea, Werauhia)
Class 3 – Neoregelia up to 200mm diameter when mature, species & hybrids
Class 4 - any other flowering bromeliad species & hybrids

Aug & Sept POPULAR VOTE – any genus species & hybrids + Decorative or novelty bromeliad display

October - MINI SHOW

Class 1 – Neoregelia over 200mm diameter when mature, species & hybrids
Class 2 – Tillandsia species & hybrids
Class 3 – Pitcairnioideae not listed elsewhere in Schedule, species & hybrids (Brocchinioideae, Lindmanioideae, Hechtia), Puya), Navioideae, Deuterocohnia, Encholirium, Fosterella)
Class 4 - any other flowering bromeliad species & hybrids

November - POPULAR VOTE– any genus species & hybrids + Decorative or novelty bromeliad display

Plant of the month List for 2016

June	Vriesea
July	Intergenerics
August	Rare Genera
September	Billbergia
October	Guzmania
November	Neoregelia, Nidularium