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Cover photographs. Front: *Guzmania victoriae* in its relationship with various other *Guzmania* species is discussed by Dr. Rauh on pages 18–20. Photo by W. Rauh. Back: Herb Hill, Jr.'s x*Neophytum* (unnamed) was awarded the silver medallion for best bigeneric specimen at the Houston World Bromeliad Conference, 1990. It and other winners are described on pages 21–24. Photo by R. Stucker.

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1992 WORLD BROMELIAD CONFERENCE
Sponsored by
The Bromeliad Guild of Tampa Bay, Inc.
The Florida Council of Bromeliad Societies, Inc.
The Bromeliad Society, Inc.
June 11–14, 1992

The World Bromeliad Conference of 1992 will be held at Tampa, Florida, as proposed by the Bromeliad Guild of Tampa Bay, Inc. and approved by the Board of Directors of The Bromeliad Society, Inc. Ever since receiving that approval, we have been busy with preliminary work. Conference and hotel reservations forms will be mailed to you with the March–April *Journal.* Until then, we invite your attention to the enclosed brochure about the exceptional facilities that we have selected.

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Tillandsia rotundata and *Tillandsia × polita:* Status Changes

Sue Gardner

Tillandsia rotundata (L.B. Smith) C.S. Gardner (Fig. 1) was elevated from a variety of *T. fasciculata* Swartz to species status after examination of living specimens of both species (Gardner, 1984a). This species, which ranges from Chiapas, Mexico, into Honduras and Guatemala, is distinguished from *T. fasciculata* by several characteristics. The inflorescence is a globose head of densely digitate spikes or branches nearly as broad as they are long. The branches of *T. fasciculata* var. *fasciculata* are distinctly lanceolate and more than three times longer than broad. The branches of *T. rotundata* are subtended by suborbicular primary bracts. The floral bracts are cucullate, slightly inflated, and nearly as broad as they are long, whereas the width of the floral bracts of several specimens of *T. fasciculata* is approximately one-half the length. The exposed surfaces of the floral bracts of *T. rotundata* are slick and polished as if lacquered cherry red, while those of *T. fasciculata* are smooth but not polished.

The typical habitat of *Tillandsia rotundata* is reported at elevations between 1400 and 2500 meters, while all varieties of *T. fasciculata* (except var. *rotundata)* occur between sea level and 1880 meters (Smith & Downs, 1977). *T. rotundata* is usually found in pine and oak forests.

Tillandsia × *polita* L.B. Smith (Fig. 2) appears to be a natural hybrid. Probable parentage is *T. rotundata* and *T. rodrigueziana* Mez. The distribution of *T.* × *polita* is the same as that of *T. rotundata.* Near San Cristobal de las Casas, in the highlands of Chiapas, *T. rotundata* apparently hybridizes with *T. rodrigueziana.* Specimens intermediate between these species occur, and morphological diversity among the putative hybrids suggests backcrosses and/or sibling crosses. Some of these intermediates were compared with *Standly 62465,* the type specimen of *T.* × *polita,* which was collected in Guatemala. The distributions of both putative parent species extend into Guatemala, and other specimens examined suggest that they hybridize there also.

Pollen infertility (0 to 18%) and the results of statistical analysis of morphological characteristics among the assumed hybrids and their putative parents support the notion of a hybrid origin for this species (Gardner, 1984b).

LITERATURE CITED:

Gardner, C.S. 1984a. New species and nomenclatural changes in Mexican *Tillandsia* - I. Selbyana 7:361-379.

———. 1984b. Natural hybridization in *Tillandsia* subgenus *Tillandsia.* Selbyana 7:380-393.

Corpus Christi, Texas

Fig. 1
The author published her discussion of the new species, *Tillandsia rotundata,* nomenclatural changes, and natural hybridization in 1984 but these are the first color photographs in the *Journal* of *Tillandsia rotundata* (Fig. 1) and *T.* × *polita* (Fig. 2).

Photos by the author

Fig. 2

A New Guzmania from Western Amazonia

Harry E. Luther

This species represents another ornamental bromeliad established in cultivation, albeit still uncommon, long before receiving a name. It has been confused, both in herbaria and horticulture, with *Guzmania conifera* (André) André ex Mez and *G. bipartita* L.B. Smith.

Guzmania claviformis **Luther, sp. nov.**
Guzmania conifera (André) André ex Mez affinis sed bracteis florigeris obtusis, sepalis minoribus, corolla patentissimis non erectis et petallis cremeis non luteis differt.

Plant flowering to 1 m tall, clustering. *Leaves* rosulate, to 1 m long, coriaceous, appressed lepidote throughout, dark green or tinged red or purple. *Leaf sheaths* broadly elliptic, to 15 cm long, 12 cm wide, dark castaneous, densely brown punctate lepidote. *Leaf blades* ligulate, acute and pungent, to 6 cm wide. *Scape* erect, much exceeding the rosette to 1 cm in diameter, dark purple. *Scape bracts* erect, densely imbricate, lanceolate to triangular, acute, pungent, the sheaths very dark castaneous, the blades dark green or purple. *Inflorescence* simple, densely polystichous-flowered, club-shaped, to 13 cm long, 7 cm wide. *Floral bracts* erect, densely imbricate, coriaceous, lustrous, slightly nerved, the lowest elliptic and subacute, the upper obovate and rounded, 3.5–5 cm long, to 3 cm wide, red or orange with darker margins, the most apical with yellow apices. *Flowers* erect, subsessile. *Sepals* ¼ connate, elliptic, acute, to 25 mm long, dark castaneous with paler margins. *Corolla* with spreading blades, opening at night, *Petals* ligulate, obtuse, to 62 mm long, 5 mm wide, 2/3 connate, naked, cream to tan. *Fruit* a capsule, cylindric, to 25 mm long. *Seed coma* brown.

Type. Ecuador: Morona Santiago, east of Macas, elev. 1160 m, 24 Feb. 1986, *Marc A. Baker 6616 1* (Holotype NY).

Additional collections. Ecuador: Morona Santiago, 20 km S. of San Juan Bosco, elev. 1300 m, 3 Jan. 1981, *M. & D. Madison* and *L. & A. Besse 7554* (SEL); Morona Santiago, vic. of Macas, photo only, 1989, *J. Kent s.n.* (SEL). Peru. San Martin: Jepelasio, May 1984, *Lee Moore s.n.* (SEL). Without locality, presumably from Peru, flowered in cultivation, hort. Bak, The Netherlands, May 1988, *E. Bak s.n.* (SEL).

This large and spectacular species is in limited cultivation in Europe and in Florida and California. The unusual phenology, most typical to bat or moth pollination, is in striking contrast with the brilliant coloration of the bracts, suggesting a recent adaptation to a novel pollen vector.

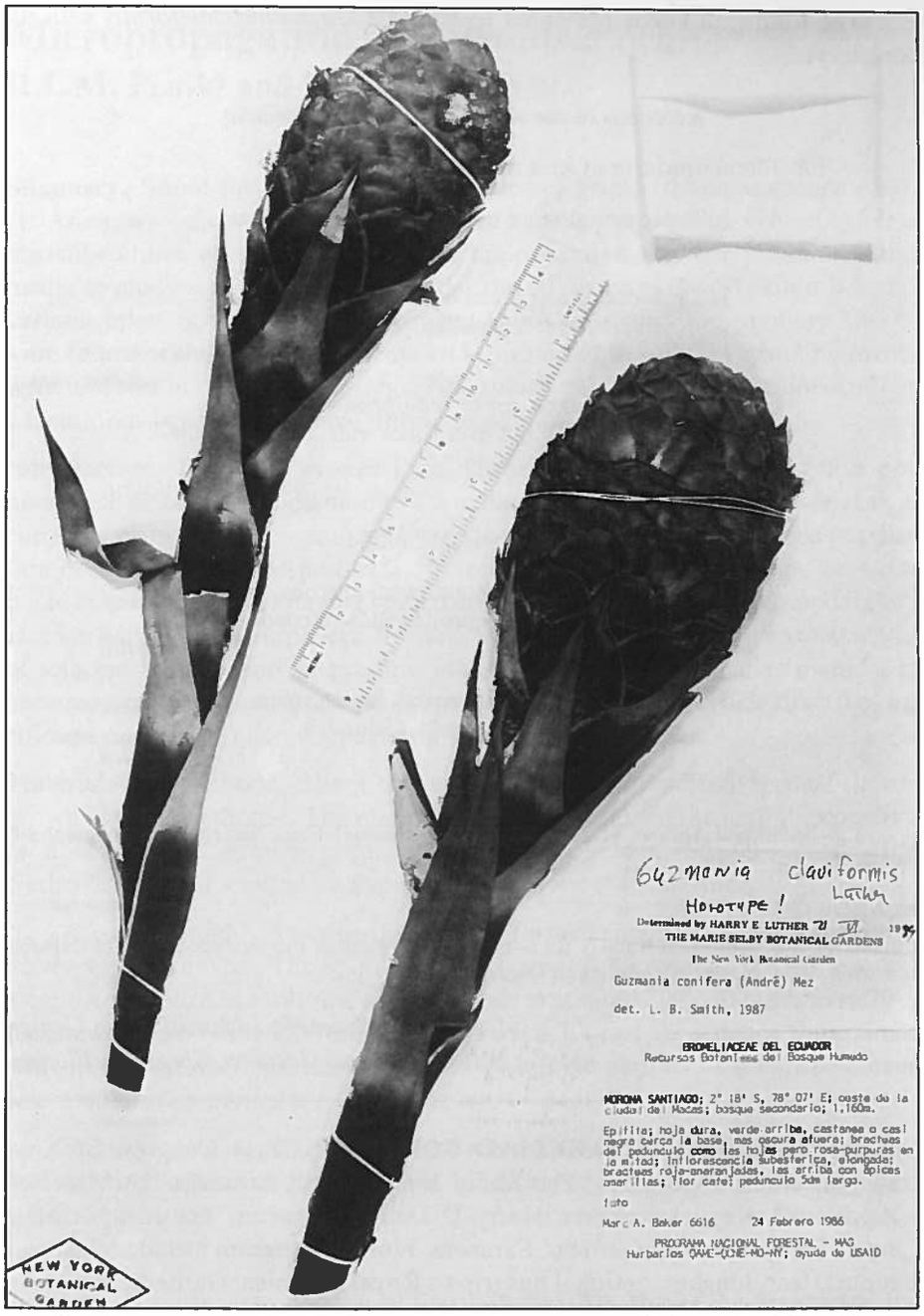


Photo by Selby Botanical Gardens

Fig. 3.
Guzmania claviformis inflorescence. The species was established in horticulture long before being given a name by Harry Luther. It has been confused with *G. conifera* and *G. bipartia.*

The following key is presented to contrast *Guzmania claviformis* with its congeners.

Additions to the Key to the Genus *Guzmania*[1]

108 Floral bracts, or at least the upper ones, rounded.

110 Inflorescence globose or broadly ellipsoid, sepals acute.

110.1 Floral bracts green or yellow, petals broadly elliptic, over 1 cm wide, pale green, Venezuela.
76 *G. mucronata*

110.1 Floral bracts red or red-tipped yellow, petals ligulate and not over 5 mm wide, cream or pale tan, Ecuador, Peru.
75.1 *G. claviformis*

110 Inflorescence cylindric, sepals obtuse.

111 Sepals dark castaneous, even, lustrous, bracts red-tipped yellow, corolla yellow, Ecuador, Peru
71 *G. bipartita*

111 Sepals stramineous, nerved, bracts green, corolla cream, Venezuela, Colombia.
77 *G. cylindrica*

[1] L.B. Smith, R.J. Downs, Tillandsioideae (Bromeliaceae). Flora Neotropica, monograph 14, part 2, 1977:1277–1284.

ACKNOWLEDGMENT:

I thank the Bak Bromeliad Nursery for donating a live plant of this new species to the research collection of the Marie Selby Botanical Gardens.

M.B. Foster Bromeliad Identification Center
Marie Selby Botanical Gardens, Sarasota, Florida

SIXTH NATIONAL BROMELIAD CONFERENCE; a Congress of Australian Bromeliad Societies. The Shore Inn, Sydney, Australia. 29 March—1 April 1991. Keynote speaker: Harry E. Luther, Director, The Identification Center, Selby Botanical Gardens, Sarasota, Florida. Program includes: lectures, banquet, teas, lunches, optional bus trip to Royal Botanical Gardens, and visits to private collections. Mrs. Elaine Jones, Conference Registrar, P.O. Box 182, Toukley, New South Wales 2263. Telephone 61 2 043 963200. Bankcard or MasterCard accepted. Registration closing date: 1 March 1991.

Micropropagation of *Tillandsia cyanea*

R.L.M. Pierik[1] and P.A. Sprenkels

Summary. Shoot tips from a very attractive pot plant, *Tillandsia cyanea* Lind. cv. Anita, were isolated in vitro to develop a micropropagation system. After a few subcultures on solid media, shoot multiplication was continued in liquid media to study axillary branching under the influence of the cytokinin BA and various other factors. After optimizing shoot multiplication, axillary shoots were rooted with auxin in the media and transferred to soil. The resulting plants were uniform in the flowering stage. No mutations occurred as no callus and/or adventitious buds were formed during multiplication.

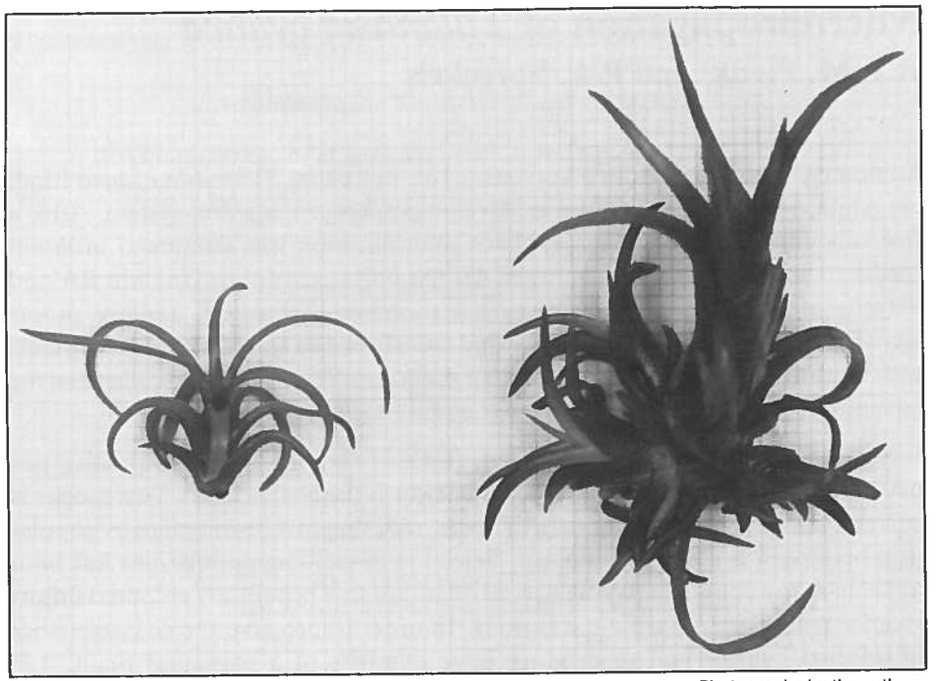
Introduction. *Tillandsia cyanea* Lind. (Bromeliaceae) is a very attractive pot plant with an annual production of 0.5 million in the Netherlands. This species is currently propagated generatively by seeds, resulting in a heterogeneous population because it is a cross-pollinator. Selection in seedling populations has been made in many countries paying special attention to a beautifully coloured inflorescence with lilac to purple-red flowers. In order to preserve the characteristics of selected hybrids and to produce large numbers of a particular plant, it is necessary to have a rapid clonal propagation system. This article describes an efficient method of micropropagating *T. cyanea.*

Materials and methods. Shoot tips were isolated from axillary-formed shoots grown in the greenhouse. The plant material was obtained through the courtesy of a commercial grower/propagator (van der Velden, St. Oedenrode, the Netherlands) who selected and commercialized the cultivar Anita.

After thoroughly washing the axillary-formed shoots with soap, the outer leaves were removed. The shoot tips (with several leaves and leaf primordia) were then sterilized as follows: a few seconds in ethanol 70%, 30 minutes in 20% bleaching liquid (with 1% NaC10) with Tween 20, and then rinsed three times with sterile tap water during 5- 10-, and 30-minute periods. A magnetic stirrer was used for this procedure.

Subsequently, several leaves were removed from the sterilized shoot tips and sterilized again for 20 minutes in 1% bleaching liquid. After washing with sterilized tap water the basal ends of the shoot tips were cut off and then isolated on a solid culture medium.

[1] Dept. of Horticulture, Agricultural University, P.O. Box 30, 6700 AA Wageningen, the Netherlands.



Photographs by the authors

Fig. 4
Axillary branching in *Tillandsia cyanea* cv. Anita as influenced by the BA concentration. Left: no BA, no axillary branching. Right: BA 0.2 mg/l + NAA 0.005 mg/l, strong axillary branching.

Isolation of shoot tips took place on the following culture medium: MS (Murashige and Skoog, 1962) macrosalts at half strength, MS-microsalts (except Fe) at full strength, NaFeEDTA 25 mg/l, sucrose 3%, nicotinic acid 5.0 mg/l, vitamin B_1 5.0 mg/l, pyridoxin 0.5 mg/l, glycine 4.0 mg/l, méso-inositol 100 mg/l, the cytokinin BA 1.0 mg/l, the auxin NAA 0.01 mg/l, Difco Bacto agar 0.7%, and a pH of 6.0 before autoclaving. The vitamin mixture was chosen according to Mekers (1977). Two subsequent subcultures of shoots took place on the same medium as described above, except that the BA concentration was 0.1 mg/l.

To study shoot multiplication Erlenmeyer flasks of 100 ml were used with 30 ml liquid culture medium; each flask contained 3 shoots. Flasks were placed on an orchid wheel at an angle of 45° at 3 rotations per minute. The basic culture medium was changed as follows: agar was omitted, MS-macrosalts were used at full strength, sucrose 3.5%, BA conc. 0.2 mg/l, and NAA conc. 0.005 mg/l. Root formation of excised shoots took place on a solid culture medium with MS-salts at full strength (except Fe), NaFeEDTA 25 mg/l, sucrose 3.5%, Difco Bacto agar, and the auxin NAA 0.8 mg/l.

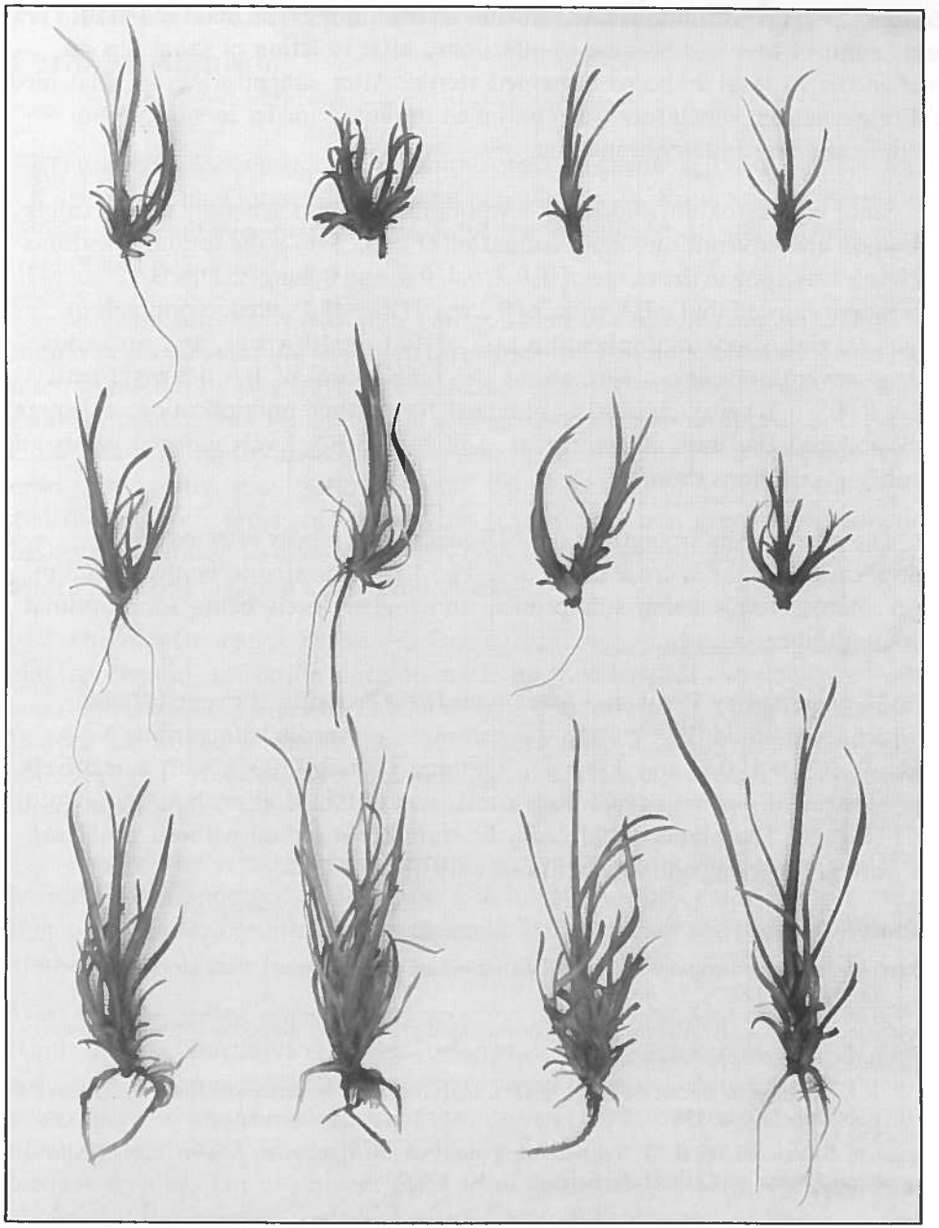


Fig. 5
Rooting of excised shoots of *Tillandsia cyanea* cv. Anita as influenced by the NAA concentration. From top to base: no NAA, 0.3 mg/l NAA, and 0.8 mg/l NAA.

All cultures were kept in a culture room at 25 degrees C and illuminated with Philips fluorescent tubes (TL 40W/57, 4 Wm^{-2}; day length was 16 hrs). Experiments on axillary branching lasted 10 weeks, whereas rooting was evaluated after 7 weeks.

Results. Despite precuations and rigorous sterilization of the plant material, many cultures were lost because of infections. After isolation of shoot tips on solid media in total 9 shoots remained sterile. After subculturing on solid media and rejuvenation, subculture was continued on liquid media to study shoot multiplication by axillary branching.

Since high cytokinin and auxin levels in the medium generally induce callus formation and adventitious shoot formation (Pierik, 1987), the testing of various BA levels was done in the range of 0, 0.2, 0.4, 0.6, and 0.8 mg/l. This BA experiment showed that a BA conc. of 0.2 mg/l (Fig. 4) resulted in optimal results (a high shoot multiplication rate of 14.6 in 10 weeks, and no callus and/or adventitious shoot formation). A combination of BA 0.2 mg/l with NAA 0.005 mg/l was chosen as standard for further multiplication, as lower BA levels reduced the multiplication rate, and higher BA levels induced callus and possibly adventitious shoots.

The effect of the strength of the MS-macrosalts hardly affected shoot multiplication. In the sucrose range of 2–4%, 3.5% appeared to be the optimum, lower sucrose levels being suboptimal, and higher levels being supraoptimal for shoot multiplication.

As suggested by Pierik and Steegmans (1984) rooting of excised shoots obtained from liquid flask culture was examined on media with various NAA levels: 0, 0.3, 0.5, 0.8, and 1.0 mg/l. Optimal rooting (100%, with a relatively high number of normal adventitious roots) was obtained at an NAA conc. of 0.8 mg/l (Fig. 5). The plants could easily be transferred to soil without problems, and normal flowering and no mutations were observed.

REFERENCES:

Mekers, O. In vitro propagation of some Tillandsioideae (Bromeliaceae). Acta Horticulturae 78:311–320; 1977.

Murashige, T; Skoog, F. A revised medium for rapid growth and bioassays with tobacco cultures. Physiologia Plantarum 15:473–497; 1962.

Pierik, R.L.M. In vitro culture of higher plants. Dordrecht, the Netherlands: Kluwer Academic Publishers: 1–344; 1987.

_____; Steegmans, H.H.M. Vegetative propagation of *Nidularium fulgens* Lem. Netherlands Journal of Agricultural Science 32:101–106; 1984.

Bromeliad Culture, No. 2: *Acanthostachys*

Carol M. Johnson

The genus *Acanthostachys* (a-cantho-steak-is, meaning thorny spike) was described by Klotzsch in 1840 and emended by W. Rauh and W. Barthlott (1982). There are two species only: *strobilacea* (conelike fruit) and *pitcairnioides* (resembling pitcairnia).

With the impressive-sounding name *Acanthostachys strobilacea,* this plant should be an outstanding beauty in form and size. It is none of these. The long, often to three-foot long leaves can be made to turn rosy red in full sun but with ordinary culture they remain a dull gray-green. The blooms appear in the leaf axils. They are approximately the size and shape of a small pine cone and have orange bracts and small yellow blooms. This plant is nearly always self-fertile and the relatively large seed germinates readily. It is best grown in a hanging basket and allowed to clump, which it does freely. Careful! The leaves are well armed and the long, thin leaves tend to tangle.

The plant is native to eastern Brazil, Paraguay, and northern Argentina and has been in cultivation since before 1850. It withstands extremely rigorous conditions including drought, cold, low light, and full sun. It is also inexpensive. It does not sound like a winner, but it maintains a steady popularity with collectors and exhibitors. I recall several bromeliad shows where it has appeared on the head table.

I use a sandy, fairly heavy potting mix including pebbles or turkey grit, keep the plant underpotted and grow it in full sun for best color. It grows with little or no water. Fertilizer would make the leaves greener and longer so I don't apply any.

Acanthostachys pitcairnioides was first described by Mez and in 1982 W. Rauh and W. Barthlott emended the description of the genus and the two species. This newer species is being seen more often in collections and in shows. It was pictured on the back cover of the *Journal* (1989), but the picture does not do the plant justice. In our Florida full sun, the leaves turn dark red with a lacquered shine. The prominent black teeth and small, brilliant blue flowers at the base of the leaves make a striking and beautiful contrast.

This species forms clumps very easily, it is about 15 inches tall, and is a desirable addition to any bromeliad collection. Culture is the same as for *A. strobilacea.* It is a shame they could not have simplified the names of both members of the genus, although they are descriptive.

Longwood, Florida

W. Rauh

Fig. 6. Acanthostachys strobilacea showing the growth habit of a cultivated plant.
Left: overall appearance, right: inflorescence detail.

W. Rauh

Fig. 7. Acanthostachys pitcairnioides with open flower.
Left: overall appearance; right: inflorescence detail.

[*The type location is not known but Dr. Rauh's description was based on a specimen collected in Domingos Martins, Espírito Santo, Brazil. In his table of comparative characters the obvious differences are in the upright nature of the leaves of* A. pitcairnioides *and the short-stemmed inflorescence.*—Ed]

REFERENCES:

J. Brom. Soc. 1989:134

_____ 1989:[192], color photograph, Dr. H. Hemker

Padilla, Victoria. 1973. Bromeliads. New York: Crown Publishers

Rauh, W.; Barthlott, W. 1982. Zur Kenntnis der Gattung *Acanthostachys* Klotzsch mit Beschreibung einer zweiten ökologisch bemerkenswerten Art. Bromelienstudien (XI Mitteilung).

Smith, L.B.; Downs, R.J. 1979. Bromeliaceae. Flora Neotropica. Monograph 14, pt. 3. New York: N.Y. Botanical Garden.

ACKNOWLEDGMENT:

The editor thanks Dr. Werner Rauh for providing these photographs first published in the comparative study listed in References.

Thoughts On Rooting Difficult Bromeliads

Dutch Vandervort

For years I have had a terrible time getting offsets from some of my choicest plants to root. I have tried all kinds of variations of mix, pH, wetness, dryness, wet/dry cycle, rooting hormone, Superthrive, superphosphate, balanced fertilizers, and every other variable I could think of. In spite of this it regularly takes a year or more to get roots on the likes of *Orthophytum navioides.*

Just to prove it could be done, I once grew a hard-core terrestrial bromeliad, *Hechtia tillandsioides* in water. It grew well for about three years until my normally tolerant and accommodating wife got tired of having it on her kitchen counter and made me plant it in the garden.

About a month ago, while planting up some *Orthophytum navioides* pups, I reflected on the time it would take to get them rooted. The hechtia experience came to mind and I decided to try one of the *Orthophytum navioides* pups in water.

The pup was about two inches tall. I stripped off six or eight of the basal leaves, dipped it in rooting hormone, let it dry, and propped it up in a narrow-mouthed mustard jar (the label is gone, and I can't remember the brand), which I filled with clear water and a drop of Superthrive. That was it! The result was beyond belief. In less than a month my plant produced a fair mass of mature, branching roots. Sibling pups potted at the same time have yet to form their first visible root.

Does this mean that hydroponics is the wave of the future for bromeliads? Only time and experimentation will tell.

Ventura, California

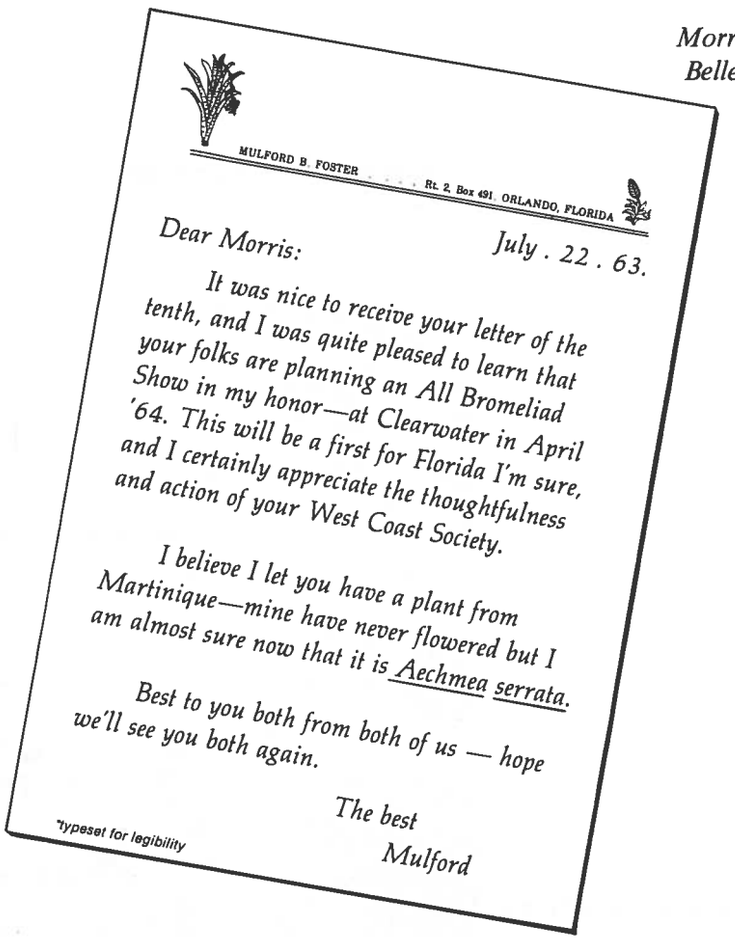
A HISTORICAL NOTE

The Florida West Coast Bromeliad Society considered itself something of a pioneer in the promoting of interest in bromeliads. With this in mind, a rather impressive all-bromeliad show was organized; however, there has been a controversy concerning the exact date.

In going over some old correspondence, I found a letter from Mulford Foster, which I am submitting herewith. The show was held in the First National Bank of Clearwater on the dates shown (April 1964). Mulford Foster was the guest of honor.

Credit should be given to "Jinks" Watkins and Ervin Wurthmann, as well as others, for organizing that spectacular and important event devoted entirely to bromeliads. It resulted in a significant increase in the popularity of bromeliads.

Morris W. Dexter
Belleaire, Florida



MULFORD B. FOSTER Rt. 2, Box 491, ORLANDO, FLORIDA

Dear Morris: July . 22 . 63.

It was nice to receive your letter of the tenth, and I was quite pleased to learn that your folks are planning an All Bromeliad Show in my honor—at Clearwater in April '64. This will be a first for Florida I'm sure, and I certainly appreciate the thoughtfulness and action of your West Coast Society.

I believe I let you have a plant from Martinique—mine have never flowered but I am almost sure now that it is Aechmea serrata.

Best to you both from both of us — hope we'll see you both again.

The best
Mulford

*Typeset for legibility

Guzmania undulatobracteata; a New Combination

Werner Rauh **Photographs by the Author**

In February 1971, we collected[1] a terrestrial bromeliad with a tripinnate inflorescence and remarkable, bicolored (yellow-red) floral bracts. These bracts were characterized, moreover, by a broad, hyaline margin. Therefore, we named it *undulato-bracteata.* Since we had very poor flower material at hand and because of the exact distichous arrangement of the flowers (typical of the genus *Tillandsia)* we described our plant as *Tillandsia undulato-bracteata* (Holotype: *Rauh 25 825).*[2]

Now, in February 1990, 19 years later, a pup of the type plant came into flower in the Botanical Garden of the University of Heidelberg so that we had many authentic flowers at hand. We must state that our *Tillandsia undulato-bracteata* has typical *Guzmania* flowers and must, therefore, be transferred into that genus even though the distichous arrangement of the flowers is a feature of the genus *Tillandsia.*

Fig. 8.
Here is a portion of the *Guzmania victoriae* inflorescence; the cover photograph of a single spike shows clearly that the flowers are arranged in two rows.

Fig. 9.
Part of the *Guzmania undulato-bracteata* inflorescence (in cultivation).

Fig. 10.
Guzmania undulatobracteata spike with one open flower.

The name of the plant must be changed to: *Guzmania undulatobracteata* (Rauh) Rauh.

Even in 1974, we pointed out that the plant, with its red-striped leaf bases and yellow-red spikes looked more like a *Guzmania* than a *Tillandsia.*

In addition to the type locality, we found the plant in Ecuador in the valley of the Río Quijas, north of Baeza, near El Chaco *(Rauh 34 656,* 1973). It was re-collected by G. Raeymaekers in Ecuador between Quito and Baeza in April 1978.

Guzmania undulatobracteata really is a striking plant. It is related to *Guzmania victoriae* Rauh[3] *(please see front cover)* from northeastern Peru (Ingenio-Tarapota, Dptm. Amazonas) where we collected this plant in a dense, dark, moist, and cool mist forest at an altitude of 220 m (holotype: *Rauh 38 336,* 1975). It has tripinnate inflorescences with a distichous arrangement of the red-yellow floral bracts, often with a transition to a spirostichous arrangement (Fig. 9). For this reason, *G. victoriae* seems to be a link between all the other polystichous-flowered *Guzmania* species and the distichous-flowered *Guzmania undulatobracteata.*

With this information, it is necessary to change the diagnosis of the genus *Guzmania.* In the L.B. Smith and R.J. Downs monograph[4] is written: "Inflorescence mostly bipinnate or simple, its branches polystichous-flowered..." In *The Bromeliaceae of Ecuador, 1972,* A.J. Gilmartin writes of *Guzmania* (p. 185): "Spikes of branches with flowers always disposed polystichously..." So we have to add to the genus diagnosis of *Guzmania:* "...branches polystichous, rarely distichous-flowered..."

In addition to the original diagnosis of *Guzmania undulatobracteata* of the 1974, a detailed description of the flowers now follows (Fig. 10):

Flowers subsessil (pedicel 2 mm high and 3 mm thick), 3 cm long. *Floral bracts* 2 cm long, subcarinate, obtuse, but the middle nerve forming a little, brownish mucro, nerved, sparsely brown lepidote, with a broad, hyaline, undulate margin, in the basal half cinnabar red, in the upper half lemon yellow, adpressed to the sepals and exceeding them. *Sepals* 1.5 cm long, 0.5 cm wide, ± 2 mm connate, lanceolate, attenuate, the posterior carinate, light green, yellowish to the tip, sparsely brown lepidote. *Petals* erect, not recurved, 2.7 cm long, 1.7 cm high connate to a light yellow tube, free part of the petals ligulate, obtuse, golden yellow. *Stamens* and *style* included, equal in length. *Filaments* yellowish white, adnate to the petal-tube. *Anthers* dorsifixed, sagittate. *Style* with erect, light yellow *pistil.*

(continued on page 24)

Best of the Best, 1990

Charlien Rose, Affiliate Shows Committee Chairman

Visiting the plant exhibition at any bromeliad show might be compared with visiting a combination first-class bakery and 64-flavor ice cream dispensary, if you are both a bromeliad fancier and dessert addict. The more so given a world conference where there may be two or three times as many plants entered into competition as may be found in a local show. Once is not enough, to quote the title of a novel of some repute a few years ago. One visit to a bromeliad exhibit with 725 entries, as was the case at the Houston World Bromeliad Conference, would have provided no satisfaction; several hours of looking and noting would have been more like it.

The best of the best entries at the 1990 WBC were photographed by Robert Stucker, a member of the Tarrant County [Texas] Bromeliad Society and the five best slides are reproduced here. The exhibitors of these plants tell us about them.

• **Best of Show—Horticulture Award** (Fig. 11). *Orthophytum burle-marxii* [var. *seabrae?*][1] exhibitor, Georgia Waggoner, Sooner State Bromeliad Study Group, Oklahoma.

Georgia collected this plant in east-central Brazil, in the state of Minas Gerais almost six years ago. There were two distinct clones growing in the sandy loam that had collected in rock crevices. One had shiny leaves while the exhibition plant leaves are densely covered with white scales. Georgia grows her bromeliads in a greenhouse. She uses a balanced fertilizer mixed approximately one part to 200 parts of water every time she waters. The entry was grown in a fast-draining mix.

• **Best of Show—Artistic Award** (Fig. 12). *Neoregelia lilliputiana* in a decorative container, exhibited by Tolene McGreevy, Bromeliad Society/Houston. Tolene bought the container when she first started to grow bromeliads because light green is one of her favorite colors. The scurf on the tiny neoregelia leaves blended well with the pale, matte green finish of the footed container while the brown flecks complemented the brownish flecks and cross bands on the underside of the leaves. The bright blue flowers made the combination even more attractive. The exhibitor planted this tiny neoregelia in the container three years ago and turned the container regularly to encourage even growth, providing the only special attention the plant received.

• **Tillandsioideae: Best Container-Grown Specimen** (Fig. 13). *Tillandsia jaliscomonticola,* exhibited by Georgia Waggoner. This specimen was about three

Fig. 11.
Orthophytum burle-marxii [var. *seabrae*?]. Mulford B. Foster Award winner for horticultural excellence. Exhibited by Georgia Waggoner.

Photos by Robert Stucker

Fig. 12.
Neoregelia lilliputiana in a decorative container. Morris Henry Hobbs Award for artistic excellence. Exhibited by Tolene McGreevy.

Fig. 13.
Tillandsia jaliscomonticola. Silver medallion winner for best container-grown specimen of the subfamily Tillandsioideae. Exhibited by Georgia Waggoner.

Fig. 14.
Canistrum fosterianum.
Silver medallion winner for best container-grown specimen of the subfamily Bromelioideae. Exhibited by Bob D. Whitman.

years old and the third generation of a plant collected in Mexico. Georgia selected this clone from among many because it has a red hue.

• **Bromelioideae: Best Container-Grown Specimen** (Fig. 14). *Canistrum seideli-anum.* Bob Whitman, Golden Triangle Bromeliad Society, Beaumont, Texas, was given this plant by Georgia Waggoner who got her specimen from Luis Gurkin of Rio de Janeiro. The entry was grown at the top of a plant pole under 65% shade cloth, kept reasonably dry, and not fertilized.

• **Best Bigeneric Hybrid Award** *(please see back cover).* An unnamed ×Neophytum *(Neoregelia* Royal Burgundy × *Orthophytum navioides).* Herb Hill, Jr., Bromeliad Guild of Tampa Bay, Florida, hybridized and exhibited this entry. Bert Foster provided the *O. navioides,* a descendent of a plant collected by Mulford B. Foster. The other parent resulted from seed sent from Germany by Walter Richter. Herb discarded all of the seedlings of that batch except for one that he raised to maturity.

Houston, Texas

NOTES:

1. There are more color photographs and descriptive material of *Orthophytum burle-marxii* in *Journal* volumes 35, pages 247–250 and 38, pages 3–6 and 33–34.

Guzmania undulatobracteata; a New Combination *(continued from page 20)*

Both *Guzmania undulatobracteata* and *G. victoriae* are related to *G. paniculata* Mez but the latter has polystichously arranged flowers.

Heidelberg, West Germany

NOTES:

1. In mountainous forest near Oxapampa (Chanchomayo, Dptm. Pasco), Peru, 1800 msm.
2. The diagnosis was published in Bromelienstudien, 2. Mitteilung (Trop. subtrop. Pflanzenwelt, 8): 6–14; 1974.
3. Bromelienstudien, 6 Mitteilung (Trop. subtrop. Pflanzenwelt, 18): 24–27; 1976.
4. Tillandsioideae (Flora Neotropica, 14/2): 1275; 1977.

Easy Methods for Raising Some Bromeliads from Seed

Part I

Richard Oeser, M.D.

Referring to Walter Richter's suggestions for raising hard-leaved bromeliads *(Bulletin* XIX, No. 4, P. 86), I can describe a most primitive but successful way for the noncommercial bromel-fan who gets seeds from his aechmeas, neoregelias, billbergias, and other berried fruit plants and wants to raise new ones from seed.

Take a slab of hapuu (Hawaiian fernwood) and hang it in a horizontal position from a wire. Be sure that the hapuu is fresh and has not been used for previous germinations. Hold the ripe berry of your bromeliad between two fingers and squeeze the seeds directly on to the surface of the fernwood, just as you would squeeze the toothpaste on to your toothbrush. Spread the seeds equally over the fernwood. Allow the fruit jelly which contains the seed to dry, so that the seeds stick firmly on to the fernwood. It is not necessary to wash the jelly off the seeds. The next day moisten the slab by dipping it into your water container. then hang it in a shady place (full sunlight will dry out the slab too quickly). Keep the slab moist. If necessary dip it daily; the excess water will drip off. By following this procedure you will see the seeds germinate after a few days. Now you should use some fertilizer in your dipping water. After the seedlings are about one inch high, break the fernwood apart and transfer the little plants into planting dishes with the usual potting material.

This method of germinating seeds has two big advantages over other procedures

1. By using fernwood and hanging it in a horizontal position, it is almost impossible to overwater the seeds (Fig. 15, 16).

2. By hanging the slabs, the snails will not get to the little leaves. These two points are the most critical in plant raising. (I might also add that the fresh seed of the berry doesn't need time to absorb water. It can germinate immediately, so it avoids infection by fungi which destroy slow germinating seed.) By following the described procedure, you will easily succeed in germinating and raising your new plants.—*Germany.*

Part II

From Australia come several interesting methods of growing tillandsias from seed. One member made a bromeliad tree and bound the branches with

Fig. 15.
Tree fern slab with tillandsia seedlings. The diagonal rods are part of a hanger used with a hanging pot.

Fig. 16.
Marcel Lecoufle, who took these pictures in October 1990, twenty years after Dr. Oeser described the procedure, has had equal success with pieces of polystyrene as a seed base as shown here. M. Lecoufle is an honorary trustee of the society.

Indian hemp. Tillandsia plants were secured to it and grew extremely well. While planting some tillandsia seed, this grower decided to try a few on the hemp-covered branches of his bromeliad tree, as he felt this would be good for germinating the seed in simulated natural surroundings. His hunch proved correct, and he had a nice batch of tillandsia seedlings sprouting on the limbs of his tree. Another grower has had good results germinating tillandsia seed on cones of *Banksia evicafolia,* and another has found that "Blackboy" fiber holds a lot of moisture and is good for this type of seed.

Parts I and II reprinted from Bromeliad Society Bulletin, *20:11–12; 1970.*

Part III
Tillandsias: Seed Gathering and Propagation of the Species
Rolly Reilly

Now that the heat of summer[1] is on us in full strength, you have to be watchful for escaping seed. From early morn to forenoon the seed capsules open and all is lost on the wind.

I find that it is better to collect the capsules as soon as you see a colour change from the green to brown on the exteriors. allow them to open in a dry container.

It is then essential, as soon as it is convenient for you, to put the seed down on a suitable medium, the reasons being that on exposure to the elements germination begins immediately. After experimenting with many different materials over the past six years, I have found the two most suitable for our climate to be:

1. Melaleuca. Tie a bundle a branch thinnings together, approximately 60 cm long, 10 cm in diameter.

2. Coir—coconut fibre tied to a backing of polystyrene board. These materials are cheap and easily obtained.

Now that the seed has been put down, several problems arise. If you are not blessed with a misting system in your plant house, and to save a lot of leg work, take the medium indoors or to a suitable place on the patio. From there, particular care must be taken to see that misting three to four times daily takes place, ensuring drying times in between until germination occurs, eight to 12 days for most species. A one-litre plastic spray bottle kept handy is essential.

After a few weeks of this care, the growing plants can then be returned to your plant house or shady tree for normal maintenance.

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[1] Just remember that the seasons are relative to the hemispheres.

Fig. 17
Tillandsias growing on a melaleuca stick in Rolly Reilly's greenhouse near Brisbane, Queensland.

T.U. Lineham

Watching your plants grow to maturity makes this little bit of effort very worthwhile.

Reprinted from Bromeliaceae, *The Bromeliad Society of Queensland, Jan.–Feb. 1987*

Why all the fuss about seeds? Why the repetition? You will remember from Mark Dimmitt's series on tillandsias in the first three issues of 1990 his instructions on sowing tillandsia seed. Here we have added Dr. Oeser's description of growing various kinds of bromeliads from seed and two other reports on seed culture. These reports from over the years prove that if you pay attention to the principles described by our authors you may expect success even though the growing media may vary considerably in appearance. There are two facts to keep in mind: the first is that tillandsia *seed must be sowed as soon as possible because it will not keep. The second is that with or without justification as we understand it the export of wild-collected plants is becoming more strictly regulated. We shall become increasingly dependent, as a result, on suppliers of second and later-generation plants and on their choice of plants to cultivate. In the interest of maintaining the largest possible inventory we shall have to help ourselves as conservation-minded hobbyists to learn and to practice seed culture.—Ed.*

Book Reviews

Growing Bromeliads, edited by Barry E. Williams and Ian Hodgson. 150 p., color and b&w illus.; 24 cm. (Christopher Helm [Publishers] Ltd., Bromley, Kent [price not stated]; Timber Press, Portland, OR, $24.95 + $3.00 shipping charge); 1990.

Two years ago, during its 25th anniversary year, the Bromeliad Society of Australia, Inc. compiled a handbook called *Growing Bromeliads*. We congratulated the authors and editor (*Journal* vol 39, page 208, 1989). We should have been more generous and called it a *very* useful work. It had a soft cover, the price was (U.S.) $12.95, and it was sold out in a few months.

We said: "This book was written, illustrated, and edited by 18 members of the B.S.A. 'to provide an insight into bromeliads from the viewpoint of the practical horticulturist....' The book will remind some readers of Victoria Padilla's *Bromeliads* with its general arrangement, preliminary information, and descriptions of genera. It reports the individual author's recommended growing techniques and describes no more than 30 species and hybrids of each of the commonly cultivated genera.

"Some chapters are longer and have more detail than others. Most of the color pictures are very good and relate well with the text. In the chapter on tillandsias for example, 17 of 29 species described are illustrated. There are 21 neoregelia descriptions followed by seven hybrids and cultivars. All of the latter are illustrated but only three of the species. Chapters on propagation, biology, variegation, and pests and diseases add to the usefulness of this book. It includes a glossary and an index."

We noted minor problems but concluded that the usefulness of the book "is certainly not limited to Australia. Recommended for hobbyists and for bromeliad society libraries."

This new edition has hard covers. The new type face is easier to read and the overall design is better especially since the double columns have been changed to single-line format. The chapters on how to grow bromeliads have not been altered noticeably. There are half as many color pictures, but perhaps the selection has been improved.

The origin of the book is now identified only by the original copyright notice with the result that the reader has no way of knowing who the authors are or what their qualifications may be. In place of the history of bromeliads in Australia and New Zealand, we are given a review of the introduction of bromeliads into the United Kingdom. Where the destruction of habitat was described and deplored, we are given a new section, "Conservation," which argues for CITES listing of bromeliads as the means of protection. Counter-proposals are not mentioned.

Although the book now has a more formal appearance, and the price has been doubled, various errors have not been corrected. The appendices listing bromeliad societies, nurseries, further reading, and genera have not been improved. The list of nurseries in the United States, for example, is many years out of date; the list of genera omits five described since 1984.

We still recommend the book because of its basic contents.—TUL

Bromeliads and Mosquitoes. Two new Florida publications written by Dr. J.H. Frank[1] discuss the relationship between bromeliads and mosquitoes. The first,[2] is a two-page, illustrated summary. The author describes how tank-type bromeliads support development of mosquito larvae. He states that chemical pesticides "do not control them reliably" and concludes "the obvious way to avoid being bitten by such mosquitoes in your yard is not to grow tank bromeliads." He adds that alternative strategies are available but they take some effort.

The second publication[3] has 17 pages, the same four color illustrations as in Circular 331, and a long bibliography. The author describes both native and introduced bromeliads in sufficient detail to explain how they serve as hosts for mosquito species. He explains how mosquitoes associate with bromeliads and then presents in the remaining half of the booklet several control methods: chemical insecticides, microbial insecticides, management (limit the number of bromeliads, flush the mosquito eggs from the tanks). He says "successful biological control methods against *Wyeomyia* [*vanduzeii* and *W. mitchellii*] might eliminate the need for any other control method...[but] there is no research program leading to that objective."

Dr. Frank has given us an excellent summary of the problem. His booklet should interest bromeliad growers and hobbyists of Florida and areas with like climatic conditions.—TUL

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[1]Professor, Entomology and Nematology Dept., Institute of Food & Agricultural Sciences, University of Florida.

[2]*Bromeliads and Mosquitoes,* Entomology Circular No. 311, June 1990, Fla. Dept. Agric. & Consumer Serv., Div. of Plant Industry, is available from the Florida Dept. of Agriculture and through some mosquito control agencies.

[3]*Mosquito Production from Bromeliads in Florida,* June 1990 (published in November 1990), Bulletin 877, Agricultural Experiment Station, Institute of Food and Agricultural Sciences, Univ. of Florida. Single copies may be obtained free by writing to Chic Hinton, IFAS Publications Office, Bldg. 440, Univ. of Florida, Gainesville, FL 32611.

Regional Reflections

Letter

Editor:

I was interested in Linda Whipkey's thoughts expressed in the September–October 1990 issue of the *Journal* on ways in which we can share our enthusiasm for bromeliads with the community.

One point she made was that the lives of the elderly may be brightened by bringing some colorful plants into their presence. Perhaps what I've done at a local nursing home may encourage other BSI members to organize a similar project.

On my visits to a resident in a nearby nursing facility, I was constantly irritated by a large, weed-filled flower bed bordering the path along which my friend exercises. Years ago it must have been landscaped. I described some bromeliads to my friend and suggested the empty bed would be perfect for displaying them. He became enthusiastic and got the go-ahead from the administration and also their cooperation in removing weeds and providing some mulch.

The area was too large for me to supply all the plants from my own garden, but DeLeon's Bromeliad World and Mitch Rabin's Plants In Design generously gave me several stunning aechmeas, guzmanias, ananus, and neoregelias, many in bloom.

One day, with the members of the home's garden club assembled on the sidewalk, I told them a little about bromeliads so they could distinguish among those in the bed. I was amazed by their interest and enthusiasm! And, installing the plants over the next few days, I was always entertained by questions and comments from the residents, visitors and employees.

Now when I visit my friend, I wear my scruffy gardening clothes and do whatever maintenance is necessary, and there are always people who come by to watch and ask questions and say thanks. That makes it all worthwhile, and perhaps is what Linda Whipkey had in mind.

Moyna Prince
Miami, Florida

Not long ago, Barb Brockway wrote asking for information about bromeliad books to use in her work at Memorial City Rehabilitation Hospital, 3043 Gessner, Houston, TX 77080. She thought it possible to use bromeliads in her horticulture therapy work. Members might want to investigate helping local hospitals with their plants and knowledge.—Ed.

Brown Leaf Tips and Edges

Gene McKenzie

I found this article in one of the shopping papers I receive, and as it made me feel better to realize others have the same problem, I thought you might be interested, too. Brown leaf tips and edges... the reason for these unsightly leaves is almost always water-related. Unfortunately, the same symptoms appear both from overwatering and underwatering so each case needs to be treated individually. Generally speaking, many houseplants do best when the top inch of soil is allowed to dry out before rewatering Even under the best conditions, leaf browning will occur, and even in large indoor plant habitats such as shopping malls, it is a problem that must be dealt with weekly by interiorscape professionals.

I've been in many homes where corn plants have leaves with flat, blunt tips. That's because their owners have taken scissors and just whacked the bad part off. Not only does it look weird but new browning usually follows, which only accents the unnatural leaf shape.

Apply the professional touch. Use the scissors to shape each leaf. Start at the tip and follow the contour of the leaf around one side and then the other. A helpful hint to keep the leaves from turning brown again... dip your fingers into egg whites and run them along the edges of the leaves. The protein helps seal the cuts from air and fungus and strengthens the leaf's own healing process.

Reprinted from Caloosahatchee Meristem, *March 1990, Caloosahatchee Bromeliad Society, Fort Myers, Florida*

Vriesea Culture

Polly Pascal

The most colorful of the wet-growing vrieseas come from Brazil and the family color is yellow. These plants are epiphytic and need good air circulation and good drainage; the thin-leaved varieties like shade and lots of water. To provide good drainage put rocks in the bottom and drainage holes in the sides or bottom of the pots.

There are three ways to water vrieseas: the entire plant and potting mix, just the plant, or misting the foliage.

In fertilizing, use not more than 1 to 1½ teaspoons of mix to one gallon of water. If Osmocote is used as a pot feeder, go very easy on the amount used. Vrieseas respond to foliar feeding but use one-half strength and do it more often, early in the day or late afternoon in the summer months, once a month. Add enough to have the cup overflow.

Avoid having floppy lower leaves on your plants. There should be a corresponding relationship between plant and flower spike. If the plant is starved it produces a short and skinny flower spike.

There are exceptions to the rule and the following vrieseas are dryer growers: *V. fosteriana* Red Chestnut, *V. gigantea, V. gigantea* Nova and *V. saundersii. V. splendens* and similar species are cold sensitive.

Vrieseas seldom ever get fly speck scale. Brown speck scale may come from overcrowding. They can be grown outdoors here at any time, but the best time for them is in May and June with the start of the rainy season.

Reprinted from The Commentary of *The Bromeliad Society of Broward County, Inc. March 1990*

[*Ervin Wurthman compiled a very useful list describing vriesea cold hardiness some years ago in* Journal *34:252–254*].

A Note of *Billbergia pyramidalis*

Peter Temple

It is well known that *Billbergia pyramidalis* is a good tree climber; its long stolens grope around the trunk and branches ever crawling, winding, and getting higher and higher. Even when potted, it still preserves its stolon and climbing habit, but it is not well known that when planted in the ground this true habit disappears and is lost. No stolons are sent out, but instead a tight clustering habit develops and flowering appears to be more prolific.

In the countries of Europe and the islands off West Africa, where the climate permits the outside planting of billbergias, *B. pyramidalis* is widely used and the cluster growth effect when in flower is a sight to behold.

There are also two distinct phases of *Billbergia pyramidalis.* One has the wide soft-leaved light apple-green leaves terminating in a blusih tip with terminal cusp and the other with leaves hard and thick, dark grey-green and narrow, cross-banded with scales, and terminating with a point. In the latter phase the inflorescence has a rosette. This may indeed by an old French or Belgian hybrid, but I have no information about this. Flowering of both forms occurs at the same time—about September.—*London, England*

[*Reprinted from* Bromeliad Society Bulletin *20:37; 1970*]

A recent note from Peter Temple contains the good news that a meeting was held on 22 September this year to "relaunch the British Bromeliad Society in conjunction with the Epiphytic Plant Study Group." Correspondence should be addressed to R.J. Houghton, 16 Culcheth Hall Drive, Culcheth, Warrington, Cheshire, WA3 4PS, England.

Cleaning Pots

If you own a crusty pot or two, don't panic. White rims and sides don't mean your plants are suffocating or that you have been a messy grower. A working over is in order, though. Cleaning those deposits will improve soil aeration and reduce the risk of transmitting soil-borne pests and diseases to the plant next door.

To clean them up, you do not have to dump or repot the plant, just take them to the sink and scrub the rims and sides of each pot with a sponge or scrub brush. An old toothbrush is good for getting in those tight spots. Rinse the surface thoroughly with water, pat the pots dry and replace them in their usual home. Using a little detergent, baking soda or borax will give your scrubbing clout. If they still lack shine from your efforts, buff them with a fine grade of sandpaper, followed by a clear rinse.

Some of us wait beyond the scrub stage and then the best treatment is boiling and bleaching. First (after emptying the pots) clean as much as possible then steep them in a pail of boiling water and detergent until they have cooled. By then it should be easy to scrub off the residue and rinse clean. Or, place them in a heavy solution of detergent. They should come out clean and ready to be rinsed and dried.

You can also disinfect the pots as you clean them by soaking them in a solution of bleach and water after scrubbing off loose deposits. Use one part bleach to nine parts water. Let soak for about twenty minutes. Then scrub and rinse. Make up a new batch to soak each group of pots.

The strongest medicine is a long soak overnight in soapy water. If the crust is as hard as rock, then use trisodium phosphate at the rate of two tablespoons of phosphate to a gallon of water. Soak overnight then rinse.

(The unnamed author suggested using various acids as a last resort. Trisodium phosphate is rough enough without messing around with acids so by doing my part for well-meaning censorship you won't get to read his final paragraphs. Don't forget to wear waterproof gloves.)—Ed.

Reprinted from Pups & Pals
Shreveport Regional Bromeliad Society Newsletter, May 1990.

Questions & Answers

Conducted by Derek Butcher

All readers are invited to send their questions and observations about growing bromeliads as a hobby to the editor. Answers will be sent directly to you and some questions will be published.

Q. I have heard that some bromeliads are carnivorous. Is that true?

A. Carnivorous means flesh-eating and when used in conjunction with plants generally means insect-eating. A plant stays still when it is being eaten but an animal or insect must be captured in some way. Many plants in nutrient-deficient areas have evolved marvelous mechanisms to reverse the roles in the insect-eating plant concept. Some have sticky hairs, some intricate springs, a translucent cap, but all show some method of capture. No bromeliads are this sophisticated.

Let us think of the many tank-shaped bromeliads and the living and dead organisms that are in the centre unless flushed out. The more tubular bromeliads such as *Billbergia* are harder to flush unless you turn them upside down, which is unlikely to happen in nature. The dead organisms decay and the living excrete nutrients into the soup. Surely these nutrients are used either by the plant directly or by the roots when overflow conditions occur. These bromeliads, however, are not actually consuming insects directly and cannot be considered carnivorous.

We know that there are many primitive plant forms in the Lost World area of Venezuela including some choice bromeliads such as *Navia.* It is also the home of *Brocchinia,* which grows mainly as a terrestrial in swampy areas and which, in *B. reducta,* looks like a billbergia until it flowers. It is probably because of its lacklustre flowers that it is not popular although it does have botanical interest. Many of the species have leaves with a loose, waxy covering that would be slippery to landlubber insects rather than the airborne kind.

Perhaps *Brocchinia* species are primitively carnivorous plants but there has, as yet, been no actual proof of their digesting insects.

If we are looking for real carnivorous plants then *Utricularia,* the bladderwort or suction trap, has been found surviving in the water in the tanks of bromeliads including *Brocchinia.* As *Utricularia* has seed in a nonexplosive capsule and normally grows in boggy areas, just how do these plants get inside bromeliads?

Q. I have problems rooting green-leaved vriesea offsets. Can you help me?

A. Vriesea offsets root readily in the warmer months with the optimum being late spring or early autumn. However, you do need to prepare them properly. They seem to react much less favourably to the knife than, say, neoregelias. The time for removal is when the offset is 1/3 to 1/2 as tall as the parent plant. I prefer to use finger pressure to ease the offset from the mother plant. Removal of the leaf outside the offset may help. You may need to use a knife for increased leverage but the offset should come free with some traces of roots at the bottom. If you are too violent you will be left with a handful of leaves.

When the offset appears next to the flowering stalk you will have a critical decision to make. You can remove the offset by butchering the plant hoping that the mangled remains will throw further offsets. However, the safest way is to leave the plant intact and slowly remove the outer leaves as they become ancient.

Then there are those tiny offsets that sometimes occur at the base of *Vriesea gigantea* and like species when they are 10–15 years old. If you can save those tiny plants you will be years ahead in your seed-sowing programme. I stick these mini-offsets to natural cork using a water-based glue and treat them as seedlings. The glue lasts long enough for the plant to attach itself to the cork.

Q. Why do leaves on my nidulariums die back especially at the tips?

A. Nidulariums are closely related to neoregelias, have a similar habitat and yet seem harder to grow as perfect specimens. This is especially so in an area which has hot, dry summers. Nidulariums, generally speaking, do have thinner or floppier leaves than neoregelias and are more susceptible to these conditions. The cause is undoubtedly a reaction by the plant to water expiration loss and parts of the plant must be sacrificed. This problem can be reduced by artificially reducing the air temperature and/or by increasing humidity. A cheap solution is to put an extra sheet of shade cloth or an extra coat of paint on the glasshouse. You will never win by putting plants under a bench because the shade will be either too much or too little and your plant will get that lopsided look with long strappy leaves.

If you intend to grow as wide a spectrum of bromeliads as possible, you will need to provide a wide range of climates including areas with different densities of shade. Even nidulariums have varying requirements so get to know your plants.

If you live in an area which has cold, wet winters you will experience another form of leaf die back unless you provide heat and protection. Here, it is usually the entire leaf that rots away. You can reduce the damage by cutting out the dead portions, by using a fungicide, and by providing more breathing space between your plants. I think that the primary cause is the cold and the length of the cold period and you must provide protection.

Q. Would you recommend charcoal as an additive to a mix suitable for bromeliads?

A. Charcoal in itself would add little to the nutritive value of a mix although it would provide some access to trace elements and is probably the best aerator available. We know that in habitat most bromeliads like a porous soil that retains a certain amount of moisture. You could grow bromeliads successfully in 100% charcoal pieces if you used some fertilizer (and had some means to keep the plant from falling over and the charcoal from floating away).

At one time, we went through a phase of believing that you could not grow a good cryptanthus without charcoal in the mix. Then we decided that there are other, cheaper, porous substances that can be used including polystyrene foam and volcanic rock. Our experience is, then, that charcoal is not essential but nice to use.

Q. Do some bromeliad contain an irritant? G.S. from Seattle writes of painful experiences.

A. I am sure that we have had our arms scratched by bromeliads during a bout of potting (unless you specialize in tillandsias). I have found that *Acanthostachys* species have a particularly bad effect on some people. The conditions described by G.S. seem to go beyond the usual reactions. I recommend that anyone who experiences more than mild discomfort that lasts more than a day see an allergist.

Some people who work in bromeliad nurseries seem to develop immunity to whatever causes the reaction that we experience but they work with the plants daily. Grace Goode clothes herself with a large hat, gloves, a cover-all costume with long sleeves. She takes no chances. We might copy her example and take particular care of face and eyes.

Correction: The Selby Gardens Symposium poster price reported on page 264 of the November–December 1990 *Journal* is $6 at the Garden shop and $9 for each mail order. The price of signed posters remains $15.

Advertising space in the *Journal of the Bromeliad Society* is available at the following rates:

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The Bromeliad Society, Inc.

The purpose of this nonprofit corporation is to promote and maintain public and scientific interest in the research, development, preservation, and distribution of bromeliads, both natural and hybrid, throughout the world. You are invited to join.

Robert Stucker

Herb Hill, Jr. of Lithia, Florida, won the silver medallion for the best bigeneric specimen at the Houston World Bromeliad Conference, 1990, with this entry. One parent of his hybrid was the descendant of a plant collected by Mulford Foster and the other was grown from seed supplied by Walter Richter. With that background and Mr. Hill's ability with plants, the award was predictable.

Calendar of Shows

23–24 February	Bromeliad Guild of Tampa Bay annual show and sale in conjunction with Tampa Federation of Garden Clubs and American Guild of Flower Arrangers National Show. Tampa Garden center, 2629 Bayshore Blvd., Tampa, FL. Plant entries Thursday 21 Feb., 5–9 p.m.; late entries Friday 22 Feb., 9 a.m.–12 noon; judging, 22 Feb., 1–5 p.m.; show, Saturday 10 a.m.–9 p.m., Sunday, 11 a.m.–6 p.m. Mike LaVasseur 407-349-2214.
29 March–1 April 1991	Sixth National Bromeliad Conference; a congress of Australian Bromeliad Societies. The Shore Inn, Sydney, N.S.W., Australia. Mrs. Elaine Jones, registrar, P.O. Box 183, Toukley, N.S.W. 2263, telephone 61 2 043 963200.
4–7 April 1991	3rd International Cryptanthus Show and Plant Sale held in conjunction with the 2nd Annual Festival des Fleurs de Louisiane. Lafayette, Lousiana. Michael Young 504-355-5408.
11–14 June 1992	1992 World Bromeliad Conference sponsored by The Bromeliad Guild of Tampa Bay, Inc., The Florida Council of Bromeliad Societies, Inc., and The Bromeliad Society, Inc. Saddlebrook, Tampa, Florida. Tom Wolfe, General Chairman, 813-961-1475