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Cover photographs. Front: Man carrying a load of *Catopsis* inflorescences to decorate his church in Oaxaca, Mexico. Photo by Dan Shook of Kilauea, Hawaii. Back: Closeup of the plant carried on the front cover photo. Probably *Catopsis compacta*. Photo by Dan Shook.

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Reports of New Bromeliads From The State Of Táchira, Western Venezuela

Francisco Oliva-Esteve and Bruno Manara

Photographs by Francisco Oliva-Esteve

On September 23 and 24, 1994, we made our third visit for bromeliads to the state of Táchira in Western Venezuela. The main goal of our trip was to search for *Guzmania lychnis*.

Therefore, our search was concentrated mainly along the headwaters of the Quinimari River between 2200 and 2400 meters in elevation, where, in 1944, the late Dr. Julian Steyermark had collected that bromeliad. The species had never before been reported from Venezuela nor has it been collected here since.

On this occasion we were impressed by the massive floral display of hundreds of specimens of a small bromeliad with thin ascending, grayish leaves. It was very common on trunks and branches of trees that had been spared from the clearing and burning of the original forests to open land for cattle and farming. In a previous report we had called it *Tillandsia myriantha*, but now in full bloom, it looked very different. Our investigation showed it to be *Vriesea heterandra* (figure 1).

Then, while looking for *Guzmania lychnis*, we spotted attached to the trunk of a tree, a huge *Tillandsia* uniformly yellowish in color. At first glance it seemed to be another variety of the ubiquitous and polymorphic *Tillandsia fendleri*, but the plant we had in front of us had leaves that were more tapered and pungent. In addition, the spikes of the inflorescence were more densely arranged, wider, and ascending, while in *T. fendleri*, they are more widely spaced, narrower, and patent or slightly drooping. It reminded us of *T. oerstedia* from Central America except that the primary bracts of the inflorescence were shorter, the spikes narrower, and the whole inflorescence longer.

A diligent search of the area revealed the presence of several other sterile individuals of the same species attached to nearby trees. However, since the rain that had persistently accompanied us during the trip became heavier, and the clouds started to cover everything as usually occurs every afternoon, we had to give up on our search until another time.

In April 1995, we spotted another individual of this species in bloom, this one a handsome form with the scape and inflorescence suffused with crimson (figure 3). This turned out to be the dominant form since we found eight crimson individuals in bloom scattered over a square acre of forest, while just two of the yellow variety (figure 4) were spotted.



Figure 1.
Vriesea heterandra found in a rainforest at 2400 meters in Táchira state, Venezuela.



Figure 2.
Tillandsia ionochroma.



Figure 3.
Crimson-colored form of an unidentified *Tillandsia* found in El Tama National Park.



Figure 4.
Yellowish form of the same *Tillandsia* species.

This species has not been reported so far from Venezuela. However, it might be a taxon known from adjacent Colombia, reaching into Venezuela as far as the mountain rainforests of the El Tama National Park, located west of the depression of Táchira. The identity of this taxon is now being studied and the authors would appreciate any suggestions or further information on the subject.

We were happy with our discoveries as we headed onward. Then, the senior author located a medium-sized bromeliad that reminded us of *Vriesea tequendamae* but for the smaller, partially ascending and laterally arched inflorescence with dull pink bracts and purple flowers. In *V. tequendamae* the inflorescence is completely drooping. The plant turned out to be *Tillandsia ionochroma* (figure 2), until now known only from Ecuador.

A bit further along the slope, and in the mist at about 10 meters up in a tree, we spotted another huge bromeliad. It is unfortunate that we could observe no more details of this particular plant. The rain and thick clouds soon blanketed the area and made us give up.

However, upon returning to the state of Mérida where our trip had started, and which was somewhat lower than the paramos, we passed a surviving subparamo grove of dense bushes and small trees where *Tillandsia towarensis* was particularly abundant. There, on the road bank, stood a magnificent individual of *Tillandsia clavigera* in full floral state. Until not long ago it was thought to have been a variety of the *T. fendleri* complex, but the apex of its inflorescence is nodding, as are the spikes, with all of them turning to one side of the stem. In addition, the tips of the leaves are pungent and blackish, while in *T. fendleri* they are just acute and uniformly hued.

We were lucky enough to be able to photograph all of these bromeliads. We hope the readers will enjoy seeing them in the JOURNAL for the first time. Unfortunately we cannot show a picture of the much-looked-for *Guzmania lychnis*. We hope to find that species on some future trip to Táchira.

Caracas, Venezuela



A New *Tillandsia* Species From Oaxaca, Mexico

Renate Ehlers¹ and Pamela Koide²

Photographs and Illustrations by Renate Ehlers

Tillandsia rubripica R. Ehlers & P. Koide, spec. nov. (figures 5–8)

A *T. dugesii* Baker rosula ampliori, scapo breviori, inflorescentia decurva, spicis decurvis longioribusque, bracteis spicarum brevioribus, bracteis florigeris solum leviter carinatis, adaxialiter nervatis et punctuato-lepidotis, sepalis subliberis et petalis longioribus differt.

Typus: Mexico. Oaxaca: inter pagus Ysondua et Buena Vista, 1900 m s.m., saxicola in rupibus prope cataractum, 15. 3. 1993, leg. K. & R. Ehlers EM 931203 (holotypus: WU, isotypi: WU), loco citato, 19. 3. 1991, leg. P. Koide & A. Lau (paratypi WU).

Plant saxicolous, stemless with long rhizomatous base, 40–60 cm high, to 40 cm wide, few leaves (10–20) forming a narrow, suberect funnelform rosette with basal off-shoots. **Leaves** to 50 cm long, coriaceous, subsucculent. **Sheaths** 8–12 cm long, 6–9 cm wide, elliptic, light-brown, adaxially brown, abaxially grey finely adpressed lepidote. **Blades** 3–4 cm wide at base, to 40 cm long, triangular, attenuate, apice acute to caudate, densely and finely adpressed lepidote, abaxially nerved. **Scape** shorter than the rosette, 8–15 cm long, stout, to 1 cm in diameter, curved or subdecurved, imbricately concealed by few, foliaceous scape bracts. **Inflorescence** decurved or subpendent, 40 to 70 cm long, to 30 cm wide, lax, bipinnate to subtripinnate, (lower branches of larger plants have a lateral, smaller spike), 7 to more than 20 branches, internodes 2–3 cm, spreading 80 degrees to suberect, axis stout, straight or slightly flexuous, glabrous, red. **Primary bracts** much shorter than the spikes, most of them only as long as the sterile-bracted stipe of the branch and enfolding it, to 5 cm long, to 3 cm wide, elliptic-deltoid, acute, nerved, adaxially very densely and finely subpruinous grey lepidote, abaxially red, lustrous, glabrous or slightly lepidote. **Spikes** 7–35 cm long, 1.5–2 cm wide (sometimes elongating postfloral and producing a long, narrower appendix), with a stout stipe 2–6 cm long, linear, acute, complanate, 6–30 flowered with 2–4 sterile bracts at base, rachis glabrous, nearly straight, flowers subsessile, odorless. **Floral bracts** densely imbricate, the rachis not visible, (1.2) 2.2–3.2 cm long, to 1.2 cm wide, ovate, acute to acuminate, enfolding the sepals, ecarinate to slightly carinate (carinate when dry), coriaceous, adaxially nerved, densely and conspicuously punctulate, lepidote, abaxially bright carmine-red, glabrous, lustrous. **Sepals** to 2.7 cm long, 6–8 mm wide, lance-elliptic, acute, yellow-green, equally subfree (connate for 2–3 mm with the ovary), the posterior ones carinate, thickened along the keels, adaxially nerved and slightly very finely

¹ Stuttgart, Germany.

² Carlsbad, California.



Figure 5.
Tillandsia rubripica R. Ehlers & P. Koide. Habit. This large, newly described species is native to Oaxaca, Mexico, where it was found growing on rocks near waterfalls at 1900 m altitude.



Figure 6.
Tillandsia rubripica.
Inflorescence branch
with flower.

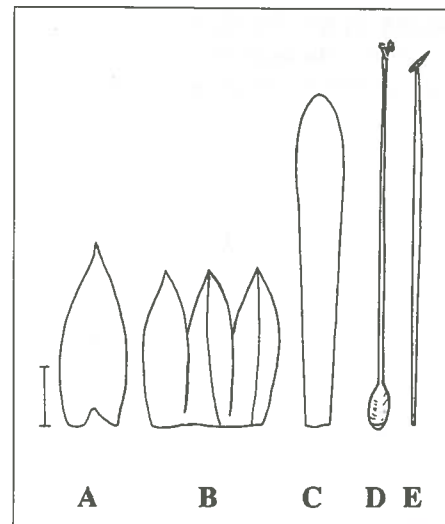


Figure 7.
Tillandsia rubripica. A, floral bracts; B, sepals; C, petal; D, style; E, filament. Scale 1 cm.

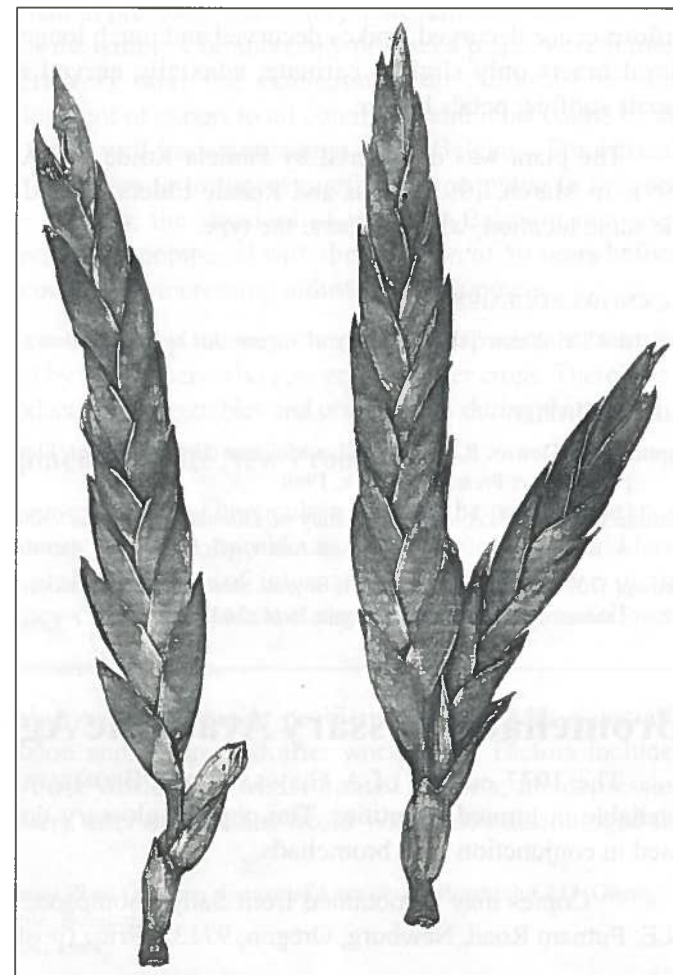


Figure 8.
Tillandsia rubripica.
(left) Simple branch;
(right) divided branch.

punctulate lepidote. **Petals** 5–5.5 cm long, 7 mm wide, tips slightly revolute, corolla throat closed around the filaments, violet, white at base. **Stamens** exerted. Filaments 5–5.7 cm long, in two series of unequal length, broadened but flattened towards apex, violet with white base, anthers 3.5 mm long, 1 mm wide, versatile fixed 1/4 from base, brown, pollen egg-yellow. Style 5.5 cm long surpassing the stamens, light violet, white towards base, stigma 2 mm long, 1 mm wide, lobes once twisted, Type II of Brown & Gilmartin (1984), ovary 7 mm long, 3.5 mm wide, conical.

Type: Mexico. Oaxaca: between Ysondua and Buena Vista, 1900 m s.m., saxicolous on cliffs near waterfalls. 15. 3. 93 K. & R. Ehlers EM 931203, paratype leg. P. Koide & A. Lau 19. 3. 91, s.n. (holotype: WU, paratype: WU).

Distribution: So far known only from the state of Oaxaca. The plant grows also on rocks along the Río de Cuanana near Yolotepec de la Paz.

The key of L.B. Smith leads to *Tillandsia dugesii* Baker from which this species differs as follows:

Plant is saxicolous; leaves much wider in funnelform rosette; scape shorter; inflorescence decurved; spikes decurved and much longer, primary bracts shorter, floral bracts only slightly carinate, adaxially nerved and punctulate lepidote; sepals subfree; petals longer.

The plant was discovered by Pamela Koide and Alfred Lau, Jr., in March, 1991. In March, 1993, Klaus and Renate Ehlers located a flowering specimen at the same location, which became the type.

ACKNOWLEDGEMENT

We thank Dr. Walter Till, University of Vienna, for his cooperation and for the Latin diagnosis.

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Bromeliad Glossary Available Again

The 1977 edition of A GLOSSARY FOR BROMELIAD GROWERS is currently available in limited quantities. The popular glossary defines a number of terms used in conjunction with bromeliads.

Copies may be obtained from Sally Thompson, BSI Publications, 29275 N.E. Putnam Road, Newburg, Oregon, 97132. Price (post paid) is \$5.50, each.

The Belgians and the Bromeliads

G. Samyn & F. Thomas¹

PART II THE TWENTIETH CENTURY

1. The Conversion to Large-Scale Production

Our previous article² was concerned with the 19th century. In fact, we stopped almost at the moment of the death of Edouard Morren in 1886, but it is most interesting to consider especially the years between that date and the exact end of the 19th century. As with many other subjects, the 19th century didn't actually end until 1914 as far as Belgian horticulture was concerned.

The beginning of horticulture around Ghent was characterized by the conversion of culture by aristocrats to production for a middle-class public. As fortunes became smaller than in previous times, this public remained quite wealthy and represented the elite of the nation. Commercially produced plants were limited in number and some were very rare. The extension of the cultural level was possible only by the development of export to all continents and most courts of the world. The tsar of Russia was a well-known customer of the Belgians. For difficult transport problems it was necessary to test most carefully the shipping techniques. In the last decade of the century, the standard of living in Belgium increased notably and became almost double compared with the situation of 50 years before. It was possible thanks to continually increasing industrial development.

The agricultural crisis caused by the importation of cheap cereals from the United States was absorbed by the farmers who converted to other crops. There was a definite increase in the production of vegetables and ornamentals during that period.

2. Continuous Development Despite New Problems

The historian who surveys Belgian horticulture during the past 100 years is confronted with an uninterrupted array of problems, which oftentimes could have been fatal. Most of the problems were of international origin because of the importance of imports. They varied in nature and may be summarized as follows:

a. Trade barriers, customs, and tolls.

Free trade has always been a major problem for exporters especially during periods of depression and before and after world wars. Factors included the arms race before the First World War, which limited imports; the depression after 1929; the slow recovery after the Second World War, which discouraged the

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² J. Bromeliad Soc. 44: 200–204; 1994.

development of luxury items such as ornamentals. We have been fortunate that the recent period has changed completely with the big market of the European Community. The International situation seems to favor free trade more and more.

b. Phytosanitary regulations.

The appearance world-wide of dangerous parasites and diseases regularly closed various borders for the importation of ornamentals. These included *Phylloxera vastatrix*, which caused severe regulations to be set up by the wine-producing countries in 1878. The absolute prohibition of the importation of plant material was not relaxed until 1880 when the exact life cycle of the parasite was studied. Other problems resulted from the San José scale (1899), Brown tail moth and Gypsy moth (1909), the Colorado beetle (1936–1937), and *Heterodera rostochiensis* (sixties).

c. The World Wars.

Without doubt, the two world wars had an extremely important influence both because of the damage caused and because of the cost of rebuilding and the political problems that persisted for a long time. From 1914–1918, it was, in theory, possible to continue cultivating ornamentals for export to Germany and the neutral countries. The lack of coal, however, brought production to nearly a complete stop by the end of the war. From 1940–1945, production was possible but quotas were assigned and we were obliged to produce vegetables also. Proof of the continued interest in bromeliads during this period is demonstrated by Louis Dutrie who mentions presenting several new hybrids at the Plant Meetings of Ghent. Coal provisioning, however, made ornamental culture difficult. A final blow occurred with the bombing of the village of Merelbeke, an important horticultural agglomeration but located near a railway system. That raid almost completely destroyed several nurseries and produced many victims among the growers.

d. Competition and prices.

The seventies were a difficult transition period to the present situation, which is characterized by efficient management and the introduction of new technology. The energy crises greatly increased the cost of heating with oil products. Dutch growers could profit from low energy prices because their reserves of natural gas gave them an inestimable advantage in international markets. It is clear that growing heat-requiring tropical plants such as bromeliads was endangered. The increase in wages, caused by the monetary inflation of that period was another brake on the development of a profitable ornamental plant culture. However, all of the attempts to redress this situation have now resulted in many new and modern enterprises that can view the future with confidence.

3. Bromeliads and the Period Before World War II

In the years following the death of Ed. Morren, the introduction of new bromeliads rose to an unsurpassed tempo. Those introductions would make a long list. Many of the plants, it is true, were unsuitable for commercial culture during this

period because it was increasingly directed toward large-scale production while they were primarily collectors' items. Various *Pitcairnia* species were in that category.

More and more beautiful hybrids were obtained however, and brought into production. Before 1900, breeding work was restricted essentially to the genera *Billbergia* and *Vriesea*. *Billbergia* × *windii*, which flowered in 1882 and is still a popular basket plant in Europe, was obtained by the firm Jacob Makoy of Liège. It was the result of the cross between *B. nutans* and *B. decora*. Both species had been imported from Brazil some years before. In spite of the short flowering time, the genus *Billbergia* received more than normal attention from breeders.

Vrieseas were even more popular. After *Vriesea* × *morreniana* (*V. psittacina* × *V. carinata*) was obtained in 1882, it was followed by *V. × retroflexa* (*V. psittacina* × *V. scalaris*) and more than 50 interesting hybrids during the following decade. Even that number was more than doubled during the period just before World War II. The bases of breeding were such well-known species as *V. barilletii*, *V. carinata*, *V. splendens*, and *V. psittacina*.

After Morren's death, bromeliad enthusiasm was continued by Jos. Maréchal, the chief gardener of the Botanical Garden of Liège and later by Charles Chevalier, the curator. While the influence of Liège on bromeliad culture can be followed up to 1940, the increasing importance of the commercial centre around Ghent, where many nurseries grow bromeliads together with a whole range of other tropical plants, must be recognized.

Names of interest are F. Spae, De Clercq-Van Gyseghem, Piens, and Dalliere who had interesting collections and who from time to time produced new hybrids. During the period after 1918, although the commercial importance of bromeliads declined seriously, important collections were, nevertheless, conserved or reconstituted so that at the Floralties of 1933 mention was made of an unparalleled splendor of the bromeliads presented.

In later years, two more important names appeared before the footlights: Louis Dutrie and the Morobe family. The former performed a whole breeding program involving several genera and some bigeneric crosses. That work was treated in detail in several articles in the Journal of the Bromeliad Society in 1987 and 1989 (volumes 37–39).

Omer Morobe was employed by A. De Clercq-Van Gyseghem but later established his own nursery. He found a variegated mutation among seedlings of *Neoregelia carolinae* 'Marechalii' that would become the famous cultivar known in the trade as *N. carolinae* var. *tricolor*.

Thanks to Morobe, other *Neoregelia* and *Nidularium* novelties were obtained such as *Nidularium* Mme. R. Morobe and *Nidularium* Souvenir de Casimir Morobe. If Dutrie's work ended at his death in 1948, the name Morobe continued his memory for many years since he retired just in 1993.

4. The Years After 1945

As with all other plant culture, but especially because of the energy required for bromeliads, it took many years before they could regain their previous importance. Again, numerous growers produced only adult plants for sale while some breeders, the real enthusiasts, started again to make hybrids that resulted in a wide range of famous Belgian hybrids known world wide. Those breeders became specialists, who restricted their activities to a few genera. The firm of Morobe continued its activity for almost 50 years, growing several *Neoregelia*. They were also well known for the production of *Vriesea tessellata* (= *Vriesea gigantea*) and ornamental *Ananas* species. They introduced the variegated *Guzmania zahnii* 'Mme. Omer Morobe' in the Floralties of 1975.

The Volckaert brothers have died or are retired but their *Guzmania* Marlebeca is still a well known hybrid. Carlos Broeckaert is also gone, but his chimeric *Vriesea* 'Mme. Carlos Broeckaert' was the origin of the *Vriesea* 'White Line', a winner in most plant contests in the Netherlands. *Neoregelia* 'Perfecta Tricolor' was discovered in 1968 by Adriens Simpens of Merelbeke. It was named by Paul de Coster who very soon commercialized it and received a U.S. plant patent for it in 1976.¹

There are six bromeliad growers in Belgium located around Ghent near the Research Station of Ornamental Plant Growing who are active breeders. They are: Albert Deroose, succeeded by his son Reginald, Hendrik De Meyer, Caroline De Meyer and her husband Luc Pieters, and Luc Devroe who specializes in *Neoregelia* and *Nidularium*. We wrote in some detail recently (Samyn 1995) about the activities of De Meyer, Deroose, and Pieters-De Meyer, and for that reason will not repeat ourselves. Devroe deserves mention for his culture of chimeric classics such as *Neoregelia* 'Perfecta Tricolor', and *N.* 'Flandria', and several selected mutants such as *N.* 'Devroe', and *N.* 'Gruvroe'. He is now collaborating with this Research Station in the development of different, small, commercial *Neoregelia* types: the Cathy clones.

It is clear that despite the problems encountered with fuel costs during the energy crises and some structural problems, the present Belgian bromeliad breeders are enterprising, using all up-to-date technologies, and are seeking a commercial impact on a world-wide scale.

In this article breeders were given special priority of mention. Perhaps the growers of just mature plants for direct sales have been a little bit hardly treated. It is, of course, a fact that numerous other horticulturists have grown and still grow bromeliads as first or as secondary culture next to other tropical plants. *Aechmea fasciata* culture is still very important for several Belgian growers despite the *Fusarium* problems encountered in the seventies when severe losses made this culture less attractive. It is, however, a fact that such production together with personal names of the producers become lost in the statistical data

¹ M.P. McMahon. The origins of three variegated *Neoregelia carolinae* clones. Journal of The Bromeliad Soc. 35:197-199, 205.

of other tropical plants and only the names of the creators of bromeliad novelties have been best conserved in the memory of bromeliad enthusiasts.

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Second Call for Nominations

This is the second reminder that there are vacancies for directors of the Bromeliad Society International for the 1997-1999 term:

Australia:	1 director	International:	2 directors
California:	2 directors	Northeast:	1 director
Central:	1 director	Southern:	1 director
Florida:	1 director	Western:	1 director

If you or your local society have not yet sent nominations to the chairman of the Nominations Committee, please consider doing so immediately. An active, committed board of directors is essential to the future of BSI. Surely every affiliate is aware of talented, qualified individuals within their region who would be willing to serve on the board.

All you have to do is to obtain the consent of your candidate and send their names and qualifications by letter to:

John Anderson
P.O. Box 5202
Corpus Christi, Texas 78405
Telephone: 512-852-5146

NOMINATIONS MUST BE MADE BY MARCH 18, 1996. You may nominate by telephone through March 15, but you must follow up with written confirmation. Answers to any additional questions may be found in the BSI bylaws, a copy of which should be in the possession of every affiliate.

Bromeliad Leaf Forms

David Longley

Illustrations by the author

Bromeliad leaves can be divided into two basic types...those with spines and those without. Those with spines belong to the subfamilies Pitcairnioideae and Bromelioideae, while those without belong to the subfamily Tillandsioideae. An exception to this rule is a plant like *Pitcairnia heterophylla*, which displays two distinct leaf forms. One is green and entirely spineless and the other is brown and wickedly thorny. Another interesting thing about this plant is that in the winter months it sheds its green leaves and blooms, while retaining its thorny brown leaves.

All bromeliads have scales or trichomes, as they are properly termed. In the genus *Tillandsia*, the leaves are generally totally covered with trichomes. Again we find exceptions to this rule. These scales play an important part in the plant's survival in that they are able to absorb moisture from the air. They can also tell us how much light the plant is able to tolerate. The scurfy-leaved tillandsias can tolerate more light than those of the waxy leafed types. This is also an indication as to where they may be found in habitat. The waxy-leaved types will more often be found lower down on the tree trunk in a shaded environment and the scurfy types higher up in the tree branches in bright light.

The form and size of the leaves are extremely varied, from grass-like leaves to wide strap-shaped leaves. In *Tillandsia duratii* we find the leaves coiled around tree branches in an effort to support itself. In general, however, bromeliad leaves are alike in that they usually have a blade and a sheath. The following is a list of some of the terms used in describing leaf forms and characteristics.

acantha	As in a leaf that is quickly narrowed to a point.
acuminata	Tapered to a long narrow point. (fig. 9).
acute	Ending in a sharp point, sides nearly straight; angle formed by leaf tip less than 90 degrees. The opposite of obtuse. (fig. 9).
angustifolia	Having narrow leaves.
armed	Having defenses such as thorns, spines or barbs.
attenuate	Narrowing to a thin, slender point. (fig. 9).
barbed	Having short, stiff, hooked bristles.
brachyphylla	Having short leaves.
carcharodon	With shark-like teeth.
chaetophylla	With bristle-like leaves.
coriaceous	Leathery.
crenate	With margins that are cut into rounded scallops.
cuspidate	Tipped with a sharp, ridged spine.
deciduous	Referring to plants that lose their leaves at the end of their growing period.

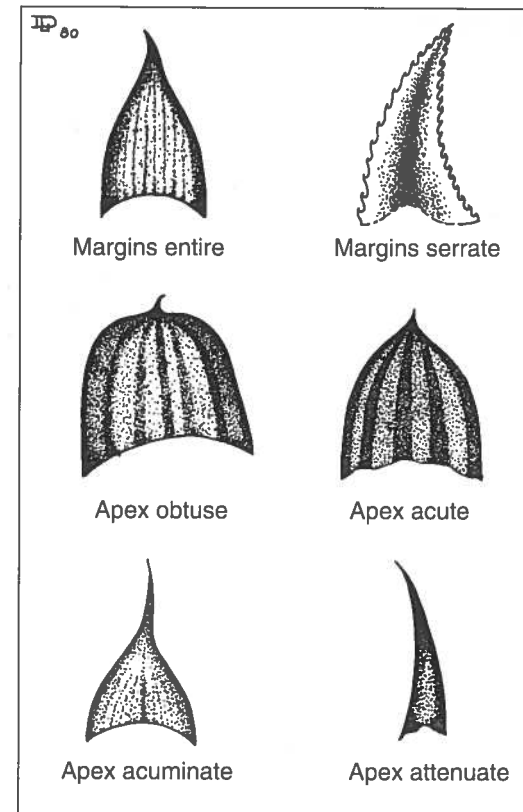
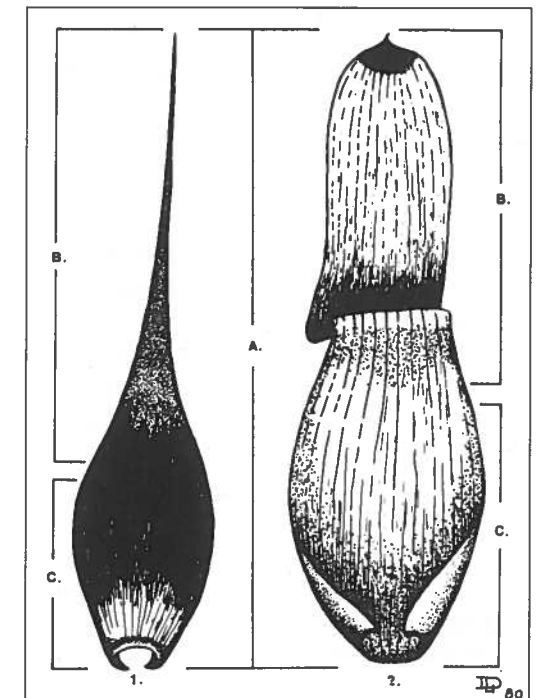


Figure 9.
Leaf Margins and Apex.

Figure 10.
A, Leaf; B, Leaf blade; C, Leaf sheath; 1, Leaf with apex attenuate (*T. lampropoda*); 2, Leaf with apex obtuse (*Vr. philippocoburgii*).



dimorphus	Refers to a plant having two distinctly different types of leaves, such as many pitcairnia.
entire	Refers to leaves with smooth edges and no indentations. (fig. 9).
filifolia	Having thread-like foliage.
flagelliformis	With whip-like leaves.
glabrous	Smooth, glossy, without hairs.
heterophylla	Having leaves of more than one shape.
induplicate	With margins folded inwardly.
iridifolia	With iris-like leaves.
junccea	Looking like a reed, as of the leaves.
laccatus	Looking as if lacquered.
laevis	Smooth, polished-like surface.
latifolia	Broad leaf.
leaf blade	The upper portion of the leaf, above the leaf sheath. (fig. 10).
leaf sheath	The lower portion of the leaf; that portion that is attached to the growing axis. The wider, basal portion of a leaf. (fig. 10).
leptosepalus	Thin, slender-leaved.
ligulate	Strap-shaped. (also called lingulate).
longifolius	Long-leaved.
macrophylla	large-leaved.
oblique	Slanting, having unequal sides.
obtuse	Blunt; angle formed at leaf tip greater than 90 degrees. The opposite of acute (fig. 9)
patula	Spread out, broad, flat.
phyllum	Leaf.
platyphylla	Having wide leaves.
polymorphic	With several distinct forms, particularly variation within a species.
pungens	Having a sharp, stiff point.
recurvata	Having recurved leaves.
retorted	Directed backwards or bent back (retroverse).
retuse	The obtuse apex of a leaf, having a slight notch.
serrata	With teeth like a saw, sharp teeth pointing forward. (fig. 9).
sinuate	Wavy; having leaves with wavy margins.
streptophylla	Twisted leaves.
tenuifolia	Finely leaved; having slender leaves.
trichome	The scales on the leaves of bromeliads that are capable of absorbing moisture and transferring it to the plant tissue.
tricophylla	Hairy-leaved.
undulata	Wavy, having a wavy margin or surface.
unifoliata	One leaf

San Francisco, California

Reprinted in part from the newsletter of the Bromeliad Study Group of Northern California, April, 1980.

Two New Species From the Coastal Region of Bahia, Brazil

Elton M. C. Leme

Photos and illustrations by the author

On a recent expedition to research local populations of *Nidularium*, *Wittrockia*, and *Canistrum* species in the southern coastal region of the state of Bahia, Brazil, two new species of bromeliads were encountered. The expedition was organized with the valuable collaboration of botanists from the herbarium of CEPEC, located in Itabuna City. We concentrated our activities on previously selected locations where the genera mentioned above were expected to be found. We found them, as well as the new species described below:

Aechmea amorimii Leme, sp. nov. (Figs 11 & 13, A–G)

A *A. bicolor* L.B. Smith, cui affinis, apicibus foliorum asymmetricis, inflorescentia densa, sepalis distincte, mucronato-spinosis, petalis longioribus, nudis, apice acuminatis differt.

Type: Brazil. Bahia: Urucuca, Serra Grande-Itacare Road; coastal rainforest, about 100 meters s.m., 4 April 1995, E.M.C. Leme 2991, P.I. Nahoum, A. Amorim & J.C. da Silva. (Holotype: CEPEC, Isotype: HB).

Plant epiphytic. **Leaves** coriaceous, forming a funnellform rosette. **Sheaths** 15 × 8 cm, oblong-elliptic, very densely brown lepidote on both sides, dark brown outside, purplish inside and toward apex. **Blades** sublinear, 50–60 × 6 cm, slightly narrowed toward base, inconspicuously but subdensely white-lepidote, green, laxly spinose toward base and densely near the apex, spines almost black and nearly straight, 0.5–1.5 mm long, apex acuminate, distinctly cuspidate, pungent, asymmetric, soon drying. **Scape** ca. 15 cm long, ca. 0.8 cm in diameter, white-lanate. **Scape bracts** linear-lanceolate, apex acuminate, 8 × 1.5 cm, papyraceous, stramineous, white-lanate on the margins, laxly spinulose, spines ca. 0.5 mm long, the upper ones massed beneath the inflorescence, reflexed. **Inflorescence** simple, shortly cylindric, densely flowered, ca. 6 cm long, ca. 4–5 cm in diameter, distinctly shorter than the leaves; rachis straight, densely white flocculose. **Floral bracts** basal ones resembling the upper scape bracts but smaller, exceeding the flowers, the upper narrowly triangulate, acuminate, 20–25 mm long, 5–7 mm wide at base, entire, distinctly equaling or shorter than the sepals. **Flowers** ca. 25 mm long, sessile, densely and polystichously arranged, slightly fragrant. **Sepals** asymmetric, connate at base for ca. 2 mm, ca. 14 mm long including the 4 mm long apical spine, 4–5 mm wide, ecarinate, sparsely white-flocculose near the base, inconspicuously brown-lepidote on the lateral membranaceous wing, green toward the base, stramineous near the apex. **Petals** narrowly lanceolate, apex acuminate, strongly reflexed at anthesis and exposing



Figure 11.
Aechmea amorimii Leme, a new
species from Bahia, Brazil.



Figure 12.
Neoregelia crispata Leme, a colorful new *Neoregelia* from Bahia.

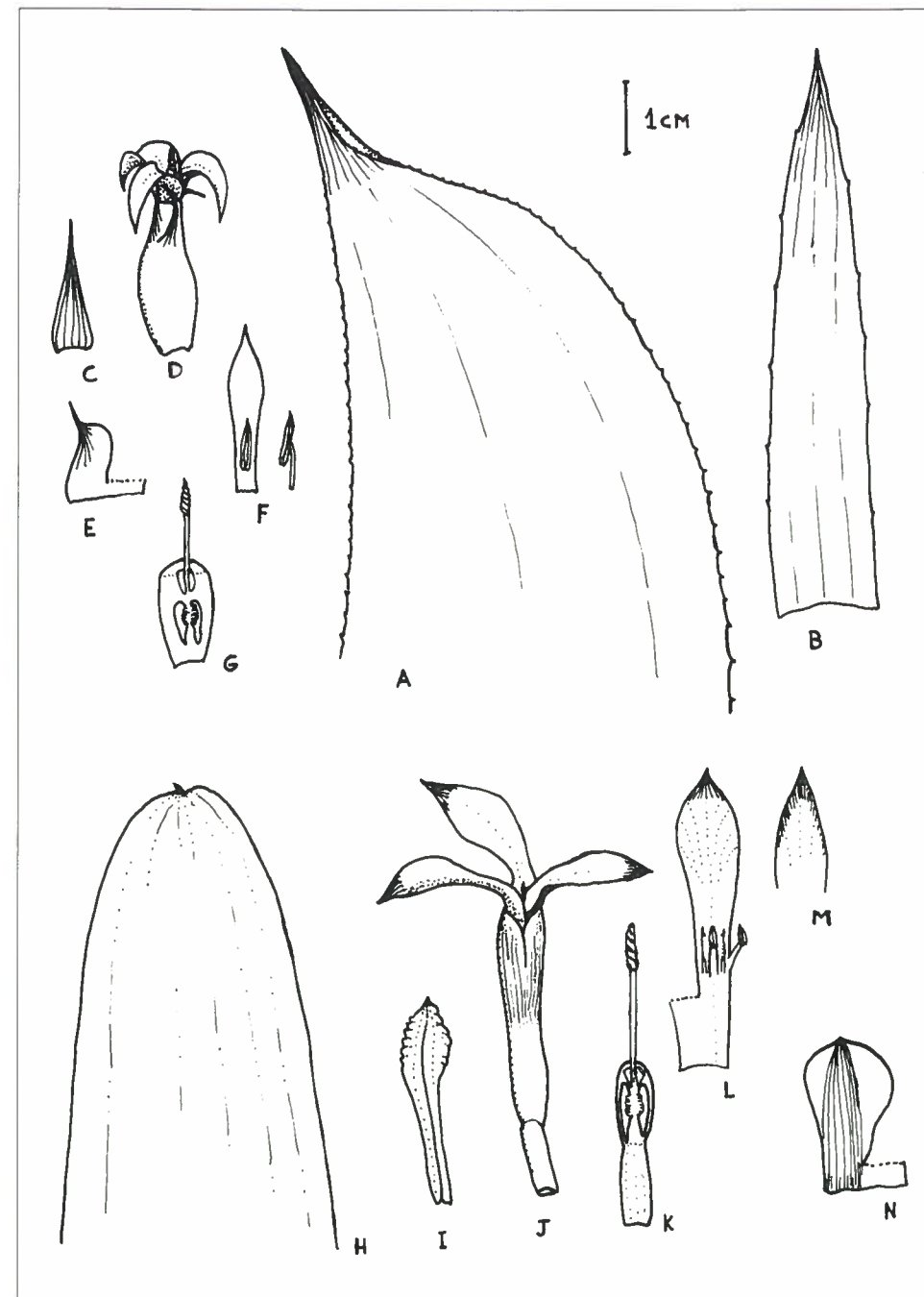


Figure 13.
Aechmea amorimii Leme: (A–G): A, leaf apex; B, upper scape bracts; C, floral bract; D, flower; E, sepal; F, petal and stamen; G, cross-section of the ovary.
Neoregelia crispata Leme: (H–N): H, leaf apex; I, floral bract; J, flower; K, cross-section of the ovary; L, petals; M, variation of petal apex; N, sepal.

only the stigma, 22×5 mm, free, naked, white. **Filaments** the epipetalous ones almost completely adnate to the petals, the episepalous ones free. **Anthers** linear, base saggitate, apex acuminate-caudate, ca. 6 mm long, fixed near the middle. **Style** slightly surpassing the anthers. **Stigma** conduplicate-spiral, subcylindric, white, blades with inconspicuously crenulate margins. **Ovary** terete, ca. 12 mm long, ca. 8 mm in diameter, sparsely white flocculose, inconspicuously verruculose, green. **Placentae** apical. **Ovules** few, obtuse. **Epigynous tube** narrow, ca. 3 mm long.

This new species belongs to the Brazilian complex of species in the superseded genus *Streptocalyx*, now included in *Aechmea*. Although it is not closely related to any previously known species, *A. amorimii* may be placed near *A. bicolor* L.B. Smith, differing from it by its asymmetrical leaf apex, dense inflorescence, sepals ending in a distinct spine, and by the longer, naked, acuminate petals.

A. amorimii is named in honor of the CEPEC botanist Andre Amorim, who took part in our expedition and helped us find many unique bromeliads.

Neoregelia crispata Leme, spec. nov. (figs. 12 & 13, H-N)

A. N. leprosa L.B. Smith, cui affinis, stolonibus elongatis, limbis foliorum latioribus, sepalis longioribus obovatis late acutis vel subrotundatis apiculatisque, petalis longioribus, apice lilacinis differt.

Type: Brazil. Bahia: Una, Estr. Una-São José; 5 April 1995, *E.M.C Leme, P.I. Nahoum, Andre M. de Carvalho, & J. Caldas da Silva*.

(Holotype: HB, Isotype: CEPEC).

Plant epiphytic, propagating by basal stolons ca. 10 cm long, ca. 0.5 cm diameter. **Leaves** ca. 12 in number, spreading at anthesis, forming a crateriform rosette. **Sheaths** elliptic, $7-8 \times 5-6$ cm, densely pale brown-lepidote on both sides, mainly purplish-wine inside. **Blades** sublinear, slightly narrowed at base, $16-25 \times 3$, $8-4.3$ cm subdensely white-lepidote, reddish on both sides or greenish adaxially and reddish abaxially with few irregular transverse wine lines or spots, margins laxly serrulate, spines less than 0.5 mm long, apex truncate, minutely and softly apiculate, abruptly recurved. **Scape** ca. 20 mm long, ca. 3 mm in diameter. **Scape bracts** ovate, broadly acute and apiculate, entire, membranaceous, 13×7 mm, inconspicuously lepidote. **Inflorescence** umbellate, subcylindric, simple, sunk in the center of the rosette, ca. 40 mm long, ca. 20 mm in diameter, few-flowered. **Floral bracts** subspathulate, apex acute and apiculate, 28×7 mm, margins entire and conspicuously crispate, ecarinate, membranaceous, glabrescent, equaling about $1/3$ of the sepal length. **Flowers** ca. 18 in number, ca. 40 mm long (excluding the petals), pedicellate, pedicels 8-10 mm long, 2-3 mm in diameter. **Sepals** asymmetric, obovate, broadly acute to

subrounded and minutely apiculate, $20 \times 10-12$ mm, connate for 2-3 mm, entire, ecarinate, green, glabrous. **Petals** narrowly lanceolate to subspathulate, acute to acuminate, $40 \times 7-9$ mm, connate for ca. 12 mm at base, spreading-recurved at anthesis, white with exception of the lilac extreme apex and apical margins, bearing two well developed uncinat callosities which equal the stamens. **Filaments** adnate to the petals tube and free for ca. 4 mm above it. **Anthers** oblong, ca. 2.5 mm long, fixed near the base, base obtuse, apex minutely mucronulate. **Stigma** cylindrical, ca. 7 mm long, conduplicate-spiral, margins glandulose, white. **Ovary** ellipsoid, ca. 10 mm long, ca. 5 mm in diameter, glabrous, white. **Placentae** subapical. **Ovules** obtuse. **Epigynous tube** ca. 2 mm long.

N. Crispata is related to *N. leprosa* L.B. Smith, differing from it by the production of basal stolons, the broader leaf blades, obovate sepals which are broadly acute and subrounded and apiculate, and by the longer petals having a lilac apex. Its comparatively small size coupled with its reddish, attractively colored foliage assure *N. crispata* of a special place in bromeliad horticulture.

The species name refers to the distinctly crispate margins of its floral bracts.

ACKNOWLEDGEMENT

I thank the botanists from the Centro de Pesquisa do Cacau (CEPEC), Dr. Andre M. de Carvalho, Curator of the Herbarium, and Prof. Andre Amorim, for their valuable collaboration on the expedition to Bahia State. I also thank Mr. Conrad D. Fleming, of the St. George Village Botanical Garden of St. Croix, Virgin Islands, who partially supported the field activities.

Rio de Janeiro, Brazil

WESTERN BROMANZA

Don and Alice Woods from Perth, Australia, have been traveling extensively in the United States in the last several months contacting various BSI affiliates and individual bromeliad growers to promote the ninth Australian Bromeliad Conference. It is to be known as WESTERN BROMANZA, and will be hosted by the Western Australian Bromeliad Society, Inc.

The WESTERN BROMANZA will be held in Perth from September 26 through September 29, 1997. This will be the spring season in Australia and will take place during the peak blooming period for its native wildflowers. It provides an excellent opportunity to visit that fascinating continent to see its native flora in its prime, as well as visit other famous Australian attractions, and to see prize bromeliads and meet their growers.

More information can be obtained by writing to Don Woods at 20 Rhonda Avenue, Willetton 6155, Western Australia. He can also be reached by Internet at dwoods@liberty.curtin.edu.au

ORLANDIANA 96...The Countdown Begins!

Bud Martin

Central Florida bromeliad societies will host the 12th World Bromeliad Conference scheduled during the first week of July, 1996. Bromeliad hobbyists and commercial growers from all over the world will gather at the Clarion Plaza Hotel on International Drive in Orlando, for a week of educational seminars, tours of private and commercial bromeliad collections, plant sales, and a standard judged bromeliad show.

A special series of seminars will be held on Tuesday, July 2nd, designed to introduce garden club members and neophyte enthusiasts to many aspects of bromeliad culture. The seminars will be held at two different times, from 8:00 a.m. till noon, and again from 2:00 p.m. to 6:00 p.m. The cost of each four hour seminar will be \$25.00 and will include written materials, a cultural handbook, and a bromeliad seedling. Planned seminar subjects include:

Just the Basics – Basic cultural information including where to grow bromeliads, light, temperature and watering requirements, fertilizing, potting, and mounting.

Breathe More Freely With Bromeliads – This seminar will cover ways you can easily use bromeliads inside the home to help create an atmosphere with less pollution. Tips from NASA studies show how bromeliads can contribute to a healthy environment.

Bromeliads as "Cut" Flowers – Bromeliad blooms and foliage can be used in casual designs for the home or as award-winning competitive designs.

Where's my Blue Ribbon?? – This seminar will cover selecting, growing, and grooming bromeliads for competition. You'll get tips that will help you win blue ribbons.

Listed below is the schedule of events for the Orlandiana 96 conference. Events identified with an asterisk are optional activities not included in the standard conference registration fee.

Monday, July 1, 1996

For those not involved in the day's activities below, it would be an excellent day to visit Walt Disney World, Universal Studios, Sea World, and other Central Florida attractions.

7:00 a.m.	Judges School breakfast
8:00 a.m. - 5:00 p.m.	Judges School
8:00 a.m. - 6:00 p.m.	Staging preparation for judged show, sales and exhibits area.
4:00 p.m. - 6:00 p.m.	Early registration

Tuesday, July 2, 1996

8:00 a.m. - 8:00 p.m.
8:00 a.m.
8:00 a.m.
8:00 a.m. - 8:00 p.m.
8:00 a.m. - Noon
9:00 a.m.
2:00 p.m.; 5:00 p.m.
2:00 p.m. - 6:00 p.m.

Registration
Tour: Selby Bot. Gardens/Tropiflora*
Tour: Pineapple Place/Boggy Creek Bromeliads*
Show, sales, and exhibit area set-up
Special seminar "Introduction to Bromeliads"*
BSI Judges Certification Committee meeting
Plant raffle
Special seminar "Introduction to Bromeliads"*

Wednesday, July 3, 1996

7:30 a.m. - 9:00 a.m.
8:00 a.m.
8:00 a.m. - 8:00 p.m.
8:00 a.m. - 8:00 p.m.
8:00 a.m. - 8:00 p.m.
9:00 a.m. - 5:00 p.m.
11:00 a.m.; 2:00 p.m.;
5:00 p.m.

BSI Board of Directors' Continental Breakfast
Walk – sponsored by Mid-Florida Milers
Registration
Continue show, sales & exhibit area set-up
Show entries received
BSI Board meeting

Raffle drawings/auction

Thursday, July 4, 1996

7:45 a.m. - 9:00 a.m.
7:45 a.m. - 9:00 a.m.
8:30 a.m.
9:00 a.m. - 5:00 p.m.
9:00 a.m.
9:00 a.m. - Noon
9:00 a.m. - Noon
11:00 a.m.; 2:00 p.m.;
5:00 p.m.
Noon - 1:30 p.m.
1:00 p.m. - 5:00 p.m.
1:30 p.m. - 5:00 p.m.
5:30 p.m.
6:30 p.m. - 8:30 p.m.
6:30 p.m. - 8:30 p.m.

Welcome to conference breakfast
Hospitality stations open to help registrants
Judges and Clerks meeting
Registration continues
Tour private homes and gardens
Judging
Seminars

Raffle/auction
Judges Awards Luncheon
Seminars
Judging continues
Cocktail party – cash bar
Show opens for conference registrants
Sales area open for conference registrants

Friday, July 5, 1996

8:00 a.m. - 5:00 p.m.
8:00 a.m.
9:00 a.m. - 5:00 p.m.
9:00 a.m. - Noon
11:00 a.m.; 2:00 p.m.;
5:00 p.m.
1:00 p.m.
1:00 p.m. - 5:00 p.m.

Registration continues
Tour private homes and gardens
Show and sales open to public
Seminars

Raffle/auction
Worldwide Show and Tell
Seminars

6:00 p.m. - 7:00 p.m. Preview of plants for Rare Plant Auction
 7:00 p.m. - 11:00 p.m. Rare Plant Auction (cash bar)

Saturday, July 6, 1996

8:00 a.m. - Noon Registration continues
 8:00 a.m. Newsletter Editor meeting
 9:00 a.m. - Noon Seminars
 9:00 a.m. - 5:00 p.m. Show and sales open to public
 11:00 a.m.; 2:00 p.m.; 5:00 p.m. Raffle/auction
 1:00 p.m. - 5:00 p.m. Seminars
 2:00 p.m. - 3:00 p.m. Preview of auction plants for Cryptanthus Society
 Rare Plant Auction
 3:00 p.m. - 5:00 p.m. Cryptanthus Society Rare Plant Auction
 7:00 p.m. Cocktail party (cash bar)
 8:00 p.m. Banquet

Sunday, July 7, 1996

9:00 a.m. - 4:00 p.m. Show and sales areas open to the public
 9:00 a.m. - Noon Cryptanthus Society Board meeting
 11:00 a.m.; 2:00 p.m. Raffle/auction

Monday, July 8 thru Sunday, July 14

All day Post conference tours

For additional information on the world conference and a registration form, see the *Orlandiana* ad on page 43.

Orlando, Florida

Notes on New Species

Bromeliad taxonomy continues to be a dynamic field. Not only have a number of genera recently undergone revision, (i.e., *Pepinia* from *Pitcairnia*, *Racinaea* from *Tillandsia*, *Streptocalyx* included in *Aechmea*), but new species continue to be discovered at a surprising rate. Three new species are described on earlier pages of this issue of the JOURNAL. Indeed, descriptions of new species are a regular, important, and eagerly anticipated feature of the JOURNAL.

In addition to *Tillandsia rubrispica*, *Aechmea amorimii*, and *Neoregelia crispata* described in this issue of the JOURNAL, SELBYANA, Volume 16(1) contains descriptions of ten other new species from Brazil. They are: *Encholirium longiflorum* Leme, *Pepinia cristalinensis* Leme, *Vriesea amadoi* Leme, *Aechmea ramusculosa* Leme, *Cryptanthus delicatus* Leme, *Neoregelia sanguinea* Leme, *Nidularium fradensis* Leme, *Nidularium kautskyanum* Leme, *Orthophytum hatschbachii* Leme, and *Wittrockia echinata* Leme.

It's an exciting time to be involved with bromeliads at any level. —CHB

Seeds Needed For Research

David Benzing

Preserved fruits of bromeliads from the subfamily Bromelioideae are being solicited for a project scheduled to begin in 1996 at Oberlin College. The project requires a supply of preserved fruits representing subfamily Bromelioideae. We plan to subject these samples to chemical analysis to determine the major nutritional constituents, specifically the types and proportions of simple sugars, lipids, and total protein present. Several reports indicate that Bromelioideae rely on a variety of vertebrate animals in addition to ants to disperse seeds. Our interest centers on the possibility that specific bromeliad species possess characteristics that encourage seed carriage by specific kinds of vertebrates including bats, non-flying mammals, and birds. Berry color, odor, and perhaps size among Bromelioideae already suggest fruit specialization to attract different types of animals. Some tropical trees with fleshy fruits clearly possess additional differentiation whereby edible tissue associated with their indigestible seeds match the dietary requirements of local fruit eaters.

Bromelioideae offer an exceptional opportunity to test the possibility that a group of related herbs exhibits differentiation equal to or exceeding that already recorded among those larger tropical plants. Bromelioideae could benefit from even greater specificity in partnerships than many animal-dispersed trees because as a mixed group of epiphytes and terrestrials they grow at specific elevations in the forest occupied by similarly restricted groups of fruit eaters. Members of Bromelioideae also offer fruits on infructescences of different shapes, sizes, and color, some totally green and others featuring color displays known to be more or less conspicuous to certain groups of animals. In effect, bromeliads may exhibit evolutionary fine-tuning involving unusually diverse plant characteristics co-adapted to attract one or another kind of seed disperser. Whether nature has taken this course, and if so how far, could be determined by studies like this one.

We are particularly interested in receiving fruits representing *Aechmea*, *Billbergia*, *Cryptanthus*, *Greigia*, *Ronnbergia*, and any of the genera with short, stout inflorescences (e.g., *Neoregelia*, *Nidularium*). Other species will also be useful. Field-collected material is best, but fruits from cultured plants are certainly acceptable. A record should be made of berry color, any odors, and pigmentations of accompanying bracts and foliage at the time of collection. Berry size should also be recorded along with estimates of numbers produced per plant. If materials come from the field, then also include information on whether plants were terrestrials or epiphytes, low or well above the ground, locally abundant or scattered, and the type of habitat (type of forest, savanna, etc.).

Berries should be dried as soon as possible to avoid decomposition using low heat, again to avoid chemical changes. The lowest setting on a kitchen oven should suffice—a fruit dehydrator would do better. Freeze-drying is most preferable. Samples

should exceed one ounce, several ounces if possible. Once dry, materials should be kept dehydrated in sealed vessels and shipped with a desiccant if possible. I'll be happy to provide details and make arrangements by phone at 216-775-8120. My address is: David Benzing, Department of Biology, Oberlin College, Oberlin, Ohio, 44074.

Results and their proposed significance will appear in this journal when they become available.

Oberlin, Ohio

Thanks to Tom Lineham

For many BSI members, receiving the JOURNAL is their only contact with the BSI other than mailing in their dues. That there are a number of other good reasons for being a member is indisputable, but nonetheless, for a large percentage of its readers, the BSI JOURNAL is the reason they belong to the BSI.

It is generally recognized that the JOURNAL is one of the better periodicals published by a plant society. Over the years, it has earned the respect of both the scientific community and growers, both amateur and professional. That is not an easy accomplishment. Of course much credit must be given to the many authors who have taken time to contribute material, but no one deserves more credit over the last thirteen years than does Tom Lineham.

Like most members, I'd pretty much taken the JOURNAL quality and dependability for granted. In the past three months however, I've been in a position to see just how much time and effort is involved in getting out a single issue. Tom has gone through that process 72 times. In addition, some of the material appearing in this issue had already been assembled and was ready to print before Tom turned over the reins.

Tom Lineham and his years as editor of the BSI JOURNAL will be the subject of an article in an upcoming issue, so I won't spend more time discussing it here. However, as the person with the awesome responsibility of following in his footsteps, I would like to thank him personally for the extra mile he has gone in making the transition between editors as smooth as possible.

Chet Blackburn
Auburn, California

CORRECTION: Vol 45(6), p. 268. Change type citation to read:

Type: Brasilia. Parana: Vila Velha, leg. Thieken s.n., Julius 1981, fl. hort. Weberi 27.8.1981, WEB 329 (HAL, holotype).

Cultivar Registration – LAST CALL!

Ellen Baskerville, Cultivar Registrar

Cultivar registration is alive and thriving! After I began as Cultivar Registrar in 1993, it was decided to update *The Preliminary Listing of all Known Cultivar and Grex Names for the Bromeliaceae* every five years with supplemental information to be published in the interim. After publishing two supplements, it is with great pleasure that I announce that a revision of the preliminary list has begun and our target date is the World Conference in Orlando in 1996! It is our plan to combine all the checklists into a new BSI Cultivar Registry.¹

Since 1991, when Don Beadle's *The Preliminary Listing of all Known Cultivar and Grex Names for the Bromeliaceae* was published, many of you have contributed valuable knowledge about your own hybrids as well as adding to our fund of historical information in regard to bromeliad cultivars and grexes. With time so very short, I am announcing a **Last Call** to hybridists and bromeliad enthusiasts for any additions or corrections that you can give us in regard to your hybrids or plants in your collection. After the registry is published, plants can be registered only through making formal application.

I am acutely aware of how busy everyone is with work and families. However, please remember that this will be **your Registry**. This record is how your plants will be historically recorded, and it is important that the Registry be as accurate and complete as possible. Your special knowledge of your own crosses and other plants in your collection is the foundation upon which our record keeping will be built. If there is any contribution you can make toward these aims, then all of us in the Bromeliad Society International will benefit. There is no doubt that at some point, our Registry will be included on Internet's World Wide Web², so you can see the importance of presenting to the world the best that we can provide. Help us eliminate the question marks in the preliminary list by giving us estimated dates, and please feel free to make additions and corrections to the best of your recollection. These should be mailed to:

Ellen Baskerville
BSI Cultivar Registrar
c/o Research Department
Marie Selby Botanical Gardens
811 South Palm Avenue
Sarasota, Fl. 34236

They may also be faxed to me at 941-951-1474. My home address is 5555 Shady Brook Trail, Sarasota, Fl. 34243, phone 941-355-1277. Thank you for your participation in this endeavor. I look forward to hearing from you soon.

Sarasota, Florida

¹ For a copy of the current supplement to *The Preliminary List* (October 1995 which superseded August 1995) please contact BSI Publications, c/o Sally Thompson, 29275 N.E. Putnam Road, Newberg, OR. 97132.

² See the article on page 36 of this issue.

Brazil

(Selections from the book **BRAZIL**)
by Mulford B. and Racine Foster

IV

JACOBINA—RIO DE JANEIRO—MOUNT ITATIAIA

After finding *Orthophytum navoides*, the Fosters searched in other directions but found few bromeliads. They did find, however, a semisucculent cryptanthus that Dr. L.B. Smith later decided was not the *Cryptanthus glaziovii* that Carl Mez had described and named^{1,2} but an entirely new species that he named *Cryptanthus bahianus*.

They considered their stay in Jacobina less than successful because with the lack of horses or trucks they were unable to make more extensive searches. Nevertheless, they collected 14 bromeliads of nine genera including three new species, in addition to cacti and orchids.

The Fosters then returned to Rio after the usual misadventures with the train and a two-day boat trip to find after unpacking that the rarest plant specimens had died and that others were in poor condition because of the effects of heat and moisture. These problems gave them great concern.

They had planned to return north to Vitória, capital of the state of Espírito Santo, but decided to wait for the Secretary of Agriculture of that state to arrive before starting out. To fill in the time, they decided to accept the opportunity to visit Mount Itatiaia, the second highest mountain in Brazil, which included a government reservation and a biological station.³

In the space of just one day they obtained collecting permits through the cooperation of various officials. They were joined by Sr. Antenor de Carvalho from the Museu Nacional and early the next morning were on the train. After a few hours they reached the base of Mt. Itatiaia. Their text resumes:



We had known of Mt. Itatiaia long before we came to Brazil. It had been the hunting grounds of botanists for over a hundred years, as botanical records show. Until recently and then, missing the score by only two or three hundred feet, Itatiaia was thought to be the highest point in all Brazil, being 9255 feet. Pico de Bandeira in Espírito Santo has since been proven to be higher. As elevation creates varied growths, naturally it was a mecca for botanists, ornithologists, and

entomologists, and of course also for the mountain climber who just wants to get to the top. We had not made plans to go there. Too many botanists had already explored its riches. But this vast mountain held many surprises and much interest; we were delighted with every turn in the sinuous road as we started our ascent.

We climbed to an elevation of 2500 feet, over many bumps and turns along close edges on a road under construction. Before we realized it, we found ourselves in a typical Alpine spot—with temperature, evergreen conifers and even the little Swiss Chalets, all, as if we were suddenly whisked into Switzerland itself. And to complete the European atmosphere we were met by a native of the Alps dressed in Alpine breeches and boots topped off by a tropical helmet. This was Roberto Donati, Italian-German-Brazilian, the host and proprietor of this retreat. He greeted us in English without accent, in fact he could carry on a conversation in four or five languages at one time, as adroitly as a professional skier would take the frozen snow on Mont Blanc!...

Donati had planted hundreds of *Cryptomerias*, *Arbor-Vitae*s, and *Chamaecyparis*, so as to create a miniature black forest around the main lodge and each chalet. And indeed he had achieved his purpose; the black forest had grown so well that it shut out the rise of beautiful hills and palms in the distance. It seemed strange to us that with a great variety of palms and tropical shrubs at his back door he had imported so much of an entirely different climate. And the surprise was that it was doing so well in the tropics.

From a botanist's point of view, the surprises continued, as we walked out along the paths and saw bamboo jungles surrounded by tropical palms rising in tropical confusion above this Alpine forest. On every rock and limb were beckoning bromels and orchids...

We had arranged for horses and with friend Carvalho took the long, hard ride beyond the Maceieras which led us to the top.

The trip up the mountain was tedious, rough, and winding, very wet and muddy in spots, which was most uncomfortable for either man or beast. But it was thrilling; an ever-changing scene was filled with vistas of shadowed valleys below and bold sunny mountain sides beyond, trees burdened with rosulate epiphytes, resplendent polychrome birds and butterflies banking the air currents, large, feathery tree ferns and tiny, almost transparent ferns living under the continuous spray of a waterfall; bamboos, from the giant impenetrable masses to the six-inch miniatures, all were the shifting props on a glorious natural stage set. With each hundred meters of altitude the tree ferns grew smaller, becoming stubby stumps with stunted leaves; likewise the bamboo, climbing higher and higher, hopelessly trying to be bigger than its relatives, the grasses, failed to attain more than 6 inches of stature in the wind-swept high reaches near the peak, Agulhas Negras.

Naturally, we paid more attention to the bromeliads than anything else, except possibly the guidance of our horses which on more than one occasion should have had more attention than the bromels. Many times our eyes would remain too long on a towering tree covered with these water-filled epiphytes, and the horse choosing his

¹ Mart. Fl. Bras. 3(3):202; 1891.

² L.B. Smith, Glaziou's *Cryptanthus*, Addisonia 20:9–18, pl. 645; 1937.

³ Please see Heinrich Wawra. J. Bromeliad Soc. 43:165–174, 180–181; 204–210; 263–270; 1993.

own way, regardless, carried us into a mass of briars or overhanging bamboo with its merciless hooked spines ready to snag and tear tender flesh. Aerial thoughts were quickly grounded by sharp cuts and spurts of blood. More than once it seemed that if we were not on guard we might be pulled from the horse to be held suspended on the end of a giant bamboo pole, like a poor fish which had just been hooked.

It seemed like we were being carried up in a slow motion elevator to the top of a timeless but gigantic superstructure with ample time to view each floor or zone of vegetation. In our first zone at 2,600 feet elevation we would find 6 or 8 species of bromeliads. As we ascended, one by one, they would soon be scarcer and scarcer when suddenly a *Vriesia* we had not seen before would appear. And then other newcomers began to take the places of those that were so common below. In each zone the bromeliads, like the ferns, bamboos, and orchids seemed to have their specialized family groups as the air became cooler and the growth masses of vegetation changed.

These plant friends seemed never to say goodbye, rather they seemed to retire quietly and gracefully so that a close relative might take over. Perhaps it would be a *Neoregelia* on a rock or an *Aechmea* climbing to the very topmost branch of the tallest tree, beckoning to us not to give up the difficult climb. Some of course, over-lapped each other's zone but sooner or later relinquished space to those who really liked the higher altitudes. Only one *Vriesia* did we find which grew down near the lodge at 2,500 feet as well as far up to the Macieiras [sic] (apple orchards) 4,000 feet higher. And there was *Aechmea (distichantha)* that ventured above the Macieiras which we also found near the foot of the mountain.

The word Macieiras created visions of thriving apple orchards, but we found only a remnant of a dream that didn't come true...

Very soon beyond the Macieiras our path became a rocky way. It became a guess as to which boulder to walk around. The wind increased steadily as the climb became more and more difficult. Here and there on rocks and the small trees we spied a *Vriesia (itatiaiae)*¹ new to our eyes. How could such a seemingly delicate plant continue to live up here in this wind with often severe frost and even a mountainside fire? It seemed that it would have been easier for the *Vriesia* to have gone a few hundred feet below where there would be protection from the elements in beautiful trees. But like the shepherds in the Alps who tend their flocks high above the tree line, they have no desire to live in the verdant valleys below.

Nearing the meteorological station which was to be our lodging place for the night, we observed that practically all vegetation was dwarfed or entirely missing except in certain gulches and protected moist spots where a spring gushed from the rocks. High above our heads on a huge boulder we were curious about what appeared to be a bunch of grass, but which we felt almost surely was a bromeliad although we had not expected to find any so high up the mountain. Mulford made the tedious climb up over the boulders where he was well rewarded with his first

¹ J. Bromeliad Soc. 35:241, 243-245, 250.

sight of *Fernseea itatiaiae*¹ which has never been found growing in any other spot in the world! This grassy-appearing bromeliad with delicate mauve flowers has stiff, glaucous, green leaves tipped with sharp spines which never dry out but always seem dry. Moisture is stored in the underground reservoir of its succulent bulb-like base, while its wire-like roots hold it fast in the crevices of huge boulders. It takes much of its food from the air. Brave little plants clinging tenaciously on to a hard life against all odds, surviving the elements which try to exterminate them. It was a rare botanical thrill to find this isolated bromeliad. Unfortunately it has never survived captivity and our attempt at keeping it in low altitudes was not successful either.

Across a dip in the land near the top of the mountain was a meadow of thick waving grass, through which we picked our way up and down its almost pathless maze to the other side where we came upon the meteorological station. A howling wind mocked us in our efforts to make our presence known to the occupants of the hut. The customary clap of the hands was entirely drowned out. The knock on the door was less and not more, than the rattling of the windows and the loose tin roof. We began to doubt our ability to arouse anyone's attention. It was so cold and we were so thinly clad that perhaps the noise that finally aroused them was the chattering of our teeth! The temperature was 10 degrees above freezing and we were not prepared for this with proper clothes. Or perhaps it was our audible shivering that at last brought a half-covered face to peep through a broken pane of a loudly banging window. It disappeared and reappeared at the door with big questioning eyes. It was an invitation to enter, and as the blanketed figure held the door ajar for us we stepped into the cold, bleak house, where the wind was a bit less but the noise greater.

The introduction presented two Brazilian girls, sisters, who lived alone here in a "penthouse" (if that word implies living high) on the roof of Brazil. They have followed the footsteps of their father and as employees of the government they continue to take meteorological observations. Each day the winds must be measured, a record made of the sudden dips of temperature and the movement of the clouds. Once a week a messenger comes up the mountain bringing mail and supplies. He returns with these records of the weather and sends them on to the government in Rio. Except for a few mountain climbers and the jaguars at night their life is very uneventful...

It was soon dark and the little barefoot nieces, who were visiting their aunts, rushed about setting extra places for the evening meal *jantar*. Yes, they were barefoot although their bodies were heavily clothed! In flickering candle light we ate the usual chicken, rice, beans, eggs, beef, bread and of course coffee, but it was so cold that warm food was out of the question.

The house shook and the roof continued to rattle. Sometimes it felt as though any moment the house would be carried off into the valley below. There being no such thing as a fireplace or a stove, all we could do after supper was to sit and shiver at each other...

¹ J. Bromeliad Soc. 35:241, 243-245, 250.

The next day we started down the mountain very early and not being just mountain climbers we had a full day ahead, collecting all the way down. We saw the Agulhas Negras from the distance but did not attempt to climb these famous "black needles." To scale these jagged pinnacles is the ideal of every mountain climber who comes, but that would have taken too much time for us. However, those unique forms of rock intrigued our attention. They seemed to form palatial turrets for some prehistoric giant, now inhabited only by a few scattered grasses and the *Fernseea*. This chaotic mass of great rocks was aptly described by the Indians as Itatiaya, "multiplying rock," a name which remains for the whole mountain.

We reached Chalet Azul at nightfall with every bag and sack filled to the top, each of us carrying an extra arm load of bromeliads, orchids, amaryllis and other plants. We had taken twenty-five different species of bromeliads on this one excursion, a record haul which was to be exceeded but two or three times on subsequent trips...

We had made a great circuitous arc around the country to get to the canyon on the way to picturesque Maromba Falls. It was a damp canyon, filled to overflowing with dark trees laden with epiphytes, bordered by high walls of rock over which the sun cannot cast many warming rays. We were dressed for hot weather in the open, so, soon here in the canyon, we became very damp and chilly. But it was an air plant paradise of such luxuriant growth that we had another case of plant indigestion. We thought we had seen the acme of lushness before but perhaps this topped them all. Aroids, ferns, bromeliads, orchids, pipers, amaryllids, selleginellas, were just a few plant families that we quickly recognized as our eyes feasted on the prolific abundance of palms, tree ferns, heleconias, lianas magnificently surrounding us...

Nearer the falls the air was always wet from the continual breaking of the tumbling waters as they dashed wildly over the rocks. It was rain water that had fallen weeks ago high up on the mountain; now it seemed to suddenly burst from the rocks as if with great joy at being released from the long underground filtered journey. Light from the sky was almost shut out by the huge vines suspended from every limb of overhanging trees whose branches were burdened with unruly masses of air plants prolifically riotous in an ideal habitat. To walk was really to stumble, not knowing if it had been some huge dislodged orchid that was mashing under foot, or was it a bed of deeply mud-buried amaryllis whose slick bulbs made every step a slide? *Pitcairnia*s, the kind of bromeliad we would expect to find near a waterfall, covered every available inch, seeing how close to the continuous spray they could live and hold on the slippery rocks that threatened at any moment to send them sliding to the pool below. They had made an excellent job of fortitude under difficult circumstances. It was impossible for us to get a foothold, try as we would to reach the misty ledges where these plants grew.

It was late and dark when we finally emerged from the canyon onto the main road. Being very cold, hungry and heavily laden with several bags of plants, we didn't relish the two-hour walk yet ahead of us. But our endurance did not give out and we arrived safely at Chalet Azul.

Our departure from Itatiaya had been greatly delayed. We had not anticipated such good hunting. Packing the plants, cleaning seeds and making drawings

consumed days of our precious little time. There were so many more species in winter flower than we expected. Making color notes of these flowers was a problem. Mulford had always done them in oil but in this damp climate the oil would not completely dry over night and they could not be packed away. A lot of flowers were missed this way. This difficulty as well as having the additional baggage of a box of oils made us decide here on Itatiaya that some other medium was necessary. So our first purchase upon our return to Rio was a set of "Lapis de Cór," colored crayons. Thereafter Mulford had no difficulty packing away his evening's work. These color studies of the interior and exterior of the flower drawn from living material became important botanical data for the Gray Herbarium in making identifications and descriptions of many known and unknown bromeliads.

When all plants were packed and we still had to wait for the paintings to dry, Mulford was restless for more bromeliads, so made a search in the immediate vicinity of the lodge and chalet which had not been covered before. He found several good specimens. But most important of all he found the same "spotty" *Vriesia* which we had taken up the mountain. Here, not far from the lodge, was that precious plant in fruit which we needed for complete identification. However, it was twenty-five feet up a slick tree and on the property of a neighbor; that presented a few problems. Have that fruit we must, as the plant which we would take home would probably not bloom for two years. A plant with beautiful speckled foliage like that must not escape identification just because the fruit was hard to get!

First it was necessary to bother Donati for a letter to the owner of the property next door asking his permission to get the plant. That was obligingly granted, and then the real difficulties began. The trunk of the "Paraná Pine" (*Araucaria angustifolia*) is very straight and rough and unpleasant to climb, pole fashion. Since our boy helper had failed, Mulford thought he could do it. By great effort and slow climbing he was able to get within six feet of that precious plant! But at this point the bark would no longer take his weight and it kept peeling off. Without the roughness of the bark to adhere to it was impossible to get further up the tree. He was practically worn out with the effort and yet he must sustain his strength to be able to return cautiously down that thirty-foot pole. If it had been a smooth pole he might have slid down fireman fashion, but it was much too knotty to do that.

All this trouble ended in finding at last a strong and long enough bamboo pole to reach up and push our prize into eager hands. It was *Vriesia guttata*.

Thus ended a memorable trip on Brazil's most famous mountain. Our discovery of a new species, *Vriesia penduliflora*, while there was a surprise to us as well as others for we had been told that so many botanists had covered the area for the past 150 years that there would be little probability of finding any new species!

[To be continued]

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Surfin' Dan Kinnard

The quantity of information available on the Internet is absolutely staggering. Some of the information is useful and some is junk, though "useful" and "junk" are solely subjective terms from the user's point of view. Some of us find this new source of information fascinating, investing many hours "surfin' the net" and encountering all kinds of things. For plant people, there is a lot of stuff out there. If you have a computer and access to the Internet, it can be interesting and rewarding. If your child or grandchild has one, perhaps they will be kind enough to teach you how to use it. This is a small sample of what one might find.

WWW (World Wide Web) Pages

This is one of the most popular styles of interface to the Internet since it allows text, graphics, and pointers to other locations to be mixed in a "newspaper" format.

Ecology & Evolutionary Biology – University of Connecticut

<http://florawww.eeb.uconn.edu>

Biodiversity Virtual Library

<http://golgi.harvard.edu/biopages/biodiversity.html>

List of WWW Sites of Interest to Botanists

<http://meena.cc.uregina.ca/~liushus/bio/botany.html>

Missouri Botanical Garden Home Page

<http://www.mobot.org/welcome.html>

The Garden Gate: Mailing Lists

<http://www.prairienet.org/ag/garden/maillist.html>

Base de Datos Tropical (Brazil – bromes, etc.)

<http://www.ftpt.br>

Mail Lists

Mail lists are like an electronic version of the round robin letters that go by snail mail. The main difference is that a message is posted to the list, and it is relayed to all members of the list at the same time. One doesn't have to wait for six months for the letter to come around again as it is there in a matter of seconds.

Joining a list is simple. Send an e-mail message with no subject to the (listsrv) address with the message:

SUBSCRIBE<list name><your name>

To post a message to the list just send an e-mail message to the (list) address and it will be echoed to all members of the list. Be aware that some of these lists may generate a considerable volume of daily e-mail.

Bromeliaceae plant family Discussion List (Brom-L Mail List)

brom-l (list name)

brom-l@ftpt.br (list)

listserv@ftpt.br (listserv)

Cacti and Succulents Discussion List

Cacti_etc (list name)

Cacti_etc@opus.hpl.hp.com (list)

listproc@opus.hpl.hp.com (listserv)

Carnivorous Plant Discussion List

cp (list name)

cp@opus.hpl.hp.com (list)

listserv@opus.hpl.hp.com (listserv)

Compost Discussion List

compost (list name)

compost@listproc.wsu.edu (list)

listproc@listproc.wsu.edu (listserv)

Mediterranean Plant Discussion List

medit-plants (list name)

medit-plants@ucdavis.edu (list)

listproc@ucdavis.edu (listserv)

Orchid Discussion List

orchids (list name)

orchids@scuacc.scu.edu (list)

mailserv@scuacc.scu.edu (listserv)

San Juan Capistrano, California

Reprinted in part from PUP TALK, publication of the Saddleback Valley Bromeliad Society, Vol. 2, Number 8, August, 1995.

Dan has recently informed us that the American Association of Botanical Gardens also has a mail address that can be reached by Internet. It is:

<http://192.104.39.4/aabga/aabga1.html>

You may also reach Selby Botanical Gardens via Internet at:

<http://www.sarasota-online.com/selby>

Enjoy the surfin'.

Tissue Culture

Shane Crozier

As a relative newcomer to the world of horticulture, I am constantly amazed by the variety of technologies employed by both the home and commercial grower. Seemingly by magic, I was confronted by row upon row of near identical plants in nearly every nursery or supermarket garden center I visited.

Some specimens I found in Target, Coles and K Mart stores recently have been *Aechmea fasciata*, *Neoregelia carolinae*, *Guzmania lingulata* var. *minor*, *Guzmania dissitiflora*, and *Guzmania wittmackii*.

I often asked myself if there were hordes of devoted garden gnomes locked behind barb wire fences somewhere, who laboured day and night to produce plants which were nearly perfect duplicates of each other. The truth is nearly as astounding.

In sterile laboratories, devoted horticulturists and biotechnologists perform a little magic called tissue culture.

Tissue culture is the process by which many of our commercially grown plants are propagated, and is not quite as Frankensteinish as it sounds.

The process begins with a parent plant or tissue parent, which donates plant material from a growing point on the plant, which can be used to produce duplicates of itself. This material is sterilized in a weak bleach solution to prevent fungi and bacteria from killing the young clone. The material is then placed in a sterile tube with a mixture of agar (a sterile food source also used for growing bacteria cultures in laboratories) and hormones which promote the growth of the plant roots and shoots.

The plantlet is allowed to grow until the food source has been fully utilized, or it fills the tube (whichever occurs first), and then is planted into sterile soil in a miniature pot and covered with plastic to keep the plant as free of pathogens as possible. The natural growth of the plant takes place as normal at this stage. As it matures it is subjected to more and more of the outside world.

But why try to improve on nature, you ask? Quite simply, because that is a habit mankind has picked up along the way to civilization. How far we wish to take technology such as this is a choice we may have to make in future generations as there are many pro and con arguments to be made.

Imagine the ability to produce from a single parent plant, one hundred genetically-identical plants of the slower to reproduce, or less prolific varieties of bromeliads. There could be a lot less anguish in propagation with the help of modern science.

I would never suggest that there might be a day when we could find our hobbies reduced to ordering custom-designed plants from a catalogue, but in this age of diminishing rainforests and extinction of both plant and animal species, this may be a way to repopulate some of the endangered botanical species. This is a worthwhile cause to say the least.

The potentials for tissue culture are mind boggling. However, some plants do not respond well, and some not at all, to this process. Also to be kept in mind are the hazards of recurrent inbreeding of a species. As with any plants from the same parent, defects may be as easily strengthened with cross-pollination as the desired characteristics.

Perth, Western Australia

Reprinted in part from BROMELIAD NEWSLINK, publication of the Western Australian Bromeliad Society. Vol. 2, No. 1; June/July, 1994.

Exciting Experiences

Odean Head

Here are some bromeliad experiences that are exciting to me:

1. Looking into the cup of a favorite plant that has not bloomed and seeing the beginning of a bloom spike. When I first started growing bromeliads they were all special plants and I routinely checked all cups for bloom spikes.
2. Seeing pups forming on special plants that I am anxious to propagate. Things have changed with my crowded conditions but the propagation of today's special plants still excite me.
3. Discovering new exciting plants in shows and other grower's collections. Even though these plants may not be available at the time, just knowing that they exist and that if I wish hard enough, possibly someday I will get one is exciting.
4. Adding new plants to my collection continues to excite me.
5. Seeing bromeliads growing wild in their natural habitat is exciting, even if they are old friends from cultivation.
6. Seeing bromeliads growing in outdoor landscapes. I have visited many gardens in southern Florida and California where large numbers of bromeliads are used in the landscape without fear of winter.
7. Collecting bromeliads from the wild. This was even more exciting than hunting Easter Eggs as a kid. I found so many plants that were new to me that I could hardly wait to see what was in the next tree.
8. Making new bromeliad friends in our society wherever I go from coast to coast has probably been the most exciting and treasured experience that I have had.

Houston, Texas

Reprinted in part from the bulletin of the HOUSTON BROMELIAD SOCIETY; Volume 1, number 9; September, 1995.

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Photo by Dan Shook

Catopsis compacta Mez

Catopsis compacta occurs as an epiphyte in the southern states of Chiapas & Oaxaca, Mexico. It grows at elevations up to 2100 meters. The thin green foliage is coated with waxy, white, powdery scales, particularly towards the base. The flowers are white, but are seldom noticed amid the bright orange-yellow floral bracts surrounding them. This is one of the more attractive *Catopsis* species, a situation causing it to be one of the bromeliads collected for use in church displays during various holidays.

Bromeliads are not the only plants used in this fashion but they are among the most frequently used because of their bright colors and eye-catching inflorescences.

The genus *Catopsis* ranges from Florida to Ecuador, although the bulk of the 21 species are found primarily in Mexico and Central America.

Members of this interesting genus are only occasionally seen in private collections.

Calendar

18–20 April 1996

59th Bermuda Agricultural Exhibition. Dept. of Agriculture, Fisheries & Parks, Botanical Gardens, Paget, Bermuda. All day. Admission: \$5.00 adults, \$2.00 for children. Equestrian events, cattle and goats, vegetables, fruit, flowers, flower arrangements, culinary, wood working, educational classes and displays, aquaria and terraria. John A. Barnes, 809-236-4201. Mailing address: P.O. Box HM 834, Hamilton HM CX, Bermuda.

Show chairmen and newsletter editors are requested to send notices of their society events to Chet Blackburn, 720 Millertown Road, Auburn, CA 95603.