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Cover photographs. Front: *Billbergia magnifica* Mez was reported by Racine Foster in *Journal* vol. 39:129–130 and is worthy of being shown again. A very large (leaves to 3 dm in length) native of the State of Espírito Santo, Brazil, its bloom will reward the patient grower. Back: *B. decora* Poeppig & Endlicher (please see back cover for brief description). Photos by Don Beadle who discusses billbergia culture on pages 102–106.

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NOTICE

Ballots are enclosed for voting members in the Florida and Texas regions only. No nomination was received for director of the Australia Region; therefore, Maurice Kellett, will remain in office until his successor is elected. If you are a Florida or Texas member and you did not receive a ballot, please tell the editor immediately.

Two New Pitcairnias of Exceptional Horticultural Merit

Harry E. Luther

Ecuador

***Pitcairnia bergii* Luther sp. nov.** (Fig. 1)

A *P. pungens* HBK, cui affinis, inflorentia longiore declinataque differt.

Plant densely clustering, occasionally producing stout stolons 3–5 cm long, flowering 0.3–0.5 m tall. *Leaves* dimorphic, seasonal, the larger leaves 25–60 cm long. *Leaf sheaths* ovate, 10–25 x 15–45 mm, serrate toward the blades, castaneous, lustrous, sparsely pale lepidote abaxially. *Leaf blades* absent or reduced to a brown serrate spine and persistent or linear, attenuate, 10–17 mm wide, serrate below the point of abscission, entire above, bright green, glabrous adaxially, sparsely pale lepidote abaxially and deciduous. *Scape* erect, 20–35 x 2–3 mm, pale floccose. *Scape bracts* erect, imbricate, exceeding the internodes, subfoliaceous, green. *Inflorescence* declinate, simple, racemose, 20–30 cm long, 35–60 flowered. *Floral bracts* erect, narrowly triangular, attenuate, 7–35 mm long, thin, nerved, sparsely pale floccose, green. *Flowers* with a slender pedicel 5–14 mm long, erect-secund, spreading at ca. 150 degrees from the axis at anthesis. *Sepals* very narrowly triangular, acute to attenuate, 22–27 x 2–3 mm, thin, nerved, orange-red. *Corolla* zygomorphic. *Petals* ligulate, acute, 45–49 mm long, each with a single retuse appendage ca. 5 mm above the base, bright red-orange. *Ovary* ca. 4/5 superior.

Type. Ecuador: El Oro, Road Uzhcurrumi-Chilla, km 10, ca 1000 m, Nov. 1990 *Cathcart & Berg s.n.* (SEL holotype).

This colorful new species is closely related to the widespread Andean *Pitcairnia pungens* but can be distinguished immediately by its longer, declinate inflorescence. The recently described *P. pseudopungens*[1] Rauh differs by its sparsely spinose leaves and shorter, erect inflorescence. The name honors the collector, Walter Berg of Sarasota, Florida.

Peru

***Pitcairnia smithiorum* Luther sp. nov.** (Fig. 2)

A *P. sceptigera* Mez, cui similis, inflorescentia perminore, bracteis scapis florigerisque percastaneis, sepalis petalisque minoribus differt.

Plant terrestrial, densely clustering, stemless, 0.4–0.6 m tall. *Leaves* polymorphic, rosulate, spreading, the larger leaves 0.6–1.25 m long. *Leaf sheaths* triangular, 3–6 x 2–4 cm, entire, castaneous, lustrous, glabrous adaxially, pale

1. Werner Rauh. Bromelienstudien, XXI. Mitteilung (Trop. u. subtrop. Pflanzenwelt, 75): 13–15; Mainz, 1990.

Wally Berg

Figure 1
Pitcairnia bergii, a colorful native of Ecuador, is related to *P. pungens* but has a longer, down-curving inflorescence with bright red-orange petals.

S. Williamson

Figure 2
Pitcairnia smithiorum, from northeast Peru, is notable for its large, cylindrical, many-flowered inflorescence.

lepidote abaxially. *Leaf blades* absent or much reduced or pseudopetiolate, the pseudopetiole 10–65 cm x 5–10 mm, channeled, pale lepidote abaxially, laxly serrate with brown, antrorse or retrorse spines 1–3 mm long, the blade narrowly lanceolate, acute to attenuate, 20–45 mm wide, channeled, dark green and glabrous adaxially, densely pale lepidote abaxially. *Scape* curved-ascending, 20–45 cm x 5–12 mm, glabrous, green to brown. *Scape bracts* erect, laxly imbricate, exposing the internodes, the sheath ovate, lustrous, nearly glabrous, dark castaneous, the blade subfoliaceous, attenuate, green, densely pale lepidote abaxially. *Inflorescence* cylindric, 8–15 x 4–5 cm, densely polystichous-flowered. *Floral bracts* erect, triangular to elliptic, attenuate, 40–52 x 18–22 mm, thin coriaceous, even, castaneous at the base, orange to red. *Flowers* sessile, erect. *Sepals* narrowly oblong, slightly asymmetrical, acute, 20–23 x 10–11 mm, even to slightly nerved, the adaxial pair carinate, yellow to orange. *Corolla* erect, regular, not at all zygomorphic. *Petals* ligulate, obtuse, 37–38 mm long, each with a single broad, erose, basal appendage 11 mm long, bright orange-yellow. *Ovary* ca. 2/3 inferior. *Ovules* immature, poorly developed, apparently caudate.

Type. Peru: Loreto, banks of the Río Napo at the confluence of the Río Amazonas, 1983, *S. &. H.L. Smith legit,* flowered in cultivation 25 Jan. 1989. *S. & H.L. Smith s.n.* (SEL, holotype).

Pitcairnia smithiorum has become a popular horticultural subject in Florida since its introduction in 1983. The name honors the collectors, Sam and Hattie Lou Smith of Fort Myers, Florida. This new species appears to be related to *P. sceptigera* of western Ecuador but is smaller in all parts with basally castaneous scape and floral bracts and a regular (not at all zygomorphic) corolla. As mature seeds have not been seen, there is some uncertainty as to its taxonomic placement; however, the distinctly polymorphic foliage and erect, regular corolla are unknown in *Pepinia.*

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

Bromeliad Culture, No. 4: What You Should Know About Billbergias

Don Beadle

It may well be that the billbergia was appreciated by the native of ancient South American civilizations before recorded history. They certainly did not leave the proof of their appreciation the way the early 19th century Europeans did in their many marvelous horticultural journals, gazettes, and magazines. That was the age of the great collectors and the great collections, and the billbergia, as well as all other tropical plants, was brought to Europe where it charmed and intrigued the horticultural community. Hand-colored drawings of the early imports dramatically illustrate this interest.

The collecting began in 1815 with the venerable *Billbergia pyramidalis,* followed shortly by *B. zebrina, B. amoena,* and *B. vittata.* There are now over 60 described species with many distinctive varieties. The native range for the billbergia is primarily eastern Brazil in the lower elevations, but several species are found in Peru, Ecuador, Venezuela, and as far north as central Mexico.

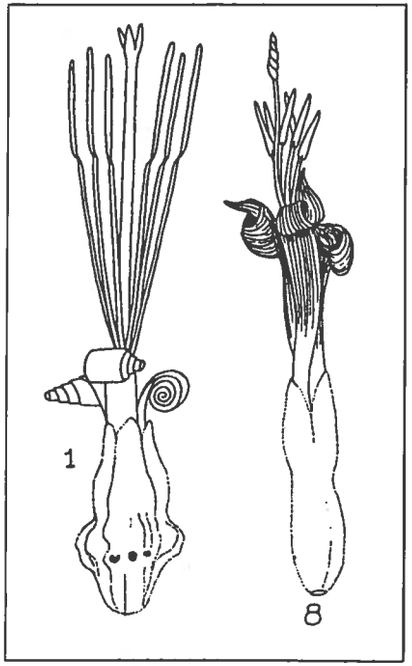


Figure 3
Billbergias such as *B. zebrina* (no. 1) and *B. brasiliensis* (no. 8) have petals that become tightly recoiled and for that reason are called watch spring or helicoid.[1]

Billbergias resemble aechmeas in form and habit and in fact differ taxonomically in only small ways such as structural details of the pollen grains and whether or not the sepal tip is "prickly." (The billbergia is "not.") In habitat, the billbergia is usually epiphytic in clumps, preferring airy locations with bright shade or indirect light. In captivity, the billbergia is usually individually imprisoned in heavy, wet soil, in dank, dismal, deep shady locations.

Glowing descriptions of the beauty of the billbergia bloom inevitably end with the deflating phrase, "unfortunately, the bloom is so short lived, lasting no more than two weeks." This, coupled with the infamous allegation, "billbergias are the easiest to propagate and grow of all bromeliads," has done much to disillusion, discourage, and deter the grower from an adventure with the billbergia.

1. Brom. Soc. Bull. 13:6–8; 1963; reprinted J. Brom. Soc. 33:34–37; 1983.

The Billbergia (I *will* capitalize that name) has much to offer the grower today. A variety of sizes allow the growing of 3″-tall, stoloniferous rosettes and 1+ meter clumps of *Billbergia rosea* or *B. stenopetala.* The thin, tubular shape of the helicoid Billbergia allows enjoyment of the color, form, and spectacular bloom without the sacrifice of growing area. The efforts of hybridizers have resulted in the availability of new, hardy, and constantly colorful cultivars to which the bloom is merely an embellishment.

CULTURE

The Billbergia prefers whenever possible to be grown in an open, porous mix with good drainage. Since the majority of growers inevitably custom design their own concoction, no specific recommendation is made here. I use the commercial PROMIX BX because of its convenience and availability. Billbergias do not universally develop large, strong root systems and the PROMIX packs well enough to support the tall plants when they become top heavy when watered. I grow many of them high overhead in the shade house and have never become adjusted to having them diving down on me when I water.

Pot shape and size seem to be more a matter of esthetics than anything else, particularly in judged bromeliad shows. I become embarrassed when I behold a single small Billbergia alone and forlorn in the center of a huge, unattractive plastic pot. Please, do not do this. Most tubular Billbergias suffer from the lack of conventional conformation when displayed as single plants. They are naturally gregarious and seem to prefer clumping and community life and are best shown competitively as neat clumps. When left to choose their own arrangement, they seldom conform, unfortunately, to our ideas of what orderly should be. The attractive arrangement of a clump requires the grower to remove the old mother plants when they begin to lose their glamour. Gaps need to be filled in by removing young offsets and replanting them in a more appropriate spot. Pruning should be merciless in order to keep a loose, open clump that will allow free access to air and light. An unattended clump will soon pack the pot with green, scaly, skinny things that will do little toward encouraging the grower to acquire more Billbergias. The spectacle of a well-grown, hanging pot of colorful Billbergias in full bloom is a rewarding and spiritually uplifting sight.

Watering is another subjective subject. Most growers schedule their watering by the clock and calendar, mystical signs, weather conditions, their general emotional state, etc. I recommend a dispassionate approach based on whether the Billbergia is wet or dry. My only problems have occurred from excess in one direction or the other. Billbergias do not seem to be overly sensitive to watering and I will confess to leaning toward too little rather than too much. When overly indulged, the Billbergia tends toward being tall, lanky, and green. The imposition

Figure 4
Billbergia pyramidalis (Sims) Lindley, plate 4756 from Curtis's Botanical Magazine, Dec. 1, 1853 (left).
B. macrocalyx (below) Hooker, plate 5114 from Curtis's Botanical Magazine, May 1, 1859.
These highly detailed drawings, beautifully colored, show erect scapes in contrast with the decurved scapes of the cover photographs and emphasize the diversity of billbergia characteristics.

Photographs by the author

Figure 5

of a degree of stress into the everyday life of the Bill seems to produce a hardier, more compact, colorful, well-formed plant. This desirable condition is more easily attained when the Billbergia is kept on a strict diet.

No single factor contributes more to the unattractiveness of a Bill than does *overfeeding*. Balance, in Billbergias as in all things, is the key word. If you grow healthy plants in locations where they get good light for long periods with lots of moving air, you may feed them well and reap all the benefits therefrom. If you grow them in low light in stagnant conditions, then feeding is a shamefully cruel process and you should look within and seek counsel.

My soil-less PROMIX provides only small initial doses of trace elements that are quickly used up. Peters Peat Lite 15-16-17 contains a balanced basic mixture of nutrients together with the needed trace elements. I usually mix Peters to a concentration of well under ¼ teaspoonful per gallon (there must be metric equivalents), which is continuously added to my water by a marvelous little proportioning device. I do not know if this is the proper amount but it has apparently done no harm.

A summary of ideal growing conditions for Billbergias would be to grow them in open, elevated, airy locations with good light for long periods, with moderate amounts of good water, and with a MINIMUM of fertilizer. Most Billbergias will survive from just above freezing to over 110 degrees F. *Billbergia sanderiana* surprised me by ignoring 19 degrees F for 30 hours. The large helicoids begin to expire or to be seriously damaged in the low 40s. They are surprisingly tender. The best temperature range for color and conformation seems to be cool to 50 degrees F. at night with balmy 70–75 degree days. I thrive under those conditions myself, but if they exist in south Texas it's for only one or two days in the spring and the fall, and that's all. We are all dealt conditions that are probably not ideal for the variety of plants we try to grow, and I have found the Billbergia willing to adapt to a wide range of conditions. I've seen them grown well in Illinois basements, New York apartment windows, hilltops in California, under the trees of Florida, anywhere at all in Australia, and even in the unrelenting winds of Corpus Christi. But this cannot happen by ignoring the particular needs of the plant. I note that the people who grow show quality neoregelias and vrieseas invariably grow show-quality Billbergias. The reciprocal is also true. The key must be caring.

Billbergias are a little more obliging at breeding time than are some other bromeliads. The appropriate parts are readily accessible and the process is well known. I have, however, set seed only about 15% of the times I've attempted to make a hybrid. That cold fact, to me, fails to validate that bit of frivolous folklore that suggests how easy it is to propagate the Billbergia. The Billbergia also frequently fails to bloom. When a neo fails in this fashion, it becomes famous.

I heartily recommend hanging pots to permit the use of otherwise unused space above the rest of your plants and allow maximum exposure to free air and light. Almost any pot can be adapted to hang with a modicum of ingenuity and will add much to the appearance of your growing area. The spectacle of sunlight through the leaves is an added pleasure not available when your Billbergia lives under a bench.

Today's grower, when beginning a Billbergia collection, is presented with a dizzying array of desirable Billbergias from which to choose. In the past, only the old standard, garden varieties were available. The packed pots of *Billbergia nutans, B. pyramidalis,* and a token helicoid or two usually defined the Billbergia for the average grower. A modern collection could begin with Richter's *B.* Fascinator, Carrone's *B.* Pink Champagne; Thom's & Schwarz's *B.* Strawberry, *B.* 'Manda's Othello', *Beadle's B.* 'Caramba' and *B.* 'Poquito Blanco'.

The spectacular bloom of *Billbergia pyramidalis* is best displayed in the marginated cultivar *B.* 'Kyoto'. For foliar color in species *Billbergia,* try *B. amoena* var. *viridis* or *B. amoena* var. *rubra.* Interesting form with attractive spines is available with *B. horrida* and *B. sanderiana.*

Try them. You'll like them.

Corpus Christi, Texas

Corrections

v. 41:19–20, 24. Change name of the plant to: *Guzmania undulato-bracteata.*

:20. Change first line to read: "*Guzmania undulato-bracteata* (Rauh) Rauh comb. nov.," and add: "(Basionym: *Tillandsia undulato-bracteata* Rauh; in: Rauh, W., Bromelienstudien II. Mitteilung [Trop. u. subtrop. Pflanzenwelt 8]:6–14, Mainz 1974.)"

v.41:51. Change line 24 to read:
Tillandsia rauhii (L.B. Smith) emend. W. Rauh.

v.41:78. Corrections, line 3.
*The correct spelling of the correction (v. 40:258–*Fig. 6) is *Aechmea penduliflora* as shown in Luther List of bromeliad binomials.

Please send address change notices, and any other changes affecting your membership and delivery of the *Journal* to Membership Secretary Linda Harbert, 2488 E. 49th, Tulsa, OK 74105 as far in advance as possible. If you do not tell us, we have to pay 35¢ for each address correction supplied by the postal service and at least 98¢ to send a replacement copy. We must ask you to refund such costs.

Metamasius callizona Kills Bromeliads in Southeastern Florida

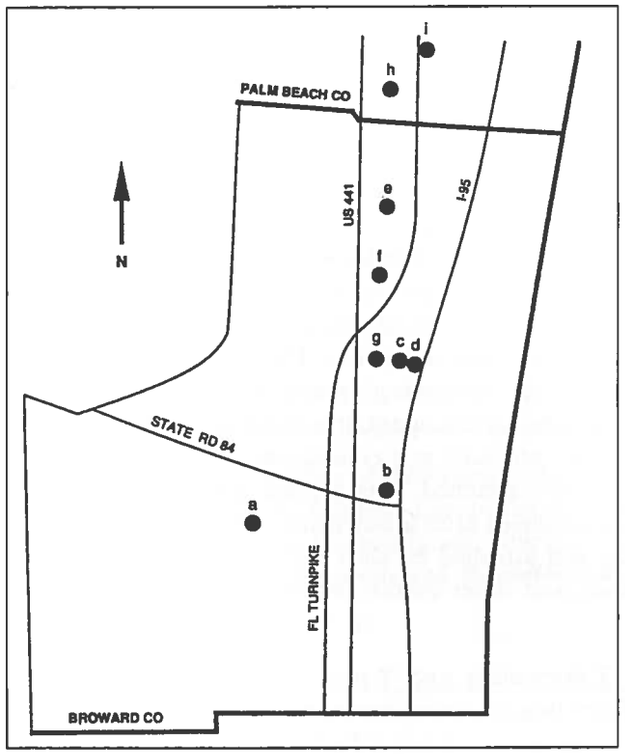
J.H. Frank[1] and M.C. Thomas[2]

Epiphytic bromeliads of the genus *Tillandsia* are one of the most striking features of the natural landscape in Florida. *Tillandsia usneoides* and *T. recurvata* are widespread, and are joined in the southern part of the peninsula by *T. utriculata, T. fasciculata, T. paucifolia* and others. The rough bark of oak and cypress trees provides much of the substrate to which the bromeliads attach. Where these epiphytic bromeliads are abundant, it is usual to find that a few of them have fallen to the ground, generally as a consequence of breaking of dead tree branches to which they are attached. The ground may be littered with broken tree branches and bromeliads after a hurricane. Even though the fallen bromeliads appear healthy, still attached by their roots to branches, they are subject to grazing by rabbits and other mammals, and at most sites will not survive long.

Tillandsia utriculata, T. fasciculata and *T. paucifolia* in Broward County and the southern part of Palm Beach County are now dying for another reason. Bromeliads of these three species are being killed by larvae of *Metamasius callizona* (Chevrolat), a Neotropical weevil, whose presence in Broward County was first discovered late in 1989 (O'Brien et al. 1990). Our examination of bromeliads on the ground at sites in these counties (see map on page 108) in February 1991 showed that many had been killed by weevil larvae. Such bromeliads typically showed extensive mining in the base of the plant, which had broken away from the roots (as in Fig. 6, p. 204, vol. 40, of *Journal of the Bromeliad Society*). By taking apart such bromeliads, we were able to collect 23 larvae, 32 pupae (each in a fibrous cocoon) and 22 adults of *M. callizona,* alive, most of them from Broward County parks. We found no eggs or very small larvae but, because of their size, these would be easier to miss than large larvae.

The precise life cycle of the weevil is yet unknown. We have not yet observed oviposition, and do not know whether it continues throughout the year. We do not know how long the eggs, larvae and pupae take to develop or how long the adults live. Our immediate objective, with support from the Florida Council of Bromeliad Societies, is to be able to rear all developmental stages of the weevil, in a laboratory at the University of Florida, for research purposes. When a ready supply of laboratory-reared eggs, larvae, pupae and adults is thus assured, we hope to begin research on biological control of the weevil.

1. Entomology & Nematology Dept., Univerity of Florida, Gainesville, FL 32611-0740.
2. Division of Plant Industry, Florida Dept. of Agric. & Consumer Services, Gainesville, FL 32602.



Map 1.
Sites in Broward County and southern Palm Beach County where living specimens of *Metamasius callizona* were collected on 4-6 February 1991: (a) Tree Tops Park, (b) Secret Woods Nature Center, (c) Easterlin Park, (d) Parks HQ, (e) Tradewinds Park, (g) country club, (h) golf course, (i) construction lot. Additionally, damage by the weevil was seen at (f) Fern Forest Nature Center, but no weevils were collected. Sites (a–f) are administered by the Park and Recreation Division, Broward County Commission. Sites (a–g) are in Broward County, (h–i) are in Palm Beach County.

REFERENCE:

O'Brien, C.W., Thomas, M.C., Frank, J.H. 1990. A new weevil pest of *Tillandsia* in south Florida. J. Brom. Soc. 40:203–205, 222.

Clarification

v. 41:23 (fig. 14)–24. Harry Luther has provided further information: Figure 14 in the article, "Best of the Best, 1990," was incorrectly identified as *Canistrum fosterianum* [as noted in v. 41:78] although it was correctly listed in the text on page 24. *Canistrum seidelianum* was described by the late Wilhelm Weber in Feddes Repertorium 97 (1986): 117–119. It was contrasted with *C. fosterianum* by having sharply carinate (keeled) floral bracts and posterior sepals. Although not stated by Weber, the habit of his new species is rather different with stiff but laxly spreading leaves that are somewhat lustrous. *C. fosterianum* has fewer leaves in an upright, semitubular rosette and the leaf surface is rather dull. In my opinion, *C. seidelianum* is the superior ornamental.

Racine Foster, 1910–1991

Fig. 6. Racine Foster

We are sorry to report that Racine Foster, widow of Mulford B. Foster, died on the 21st day of March 1991 at the age of 81. She was an honorary trustee of The Bromeliad Society, Inc. and a member of the editorial advisory board.

Racine and Mulford were married in 1935. They brought the bromeliad family to the attention of the world by founding and editing the *Bulletin* (now *Journal*). Their enthusiasm was such that they also paid the costs of printing and distributing the *Bulletin*. Mrs. Foster a few years ago donated the remaining copies to the society. While Mulford gained fame by collecting, writing, and lecturing, Racine provided the inspiration and the essential support: the cataloging, researching, plant pressing of those collections, sometimes in the field and sometimes at home. They both wrote extensively for the *Bulletin*. She served also as copy editor for years and was editor of volume eight.

Racine (she was named for that city in her native Wisconsin) Foster's brain was a mine of information that she shared in recent years through the *Journal*. Her series of articles about Mulford's 90-day trip around South America in 1948 came from piecing together a narrative using his letters. It was a major work given the extent of that correspondence and the poor condition of her health. It was next to being a first-hand account of the problems and pleasures of plant collecting. In shorter articles, she described her enthusiasm as a bibliophile, her admiration of the beauty of *Bromelia balansae*, the thrill of watching *Billbergia magnifica* bloom.

Racine's life was a record of devotion to her husband and their joint work. After his death, she continued to work with their records and correspondence, determined to become his biographer. It is too bad that she could not have finished that work.

Early last year Glenna Simmons wrote a more complete biographical essay about Racine for the *Journal* and Racine supplied the accompanying portrait, which is shown here. She seemed pleased with the result. It is worth being reread now.—TUL

Nidularium marigoi; or, Progress toward a New Species

Elton M.C. Leme

About five years ago, when we had just started to revise the typical subgenus *Nidularium* Lemaire, we announced success in identifying the little-known *N. itatiaiae* L.B. Smith. We had found that species dominating the highest parts of the Itatiaea National Park situated on the border of the States of Rio de Janeiro and Minas Gerais. In an article under the title, "Remarkable Bromeliads of Itatiaia,"[1] and using a lovely photograph taken by the photographer Luiz Claudio Marigo, we described that species as a native of heights above 1,000 meters. That plant presented a rounded leaf apex, an inflorescence slightly emerging above the rosette, primary bracts with indistinct blades of bright red color and blue petals turning orange as they wither.

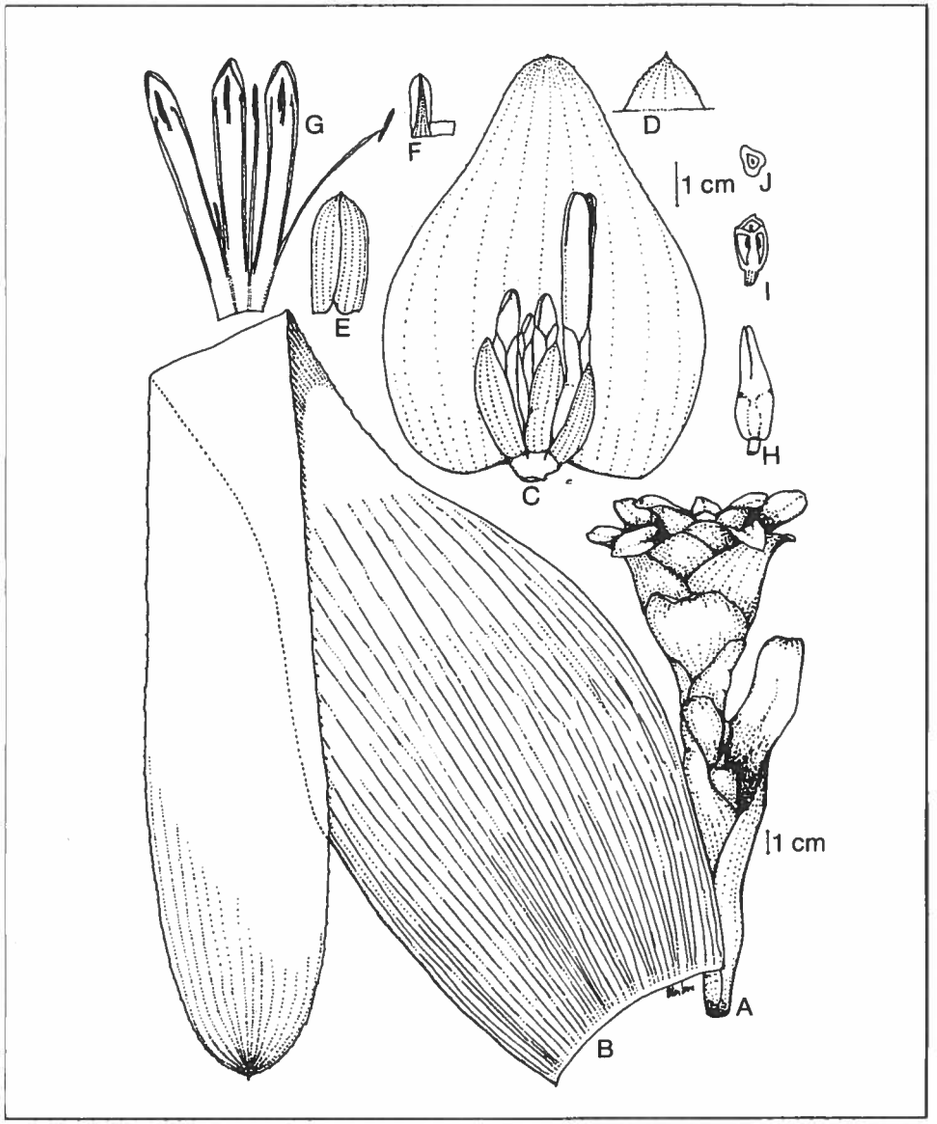
Later, as our investigation progressed toward making a complete revision of the genus, we examined specimens deposited at the herbarium of the Centro de Botânica de Fundação Estadual de Engenharia do Meio Ambiente-FEEMA (GUA) identified by Dr. Lyman B. Smith as *Nidularium itatiaiae* (Strang 331; Castellanos 23338).[2] Since some of the observed floral details did not fit well with Dr. Smith's description,[3] we considered the possibility of having in hand a very variable species. If so its original conception could be enlarged eventually to encompass our previously described *N. pedicellatum* Pereira & Leme[4] (found originally at high altitude parts of Friburgo in the state of Rio de Janeiro) because of ecological and morphological similarities. We also found in the Museu Nactional herbarium (R) one isotype of *N. itatiaiae* apparently lost amongst the various other common specimens. Despite its type progeny, its sepals and floral bracts showed a high degree of variation as to shape and the spines of the margins, respectively, not taken into consideration in the Smith description. So, we started to work with three main hypotheses:

a) If the *Nidularium* photographed by Marigo was *N. itatiaiae,* confirming a high degree of morphological variation, then under a new and enlarged concept it could also include our *N. pedicellatum*. The latter could then be reduced to synonymy.

b) If *N. itatiaiae* was a distinct species in comparision with the *Nidularium* portrayed by Marigo, the latter could be at least identified as *N. pedicellatum* under an enlarged concept of this species and given a more widespread distribution.

c) If not so variable (the *N. itatiaiae* and *N. pedicellatum* being in fact taxonomically different species), the Marigo bromeliad could really be a third one, new to science.

We then started an intensive field research, at first trying to follow the same path as Mulford Foster in order to spot what would be the typical *Nidularium itatiaiae,* which he collected in a place called Maromba, at Itatiaia. As there



Elton M.C. Leme

Fig. 7

Nidularium marigoi Leme. A) inflorescence; primary bracts; B) leaf; C) outer primary bract and branch; D) apex of the inner primary bracts; E) floral bract; F) sepal; G) petals; H) flower without petals; I) longitudinal section of the ovary; J) cross-section of the ovary.

were two places named Maromba, situated in the same neighbourhood, both near rivers with waterfalls as reported by Foster, we first went to the village of Maromba in the vicinity of the city of Visconde de Maua and the Itatiaia National Park. There we went over the many steep slopes along two rivers

making a thorough search of the remaining vegetation near small waterfalls. We found nothing but isolated specimens of a nidularium related to *N. fulgens* Lemaire, and *Neoregelia fosteriana* L.B. Smith and *Vriesea penduliflora* L.B. Smith, both collected by Foster in 1939.

After this first unsuccessful try, we went months later toward the heart of the Itatiaia National Park in the direction of the Maromba Falls. As we got near there, we found a big population of a *Nidularium*. Unfortunately all of the plants were sterile making impossible any accurate determination study of their identity. That being the case, it took us two more trips to this place on different occasions to find the desired bromeliads in flower. It was worth the effort. In the late spring, most of them were in full bloom, different from all the others. Foster collected the species in seed-maturing stage, lacking complete flowers, and without full beauty. Now, the plenitude of the flowering season provided us a show apart: leaves usually green turning reddish under more intense sunlight, green primary bracts with the apical half a red color in contrast with the coral-colored petals (Figures 8 and 9).

With this material and information available, it would be impossible not to know for sure the identity of the real *Nidularium itatiaiae*. When in flower it is visibly distinct from the others belonging to the complex of species headed by *N. purpureum* Beer. We then started to work with the hypothesis that the *Nidularium* photographed by Marigo was our *N. pedicellatum*.

Examination of the dried specimens in several herbaria was very important for this purpose but so was examination of living material. Only after many visits to the high plains of the Itatiaia where the "Nidularium of the photograph" could be found easily, could we conclude that the uncommon floral characteristics observed were not subject to notable variation even in small isolated populations such as those of the Ibitipoca State Park in Minas Gerais. With that decision and with the accumulated taxonomical evidence, we confirmed the third hypothesis: to consider Marigo's nidularium as a new species. The course then was to pay tribute to Luiz Claudio Marigo who first documented the plant in full bloom with his fine, specialized art.

***Nidularium marigoi* Leme sp. nov.**
subgen. *Nidularium*

A *Nidularium pedicellatum* Pereira & Leme, cui affinis, *bracteis primariis* inconspicue spinulosis spinulis usque ad 0.5 mm longis, apice rotundatis et perminute apiculatis, *sepalis* oblongis minoribus basi 2–3 mm connatis, *petalis* liberis vel basi irregulariter agglutinatis in tubum ad 7 mm longum, longitudinaliter per manifeste bicallosis, *filamentis* episepalis liberis vel supra basin 10 mm petala male adnatis differt.

Plant not stoloniferous, sometimes short-caulescent with age, the older portion of the stem covered with a dense paleaceous material originated by the disintegration of the older leaf sheaths. *Leaves* 30 or more, suberect, in a very dense rosette; *sheaths* elliptic, 12–13 cm long, 7–8 cm wide, densely and finely brown lepidote on both sides, greenish, strongly nerved mainly when dry; *blades* sublinear, inconspicuous, narrowed at base, 15–30 cm long, 3–4 cm wide, apex rounded and very minutely apiculate, becoming glabrous, nerved, green or dark red toward apex, margins very minutely and densely serrulate, spines about 0.5 mm long. *Scape* 12–19 cm long, 1–1.5 cm in diameter, lepidote, greenish, slightly or distinctly surpassing the length of the leaf sheath. *Scape bracts* subfoliaceous, shorter than the inflorescence, completely hiding the scape. *Inflorescence* subcapitate-obconic, 5–7 cm long, 6–9 cm in diameter at apex, distinctly raised above the leaf rosette; *primary bracts* broadly ovate, rounded or subacute and very minutely apiculate, the outer ones 7–9 cm long, 5–7 cm wide at base, suberect, without evident distinction between blade and sheath, red, very inconspicuously lepidote or becoming glabrous, margins very minutely and subdensely or densely serrulate, spines less than 0.5 mm long; *branches* about 10, the outer ones with 3–4 flowers, subflabellate, complanate, 2.5–3.5 cm long (without the petals), 1.5–2.5 cm wide, shortly pedunculate; *floral bracts* oblong-elliptic or oval lanceolate, subacute or acute and inconspicuously apiculate, 18–30 mm long, 9–13 mm wide, obscurely spinulose toward the apex, hyaline-greenish, exceeding the center of the sepals, inconspicuously lepidote, carinate. *Flowers* 50–70 mm long, pedicellate, pedicels 2–5 mm long; *sepals* oblong, 12–15 mm long, about 5 mm wide, apex subacute and minutely apiculate, connate for 2–3 mm, whitish or green, glabrous, obtusely carinate; *petals* 40–60 mm long, 5–7 mm wide, free or irregularly agglutinated at base for 7 mm, the basal 4/5 of its length white, the apical 1/5 dark blue with the exception of the rose-lilac margins and apex, apex obtuse-cucullate, bearing 2 very well developed longitudinal calli equaling the length of the filaments; *filaments:* epipetalous highly adnate to the petals, the episepalous free or weakly adnate to the petals at base for 10 mm; *anthers* sublinear, about 6 mm long, base obtuse, apex conspicuously apiculate, fixed near the middle; *ovary* 7 mm long, 5–6 mm in diameter, white, glabrous, subclavate; *epigynous tube* 1.5 mm long; *placentae* apical; *ovules* numerous, obtuse.

Type: Brazil. State of Rio de Janeiro near the border of the State of Minas Gerais: Itatiaia National Park, about 2,000 meters above sea level; leg. *Elton M.C. Leme 937, R. Menescal & R. Bello,* August 1986. **Holotype** HB; isotype RB.

Distribution: *Rio de Janeiro:* Itatiaia National Park, base of the Prateleiras, *F. Atala 272,* Mar. 13, 1960 (GUA; HITA); ibid. between the Rebouças Shelter and Massenas, *H.E. Strang 331*, Jan. 14, 1961 (GUA); ibid. *E. Ule 290*, Mar. 1984 (R). *Minas Gerais:* Passa Quatro, Mantiqueira Mountain, São Bento Farm, without collector (R); Morro Cavado, watershed of Mauá, *A. Castellanos 23338,*

Figure 8
Nidularium itatiaiae in habitat. The several attempts needed to locate the species in full bloom were finally rewarded. The leaves turn reddish under more intense sunlight and the primary bracts with green and red halves contrast with the coral-colored petals.

Photographs by the author

Figure 9
Inflorescence detail of *N. itatiaiae.*

Luiz Claudio Marigo

Figure 10
Nidularium marigoi, also in habitat, showing leaves colored a glossy, vivid red from the sun. The raised inflorescence is clearly evident.

Luiz Claudio Marigo

Figure 11
N. marigoi inflorescence detail. The lower part of the petal is dark blue becoming a pink-lilac on the margins and apex.

Apr. 30, 1962 (GUA); Lima Duarte, Ibitipoca State Park, near the Cave of Três Arcos, *E.M.C. Leme 1494 & L.C. Marigo,* Dec. 28, 1989 (HB; RB). São Paulo: Bocaina National Park, *D. Sucre 3083, P.I.S. Braga 800 & D.J. Guimarães,* May 7, 1968 (RB).

Material used for comparison:
Nidularium pedicellatum Pereira & Leme: State of Rio de Janeiro, County of Nova Friburgo, Morro da Caledônia, *E.M.C. Leme 261,* 1981, flowered in cultivation May 13, 1984 (HB), ibid. *G. Martinelli 2503,* June 8, 1977 (RB; HB).

Nidularium itatiaiae L.B. Smith: State of Rio de Janeiro, Itatiaia National Park, Maromba Falls, *M.B. Foster 118,* June 30, 1939 (GH;R); ibid. *D. Sucre 5155 & T. Plowman 2855,* May 30, 1969 (RB); ibid. *E.M.C. Leme 1415,* Aug. 26, 1989 (HB; RB), ibid. *H.E. Strang 626,* Dec. 13, 1964 (GUA); ibid. way to Véu de Noiva, *G. Martinelli 3253 & Paul Maas,* Oct. 11, 1977 (RB); ibid. way Barbosa Rodriguez, *S. de Andrade s/n,* Aug. 1, 1966 (HITA); ibid. edges of Campo Belo River, *H.E. Strang 955 & A. Castellanos 26244,* Feb. 3, 1967 (HB); Itatiaia, Mont Serrat, *Dusén 7402,* July 15, 1092 (R); ibid. *M.B. Foster 122,* in part, June 30, 1939 (R); Mantiqueira Mountain, Itatiaia River, Santa Deolinda Farm, *A. Castellanos 23105,* Apr. 22, 1961 (GUA; RB).

Nidularium marigoi is a typical inhabitant of the elevated parts of the Mantiqueira Mountain. It grows at an altitude of over 1600 to 2700 meters, more frequently observed in dense population groups as terrestrial or on rocks, seldom epiphytic, near the edges of the tree-like vegetation of the high plains. The coloring of the leaves, usually green, may reach a glossy, vivid red under sunny conditions. The inflorescence is visibly raised above the leaf rosette with totally red primary bracts. The petals, nearly free, have dark blue color near the apex, but the margins and the apex are pink-lilac. A curious fact is that the aged plants show themselves rather caulescent with the older portion of the stem covered by a thick layer of paleaceous material formed by the deterioration at the strongly nerved leaf sheaths.

This new species and *Nidularium pedicellatum* are part of a complex of species related to *N. antoineanum* Wawra. *N. margoi* may be distinguished by its primary bracts with inconspicuously serrulate margins, spines less than 0.5 mm long, and the rounded and very minutely apiculate apex; by the smaller oblong sepals, which are connate for 2–3mm, by the petals free or irregularly agglutinate at base for 7 mm, with very well developed longitudinal calli, as well as by the episepalous, nearly free filaments.

Although not closely related to *Nidularium itatiaiae* as it seemed at first, *N. marigoi* has in common with it the relative proximity of geographical distribution in the region of Itatiaia, but with distinct altitudinal preferences. Thus, *N. itatiaiae,* of which the type is represented by an apparently sun-exposed specimen with a more compact shape than general for the species, prefers to grow at

altitudes between 800–1500 meters. It can be seen usually growing on arborescent vegetation as well as on shaded rocks in the majestic, damp Atlantic Forest. While other species of *Nidularium* bloom during November and December, *N. marigoi* can be found in flower from February to May.

Our studies of the genus *Nidularium,* including the results and conclusions presented here, are now in the final stages of preparation. While searching for necessary sponsorship of the publication of that monograph, we are continuing to collect the largest possible amount of data about the new and old species involved.

ACKNOWLEDGEMENTS:

We wish to thank the curators of the herbaria listed below for the loan of materials: Gray Herbarium of Harvard University (GH), Centro de Botânica de Fundação Estadual de Engeharia do Meio Ambeinte-FEEMA (GUA), Jardim Botânico do Rio de Janeiro (RB), Museu Nacional (R), Parque Nacional do Itatiaia (HITA), and Herbarium Bradeanum (HB). We thank also the Instituto Estadual de Floresta of the State of Minas Gerais (IEF/MG), and the director of the Ibitipoca State Park, Maria Rita de Cassia Amancio and Paulo R. Tenuis for the support of our activities at that park.

Rio de Janeiro

NOTES:

1. Leme, E.M.C. 1985. The remarkable bromeliads of Itatiaia. J. Brom. Soc. 35:243–245, 250, and back cover.
2. Smith, L.B.; Downs, R.J. 1979. Bromelioideae. Flora Neotropica 14 (32):1617–1619.
3. Smith, L.B. 1955. The Bromeliaceae of Brazil. Smithson. Misc. Collect. 126(1):32–33, fig. 76.
4. Pereira, E.; Leme, E.M.C. 1984. Spec. Nov. Bras. Bromeliacearum–XXIV. Bradea 4(11):70–71, fig. 2.

The BSI Research Grant Committee is seeking persons to submit applications for research grants that may budget up to $1,000. A wide variety of projects concerned with bromeliad culture, conservation, or general biology could qualify. Funding will be contingent on the quality of the design of the project and the importance of the subject. Applicants need not be trained scientists but they should provide evidence of their qualifications to pursue effectively the intended study. Results of funded projects must be submitted to the *Journal* editor for consideration. Related information and instructions for submitting an application can be obtained from David H. Benzing, Chairman of the BSI Research Grant Committee, Department of Biology, Oberlin College, Oberlin, Ohio 44074 U.S.A.

Guzmania blassii and *Guzmania weberbaueri* Compared

Elvira Gross

Guzmania blassii Rauh and *Guzmania weberbaueri* Mez are beautiful, ornamental plants with red-yellow inflorescences and, therefore, showing some similarities. The following descriptions clarify the differences.

Guzmania blassii, described by Rauh in 1983[1] is a native of Costa Rica. Field data of the type specimen are not known, but last year Chester G. Skotak reported[2] that the massive population of *Guzmania blassii* that he found in 1987 on Mount Turrubares in Costa Rica had been completely devastated.

The *plants* have horizontally spreading leaves forming a broad, funnel-shaped rosette. The *blades* are 35 cm long and 4 cm wide, olive green, the inner ones becoming red. *Scape* stout, only 10–30 cm long, red. *Scape bracts* are subfoliate, densely imbricate, bright red and forming a kind of involucrum. *Inflorescence* densely cylindrical, bi- to tripinnate, 20 cm long, 7 cm in diameter. *Primary bracts* bright red, broad-ovate, the basal ones exceeding the branches, the upper ones shorter. *Floral bracts* sharply carinate at the base, bright red, green tipped, shorter than the *sepals;* these to 2 cm long, connate for 7 mm, lemon yellow. *Petals* lemon yellow, to 3.2 cm long, with free lobes 5 mm long. *Stamens* and *style* included.

Guzmania weberbaueri, described by Mez in 1905, grows as both an epiphyte and terrestrial in Ecuador and Peru.

Plants with *leaves* 80–90 cm-long, spreading-recurved and thus forming a small and high rosette. *Blades* green, to 5 cm wide. *Scape* elongated, to 70 cm long, in the upper part bright red. The *scape bracts* are subfoliate and longer than the internodes but not wholly covering the scape and not forming an involucrum. *Inflorescence* small-cylindrical, laxly bipinnate, but becoming very dense at toward the apex, 40 cm long and 6 cm wide. *Primary bracts* broad-ovate, the basal ones exceeding the spikes, the upper ones shorter, bright red with a reddish green apex. *Floral bracts* carinate, shorter than the sepals, red, yellow to the tip. *Sepals* +/– 2.5 cm long, half connate, lemon yellow. *Petals* 3.5 cm long, yellow, drying off black. *Stamens* and *style* included.

Both plants, looking only at the inflorescences, are similar but have certain characteristics that make distinguishing them easy.

Guzmania blassii has a broad, red-green rosette, a stout, short scape and involucrate, bright red scape bracts. All parts of the inflorescence, with the exception of the sepals and petals are bright red.

Photos by W. Rauh

Figure 12

Guzmania blassii (top) and *G. weberbaueri* (right) have red-yellow inflorescences but differ in most other characteristics. The most obvious are shape and height since *G. blassii* is short and broad while *G. weberbaueri* is twice as tall with leaves forming a high rosette (note person's hand and arm).

Figure 13

Guzmania weberbaueri has smaller and pure green rosettes, the scape is elongated and lacking involucrate bracts. The floral bracts are not solid red but have yellow tips giving the spikes a yellow appearance. Moreover, the inflorescence is not as dense as in *G. blassii* and the primary bracts have a reddish green apex.

The plant of *Guzmania blassii* shown in figure 12 is the type specimen (B.G.H. 55 238). The picture of *G. weberbaueri* (collection no. Rauh 34 759) was taken in the native location of the plant, near Baños (Dptm. Tungarahua, Ecuador) at an altitude of 1200 m. According to Smith and Downs,[3] Hitchcock (no. 21861) collected *G. weberbaueri* in the same region in 1923.

Heidelberg, Federal Republic of Germany

NOTES:

1. J. Brom. Soc. 33:66; 1983.
2. J. Brom. Soc. 39:147–149; 1989.
3. L.B. Smith, R.J. Downs. Tillandsioideae. Flora Neotropica, no. 14, pt. 2: 1300; 1977.

The **European Bromeliad Society** (formerly British Bromeliad Society) announces that it has reemerged after a period of dormancy. The secretary is soliciting exchange journal arrangements and asks interested societies to correspond. In addition, EBS is working to develop a national collection of bromeliads at Shapeley Water Gardens and asks for assistance. Please communicate with: R.S. Houghton, 16 Culcheth Hall Drive, Culcheth, Warrington, Cheshire WA3 4PS United Kingdom.

The Luther *Alphabetical List of Bromeliad Binomials* is now available in its **FIRST REVISION.** The author has added for the benefit of specialist users the name of the author (or authors) following the specific and subspecific names. He has also made numerous additions and changes. The price per copy is unchanged: 3rd class and surface mail: $10.00; United States airmail, $11.00; all other countries airmail: $14.00. Please make checks payable in U.S. dollars to BSI. Send orders to Editor, 1508 Lake Shore Drive, Orlando, FL 32803. Telephone 407-896-3722.

The editor plans to publish a list of these binomial additions and changes in the *Journal* as soon as possible for the benefit of those who have already purchased the original *List*.

Tillandsia praschekii, an Abbreviated Description

Renate Ehlers

Karel Willinger wrote an article, "Interesting Tillandsias of Cuba,"[1] about some plants not very well known by collectors. Indeed, he and his friends discovered a number of very interesting tillandsias.

Before concluding their visit to Cuba, Mr. Willinger and his group climbed Pica Turquino, the highest mountain of the island, where they discovered two new species of *Tillandsia.* One of them was *T. turquinensis,* which I have seen. Contrary to the published description,[2] it is stemless and has a bipinnate inflorescence and, therefore, needs further investigation.

The other new plant mentioned by Mr. Willinger in his article was described in this way: "One of my friends found another interesting plant. It was, in fact, *Tillandsia ionantha,* or a natural cross of *T. pruinosa.* The plant leaves are longer and corrugated. The inflorescence grows over a rosette and forms a smaller rosette over the main plant [a small involucre]."

In fact, at first glance, the plant looks like *Tillandsia ionantha* var. *scaposa* or a small *T. pruinosa.* When Mr. Willinger returned to Cuba and re-collected, he found neither *T. pruinosa* nor *T. ionantha* growing in the area.

Since this plant differs in many details from its relatives, we have described it as a new species and have named it for Ing. J. Prasek who discovered it near Los Hoyos.[3]

***Tillandisa praschekii* R. Ehlers and K. Willinger.**
Habitat: Cuba. Pinar del Río: on several mogotes, 200–300 m elevation, mostly on rocks, rarely on cactus or bushes.

Comparisons.

- With *Tillandsia pruinosa* Swartz, *T. praschekii* differs with a less bulbous habit of the plant, smaller spikes, floral bracts shorter than the sepals, and shorter sepals.
- With *T. ionantha* var. *scaposa* L.B. Smith 1941, it differs with more pruinous leaves, with broader, subbulbous sheaths and longer blades; inflorescence not simple[4] but compounded of many small spikes enveloped in a small rosette of leaf-like primary bracts. The coriaceous, triangular floral bracts are strongly carinate, lepidote, and shorter than the sepals.

Stuttgart, Federal Republic of Germany

NOTES:

1. J. Brom. Soc. 37:170–172; 1987.
2. J. Brom. Soc. 39:8–9; 1989.
3. The complete description (including Latin diagnosis) was published in Die Bromelie 2/89:35–37 with color photograph.
4. [Guatemalan *T. kolbii* can be found with compound inflorescences—H.E. Luther]

Book Review

Vascular Epiphytes, by David H. Benzing.

If there were a literary hero of epiphytes, it would be David H. Benzing, professor of biology at Oberlin College, who has carried out and communicated scientific and horticultural research on epiphytes for decades. In his 1990 volume, *Vascular Epiphytes* (Cambridge University Press), he has not let down those who have long awaited a synthesis of the current state of knowledge about these diverse and fascinating plants that grow upon other plants.

Dr. Benzing presents a thorough and well-organized treatment of vascular epiphyte biology, physiology, mineral nutrition, ecology, and evolutionary biology. He precedes the body of the text with an interesting historical perspective on epiphytes, including the fact that Columbus was credited with the first recorded comment on canopy-adapted vegetation. The eight chapters are arranged logically, and integrate existing knowledge culled from the scientific and horticultural literature, unpublished data from a large number of researchers, and his own vast experience on the subject.

This book is targeted at a mainly academic audience, rather than for the casual hobbyist. Unlike his former book, *The Biology of the Bromeliads* (Mad River Press, 1980), in which he tried to find a middle ground between academic and hobbyist audiences, *Vascular Epiphytes* is unabashedly designed to compile and convey results of scientific research to scientists and others with botanical backgrounds and interests. In contrast to many so-called scientific books, however, the text is beautifully written and explains such complex concepts and processes as photoinhibition and crassulacean acid metabolism in clear and understandable terms.

Although few photographs are presented (this is NOT a coffee-table book!), the graphics and figures are clear and illustrative of points made in the text. They are well referenced, and sufficient citations are presented throughout for the reader who wishes to follow up on a certain study or subject area.

My only major criticism of the book is that although the author emphasizes the diverse nature of epiphytes, the temptation to generalize about the nature of epiphytism too often overpowers him, and we are given an oversimplification or overgeneralization about the epiphytic habit. This is no doubt in large part owing to the nature of the current state of knowledge about epiphytes: there are few rigorous studies on epiphytes, and on only a tiny representation of the vast number of species of epiphytes. Any generalization, consequently, is subject to a raised eyebrow or an obvious exception. In general, however, Dr. Benzing has done an excellent job of incorporating and integrating the existing data, which are especially few and scattered in the field of epiphyte ecology.

I have found the book extremely useful in my work as an epiphyte biologist in several ways: to gain an overview of epiphyte-related topics outside my own expertise; for putting together seminars for a variety of audiences, and simply as a source book for academic pursuits. I particularly delight in the extensive and carefully prepared bibliography.

The glossary could have been more complete, especially for the nonbotanist who reads the book; the term "indumentum," for example, was not included. The unfortunately high price ($60.00 retail) is the consequence of publishing with a university press, but will, I hope, not restrict access of the book to academics and the public. We owe a large debt to our hero for completing the monumental task of compiling so much scattered data into such a readable and interesting account.

Dr. Nalini M. Nadkarni
Director of Research
The Marie Selby Botanical Gardens
811 South Palm Avenue, Sarasota, FL 34236

Regional Reflections

A Natural Synthesis: The Tropical Garden Bromeliad and Its Cousins

In the past, this column has emphasized bromeliad-related subjects as well as a host of nonrelated topics. The range has been wide, indeed. In some cases, the scope has been not only somewhat farfetched but also possibly too broad for a bromeliad society newsletter. Whatever its shortcomings, this column will delve into a subject that, to some old-timers, will seem trivial but to the newcomer a useful guide.

The bromeliad is one of nature's crown jewels and as such takes back seat to no family of plants. I must admit that this is a conceited and biased statement. Collectors and fanciers, both neophytes and veterans, concur that, while the bromeliad is truly a magnificent giant among its fellow plant comrades, it cannot stand distinctly alone and aloof in any garden of lasting and permanent value. The accumulation of bromeliads in a garden setting exclusively composed of bromeliads, while most interesting, is far from being a superior symphony of beauty and effectiveness.

The bromeliad can boast of some very important comrades or first cousins as we shall call them. These cousins: the orchid, the cactus, and the succulents, deserve a place in the spotlight of beauty and glory along with the bromeliads. The bromeliad and its cousins form a natural community of closely related beauties. Each plays an important role in the permanent tropical garden. In their

tropical canyons, mesas, and forests, they are found heavily entwined on the tree limb, tree trunk, and the road escarpment, all happily coexisting. So, taking a lesson from nature and God's creations, we as garden owners ideally should create our own garden closely akin to the gardens of nature and utilize the bromeliad and its first cousins fully and freely. It is no sin to imitate the forest garden and to steal its secrets. This precisely is the suggestion.

In ideal conditions, the most beautiful of tropical gardens provide equal space among the bromeliad and its cousins. Not of course in straight, boring lines and in exactly equal spaces but rather in staggered, informal and irregular lines, and spaces. The garden that appears to have been lifted out of the real forest setting is the garden of excellence. Some expert gardeners arrange the bromeliad and its first cousins in an elevated position to catch the visitor's eye and to direct it to the high spots. These spots can easily be made by piling up the turf or soil to create the peaks on which rest these main attractions.

So far we have discussed the high spots or peaks of attention. But, one may ask, what about the valleys? Here enter the scene, the second cousins of the bromeliad. They play a minor, yet vital, part of the whole. They are plentiful and some are relatively inexpensive. Their basic and necessary role is to fill the gaps or valleys between the elevated positions. These helpers fall into two divisions: the foliage plants and the flowering plants. Included in the foliage group are the maidenhair fern, aralia, asparagus ferns, *Begonia* Rex, *Cissus,* coleus, ficus, diffenbachia, monstera, philodendron, fatschedera, peperomia, phoenix palm to name a few. In the flower division, the following are recommended: cyclamen, begonia, caladium, cineraria, anthurium, impatiens, geranium, azalea, hoya. The list of available second cousins is endless and gives the garden planner many fine choices. Truly, the garden of variety is the garden of interest and beatuy.

I hope that this will be not only a guide of some use especially for the beginner and new members of the society but also a review for the old pros. The objective has been to show that the bromeliad supplemented by its first and second cousins can help make the garden an everlasting paean.

Jack E. Percival, Jr.
Reprinted from the San Diego Bromeliad Society
Newsletter, *June 1990*

A Novel Way to Germinate Tillandsia Seed

When I first came to Caloundra [vicinity of Brisbane] over fifty years ago, almost 100% of the supplies to the town came up Pumicestone Passage on the barge "Waterhen." Out to sea the steamships brought produce to and from Brisbane. The hatches of these vessels were covered by timber. Loose timber

often was blown, washed or thrown overboard. A group of beachcombers earned their living by collecting and selling this new, or almost new, timber washed up on the shores of the northern end of Bribie Island. Many a persons home contained timber of this nature.

Today, there is a modern beachcomber still collecting flotsam for housing. I have found an easy way to germinate tillandsia seed. I collect washed up coconuts, chop them into about four pieces or sizes to suit my requirements and merely spread the seed on the coir. I then hose it in, and this process provides a good home for the young seedlings.

I have also started mounting plants, in numbers, on driftwood in the hope one day I shall have large colonies of plants growing on them. There does not seem to be much of a salt problem. I just wash the coconuts or driftwood, sometimes soak it in a tub for a day or so, then leave it out in a few falls of rain. The plants in general I suspect also have some tolerance to salt as they seem to thrive in my salt-laden atmosphere.

Should any of you fellows wish to try this method of mounting on coconuts here is a tip to speed up the process. The coconuts are usually waterlogged and fairly heavy. If you take your wife along, together with a couple of extra fertiliser bags, I've found one wife can carry two bags with five nuts in each for a distance of 3 to 5 kilometres. This process gets the number of nuts collected much more quickly.

Happy collecting and good germination results.

OH! p.s. Thanks Gwenie

Des Anderson
Reprinted from Bromeliaceae
Bromeliad Society of Queensland, July–August, 1990

A Matter of Mulch

Utilize mulches in your garden and reap many benefits. Mulching with dried grass clippings is an excellent way to recycle this garden waste. Just stop and think how many bags of grass cuttings are sent to our landfill each week. As gardeners, we can greatly reduce this land fill by using our organic wastes as mulches or in our compost piles. Bermuda grass clippings may contain seed but if a heavy mulch is maintained the Bermuda seed will not live past germination and, therefore, won't become a problem in your yards.

Drying the grass first is recommended but if you are not able to do so, just apply thin layers of clippings over the entire garden. Thick layers will mat and

can restrict water penetration into the soil. Also, by matting, the clippings ferment and can have offensive odors.

Mulches in your garden will prevent many weeds from growing. Weeds that germinate from seed will be killed by a thick mulch. The seedling is not able to receive the sunlight it requires and will die. Perennial weeds such as nutgrass become more easily pulled. My experience is that perennial weeds become less deeply rooted when mulches are in your garden.

Mulches break the force of rain, therefore your soil will be less compacted. Less compaction of the soil allows for better root growth. More oxygen is available to the plant roots in a loose soil. This oxygen is critical for plant health since roots breathe just like we do—they take in oxygen and give off carbon dioxide. A loose soil will also absorb water more readily. The open pore spaces in a soil that is not compact will allow for a better internal drainage of excess moisture. Some nonorganic mulches such as sheets of plastic limit oxygen penetration into the soil. Newer synthetic mulches are available that are tightly woven fibers that easily allow for air and water penetration. Whenever possible we should use organic mulches.

Organic mulches shade the soil and keep the soil temperature in a more desirable range. This is especially important because of our high temperatures from May to October. If soils become too hot, plant health will be affected.

Mulches conserve soil moisture, therefore, we water less often saving us money on our water bill. Mulches prevent the splashing of soil onto plants, which can prevent some diseases.

Reprinted from Potpourri
Greater New Orleans Bromeliad Society, Sept. 1990

Notes on Bromeliad Culture by Rick Shiell

Potting: No two collectors give their plants exactly the same growing conditions. Some growers water more often than others, some water in the morning, some in the evening, some live on the coast, some inland, and so on. Your choice of potting medium depends on your growing conditions. There are a few basic criteria to consider when choosing a potting medium:

Firmness: The medium should hold the plant securely, so it does not wobble and suffer root damage. Firmness is achieved by providing compactible material such as bark, tree fern fiber, sand, or whatever, and through proper potting technique.

Air Circulation: The medium should provide the roots with ample air, either by being coarse enough to create air spaces, or by containing lots of

porous material like pearlite or pumice. If your conditions dry out rapidly, air circulation may be less important than moisture retention.

Moisture Retention: The medium should hold enough moisture to promote good rooting, but not so much as to exclude air or cause rot. The less you water, and the drier your conditions, the more moisture retention is needed. Note: a potting medium that stays soggy for a long time is a poor substitute for regular watering.

Proper pH: Bromeliads root best in mildly acidic media. To test the pH of your medium, first test the pH of some tapwater, then pour the water through a fresh pot of your medium, and test it again to see how the pH has changed. It should become one or two (or even three) pH points more acidic. Organic materials in the medium provides acidity by gradually breaking down. Some good organic materials include: peat moss, leaf mold, redwood mulch, and composted planter mix. [Look in gardening supply catalogs for pH testers.]

Nutrients: The medium should either contain nutritious materials, such as mulch, leaf mold, or compost, or it should have fertilizer added. My medium contains little nutritious material, so I supplement it with Bandini Blood & Bone Meal, and the legendary combination of Mag-Amp and Vim.

Drainage: The medium should not be so dense that water sits on top of it and drips through very slowly. It should not be so coarse that water goes "in one end and out the other." Anything in between usually works, but there are always exceptions. Some dyckias are found in areas where the soil is constantly wet sticky clay, and some cultivated aechmeas do best planted in garden soil. The more you water, and the more humidity available, the faster your mix should drain.

Convenience: Don't go crazy mixing up a dozen materials. Try commercial orchid and cactus mixes. Find the easiest thing that works. I know of growers who use pure pea-gravel or pure pine needles. The late Dr. Oeser (who was the greatest tillandsia hybridizer ever, and whose *Neoregelia sarmentosa* × *N. chlorosticta* hybrids now bear his name) once wrote that "if you want good root systems, plant your bromeliads in pure German peat."

Pots: There are basically three types of pots: clay, plastic and fancy. Plastic pots are cheap, lightweight, sturdy, and are the most popular. Dark green plastic pots are favored by many show judges. (Beware of exhibiting plants in distracting or cheap containers; many plant, and other judges can't stand to see a nice plant in a black cylindrical nursery can.) Personally, I use clay pots because they don't blow over in the wind, and because I can cover the single drainage hole with a piece of plastic screen door mesh to keep sowbugs and earwigs out. Those critters will burrow up into a pot, eating the roots.

Potting Technique: If your medium needs help draining, pack a layer of gravel or pottery shards into the bottom of the pot. Then put enough medium in so that the base of the plant (or its roots) rests on it and pack it down firmly. Continue adding medium up around the plant, packing it down as you go. Strong thumbs or a wooden dowel help. Always water the plant immediately after potting, and use Vitamin B-1 or Superthrive, if you have it.

Submitted by John Arden
Reprinted from San Diego Bromeliad Society newsletter, July 1990.

Letters

Editor: I am a student at the University of Iowa at Ames and you have already heard about my love of bromeliads, now let me tell you about growing *Puya mirabilis* from seed in my apartment as an exercise in enthusiasm.

I sowed the seeds (from the BSI Seed Fund) on April 13, 1989 on a 50/50 mix of Canadian peat and perlite, which had been heat sterilized in my oven. The seed flat, a plastic container in which mushrooms had been purchased, was sterilized with bleach I used distilled water to wet the soil before sowing and plastic wrap to seal it after sowing the seeds. As this was my very first attempt of growing bromeliads from seed, I was paranoid about fungus. Since then, I'm not always so careful except with vrieseas and I haven't had much problem with fungus.

The seeds germinated in about a week and were kept covered for about three weeks at which time the seedlings were pressing against the plastic wrap. They were moved outside in early June 1989.

Finally, in August 1989, a few were transplanted to clay pots (3–4″ diameter) into a mix of 1 part gravel, 1 part peat, 2 parts perlite. By late September they were brought indoors and transplanted into a larger pot and placed 8″ under grow lights.

Since then, they've had to be transplanted only twice, because I hate how they rip up my hands (thick gloves are too clumsy!).

One interesting thing about the blossoms which I haven't seen written anywhere, is that the bud began to open after sunset and was fully opened by 11 p.m. Also, the flower had a refreshing smell something like a flesh of zucchini or cucumbers. The smell also intensified as the night progressed. By the next morning, the blossom had lost its smell and was beginning to fade. By that evening the petals had definitely become "contorted after anthesis" as Smith & Downs writes.

Sorry, but I got carried away. Thanks for listening.

Linda Hornberger

Letters

Dear Mother Nature: Yes, I had planned to reduce the size of my collection of plants this year, selectively, but if you expect me to say thank you for the indiscriminate reduction you produced, you are going to wait until it freezes in a place much warmer than where I live! Was it necessary for you to surprise with the coldest weather we have had in this area since 1937? Aren't you ashamed of yourself getting down to twenty-four and twenty-five degrees fahrenheit for five nights straight and then, as if that wasn't bad enough, staying in the low thirties for several more nights to be SURE you delivered the coup de grace to as many plants as possible? Do you have a personal grievance against my showing plants this year? You seemed to take great pride in the fact that at least 98 percent of the plants being groomed for show are now in the compost heap.

The **aechmeas** suffered the most. The lovely cross of *Aechmea lueddemanniana* x *A. weilbachii* now has pure white leaves (instead of the pretty mahogany) and is leaning from the base. *Aechmea orlandiana* specimens are turning pink and have mushy leaves. The offsets are lying in the pots. *Aechmea fulgens* variety *discolor,* Maginalli, Foster's Favorite, and many others of the same kind are now an ugly brown and quite a few have broken off and are lying beside their pot. *Aechmea fasciata* didn't even wait a week to fall over! Oddly enough, the aechmeas that seemed to take the cold the best were the Hummel hybrids.

Neoregelias came in second. I much prefer the beautiful reds, purples, and mottled colors to the tan and white leaves that many of mine now have. The bases of many of these are green and the centers are still solid, so I have hopes that there will be offsets. The plants sitting on the ground seemed to fare better than the ones that were up on the poles, although even they did not get through unscathed. The plants that were dark purple seemed to receive the most damage. A pot full of *Neoregelia* Royal Flush and another of *Neoregelia* Royal Flush x *N. pauciflora* was completely devastated with no hope of recovery. At the present time, I have no idea of just how many plants will bite the dust as I am finding more each day.

The **vrieseas** took the cold very well. Only some mild tan striping of some of the leaves is showing at this time. Even this damage applies only to a minimum of plants The majority seem to have no problem. It hasn't even slowed up the flowering.

Orthophytums also withstood the cold with impunity. They appear to have no damage—this includes *Orthophytum saxicola* variety *aloifolium,* which is a soft-leafed plant and one that could have difficulty. It was under a solid overhead covering, but the other orthophytums were under shade cloth or sheets.

The **nidulariums** sustained no damage, but that possibly could be attributed to the fact that I grow them next to the house and they are more or less hidden among other plants that provide some protection.

The **cryptanthus** are grown under a solid overhead covering and, at least at this time, are showing no damage.

The **billbergias** were the greatest! Although several had their inflorescences nipped by Jack Frost, there is not one plant that shows any damage in any other way. They are continuing to flower and seem quite happy. The only loss was some billbergia hybrid seedlings that were not protected. A flat I had covered half way with a sheet (the covered half) shows no damage. The other half is now dead. These seedlings are only about three inches tall.

Billbergia x *Cryptanthus* plants were covered with sheets but apparently that was not enough protection. They are not badly damaged but the tips and edges of some of the leaves show burn. I'm not sure whether it is a bonus or whether it would have happened anyway but I noted this morning that some of them are showing they intend to flower.

Dyckias, hechtias, and **deuterocohnias** show no damage.

The only tillandsias with obvious damage were the soft-leafed species. *Tillandsia secunda, T.flabellata,* and several other have frost-bitten leaves but it appears that they will survive.

Sadly,
Kathy Dorr

WHAT DID I LEARN?

1. Double cover all plants possible. Don't trust the shade cloth.

2. Plants growing on the ground or in down low protected places survived the cold much better than the plants that were up high. Next time, bring the plants down.

3. Don't trust the weatherman as to what the temperature is going to be! If he says it is going to be cold, add a few degrees downward to be safe.

4. Above all, don't let Mother Nature know that you intend to decrease the number of plants. She is not a good assistant!

Lakewood, California

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. What makes some bromeliads have that silvery look?

A. The short answer is trichomes. Trichomes are modified hairs that come in many shapes and sizes and occur on the leaf surfaces of many plants. Trichomes in the bromeliad sense have evolved into quite intricate patterns and could be described as like an umbrella for most species (exceptions are in Pitcairnioideae).

Trichomes can be scraped easily from the surface of the leaf with a knife. Even if you have only a stamp collector's magnifying glass you will be able to discern the different shapes from the different species and genera.

When trichomes absorb moisture, they seem to become invisible and to merge with the colours of the leaf. The reason is that the air spaces between the shield of the trichomes and the leaf surface and the air spaces in the trichome are filled with water. This condition changes the reflective nature of the trichome from one that is more reflective because of light scattering (associated with air space) to one that is less reflective because the air space is reduced. When they dry out, the silvery look returns.

In other words, 1) the dry trichome has more air space and is thus more reflective; 2) the larger the trichome, the more the air space edges can move away giving even more reflection; 3) the more trichomes are crowded together, the brighter the total effect.

Q. It is often said the botanists prefer not to use colour in their descriptions of plants and yet, in more recent years, descriptions specify colour even to the extreme of referring to colour charts. Is this a trend?

A. It is pleasing that you, too, have noticed this change and one that botanists might like to comment on. Meanwhile, I will give a layman's reply.

Botanists rely heavily on herbarium specimens backed up by written descriptions. Line drawings are also used. When it could be afforded, botanical paintings were also supplied. these provided the colour and shapes mentioned in the description because it is very difficult to discern colour in a dried specimen.

There seems to be, however, no universal approach to colour. Not only are many males colour-blind to some extent but a written description of a colour can be misleading. There are standard colour charts but they are not accepted internationally.

While botanical paintings still occur and are preferred they are still costly to produce and with the improvement and cheapness of colour photography we are now seeing colour photographs. This is great for the keen bromeliad grower because he/she can recognize a plant for what it is and whether it is desirable. There are some problems again caused by a lack of international standard approach to colour photography by the various manufacturers. You then get problems with reproduction especially in printing. We have all noticed problems with reproducing pinks and some blues, for example, the petal colors of *Tillandsia cyanea.* These problems are basic to the film and not to the processors.

While the layman relies heavily on colour, it has its problems. The botanist also has trouble coming to grips with colour as the following examples will show:

Tillandsia xiphioides var. *tafiensis*[1] is shown in Paul Isley's book, *Tillandsia,* as having white petals whereas the description in Smith & Downs on page 817 says "violet." *Tillandsia lorentziana* is described as having white petals (page 801). A few years ago I imported plants from South America and on flowering one keyed out to *T. lorentziana* but had blue petals. So, I kept looking only to find a comment by Rauh that blue flowers could be found within *T. lorentziana.*

These two examples indicate that even if colour is used in the description it can be misleading.

Colour is important in plant recognition and long may this *Journal* continue to produce colour plates for us all.

1. [Dr. Walter Till, Univ. of Vienna, states that this is not var. *tafiensis* because the typical var. *tafiensis* has "rather soft, much more pruinose leaves, and violet petals."]

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.

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Don Beadle

Billbergia decora Poeppig & Endlicher. H.E. Luther has identified the plant shown here as *"the true decora."* It was collected by Lee Moore on the Rio Mayo in Peru and misidentified in cultivation as *B. tessmannii.* The bright green petals that roll up into tight spirals (and other less obvious characteristics) identify it as a member of the subgenus *Helicodea.*

Calendar of Shows

4–5 May	La Ballona Valley Bromeliad Society Annual Show and Sale. Veterans Memorial Auditorium, 4117 Overland Ave. at Culver Blvd., Culver City, CA. Saturday, noon to 4:30 p.m.; Sunday, 10:00 a.m. to 4:00 p.m. Richard Fleg 213-830-8346.
10–12 May	Bromeliad Society of Central Florida Annual Show & Sale. Florida Mall, SE corner of South Orange Blossom Trail (U.S. 441) and Sand Lake Road, south Orlando. Entries received 9 Mar., 9–11 p.m.; judging 10 March, 1:00 to 5:00 p.m.; show hours: Friday and Saturday, 10–11 May, 10:00 a.m. to 9:00 p.m.; Sunday 12:00 noon to 9:00 p.m. Bromeliad entries invited from the general public. Bud Martin 407-321-0838.
25–27 May	Extravaganza of Exotic Plants to be held at Stapeley Water Gardens is being organized by the European Bromeliad Society (formerly British Bromeliad Society). Participants include the EBS, the Epiphytic Plant Study Group, the Cheshire Orchid Society, and the National Council for the Conservation of Plants and Gardens. Suggestions for furthering interest in bromeliads are solicited. Barbara Dobbins, London Road, Stapeley, Nantwich, Cheshire CW4 7LH, UK (0270) 628628.
1–2 June	Bromeliad Society of Broward County 5th Annual Standard Show, "Bromeliadventures," and sale. Deicke Auditorium, Plantation, FL. Entries received 31 May, 8:00 to 11:00 a.m. Demonstrations, garden tours. BSI members will be guests at Saturday dinner and Sunday brunch.
11–14 June	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.

Please send 1991 show and related notices to reach the editor on or before 8 July, 9 September, and 4 November (for January–February 1992).