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COVER PHOTOGRAPHS. Front: *Aechmea macvaughii* L.B. Smith. Patricia Magaña describes the differences between this species and *A. tuitensis* on pages 74-75. The plant in this photograph was collected by Dr. Sue Gardner. John Anderson cultivated it in Corpus Christi, TX. Don Beadle took the picture. Back: *Neoregelia* 'Medallion,' a much desired cultivar with dazzling color, has the reputation of being hard to propagate, but Drs. Dexter and Montgomery give their observations on pages 72-73. Photographs by Dr. Dexter.

CONTENTS

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Experience It

Jimmy L. Antle

Looking back, I guess it was when we put fiberglass over the back porch to create a plant shelter that we really got the desire to collect and grow a wide variety of plants. Our first bromeliad was an *Aechema lueddemanniana.* Little did we know how this one purchase would influence our lives. The plant almost immediately generated more questions than we could find people, at that time, to answer.

My wife Sandy came to the rescue by discovering that there was a bromeliad society in Houston, about 30 miles away. We joined the Houston Bromeliad Society in 1976 and were introduced to a group of wonderful people with both a wide cross-section of knowledge and fine plant collections. We were so impressed with this group that we took their advice and joined the Bromeliad Society, Inc. These actions started our collecting in earnest, but we had no idea how fast the back porch could be filled, or that the bromeliads would soon account for 80 percent of what we grow.

As the bromeliad world opened up to us, we knew that the back porch was to be only temporary housing. Together we looked at the back yard and realized that somehow a greenhouse was going to be built there. After writing to numerous companies we decided on an 18′ x 36′ gothic arch, fiberglass-covered greenhouse. Sandy and I did the building and that is a story all to itself. Now the good old back porch has become our seedling house.

With our collection increasing in size we started having some problems with proper light for the plants that were placed outside for the summer months. I remedied this for a short time by constructing a 12′ x 16′ lath house of redwood and cedar to give 50 percent shade. Before long that, too, was full, so in the center of the back yard I built a 12′ x 15′ shadecloth frame with redwood and cedar and 63 percent shadecloth. Then, with the lawn slowly being displaced by greenhouse, lathhouse, and shadecloth frame, I decided (with the gentle prodding of my wife) to build one more structure. In the last remaining open space I built one more shadecloth frame, this one 14′ x 35′ using 50 percent shadecloth. Now I have to police my collection: as one plant comes in, one must be moved to a new home. But I have no more lawn problems.

As our collection continued to grow, a definite trend seemed to develop and to persist. I found my interest shifting to neoregelias, while Sandy's tended toward cryptanthus, although we have limited numbers of other genera.

Author

Fig. 1: The Antles' shadecloth structures and some of their collection are shown here. The shadecloth, in 50% and 63% grades, protects the bromeliads from the Texas Gulf Coast sun.

After competing in Houston shows and having some success I began to think about creating some bromeliads of my own. I was introduced to bromeliad seedlings through our society program which gives members a different seedling every month and then encourages them to show off the survivors a year later.

Sandy and I both started to search for and to accumulate seed so that we could experience the fun of raising our own seedlings. We ordered seed from the Bromeliad Society Seed Fund and communicated with other growers who were willing to share theirs from selfed hybrids, and in some cases, their new hybrids. We found that growing seedlings was most interesting. We could observe the step-by-step setting of the individual characteristics of the plants as they matured. The need for more space, however, really became a problem because as the plants developed they needed more and more space so that they could attain good conformation and color. My advice to the new grower is to think about this before sowing seeds.

As I read *Journal* reports of more new hybrids being introduced into cultivation, I began to get the urge to develop my own crosses. With information from the Houston society members and the *Journal* I set out to do just that. I am sure that it is one of the most rewarding things I have done.

Since I began hybridizing I have noticed varied reactions from people to my new creations. What I have learned is that whether or not what you develop is accepted for registration, and no matter how good you think your plant is, the real test is whether or not the public likes the plant well enough to buy it and to keep on buying it (or even accepting it as a gift).

Sandy has hybridized three *Neotanthus* and I have developed three other bigeneric hybrids that please me. There are 19 others for which I have registration applications pending approval. Here are the names and formulas[1] of some:

Cultivars–

Neomea 'James J. Antle' (Fig. 2)	*(Aechmea chantinii* var. Pink Goddess × *(Neoregelia concentrica* × *N. melanodonta))*
Neomea 'Mars'	*(A. chantinii* × *N. hatchbachii)*
Neoregelia 'Magma'	*(N.* 'Fosperior' × *N. ampullacea)*
Neoregelia 'Orange Prince'	*(N.* 'Pepper' × *N.* 'Buccaneer')
Neoregelia 'Red Hot'	*(N.* 'Oh No' × *N. olens* "696")
Neotanthus 'Charlien Rose'	*(Cryptanthus diversifolius* × *N. spectabilis)*
Neotanthus 'Ted Will'	*(Cryptanthus acaulis* × *N. olens* "696")
Neotanthus 'Tom Montgomery'	*(C. lacerdae* × *N. spectabilis)*

Hybrid–

Neomea Sandra J. Antle	*(N.* 'Red Devil' × *A. orlandiana* 'Pickaninny')

Unnamed cultivars–

Neoregelia cv.	*(N. cruenta* × *(N. concentrica* × *N.* 'Clare'))
Neolarium cv.	*(Nidularium* 'São Paulo' × *Neoregelia* 'Aztec'[2]

Author

Fig. 2 Neomea 'James J. Antle', a cultivar named for the author's son, an example of the advice: "Have a plan, something you want to create and not just the product of two plants that happen to be in bloom."

For those who have been thinking about setting seed on a species, or making hybrids, may I offer these ideas?

- Some species will not set seed using their own pollen. Bring in pollen from another plant of the same species for this purpose.
- Some plants like *Neoregelia* 'Oh No', 'Sunset', and *Aechmea lueddemanniana* self-pollinate and should be suspect when used in attempting a hybrid. When making a cross and you notice more seed pods maturing than those you pollinated, be suspicious that selfing has occurred. If, on the other hand, only the ovaries that you pollinated swell, then relax and wait for the seeds.
- Learn to be very careful with plant names because you will want to be sure that your plants are correctly identified.
- Have a plan: something you want to create and not just the product of two plants that happen to be in bloom.

This is how I make a neoregelia cross and I encourage you to try:

1. When the selected parent plants are mature, isolate them. At seven o'clock in the morning, and before the bloom opens, use needlenose tweezers to pull away the petals of the plant designated to receive the pollen (in order to expose the pistil and anthers. Using the tweezers, pull away and discard each pollen-bearing anther surrounding the pistil. Even though pollen on these anthers is damp and not viable, you should still be careful not to let them touch the stigma.

2. At eleven o'clock, remove an anther from the open flower of the pollen parent and take it to the anther-bare seed pod parent stigma. I always try to increase the exposure time to the pollen by positioning the anther so that it stays attached to the pistil.

3. Now make a plastic identification tag about 1/16″ × 1/8″ × 1″ and log either a code number for the cross, or enter the name of the pollen parent and date. Place this plastic sliver between the broken-off petal and the sepals. Make sure that the sliver has blunt ends to prevent damage to the ovary.

4. Keep the plant isolated from insects for the remainder of the day. When the torn bloom closes at the end of the day it will hold the tiny tag.

5. Once this is done, it is a waiting game of about three months. You may want to set up a seed nursery during this period (see below).

6. At the end of the three months, check the ovary for fullness. Sometimes you can see through the skin to the dark seeds inside. Gently lean the seed pod to one side to observe this. When you think that the seed pod is ready, gently tug on the pod and if it is ready the stem end will pull free easily.

7. Prepare a small jar of water containing a few drops of a mild detergent. Squeeze the ovary from the pointed end so that the seeds drop into the solution,

cover the jar and shake it vigorously to remove the membrane material. Drain some water from the jar, then pour the remaining water and seeds onto a clean paper towel. Allow the seeds to dry briefly.

8. Next, put a layer of damp peat moss about 1–1½″ deep in a clear plastic shoe box. Do not let the moss get soggy. Take seeds from the paper towel and place them in a small container such as a dry jar along with the stimulant Rootone (that also contains a fungicide) and shake vigorously so that each seed gets covered with the powder. Then spread the seeds on the damp peat moss. Put an identification tag in the box, put a clear plastic cover on the box and place this nursery under a fluorescent light, or in a bright location. Temperatures of 80–85 degrees F give good germination. Germination times vary with temperature and genus: billbergias, 7–10 days, and cryptanthus, up to six months. Neoregelia seed usually will show the first leaves at 10–15 days.

9. Leave the container closed so as not to introduce fungus. I allow my germinated seeds to stay in the container until the leaves reach the top, (approximately 4–5″). Then I remove the top for 5–7 days to allow fresh air to harden them off so that I can place them in a community flat. In these flats I use a mix of 60% peat moss, 30% perlite, and 10% Baccto, a humusy, commercial mix. To this mix I add a weak solution of a water-soluble fertilizer such as Peters 20-20-20.

10. Keep the seedlings in a bright, calm area and mist them daily until they develop enough leaf reservoir capacity to hold water and nutrients. Use a small amount of fertilizer for foliar feeding (½ tsp. Peters 20-20-20 per gallon of water). This program should give you good leaf growth. When the seedlings have sufficient water-holding capacity, they may be potted separately and the nitrogen number decreased, allowing the plant to harden off further and to develop its individual characteristics. More and brighter light can be given.

11. The next consideration will be to pick which one, two, or three plants from the many that will represent to the public the cross you have made and matured. It can be a trying, but rewarding time. Society will let you know how well you have done.

Happy growin' to ya!

NOTES:

1. Seed pod parent is listed first.
2. Jim Elmore named a cultivar of this same hybrid 'Calypso'. Undated.

Baytown, Texas

Billbergia robert-readii, a Striking New Species from Southern Peru

Elvira Gross and Werner Rauh

The genus *Billbergia* is represented in the western countries of South America including Venezuela, Colombia, Ecuador, Peru, and Bolivia according to L.B. Smith and R.J. Downs[1] with only about eight species. In recent years more have been discovered in Ecuador and Peru, but many are not yet described. In 1971, however, Dr. Rauh collected two different billbergias in southeastern Peru in a degraded rainforest. One of them came into flower in September 1986.

This plant is characterized by hanging inflorescences, with upward-curved flowers at anthesis, and the strange, dusky green-brown color of the petals which are covered with minute glandular hairs. Since we were of the opinion that our billbergia is a new species, we sent the material to Robert W. Read of the Smithsonian Institution because he is more specialized in *Billbergia* than we are. Dr. Read verified our statement and so we will dedicate our plant to him not only

E. Gross

Fig. 3
The newly described *Billbergia robert-readii* is notable for its hanging inflorescences with upward-curving flowers and the unusual, dusky green-brown color of the petals.

for his merits in studying these representatives of the subfamily of the Bromelioideae, but also as a belated wedding gift from the Heidelberg Garden.

***Billbergia robert-readii* Gross et Rauh, sp. nov.**

Planta acaulis. *Folia* pauca rosulam infundibuliformen angustam usque ad 80 cm altam formantia. *Vaginae* distinctae, oblong-ovales, 9 cm longae, 6 cm latae, utrimque dense brunneo-lepidotae. *Laminae* triangulo-acuminatae durissimae, arcuatae, usque ad 1 m longae, atrovirides, subtus albo-lepidotae, supra glabrescentes, margine dense dentibus 2 mm longis atrobrunneis instructae. *Inflorescentia* pendula, simplex, cylindrica, plus minusve 40 cm longa multiflora. *Scapus* inflorescentiae 50–60 cm longus, teres, plus minusve 1 cm diametiens, dense albo-floccosus, nodiis incrassatis, bracteis dense obtectus; *bracteae* imbricatae sub anthesi iam brunnescenti-desiccatae, triangulo-acuminatae, utrimque brunneo-lepidotae, etiam superiores multo longiores quam internodia. *Axis inflorescentiae* crassus albo-lepidotus. *Bracteae florales* minimae, 3–4 mm longae, 3 mm latae, acuminatae, utrimque dense lepidotae, virides brunneo-apiculatae. *Flores* 5 cm longi divaricati. *Sepala* divaricata triangulo-acuminata, 1 cm longa, subtus dense brunneo-lepidota, itaque brunnescenti colore, apice brunnea. *Petala* ligulata, 4 cm longa, cum glandulis minutis, 1.5 cm ex eis circinatim involuta, sordide viridi-brunnea, basi ligulis lutescentibus duabus. *Stamina stylusque* exserta. Filamenta crassa viridi-brunnea; loculi antherarum tenues, 1.5 cm longi obscure colorati pollie luteo. *Stylus* paullo longior quam stamina lobis stigmatis tribus liberis torquatis. *Ovarium* triangulum, 1 cm longum, 7 mm diamentiens, viride, albo-lepidotum, sulcatum; tubus epigynus distinctus, 2–3 mm longus, ovala in muco inculsa, obtusa.

Holotypus: *Rauh 26163* (24.8.1971), in herb. instl. bot. system. univ. heidelb. (HEID).
Patria et distributio: Peruvia meridionalis, Dptm. Madre de Dios, in vicinitate Hcda. Salvación, 600 msm.

Plant stemless. *Leaves* few, forming a narrow, tubular or closed rosette. *Sheaths* conspicuous, long-ovate, up to 9 cm long, 6 cm wide, densely brown lepidote on both surfaces. *Blades* narrow-lanceolate, long attenuate, hard, recurved to pendent, up to 1 m long, dark green, white lepidote above the abaxial nerves, becoming glabrous above (adaxially); the margins densely provided with 2 mm-long, hard, dark brown teeth. *Inflorescence* simple, laxly cylindrical, pendent, ca. 40 cm long, many-flowered. *Scape* curved, 50–60 cm long, round, 1 cm in diameter, densely white-floccose with thickened nodes. *Scape bracts* imbricate, at anthesis already dry and twisted, lanceolate-attenuate, entire, also the upper ones much longer than the internodes. *Rachis* 1 cm thick, white lepidote, pendant. *Floral bracts* minute (all shorter than the ovary), 3–4 mm long, 3 mm wide, triangular, green, brown-tipped, white lepidote on both surfaces. *Flowers* subsessile, with minute tuberculate pedicels, 5 cm long, horizontally spreading to curved upward at anthesis. *Sepals* spreading, triangular, narrowly acute to acuminate, ca. 1 cm long, brown-tipped, densely brown

lepidote beneath. *Petals* ligulate, 0.5 cm wide, ca. 4 cm long, lightly covered with minute glandular hairs (trichomes); 1.5 cm of the blades rolled back, dusky green-brown colored with 2 yellowish obscure ligulae at the base. *Stamens* and *style* exserted. *Filaments* thick, colored like the petals. *Anthers* slender, 1.5 cm long, dark brown with yellowish pollen. *Style* somewhat longer than the stamens with 3 elongated spiraled stylodes (stigmas). *Ovary* 3-angled, ca. 8 mm long, 7 mm thick, green, densely white lepidote, subcylindrical, sulcate; epigynous tube conspicuous, 2–3 mm high; ovules embedded in mucilage, obtuse.

Holotype: Rauh 26163 (24.8.1971), in Herb. Inst. System. Bot. Univ. Heidelberg (HEID).
Distribution and locality: Hcda. Salvación, near Quincemil (Dptm. Madre de Dios), southern Peru, 600 m, epiphytic in rainforest.

Billbergia robert-readii has a remarkable flower color, a dusky green-brown; the stigmas are very long, especially postfloral, and wide spreading. Because the petals are rolled back at anthesis (only 1.5 cm long) it belongs to the subgenus *Helicodea*. According to the key of L.B. Smith and R.J. Downs[2] it is related to *B. cardenasii* L.B. Smith from Bolivia, which has clear yellow petals with large flabelliform basal appendages (those of the present species are obscure and with only one or two lobes), the ovary is ellipsoid and trigonous (the present species has a more cylindrical ovary) the epigynous tube is shorter than the ovary proper (as in the present species), but the petals lack the glandular hairs. *B. alfonsi-joannis* Reitz, of Santa Catarina, Serra do Mirador, Brazil, differs from the present species by having sheaths 20 cm long; scape bracts rose-red, not dried up at anthesis; sepals deeply emarginate (retuse), yellow-green with a sharp violet apiculus; petals 10 cm long. Neither of the latter two species has flowers which curve upward from the essentially horizontally spreading ovary position at anthesis, nor are the sepals quite like the present new species.

NOTES:

1. Bromeliaceae (Bromelioideae). Flora Neotropica 14/3. 1979.
2. See note 1 above.

Institute for Systematic Botany and
Botanical Garden of the University of Heidelberg
West Germany

NOTICE OF BSI BOARD OF DIRECTORS MEETING

The annual meeting of the Board of Directors will be held in Dallas, Texas, on May 23, 1987. The place and time will be announced when available. This will be an open meeting. Members are invited to forward matters for consideration by the Board to the president before the meeting date.

Welcome to New Members

Linda Harbert, Membership Chairman

I want to welcome you to the Bromeliad Society, Inc. and to acquaint you with the Society services, policies, and committees of direct interest to you.

The *Journal* is every member's primary interest. It is published six times a year starting with January. We try to have the *Journal* in the mail before the tenth of the month and mailing times vary. For example, third class mail may take up to three weeks to reach addressees in the United States, and surface mail may take up to four months to reach overseas members. First class mail is available to all members for an additional $5.00.

Some of the services of the Society are advertised in the commercial section of the *Journal.* These include the seed fund, various publications including cultural brochures, and most recently, a video-taped garden tour and a lesson in growing from seeds.

The names of all officers, directors, and chairmen are listed on the inside back cover of the *Journal.* Here you will find the name and address of the Slide Library chairman from whom members and affiliated societies can borrow slide programs for a small fee. We are working to improve and expand these programs and welcome any slides from members for possible use. You will also find the Mulford B. Foster Bromeliad Identification Center listed here. The Center is funded by the Society, its members, and affiliates. Harry Luther is head of this activity and he can tell you exactly what to do to have a bromeliad identified. We also have a calendar of shows on the back page to help you plan trips to enjoy more bromeliads and to meet their growers (sometimes the calendar is so long that it pushes the directory aside).

The Bromeliad Society, Inc. sponsors judging schools. Successful candidates become internationally accredited judges, but they must renew their certification every three years.

Every other year a world conference is held within the United States. Local affiliates sponsor and arrange these conventions. They usually include seminars, plant sales, benefit auctions, an enormous show of quality plants, arrangements, and exhibits. Hundreds of growers meet, socialize, learn, exchange growing secrets, buy plants, and tour local gardens and nurseries. The next world conference will be held in Miami, Florida in May of 1988.

The business of the Bromeliad Society is conducted by an elected board of directors and officers at an annual meeting. The Society is organized into 10 geographical regions. Each region elects one director for each five percent of

[continued on page 87]

Edmundo Pereira (1914-1986)

Cezio Pereira and Elton M.C. Leme

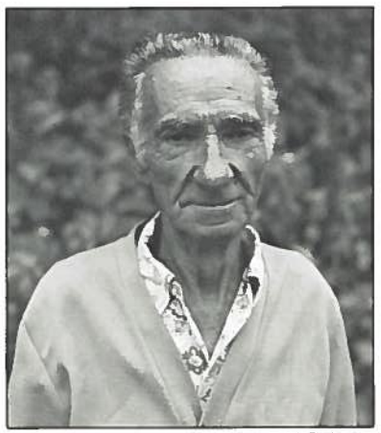

Fig. 4 E.M.C. Leme

Edmundo Pereira was born in Petrópolis, State of Rio de Janeiro, Brazil, on March 19th, 1914, and died on May 16th, 1986 in Rio de Janeiro. His legacy includes more than 50 scientific papers on many aspects of botany, and one of the outstanding collections of taxonomic studies of the Brazilian Bromeliaceae. In collaboration with his great friend Guido Frederico João Pabst, he planned and founded the Herbarium Bradeanum in 1958 using the private Pabst Herbarium and library as the basis of the new establishment. The new herbarium was named in honor of its patron Alexandre Curt Brade.

Professor Pereira began his work at the Rio de Janeiro Botanical Garden when he was eleven years old. He continued his professional development through successively important assignments with the Garden and governmental agencies, all the while devoting himself to the systematic study of plants. For many years he made field trips as assistant to the naturalists Aparicio Pereira Duarte, and Alexandre Curt Brade, among others. In 1951, he placed seventh among many applicants in a highly competitive examination, and in August of that year he was given the permanent post of Naturalist in the Ministry of Agriculture.

Professor Pereira's decision to specialize in bromeliad studies came during the 1960's after a heart attack left him unable to continue his work as Administrator of the Rio de Janeiro Botanical Garden. It was hard for him to limit his activities, however, and he never stopped taking short trips into the country looking for botanical material for his researches.

During the last 16 years of his life he turned his entire interest to the Herbarium Bradeanum and the study of the Brazilian bromeliads. He described his first new bromeliad species as joint author with Dr. Lyman B. Smith, with whom he continued a scientific exchange. During these years he wrote more than 30 papers involving more than 100 new bromeliads. At this same time, he welcomed several trainees and apprentices. Among his great qualities were his ability to suggest various paths to his students, his willingness to share with them the fabulous diversity of information he had amassed, and his interest in giving them the opportunity to develop their own plans and ideas.

When it became physically impossible for him to leave his home, he turned it into a place of work with a laboratory where he could be found at any time studying his books and specimens.

To those privileged to enjoy his company there remain the lesson of work, the example of personal effort, and the undivided devotion of this really self-made man. Professor Pereira is survived by his wife Agostina and son Cezio.

Rio de Janeiro

BOOK REVIEWS

Hybridist's Handbook and Checklist of Bromeliad Hybrids and Cultivars, compiled by Derek R. Butcher, published under the auspices of the Bromeliad Society of South Australia, Inc. D.R. Butcher, 25 Crace Road, Fulham, South Australia 5024, Australia. (U.S.) $4.00, postage paid.

The first edition of this 68-page booklet was produced in 1982 and is here reworked and made current. It is not a registration, but (in Mr. Butcher's words) a list of hybrids made in Australia, both good and bad. It includes also a few cultivars and plants imported to Australia under incorrect names, hints on how to hybridize, problems associated with this exercise, and reprimands to those who dabble with a dirty brush. The entries are cross-referenced. Parent plants are named in most cases. There is a bibliography, a list of Australian hybridists, and a very useful explanation of the *International Code of Nomenclature for Cultivated Plants (1980).* This book is recommended as reference material for all bromeliad society libraries and particularly to hybridists. It is particularly welcome as the *Journal* continues to print articles by hybridists, a series intended both to let them describe their work and to encourage others to grow species from seed and to hybridize with care. We hope that Mr. Butcher's exemplary work and Brian Smith's *Manuscript of Bromeliad Hybrids and Cultivars* (1984), reviewed here earlier, will stimulate interest in getting on with the Bromeliad Society registration activity.

The Houseplant Forum, a new, bimonthly newsletter designed for the houseplant hobbyist has been received. This 14-page, illustrated newsletter is intended, according to the editor Larry Hodgson, to go one step beyond what the average book teaches. The first issue has a wide range of articles: how to grow miniature roses indoors, mesembs (living stones) culture, indoor bonsai, a column on growing orchids, and information about hybridizing African violets. There are advertisements, a seed bank notice, and a column on detecting and treating insects. The editor plans a Q&A section. We were disappointed to find no mention of bromeliads, but perhaps this important aspect of bromeliad culture will not be overlooked in the future. This looks like an interesting way for the winter-bound hobbyist to indulge in imagination and, perhaps, to work up the spirit to try something different. Enterprises HortiCom enr., 1449 Ave. William, Sillery, Quebec, Canada G1S 4G5. $7.50 (U.S. or Canadian).

TUL

Explorations for Pitcairnioideae in South America, Part 2

G. S. Varadarajan

[In the January-February 1987 number, the author described his explorations in Venezuela. He concludes his discussion in this installment.)

ARGENTINA

Field research in the Pitcairnioideae continued into three regions of Argentina: the northeast including Santa Fé, Entre Ríos, Misiones, and Corrientes provinces, the north central with Córdoba, Catamarca, La Rioja, and Mendoza provinces, and the northwest in the Tucumán, Salta, and Jujuy provinces. The following account briefly describes the vegetation, the climate, and the species of Pitcairnioideae found.

Northeastern Argentina. This region with an annual rainfall of 1,000–1,300 mm is relatively wet, but it also has a dry season of one to two months (Sarmiento 1972). Subtropical, deciduous, gallery forests occur here and in the neighboring Brazilian states of Santa Catarina and Paraná.

In these forests, I collected *Dyckia ragonesei* Castellanos and *D. ferox* Mez. Populations of *Dyckia* were apparently more homogeneous than those of other pitcairnioids, for example, *Pitcairnia.* Plant size in *Dyckia* remained more or less uniform and the populations were usually less than ten individuals despite the abundant seed production. The branching of inflorescence and the flowering time of individuals varied notably within populations. Species distribution of *Dyckia* appeared to be discrete and well defined in northern Argentina and this condition may be the reason for the paucity of natural hybrids within the genus.

North Central Argentina. Most of this region is drier than northeastern Argentina. The vegetation here is an arid Chaco woodland, marking the southwestern boundary of the Gran Chaco. Annual rainfall in the woodlands ranges from 300–400 mm, and the dry season lasts about eight months. The transition from subtropical to temperate climates occurs mostly along this vegetation (Sarmiento 1972) and coincides with the southeastern geographic limits of Pitcairnioideae in South America.

Dyckia floribunda Mez, *Deuterocohnia longipetala* (Baker) Mez, and *Puya spathacea* (Grisebach) Castellanos co-occur in several localities. This overlapping may be the result of the similar demands that the species place on their environments. For instance, these taxa are sun-loving, rock-dwelling, and semi-succulent. Some degree of grazing pressure, evident from the trampled soil, and the general preponderance of several spiny plants such as *Prosopis* and various

cacti appeared to be the key features of the plant communities. In their overlapping habitats, *Dyckia* species had fewer individuals (4–5) per population and occurred in more restricted sites than did *Puya* and *Deuterocohnia* species. These field observations, however, require careful, future ecological evaluation.

Within this region, the southwestern borders of the Chaco plains include the Sierra forests on low hills (900–1,200 m) (Sarmiento 1972, 1975). Sierra forests have an annual rainfall of nearly 600 mm, and the vegetation, as a result, is less arid. The dry season is five- to six-months long.

Deuterocohnia longipetala, Puya spathacea, and *Dyckia floribunda* were found, again, growing together in dry and rocky sites of the Sierra forest. *Dyckia valascana* Mez and at least two other *Puya* species replaced their counterparts at elevations of 1,500 m and above.

Northwestern Argentina. The four principal kinds of vegetation in this area include the lower montane forests, the transition forests, the monte-semidesert scrub (Sarmiento 1972, 1975), and the punas. Each includes representatives of Pitcairnioideae. Despite their occurrence in subtropical latitudes, the lower montane forests have a tropical appearance as evidenced by the abundance of vines and other climbers. These forests occur on the slopes up to 900 m and receive a relatively high annual rainfall averaging 1,500 mm. Earlier collectors have reported a few pitcairnioids such as *Fosterella* and *Pitcairnia* from these forests.

Transition forests, as the name implies, are found between the wetter, lower montane forests and the drier Chaco forests on the eastern lowlands. Populations of *Abromeitiella brevifolia* (Grisebach) Mez were huge and bolster-shaped (Fig. 5 on page 66) on the moist, rocky edges of these forests where they grew in company with *Puya lilloi* Castellanos and *P. smithii* Castell. Here the annual rainfall ranges from 800–1,000 mm with a moderate, annual dry season of about four months duration.

The vegetation of the monte-desert scrubs and the punas is more arid than that of the montane and the transition forests. The annual rainfall scarcely exceeds 300 mm and the dry season dominates nearly ten months of the year. *Deuterocohnia haumanii* Castell. and *D. schreiteri* Castell. occurred in massive colonies along the monte-desert scrub especially in the Cafayate area of Salta Province. Here *D. longipetala* was completely replaced by the other two species.

Arid sites in the Andes include the punas, cold, high, treeless plateaus. *Abromeitiella lorentziana* (Mez) Castell. and *A. brevifolia* were common in the punas of Jujuy and Salta provinces as the elevation increased to 3,000 m and above. Puyas such as *Puya harmsii* (Castell.) Castell. that I collected from the high punas (ca. 3,600 m) were always restricted to rocky slopes.

All of these genera except *Fosterella* and *Pitcairnia* overlap in several localities. At the same time, each taxon has a sharply defined range. As one moves westward through the montedesert scrub and the punas, the altitude increases, as does the aridity. These factors limit, perhaps, the expansion of *Dyckia,* but encourage *Abromeitiella.* In contrast, most *Deutercohnia* and *Puya* species occur in the arid localities of the Sierra forests. They (except for one species of *Deuterocohnia)* are presently not known to extend into the eastern (Chaco) plains in Paraguay and Brazil, probably because there is more humidity at the lower altitudes.

Fosterella and *Pitcairnia* are not known to overlap with the other pitcairnioid genera although not far separated from them in their range. In northwestern Argentina, the lower montane forests appear to constitute the southern boundaries for these genera. The reason may be the decrease in annual precipitation and consequent increase in aridity toward the southern limits of the area.

Significance of the geographic distributions and latitudinal limits of Pitcairnioideae in Argentina. My understanding of the habitats, distribution patterns, and ecological factors has led to some considerations concerning the geographical limits of Pitcairnioideae in Argentina. Altitude, gradient of precipitation, humidity, and the duration of the annual dry season are apparently critical factors in the area between the Andes in the west and the Chaco plains in the east (*see also* Cabrera 1953, Cabrera and Willink 1973, Sarmiento 1972, 1975). Differences in the intensity of each of these interacting factors is probably reflected in the diversity of vegetational types, the variety of the pitcairnioid members, and the sharply defined limits in the distribution of the pitcairnioids.

Summary. I consider the northwestern section of Argentina a significant zone for Pitcairnioideae comparable to the Guayana Highlands. Distributional limits of the various members are sharply defined although the north central region includes the actual boundaries of the subfamily. This definition becomes more obvious south of Córdoba and Mendoza provinces where remarkably fewer species are to be found. The causes may be a variety of habitat factors such as annual precipitation, duration of dry season, and altitude. The distributional limits of several individual members are pronounced within a relatively narrow range of latitudes (approximately between 23° S and 34° S) that, in turn, coincides with the boundaries of this subfamily.

BOLIVIA

The Bolivian Andes that I explored represented two major structural units, namely, the Altiplano and the Cordillera Oriental in the La Paz and Cochabamba departments. These constituents of the Andes must have had distinct geologic histories (Simpson 1975). They may be a significant center of proliferation of *Pitcairnia* and *Puya* species.

The Altiplano is a high altitude plateau extending from southern Peru to northern Argentina and the vegetation is puna. The western Altiplano (the Lake Titicaca area) is drier than its eastern counterpart (the Cochabama area), with gradual transitions.

In the Department of La Paz, dry punas included *Puya atra* L. B. Smith, *P. ferruginea* (Ruiz & Pavon) L.B. Smith, *P. meziana* Wittmack, and *P. stenothrysa* (Baker) Mez. In wet punas (3,000–4,000 m) I found *P. herzogii* Witt. (Fig. 6, page 66), *P. glabrescens* L.B. Smith, and *P. tristis* L.B. Smith.

The Cordillera Oriental (La Paz Department) includes cloud forests where I found several pitcairnioids including *Fosterella rusbyi* (Mez) L.B. Smith, *F. schindosperma* (Baker) L.B. Smith, *Pitcairnia crassa* L.B. Smith, *P. lanuginosa* R. & P., *P. paniculata* (R. & P.) R. & P., and *P. trianae* André. Populations of *P. ferruginea* in the cloud forests differed sharply (a variability which I propose to describe elsewhere) from those of the punas, especially in overall population size, growth habit, and flower color.

CONCLUSIONS

This narrative would be incomplete without a statement of the outcome. As mentioned in the introduction, the goal was to obtain new field data and plant material. The data gathered have provided insights into the growth habit, habitats, and variability of populations of several pitcairnioid taxa. Four previously undescribed species were located, and, in some instances, better diagnostic features were recognized to differentiate among the taxa. Field research has made this study most interesting and rewarding and has helped me to reconstruct the evolutionary lineages within Pitcairnioideae. All specimens are permanently preserved in one or more herbaria.

ACKNOWLEDGMENTS:

I gratefully acknowledge the help and assistance of the following persons in South America: C. Bilos, J. Crisci, C. Cristóbal, D. Diaz, T.E. Di Fulvio, J. Dugarte, E. Forero, F. Guanchez, A. Hunziker, G. Morillo, R. Neumann, L. Novara, F. Oliva-Esteva, F. Ortega, G. Rodríguez, A. Schinini, J. Solomon, B. Stergios, J. Steyermark, F. Vervoorst. I am very thankful to Dr. A.J. Gilmartin, my major professor. Her continued support, help, enthusiasm and guidance played a significant role in my field and subsequent laboratory research. I thank my collaborators G.K. Brown, V.R. Franceschi and H.E. Luther for their cooperation, and S.J. Gill and P.M. Peterson for comments on the manuscript. I have been extremely fortunate to have my wife Usha's untiring cooperation and help in preparing the manuscript. I am grateful for financial support from an NSF doctoral dissertation improvement grant (BSR-8306999) and a short term visitor fellowship from the Smithsonian Institution.

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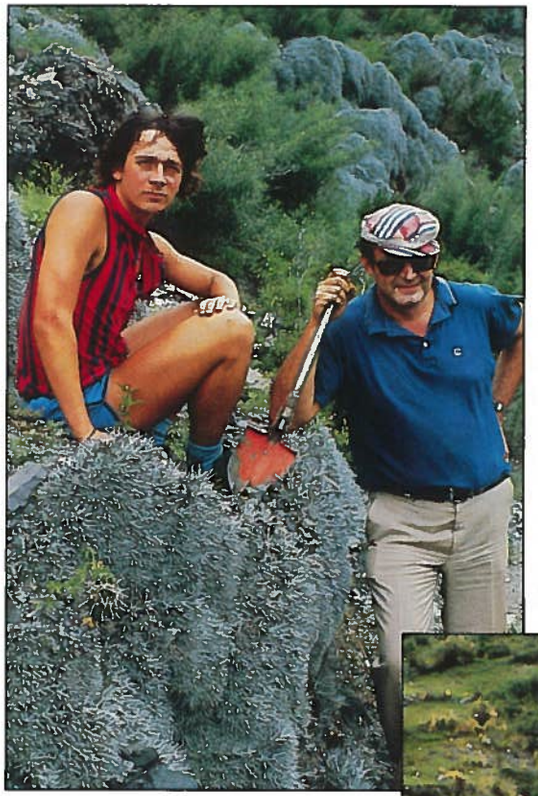


Author

Fig. 5

Abromeitiella brevifolia grows in masses on moist rocks. Here, C. Bilos (sitting) and L. Novara (standing), the author's field associates in Argentina, discuss ways of removing a clump intact.

Author

Fig. 6

Puya herzogii Wittmack is found on the rocky, grassy slopes at tree-line and above of the dry punas of Bolivia.

[continued on page 84]

1988 World Bromeliad Conference

Connie Johnson

The Bromeliad Society of South Florida, in cooperation with the Florida Council of Bromeliad Societies and The Bromeliad Society, Inc., cordially invites you to attend our World Bromeliad Conference, May 20 through May 22, 1988. The conference will be dedicated to the memory of Victoria Padilla since most of us cut our bromeliad teeth on her excellent books and the numerous articles she wrote while editor of the *Journal.* The conference theme will be "Miami Magic" and we promise to make your stay with us a magical one.

The site of the conference will be the Inter•Continental Hotel in Miami, a luxury accommodation 35 stories high overlooking Biscayne Bay. This majestic, triangular tower is decorated with travertine, including the bathrooms of the spacious rooms. All guest rooms have refrigerated minibars stocked with liquors and soft drinks.

Although the hotel has several fine restaurants, you will need not feel confined because it adjoins "Bayside," a development of 150 shops and restaurants, also on Biscayne Bay. So, you won't have to venture far for shopping, dining, and other delights.

The judged show will be staged in the Grand Ballroom, 13,622 square feet of it, where we expect to have the largest assemblage of bromeliads ever seen in once place at one time. The ballroom will also abound with exhibits by societies, wholesale growers, and landscapers, plus some surprises yet to be announced. Bromeliad art will be included, of course.

Our awards table will be a knockout with more than 50 pieces of crystal, each etched with a bromeliad, going to the lucky winners. Competition is open to all. Be sure to bring your entries.

Have you ever seen an albomarginated *Aechmea fascini* or a variegated *Aechmea mulfordii*? These are but two of many bromeliads to be offered for the very first time in the commercial sales portion of our show. You will want to take home lots of these fine specimens. For the first time ever, you will have an area where you can pack and box your purchases to take or ship home. Materials will be available.

All proceeds from the Rare Plant Auction will go to the Mulford B. Foster Bromeliad Identification Center at Selby Gardens. The auction has become one of the most popular conference events. You'll want to join in on the excitement and bid on a whole host of rare plants and other items we expect to have for this special event.

Our seminars will be given by expert growers and will be nontechnical, easy-to-understand presentations. There will be several workshops to keep you busy. The principle speaker will be of world-wide reputation.

During the conference you will be able to visit fine, local, private bromeliad collections. You may also want to tour well known Fairchild Tropical Garden and see the fine tropical plant collection at Parrot Jungle, or the Florida Everglades where there are bromeliads growing in the wild.

Want to relax after the conference? Try an all day, one-day Grand Bahama cruise or take a longer island cruise, if you prefer. Miami is the place to start.

Since Miami is an ideal jumping-off point, we will offer at least two specially designed bromeliad collecting trips. Visit Guatemala and collect highland, as well as lowland, bromeliad species. For the more adventurous bromeliophile, head for Brazil, the jewel of the bromeliad world, where you may be lucky enough to discover some new species.

If you are driving home, either up the east or west coast of Florida, there will be numerous bromeliad collections for you to see. You might also take in some of the famous attractions in the Orlando-Tampa area as long as you're so close.

Renew old bromeliad acquaintances and make new ones. Make this your magical, fun-filled bromeliad vacation. We promise to keep you well informed of our plans. Come, be spellbound by "Miami Magic."

Registrar: Elaine Mills
9735 SW 138 Street
Miami, FL 33716
(305) 235-3036

For other information: Bromeliad Society of South Florida
13075 SW 60 Avenue
Miami, FL 33156
(305) 667-7890

ANNIVERSARY NOTICES: The **Bromeliad Society of Queensland** is celebrating its 20th anniversary. Mrs. J. Imray, president. The **Hawaii Bromeliad Society** is celebrating its 10th anniversary. Lisa Vinzant, president. Our hearty congratulations to the officers and members of both of these societies.

Some Australian Hybrids and Growers

Geoff Lawn

In terms of hybrids made and growing experience it could be said that hybridising in Australia is just emerging from its infancy. True, several individuals have been in the game for 30 years or more, but only within the last two decades have bromeliads captured gardeners' attention Down Under. We now have dedicated specialists scattered around our vast continent. Considering the national population of 15.6 million, each state society based in the respective capital city gets comparable support in membership.

From the limited species available in the 1940s and 1950s, some pioneers such as Bill Morris, Charles Hodson, Nez Misso, Norm Kreschmen, and Charles Webb tried their hands at hybridising. The formation of the Bromeliad Society of Australia in 1963 brought forward a new breed of growers keen to import and create new cultivars to enhance their meager collections. Some individuals active in that period were Win Reid, Joan White, Kevin Walters, and Doug Burns.

During this time, the Bromeliad Society's Australian honorary trustee, Olwen Ferris, produced not only her own hybrids but through her pen friend, the late Dr. Richard Oeser of East Germany, raised some wonderful crosses from his hybridized seed. Many of these home-grown imports were exceptional: *Billbergia* 'Curly Top' (Fig. 7), *Neoregelia* 'Beefsteak', *N.* 'Dark Delight', and *N.* 'Orange Supreme'.

These hybrids soon graced show benches and displays inspiring the next generation of bromeliiphiles to enter this field. Queenslander Grace Goode, whose excellent crosses need little introduction,[1] has been eminent since the mid-1970s. Her numerous hybrids indeed dominate many Australian collections because of their sheer brilliance, and one wonders if they can be improved on.

Newer growers are certainly attempting to do so. Possibly the most active is nurseryman Bob Larnach of New South Wales. His *Neoregelia* 'Night Out' and *N.* 'Wild Ruby' were soon snapped up when first released. The late Bernard Stoner of Western Australia produced a winner in *Aechmea* 'Fireworks', whose clones taken the plant form of *A. caudata* and the inflorescence shape of *A. cylindrata.* The peach and magenta tones of the flower spikes turn coral pink and finally set black berries. Other names on record for hybridising are Clyde and Flo Wasley, Barclay Binnie, Frank Young, and Ann Vincent.

All the while these new hybrids were circulating, some noteworthy cultivars appeared in collections. *Aechmea nudicaulis* 'Mary Hyde' (Fig. 8) emanating from Brisbane grower Jim Hyde became a demand item and initially fetched

1. *Journal* 36:3-5, 9.

Author

Fig. 7
Olwen Ferris, our Australian honorary trustee, grew *Billbergia* 'Curly Top' (shown here) from the seed of Dr. Oeser's hybrid *B. amoena* × *B. leptopoda* in 1967.

high prices by local standards. This albomarginated form generally has a stockier growth habit than the North American clone, but, unfortunately, the variegation can be unstable.

Probably our most famous export has been *Neoregelia concentrica* 'Albomarginata' originating with Melbourne grower Bill Nicol. A select type of the normal *concentrica* with deeper foliage markings and nest colour was dubbed 'Alvin Purple' after a fictional film character of dubious renown.

Cryptanthus species are particularly well hybridized here whilst *Billbergia, Aechmea, Nidularium* crosses and bigenerics are represented. Refined forms of species often can be just as attractive as the best hybrids and that is why many Australian growers hold onto common types despite all the latest crosses doing the rounds.

It might be argued that Australian hybrids and cultivars are not significantly different from those created overseas since they all descend from the same genetic pool. To date, many are primary crosses (species × species) which I consider have remained fairly distinctive amidst the volume of imported look-alikes of complex and often unknown parentage.

Whilst over 200 hybrids and cultivars are recorded here, regrettably few are registered. Neoregelias have possibly reached their popularity peak with Australians and one hybridizing trend is the same as elsewhere—to produce foliage and nest colour of one solid tone, be it red, orange, or purple.

Quarantine laws are strict, yet they have not prevented tillandsias from becoming the current favourite genus to own and grow. Even with the multitude of species becoming available, the potential of this genus is yet to be realized in this sunburnt country. Acquiring all the various forms and varieties of particular *Tillandsia* species is a hobby in itself for the avid fanciers.

We have our identification problems, too, but with the research done by Derek Butcher, of Adelaide, to compile a *Checklist of Australian Hybrids and Cultivars* (2nd ed., June 1986) some semblance of order has evolved. His valuable work includes recording the names of parents and unscrambling our often inherited nomenclature mix-ups.

Author

Fig. 8: 'Mary Hyde', a variegated form of *Aechmea nudicaulis*, produced by Brisbane grower Jim Hyde.

Como, Perth, Western Australia

Propagation of *Neoregelia* 'Medallion'

[Here are complementary descriptions of experience with an unusual bromeliad.)

Tom Montgomery

Have you seen how *Neoregelia* 'Medallion' is being propagated? *N.* 'Medallion', as you probably know, is apparently a *Neoregelia carolinae* that seldom or never blooms. Thus, with no destruction of the terminal tip, it is given a long life. The mature plant begins to assume its fantastic color at about one year and a good grower who can maintain the lower leaves ends up with a varitable fountain of color. Obviously, this plant can be reproduced by vegetative means only.

Don and Betty Garrison acquired this plant in 1982. By the early summer of 1986 it had grown to a size that required a two and one-half gallon, black, nurseryman's plastic pot. These pots are about thirteen to fourteen inches tall. The Garrisons placed the root ball on the bottom and added mix to a level one inch below the top. The plant's ninety to one hundred leaves arched down nearly covering the pot and produced an explosion of color on top. But, in four years, it produced only one pup.

In June, Don decided to try to stimulate pups. The method to be used was not only tricky, but perilous, and could have resulted in the loss of part or all of the mature plant. He started stripping lower leaves more and more until about thirty were in the trash. Now the caudex was exposed, some two inches of old, hardened caudex above the mix topped by about four inches that had been freshly stripped. In a final, courageous move he cut off the top, leaving about one inch of caudex below the bottom leaves. He applied Rootone to the stump and placed the rootless top on an empty clay pot with the stump hanging in mid-air. Until new roots formed, this portion would have to live epiphytically. There was left also the two and one-half gallon pot with the root mass and a four- to five-inch, leafless trunk sticking up in the middle.

Four weeks later, in all ignorance of past events, I chanced on the scene. Don took me to see his *Neoregelia* 'Medallion'. It was beautiful in its large clay pot, leaves half covering the sides and a burst of color on the top. Then, he casually picked the plant up—no roots, no mix, just a damp, empty pot. He turned the plant over and, sure enough, on the little stub of a caudex were two quarter-inch long roots and, in addition, two healthy looking eyes. After explaining what was being done, Don showed me the remains in the black pot. Stark above the mix stood the brown caudex. Then, closer viewing revealed tiny green dots, some thirty of them, all over the top two and a half inches of the stump. Apparently all was going well.

The latest report indicates that on August first, the plant, sporting more roots and three well developed, though immature offsets, was placed in mix. The old caudex now carries some nine well defined eyes and about twenty green spots . . .[1]

Morris W. Dexter

Tom Montgomery recently reported (above) on the propagation of *Neoregelia* 'Medallion'. Because *N.* 'Medallion' is such a magnificent plant and because it will certainly become more common in collections, I thought that some additional observations were merited.

In 1981, Jim Elmore gave me a 'Medallion' pup and within a few months it developed its dazzling red rosette. Without a doubt it is one of the more spectacular of all plants. In addition to its brilliant color, it is compact with wide, highly polished leaves. The red "pseudo" inflorescence gradually becomes green and is followed by another red rosette within about a year. However, it remains in color for such a long period that the impression exists that it is without color for only a few months.

Since the terminal bud (meristem) is not ablated by an inflorescence, the plant continues to grow vertically and eventually produces a very tall caudex which must be supported.

About ten months ago I severed the caudex about three inches below the lowest leaves and placed the upper section in perlite. Although it is still alive, it has not struck roots. Nevertheless, it has produced three minuscule pups. The bottom section was three inches long. It died shortly after producing a very small pup. No rooting or budding hormones were used.

So far, there seem to be two ways of propagating the plant:

1. Don't do anything. Small plantlets will appear on the caudex when it is two or three or more inches long and their production will continue indefinitely. They tend to develop roots when rather small (2–3 inches long). When severing the pups, make sure the roots are still attached to them. At this stage the plantlets grow vigorously.

2. Another technique is to drill out the center.[2] This usually results in much larger pups which appear higher on the caudex or among the leaves.

Of the two methods I prefer the first. One can anticipate a continuous harvest of small but vigorous plants and at the same time enjoy the beauty of the parent plant.

Belleair, Florida

NOTES:

1. Reprinted from *The Bulletin* of the Bromeliad Society/Houston, August, 1986.
2. [As Dr. Dexter explained in the last issue of the *Journal.*]

Aechmea tuitensis, a New Species from Western Mexico

Patricia Magaña and Emily J. Lott

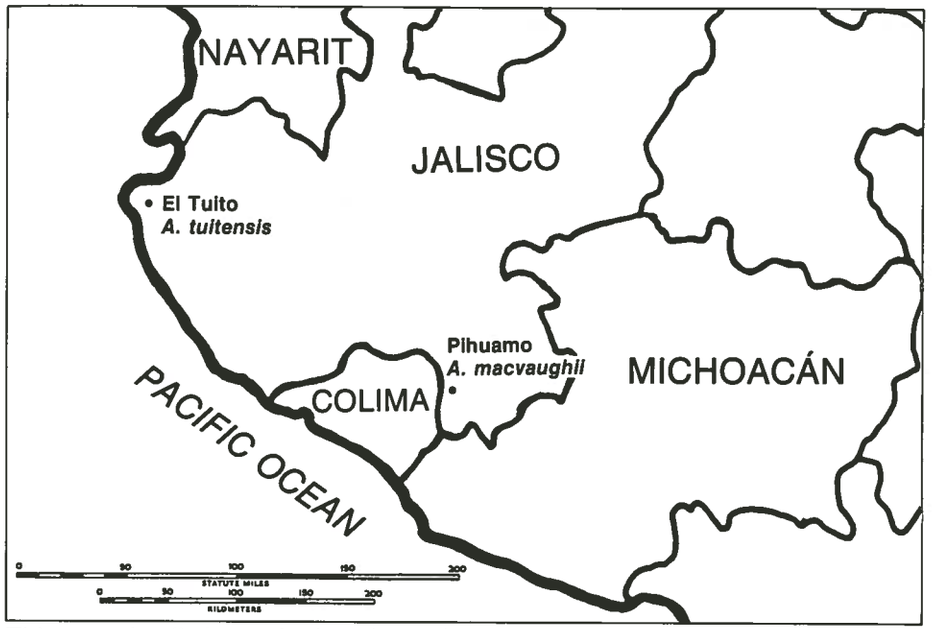
Field work for a thesis project on the Bromeliaceae of the coast of Jalisco, Mexico, resulted in the discovery of a new species of *Aechmea* in an interesting area which takes its name from the town of El Tuito.

Aechmea tuitensis P. Magaña & E.J. Lott[1] is a semicaulescent plant 30–50 cm tall, which grows profusely on boulders. Its serrate leaves have a reddish color at anthesis (Fig. 9). The inflorescence is simple, erect, and densely covered with white branched tricomes. It terminates in a coma of linear bracts. The scape has brilliant red bracts. The showy flowers are dark blackish purple.

Aechmea tuitensis has been in cultivation under the name *Aechmea macvaughii* L.B. Smith from which it differs in its nonimpounding rosette, smaller size, simple, erect inflorescence, spatulate petals, and longer floral bracts. The table on the opposite page compares the two species:

Thelma O'Reilly

Fig. 9: Aechmea tuitensis in cultivation. This picture first appeared on page 96, vol. 30 of the *Journal.* Mrs. Thelma O'Reilly, who grew the plant and took the photograph says that she bought it from Jeff Kent in 1977. The cover photograph shows *A. macvaughii,* with which *A. tuitensis* has been confused.



This map detail shows the locations of El Tuito and Pihuamo in Jalisco, Mexico, where *Aechmea tuitensis* and *A. macvaughii,* respectively, have been collected.

Characteristics	*A. tuitensis*	*A. macvaughii*
Leaf size	28-56 × 2-7 cm	to 120 × 16 cm
Leaf shape	ovate-triangular	ligulate
Inflorescence	erect, simple	pendulous, branched
Floral bracts	4.5 cm long	1 cm long
Petals	oblong-spatulate	lanceolate

Aechmea tuitensis is found at elevations of about 1500 m in oak-pine forest, growing on rocks, while *A. macvaughii* has been collected at 500–600 m in mixed tropical forest, almost always as an epiphyte.

We would like to say that seeds offered by Dr. Sue Gardner in her article[2] were of the true *Aechmea macvaughii,* but the photograph with that report shows the new *A. tuitensis.*

NOTES:

1. Phytologia 54:221-223; 1986
2. *J. Bromel. Soc.* 34:104; 1984.

National Herbarium
Mexico

Rusts on Bromeliads

Thomas U. Lineham, Jr.

David Guy of Ingham, Queensland, wrote recently that in spite of strict quarantine controls, "tillandsia rust *(Puccinia tillandsiae)* has now made its first appearance. . . and growers here don't know a single thing about its habits." He then asked:

> Is tillandsia rust common in North American collections?
>
> Is the rust confined to tillandsias, or what other bromeliads are susceptible?
>
> Is the rust most common in green or grey tillandsias?
>
> Which tillandsias are most susceptible to rust?
>
> What chemicals are most suitable to control rust?

Soon after Mr. Guy's letter arrived, Harry Luther sent me a copy of a bulletin of the Florida Dept. of Agriculture and Consumer Services[1] describing a nematode species recovered from soil about the roots of a bromeliad shipped from Guatemala to California. We shall discuss the nematode later, but I asked the author of the paper, Dr. Paul S. Lehman, for information about tillandsia rust. He generously supplied details summarized as follows:

1. Four rusts have been reported in bromeliads.[2] *Puccinia tillandsiae* (1960), on *Tillandsia punctulata,* Costa Rica; *Puccinia pitcairniae* (1890), on *Pitcairnia pungens,* Ecuador; *Puccinia pitcairniae* ssp. *chapalensis* (1899), on *Pitcairnia palmeri,* Chapala, Jal., Mexico; *Uredo nidularii* (1898), on *Nidularium longiflorum,* Ule, Serra dos Orgaõs, Brazil.

2. *Puccinia tillandsiae* has been found on *Tillandsia* species from Guatemala, Honduras, Jamaica, Mexico, Nicaragua, and Panama.[3] This disease was found on native Florida *T. fasciculata* at seven locations between November 1980 and July 1981. These are the only records available from the Florida Dept. of Agriculture files as this is written. [Jerry Robinson of Rainforest Flora, Inc., a large volume tillandsia importer in Gardena, California, supports this observation saying that he is aware of two cases only of (unspecified) rust infestation in the past four years and that *T. tricolor,* and *T. seleriana* were affected.]

3. The symptoms vary, of course. *Puccinia tillandsiae,* for example, "often forms non-erumpent (blister-like) spots on tillandsia leaves. These are most readily observed against a bright background such as bright day."[4]

The final question about what chemicals are most suitable to control rust does not have an easy answer. On Dr. Lehman's advice, I telephoned Dr. Ann R.Chase.[5] She stated that chemical controls are strictly regulated in Florida. Compounds may be used legally only on plants specifically named on the product label. Growers in other states and other countries should ask their county extension agents or national agricultural authorities for assistance.

But don't give up. After more telephone calls, I found Dr. Arthur W. Engelhard.[6] He described an experiment with rust-infected geraniums, which came about because a grower had his crop infected by a shipment of diseased cuttings. Dr. Engelhard and his associates were not permitted to move the plants to the research center so they began to experiment with various chemical sprays in the owner's greenhouse with infected and healthy plants ranged on benches. After they ran out of space in the big glasshouse, they moved to a small glasshouse where they installed more diseased and healthy plants. The humidity in that house was relatively low and the heat exceeded 95 degrees F. They soon observed that the disease did not spread to the healthy plants, and neither did the disease progress in the infected plants. They concluded that the heat destroyed the airborne spores of the disease. [Successful treatment of geranium rust, which has its origins in temperate regions, is not proof that heat treatment would control rusts affecting plants from tropical areas. But, if chemicals are not permitted, the grower may be faced with the choice of destroying infected plants or of experimenting with heat treatment.]

Dr. Engelhard suggested that growers with small collections might have more success with heat treatment because they can better control the temperature and humidity of relatively small greenhouses. He said that they might also use polyethylene bags as miniature greenhouses, but to use great care to avoid cooking the plants.

We would all be grateful to learn more from readers about their experiences with these diseases and effective controls.

NOTES:

1. Nematology Circular No. 129; May 1986. Div. of Plant Industry.

2. *Mycologia* 66:533-536; 1974.

3. McRitchie, J.J.; Burnett, H.C. A rust on *Tillandsia* new to the United States. Plant Pathology Circular, no. 224. May 1981 (2 p.). Fla. Dept. of Agriculture and Consumer Services. Div. of Plant Industry.

4. See note 3 above.

5. Plant pathologist, Agricultural Research and Education Center, Apopka, FL, an agency of the University of Florida.

6. Plant pathologist, Gulf Coast Research and Education Center, Bradenton, FL, also an agency of the Univ. of Florida.

Orlando, Florida

Bromeliad Flower Arrangement, No. 14: *Portea petropolitana* with *Tillandsia lindenii* and *Tillandsia cyanea*

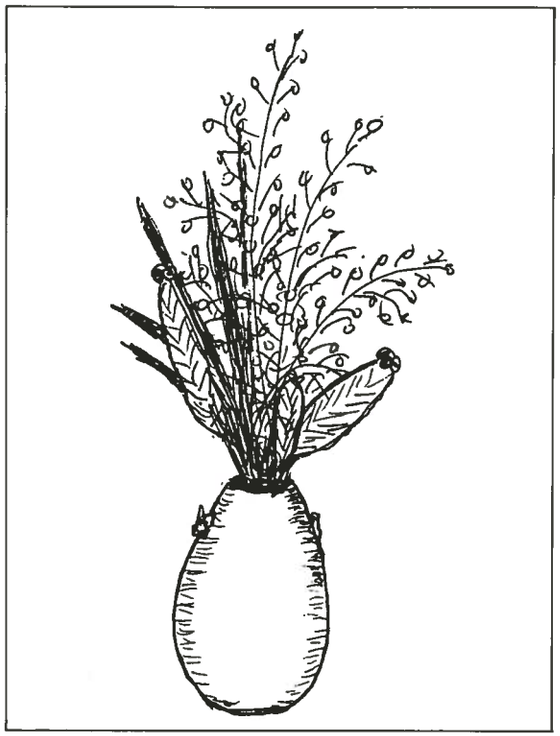
May A. Moir

Robert Chinn for the Honolulu Academy of Arts.

Fig. 10
An arrangement with *Portea petropolitana* sprays with contrasting color and shape of *Tillandsia lindenii* and *Tillandsia cyanea.*

The *Portea petropolitana* had finished its blooming season but a few sprays still had attractive lavender berries. These I cut and began to look for something to complement them. The *Tillandsia lindenii* and *T. cyanea* seemed to be a good color and of a different shape. I added a few red flax leaves to the bromeliads and looked for a container that would complement their colors. I chose an old Pigeonblood ceramic. The portea berries are quite heavy and need support. I used a slender heliconia stem well secured to a small kenzan (needle holder) and the portea wired to the stem in a couple of places. I have to take precautions because the arrangements at the Honolulu Academy of Arts have to last a week in good condition. This arrangement was about 4 feet tall.

Honolulu, Hawaii



Ronnbergia carvalhoi

Gustavo Martinelli and Elton M.C. Leme

Ronnbergia carvalhoi Martinelli & Leme, sp. nov.

A omnibus speciebus adhuc cognitis inflorescentia subcapitata, bracteis floriferis sepalis superantibus, sepalis 10 mm longis, perasymmetricis et mucronatis differt.

Plant epiphytic, stoloniferous. *Leaves* about 8, suberect, rosulate, lingulate, not petiolate, bearing a narrow median channel, forming a narrow elliptic water reservoir at base; *leaf sheaths* about 11 cm long, 4 cm wide, oblong-elliptic or long-obovate, purplish on both sides but mainly inside, densely white-lepidote on both sides; *leaf blades* 20–40 cm long, about 2 cm wide, linear-attenuate, apex acuminate to broadly acute and apiculate-caudate, green on both sides, densely but inconspicuously white-lepidote on the upperside, densely white-lepidote or slightly white-banded beneath, entire, *Scape* erect, about 10 cm long, 5 mm in diamet. in life, white, brown-lepidote, completely hidden by the leaf sheaths;

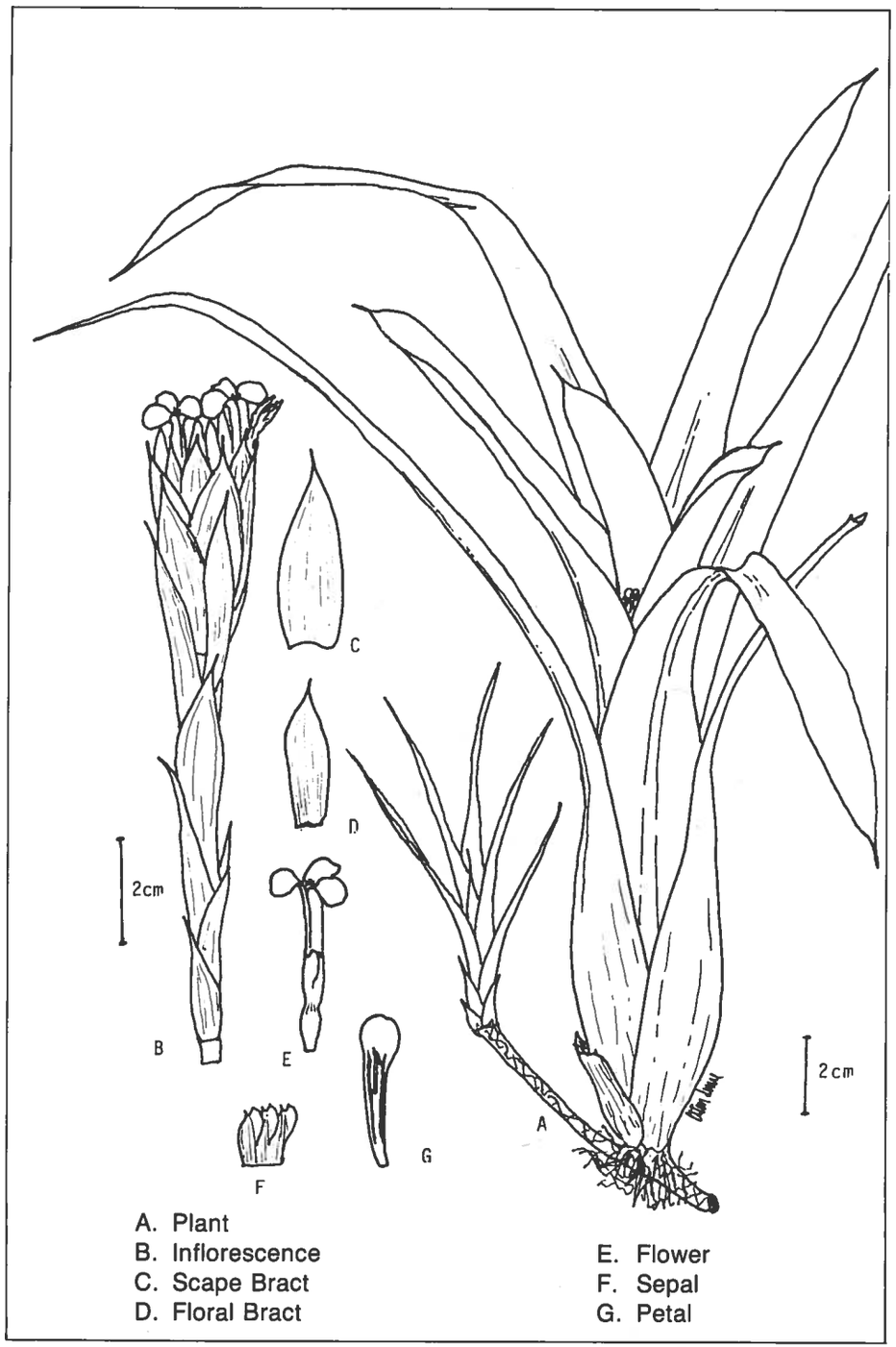


Fig. 12: Ronnbergia carvalhoi Martinelli & Leme

scape-bracts ovate-lanceolate, acuminate, erect, 3-4 cm long, about 1 cm wide, white, entire, membranaceous, lepidote on both sides, longer than the internodes, the upper ones congested beneath the inflorescence. *Inflorescence* simple, densely flowered with about 20 flowers, equal to or slightly exceeding the leaf sheaths, subcapitate, about 40 mm long, 20 mm in diamet.; *floral bracts* erect, long obovate, apex acuminate to broadly acute and apiculate white, entire, membranaceous, the lower ones equaling the middle of the petals, the upper ones slightly exceeding the sepals, lepidote. *Flowers* erect, 35-40 mm long, sessile; *sepals* about 10 mm long, strongly asymmetric, mucronate, connate for 5 mm, lepidote toward the apex, white, ecarinate; *petals* white, 30 mm long, naked, free or nearly, blades spreading, spathulate, apex obtuse, bearing 2 callosities equaling the length of the stamens; *stamens* shorter than the petals; *filaments* complanate the first series free, the second series adnate to the petals for ¾ of its length; *anthers* sublinear, 4 mm long, base sagitate, apex mucronulate fixed near the base; *pollen* elliptic, biporate; *ovary* elliptic, terete, strangulate near the apex, 8 mm long, white, plain, glabrous; *epigynous tube* 3 mm long; *placentae* apical; *ovules* many, obtuse.

Type. *G. Martinelli 9695 & T. Soderstrom* (holotype RB, isotype CEPEC, US, MBM), on the road Urucuca-Serra Grande, km 26, 50-100 m above sea level, Urucuca, Bahia, Brazil. October 20, 1983.

This new species does not present clear affinity with any of the known species of the genus *Ronnbergia* E. Morren & André typical of Central America and surroundings. It looks somewhat like *R. petersii* L.B. Smith because its leaves are not narrowed above the base and because of the short scape and dense inflorescence. In details, however, it is very different from the species mentioned.

It is interesting to add that the *Ronnbergia carvalhoi* (referring to its floral parts) also does not show any affinity with the only representative of the *Ronnbergia* known in Brazil, that is the *R. brasiliensis* Pereira & Penna.[1] The *R. brasiliensis,* in turn, is sort of similar to *R. columbiana* E. Morren, but differs, according to its authors, because the leaf-blade is entire and slightly narrowed at base, and in the size of the sepals and petals. Another difference is that the stamens of the second series are highly adnate to the petals.

Ronnbergia carvalhoi and *R. brasiliensis* appear in floristically similar areas in the State of Bahia, which once again shows the parallelism among the flora of the regions of the Brazilian northeast near the Atlantic coast and the north of the South American continent.

With this new species we pay tribute to the botanist André Mauricio de Carvalho, of the Centro de Pesquiso do Cacau-CEPEC, who has greatly contributed to the study of the flora of the State of Bahia.

Jardim Botânico do Rio de Janeiro,
Brazil

1. Bol. do Mus. Bot. Mun. de Curitiba 62:1-2. 1985.

Questions & Answers

Conducted by Bob Heer and Tom Montgomery

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. (Tom Montgomery was hospitalized some weeks ago, but is now at home. We wish him a speedy recovery.)

Q. What is a "wet table"? How do they operate? Why are they used? Can I build one for my greenhouse? Are they expensive?

A. WET TABLES are a means for providing constant water and desired nourishment to the roots of the plants in a manner that will not cause the roots to rot or disintegrate. They do this by providing a constant source of moisture that is pulled up into the pot by capillary action to keep the potting medium moist but not soggy. There are two basic kinds of wet table: active and passive:

The active wet table is a solid plant bench with one side slightly higher than the other. The top is covered with a plastic film and a capillary mat. The film may be black builders' plastic or other waterproof material and the mat can be purchased at a nursery supply company. A cheap polyester blanket can be a substitute capillary mat. A water reservoir is provided with a small pump and suitable emitters are located along the high edge of the table so that the solution flows across the mat to the low side of the table and then drips off into a gutter provided to collect and return the solution to the reservoir from which it is then recirculated. This keeps the table constantly moist.

The pots to be placed on the table must have some kind of wick. A commercial wick is available from supply houses or from African violet growers, but a small wad of wet sphagnum, forced partially through the bottom hole of the pot to reach both the mix and the capillary mat, will work just as well.

After wicking, the pot may be filled with a loose mix and planted. Before placing the pot on the table it should be well watered so that the mix is thoroughly moistened. The capillary action will not start well in a dry mix. For this reason, if the table or pots are ever allowed to dry out, each pot should be well watered from the top as you reactivate the system.

The passive wet table is much simpler. The solid plant bench has a gutter or trough along one side to act as a reservoir. The table top and trough are covered loosely with plastic film. The film must line the trough and be loose enough so that it will not tear or be stressed. With the film smoothed over the table and stapled to the table frame (if desired), the blanket is spread over it and one edge is allowed to extend into the bottom of the trough. The other edges of the blanket should stop several inches short of the table edge to

prevent drip and waste. Fill the reservoir, then wet the blanket or mat thoroughly and capillary action will draw water up from the reservoir. Even on the hottest days the blanket will remain evenly moist. As with the active system, the pots must have a wick in some manner to maintain contact between the mix and the mat, and the mix should be wet to start the action.

The use of the wet table accomplishes several things:

• The constant moisture promotes even growth and healthy root systems. This may seem strange when so much emphasis is placed on not overwatering, yet, even plants such as African violets that have such sensitive roots do well when grown in this way. The capillary action seems to provide just enough moisture, but not too much. In a loose mix the water does not stop up the interparticle spaces, but allows air and other gases to move through and gives the roots a chance to breathe. There can be a problem if too much organic material is used in the mix because it will rot, disintegrate, and pack.

• Nutrients can be applied evenly. Just add small amounts to the reservoir or trough. Start off with one-quarter strength according to the manufacturer's instructions, and then add one-eighth strength as you need to replenish the reservoir. If you have several tables this could lead to some interesting experiments in fertilizing.

• The constant humidity that comes from the evaporation off the mat should help to reduce leaf tip damage and other problems that arise when the humidity falls too low. With the wet table it is not necessary to keep water in the cups or leaf axils and lacking that water there will be no buildup of mineral salts or water to sour and cause tissue damage. If needed, systemic insecticides and fungicides may be added to the trough so that you won't have to treat individual plants.

Some additional suggestions are to use plastic pots and mostly inorganic mix. The plants should be flushed periodically. Plastic pots will, of course, salt up around the bottom, but not nearly as bad as clay pots, as the clay allows evaporation through the walls and increases the salt buildup. Also, plastic is much easier to clean.

Since you can supply whatever nutrients you desire and in whatever quantities needed, there is not much reason to use organic material in the mix. Some peatmoss may be used in growing terrestrials such as cryptanthus, dyckias, hechtias, or ananas, but it is not essential. The only organic material that should be considered for epiphytes would be redwood chips or shredded tree fern fiber in judicious amounts. Every six months, such as spring and fall, it would be wise to drain the system and flush the plant, pots, mat, and reservoir. Use water that has had the pH adjusted to about 5.5 to help dissolve any chemical salts that have accumulated. Wait about 30 minutes to one hour,

but do not allow to dry, and then flush again. Refill the trough and add whatever nutrients you are using, if any. At all times the solution in the reservoir should maintain a pH of 5.5 to 6.0; check frequently.

This growing method is easy to provide and is inexpensive to start up and maintain.

Explorations for Pitcairnioideae in South America *[cont. from page 66]*

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Department of Botany and Marion Ownbey Herbarium
Washington State University, Pullman, Washington 99164

CORRECTIONS: Volume 37, page 17, line 17 should read: "My studies (1986)" in place of: "My account of habitats of *Brocchinia* (1986);" page 24, John Yellen's address should read: 1600 Woolsey St., Berkeley, CA 94703.

Indoors/Outdoors for Success

Larry Hodgson

Culture articles in this journal tend to concentrate on growing bromeliads outdoors in warm climates or else on greenhouse growing. In very few cases are the needs of the temperate climate grower on a modest budget taken into consideration. While I don't pretend to be an expert on the subject, I have managed to find ways of keeping my bromeliads thriving in what would otherwise be a very hostile environment to tropical plants—Southern Canada—and this without use of a greenhouse or even a bright window. I think that other readers might benefit from my experience.

For many years, I grew my bromeliads entirely in windows with only moderately satisfactory results. Leaf colour was poor (most coloured varieties gradually become a uniform green) and leaves were narrower and longer than they should have been, symptoms of what I know now to be a lack of light. With very few exceptions (*Billbergia nutans* is one), flowering was rare or nonexistent. The windows of my ground floor apartment face southeast and should, therefore, be good sites for bromeliad growth. Unfortunately, they are heavily shaded by nearby trees in the summer and in the winter by the long shadows of nearby buildings with the result that my plants do not get any direct light at all.

After a few years of frustrating experiences, I tried growing some of my bromeliads under lights. I had grown many plants under lights over the years, including small bromeliads such as cryptanthus and various seedlings, but my light setups were not designed for taller growing plants such as most bromeliads. Given my lack of success with window growing, though, I finally decided to purchase some used fixtures in order to set up a growing space for plants over a foot in height. I had learned from different books that bromeliads needed special growth lights in order to bloom well under lights, but I found these to be extremely expensive. Also, my experience with other plants using ordinary fluorescent tubes had been excellent and I thought I should start off with cool white and warm white tube combinations for at least the first year. If results were not good enough, I could always try the more expensive wide-spectrum tubes later. I tried keeping the bromeliads on the same regimen as my other light garden plants: 12- to 14-hour days with the tops of the plants about 6 to 10 inches from the light source.

The results were quite striking: although old foliage remained green or bleached, new growth was colourful and dense. In some cases, the width of the leaves more than tripled. This, of course, created some strange-looking plants—green and spidery on the bottom, compact and colourful on the top. In most cases. I eventually removed the unattractive lower leaves and covered the bare stems with soil. Usually, new roots quickly formed on the covered areas.

I was surprised to see that there wasn't much difference between bromeliads grown under two tubes and those grown under four. I would have to assume that the light intensity from two tubes was at least sufficient for normal growth. I couldn't have been more pleased with the results and so I grew my bromeliads this way for several years.

The second problem became apparent when my bromeliads had recovered and had reached adult size. I was simply not getting the flowering I wanted. Some genera, particularly *Vriesea* and *Guzmania,* bloomed on schedule, but others, even the lowly *Cryptanthus,* which had flowered fairly well on my window sills, simply got bigger and bigger or developed more and more pups. I came to the conclusion that either the quality of my fluorescent lights was at fault or that it was a matter of day length. I knew that the latter was a factor in flower billbergias, but had not heard of its effect on other bromeliads. I tried switching some bromeliads to places under a two-tube wide-spectrum fluorescent setup, but this didn't seem to have any effect. Some did bloom when I gave them shorter days (*Cryptanthus,* among others), but other simply began to lose their color again, probably because they were no longer receiving enough light. I was, therefore, unwilling to continue the experiment.

I then decided to try putting some of my bromeliads outside for the summer. I was very leery of doing this, since I have had plants (and notably my entire tillandsia collection) stolen in the past. My back yard, being surrounded on two sides by a public park and protected by only a low metal fence (which my landlord is unwilling to change) is open to public view and is far from being a secure place to grow valuable plants. Another factors was the cool, rainy, and very short summer we usually get in my part of Canada, with danger of frost for all but two and a half months of the year. I wasn't sure that such a short period of time outdoors with relatively cool nights would do any good.

Since my principal worry was theft, I thought that this year I would plant my bromeliads, pots and all, in the garden then cover the soil with a decorative mulch, thus making them look much like a "cash and carry" display at a garden centre than they had in a previous year when I had placed some on my picnic table. This seemed to work wonders, as not one plant was taken (although my dog chewed up a few plants before I moved her chain further away). It also made for a very attractive display. The garden was entirely composed of houseplants, mainly bromeliads and succulents, with no annual flowers at all. I was particularly impressed with the bromeliads. I was used to seeing them from the side or below, but in the garden they were viewed from above, allowing the perfect splendor of their symmetrical rosettes to be viewed. Some got quick reddish in spite of the fact that they were in semishade, but none was burnst and the reddish colour faded when they were brought back in. Surprisingly and happily, by summer's end, of twenty adult plants, six were in flower, eight more flowered during the fall or winter, and I assume that their stay outdoors was the reason.

There was less of a problem of bringing insects indoors than I had thought. I treated my plants once with the systemic Cygon, watered into the soil, just to be sure, but I noticed no insect or slug damage on my plants. In fact, some of the plants placed outdoors had a slight case of scale at the beginning of the summer, but not a one was to be seen by the end of the season. I assume some beneficial insect had wiped them out. The one insect I did bring in was the earwig, a particularly repulsive bug which does no harm to bromeliads, but which loves to hide in the plant's leaf bases. In Quebec, fall is the end of earwig season anyway and any that I did not crush probably just died their natural death. They do not reproduce indoors. Since earwigs are particularly numerous in my area and since they are omnivorous, it is quite possible that they were the "beneficial" insects which devoured the scale.

I was, unfortunately, not able to repeat this experiment again last summer as unusual weather conditions, including nearly continuous rains until midseason, kept me from even working in the garden. At any rate, I would have worried about rot under those conditions, since the soil would have been constantly moist. I hope to repeat it this coming summer, however, as I miss my bromeliads flowers.

One final note. I was not and have not been able to get any flowering from dyckias, hechtias, puyas, or pineapples, no matter what size the adult plants. They do however flower at this latitude since the Montreal Botanic Garden's collection, about 150 miles southwest of here inevitably contains flowering plants of these genera. It may be that in spite of their size, my plants are not mature, or that full sunlight is necessary throughout the year in order to stimulate their flowering. I would be glad to hear from readers who may know the answer.

1449 Ave. William
Sillery, Quebec

Welcome to New Members *[continued from page 59]*

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Calendar of Shows *[continued from back cover]*

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May 16-17 Bromeliad Society of Houston 19th Annual Judged Show and Sale. Greenpoint Mall at I-45 and North Belt near Intercontinental Airport, Houston, TX. Saturday, 1:00 p.m. to 9:00 p.m.; Sunday, 12:00 noon to 4:00 p.m. Plant sale hours: Friday and Saturday, 10:00 a.m. to 9:00 p.m.; Sunday, 12:00 noon to 4:00 p.m. Andy Spearry (713) 692-5350.

May 16-17 Bromeliad Society of South Florida 10th Annual Show & Sale. Fairchild Tropical Garden. Old Cutler Rd., Miami, FL. 9:30 a.m. to 4:30 p.m. daily. Trisha Frank (305) 655-4369.

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Morris W. Dexter

Neoregelia 'Medallion'.
Propagation methods are described on pages 72 and 73.

Calendar of Shows

April 24-25 Bromeliad Society of Greater Mobile 10th Annual Show and Sale. Bel Air Mall, intersection of I-65 and Airport Blvd., Mobile, AL. Saturday, 1:00 p.m. to 9:00 p.m.; Sunday, 10:00 a.m. to 8:00 p.m. Sale begins at 10:00 a.m. Saturday and continues through regular show hours. Mrs. Sheri Garcia (205) 633-8360.

May 2-3 Acadiana Bromeliad Society 7th Annual Show & Sale. Ira S. Nelson Horticulture Center, 2206 Johnston Street, Lafayette, LA. Saturday, 1:00 p.m. to 5:00 p.m.; Sunday, 10:00 a.m. to 5:00 p.m. Mrs. Lou Trahan (318) 893-3059.

May 2-3 Bromeliad Society of Broward County competitive show. Theme "A Kaleidoscope of Color." Diecke Auditorium, 5801 Cypress Rd., Plantation, FL. Saturday, 10 a.m. to 5 p.m.; Sunday 10 a.m. to 4 p.m. Maureen Frazel (305) 474-1349.

May 2-3 La Ballona Valley Bromeliad Society Annual Show & Sale. Culver City Veterans Memorial Auditorium, 4117 Overland Ave. at Culver Blvd. Saturday, 12:00 to 4:30 p.m.; Sunday, 10:00 a.m. to 4:00 p.m. Admission free. Alan D. Levy, 10713 Ashby Ave., Los Angeles, CA 90064. (213) 836-3117.

May 2-3 Morris Henry Hobbs Bromeliad Association Annual Show & Sale. Cleary Playground, 3700 Civic St. off W. Metairie at Turnbull Dr., Metairie, LA. Saturday, 2:00 p.m. to 8:00 p.m.; Sunday, 9:00 a.m. to 5:00 p.m. Henry Picard (504) 835-6736.

May 8-10 Bromeliad Guild of Tampa Bay Competitive Show. Westshore Mall, corner of Westshore Blvd. and Kennedy Blvd., Tampa, FL. Last chance for entries Friday, 10:00 a.m. to 11:00 a.m. Show opens Friday, 5:00 p.m. to 9:00 p.m.; Saturday, 10:00 a.m. to 9:00 p.m.; Sunday, 12:00 noon to 5:30 p.m. Tom Wolfe (813) 961-1475.

[continued on page 94]