# The BEGONIAN

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# The BEGONIAN

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## ELECTED OFFICERS



## AIMS AND PURPOSES OF THE AMERICAN BEGONIA SOCIETY, INC.

**The purpose of this Society shall be to promote interest in begonias and other shade-loving plants; to encourage the introduction and development of new types of these plants to standardize the nomenclature of begonias; to gather and publish information in regard to kinds, propagation and culture of begonias and companion plants; to issue a bulletin which will be mailed to all members of the Society; and to bring into friendly contact all who love and grow begonias.**

## APPOINTED OFFICERS



★ ★ ★

**National Board meets 4th Monday, 7:30 p.m.**
**South Gate City Auditorium**
**4900 Southern Avenue, South Gate, Calif.**

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Views expressed in this magazine are not necessarily those of the Editor, the Society, or its officers.

# PHYLLOMANIA – WHAT? WHEN? AND HOW?

*By* HARRIET B. CREIGHTON
*Ruby F. H. Farwell Professor of Botany*
*Department of Biological Sciences, Wellesley College*

When I tell people that I am studying phyllomania, most of them wonder who is studying me and why they let me out. But that is what the phenomenon that *Begonia phyllomaniaca* sometimes exhibits is called. Literally, it means leaf crazy. Out of the blades and petioles of the leaves and out of the stems come outgrowths which I have found are really leaves, each leaf having its two stipules like all begonia leaves.

At first, I didn't realize that these small outgrowths were leaves. This was because leaves just do not grow out of leaves. Plantlets do, but a plantlet is a small stem which then bears leaves and often produces roots. The rex begonia leaves, when the veins are cut and they are laid on a moist rooting medium, produce plantlets which in a matter of weeks grow large enough to be potted up. But *Begonia phyllomaniaca* only produces plantlets on the stem, usually near the moist soil at the base, and only after many months, even years. Even then roots grow out of the short stem which finally develops, only when this stem stays covered with moist soil.

There are a number of botanical problems that phyllomania raises. I have already mentioned one. How can leaves grow out of leaves or out of stems? In "typical" plants, leaves form only at the very tip of a stem. If, from a begonia stem tip, you were to pull away the stipules and leaves, taking off the larger ones, then the smaller and the smaller, younger and younger ones, you would get to such small ones that even a hand lens wouldn't magnify them enough for you to recognize them. You would have to continue to get at the very smallest, using a microscope that magnifies about 50-75 times. In fact, to see the actual origin of two stipules and a leaf, you would have to make thin, longitudinal sections of the stem tip and magnify them 500-1000 times to determine how and where a leaf is produced.

The origin of leaves on many kinds of plants has been studied by many botanists in the last one hundred years. Always, without exception, they are first seen as a little bump of cells on the side of the dome-shaped stem tip. On any particular kind of plant the bumps arise in a regular pattern, either one at a time, or two at the same time and at the same level. When there are two, they are opposite each other, and we have an opposite-leaved plant. When only one young leaf arises at a time, the stem grows on a little before another bump, or leaf primordium, appears. This is the way begonias grow, one leaf at a time, subtended by its two stipules.

If you look down on a begonia stem from its top, you can see that the successively larger leaves are in a regular pattern making a spiral around the stem. Such plants are said to have spirally arranged leaves, or sometimes, not accurately, they are called opposite-leaved plants. The point to bear in mind is that leaves originate as small bumps on the side of the very tip of the stem. This has come to be the sure way of distinguishing a leaf from any other lateral outgrowth from a stem, for not all leaves look like leaves. Some may look like thorns—or other stems.

*(Continued on Page 56)*

## COVER PICTURE

**A bed of tuberous seedling begonias in the author's garden in the old stockade area of Schenectady, New York. The photograph was taken in June as the plants began to bud and bloom after their roots had been established in the cool, moist weather.**

**See the article by H. Gilbert Harlow on page 44.**

# TUBEROUS BEGONIAS

*By* H. GILBERT HARLOW*

Few garden subjects can complete with tuberous begonias for sheer breath-taking beauty. Whether they are displayed in beds, used as specimen plants in individual containers, or grouped in planters and window boxes, their effect is equally impressive. The purity and depth of color are remarkable, and the form of the superior flowers is so letter-perfect that one must constantly assure observers that they are real.

Tuberous begonias are a tribute to the hybridizers of the past one hundred years who started with a half-dozen wild species and transformed them into the splendid hybrids of today. All the original species which contributed to the present strains were native to the high elevations of the Andes Mountains, growing in a climate which was cool and moist. These wild plants were single or semidouble, and there was abundant pollen to assure natural pollination and perpetuation of the species through seeding. Typical of them is *Begonia pearcei*, an ancestor of all the modern yellow hybrids; it has a small single flower, perhaps an inch across and resembling a flattened buttercup. The other species are equally modest, and it is difficult to believe that a hundred years of successive crossing, selecting, and crossing again could produce the gigantic, fully double, beautiful tuberous begonias which are available from good suppliers today.

Unfortunately, these begonias are often excluded from gardens because of the false notion that they are difficult to grow. While it is true that their requirements are somewhat different from many commonly grown flowers, they are no more demanding in terms of time or attention than a bed of petunias or snapdragons. On the plus side they offer a season of bloom extending from June until frost, and they can be grown in locations where an equally colorful display cannot be obtained from any of the usual bedding plants.

**An important characteristic of a good seedling tuberous begonia is a stiff stem which will hold the large blooms well above the foliage.**

To understand the cultural requirements of the tuberous begonia or any other garden subject, it is sensible to consider first the climate where the plant grows naturally. While few of us can duplicate the Andes environment, we can at least select that portion of our garden which comes closest to being cool and moist. Providing moisture does not necessarily mean watering daily. A mulch will keep the soil in most gardens moist for a week and at the same time provide insulation to keep the soil temperature

*H. Gilbert Harlow, a professor of engineering at Union College, in Schenectady, New York, has spent twenty years in developing a new strain of tuberous begonias particularly adapted to the climate of the northeastern United States. He serves as National Chairman of the tuberous begonia test program of the Men's Garden Clubs of America.

This article is reprinted from the January-February, 1967, issue of **The Garden Journal.**

down. Mulching prevents heavy rains from splashing the leaves and flowers with dirt and soil-disease organisms, and it also prevents the rain from packing the soil and reducing the air content necessary for good root growth. It is much more important to mulch than that any particular material be used, excellent results being obtained with grass clippings, cocoa shells, buck-wheat hulls, and peat moss.

While we cannot make it cool in the garden when the weather is hot, we can at least refrain from planting tuberous begonias where the hot afternoon sun will dessicate them. It is in going to the other extreme that many gardeners err. While these plants will grow in dense shade, they will not bloom under this condition. The quantity of bloom varies directly with the light which the plant receives, provided it does not at the same time become overheated by the sun. Ideal conditions are furnished by thin, high, overhead shade. One experienced grower, Oscar Rheingold of East Schodack, New York, plants fifteen hundred seedling begonias on the shady side of a long line of spruces with rather sparse foliage, and the plants grow to perfection. The object in utilizing shade is to allow considerable sun to shine upon the plant but to have moving shadows cool off each area before it overheats. Many growers have outstanding success by planting in beds which receive full sun only in the morning or full sun only in the late afternoon and early evening.

A little-known fact about begonias may be useful to the person growing them for the first time or one whose past experience has been less than rewarding. A tuberous begonia grown in shade will produce very large, deep green leaves under the usual conditions of soil moisture and fertility. The same plant, grown under maximum light conditions, will have smaller and lighter colored leaves and the leaves will have a shinier surface. This is nature's way of adapting to the environment. Through reflection of a portion of the sunlight the plant is able to cope with a marginal situation. If a shade-grown plant were moved abruptly into a sunny location, it would simply expire from the heat on the first bright day. It would also take time for a plant grown under sunnier conditions to adapt to shade. The practical application of this information is obvious: by early planting in the area where the plant is to grow, we induce the kind of growth that the situation demands. In addition, the plant benefits from the opportunity to form a big root structure before it is called upon to bloom.

**A bed of seedling begonias will brighten a semi-shaded area and provide cut flowers for floating in dishes or trays.**

An ideal bed of tuberous begonias consists of five or six inches of rich, humusy soil preferably raised several inches above the surrounding area, or otherwise assured of good drainage. Begonias are shallow-rooted so that deep preparation of the bed required for such plants as roses and sweet peas serves no useful purpose. Almost any existing soil can be made acceptable by incorporating a sufficient quanitity of compost, leafmold, vermiculite, perlite, or peat moss. Combinations of these are usually best. The resulting soil should be sufficiently porous so that even after a heavy downpour water will not remain on the surface.

Begonias respond to a sensible fertilizing program. This may be nothing more than a generous application of a high organic fertilizer before planting, or it may be a weekly application of a completely inorganic soluble plant food in very dilute concentration. Fish emulsion or any other liquid organic fertilizer supplied to other plants will give satisfactory results. By observing the color of the leaves a careful grower will learn to recognize symptoms of hunger in a plant, before its growth is seriously checked.

Tuberous begonias are such showoffs that many growers prefer to use containers which can be moved about to brighten up a particular spot. A half-dozen, well-grown specimens at the edge of a patio will often give the effect of a whole garden, even though space for a garden is not available. Three seedling plants of the same color in a single, ten-inch container will develop into what appears to be a single, large plant with many flowers open simultaneously. Large containers make it possible to water and fertilize on a more relaxed schedule, but smaller pots can accommodate fine show specimens.

At Tanglewood in Lenox, Massachusetts, home of the Boston Symphony Orchestra in the summer, Superintendent James Kiley grows superb begonias in six-inch bulb pans, feeding them frequently with fish emulsion. These are seedling plants approximately six months old at the time of first flowering. At the Crane Estate in nearby Dalton, Carl Deame grows equally fine plants obtained from the same source, Koral Gardens in Pattersonville, New York; but Mr. Deame grows them in beds which have very nearly one hundred per cent sunshine. He also grows the pendulous or hanging basket begonias in redwood baskets and large bulb pans and enjoys a profusion of blooms rivaling that of plants grown under the ideal climate of the West Coast fog belt. At Koral Gardens, Bob Koral gets unbelievable blooms on many thousands of seedlings which he grows in a sterile mixture of peat-perlite-vermiculite in four-inch pots. The seedlings are nourished to perfection with a weekly feeding of diluted, carefully balanced, inorganic fertilizer. I have cited these experiences to indicate the wide range of cultural conditions which result in outstanding plants under the supervision of expert growers.

Until recently almost all tuberous begonias grown in the eastern United States were started from tubers. They had the advantage of being easily transported from the West Coast, England, Belgium, or wherever they are produced. However, tubers tend to lose their vigor with the passing of time, and even a new tuber appears to be a bottleneck in the orderly process of communication between the roots and the plant. Perhaps this is best demonstrated by planting a bed of tuber-grown plants and a bed of seedlings side by side. Tubers produce large plants quickly, but they are generally less satisfactory bedding plants than are seedlings of equally good strains. Seedlings purchased while they are small plants are relatively inexpensive, and they are frequently raised in the same manner as annuals with no attempt being made to produce tubers for the next year.

When an outstanding plant develops, the grower should make an effort to propagate it from cuttings, since only a cutting or tuber-division will produce another plant exactly like it. (Tuber-divisions are less desirable because of the loss of vigor associated with tubers.) Cuttings may be made from the individual plantlets which usually grow from the leaf axils near the base of a mature plant. A cutting three or four inches long is sufficient. Vermiculite, perlite, or coarse sand may be used as the rooting medium; but an even better material for begonias and most other cuttings is the combination of two or three parts of ⅛" to ¼" expanded shale aggregate (available at most concrete plants) with one part of ver-

*(Continued on Page 55)*

# ANOTHER HOLLYHOCK BEGONIA

*By* CARRIE E. KAREGEANNES

"I have a lovely little begonia I would like to see in a picture," wrote Mrs. Florence Bettis in a round robin. "It is a Hollyhock Begonia. They are so beautiful yet you never hear them mentioned. Why? Mine is only about a foot high, with large deep pink flowers on the single stem — and what a jewel it is!"

Mrs. Bettis received *Begonia martiana,* grown in a greenhouse, this fall when it was ten inches high and forming buds. The tuber is one inch across and rests on top of the soil in a three-inch pot. Flowers opened on one side of the stalk, overbalancing it, and a stake was added. Bulbils are produced at the base of the leaves.

Brought into the house, the flowers started to wilt, "just as though it had been picked and left out of water". Returned to the greenhouse, it recovered quickly.

Since both male and female flowers were open at the same time, Mrs. Bettis self-pollinated the seed flowers. She is not sure of success, because pods did not stay on the plant long, but is trying the seed.

As the flowers opened up the stem, tiny bulbils appeared in every axil. As they ripened and dropped, they were gathered and, in another week, a second crop appeared.

*B. martiana* likes very good light with some sunshine, she reports, as well as good humidity.

### Other Descriptions

The standard begonia references (available in the A.B.S. Library), files of *The Begonian,* and materials turned up by the A.B.S. Research Department fill out the picture of *martiana* and its varieties.

Bernice Brilmayer says in her *All About Begonias* that this "near-hardy" Mexican tuberous begonia will take a good bit of sun, that its tubers are oddly cream-colored, thin-skinned, and nearly round. Tubers are planted with the old stem scar on top. Bulbils are gathered in the fall, stored in a cool dry place, and planted early the next year. The plant should be staked and should be grown in brightest light for a compact shape.

Tubers should be dug in the fall, as they will not winter over outside, even in California, Rudolf Ziensenhenne warned in a 1940 *Begonian.* Old tubers may deteriorate, however, because of the thin skin, and the bulbils should be planted in the spring. Some have found bulbils slow to start.

Single rose-pink flowers grow in pairs from the leaf axils, close along erect stalks, as in a hollyhock. Lower leaves are quite round, but upper leaves taper to a point, according to Bessie Buxton in *Begonias and How To Grow Them.* In partial garden shade, *martiana* will bloom a long

Begonia Martiana

Drawings by Millicent Rader Harris

**Begonia 'Ivy Ever'**

time. Dormant in winter, it is more useful as a summer garden plant, like other tuberous begonias, than as a house plant.

Charles Chevallier wrote in his *Les Begonias* (Belgium, 1938) that *martiana* and its hybrids and varieties flourish in any exposure there, even full sun if accustomed to it from an early age — becoming bushier and more beautiful than in a cool, shaded greenhouse. But in a well-lighted cool house, they will grow to tall "bushes" covered with flowers two or three months of the summer.

A plant grown from seed attracted attention at the 1950 A.B.S. Show because of its beauty and contrasting habit. It was pictured on the cover of the November, 1950, *Begonian,* and that issue quoted from a detailed study of the species by Rudolf Ziesenhenne in the October, 1940, *Begonian.* Mrs. Buxton's book also includes a photograph, and the 1967 Breck's of Boston catalog shows a small picture in color with a description of "old-fashioned charm . . . showy spires of four-petal shell-pink begonias, with bright golden-yellow centers — flowering on miniature hollyhock-like stalks", and forecasting twelve to twenty - four one - and - a - half - inch blooms on each two- to two-and-a-half-foot stalk. It said several stalks were possible from each tuber. *Martiana* is also available from a number of other catalogs.

### History

*Begonia martiana,* named for German collector, K. F. P. von Martius, was discovered by Ferdinand Deppe in Mexico in 1828, a mountain plant growing in lava beds at an altitude of 5,000 to 8,000 feet. It was introduced by P. Neill of Edinburgh in 1829 and reintroduced from Mexico by Lemoine in 1882. Two pronunciations are in use, *marty-ANE-ah* and *mar-she-AY-nah.*

Chevallier stated that *martiana* was a more interesting and more often grown form of *B. gracilis* (also called "Hollyhock Begonia"), but that some botanists recognize *martiana* as a separate species. He identified the plant called *B. martiana* by Link and Otto as the one A. de Candolle called *B. gracilis* var. *martiana.* Mrs. Buxton also listed it as *B. gracilis martiana,* though others call it simply *martiana.*

Mrs. Brilmayer describes it as tougher than *gracilis;* and Helen Krauss in *Begonias for American Homes and Gardens* says it is similar to *gracilis* but lacks the crenate leaf margins and fringed flower petals of *gracilis.* Chevallier says it has a more bushy look, stronger and shorter stalks branched from the base, and larger (two-inch) dark pink flowers.

*B. gracilis* itself, also a native of Mexico, was described in the *Begonians* of February, 1966, (with photograph) and May, 1962. Thomas MacDougal found it growing on steep, rocky slopes in Mexico, at 7,000 feet, in "well-drained, poor soil with some humus", with part shade but not directly under trees, in a cool climate.

### Hybrids

Several hybrids have been derived from *martiana,* but the one turning up in current catalogs is Leslie Woodriff's 1941 hybrid, B. 'Ivy Ever'. *Mar-*

*tiana* was the seed parent, with *B. limmingheiana* (sometimes called *glaucophylla scandens*) as pollen parent. 'Ivy Ever', pictured on the August, 1954, *Begonian* cover, is an evergreen, everblooming trailer,. It has many drooping stems from the base, and Mrs. Krauss says branches develop from large buds that at first glance appear to be bulbils. Leaves are heart-shaped, with shallow lobes, a glossy dark green tinged metallic purple between veins. Flowers are about two inches, pink, and close to the stem.

F. J. Bedson reported in *Successful Begonia Culture* that his 'Ivy Ever' grew continuously, without noticeable rest, remaining green at a temperature down to 45 degrees; the tuberous habit of the seed parent had been lost in the hybrid. Some growers have noticed a tendency to rest sometimes, however.

B. 'Winter Hollyhock', another Woodriff hybrid of 1941, from *martiana* x *socotrana,* was different from *martiana* only in shorter growth, Mrs. Krauss reported. A Woodriff catalog said it had bright pink flowers during winter and could be propagated by bulbils and cuttings.

Crossing *B. g. martiana* with B. x 'Racemiflora Rosea Grandiflora' produced *B. gracilis martiana* 'Racemiflora' for Lemoine in 1884. Chevallier described it as a vigorous hybrid with a "more compact bush", red stalks, pink flowers.

From the same cross came *B. g. martiana* 'Grandiflora', with green stalks and large carmine-pink flowers, considered one of the loveliest of the group. Mrs. Buxton says it is much larger than the original species and, under good conditions, will grow to true hollyhock size, five to eight feet, requiring stakes. Potgrown, it is smaller.

From seed of 'Grandiflora', Lemoine raised *B. g. martiana* 'Pulcherrima', which Chevallier described as compact, with thinner and darker red stalks, smaller leaves of purplish bronze green, and large almost round flowers of carmine pink.

Ziesenhenne noted that Worth Brown had used *martiana* in tuberhybrida breeding. And Frank Reinelt's cross of *martiana* with a large apricot camelia-form tuberous begonia was the beginning of the apricot shades in hanging basket begonias.

### Related Species

Chevallier also lists *B. gracilis* var. *diversifolia,* introduced from Mexico in 1829, differing from the others in having more stalks, pale green, as much as thirty-nine inches tall. He reported several hybrids with tuberous begonias had been produced but lost. *B. racemiflora* is another Mexican species related to the group, sold by Lemoine in Zurich in 1877. Chevallier called it mediocre. It had white or pink flowers, in long axillary racemes. Crossed by Lemoine in 1882 with *B. g. diversifolia,* it produced *B. racemiflora* 'Rosea Perfecta', with almost white flowers, and *B. r.* 'Rosea Grandiflora' with pink flowers. Both had larger flowers and were about thirty-nine inches tall.

Some of these species and hybrids probably have gone out of cultivation with time, and others may have been confused with similar ones, probably accounting for variations in plants listed under the same name. Perhaps *gracilis* or varieties of *martiana* are sometimes offered as *martiana. Exotica* 3 carries a photograph on page 301 labeled *Begonia gracilis diversifolia* ("martiana"), and one on page 378 as Begonia "martiana" in the trade.

# CLAYTON M. KELLY SEED FUND FLIGHT

**No. 1 — B. cathayana, Hemsley —** Growth erect, shrubby, 40 cm to 60 cm high. Leaves are succulent, reddish-brown, covered with soft white hairs, asymmetric, hanging down, about 20 cm by 12 cm, cordate more or less dentate, ending in a point, velvety, dark olive-green with a light area which becomes white toward the center. Deep purple, velvety veins, covered with soft hairs, mainly at the margins and beneath. The lower side of the leaf is very red with reticulate venation. Petioles 7 to 12 cm long, round, succulent, light green, densely covered with hairs on the outside. This is a beautiful species requiring greenhouse care with plenty of warmth and humidity. Price $1.00 per pkt.

**No. 2 — B. paulensis —** Brazil. Leaves are medium green, shiny, and peltate; distinctly striking, with its ivory-colored sinus or eye, from which radiate the main veins. The radial veins are joined by cross-veins which form a circle, giving an interesting spider-web effect. Each spider-web section is covered with short white hairs, but on the underside of the leaf the hairs are red, showing up distinctly on an apple-green background. The leaf petiole is light green, covered with pinkish hairs, and a small collar of red hairs appears at leaf-petiole junctions. Flowers are 1½ to 2 inches in diameter and are white inside.

Seed is direct from a begonia grower and collector in Brazil and should germinate rapidly. Grow plants in the usual begonia soil and feed them often. Plants prefer a cool house to a heated glass-house. Price $1.00 per pkt.

**No. 3 — B. olsoniae syn B. vellozoana, Brade —** Brazil species. Herbaceous. Eight to twelve inches tall, stems short, oblique, up to 5½ inches long, rooting at the stipules. Leaves oblique, broadly ovate suborbicular, cordate, with a closed basal sinus, palmately eight-nerved, 4 to 5 inches long, 5 to 8 inches broad, hispidpilose on both surfaces, with small frimbiate scales on the nerves beneath, green above, with a whitish zone on the veins, paler below and occasionally reddish. Flowers are whitish, sometimes the outer rosey. One of our most beautiful begonias. Price $1.00 per pkt.

**No. 4 — B. aridicaulis —** Also called B. 'Cathedral Windows'. Mexico. Small terrarium-type plant seldom seen in cultivation. Rhizomatous with a frilled, scalloped or fluted edge leaf with transparent panels of very light green between veins. Flowers are pink. Price $1.00 per pkt.

**No. 5 — B. acetosa —** Brazil. Neat, round, hairy leaves, short stem from rhizome. On top, the effect of fuzz is subdued green; underneath, ruby red. White flowers in spring. 50 cents per pkt.

**No. 6 — B. hemsleyana —** Shiny green leaflets radiate from stem end like umbrella ribs. Beautiful pink flowers. Leaves will produce vivaparous plants. 50 cents per pkt.

**No. 7 — B. andersonii —** Rhizomatous begonia from India. 50 cents per pkt.

**No. 8 — B. 'Bow-Nigra' —** (*B. boweri* x *B. heracleifolia nigricans*) Small, star-shaped, bronzy leaves with light veins and pink flowers. 35 cents per pkt.

**No. 9 — B. 'Reichenheimi' —** (*B. heracleifolia* x B. 'Fuscomaculata') Rhizome curls along the soil. Leaves green with red-brown veins, star-shaped. Large sprays of pink flowers on tall stems. Grows dry. 25 cents per pkt.

**No. 10 — B. 'Othello' —** Intermediate growth, bronze foliage. Scarlet-orange, outstanding for its deep waxy-bronze foliage. Grows well in pots or outside. 35 cents per pkt.

**No. 11 — B. 'Derby' —**

$F_1$ semperflorens. A bi-color, glistening white with each petal edged tinged salmon-pink. Free-flowering, compact, and uniform. 35 cents per pkt.

**Still available —**

B. rex from Germany, rex American hybrids, and India rex. Price $1.00 each variety.

**BROMELIADS**

**Aechmea fasciata —**

Sometimes called 'Urn plant'; a window gardener's delight. It produces a large pink inflorescence with hundreds of tiny blue flowers in summer. Well suited for basket culture. 50 cents per pkt.

**Vriesea hieroglyphica —**

Beautiful and decorative, with light green, cross-banded dark green, and purple-brown beneath leaves. Yellow flowers appear in spring on a tall branched spike. Grow in a northern exposure with humidity. 50 cents per pkt.

**Aechmea weilbachii var rubra —**

Medium-growing, dark red leaves, branching red and lavender inflorescence in the fall. Very decorative and a good grower. 50 cents per pkt.

The bromeliads listed above have been imported from Germany.

If you have a flowering size bromeliad that refuses to bloom, try this: Place the plant in a plastic bag and add an apple; close the bag and leave it for four days. Ethylene gas given off by the apple will force the plant to bloom in one to six months. (from USDA research center.)

MRS. FLORENCE GEE
*Seed Fund Administrator*
234 Birch Street
Roseville, California 95678

## ROUND ROBIN NOTES

Rexes that do not go dormant have been a joy this past winter — rich color cascading from a window sill, against a background of snow. And now as spring comes, those that did go to sleep should be coming into their own also. The new rex robin is brimming with comments and descriptions.

Flight Chairman Virginia Withee of Coventry, Rhode Island, finds her rex 'Black Monarch' difficult to propagate. It is succulent, with red-fuzzy stems. She tried drying the stem before putting it into perlite, but had no more success than before. Flight members suggested rubbing (not scraping) the fuzz off the stem and perhaps using a drier medium. Daisy Austin of Anaheim, California, also suggested that the leaves may lack auxin needed for rapid growth, or that dark leaves may retard this growth harmone (since light plays a great part in regulation).

Rex 'Helen Teupel' cooperates well in house conditions, without brown edges even when no special humidity is provided, Virginia agrees with other growers. Rex 'Fairy' is apt to brown at the edges (as is Virginia when rexes brown at show time!). Another rex of the same nature as 'Helen Teupel' is 'Shirtsleeves'; it seems to have no idea of snoozing in winter.

High on Virginia's list are her 'Renee' with more than fifty leaves, many eight to ten inches long, gorgeously colored; 'King Edwards', with a three-foot spread of lush, dark red leaves; 'Ember', with lovely hues cascading from a table; and 'Green Gold', 'Can Can', 'Rosy Dawn', — all happy in December.

Margaret McDowell of Morgantown, West Virginia, finds that plants in ground beds in her greenhouse, with little air circulation problem, seem to have little tendency toward dormancy. Some rexes are growing quite large.

*Calla Begonias:* Barbara Walker of Bloomington, Indiana, who has had different kinds of callas for years, finds they must have superb drainage and be allowed to go completely dry between waterings. They like coolness and very bright light. When pot-bound, they like fertilizer with twice as much phosphorous as nitrogen and potash (a formula such as 15-30-15), which may encourage variegation, as in Africa Violets. Barbara's own hybrid, 'Calla Carnation', threw two pure white leaves after being fed this formula.

MRS. CARRIE KAREGEANNES,
*Round Robin Director*
3916 Lake Boulevard
Annandale, Virginia, 22003

## In Memoriam

Members of the American Begonia Society were saddened by the death of Harold B. (Hal) Burkett on January 19.

Mr. Burkett served two terms as treasurer of the American Begonia Society and was a charter member of the North Long Beach Branch. He had just been installed in January as treasurer of the California National Fuchsia Society.

He was a resident of Los Alamitos, California, and an accountant and tax consultant by profession.

His loss will be felt by all who were familiar with his enthusiasm and fine spirit of cooperation. His many friends extend deepest sympathy to his wife, Edna.

## BEGONIAS IN MARCH

*By* ELDA HARING

In March in the northeast there are two pleasant chores for begonians, in addition to the usual daily inspection, grooming, and watering, and the bi-weekly feeding of all begonias in the collections.

This is the month to start tuberous-rooted begonias to start in our outdoor gardens in mid-May. Old tubers which have been stored properly will probably be showing pink buds. Plant these immediately in four-inch pots for medium size tubers and in five-inch pots for the larger tubers. Cover them with one-half inch of potting soil, because tuberous-rooted begonias do better if the entire tubers are covered, to permit roots to develop over the entire tubers.

For soil for my tuberous-rooted begonias I used one part garden loam, one part peat moss, one part vermiculite, and one part sand. This soil is mixed and stored in the fall for winter use. There are also packaged potting mixes which may be used. To some of these I prefer to add one quart of vermiculite to make them more spongy and moisture-retentive.

There are so many ways to grow tuberous-rooted begonias that I hesitate to make any recommendations. However, after I have potted my tubers and watered them thoroughly, pots are placed in an east or south window. When plants are about four inches tall, I begin to feed them every other week. In mid-May they are planted in a bed under a mountain ash tree, where they receive several hours of late afternoon sun during the summer. They are kept moist and misted on hot days. The soil is good garden loam to which has been added compost and superphosphate.

I have a friend who grows huge basket types of tuberous-rooted begonias, which she hangs on a porch where they receive an hour or two of morning sun each day and some slanting late afternoon sun. This lady has won many blue ribbons in local flower shows for her gorgeous tuberous-rooted begonias. They are as beautiful as any I saw growing in California, with the possible exception of those being grown in greenhouses under controlled conditions.

The other chore for this time of year is to divide old B. semperflorens into many divisions, planting them into individual pots. They should then be kept growing in a sunny window to be planted out in semi-shaded areas in the garden, to liven up spots that would otherwise be dreary.

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**TUBEROUS . . .**

*(Continued from Page 46)*

miculite. This material has perfect drainage, sufficient absorption, and enough stability to hold the cutting erect until rooted. The entire cutting should be dipped in a solution of fungicide, such as "Ferbam", since it is susceptible to rotting under the humid conditions required for rooting; and the base of the cutting should be dipped in a rooting hormone to hasten the process.

An English grower, Alan Langdon, suggests putting the rooting medium in a clean, three-inch, clay pot and inserting the cutting at the edge of the pot in contact with the clay. This permits additional air to pass through the porous clay and augment that which finds its way through the rooting medium. If the pot is placed in light shade and provided with a glass or plastic enclosure to increase the humidity, rooting should take place in about five weeks. Tip-cuttings may take a bit longer. A number of pots may be placed in a tray and watered from the bottom. Plants will bloom in three or four months from cuttings.

Insects rarely bother begonias. Thrips, cyclamen mites, and aphids have been known to attack them, but this is most unusual and an appropriate spray will quickly eliminate the pests.

Of the diseases only powdery mildew is ordinarily serious. Most gardeners have seen mildew on roses or phlox and will easily recognize it on tuberous begonias. Its effect may be disastrous, and usually will be if it occurs and nothing is done to eliminate it. There are, however, excellent specific remedies for mildew, including "Mildex" (also known as "Karathane") and "Actidione". These readily available fungicides will wipe out mildew in its incipiency or even check a general invasion, if it has been allowed to reach such proportions. In gardens where mildew is known to occur, it will pay to keep a small spray bottle handy so that the first tell-tale white patches can be treated. Often no more drastic measures need be taken. Sulphur is a reasonably good preventive but will not eradicate mildew once is appears.

Begonias form tubers in the short days of the fall. Whether grown from seedlings, cuttings, or tubers it is important that they be kept growing as late as possible, if the tubers are to be saved for the following year. Protection from the first frosts pays big dividends. This can be accomplished by covering or by moving the plants to a protected area. When the plant finally dies down, the stem should be permitted to part naturally from the tuber. The tuber is then cleaned and stored in a cool place for the several months of dormancy before it begins to sprout. Plastic bags make suitable containers, once the tubers are thoroughly dried.

Cool summers will always produce finer tuberous begonias than hot summers. Hot days are less damaging than hot nights. Unseasonably high temperature may discourage blooms for several weeks, but a return to night temperatures in the 50°-70° range will soon be followed by a fresh burst of color. Those who have seen tuberous begonias growing in the California fog belt or in cool, moist climates such as that of Vancouver, Banff, or the mountains of upper New York State or New England, know what can be done with almost no care where conditions are ideal. However, very fine plants may be grown in many less favorable areas, provided the grower understands the needs of these begonias and cares enough to make them comfortable. The extra vigor of seedlings makes them especially valuable for plantings in less than ideal areas, and even under very good conditions they are generally superior for bedding purposes.

## PHYLLOMANIA . . .

*(Continued from Page 43)*

My first problem, then, was to be absolutely sure that *B. phyllomaniaca's* outgrowths were built like leaves since they are the first outgrowths we know of that look like leaves and don't come from a stem tip. The answer to that problem was finally settled while I was working in the Botany Department at The University of California at Berkeley. They are leaves. Their stipules are like the usual stipules. Their petioles are like petioles and their blades are like the blades of seedling begonias' leaves.

How do you know that the stipules, petioles, and blades are like normal begonia leaves? They look alike when you just look at the outsides, but that is not enough. You must look not only at their internal structure, but also at their development. The key structures are the various characteristic kinds of cells of the leaf blades, including the pattern of the veins which are made up of water-conducting and food-conducting cells. In all respects the cells of the outgrowths are exactly like those of the normal leaves. It is of great interest that the shape of the blades is like those of seedling begonias rather than like those of older plants. The difference is that they are bi-laterally symmetrical, that is, if you fold a blade in the middle lengthwise, the two halves are the same shape. Older leaves, as you well know, are asymmetrical. It is interesting, and completely unexplainable as yet, that the outgrowth leaves are juvenile in their form.

When outgrowths persist a year or so, occasionally on a leaf blade but more frequently on a stem, some few of them become plantlets and form a normal stem. Then on the stem tip new leaves are formed in the orthodox way. These new leaves, like the successive leaves that a seedling produces, become successively more and more asymmetrical; that is, more and more like typical begonia leaves.

Botanists have no explanation of what causes many kinds of plants to form leaves of different shapes at different times in their lives. This is the same kind of problem that zoologists face when they study the changing forms of an insect as it develops from an egg through one or more larval stages to a pupa and finally to a flying moth or butterfly. Botanists hope that the changing form of leaves from juvenile to adult and often to a different form when the plant is about to flower will be a problem easier to attack than that presented by insect metamorphosis. Perhaps the careful study of *B. phyllomaniaca* will contribute some clues.

Having established that phyllomania is really the production of leaves in places where plants don't produce leaves, the question now is what kinds of cells or tissues do give rise to them? What cells not at the tip of a stem can divide and produce more cells until there is a mound of new cells that finally grows into two stipules and then a petiole and blade?

To find out, one has to look for the smallest and then smaller and smaller outgrowths, tracing them back to their origin. To cut a long story short, they start with the division of one or a few neighboring epidermal cells. These cells subdivide into first two, then four, and then dozens of very small cells all within the walls of the original cell or cells. Then, the outermost of these new cells enlarge and keep enlarging and dividing until quite a mound of new cells is raised up above the surface level of the epidermis. In a matter of a few weeks this outgrowth is developing into stipules and a leaf blade. Would that we knew how any group of cells develops into such a recognizable, characteristic form!

Morphogenesis, the development of form, is one of the riddles of biology. How an embryo chicken gets to be a chicken with two wings and two legs growing out of its body we don't know. To many biologists, plant development looks simpler than animal

development. It may be useful to work hard on understanding it. Careful study of phyllomania may yield some little clue to help solve the riddles of morphogenesis. It will be a long study involving analyses of the amounts of naturally occurring hormones and enzymes. Then it will be necessary to use extracted or synthetic plant hormones to try to alter the course of development.

In short, an experimental physiological and biochemical study will follow the descriptive morphological studies. This will probably run into years. One comfort is that many people are developing techniques for such studies now in these days of molecular biology. Someone who is a biochemical botanist may turn up the methods that can be used to understand the hereditary controls over the development of form. These will be usable in trying to understand phyllomania.

There is one more type of problem that the study of phyllomania has opened up on which I have gotten some leads. *B. phyllomaniaca* and its cultivar 'Templini' do not always produce outgrowths. When they do, they may do a job of it. As many as 8,000 of these outgrowths have been counted on a single large blade, several hundred on a petiole, and 4,000-5,000 on a single internode of a stem. Usually the numbers are lower. Much of the time there are none. Why? Really, not why none, but why any?

To come to the answer immediately, the roots have to be damaged. When they are, the epidermal cells of a leaf ¼-½ inch long at the stem tip, and the epidermal cells of the young piece of stem, the internode, just below that leaf, are stimulated to subdivide. Why? Don't we wish we knew! Don't we wish we knew what makes any cell divide, particularly one that in the normal course of development would not divide. Epidermal cells usually mature and do not divide in the later life of a leaf or stem. In a general sense, these epidermal cells of *B. phyllomaniaca* act like tumor cells — they divide and make more cells when normally they wouldn't.

Why does injury to the roots trigger the division of cells a long way up the stem from them? We don't know, but there is at present increasing evidence that some chemical substances made in roots move from them into the tops of plants and have effects there. Substances like these which are made in one part of an organism and move to another part where, in very low concentration, they have an effect, are called hormones. In plants they are plant hormones. Studies will have to be initiated, when it is absolutely certain that root injury and this only causes outgrowths, to see whether hormones are involved and, if so, whether they are already known ones, or new ones.

There is one more aspect of phyllomania that should be mentioned. I have been studying it in *Begonia phyllomaniaca,* 'Templini'. This cultivar is a variegated-leaved form and I always keep in mind that spotting and variegation of leaves is often a symptom of a latent virus infection. Both the species, which has plain green leaves, and the cultivar produce outgrowths, but both may have a virus infection. Cultivar 'Templini' may just happen to manifest it in leaf variegation. The electron micrographs which I hope to be taking and studying soon at The Cell Research Institute and the Botany Department of The University of Texas may, or may not, reveal whether a virus is present. Viruses in plants, or in animals, are not the easiest things to track down.

Even so, this is a lead that must be kept in mind, even if it is difficult to arrive at any sure answers. Phyllomania may be a manifestation of a virus infection that shows up only when the roots are injured. There is increasing evidence that viruses are involved in particular types of animal tumerous and cancerous growths. Nearly fifty years ago, Dr. Erwin F. Smith, a plant

pathologist with the U.S. Department of Agriculture, studied phyllomania and found that no fungi nor bacteria were causal agents. Not much was known about viruses then. Their possible involvement should be investigated now.

I hope it is clear that phyllomania is a really intriguing biological phenomenon. The questions it poses have to do not only with begonias, nor even only with plants, but also with animals. How do organisms develop their form? What starts cell division and cell enlargement leading to abnormal outgrowths? How does a causal agent —hormones or viral products—or both, trigger the production of unusual growths at some distance, apparently from its source?

So far, I am engrossed in the problems of this one species, but I am interested in collecting other begonias with abnormal growths from their leaves or stems. If anyone wishes to send me rooted cuttings of such plants, with as much as is known of their origin, I would greatly appreciate it.

The address is: Margaret C. Ferguson Greenhouses, Wellesley College, Wellesley, Mass. 02181. A letter addressed to me there will reach me.

I cannot close this brief report of my work with *Begonia phyllomaniaca*, 'Templini' without noting my appreciation for the encouragement and financial support given to me by the American Begonia Society, its officers, its Research Director, and the many interested individual members whom I have met. The Society is to be congratulated in supporting in a modest but very effective way investigations which are not likely to have any immediate benefits to begonia cultivation or improvement. Only by learning as much as possible about the basic processes of plant growth and development can we acquire fundamental knowledge, the practical applications for which we often cannot foresee, but which may emerge at any time in the future. Such support and encouragement are implicit in the aims and purposes of the Society and I am deeply grateful to be one of the first recipients of financial aid.

## CONVENTION PLANNED FOR LABOR DAY WEEK-END

The annual convention and show of the American Begonia Society will be held Saturday, Sunday, and Monday, September 2, 3, and 4. All events will be held at one location, the Hawthorne Memorial Building in Hawthorne, California.

## RUMMAGE SALE

A rummage sale sponsored by the American Begonia Society will be held Monday and Tuesday, March 20 and 21, at Hall no. 1, at the corner of Whittier Boulevard and Redman Avenue, Whittier, California.

Members are urged to save discarded clothing, pots, pans, dishes, furniture, and knick-knacks. Rummage will be accepted at the Hall on Sunday after 5 p.m.

For further information, contact Mrs. Alice Martin, Chairman of Ways and Means, 4692 West 141st Street, Hawthorne, California; phone OS 6-1610.

*PATRONIZE OUR ADVERTISERS*

## REPORT OF A.B.S. BOARD MEETING

A meeting of the Board of Directors of the American Begonia Society was called to order by President Everett Wright at 7:40 p.m. Monday, January 23, in the South Gate City Auditorium.

Roll was called with seventeen officers and fourteen Branches reporting.

A letter was read from an Eastern Branch, announcing that the dates for the Eastern Regional Meeting will be August 4 and 5.

President Wright announced a rummage sale to be held March 20 and 21, to raise money for the American Begonia Society.

A letter from the Round Robin Director was read. She suggested that a committee be appointed to keep files on the hybridizing of plants, and that we have two files, so that in case one file is lost or destroyed by fire, we will have another file to go to. She suggested that Dr. Grant McGregor of Ottowa, Canada, and Charles E. Tagg of Fullerton, California, be appointed. After some discussion, Walter Barnett made a motion that we approve the appointment of these two persons. Seconded by Terry Olmstead, the motion carried.

Past President Muriel Perz reported that she had received a letter from Mr. Stallings of Ventura, inviting the Board to hold a meeting in Ventura. There would be a garden tour before the meeting for those who can come early. Charles Tagg made a motion that we accept the invitation for April 30. Seconded by Sylvia Leatherman, the motion carried. President Wright appointed Muriel Perz to check into bus prices and report at the next meeting.

The Treasurer, Walter Barnett, reported a balance of $2,222,11 on hand. He also reported that the Dr. Creighton fund now has $388.00.

The Membership Secretary reported 48 new members and 185 renewals the past month. She mailed 2,619 *Begonians*.

Ralph Corwin, Photographer, reported that the pictures of the convention have been made up and given to the Historian.

Sylvia Leatherman reported that the judging course had a balance of $20.56 on hand.

Terry Olmstead, Librarian, turned over $80.42 for books and other things sold.

Show Chairman Bert Slatter reported that he and President Wright had located the Hawthorne Recreation Center for the 1967 convention. This would give the meetings, flower show, banquet, and all under one roof. Earl Hough made a motion that we get the hall in Hawthorne for Friday, Saturday, and Sunday, before Labor Day, which will be August 25, 26, and 27. Seconded by Floyd Neff, the motion carried.

Evelyn Vollnogle, President of the Inglewood Branch, said that the Branch would be happy to act as host for the 1967 convention.

—Lucille Williams
*Secretary*

## CALENDAR

March 8 — Inglewood Branch: John Van Barneveld, from Rose Hill Memorial Park, will be the guest speaker. He will talk on "Growing and Pruning Roses".

March 10 — San Gabriel Valley Branch: William R. Paylen will talk on "Landscaping with Tropical Plants for Sun".

March 14 — Glendale Branch: Potluck dinner at 6:30 p.m. Mrs. Mabel Corwin will speak on "Begonias in the Spring".

March 16 — Foothill Branch: This will be the second in a series of programs dealing with plant culture.

March 17 — North Long Beach Branch: Howard Criswell, of Widow Farmer Products, will talk on "Pests and Insecticides for Begonias". Bring in plants or leaves with holes and he may help solve your problem.

March 24 — Redondo Area Branch: Ken Terry, horticulturist, will talk on miniature roses and "What's New in the Plant World".

April 13 — Orange County Branch: Sylvia Leatherman will give the judge's view of judging as she comments on members' plants.

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