

May-June 1983

The BEGONIAN



The BEGONIAN

Publication of the American Begonia Society

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THE COVER: Female flower of *B. mannii*, photographed by Jim Nelson, a botanist and friend of ABS member Bob Haussler, in Bob's garden. See Bob's article explaining how he grows African epiphytes, beginning on page 64.

African species How to grow them by Bob Haussler. 64
Moving day Pat Maley moved her collection—most survived. 69
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NOTES/ *From the editor*

Watch your mailbox for a packet of information about the Aug. 18-21 ABS Convention and Show in Riverside, Calif. Convention organizers weren't able to get their information to *The Begonian* before its deadline, so we couldn't review (or preview) the information for you.

We do know, however, that an earlier plan to offer two alternative bus tours has been scrapped in favor of one destination: the incredibly beautiful Huntington gardens, library, and art gallery in San Marino. The Huntington's gardens, normally closed mornings, will be open during the morning for our exclusive use. ABS members will view rare books and valuable art objects that afternoon.

Members looking for excuses to visit California take note: conventions have been scheduled in Dallas, Miami, and Seattle for 1984, 1985, and 1986. This is your last chance to attend a California convention for several years.

Setting the record straight, Pat Maley has written to clarify the proper spelling of "*B. 'Neely Gaddis'*," hybridized by Eva Kenworthy Gray and mentioned in Rudy Ziesenhenné's March-April article about Mrs. Gray.

Hidden away in a notebook given her a couple of years ago by the late Alice Clark, Pat discovered a letter Alice sent Mrs. Gray in 1943 seeking information about her hybrids. Alice left space for Mrs. Gray to pen her replies and return the letter.

There it is in the margin: a note from Mrs. Gray stating, "Neeley is right."

Most ABS members have been wrong for years.

Mrs. Gray also wrote that she and Neeley, a twin cousin, "grew up together until her death in 1869." Neeley was 6 when she died.

Alice apparently forgot that earlier correspondence when writing her book, *Begonia Portraits*, for she perpetuated the error of dropping the final "e" in Neeley. Helen Krauss, in her 1947 book, *Begonias for American Homes and Gardens*, spelled the name correctly, but a cursory examination of begonia literature reveals most of us have long accepted the wrong spelling.

You'll find the ABS officer election ballot printed on a separate card and stapled into the center of this issue. San Gabriel Valley Branch requested the card so ABS members would not have to clip a ballot out of their magazines.

The same sentiment has been expressed in the past by other branches.

The cost of printing and inserting this card is \$325—approximately \$1.60 per vote, assuming a typical voter turnout. Last year's election drew 205 votes, approximately 10 percent of the membership.

Production of this issue was held up pending the deadline for petition candidates. No petitions were presented. Information about the candidates put forward by the nominating committee is on page 79.

—K.B.

The fascinating species from Africa: special techniques for growing them

Bob Haussler

The dense tropical rain forests of Western Equatorial Africa provide habitat for many fascinating plant species. The hardwood rain forests of several islands in the Gulf of Guinea, including Fernando Po, Principe, Sao Tome, and Annobon, as well as nearby coastal lowlands and mountains, provide good growing conditions for our favorite plants—begonias.

Whenever species are studied from this area, names of interesting countries like Cameroon, Gabon, and the Congo are mentioned. Begonias in section *Tetraphila* come from this area, and they are found growing along with other epiphytic plants in the rain forest trees such as mahogany, ebony, and African oaks.

The begonias of section *Scutobegonia* also come from this general area, and

Bob Haussler of the Sacramento Branch, a biologist, lives at 6067 Inn Ct., Citrus Heights, CA 95610. He presented a seminar on greenhouses at the ABS convention last year.

B. subalpestris growing on driftwood

Photo/Bob Haussler



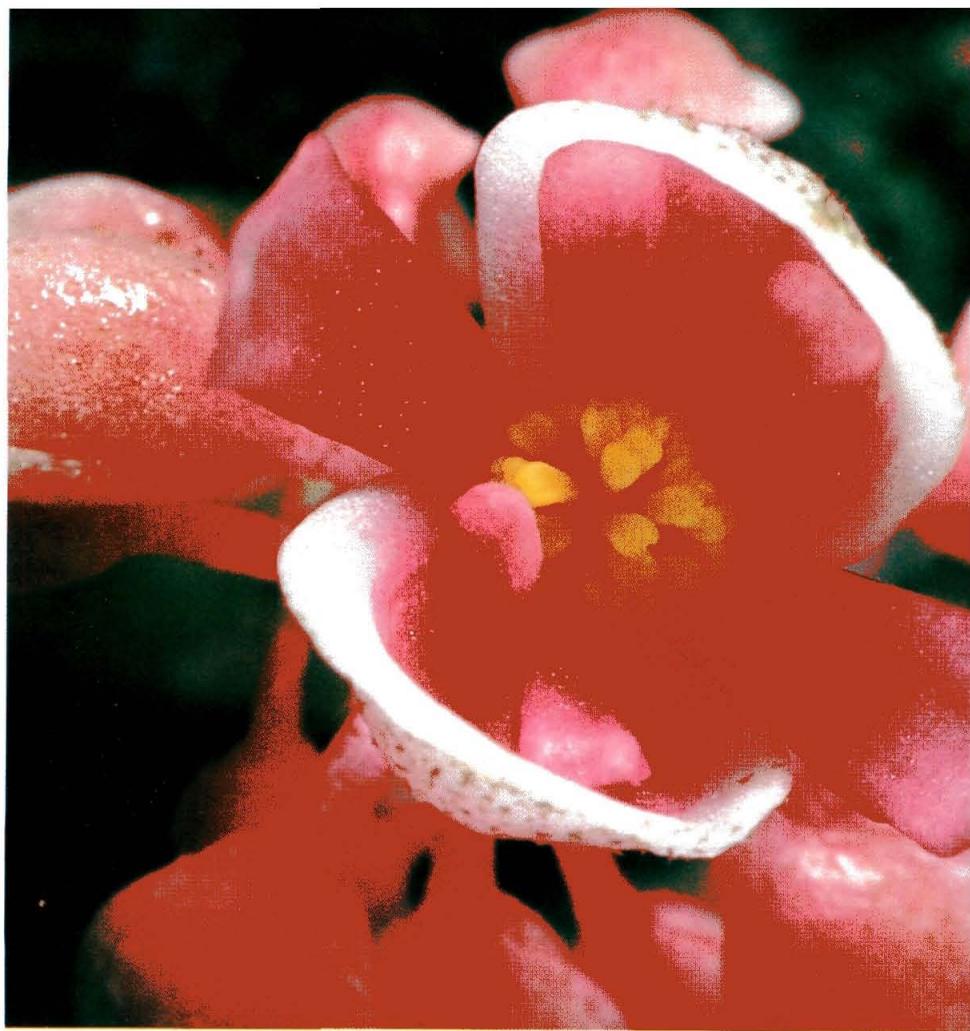
yet they have very different environmental requirements for growth. Begonias of this section, with species like *B. ficicola*, are fragile and require very stable environments, while begonias in section *Tetraphila*, being woody stemmed with succulent-like leaves, grow well in the open greenhouse.

Aside from coastal mangrove swamps, similar to those in the Southeastern U.S., both the islands and the coastline are mountainous and covered with rich vegetation. The coastline of Cameroon is dominated by Cameroon Mountain, a live volcano at an elevation of 13,353 feet. The western side of this mountain facing the Gulf of Guinea is one of the rainiest regions of the world—receiving about 400 inches per year. Some areas in the islands off the coast, on the other hand, average less than 100 inches per year.

The area is very close to the Equator, resulting in relatively warm temperatures that vary depending upon location, time of year, and elevation. The ocean has a moderating effect on the climate and, at elevations below 2,000 feet on both the mainland and islands, temperatures normally stay between 60 and 80 degrees F. Humidity is high, and soil in most areas is very fertile. Now if that isn't paradise for a begonia, I don't know what is!

Begonias growing as epiphytes in trees are more subject to varying climatic conditions, such as temperature extremes and dry periods, compared to those growing on the more protected forest floor. As a result, once established, most begonia species in this group are quite hardy and survive periods of apparent dryness quite well. Besides having leaves and stems on the "tough" side, another reason for the hardiness is that their roots tend to invade the cracks which seldom become totally dry.

In my greenhouse, I am growing five of these species on a 3-foot hanging piece of driftwood, and all are doing well. Species used on the driftwood include *B.*



Photo/Jim Nelson

Female flowers (above) of *B. squamulosa*, which can grow on driftwood (below)

Photo/Bob Hausler

subalpestris, *B. komoensis*, *B. squamulosa*, *B. gracilipeteolata*, and *B. polygonoides*.

I bored holes in the wood to provide depressions where begonia potting mix was placed. Over the holes I put a thin layer of long-fiber sphagnum moss.

I removed some small specimens of the above species from their 3-inch clay pots and wrapped their roots in more sphagnum moss. They were then secured over the prepared areas with crisscrossed nylon fishing lines fastened with small staples. The plants are growing and flowering as if each had its own tree crevice in Cameroon or Gabon!

The soil mix and sphagnum moss provide a slightly acid growing medium with ample organic material (like you would find in the crevice of a tree), and allow



moisture and oxygen from the air to reach the roots easily. The roots of each species are actively growing out from

***B. manii* flowers, shown close up on the cover, grow in clusters like this (right). The plant itself grows foliage as in photograph at far right.**



underneath the sphagnum moss along crevices in the wood.

While the plants were started by tying them on with the nylon line, they now adhere to the driftwood with their own roots like true epiphytes. They get their nourishment from the exterior of the wood, the planting medium, and also from half-strength fish emulsion fertilizer which I apply about once a month as I water.

Watering is best done frequently. Although the leaves of the plants in this begonia group are somewhat leathery and succulent, the plants grow best when their growing medium doesn't dry out. The driftwood piece has been left unwatered for seven consecutive days, however, with no ill effects. Also, the roots never become waterlogged, which is a distinct advantage of this growing method.

We are fortunate in that our greenhouse provides an ideal growing environment. Relative humidity stays above 60 percent, temperature rarely falls below 60 degrees F. or rises above 90 degrees F., and a fan is kept going to circulate air and minimize water standing on leaves.

Shade cloth provides filtered sunlight similar to what begonias might receive in the rain forest. In spring and fall I use 55 percent shade cloth, and in summer I increase this to 78 percent shade cloth when temperatures soar in the hot central valley of California.

If you don't have a greenhouse, don't give up yet! Plants of this group that stay relatively small can also be grown in a terrarium. Examples of suitable terrarium plant choices include *B. eminii*, *B. kisululana*, *B. subalpestris*, *B. komoensis*, *B. gracilipeteolata*, and *B. squamulosa*.

B. eminii and *B. squamulosa* were the first species of this group that I grew: I put them in a terrarium where they stayed for almost a year. They grew to be attractive but later I felt confident enough to put them in clay pots in the greenhouse. Terrarium culture did seem to stunt their growth, but this had no lasting ill effects because later the leaves doubled in size.

Cuttings of these species are relatively easy to propagate in coarse 50 percent perlite and vermiculite mix. I use this mix



in a propagation box that is kept moist at a temperature of 75 degrees F. If you would like to try growing from seed, instructions on fertilizing flowers are provided by Dr. Jan Doorenbos in his April 1980 *Begonian* article on *B. rhopalocarpa*. Growing seed can sometimes be a challenge, but you will likely have success if you follow instructions given by Mabel Corwin on page 14 of the 1982 January-February issue of *The Begonian*.

If you would like to become more familiar with plants in section *Tetraphila*, numerous articles in past *Begonians* will help you. I quickly thumbed through the issues from 1975 until now, and easily found 18 issues with information on these species. Although probably not exhaustive, a list follows this article.

Begonia species from all over the world are intriguing to me. I enjoy studying them first by reading available information, and then experiencing the unique beauty and requirements of each species by obtaining and growing them if possible. The example of beauty on the cover of this issue, a photo of a female *B. mannii* flower, shows how rewarding the effort can be.

The interesting African species are be-

ing introduced to cultivation in the U.S. primarily through the efforts of a few researchers and growers. We owe thanks primarily to Dr. Jan Doorenbos of The Netherlands, who has been receiving and growing begonia species directly from Africa for more than 11 years, and to Mabel Corwin, Millie Thompson, Patrick Worley, and Rudy Ziesennehenne for their assistance in distributing available species.

I am also interested in their distribution to interested growers, and if you are having difficulty getting your collection started, feel free to write me and I will do what I can to help.

May 1975: Cover photo of *B. gracilipeteolata*

August 1975: Photo and brief discussion of *B. eminii* by F. O. Michelson.

December 1975: Begoniaceae taxonomic drawings and discussion, by Kalil Boghdan II and Dr. Fred Barkley.

September 1977: Photos and article on *B. polygonoides* by Millie Thompson.

November 1977: Photos and article on *B. eminii* by Millie Thompson.

January 1979: *B. mannii* drawing and description by Dr. Fred Barkley.

May 1979: Photo and description of *B. ebolowensis*.

January and February 1980: Photos and discussion of yellow-flowering species and

mention of section *Tetraphila* by Dr. Jan Doorenbos.

April 1980: Cover photo and article on *B. rhopalocarpa* by Dr. Jan Doorenbos.

April and May 1980: Photos and article concerning epiphytic species by Alan Meerow.

June 1980: Photo and discussion of *B. rhopalocarpa*.

July 1980: Discussion of trailing-scandent begonias by Karen Bartholomew and Chuck Anderson.

February 1981: Photos and discussion of be-

gonias at Selby Gardens by Alan Meerow. January-February 1982: Articles by Kit Jeans and Mabel Corwin concerning growing techniques.

March-April 1982: Article concerning *B. ampla* from section *Squamibegonia* by Millie Thompson. *B. ampla* comes from the same area and has similar growing characteristics and requirements as species in section *Tetraphila*.

January-February 1983: Article about Dr. Jan Doorenbos by Susan Yamins.

Photo/Bob Haussler



Growing together on driftwood are *B. komoensis*, *squamulosa*, and *polygonoides*

Moving day for begonias—Pat finds plants surprisingly tough survivalists

Pat Maley

I wouldn't put my worst enemy through what my begonias have endured in the last year-and-a-half.

If anyone tries to tell you that begonias are delicate, temperamental, and require carefully controlled subtropical conditions, that person is *not* a begonia grower! I'll admit there are a few such temperamental species, from exotic atmospheres, but 99 percent are survivalists that can take far more hardship than given credit for. I've put them through thorough testing!

What did I do to them that was so horrible? I moved—and took them with me. Actually, the story of their ordeal starts long before the move.

We were happily living in El Cajon, 20 miles inland from San Diego. The begonias enjoyed a lovely shade garden, a large greenhouse, and a smaller propagating house. They were well adapted to southern California living, with overhead misters out in the garden to cool 100-degree-plus temperatures of summer.

With my husband's 20 years in the Navy soon to end, we decided in 1981 to buy a home in northern California. I went to work six days a week; Dennis went back to sea for one last tour. This left hundreds of begonias, from those in little liner pots to 8-foot specimens, to survive

Pat Maley's begonias—and Pat—now live at 7384 White Oak Dr., Placerville, CA 95667.

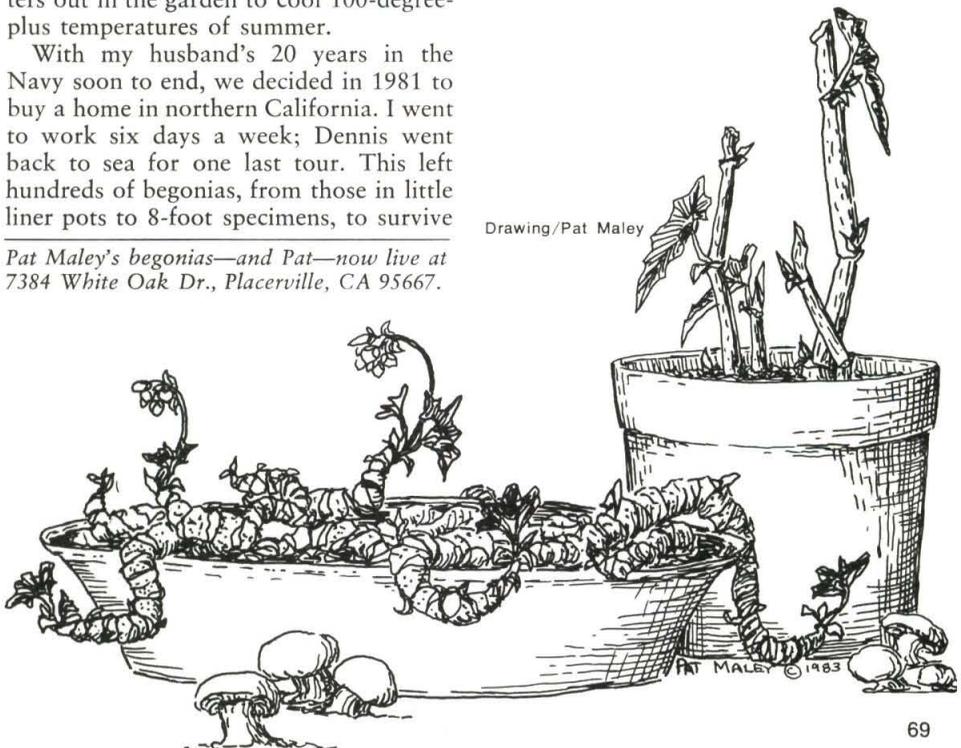
more or less alone.

Debris piled up, the mealybugs had a gay old time, and no one was there in the heat of the day to turn on the misting system. At the end of that year, there were slightly fewer to worry about, and the rest certainly were sorry looking. Still, there was beauty there to be seen.

I took care of that in short order. First, I had a sale. But, loving each of them as I did, I could only bear to sell duplicates and propagations. When the sale was over, I couldn't tell anything was missing! The giant specimen plants were still there, plus hundreds of smaller ones. Many of those specimens had been grown from cuttings from special friends. How could I bear to give them up?

September came and I had to do the hard part. The only way to move all these plants in an 18-foot van was to make them take up as little space as possible. I took 5-foot plants of *B. 'Sophie Cecile'*,

Please turn to page 90



Drawing/Pat Maley

Structure, micromorphology of *Begonia* seeds

F. Bouman and A. de Lange

The seeds of the flowering plants exhibit a great diversity in size, shape, color, and structure. The difference in size, for instance, is most spectacularly demonstrated by the seed of *Lodoicea maldivica*, the well-known "double coconut" or *coco de mer*, and, on the other hand, the "dust seeds" found in Orchidaceae and other families. The *Lodoicea* seeds are about 30 cm long, weighing up to 20 kg and more, whereas dust seeds are less than 1 mm long and sometimes weigh only 0.000001 g.

Structural seed characters have long been used by taxonomists as additional evidence in floristic and taxonomic studies. Especially in bigger seeds the internal architecture is important, but in smaller seeds the external features, in particular the micromorphological structure of the seed surface, is studied. In smaller seeds the internal structure is less diversified, whereas the external seed structure exhibits a considerable variation. However, the resolving power of the traditional light microscopes is too limited, so that they do not adequately reveal the structural details of small seeds.

The introduction of the scanning electron microscope has strongly improved the possibility of studying seed coat surfaces in great detail. Since the first publications in this field, more than 10 years ago, a continuous stream of papers has appeared (Brisson and Peterson, 1976). Until now hardly any attention has been paid to the seed structure of the family Begoniaceae.

From the scanty literature on seed development in *Begonia* it appears that the mature seed coat is mainly formed by the thickened outer cell layer of the ovule. All other layers of the seed coat have become compressed or resorbed during de-

velopment. At its inner face the seed coat is lined by one layer of endosperm, the nutritive tissue for the embryo (Boesewinkel and De Lange, 1983).

To gain an insight into the applicability of the micromorphological characters of the seed coat of *Begonia* in taxonomic studies, a preliminary study was undertaken. Fresh seeds were obtained from the collection begonias of the Department of Horticulture at the Agricultural University of Wageningen, The Netherlands, brought together by Prof. J. Doorenbos for breeding purposes. In addition, seeds from herbarium collections of the Laboratory of Plant Systematics and Geography, Wageningen, were provided by Dr. J. J. F. E. de Wilde, who is involved in a monographic study on the African begonias.

Up to now about 75 species belonging to 26 different sections of African, American, and Asiatic origin were studied. The terminology for micromorphological structures as proposed by Barthlott (1981)

General structure and diversity in shape and size

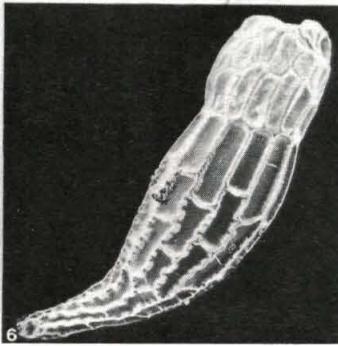
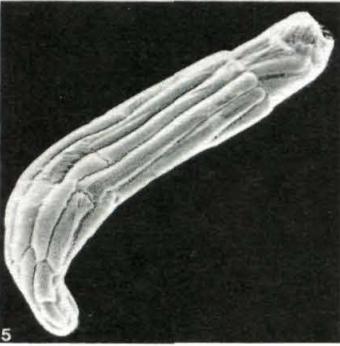
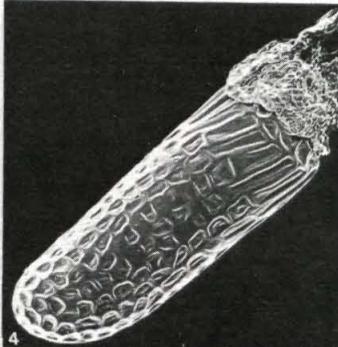
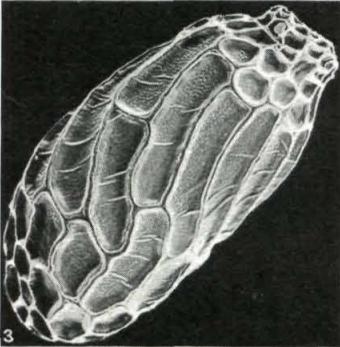
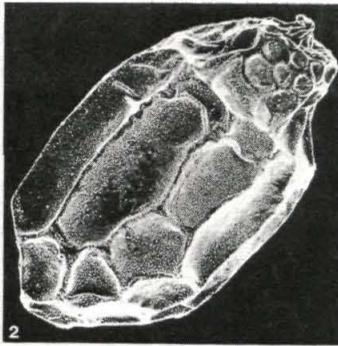
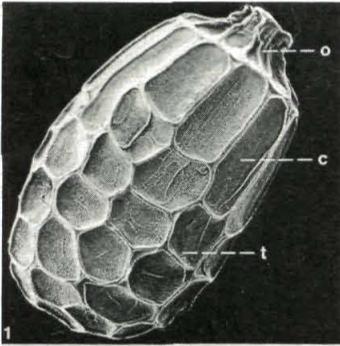
(Figs. 1-6)

The seeds are mostly ellipsoid (Figs. 1-3), the smaller ones broadly elliptic in outline to sometimes almost circular. The larger ones are more narrowly elliptic (Fig. 4). The seeds are normally straight. Faintly sigmoid or curved seeds are found in the sections *Solananthera* and *Begoniastrum* (Figs. 5 and 6).

Because begonia seeds are small, the majority being less than 0.6 mm long, many of them can be called true dust seeds. Of the minute ones, those of *Begonia elatostemmoides* (Fig. 2) measure only 0.28 mm and belong among the tiniest ones observed. *B. ebolowensis* (Fig. 4) has seeds more than 2 mm long, probably the largest ones known. So, the extremes differ in size by a factor of eight.

The seeds of the African sections *Tetraphila* are supplied with a small aril, a fleshy outgrowth of the funicle, which covers the apical part of the seed.

Dr. Ferry Bouman and Dr. Ton de Lange hold appointments at the Hugo de Vries Laboratory for Evolutionary Botany, University of Amsterdam, Plantage Middenlaan 2a, 1018 DD, Amsterdam, The Netherlands. Among their specialties are seed structure and development.



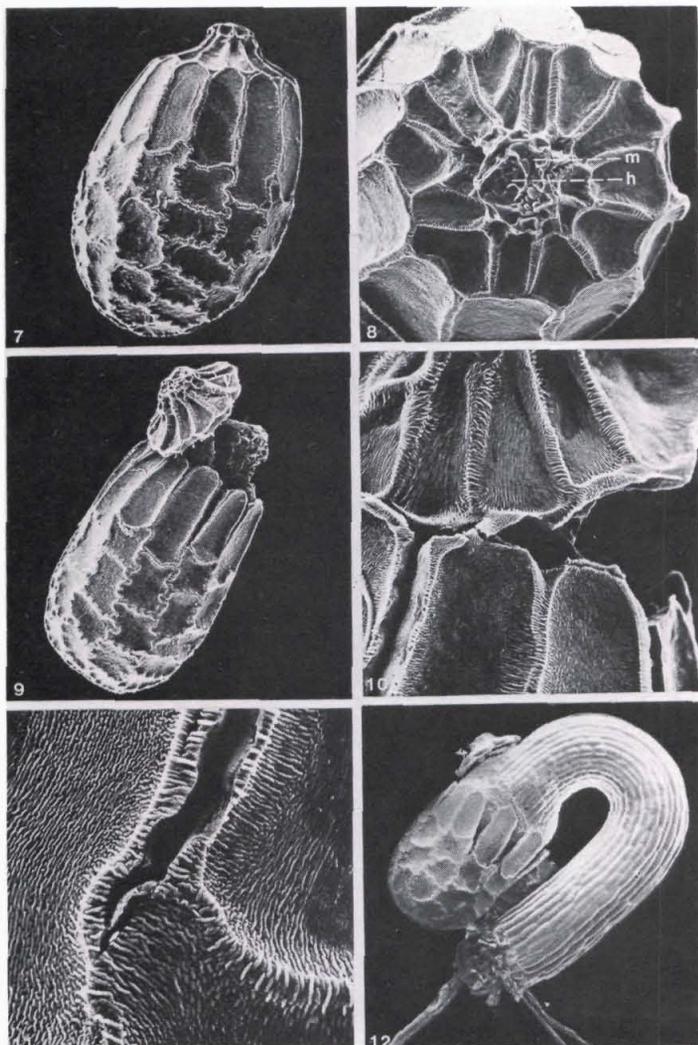
Figures 1-6: Seed forms in *Begonia*.
c = collar cells,
o = opercule,
t = testa cells.
1. *B. epipsila* ca X 122. 2. *B. elatostemmoides* ca X 193. 3. *B. putzeysiana* ca X 129. 4. *B. ebolowensis* ca X 25. 5. *B. solananthera* ca X 89. 6. *B. patula* ca X 72.

One of the most striking characteristics of the begonia seeds is the presence of specialized testa cells, the so-called collar cells. These cells are longitudinally stretched and form a transverse ring around one end of the seed. The length of the collar cells may vary from 100-150 μm (thousandth of a millimeter) in smaller seeds to more than 300 μm in the larger ones. In the most commonly occurring type of seed, they occupy about one-third of the total seed length (Fig. 1).

In the smallest seeds the collar cells may cover almost the whole testa surface (Fig. 2), whereas in the longest seeds this is only about one-sixth of the seed length

(Fig. 4). In rare cases the collar cells and adjacent testa cells are twisted (Fig. 3). In *B. solananthera* the collar cells are extremely elongated, and about 10 times as long as they are wide (Fig. 5).

The collar cells bound the micropylar-hilar part of the seed. The hilum represents the scar of the umbilical cord or funicle, the former attachment of the seed to the inner fruit wall; the micropyle is the place where originally the pollen tube entered the ovule before fertilization. The collar cells seem to represent an exclusive feature of the Begoniaceae and until now have not been recorded in any other family of flowering plants.

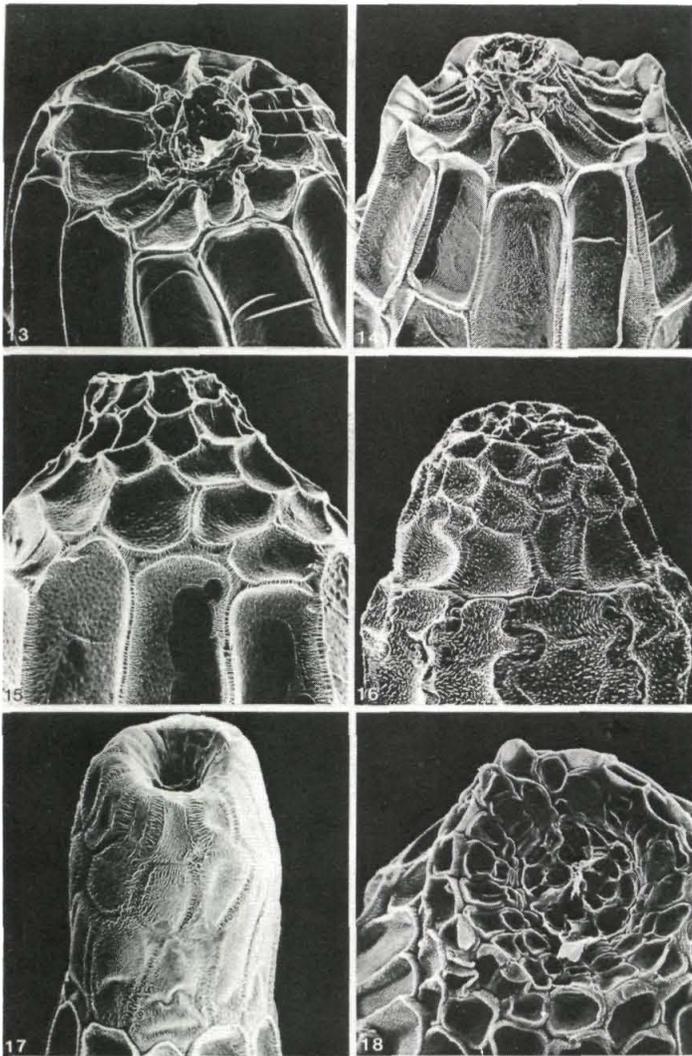


Figures 7-12: Seed germination in *B. leptotricha*.
 7. Mature seed ca X 129. 8. Top view of lid with micropyle (m) and hilar scar (h) ca X 232. 9. Empty seed coat with detached seed lid after germination ca X 100. 10, 11. Details of cell wall splitting ca X 411 and ca X 894, respectively. 12. Germinating seedling with emerged root and hypocotyl, cotyledons still enclosed by seed coat ca x 64.

Seed structure in its relation to germination
 (Figs. 7-12)

In all seeds of flowering plants the embryonic root or radicle lies under the micropyle. As a rule the seed coat around the micropyle becomes irregularly ruptured by the pressure of the growing root, but begonia seeds have a much more sophisticated mode of germination: the whole micropylar-hilar part of the seed is separated along preformed lines of rupture and is lifted off like a seed lid or operculum (compare Figs. 7-9).

The walls between the seed lid and the collar cells split along their middle lamellae (Figs. 10-11). Also, the walls between the collar cells split, and these cells thus become more or less separated from one another and may gape to clear the way for the emerging seedling (Fig. 12). The collar cells are, therefore, specialized testa cells which play a role in seed germination. The advantage of germination by means of a seed lid is that the seedling does not encounter many problems when it comes to *bursting the thick, protecting seed coat*, but liberates itself in a relatively easy way.



Figures 13-18: The seed lid.
 13. *B. rosiflora* ca X 286. 14. *B. rostrata* ca X 275. 15. *B. goudotii* ca X 275. 16. *B. dielsiana* ca X 268. 17. *B. patula* ca X 179. 18. *B. putzeysiana* ca X 400.

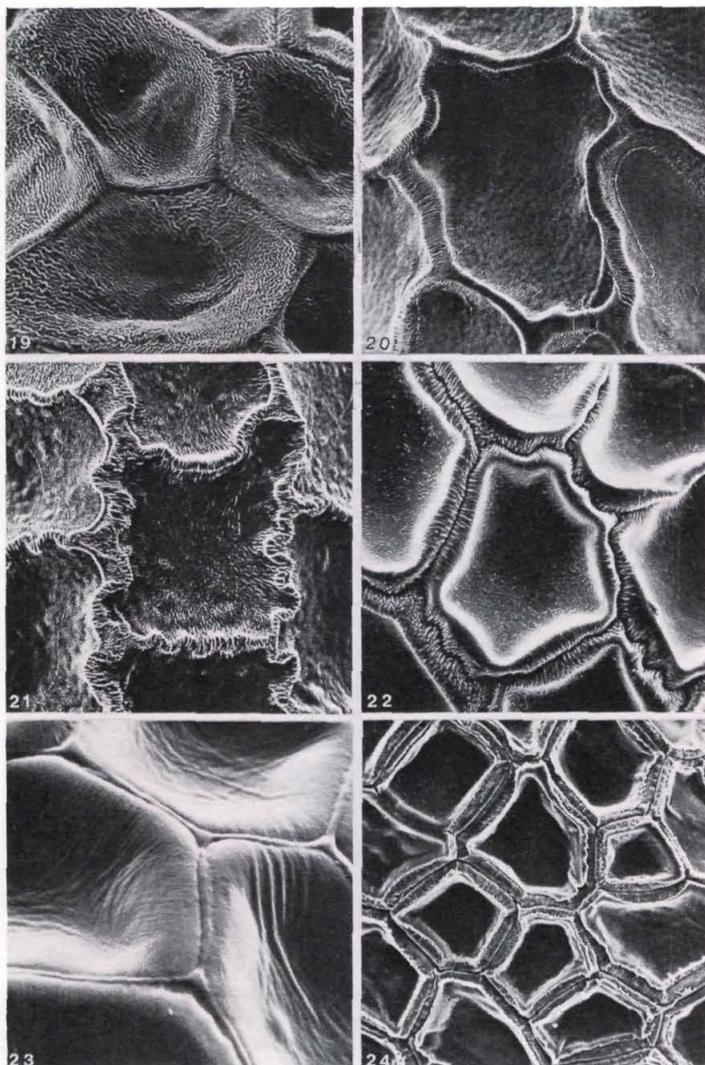
The seed lid (Figs. 13-18)

The seed lid is built up by the relatively small testa cells around the micropyle and by funicular tissue. The hilar scar is seen as an irregular group of cells with ruptured walls. The micropyle is mostly more obscure, but can be recognized by a number of small, somewhat papillose cells.

The shape of the seed lid varies considerably. It may be almost flat as in *B. rosiflora* (Fig. 13), more commonly nipple-shaped as in, for instance, *B. rostrata* and *B. goudotii* (Figs. 14 and 15), or obtuse

as in *B. dielsiana* (Fig. 16). Massive seed lids occur in the American sections *Solananthera* and *Begonia* (Figs. 5, 6, and 17, respectively). In a number of species the micropyle and hilum are sunken owing to a funnel-like outgrowth of the surrounding cells (Figs. 17 and 18).

Also, the arrangement of the testa cells of the seed lid shows variation. Sometimes the arrangement is at random, the cells are irregular in shape and gradually become smaller towards the apex. In other cases the cells are more regularly patterned and lie concentrically in respect to the collar cells, and often form a continu-



Figures 19-24:
Primary structure of
testa cells.
 19. *B. seychellensis*
 ca X 501. 20. *B. gran-*
dis ca X 536. 21. *B.*
leptotricha ca X 465.
 22. *B. rostrata* ca X
 400. 23. *B. cavallyen-*
sis ca X 501. 24. *B.*
poculifera ca X 232.

ation of the latter (Figs. 8, 13, and 14). In those cases the cells are larger and trapezium-shaped. The few remaining cells are inconspicuous. In other respects, the testa cells of the seed lid most resemble the ordinary testa cells.

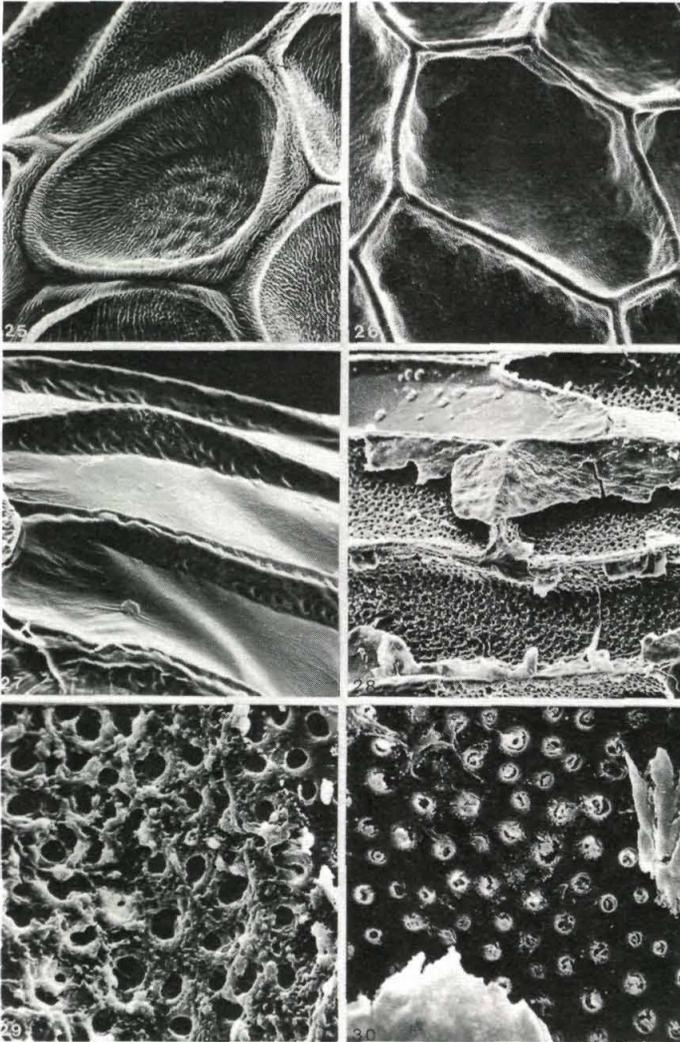
The primary sculpture of the unspecialized testa cells
 (Figs. 19-24)

According to the definition of Barthlott (1981), such micro-characters as cell shape, the course of the anticlinal (radial) walls, the relief of the cell boundaries, and the curvature of the outer walls de-

termine the primary sculpture of the seed surface.

The variation of shape of the unspecialized testa cells is rather small. They are mostly polygonal (often hexagonal) and isodiametric, sometimes more elongate, especially in some of the larger seeds. The boundary between the collar cells and the adjacent testa cells is usually rather obscure.

Quite often the testa cells lie in line with the collar cells. In bigger seeds they may form rows of cells (compare Figs. 4-6). In other seeds the testa cells are less regularly arranged. The form of the testa



Figures 25-30: Curvature of outer cell wall and the underlying structure. 25-27. Collapsed cells showing underlying pits and holes: *B. putzeysiana* ca X 983, *B. decora* ca X 626 and *B. polygonoides* ca X 268, respectively. 28-30. Pits of the inner cell walls: *B. oxyanthera* ca X 300, the same, detail, ca X 1645 and *B. schultzei* ca X 1001, respectively.

cells is the same all over the seed. There is no indication of the presence of underlying conducting tissue, visible as the raphe in many seeds. The anticlinal walls may be straight (Fig. 19), faintly to distinctly curved or undulated (Figs. 20 and 21). The number and amplitude of the curves seem to be specific in many cases.

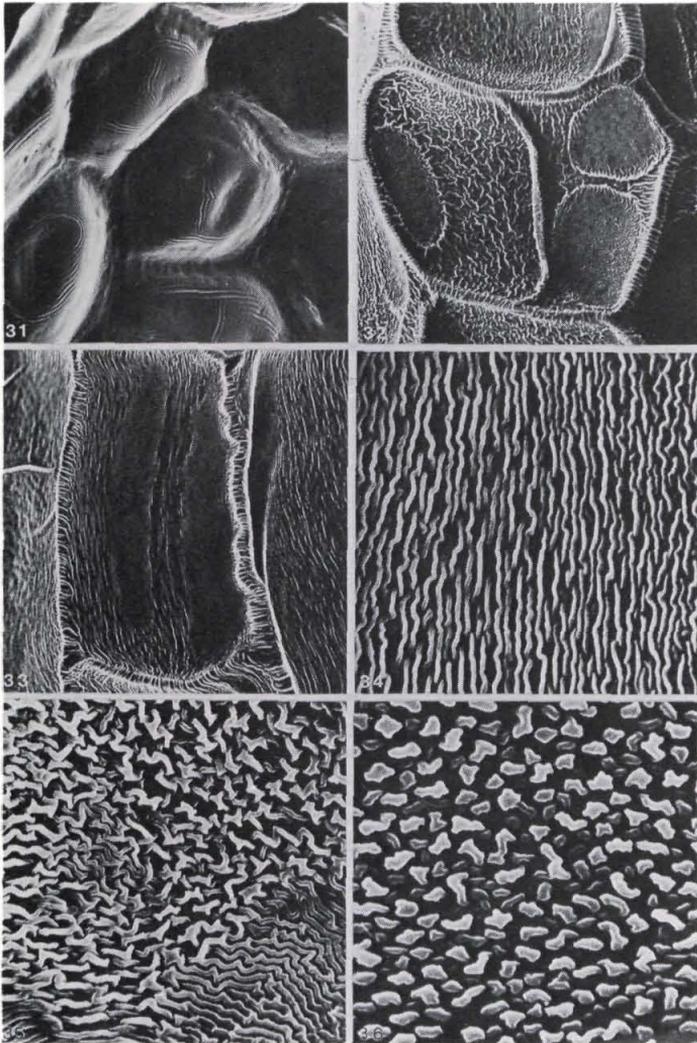
The anticlinal cell boundaries show particular structures. They can be straight, channeled (Fig. 22), or raised (Fig. 23). The small section *Squamibegonia* shows a peculiar feature in that the anticlinal walls split along the middle lamellae. The cuticle ruptures and the outermost part of

the anticlinal walls unfolds (Fig. 24).

The curvature of the outer cell wall (Figs. 25-30)

The outer cell wall of the seed coat is thin in most species of *Begonia*. In the immature seeds, this wall bulges by cell turgor. During seed maturation, the cell contents die off, and the outer wall collapses and becomes concave due to loss of tension. The outer cell wall comes to lie against the radial walls and, depending on the height of the cells, also against the inner (periclinal) wall.

In some cases, the outer wall is thin



Figures 31-36: Diversity in fine structure. 31. *B. ebolowensis* ca X 250. 32. *B. epipsila* ca X 518. 33. *B. guadensis* ca X 644. 34. *B. veitchii* ca X 2503. 35. *B. quadrialata* ca X 840. 36. *B. minutifolia* ca X 2503.

and flexible and reflects the structure of the thick inner cell walls (Figs. 25-27). These inner walls are completely thickened except for the pits, which are canal-like perforations between adjacent cells. The inner walls are never reticulate, as is the case in many wind-dispersed seeds of other families.

If the outer wall is thin and fragile it may rupture and tear off, which renders the underlying cell wall structure directly visible (Figs. 28-30). The number and size of the pits vary considerably.

The structure of the radial and periclinal walls are almost the same, except,

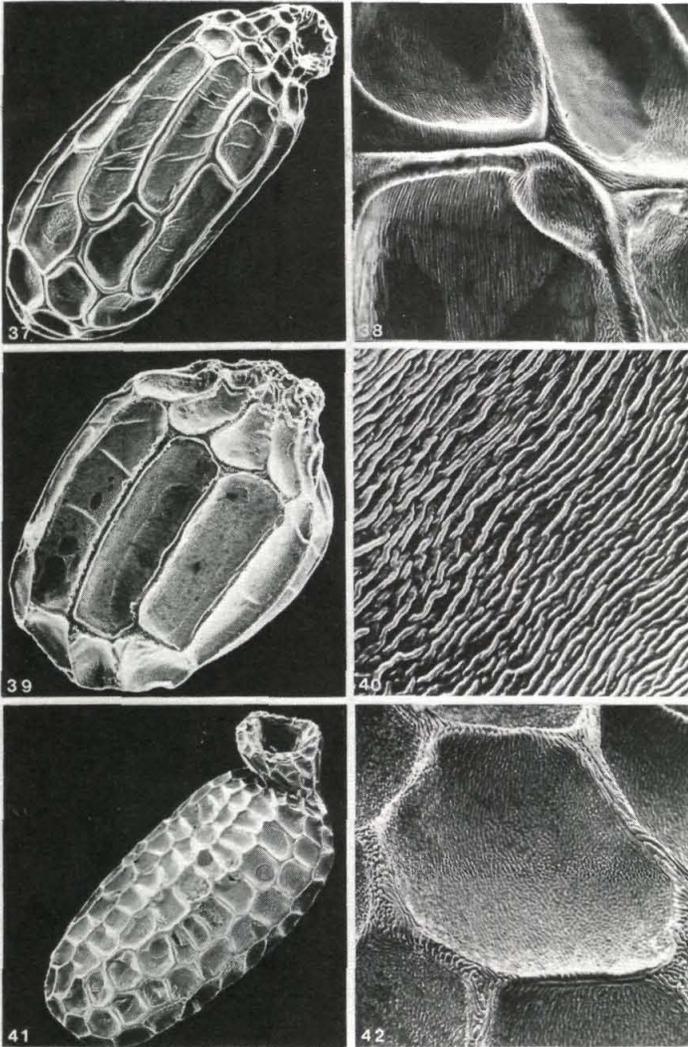
for example, in *B. decora* (Fig. 26) where the radial walls show distinct holes.

The secondary structure

(Figs. 31-36)

The surface of the testa cells is covered by a cuticle. In the majority of the begonia seeds, this cuticle shows very interesting patterns with a relief varying from weak to strongly pronounced. Completely smooth seeds are rare and only known from the African sections *Mezierea*, *Squamibegonia*, and *Tetraphila* (Fig. 31).

In the cuticular pattern we can distin-



Figures 37-42: Seeds of the closest relatives of *Begonia* (and *Begoniaceae*). 37, 38 *Hillebrandia sandwicensis* ca X 161 and ca X 1126, respectively. 39, 40. *Symbegonia* species ca X 179 and ca X 2503, respectively. 41, 42 *Datisca cannabina* ca X 72 and ca X 551, respectively.

guish long, parallel running striae (Fig. 33); shorter, slightly undulated striae (Fig. 34), which also may become more zig-zag-wise and may show bifurcations resulting in labyrinth-like structures (Fig. 35); more randomly oriented, short-bifurcated striae; and, finally, a granular or verrucose ornamentation (Fig. 36).

The above-mentioned types are not clearly distinguishable and show all kinds of transitional stages. The more linear orientation of the striae is especially found in the collar cells and corresponds with the direction of the cell elongation. At the anticlinal boundaries the cuticular striae

mostly cross transversally, or they are interrupted (Figs. 19 and 22).

Mostly the micro-ornamentation is uniformly distributed over the whole outer cell wall. In a number of species the walls of some testa cells contain one or more distinct patches of a different texture (Fig. 32). In those areas the cuticular sculpture has a flattened appearance and sometimes a contrasting orientation.

The close relatives of *Begonia* (Figs. 37-42)

In most recent systematic classifications of the *Begoniaceae*, two genera apart from

Begonia are recognized, *Hillebrandia* and *Symbegonia*. The seed characteristics of these two genera agree fully with the general seed characters of the genus *Begonia*.

The monotypic genus *Hillebrandia* has rather small seeds (about 400 μm) (Fig. 37). The borderline between the collar cells and the seed lid is rather irregular (Fig. 38). Micropyle and helum are sunken in a crooked nozzle-like protrusion. The anticlinal walls of the seed coat are manifest and have clearly channeled anticlinal boundaries. The seeds are very similar to those of *B. putzeysiana*.

Symbegonia has very small seeds (320 μm) (Fig. 39). More than half of the seed length is taken up by the broad collar cells. The distal end consists of only four to seven cells. The testa cells exhibit a faint cuticular pattern of short, mainly longitudinally running striae (Fig. 40).

The Datisceae, a small family comprising only three genera and four species, probably represent the closest allies of the Begoniaceae. The general characteristics of the Datisceae agree rather closely with those of the Begoniaceae: the seeds are minute; the mature seeds coat is formed by the outer layer of the ovular coverings and has lignified, pitted inner cell walls and shows cuticular striae; the endosperm is reduced to a single layer; and the embryo is straight. *Datisca canabina* seeds also germinate by means of a seed lid which tears off along middle lamellae, but they lack the collar cells so typical of the Begoniaceae (Figs. 41 and 42).

Conclusion

From this survey of the diversity in size, shape, and micromorphology of begonia seeds, it is clear that scanning electron microscope studies disclose a wealth of new information.

Although until now only a small percentage of the begonias have been studied for their seed characters, these data may contribute substantially towards the delimitation of species and sections and may aid in tracing their interrelationships (Bouman and De Lange, 1982). They may also help to define the relations of the genera *Hillebrandia* and *Symbegonia* with specific sections of *Begonia*. Apart from the

generally applied geographical arrangements of the various sections of *Begonia*, there is no information regarding the interrelations within the family.

As regards the relations of the Begoniaceae with other families in the order Parietales (or Violales), the ties with the Datisceae are unmistakable, both the general anatomy and the micromorphology of the seeds of both families showing much agreement.

In addition to evolutionary aspects, the seed structure may also throw light on functional aspects in relation to seed dispersal and germination. Seeds of most species of *Begonia* are dispersed by wind (anemochorous). The dry mature fruits are pendulous from their thin, flexible peduncles and dehisce with longitudinal slits.

The wings commonly present on the fruit walls help in shaking the fruit and thus promote the liberation and subsequent transport of the lightweight seeds. The cuticular foldings of the seed surface cause a superficial roughness, which is supposed to promote microturbulence and may help to slow down the rate of falling. The cuticular sculpture also increases the floating power of the seed. In many tropical and subtropical areas, often-abundant superficial streamlets of rain water may be responsible for subsequent seed transportation.

Smooth seeds in combination with fleshy fruits are known from three African sections. The sections *Squamibegonia* and *Meziera* have berry-like fruits with a white or pink fruit wall. Although no field observations have been made, dispersal by animals is most likely.

The fruits of section *Tetraphila* are also fleshy but always dehiscent. They open by valves exposing the seed-bearing placental tissue. Their seeds are provided with an aril-like outgrowth. Here dispersal by animals, presumably including ants, is probable.

The functional aspects of the seed structure in relation to germination are clearly demonstrated by the presence of the collar cells and the seed lid. The interjacent middle lamellae present predeter-

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Candidates for 1983-84 ABS elected offices

Bob Ammerman, ABS president-elect, will run unopposed for the 1983-84 ABS presidency on a slate selected by the nominating committee and reported to ABS directors by mail in June.

The president-elect's office was abolished in constitution and bylaws revisions approved by membership vote this year. Bob, proprietor of a wholesale nursery in Vista, Calif., and president of the ABS Palomar Branch, became ABS president-elect in 1982.

The other candidates, picked by the nominating committee consisting of Carol Spediacci, chairman, Glenn Maynard, and Phyllis Bates, are:

First vice president—Dan Haseltine of Chicago, current second vice president and slide librarian and past president of the ABS Greater Chicago Branch.

Second vice president—Joy Porter of Framingham, Mass., director of the Clayton M. Kelly Seed Fund and an active

member of the ABS Buxton Branch.

Third vice president—Phyllis Wright of Seattle, national director of the ABS Seattle Branch and a past officer of several other plant societies.

Secretary—George Ghiotto of Long Beach, Calif., ABS librarian, member and past officer of several ABS branches, and founder of the new South Coast Branch in Palos Verdes, Calif.

Treasurer—Bill Scarbrough of El Monte, Calif., who is running for re-election. He also is national director of the ABS Whittier Branch.

ABS President Chuck Anderson told the nominating committee he chose not to seek a second term. He will remain on the board of directors automatically as past president for a year.

Members will vote in a mail ballot. For ballot and voting instructions, see card inserted in this issue. (No petitions for additional candidates were received.)

BEGONIAN MINI-ADS

Begonia and lily catalog—35¢. Leslie & Winkey Woodriff, Fairyland Begonia and Lily Garden, 1100-B Griffith Rd., McKinleyville, CA 95521. Visitors welcome.

Violets - Begonias - Episcias

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THE THOMPSON GREENHOUSE "A Living Museum of Begonias" owned and operated by Millie and Ed Thompson. Over 1400 different species and cultivars of begonias are displayed. While in New York plan to visit. HOURS: 9-12 noon Mon., Wed., Thurs., Sat.; 2-5 p.m. Fri. Other times by appointment. Call The Thompsons at 516-283-3237. LOCATION: Southampton College Campus, Southampton, N.Y. Open all year. No admssion fee. A number of small plants are available for sale. Branches and garden groups are welcomed. Seminars by The Thompsons are also available. For arrangements and scheduling call 516-283-3237 or 516-283-1633.

BEGONIAS: ferns, violets, cactus, & more. ATKINSON'S GH, Rt. 2, Box 28, Morrilton, AR 72110. List 45¢. Rooted cuttings, reasonable prices. SPECIAL: 15 begonias \$15.95 p.p.

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Begonias—violets—episcias. Cuttings only. List 50¢. *Springtime Gardens*, 2212 Hickory, Sulphur, LA 70663.

Plant books, bulletins, and catalogs—Collection dates 1930 to 70: mainly begonia, gesnerial, fern, under lights. Send 40¢ stamps for 16-page list to Sausaman, 2058 Lombard, Phila., PA 19146.

African violets, begonias, gesneriads, terrarium and dish garden minis, cuttings only. Windowsill Gardens, Box 943, Center Moriches, NY 11934. List 35¢.

BEGONIAS: THE COMPLETE REFERENCE GUIDE, by Mildred L. and Edward J. Thompson, 384 pages, 850 illustrations (165 in color). Culture, classification, and history of begonias in one definitive volume. Price \$35 (shipping in U.S. included UPS or first class mail). For autographed copies write The Thompsons, P.O. Drawer PP, Southampton, NY 11968. Enclose \$35 check or use Master Card or Visa.

ROUND ROBINS/ *Dealing with hot summer weather*

Mary Harbaugh

Summer with its high temperatures and bright sunlight can wreak havoc with begonias. Several robin members have described for us their methods of coping with these situations.

Beryl Orchard, Mansfield, Mass., in need of shading pegged up sheets of off-white muslin. The muslin turned a grey-brown color because of dampness but her begonias seemed to respond favorably.

Art Sackenruther, Redwood City, Calif., says that 50 years ago he used white-wash for shading when he had 60,000 square feet of greenhouse glass in central Illinois. "The nice thing about this shading was that the freezing weather would break the shading loose resulting in the more light needed in the shorter days. Here in California, I use shade cloth which I like because I can take it off during the winter months."

Bob Hamm, Wichita Falls, Texas, didn't have the money to put a cooling system in his greenhouse so he stripped the greenhouse to its frame and put 70% shade cloth over it. He had great results. A few begonias received too much sun in the hottest weather but nothing too severe and most did well on the ground with baskets over them.

Bob also started using moss-lined baskets for many of his plants and they work much better than regular pots in his climate. "Whether it is the constant watering of summer or letting them dry enough in winter, they maintain a good air supply to the roots, regardless of how much you have to water or the cold and cloudiness of the weather."

Tom Hixson, Matthews, N.C., provides extra humidity in his greenhouse during the summer with a pool of water about

2' x 4' x 6" in the center between the benches.

During a six-week period when temperatures rose to over 100 degrees, Sharon Nolte of Dallas, Texas, hosed down all her outside plants every 36-48 hours. Results were good although the soil was constantly moist—much more so than it would have been in the house.

Carl Walker, Lenoir, N.C., is a light gardener. During the summer months he reverses night and day. "That way the heat from the lights is available when temperatures are lower . . . I have them off and the room is closed from the heat during the day. Since I'm at work during the day it means that anytime I have trouble sleeping, I can work with the plants!"

Insecticidal soap

A number of robin members have been trying out the new insecticidal soap mentioned in a previous column.

Ruth Silverman of New Paltz, N.Y., tried it against scale on fern and didn't have very good results. However, it did safely work against scale on her orchids and begonias.

Carl Walker said a friend of his had a very large fern covered with scale and she decided she had nothing to lose by dipping the entire plant in full-strength insecticidal soap. She was a little concerned since it was recommended to use lower strength on ferns, but the scale problem was completely eliminated with no apparent damage to the plant.

Joyce Martin, Liberty, Ill., is making progress against scale and mealybugs by using the soap at $\frac{3}{4}$ strength with repeat sprayings. Before spraying she breaks the crust on the scales to get any eggs and crawlers that might be there.

Mae Blanton, Lake Dallas, Texas, says insecticidal soap is the first thing she has found that works well against soft brown scale. Her *B. 'Bessie Buxton'* was covered top to bottom with scale. She was able to rid it of scale by saturating the plant two to four times at intervals without damaging a leaf.

Maxine Zinman, Boyce, Va., found the

Information about joining a robin—a packet of letters circulated among begonia lovers—is available from Mary Harbaugh, round robin director. Write to her at W2899 Homewood Ave., Shawano, WI 54166. Please include a self-addressed stamped envelope.

soap to be great against mealybugs on hoyas and begonias. She did notice a little burning on her ferns.

Eric Smith, Aloha, Ore., finds the soap to work better than any pesticides he had been using. He had a purple passion plant and a couple of kalanchoes that were being eaten alive with aphids. He tried a houseplant spray several times without much effect. Then he sprayed them with a garden insecticide, but still no results. Finally, he used insecticidal soap twice at three-day intervals and eliminated the aphids.

Alternatives for pest control

Mabel Corwin, Vista, Calif., has found another effective method for dealing with mealybugs. She puts the affected plant into a large plastic bag with a no-pest strip, closes it up tight, and leaves it overnight. She has never had any damage to her begonias. This method gets the mealybugs down in the joints and under the stipules where a spray might not reach.

In a similar vein, Kathleen Herr of Marion, Ohio, places moth crystals into a paper bag, terrarium, or similar device along with a plant infested with cyclamen mites for several hours—less time if the temperatures are high. She says the mites respire much faster than the plants, and so they die before the plants have had a chance to absorb enough of the fumes to harm them.

She does give us several warnings about their use. “Don’t let the crystals touch the foliage—it will die. “Don’t use this on young plantlets and don’t put the moth crystals into a plastic container—it will melt. Repeat treatments are probably necessary to get any mites which hatch later.

Rhodora Buss, Le Mars, Iowa, prefers to swab mealybugs with camphor instead of alcohol. She finds that it works better for her as the odor clings after the rest evaporates. She swabs the mealies with toothpicks and cotton and then isolates the plant.

Growing begonias

Frances Hoffman, Northport, N.Y., has found that if *B. hatacoa* ‘Silver’ is not

kept in a warm, moist, well-ventilated place it has a tendency to mildew and lose those silvery leaves.

Joyce Smith thinks *B. hatacoa* would do best in a terrarium. When she grew one that way it became enormous and produced heavy bloom a good part of the time.

King Langenberg finds *B. ‘Eunice Gray’* to be one of his best. It grows very full and lush with thick, shiny leaves. In fact, it grows so fast he has to cut it back once a month. King thinks it should be grown if only for a supply of cuttings to give away in an attempt to hook others on our hobby!

Mabel Corwin describes *B. rhopalocarpa* as a rangy grower, not really scandent but it puts out long shoots. The blooms come from the leaf axils instead of on a stem. The seed pods are long and skinny instead of the usual shape. When two of hers matured, they were a yellow-orange color. She was waiting for them to split as *B. ebolowensis* does. Instead, they opened up at the tip and peeled back just like you would peel a banana. The whole thing was bright orange. “Very interesting!”

Mabel also described as very unusual *B. ‘Jabberwocky’*, which is a cross of *B. gehrtii* x U003. It has the rough texture of *gehrtii* and the dark brown color of U003. New growth has a pink cast which just sort of glows. She finds it to be a very vigorous grower.

Dael Jones of Dallas, Texas, said, “Imagine my distress, after having given away a number of *B. exotica* cuttings to read in an old issue of the *Begonian* that those who did this often lost the parent plant! I am pleased to report that mine did not reward me so poorly and still is beautiful.”

Finally, a bit of contemplation on begonias and nature from Dael. “I had been looking at *B. chlorosticta* for several months before realizing that the spots are not random, as I had supposed. Rather, they are in a very definite spiral pattern which runs all through nature: the spiral nebulae, tropical storms when viewed from satellite cameras, the placement of

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QUESTION BOX / *What's leaf mold and where do I get it?*

Mabel Corwin

Question: Many times in *The Begonian* and in other books, people refer to their use of "leaf mold." How does one acquire it, what is it actually, and if one were to attempt to make it, what types of leaves and how do you go about it? I would like to try this ingredient in potting mix, but really know nothing about it. What is the benefit in it, what does it contain (nutrients), and what type of plants should it be used on?

Answer: Leaf mold is usually made from oak leaves. It is simply the leaves that are coarsely ground and partly broken down. Other leaves can be used, but oak leaves seem to be most satisfactory. As the leaves decompose they make humus and do provide some nutrients. One advantage to using good leaf mold is that it loosens the mix and adds organic matter.

Many years ago when I started growing begonias, oak leaf mold was a very popular ingredient in the mix. I think most growers no longer use leaf mold because it isn't available. If we can find a product labeled leaf mold it is usually a heavy material, completely broken down. I don't like to use this in my mix. Good leaf mold is light and rather fluffy.

In some areas people can go into the woods and collect their own. Since most of us can't do that, we have to make do with whatever is available to us. I think we each have to experiment with different mixes until we find the one that works best for us, using the products available to us in our local garden centers.

I start with a packaged mix and add perlite, fir bark, and redwood soil conditioner until the mix feels loose and friable. If you can find good leaf mold, by all means use it. If it is not available, you can still grow good begonias using other materials.

Send questions about begonia growing to Mabel Corwin, 1119 Loma Vista Way, Vista, CA 92083. Include a stamped, self-addressed envelope; you'll get a prompt reply.

Question: How can I safely move my household of begonias from the northern San Joaquin valley to Phoenix, Ariz., in the middle of summer? A direct drive takes 13 hours going very fast. Some plants are very large, some are young and fragile. There are several in glass terrariums.

Answer: I'm not sure you can move your plants safely to Phoenix in the middle of summer. The best advice I can give is to insulate them as much as possible. You can lay the plant on its side (even the large ones) and roll in something for insulation. A thick layer of newspaper works well, or large sheets of plastic material used for packing if that is available.

Sometimes large plants are placed inside an old pillowcase to pull the leaves and branches together, then wrapped with newspapers. When handled this way they can be laid on their sides and stacked one on top of the other for traveling.

Smaller plants can also be rolled in newspapers or corrugated cardboard and placed together in a large box with a lid. Small plants and glass or plastic terrariums can be moved successfully when packed in foam plastic ice chests. Some damp sphagnum moss can be placed in the bottom. This method protects from both heat and cold.

If the plants are going in a moving van it would be helpful to place them near the center of the load. If they are traveling in a car or station wagon it would be important to pack them where the sun won't shine on them.

Question: I have long been perplexed about how often to pinch a begonia. Can you give me any rule of thumb? Probably the ideal way is to know when a particular variety blooms. Is there any publication that gives approximate times of blooming? I went to the New York Convention and loved it, but when I came home to my plants I realized how far I had to go.

Answer: Begonias don't require a lot of pinching, but a little is very important. When the plant has been resting and is

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ABS NEWS/ *Oklahoma spectacular—warmup for 1984*

The ABS Barkley Branch staged a spectacular branch show in Oklahoma City, Okla., in April as a successful early rehearsal for ABS' first-ever spring convention and show in 1984.

The convention will take place at the Hilton Hotel in Dallas on April 12-15, it

was decided after the Southwest Region's annual Get-Together, held along with the Barkley show on April 15-17.

One-hundred eighty-nine entries comprised the show, which qualified to issue ABS cultural awards for the first time.

Best-in-show winner was *B. nelumbii-folia* grown by Merrill and Kathlyn Calvert of Choctaw, Okla. The show and adjoining plant sale filled the senior citizens center in Oklahoma City's Will Rogers Park.

At the Southwest Region's annual meeting, Tamsin Boardman of Roanoke, Tex., was elected director. The region and the Oklahoma and Texas branches within it will host the 1984 convention.

Dorothy Patrick of Dallas will be convention chairman. Her show chairman
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Photos/Chuck Anderson

Judges (left to right) Glennis Crouch, Gil Estrada, and May McKnight confer about a pustulated-leaf rhizomatous begonia at the Barkley Branch show in Oklahoma City, Okla. The show itself (below), a rehearsal for the 1984 ABS convention and show, was impressive.



More ABS news

From page 83

will be Jean Barron of Shawnee, Okla., a veteran of many plant shows and director of the Barkley show.

At a convention brainstorming session attended by ABS President Chuck Anderson and Past President Gil Estrada, planners tentatively decided on a western round-up theme. Among events under

consideration are daily aerobic exercise sessions, a birding trip, a cuttings "snip and snitch" party, and seminars for members of the public as well as ones for ABS members.

Buxton Branch information day

The Buxton Branch held its fourth annual "Begonia Day"—an information day for the public—in Waltham, Mass., on April 23. The event serves as a follow-up

In memoriam:

Worth Brown

Worth A. Brown, an ABS member since 1936 and a partner in Brown Bulb Ranch of Capitola, Calif., the world's largest wholesale grower of tuberous begonias, has died at age 73.

Worth and his brother Allan operated the business started by their father, James A. Brown, in 1911. Allan now lives in Santa Cruz, Calif., and the company is run by his and Worth's sons.

Author of the 1948 book, *Tuberous Begonias*, Worth also was active in numerous horticultural trade associations and local business organizations. He succumbed last July 8.

Wanda Elin

Wanda Dale Elin, an ABS member since 1964, died May 11 from cancer. A member of the Orange County Branch, the Rubidoux Branch, and Garden Grove Branch, she also was active as a show judge and clerk and served as a branch national representative.

She was an expert grower of all types



Wanda Elin

of plants, but favored begonias. She won many trophies and cultural awards at begonia shows and also took top honors for displays entered in the Los Angeles County Fair and at other shows.

B. 'Wanda' was named in her honor by hybridizer Leo Porter. A specimen grown by her sister-in-law, Glenda Elin, won Best New Introduction in the 1971 ABS show.

Wanda is survived by her husband, Tom, a daughter, Terri, her mother, Ann Brown, a brother, Gordon McCracken, and many other relatives and friends. Services were held May 13 in Brea, Calif.

Herbert Moline

Herbert Moline, vice president of the San Francisco Branch, died March 30. A former botany professor at University of Minnesota, he gave up teaching several years ago when he developed Lou Gehrig's disease.

A member of the San Francisco Branch for four years, Herb worked as a gardener on a local estate and served as a church organist.

Services were held in Minnesota.

Carl Laipple Sr.

Carl Laipple Sr., long-time grower and member of the San Francisco Branch, died February 27 following a long illness. With his wife Hilda, who survives him, he grew all types of begonias.

Also surviving are two sons, Carl Jr. active staging San Francisco Branch shows, and Robert.

for questions that are asked at the branch booth in the Massachusetts Horticultural Society's New England Spring Flower Show, held in March.

Hugh Mack, Rhode Island, demonstrated growing from seed and Dick Spencer gave demonstrations about propagation, soils, potting, and pesticides. Sue Blair, New Hampshire, showed many kinds of containers while demonstrating contained-atmosphere growing.

Summer branch shows

Despite hardships brought on by heavier-than-usual winter storms in many parts of the country, ABS branches are busy preparing for summer shows.

The Sacramento Branch will present Begoniasta Ferndango Aug. 6-7 at the Shepard Garden and Arts Center, 3330 McKinley Blvd. Begonias, ferns, and other shade plants will be on display, and demonstrations will be presented. Hours will be 2 to 6 p.m. Saturday and 10 a.m. to 3 p.m. Sunday.

The Greater Chicago Area Branch has scheduled its fourth annual show on Labor Day weekend, Sept. 2-4, at the Botanic Garden in Glencoe, Ill. Last year

6,000 people viewed the show.

A new site, Tanforan Park Shopping Center, has been selected by the San Francisco Branch for its show and sale. The spectacular display of begonias, especially tuberous, is set for July 30-31. Branch members also will participate in the annual San Francisco County Fair Flower Show, to be held the same weekend as the ABS Riverside convention, Aug. 18-21.

The previous weekend, Aug. 13-14, San Gabriel Valley Branch will hold its show and sale. The Eastside Begonia Branch in Seattle stages its show the same weekend in conjunction with the Puget Sound Gesneriad Show at the Crossroads shopping center.

Also Aug. 13-14, Garden Grove Branch will stage its annual show at the Huntington Center, corner of Brookhurst and Edinger in Huntington Beach.

New ABS branch

A charter was issued May 5 to a new ABS branch—the Dallas Area Branch. An organizer of the group, Dorothy Patrick, is serving as president. Forty-three individuals are listed as founding members on the branch's charter.

NEW BOOKS!

African Violets and Related Plants. 117 color photos plus 21 photos of gesneriads. \$4.50.

Begonia Portraits. Collector's item by the late Alice Clark. Only a few copies. \$11 hard cover.

Ferns. How to identify and grow 84 common ferns. Color photos. \$4.50.

Mother Nature's Secrets for Thriving Indoor Plants. Fundamentals of indoor gardening. Color photos and information on 341 house plants. \$5.

Still available:

Begonia. Misono, 1974. Japanese text with 302 good color photos identified in English. \$30 hard cover. (English translation with no no photos. \$5.50 paperback. Order both for \$34.)

Begonias. Japanese text with 431 excellent color photos from 1980. \$23 paperback.

Begonias for Beginners. Elda Haring's popular primer published in 1976. Very useful. Now sold only by the ABS Bookstore. \$6 hard cover.

Les Begonia. Charles Chevalier's classic 1938 study of the begonia family translated by Alva Graham from the French in 1975. Illustrated. \$5 paperback.

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SEED FUND/ *Prize-winning B. nelumbiifolia*

Joy Porter, director, Clayton M. Kelly Seed Fund

- M-J 1 — U099: It is not known if this *Begonia* is hybrid or species. Grower purchased as an African species. Grows to 6 feet staked. Leaves are dark green, sparse-hairy, 2½ x 8-10 inches. Large inflorescence of medium-size white flowers in spring. Tips of some mature leaves have strange, irregular lobes. per pkt 1.00
- M-J 2 — U100: A rhizomatous species with a pale green, hairy leaf and white flowers in spring. Seed collected near El Valle, Panama. . . per pkt 1.00
- M-J 3 — *B. rigida*: thick-stemmed, large-leaved species from Brazil, seldom branching, with white flowers in spring. Stem is dark red, woody with age. Leaf petioles light red, which is the only difference from the *B. tomentosa* grown in some parts of this country. Could be the same, as color can be misleading in determinations. per pkt 1.00
- M-J 4 — *B. incarnata*: small shrub-type species with light green 1½x4-inch leaves with undulating margins. With pinching it makes a lovely basket plant. Pink flowers in winter. per pkt .50
- M-J 5 — *B. williamsii*, syn. *B. wollnyi*: semi-tuberous species with thick stem and lovely lobed green leaves with white markings. Under greenhouse conditions, loses leaves in winter, blooming on bare stems with medium-size pale pink flowers. per pkt 1.00
- M-J 6 — *B. nelumbiifolia*: rhizomatous species with large green peltate leaves named for its resemblance to the pond lily. Clouds of small white flowers in early spring. A large specimen won 'Best in Show' at the recent Barkley Branch show. per pkt .50
- M-J 7 — *B. bracteosa*: shrub-like, bare-leaved species—one of the few begonias with a slight purple tinge to its rose-colored flowers. Has been grown over the years as *B. roezlii* and as 'Machu Picchu' because it has been found growing in the ancient Inca fortress in Peru. Frost in that area 10 months of the year! per pkt 1.00
- M-J 8 — *B. ludwigii*: species from Ecuador classified as thick-stem, trunk-like; however, when grown from seed, forms good-sized tubers under the soil-line, and goes dormant in winter under greenhouse conditions. (Does not go dormant with 12-14 hours under lights.) Large cleft green umbrella-like leaves with a touch of red at the sinus. Bright

Photo/Chuck Anderson



This *B. nelumbiifolia*, grown by Merrill and Kathlyn Calvert of Choctaw, Okla., was best-in-show at the April Barkley Branch show. The species is offered in this month's Seed Fund.

- silver-white tips decorate each lobe. Ivory-white flowers in spring. per pkt 1.00
- M-J 9 — *B. coccinea*: small cane-type species from Brazil with medium green rubbery leaves and bright red flowers in late winter. Parent of many hybrids. If you ordered M-A 10, try this also and we can have a comparison. per pkt .50
- M-J 10 — *Quercifilix zeylanicus*: Oak (leaf) fern. Spores. per pkt .50

PAMPHLETS

Begonias from Seed, Sowing and Growing ea. .25

Note to Canadian customers: U.S. banks now charge a \$3.00 collection fee for Canadian Postal Money Orders. Please send an International Bank Money Order in U.S. funds which may be purchased at any Canadian bank. Postage for seed orders to Canada is same as continental U.S.—40 cents.

Notice to all customers: If ordering more than 10 packets of seed, please include 50¢ postage.

Send orders to Joy Porter, 9 Bayberry Lane, Framingham, MA 01701. Include self-addressed, stamped envelope or add 40 cents for padded, hand-cancelled package. Massachusetts residents add 5% sales tax. Checks and money orders should be made payable to: Clayton M. Kelly Seed Fund. Foreign orders: U.S. funds only and add \$1.20 for postage.

More Question box

From page 82

ready to make new growth, I cut back part way. Then when the new growth has three or four growth buds I pinch out the tip. This is usually all that is necessary to make a bushy plant with lots of blooms. It is not necessary, or wise, to continue pinching for a long period of time. Don't hesitate to cut or pinch branches when necessary to make a well-shaped plant.

Young cane begonias should have the tip pinched out. This will force new growth from the base. The tip of the rhizome should be pinched or cut off rhizomatous plants. This is usually done when the rhizome reaches the edge of the pot. This forces new growth along the rhizome and makes a nice full plant.

It is helpful to know the blooming season of the plant so you don't cut it back at the wrong time. Most of my begonias are cut back and pinched in the spring. However, *B. solananthera* and its hybrids are winter-spring bloomers and should not be cut back until after blooming.

Bloom information is available in *The Thompson Begonia Guide*, volume II, and in *Begonias: The Complete Reference*

Guide, both by Ed and Millie Thompson. The blooming season and the color of bloom are listed.

I think you should find the Thompson book *Begonias* very helpful. I find myself referring to it often for some specific information. Don't try to digest it all at once. Just take one thing at a time and use it. It is a wonderful book and we are fortunate to have so much information in one volume.

Even those of us who have been growing begonias for a very long time have a lot to learn. So don't be discouraged, just keep learning a little at a time and have fun!

Don't miss an issue . . .

Check address label.

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Elisabeth Sayers, membership secretary
369 Ridge Vista Ave.
San Jose, CA 95127

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Mary Church, Pres.
1090 E. Grant Rd.,
Tucson, AZ 85719
Barbara Rogers, Natl. Dir.

California

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5630 Bellevue Ave.,
La Jolla, CA 92037
Margaret Lee, Natl. Dir.

CENTRAL SAN JOAQUIN BRANCH

Mary L. Lane, Pres.
19239 Road 232, Strathmore,
CA 93267

Esther Passet, Natl. Dir.

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3rd Thursday, 7:45 p.m.
Northbrae Community Church,
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Milton Watt, Pres.
119 Kenyon Ave.,
Kensington, CA 94708

Helen Myers, Natl. Dir.

GARDEN GROVE BRANCH

3rd Thursday, 7:30 p.m.
Woman's Civic Club,
9501 Chapman Ave.,
Garden Grove, Calif.

Arthur Monday, Pres.
12881 Sylvan, Garden
Grove, CA 92645

George Allison, Natl. Dir.

GLENDALE BRANCH

2nd Tuesday, 7:45 p.m.
Glendale Federal S & L,
401 N. Brand, Glendale, Calif.

Helen Baker, Pres.
1832 N. Ontario St.,
Burbank, CA 91505

Darlene Fuentes, Natl. Dir.

LONG BEACH PARENT CHAPTER

2nd Sunday, 1:30 p.m., Great
Western S & L

6330 E. Spring St., Long Beach
George Ghiotto, Pres.

702 Sunrise Blvd., Long
Beach, CA 90806

Florence Hess, Natl. Dir.

MONTEREY BAY AREA BRANCH

4th Wednesday, 8:00 p.m.
New Monterey Neighborhood
Center

Lighthouse and Dickman Sts.,
New Monterey, Calif.

Raymond Peterson, Pres.
192 Walker Valley Rd.,
Castroville, CA 95012

Leslie Hatfield, Natl. Dir.

NORTH LONG BEACH BRANCH

2nd Tuesday, 7:30 p.m.
Mercury S&L

4140 Long Beach Blvd., Long
Beach

Edith Van Landingham, Pres.
6925 Lime Ave., Long Beach,
CA 90807

George Ghiotto, Natl. Dir.

ORANGE COUNTY BRANCH

2nd Thursday, 7:30 p.m.
Fullerton S & L, 2310 E. Lincoln
Ave., Anaheim

Barbara Vallejos, Pres.
1021 Cardiff,
Anaheim, CA 92806

Sandy Sandoval, Natl. Dir.

PALOMAR BRANCH

2nd Thursday, 7:30 p.m.
Glendale Fed'ral Savings & Loan
Katherine Belz, Pres.
2767 High Mead Circle,

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immediately and send a copy
of your letter to the editors.*

Vista, CA 92083
Patrick Worley, Natl. Dir.

RUBIDOUX BRANCH

4th Thursday, 7:30 p.m.
West Riverside Memorial
Auditorium
4393 Riverview Dr., Rubidoux
Glenda Elin, Pres.
5390 Camino Real,
Indian Hills, Riverside, CA
92509

R. H. Terrell, Natl. Dir.

SACRAMENTO BRANCH

3rd Tuesday, 7:45 p.m.,
Garden Center

3330 McKinley Blvd.,
Sacramento, Calif.

Joan Coulat, Pres.

4111 De Paul Ct.,
Sacramento, CA 95821

Marvin Vipond, Natl. Dir.

SAN FRANCISCO BRANCH

1st Wednesday, 8:00 p.m.,
Garden Center

Golden Gate Park, 9th Avenue
and Lincoln Way

Carol Spediacci, Pres.
1189 Glenwood Dr.,
Millbrae, CA 94030

Dolores Dupre, Natl. Dir.

SAN GABRIEL VALLEY BRANCH

2nd Tuesday, 7:45 p.m., Los
Angeles State and County
Arboretum

301 N. Baldwin Ave., Arcadia,
Calif.

Linda Proctor, Pres.
201 N. Sunset Pl.
Monrovia, CA 91016

Louise Best, Natl. Dir.

SAN MIGUEL BRANCH

1st Wednesday, 7:30 p.m., Casa
del Prado, Rm. 104, Balboa

Bob Ammerman, Pres.
1770 Foothill Dr.,
Vista, CA 92083

Juana Curtis, Natl. Dir.

SANTA BARBARA BRANCH

4th Saturday, 7:30 p.m.
Louise Lowry Davis Recreation
Center

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Dara Emery, Pres.
517 W. Junipero St., No. 2,
Santa Barbara, CA 93105

Kay Willis, Natl. Dir.

SANTA CLARA VALLEY BRANCH

3rd Thursday, 7:45 p.m.
Elisabeth Sayers, Pres.
369 Ridge Vista Ave.,
San Jose, CA 95127

Mary Margaret Rafferty,
Natl. Dir.

THEODOSIA BURR SHEPHERD BRANCH

1st Tuesday, 7:30 p.m., Senior
Citizens Bldg., 420 Santa
Clara St., Ventura, Calif.

Norm Rohn, Pres.
2033 N. Latham,
Camarillo, CA 93010

Mary Stine, Natl. Dir.

WESTCHESTER BRANCH

1st Thursday, 7:30 p.m.
Allstate Savings,
8800 S. Sepulveda Blvd.

Los Angeles
Pat McElderry, Pres.
5137 Inadale Ave.,
Los Angeles, CA 90043
Clair M. Christensen, Natl. Dir.

WHITTIER BRANCH

1st Thursday, 7:30 p.m., Palm
Park Community Center

5703 South Palm Avenue,
Whittier

Connie Thornburg, Pres.
9535 Nan St.,
Pico Rivera, CA 90660
Billy Scarbrough, Natl. Dir.

Connecticut

CONNECTICUT BRANCH

4th Monday, Homes of members
Arline Peck, Pres.

Eagle Peak Rd., Pascoag, RI
02859
Priscilla Beck, Natl. Dir.

District of Columbia Area

POTOMAC BRANCH

4th Sunday, 2:00 p.m.,
Sherwood Hall Library,
1205 Sherwood Hall Lane,
Alexandria, VA

Maxine Zinman, Pres.
Rte 1, Box 73, Boyce, VA 22620
Linda Record, Natl. Dir.

Florida

JACKSONVILLE BRANCH

3rd Monday, 7:30 p.m.
Agricultural Ctr.,
1010 North McDuff Ave.

Ed Harrell, Pres.
1628 Broward Rd.,
Jacksonville, FL 32218

Mary Harrell, Natl. Dir.

MIAMI BRANCH

4th Tuesday, 8:00 p.m.
Simpson Memorial Garden
Center

55 South West 17th Road,
Miami, Florida

Maybelle Green, Pres.
13940 Harrison St.,
Miami, FL 33176

Charles J. Jaros, Natl. Dir.

PALM BEACHES BRANCH

2nd Monday, Mounts
Horticultural Learning Center,
531 N. Military Trail,
West Palm Beach

Edwin F. Maley, Pres.
1365 Redpine Trail, West
Palm Beach, FL 33411

Helene Jaros, Natl. Dir.

TAMPA BAY AREA BRANCH

4th Thursday, 7:30 p.m.
Seminoole Garden Center,
5800 Central Ave., Tampa

Mary Breit, Pres.
2713 N. B St., Tampa, FL 33609
Marie Van Etten, Natl. Dir.

Illinois

GREATER CHICAGO AREA BRANCH

4th Sunday, except Dec., 2 p.m.
Oak Park Conservatory

561 Garfield, Oak Park, Ill.
Mary Weinberg, Pres.
1527 W. Highland Ave.,
Chicago, IL 60660

Virginia Beatty, Natl. Dir.

Massachusetts

BUXTON BRANCH

3rd Saturday, Mass. Bay
Community College,
Rosemary Norton, Pres.

979 South St., Roslindale,
MA 02131

Percy Ehrlich, Natl. Dir.

Minnesota

MINNESOTA BRANCH

2nd Wednesday, 7:30 p.m.
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1840 Eighth St., Elk River,
MN 55330
Thelma Adair, Natl. Dir.

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ELSA FORT BRANCH

Helen Green, Pres.
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NJ 08077
Gladys Cooper, Natl. Dir.

New York

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Herbert E. Speanburg, Pres.
75 Swagertown Rd., Scotia,
NY 12302

HAMPTON BRANCH

2nd Monday, 7:45 p.m., Parrish
Memorial Hall, Southampton,
NY
Ed Thompson, Pres.
310-A Hill St., Southampton,
N.Y. 11968
Mary Burnaford, Natl. Dir.

KNICKERBOCKER BRANCH

2nd Tuesday, 7:30 p.m.
Horticultural Society of New
York
128 West 58th St., New York,
N.Y.

Gerald Goodman, Pres.
102-35 67th Rd., No. 5K,
Forest Hills, NY 11375
Howard Berg, Natl. Dir.

LONG ISLAND BRANCH

2nd Wednesday, 8:00 p.m.
Planting Fields Arboretum
Oyster Bay, Long Island, N.Y.
Mrs. Martha Graham, Pres.
55 Duryea Rd., Melville,
NY 11746
Marie Donnelly, Natl. Dir.

Ohio

GREATER CINCINNATI BRANCH

Verda Stull, Pres.
5 Burnham St., Cincinnati, OH
45218
Erich Steiniger, Natl. Dir.

Oklahoma

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1st Sunday, 2:30 p.m.
Huey Long Community Center,
Del City, Okla.
Merril Calvert, Pres.
11201 Draper, Choctaw,
OK 73020
Ruth Wills, Natl. Dir.

Pennsylvania

EDNA STEWART PITTSBURGH BRANCH

3rd Wednesday, 7:30 p.m.
Pittsburgh Civic
Garden Center
Suzanne Colaizzi, Pres.
115 Lillian Rd., Pittsburgh,
PA 15237
Frank Kerin, Natl. Dir.

WESTERN PENNSYLVANIA BRANCH

2nd Wednesday, 11 a.m.
Ricardo's Restaurant,
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Antonette Ponteri, Pres.
407 Canterbury Trail, Mars, PA
16046

WILLIAM PENN BRANCH

4th Tuesday, noon, Homes of
members
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Dove Lake House, Gladwyne,
PA 19035
Mrs. Lancelot Sims, Natl. Dir.

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3rd Monday night, Homes
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Eagle Peak Rd., RFD #1,
Box 478, Pascoag, RI 02859

Southwest

SOUTHWEST REGION

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2951 Elliott, Wichita,
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Texas

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234 Tallant Dr., Houston
TX 77076

COASTAL BEND BEGONIA SOCIETY

Helen Gonzales, Pres.
Rt. 1, Box 103, Taft, TX 78390

DALLAS AREA BRANCH

Dorothy Patrick, Pres.
and Natl. Dir.
1023 Elmdale, Dallas, TX 75224

HOUSTON TEXAS BRANCH

4th Monday, 10:30 a.m., Garden
Center, 1500 Herman Dr.,
Houston, Tex.
Nancy Blakeman, Pres.
1838 Bayhurst, Houston, TX
77024
Mrs. Grant Herzog, Natl. Dir.

MAE BLANTON BRANCH

4th Wednesday, 10 a.m.
Homes of members
Mae Blanton, Pres.
118 Wildoak Dr., Lake
Dallas, TX 75065
Glennis Crouch, Natl. Dir.

Washington

EASTSIDE BEGONIA BRANCH

4th Wednesday, 7:30 p.m.
590 116th Avenue N.E.,
Bellevue, Wash.
Lewis VanderCook, Pres.
12671 SE 161st St.,
Renton, WA 98055

SEATTLE BRANCH

3rd Tuesday, 7:30 p.m., Bethany
Lutheran Church, 7400
Woodlawn Ave., N.E.
Anton Soder, Larry Fullner,
Robert McCarter, Co-Presidents
Phyllis Wright, Natl. Dir.

SOUTH SEATTLE BRANCH

4th Tuesday, 7:30 p.m.,
Wm. Moshier Field House
430 S. 156th St., Seattle
Joanne Slosser, Pres.
16419 3rd Ave., S.W., Seattle,
WA 98166
Shel Fisher, Natl. Dir.

More Round robins

From page 81

seeds in a sunflower, the positions of branches on trees when seen from directly above, and the spiral of certain seashells.

"As an artist and designer one of my chief delights in plants is observing nature's endless patterns and color combinations. There are unbelievable repetitions from one thing to another, but always with incredible variety.

"No artist could ever bring as many changes as does nature! And no one will ever see them all."

When to start new plants

When Mabel Corwin has a nice healthy plant she usually puts a leaf down in the

cutting box and starts a new plant. "There are usually a few rexes that don't come out in the spring like they should. Those I discard and replace with the new plants that I have started. They will grow faster and make better plants.

"When the new growth starts it is necessary to pot up if they need it, water and fertilize carefully. They make so much growth in the spring that they need to be fed regularly to bring out the color of the leaves. I usually use a 20-20-20 formula a couple of times and then vary the feeding with other things. They really respond to blood meal, but it must be used carefully if it will burn. Manure water is very good. I usually use that several times during the growing season."

More begonia moving

From page 69

B. 'Irene Nuss', and many others at peak bloom, and whacked them off to just a few short canes in their pots. *Begonia luxurians*, more than 8 feet tall, 3 feet wide, and blooming for 2½ years straight, got the axe, too. The rhizomatous plants were nearly denuded of leaves in order to travel.

For my special *B. 'Mount Soledad'*, I made an exception. It would travel whole, its giant crested leaves carefully tucked into a box all its own. Then came the packing. All but the largest went into boxes and were taped shut. This took a couple of days in itself.

Meanwhile, the movers spent three days packing the rest of our goods. After a few hours sleep on the hard floor in the empty house, we stuffed in the last plant we could, and turned our backs on the rest. I stopped at my daughter's house and called Digger O'Dell, who had sweated off 20 pounds helping dismantle the greenhouse, and told him to go get any of the plants we had to leave behind. Dennis and Kevin, our youngest, got into the van full of plants, I put the five cats and myself into the battered pickup, and we were off.

Finally, days later, we unpacked plants. Some had been in boxes for a week. The majority of them came through with flying colors.

The secret is moisture: Water them well the day before packing. Fit them tightly into boxes and fill any spaces with newspaper or other material. Most important, *close and seal* the boxes. No, the plants won't suffocate. On the contrary, the sealed box will retain the moisture in the pots and the humidity in the air around the plants.

The only plants that dried out or suffered were those in containers left open due to tallness. In the heat, they dried up rapidly as the moisture was just sucked out of them into the dry air. Most of those sealed up, when we unpacked them, did not even need watering!

This was not the end of their ordeal. These chopped-up, denuded begonias ended their journey in a hastily built temporary fiberglass shelter, under a west-facing deck, at 3,000 feet on a foothill

slope in the northern Sierra. Conditions are crowded and lighting is poor.

Before long, winter set in. Winter in the Sierra foothills, 50 miles from Lake Tahoe, is not winter in San Diego County, 25 miles from the ocean. Nighttime temperatures in the greenhouse were generally in the high 30s or low 40s. Days were, for the most part, gray and wet. We even had a few days of snow, but on this southwest slope it doesn't stay long.

For weeks I seldom entered the greenhouse; it was too dreary. Bare begonias growing little but plenty of fuzzy mold, and in the mud underfoot the most colorful collection of mushrooms, toadstools, and other fungi I've ever seen.

But then there were hints of spring. Trees and shrubs and wildflowers were in bloom all around. Flocks of geese called overhead as they headed north.

And now I survey what has survived the first six months. My lovely Vanda orchid is black and dead, as are several rare aroids. I clean up the molding debris and get out the karathane and benomyl. There, surviving better than anything else, are my begonias, with new leaves sprouting from dead-looking canes, and rhizomes almost beginning to crawl with life.

I suppose they really do look like the devil, but I see all they once were and one day will be again. They are survivors, on into a new life. They are rather laughable, with bare rhizomes crawling out of dirty pots, sporting little tufts of new leaves.

The leaves are poor in color. It has been a long time since they have been fed, and I always was a pretty heavy feeder. Somewhere, yet unfound in the unopened boxes in the garage, is about 10 pounds of Osmocote. I'll keep hunting. The pots for repotting are still in boxes, too. I suspect some things will never get unpacked.

I keep putting off trimming off those dangling rhizomes, thinking that maybe this week we'll find all the parts to my old light garden and get it assembled. It's not my propagating house in El Cajon, but it will do. It is what I started with before I had gardens and greenhouses. I guess if these begonias can survive and start over in a new place, so can I.

ABS AIMS AND PURPOSES

- TO stimulate and 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.
- TO bring into friendly contact all who love and grow begonias.

ABS SERVICES

These services are available to all ABS members. For names and addresses of department heads and other officers, see inside front cover. Include a self-addressed, stamped envelope when you write.

AT-LARGE MEMBERS—Services for members who don't belong to branches are handled by the members-at-large director. Contact her for details. If you are interested in finding a branch or starting one in your area, contact the branch relations director for help.

THE BEGONIAN—The journal of the society publishes how-to articles, scientific information, and ABS news. Articles on a member's personal experiences with begonias are welcomed, as are black-and-white photos of begonias and color slides suitable for use on the cover. Contact the editor.

BEGONIAN BACK ISSUES—Individual copies of The Begonian more than a year old are available from the back issue sales chairman (75 cents). A full year is \$6.50 for any year in the 1940s. \$5 for any year from 1950 through 1980. Back issues less than a year old are ordered from the membership secretary for \$2 each.

BOOKSTORE—Books on begonias and related subjects can be purchased mail-order from the bookstore manager. Contact her for a list of books available. The bookstore also sells reproductions of antique begonia prints and other items.

JUDGING DEPARTMENT—The judging department offers a course by mail with which you can learn to become an accredited begonia show judge (\$8). Also available are a booklet on point scoring (\$1.25), information on fuchsia and fern judging, and other requirements to become a judge. Add \$1 postage and handling to all orders and 6% tax for California residents.

LIBRARY—Books about begonias and gardening may be borrowed by mail from the lending library. Contact the librarian for a list of books and the procedure.

NOMENCLATURE — The nomenclature department monitors newly published findings on begonia names as well as handling official international registration of new begonia cultivars. Registrations are published in *The Begonian*.

QUESTION BOX—Send begonia-growing questions to Mabel Corwin, 1119 Loma Vista Way, Vista, CA 92083. You'll get a prompt answer and Mabel will use questions of general interest in her Begonian column.

RESEARCH—The research department conducts projects periodically. The department also has other activities, including the review of requests for ABS backing of outside projects. For details, contact the director.

ROUND ROBINS—Members exchange information about begonias and their culture through a packet of letters which circulates among a small group of growers. There are dozens of these packets—called flights—on many specialized subjects. To join one or more, contact the round robin director.

SEED FUND—The Clayton M. Kelly Seed Fund offers seeds of begonia species and cultivars by mail. New offerings are listed in *The Begonian*. Donations of seed are encouraged. Please contact the seed fund director.

SLIDE LIBRARY—A series of slide shows on begonias and begonia growing can be borrowed by mail for showing at meetings and seminars. New shows are under preparation. Contact the slide librarian for fee information.

SPEAKERS BUREAU—The speakers bureau maintains a directory of speakers on begonias and related subjects. Contact the director.

More seed structure

From page 78

mined zones of rupture, which facilitate germination. Although seed lids are found in about 10 percent of the angiospermous families, the combination of a seed lid and cleaving collar cells is a unique feature of the Begoniaceae.

REFERENCES

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