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*The* BEGONIAN

# The BEGONIAN

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### ABS NEWS

#### ABS MEMBER RECOGNIZED

Dr. Bernice G. Schubert, 1968 winner with Dr. Lyman B. Smith of the American Begonia Society's highest award, the Eva Kenworthy Gray Award, has been honored by the Massachusetts Horticultural Society.

In May 1986 the Society awarded Dr. Schubert its silver medal for "noteworthy service to horticulture." Recently retired after serving for many years as curator of the Arnold Arboretum Herbarium of Harvard University, Dr. Schubert is known to ABS for her many publications on species of *Begonia*, many of them in cooperation with Dr. Smith of the Smithsonian Institution.

#### EASTERN REGION CONVENTION

"Begonias—A Capital Idea!" will be the theme of the first Eastern Region Begonia Convention and Show held in the nation's capital. It is scheduled for Sept. 18-20, 1987.

Hosted by the Potomac Branch with support from other branches of the Eastern Region of ABS, the convention will offer a judged begonia show, informative seminars, plant sale, tour of the National Botanic Garden, and banquet. It will be held in the new Washington-Dulles Holiday Inn, close to Dulles Airport and only 30 minutes from downtown Washington.

Plan now to attend and to enter plants. To indicate your interest and receive more details, write to:

Lavinia Voss  
3805 Louise Avenue  
Chantilly, VA 22021.

#### BEGONIA HOMECOMING NATIONAL CONVENTION AT LONG BEACH

August 27 though 30

It will be a real homecoming as ABS returns to the site of its founding group in Long Beach for the late summer convention. The Long Beach Parent Chapter of the ABS will be assisted by the Rubidoux, Garden Grove, Westchester, Whittier, Orange County, and San Gabriel Branches at hosting the national convention and show. The Breakers Hotel in Long Beach, near the Pacific Ocean and Queen Mary Liner will be the center of activities.

The committee has already issued calls for plants for the sale and trophies, not to mention early registrations. The room rate will be \$60, single or double. Information about activities and registration will be sent in a mailing to members in May.

Coordinating the arrangements and activities for the Show and Convention is Chairman Gilbert Estrada, former ABS president. His address is 7914 Springer St., Downey CA 90242.

#### MIDWESTERN GROWER RETIRES

Maxine Wilson supplied begonia leaves and cuttings to many ABS customers from her Missouri greenhouse over the years. She sold most of her stock plants and closed her doors to commercial trade early this year. Her many friends were sorry to lose this reliable source for new begonias.

# A BEGONIA FROM THE RAINFOREST:

## Cover Photograph and Story by Jacques Jangoux

The photograph on the cover was taken in September 1985 in the tropical rain forest in the state of Acre in western Brazil near the Peruvian border, at approximately 7°45'S and 73°62'W, during botanical exploration of Rio Azul, a tributary of Rio Moa, itself a tributary of Rio Jurau, which is a tributary of the Amazon.

We were a team of 15, including botanists, botanical assistants, woodsmen, boat crews, and a cook, travelling on two diesel-powered boats. The main purpose of the trip was doing forest inventories under the direction of David Cambell of the New York Botanical Garden, whereas I was taking photographs and doing general botanical collecting (concentrating especially on the genus *Siparuna* of the Monimiaceae family, which I study, on palms, and ferns).

After leaving the town of Cruzeiro do Sul we travelled for three days on shallow waters (it was the dry season), having sometimes to haul the boats over sand banks or fallen tree trunks. Two contiguous one-hectare transects of supposedly virgin forest were chosen to be inventoried. The standard inventory plot used by many tropical rain forest ecologists measures 1 km in length by 10 m in width (1 hectare). This size has been shown to be generally sufficient to provide representative information on the forest being studied and permits comparison between inventories in different regions.

The inventory crew counted, mapped, and measured the trees (diameter, height, bole height, crown diameter). From these data indices familiar to ecologists such as relative density, relative dominance, and relative frequency would be calculated for each species, and the forest would be characterized as to species diversity, species distribution, structure, successional stages, effect of light gaps, etc. Herbarium specimens were also collected for identification and as vouchers.

*Jacques Jangoux works as a botanist at the Museu Paraense Emilio Goeldi in Belem, Brazil. He used to be a freelance photographer.*

Meanwhile I proceeded with photography and with botanical collecting. This forest turned out to be extremely rich in palms, which impressed their graceful physiognomy to it. As I walked slowly looking for subjects to photograph, I saw on the banks of a small stream a striking begonia with variegated silver white and green leaves. I later found several clusters of the plant with the leaves showing two different patterns of variegation; silvery with some green along the veins (this cover photograph), and mostly olive green with some silver. I took photographs and collected a few live plants for cultivation.

After propagating them, I have now about 10 plants under cultivation. This begonia is relatively easy to grow in the tropical climate of Belem, Para, Brazil, provided high humidity is maintained. Some plants grown indoors presented scale insects, easily controlled with a spray insecticide; this also presented some deformed leaves, as if infected by a virus; this problem sometimes seems to disappear spontaneously. This begonia is extremely easy to propagate, either by stem or by leaf cuttings.

It has produced numerous flowers both pistillate and staminate, borne on different inflorescences, but so far has produced no seed. I did not know how I should pollinate it; I am hopeful the article "Growing From Seeds" by Jan Doorenbos in the *Begonian* (Nov.-Dec. 1986) will help.

Preliminary observations of the variegation pattern in cultivation are not conclusive: it appears to be stable on some plants but seems to show a tendency to switch from one pattern to the other on other plants (to be confirmed by more careful observation; I suspect that variegation may be influenced by the amount of light the plant receives).

Comparing this begonia with specimens in the herbarium at Museu Paraense Emilio Goeldi in Belem, I tentatively identified it as *Begonia* cf. *maynensis* A.DC. which was confirmed, also tentatively (until he could see a herbarium specimen) by Dr. Lyman B. Smith of the Smithsonian Institution.



# MY WORK ON THE STOMATA OF BEGONIA

W. Scott Hoover

Stomata are the respiratory organs of plants and are comprised of guard cells through which water vapor and carbon dioxide are exchanged, water vapor passing from the plant to the environment and carbon dioxide passing from the environment into the plant. In many species of *Begonia* the pattern of stomata on the lower leaf surface is unusual in that the stomata occur in clusters, or aggregates, of individual stoma ranging from two per cluster up to an observed high of over 30 per cluster. In this article I will summarize my collecting and research efforts on *Begonia* stomata and describe the directions anticipated for this research.

## Some Personal Background

Let me briefly describe how I became involved with *Begonia* stomata as a research project. As a high school student in the late 1960s, I developed a strong interest in horticulture and botany. Accepted at Colorado College in 1970, I worked in the C.C. Biology Department greenhouse. Once, as a freshman, I asked Dr. Jack Carter, a botany professor, if I could use a microscope to observe the leaves of some begonias. I prepared live tissues on slides from several species and began to observe the lower leaf structure, not intending to find anything different, just wanting to look at the leaves. Everything looked normal for the first couple of species, just as the textbook described. Then I saw the clusters of stomata, and that was the beginning. Now, it is 17 years and 6,000 epidermal peels later, and I am still very much involved.

## Why Study Begonia Stomata?

As it stands now, I have exerted a considerable effort since 1979 to carry out research on the stomata of *Begonia*. All of the field work for this research has been supported by the American Begonia Society and a handful of

loyal individual members and branches, whom I acknowledge at the end of this article. The question that likely pervades most peoples' minds is "Why study the stomata of begonia?" Well, on one level it is just like any other type of scientific research, be the discipline astronomy, physics, geology, or whatever. The specifics of scientific inquiry, whether it be a search for understanding a part of the universe, or exploring a new intellectual horizon, or a personal identification, are independent of the particular discipline one chooses because at their deepest and most philosophical levels the objectives of scientific inquiry are all fundamentally the same\*.

The basic biological reasons for researching the stomata of *Begonia* are easier to explain and may be briefly described as follows. Stomata clusters are an evolutionary novelty, for few other groups in the plant kingdom exhibit such a morphological variation, thus raising the question of the functional or adaptive significance for such an unusual variation. Within the genus *Begonia* it is of interest whether stomatal cluster patterns are related to ecological parameters, an analysis which may shed light on the evolutionary significance of the trait. It is also curious whether specific cluster characters together with other stomatal and epidermal characters, such as stomatal density, pore length, and epidermal cell length, have taxonomic importance on the sectional or species level. Because 95% of evolution biology is based on a knowledge of temperate organisms, it is of special interest to gain knowledge of tropical organisms because new insights into evolutionary processes may result. After all, at least 75% of all species of organisms are found in the tropics (Mayers 1980, N.A.S. 1980).

*Scott Hoover's address is 718 Henderson Rd., Williamstown, MA 01267. He is planning a trip to Ecuador early next year to gather further specimens and seeds.*

\*This is obviously a glittering generality, and can be subjected to a great deal of analyses and, of course, disagreement. Nonetheless, for support of this concept, see Siv (1957) and Capra (1983), and of related interest Monod (1971), Hofstadter (1979), or Wilson (1984), to name several pertinent works.

### Field Data Collected

The field methods employed for obtaining stomata data have remained basically the same since the first Latin American expedition in 1979. Populations of *Begonia* are sampled by obtaining epidermal peels from the lower leaf surface of, usually, 10 individuals. Voucher herbarium specimens, with all their accompanying information, are collected, together with habitat, habit, male and female slide flower photographs. Ecological data is carefully evaluated for each population sampling and includes: elevation (with an altimeter), exact regional location, relative light and relative moisture on a scale of 1 to 10 for each population sample, descriptive details of the population habitat, and relative population density.\*\*

### Conservation Accomplishments

It is my belief, and the belief in general of the community of tropical biologists, that inventorying tropical organisms through specimen acquisition is one of the principal conservation measures available (N.A.S. 1980). Naturally, it would be ideal from a biological standpoint to preserve all remaining natural rainforest intact, but this is not possible. It is through botanical exploration of remaining natural rainforest areas that it is possible to preserve certain areas, by determining species diversity in rainforest areas, together with other criteria, biologists can determine the relative biological importance of an area.

The importance of herbarium specimens cannot be stressed enough and represents the principal source of data for systematic botany. Also, herbarium specimens with good label information are a valuable means of helping conserve the tropical rainforest, since they record a species existence, at a time when the rate of extinction is possible faster than at any other time in earth's history (Lewin 1985). Photographs are important to our conservation efforts on *Begonia* because we again are preserving a record of the plants in their natural habitats, which may be permanently altered by man. Of especial importance to

conservation is the importation of germplasm which allows a species to be kept alive in the threat of extinction.

As far as I am concerned, conservation and preservation of *Begonia* are the principal functions of the American Begonia Society. Between the cooperative efforts of collectors and knowledgeable growers, we have been able to make a strong effort in preserving the *Begonia* of certain countries. Horticultural shows that include species are a means for extending the appreciation of *Begonia*, which is most important because the more members in ABS, the greater the chances of assisting with our conservation efforts. Thus, for many collections I have made we have a photographic record, voucher herbarium specimens with accurate notes regarding the species population, and live plants in greenhouses around the country. I would say we have made an excellent start in preserving begonias and I hope in the future we can do more.

### Accomplishments

During the last seven years' work on *Begonia* stomata a number of accomplishments have been made which I feel are important to list since they are either directly or indirectly concerned with the grants given by the ABS, individual members, and certain branches. (See list on page 61.)

### Future Directions for Research On *Begonia* Stomata

The volume of data collected from field expeditions will potentially allow for an extensive amount of analysis and will elucidate aspects of the functional and evolutionary significance of stomatal clusters and the multi-layered epidermis of *Begonia*. This is one of the principal objectives of the research, though many other questions have arisen which represent valid scientific inquiries in themselves.

Now I shall describe the intended research, listing the ideas separately for purposes of brevity.

1. A possible stomatal indicator of tropical seasonal climate change. A large population of *B. nelumbiifolia* distributed along an eleva-

\*\*Samples studied include 203 species from 744 populations for a total of 6,124 peels collected in Mexico, Guatemala, Costa Rica, Panama, Venezuela, Colombia, Ecuador, and Jamaica.



tional gradient in Hidalgo, Mexico was sampled for leaf age variation. Stomatal pore length was found to vary consistently between young, medium, and old age leaves for all samples along the gradient. This suggests that stomatal pore length in this *Begonia* may track the seasonal climatic changes in a rain-forest habitat.

2. Unusual stomatal density in *Begonia parviflora* from Napo, Ecuador. A population of this species was sampled along the road from Puyo to Baeza in Napo Province. The mean stomatal density for this species is 634 stomata/mm<sup>2</sup>. Scanning electron micrographs have been taken from epidermal peels of this population and from those of a more typical *B. parviflora* population. Epidermal cells are not distinguishable on peels from the novel population, only subsidiary cells surrounding the guard cells. This suggests the leaf anatomy of this population is very unusual among angiosperms, and raises questions concerning the physiological properties of leaves with such a structure.

3. Stomatal characteristics among sympatrically occurring species of *Begonia*. Twenty-four habitats in Mexico, consisting of areas less than 200 square meters, were observed with two or more sympatrically occurring species of *Begonia*.<sup>\*</sup> In some cases the microhabitat characteristics were nearly identical, and in others they were different. The interest here is how sympatrically occurring species' stomatal characters respond to the same habitat, or nearly the same habitat, characteristics.

4. Stomatal response to microhabitat characteristics in several Andean species of *Begonia*. Seventeen populations were sampled where the microhabitat characteristics of each individual plant sample were analyzed for vegetation density, percentage of moisture and light, and directional orientation of the plant. The data from these samples will result in the most fine-grained ecological analysis for the entire research.

5. Stomatal strategies in neotropical *Begonia*.

<sup>\*</sup>Sympatric = in the same geographical habitat.

All species populations can be analyzed for ratios of stomatal parameters such as mean cluster size/no. of stomata/mm<sup>2</sup>, mean cluster size/stomatal pore length, no. of stomata/mm<sup>2</sup>/pore length, pore length/epidermal cell length, etc. Certain stomatal ratios may be more or less correlated, which will be important in describing aspects of *Begonia* stomatal strategies.

Perhaps the most important aspect of these analyses is the possibility of determining species' taxonomic specificity based on a ratio of stomatal parameters. Too much variation exists in stomatal morphological characters to be of taxonomic significance. Therefore, if a mathematical ratio of stomatal characters remains constant when the ecological or geographic conditions change, this may be a means for identifying a taxonomic character.

6. Stomatal variance and population density in *Begonia* along elevational gradients in Mexico. *Begonia nelumbiifolia*, *B. oaxacana*, and a Gireoudia species were sampled in Oaxaca, Mexico and *B. nelumbiifolia* was also sampled in Hidalgo to determine how stomatal characters vary with population density. The above species of *Begonia* were distributed along elevational gradients and the population size was counted at set distances; leaves were sampled at intervals along the gradient also. It will be of interest to determine if there is a certain "stomata optimum" that is observed at the highest population density sites for the species along the gradient.

7. Epidermal cell layers in *Begonia* and their functional relationship to stomatal clusters as determined through ecological analysis. This investigation is likely to be one of the most important in terms of explaining the evolutionary significance of clusters and the multi-layered epidermis in *Begonia*. Thus far, leaf sections have been collected from Panama, Costa Rica, and Chiapas in Mexico. It is of importance to observe how epidermal cell characters vary with ecological conditions. The epidermal characters of interest, at this point, include number and thickness of upper and lower epidermal cell layers, together with overall thickness of mesophyll layer.

After reading through this list of apparently esoteric research investigations on *Begonia* stomata, one may question what all this research will prove and what is its value? Again, waiving a philosophical discussion justifying esoteric research, let me briefly highlight a couple of major points:

One, the role of stomata and carbon dioxide; CO<sub>2</sub> is a gas building up in the atmosphere as a consequence of the destruction of tropical rainforests and the combustion of fossil fuels. An excessive buildup of CO<sub>2</sub> could cause climate patterns to shift and sea levels to rise (see, for example: Hansen et al. 1981, Gornitz et al. 1982, Etkins and Epstein 1982, Woodwell et al. 1983, or N.R.C. 1983). Because *Begonia* have unusual stomatal patterns, as indicated by clusters, it is possible that species having clusters assimilate CO<sub>2</sub> in a different manner than other plants without this unusual morphology. It is important to first learn some of the morphological characteristics of stomatal clusters before beginning research on *Begonia* stomatal physiology. Once a piece of basic research can be applied at a certain level, a different perspective is achieved regarding the value of the research, and it is no longer just another esoteric investigation. At this point there is much basic research to do.

Two, the interest for evolutionary biology; certain observations to date suggest that stomatal clusters and the multi-layered epidermis function as a water conservation mechanism (Hoover 1986). Additional data may well provide further support for this hypothesis, though observations from some Ecuadorian Casparyas hint toward just the opposite function, namely, large clusters functioning to remove water rather than conserve it. This is of evolutionary biological interest because if clusters can be proven to function in both capacities, we've observed the evolution of a morphological characteristic that is so plastic it functions oppositely in different species. This, of course, leads to the possibility of neutral intermediates, which may sound like heresy, and for now such speculation is best left with these few words.

## Summary

Having reviewed the last seven years of work on *Begonia* stomata, what is most apparent to me is how much work still remains. In spite of what remains to be done, what we all have accomplished this far is of considerable value to our efforts. As members of the American *Begonia* Society, we have successfully formed a team that has made progress on several fronts: field collecting, research publishing, propagation of germplasm, and a slide library, all of which are important elements toward the conservation and preservation of *Begonia*.

I ask that we keep up what we have begun. Let's see if in the next seven years we can support larger expeditions and attract volunteers for both field and laboratory work. As I mentioned in my last paper, anyone who wants to volunteer for a collecting trip, or who would do some laboratory analysis, please let me know. I've already received several inquiries. My next expedition in 1988 will be back to Ecuador, and I could use some good volunteers. You'll hear more about it.

## Acknowledgments

Since the beginning of my research on stomata, the ABS has supported my field expeditions in return for collecting seed and assisting with the conservation of *Begonia*. In addition, several branches have consistently made contributions including: Buxton, Chicago, Palomar, Santa Barbara, and Sacramento groups. Other branches have contributed also, including: the Miami, Dallas Area, and Minnesota groups. Individual members who have made generous donations include: Mr. and Mrs. Howard Berg, Mr. Martin Johnson, Mr. and Mrs. Rudolf Ziesenhenné, Mr. and Mrs. Daniel Hazeltine, Mr. and Mrs. Tim O'Reilly, Mrs. Hazel Snodgrass, Mrs. Barbara Philip, Mr. and Mrs. Ed Thompson, Mrs. Joy Martin, Mr. and Mrs. Ed Bates, Mr. and Mrs. Ralph Corwin, and Mrs. Joan Campbell.

I thank all of you personally; without your contributions I would not have been able to make the professional steps leading toward a career in botany. We have formed a valuable team in which we can all take pride. I am most grateful for your generosity.



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*Members who wish to financially support Hoover's continued efforts and those of conservation of Begonia may send contributions to the Conservation Fund. Make checks payable to ABS and send to the treasurer.*

## Chronology of Research by W. Scott Hoover On Begonia Stomata

- 1979-80** First field expedition — Mexico, Guatemala, Venezuela, Colombia, Ecuador, and Jamaica; 5 months. Grant supported by American Begonia Society, certain ABS members and branches, and Eli Lilly Co.
- 1981** Publication: *Endangered Begonia Habitats; Can We Help? The Begonian*.  
Publication: *The Hoover Expedition to Latin America, Begonian*.
- 1982** Delivered paper: *Stomatal Cluster Response to Environmental parameters in Two Mexican Species of Begonia*, Botanical Society of America Symposium with AIBS in Bloomington, Indiana  
Second field expedition — Mexico: two months. Grant supported by ABS, certain members and branches, and Mr. John Beard.  
Publication: *An Update on Endangered Begonia Habitats. The Begonian*.
- 1983** Elected Member, non-resident, to the Explorers Club.  
Publication — *As Rainforests Come Tumbling Down, Will Species of Begonia Come Through? The Begonian*.  
Publication: *The Destruction of Tropical Rainforests. Cuttings*.
- Publication: *What the Horticultural Community Can Contribute to the Preservation of Tropical Rainforests. Cuttings*.
- 1984** Third field expedition — Colombia and Ecuador; two months. Grants supported by ABS, certain members and branches, and specimens purchased by Missouri Botanical Garden.  
Award: Eva Kenworthy Gray from American Begonia Society.  
Publication: *Do Many Species of Begonia Remain to be Discovered? The Begonian*.
- 1985** Given Research Associateship with Missouri Botanical Garden.  
Publication: *How Can We Preserve Begonia Species that don't Germinate Under Cultivation? The Begonian*.  
Publication: *Summary of 1984 South American Collecting Expedition. The Begonian*.
- 1986** Publication: *Stomata and Stomatal Clusters in Begonia: Ecological Response in Two Mexican Species. Biotropica*.  
Publication: *Begonia Extinction and Man. The Begonian*.  
Grant from Mr. Jacques Lennon to purchase Apple IIC computer for continuing stomatal research.

# FOOD FOR THOUGHT

By George McCormick

There is a world wide awareness in respect of diet, exercise in various forms, and in fact, anything which in some way would enhance the chance of a long and healthy life. After a period of healthy diet and exercise you could hopefully look forward to enjoying a longer life span.

Now that all of us are in proper shape, why not apply somewhat similar techniques to our hobby of growing begonias? There is a wide difference of opinions regarding suitable composts (potting soils) and the use of fertilizers in the growing of our favorite flower.

If you hope to be successful in growing any type of plants, then there are two important factors you must take into consideration. You must understand how the basic fertilizers affect the growth of plants and to what period of growth they are applicable. First, there are superphosphates which promote root growth, secondly, there are nitrogen compounds which promote plant and leaf growth, thirdly, there is potash, a ripening promoter. This is not to say you have to apply these fertilizers on their own to give you the above results. You should always use a fertilizer composed of all three compounds made up to cover the three particular growth periods in the growth cycle. Treat your plants as you would your children, giving appropriate feeds to cover all forms of growth.

With all tuberous begonias I start the corms in a peat and sand or perlite mixture fertilized with a seed fertilizer suitable for a peat compost, that is, which has the required lime content for peat composts. The fertilizer I use is called Chempak Seed Fertilizer and has everything incorporated in it suitable for a peat-based compost.

The second phase is potting up for which you can use either a peat- or loam-based mixture. Finding suitable loam is sometimes dif-

ficult, but peat-based composts will grow first class plants. If you decide on a loam compost then the compost is made up to the John Innes standard, and is as follows: seven parts loam, three parts peat, two parts sand (rough). To every bushel add 1/4 lb of a good general fertilizer plus 3/4 oz lime, which constitutes John Innes No. 1. I always use twice this amount to bring it to John Innes standard No 2.

It is advisable to have a test on your prepared compost before fertilizing (all soils in Britain are deficient in phosphates) and in all probability the pH will be also deficient. [A soil testing kit or pH probe will help you to determine if the pH of your potting soil is in the neighborhood of 6.5.] Don't think the 1 1/2 oz of lime you add with your fertilizer will be all the lime required. The reason to add the 1 1/2 ozs of lime is only to counteract the drop in pH that adding the fertilizer will cause, nothing else. Once the deficiencies have been corrected, you are ready to pot up your plants. If your compost deficiencies have been attended to, and your pH is in the right range, then your plants are off to a good start with their diet suitably attended to.

Any fertilizers used from potting stage until bud stage should be of a balanced nature, a popular one here is 8N-8P-8K. Your plants should be needing additional feeding around five or six weeks from final potting.

Once you secure your buds you then change over to a higher potash feed—the one I use is called Phostrogen and has a N-P-K of 10-10-24. These fertilizers all contain the necessary trace elements.

One word of warning. Never use hydrated lime at any time; if you do, you will find your pH will register in the region of pH12, very basic. Always use either ground limestone or dolomite. Your test will determine which or what to use.

Now having your plants on a healthy diet you can then look forward to the best possible plants and flowers. If you give your plants' diet as much thought as your own, then your plants will duly give of their best.

*George McCormick finds that careful attention to the needs of his plants produces outstanding results. His address is Rosedale Cottage, Kirkconnel, Dumfriesshire DG4 6NJ, Scotland.*



# THE GLASGOW EXPEDITION

## Search for Begonias in Papua New Guinea

By James H. Dickson

The expedition leaves for Papua New Guinea about the end of March for a stay of up to two months. One of the principal aims is the collection of *Begonia* (with about 80 to 100 species in PNG) and of the closely related *Symbegonia* (with 12 species all endemic to PNG). We intend to work in a variety of locations mostly at low to moderate altitudes where the Begoniaceae is concentrated.

Only a very few New Guinea species of Begoniaceae are in cultivation in Britain. At Glasgow we have *B. brevirimosa*, *B. serrati-petala*, and *B. sharpeana*. Experience seems to show that many New Guinea Begoniaceae are difficult to cultivate but at Glasgow we are hopeful that a few species of *Begonia* and *Symbegonia* brought back by the writer from his brief preliminary visit to PNG last autumn have survived the dark days of winter and will now begin to flourish.

On the main expedition we anticipate collecting many species of Begoniaceae and expect to get them back to Glasgow within a week of dispatch from PNG. These plants will be added to the already large numbers of *Begonia* forming the British National Collection which is the special interest of the Curator, Eric Curtis, as reported in the *Begonian* last year.

The initial stimulus for our plant collecting expedition was the National Garden Festival, being held in Glasgow in 1988. The most attractive and most botanically interesting plants we bring back from Papua New Guinea will be on display at the Garden Festival before being grown in perpetuity in the Glasgow Botanical Gardens. We hope to find new species of Begoniaceae which will be sent for scientific study at Kew. Duplicates of both live and pressed specimens will be given to the Botany Division of the Department of Forests in Lae, PNG, which is our official affiliation.

*Dr. James H. Dickson is leader of the Glasgow expedition. He is on the faculty of the Botany Department, Glasgow University, G12 8QQ, U.K.*

The Expedition has as the sole sponsors the Trades House of Glasgow, a charitable body concerned with fostering the interests of Glasgow. The Trades House is the modern continuation of the medieval craft guilds of the city (now called Incorporations): the Incorporation of Gardeners was the prime mover in supporting the Expedition after an approach from Mr. Keith Fraser, Director of Parks and Recreation of the City of Glasgow. The Trades House has also raised funds to bring Papua New Guineans to Glasgow for short periods of study in the Botanic Gardens and in the Universities of Glasgow and of Strathclyde.

Sponsors:

The Trades House of Glasgow

Patrons:

The Royal Society of Edinburgh

Leader: Dr. James H. Dickson

Deputy Leader/Horticulturist:

Mr. E.G. Donaldson

Photographer: Mr. T.N. Tait

Botanists: Mr. G. Steven, Mr. K. Watson

The members of the Expedition are from the University of Glasgow, except for Mr. Donaldson who is Deputy Curator of the Glasgow Botanic Gardens.

### BALLOTS MAILED TO MEMBERS

Election time is here for the American Begonia Society. Ballots have been sent to all members eligible to vote. The ballots should be voted and returned by July 21 to Ballot Counting Chairman Ronnie Nevins, 1913 Aspen Circle, Fullerton, CA 92635.

The slate of officers presented by the nominating committee is:

President: Arlene Davis

First Vice President: Michael Ludwig

Second Vice President: Charles J. Jaros

Third Vice President: Robert L. Dodd

Treasurer: Eleanor Calkins

Secretary: Jeanette Gilbertson

To be valid, the sealed ballot must be voted and sent directly to the committee.

# Protecting Our Best Cultivars

## Cooperative Program for Tissue Culture of Begonias

By H. Gilbert Harlow

A few months back I suggested in the *Begonian* (March-April 1986, p. 38) that it might be mutually beneficial to start a cooperative program through which members could build superior collections by exchanging their very best plants. I proposed to propagate the plants through tissue culture. This would permit participants to supply only a small piece of a prized begonia rather than having to risk a whole plant or a tuber.

The response surprised me in two ways. First, there were only five replies where I had expected many more. Secondly, those who answered were for the most part interested in setting up tissue culturing facilities rather than exchanging plants.

One valuable result has been renewing my friendship with Howard Siebold of Fort Bragg, California. Howard has been developing a strain of fragrant begonias. He reports that the idea that fragrance in a tuberous begonia comes only from the pollen is a myth. Howard has worked out a system for getting the plant peduncles to me from California in a condition that is suitable for their use in tissue culture.

For those who would like to try tissue culture I have prepared a list of the necessary equipment. It is rather extensive and is probably practical only for those who have access to a laboratory. I will be happy to supply the list to any member who would like it. I am also in the process of writing up the method I used. Tuberous begonias are more difficult than many other plants to propagate through tissue culture and I would advise those interested

to start with something easier, for example, African violets.

Those who take cuttings regularly from their tuberous begonias need to know that there are bacteria which are systemic, that is, which can invade the inner tissues of the plant. Viruses also are present inside the tissues of many species of plants. I have not observed viruses in begonias but they probably do occur. To prevent spreading them through your collection always take each cutting with a sterilized blade. An easy way to do this is to assemble a supply of razor blades and autoclave them or put them in the oven when you are baking. Set each one aside when you have used it for a single plant and then bake the whole collection again. (You can also sterilize blades by dipping them in alcohol or flaming them but the batch method seems easier to me.) When bacteria are on the external parts of a plant they can be eliminated by appropriate treatment with a chlorine solution before being used for tissue culture. If they are systemic the external treatment is ineffective. If you have plants that appear to have lost their vigor for no apparent reason the answer could be internal bacteria.

One valuable use of tissue culture is to increase a supply of proven parents. In making crosses of my tuberous begonias this fall I have had forty or fifty replicates of the best picotee I was able to select in 1980 and the best from the following year. Our climate is such that late in the season pollen is available from even those plants that are normally fully double. Having a supply from each of these selections is truly a luxury. Thrips and mildew have cut back on our recent crops of seed and it will be satisfying to have a good season for a change.

I am still eager to hear from those members of the society who are interested in our cooperative effort to improve our collections.

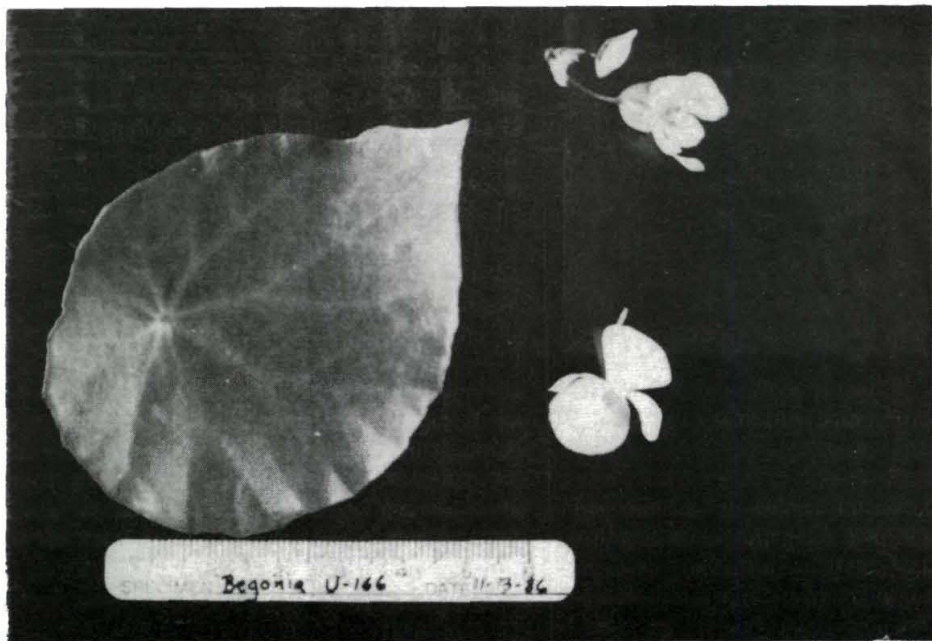
*If you are willing to share a bit of your favorite begonia for tissue culturing or to actively work at the process, write to H. Gilbert Harlow, C.E. Dept., Union College, Schenectady, New York 12308.*



# THE IDENTIFICATION OF BEGONIA U166

Kingsley Langenberg

This article was originally written as a letter/ report to the members of the Research Robin.



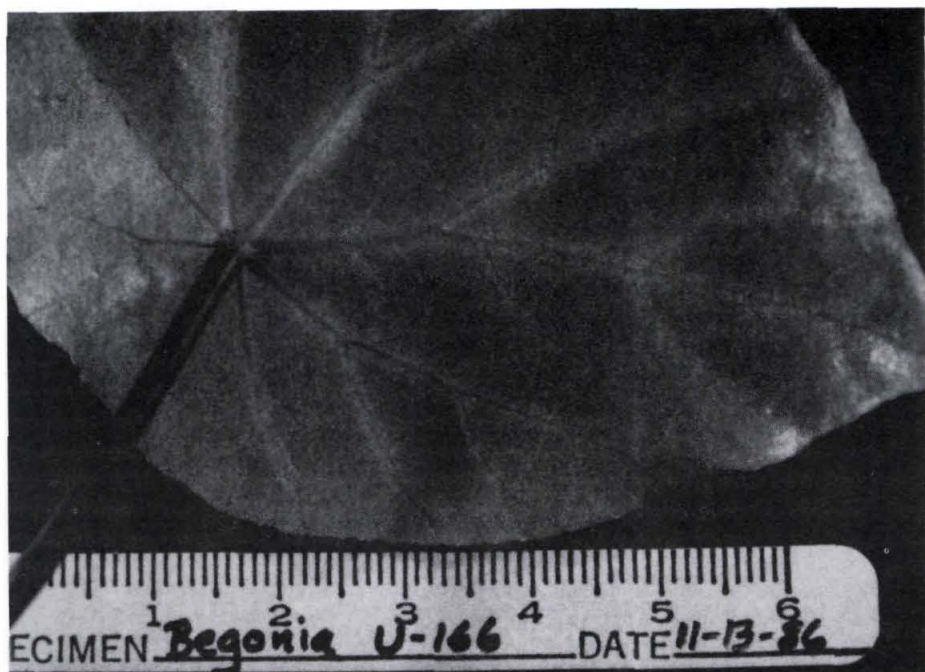
**Begonia U166: leaf showing upper surface, male and female blossoms**

I think I may have identified *B. U166*! I received my copy of *Smithsonian Contributions to Botany*, No. 60 (1986): *Begoniaceae*. This work will certainly become the begonia researcher's bible because it contains a key to the identification of every recognized published species of *Begonia* known to the authors, Lyman B. Smith and Dieter Wasshausen, along with a picture of the preserved type specimens (as presently known) of each species. This book, which also includes an annotated species list compiled by Jack Golding and Carrie Karegeannes, is 584 large (7 3/4" x 10 1/4") pages long and must weigh 3 pounds or more.

*King Langenberg is a member of the Research Round Robin #54 and a member at-large. He grows many of his plants under lights at 2141 W. Bonnie Brook Lane, Waukegan, IL 60087.*

The species key is what has really excited me, because it does not concern itself with long Latin names for Sections, Sub-sections, Sub-subsections, etc., along with undecipherable, boring, and, to me, useless descriptions of such. Instead Smith and Wasshausen have gone about the business of telling one *Begonia* from all the rest in the most efficient manner they could devise. They based their scheme (key) for identification on just three categories of observation: (leaf) blade shape, (growth) habit, and inflorescence — in that order of importance. Right off, you can see the appeal of this method: you don't even have to wait until your specimen flowers to start narrowing down the possibilities. In the case of *B. U166* I was able to narrow down the possibilities to a field of about 75 on the basis of three observations:

**Does the flowering plant have leaves?** Even though my plant has not yet flowered, others



**B. U166, lower surface.** Langenberg's specimen plant came from Mary Weinberg, chairman of the Robin, who raised it from seeds obtained from Martin Johnson.

of you [members of the research robin] have seen *B. U166* in flower, and I think I can safely assume that you would have mentioned there weren't any leaves on the plant when it flowered!

**Are the leaf blades peltate?** Yes, this is a big break for us (and others).

**Are the leaves: (a) solitary or fasciculate, or (b) separated by distinct internodes?** *Fasciculate* means "bundled," and the petioles of my plant all seem to originate from a tight ball. So I chose option (a) and feel confident in the choice.

So that takes me to Subkey 2 which contains about 75 peltate-, fasciculate-leaved species from all over the world. Now here is where another beauty is perceived in this Key. The country of origin is considered last. Therefore, once you have narrowed down the possibilities as far as you can go from the top down, then if you know where it came from (as we do) you can jump to the bottom and work up.

In Subkey 2 there are only four species from the Philippines: *B. hernandioides*, *B. tayabensis*, *B. rufipila*, and *B. elmeri*. There are some others from the East Indies that should be

kept in mind, I suppose, but for now I have taken the key at face value.

Going back to the top of Subkey 2, the first question seemed to be the end of the line for my search because it asks: **Inflorescence: (a) dense or with central axis, not basally and laxly dichotomous (excluding pedicels)? OR (b) basally dichotomous (or more divided)?** Here we lucked out again. Because all four Philippine species fall under answer (b) the question becomes moot.

Plunging on, I found that I could answer the next question: **Petioles: (a) glabrous or their indument sparse, inconspicuous, or evanescent? or (b) notably vestite (hairy)?** The answer is clearly (a) since only the petiole indument is an inconspicuous collar of "hairs" at the petiole-blade junction.

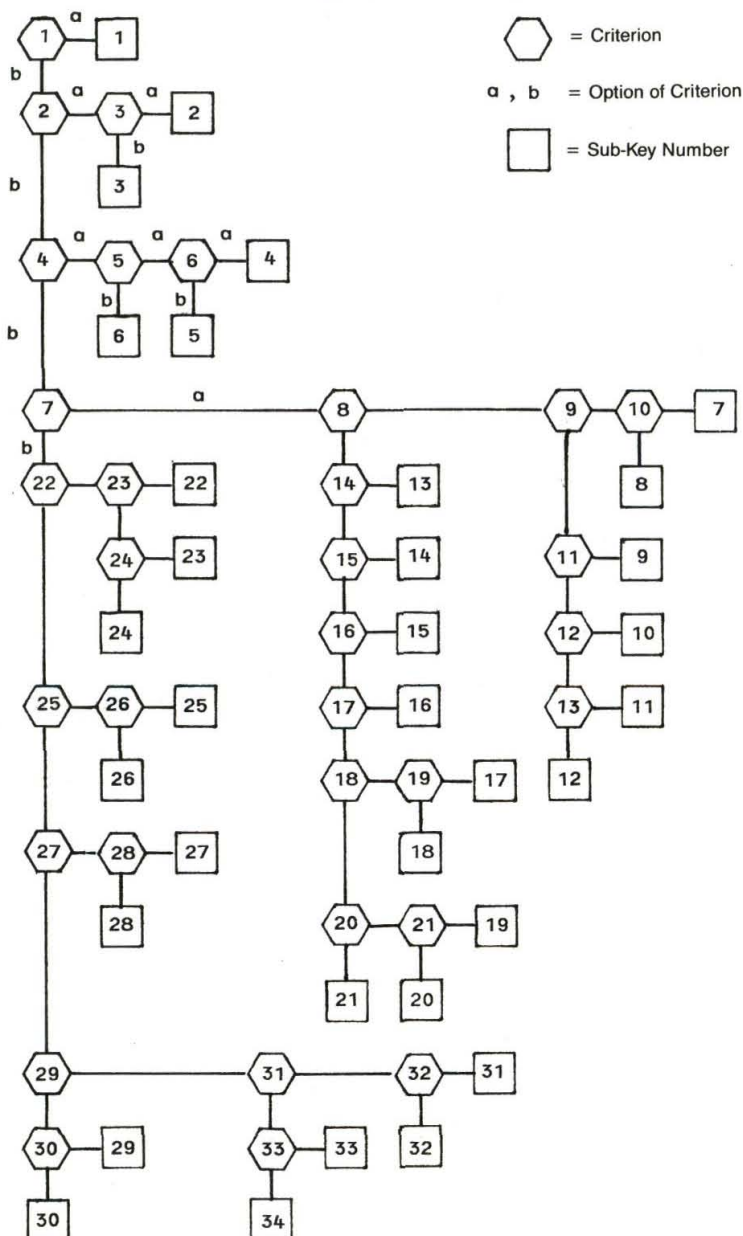
The next question can be skipped, again because none of the included species come from the Philippines. I'm glad because I would have had to guess at the answer, not having any observational experience in this area. The question was: **Umbo [= sinus]: (a)**

Continued on page 71.



**(Primary Key Only)**

**By Kingsley Langenberg**



This diagram illustrates the structure of the Primary Key. Each numbered criterion leads to two options: another numbered criterion or directly to the numbered Subkey for selection of species from that group.

# **Illustrated Guide to the Use of Smith and Wasshausen's *Key to the Species of Begoniaceae* (Main Key Only)**

**By Kingsley Langenberg**

Criterion 1. Flowering Plant:



(a) leafless



(b) foliaceous

Criterion 2. Petiole-leaf blade junction:

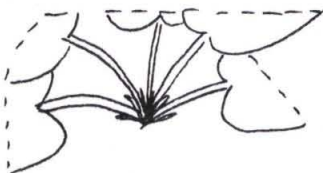


(a) peltate (within margin)



(b) basifixed (at margin)

Criterion 3. Leaves:



(a) (solitary) or fasciculate

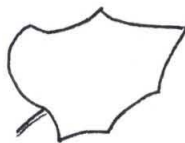


(b) separated by distinct internodes

Criterion 4. Blade shape:



(a) deeply lobed to divided



(b) shallowly lobed to entire

Criterion 5. Nerves (Veins):



(a) digitate  
(radiate from a single point)



(b) pinnate  
(featherlike)



Criterion 6. Inflorescence:



(a) dichotomous at base



(b) borne on a simple axis

Criterion 7. Petiole-midnerve angle:



(a) none



(b) distinct

Criterion 10. Blade shape:

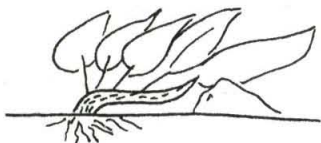


(a) orbicular (circular)  
to reniform (kidney shaped)

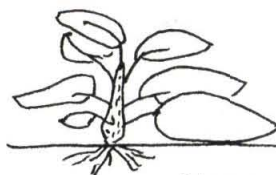


(b) ovate or obovate

Criterion 11. Stem:



(a) repent



(b) erect

Criterion 12. Blade apex:



(a) rounded



(b) distinct

Criterion 13. Blade apex:



(a) symmetric



(b) asymmetric

Criterion 17. Blade base:



(a) generally inequilateral

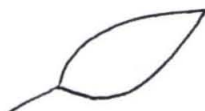


(b) strongly asymmetric

Criterion 18: Blade base:



(a) dimidiate



(b) not dimidiate

Criterion 21: Petiole surface:



(a) vestite (hairy)

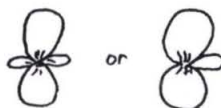


(b) glabrous (bare)

Criterion 23: Staminate (male flower) tepals:



(a) two



(b) not two (four or rarely three)

Criterion 28: Blade shape:

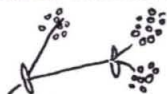


(a) at least twice as long as wide

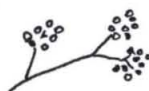


(b) less than twice as long as wide

Criterion 32. Bracts (leaflets on flower stalk or just below flowers):



(a) persistent



(b) deciduous



## B. U166

Continued from page 66.

submarginal [close to the blade edge]; blade-base subcordate? or (b) far from margin; blade-base broadly rounded?

At this point I had narrowed the field down to two candidates, *B. hernandioides* and *B. tayabensis*. At the back of the book, I found pictures of the type specimens of the two species. *B. tayabensis* has ovate blades with acute apices—clearly different from *B. U166*. The picture of the type specimen of *B. hernandioides* is a dead ringer for *B. U166*!

So this is where I am right now. I have requested a copy of Merrill's publication of *B. hernandioides* and had hoped to include this reference with the robin, but I have held up the robin too long already and must send it on.

I just today received a letter from Thelma O'Reilly, who is in charge of the U-numbered species, saying that *B. U166* has been identified as *B. hernandioides* by a university in the Philippines.

In the course of the above endeavors, I have generated some materials which I think are worthwhile to include in the robin packet. First is a guide to Smith and Wasshausen's Key, with drawings to illustrate my interpretation of the choices to be made. The second is a diagram of the structure of the primary key.

## The Wine Cup Begonia

Continued from page 73.

insecticides and fungicides is a good preventative measure to keep the species pest and disease free.

Propagation by seed is not too difficult, but the berrylike fruits are challenging to harvest at a time when the seed is ready to germinate; this is also true for *B. ampla*. Propagation by stem cutting is successful; compared to succulent begonias, it takes longer for roots to form since the stem is woody.

I am also enclosing a picture of my *B. U166* (= *hernandioides*). As I said, mine still has not bloomed. Recently I moved it under bright fluorescent lights which are on for 16 hours a day—I hope that will do the trick. In the meantime, I predict that when it does flower the inflorescence will be basally and regularly divided, and the ovary will be two-celled. Otherwise, *B. U166* is not included in the Key and we have an unknown unidentified species.

Since the original report was written, King Langenberg reports that *B. hernandioides* is sensitive to cold and requires a lot of light. Once started, it has always been in bloom. Also, he has seen the botanical description. The plant is identical in all respects except for the fact that the ovary is 3-celled. Merrill does not say that the ovary of *B. hernandioides* is 2-celled, but he places the *Begonia* in the section characterized by 2-celled ovaries. However, his introductory remarks mention that one of the *begonias* is included in the section for want of better information. And King believes this is the information he was lacking. King is now waiting for his identification to be verified.

*The Philippine Species of Begonia* by E. D. Merrill, *The Philippine Journal of Science, C. Botany*, Vol. VI, No. 6, Dec. 1911.

I urge you to search for and grow this intriguing species. Try to simulate, as closely as possible, its natural growing environment; you will experience all the fascination of the unusual and captivating species.

My thanks to Dr. Jan Doorenbos for sharing seeds with me so that I can grow this very rare species at the Thompson Begonia Museum for others to enjoy. His generosity makes it possible to share it with other growers so they may also grow, study, and enjoy this African species.

# THE LITTLE WINE CUP BEGONIA FROM AFRICA

Mildred L. Thompson

African begonia species have fascinated me for a long time because, in most cases, they are not only attractive, but they possess very interesting characteristics. Most of the African species grown in the United States have been sent to begonia growers by Dr. Jan Doorenbos of the Wageningen University of the Netherlands. So when Dr. Doorenbos wrote me that he was planning to send seeds of *Begonia poculifera* to me as soon as the seed pod was ready, I could hardly wait!

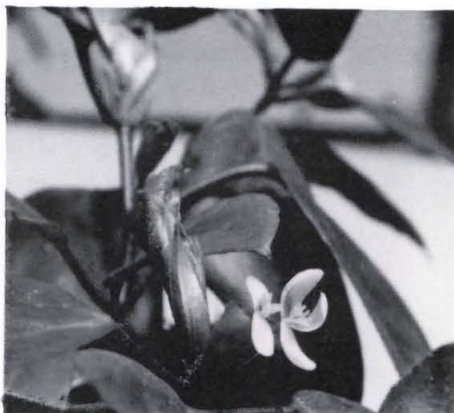
On January 11, 1984, he sent the seed from a plant which had been collected in Gabon. I hovered over the propagation box during the germination period and the young plants until they were ready to transplant. During the immature stages, I grew this species in the additional humidity of the contained atmosphere to ensure its steady development because I knew that *B. poculifera* originally came from a humid tropical environment. During this time, I collected all the reference material that I could about this exciting species.

*B. poculifera* was first collected by Gustav Mann before 1871 in Upper Guinea in the Cameroon Mountains at an altitude of 4000' and on the West African island of Fernando Po at 2000'. Joseph Dalton Hooker, author of the species name, designated these collections as the type specimens for *poculifera*. In the literature, *B. poculifera* is also reported to have been collected in Fernando Po, Cameroon, Nigeria, and Gabon in an altitude range from 2700' to 4500'.

In 1895, Otto Warburg wrote that Preuss collected this species, as an epiphyte, at altitudes ranging from 2,850' to 5400'.

The name and botanical description were validly published in 1871 by Joseph Dalton in

*Mildred L. Thompson is the mainstay of the Thompson Begonia Museum on Long Island, and coauthor of Begonias: A Complete Reference Guide. Her address is P.O. Drawer PP, Southampton, NY 11968. She wrote this article for the Eastern Regional Newsletter.*



*B. poculifera* flowers.

Photos by Millie Thompson

"Begoniaceae" in Daniel Oliver's *Flora of Tropical Africa* on page 574. The name *poculifera* comes from two Latin words which mean bearing a little wine cup; the name refers to the cup-shaped bracts that envelop the inflorescences.

All the places where *B. poculifera* has been collected are in the tropical portion of West Africa near the equator where the temperature is high and steady all year. The humidity and rainfall are also high. Since this species was collected in a fairly wide range of altitudes and since temperature lowers with altitude, it is safe to assume that this species would tolerate various temperatures, starting at about 62°F, and that it would probably withstand temperatures to 55°.

*B. poculifera* is a trailing-scandent species that, according to Joseph Hooker, has stems that reach 16' long in the wilds. The mature woody stem is smooth and somewhat glossy. Scaly hairs are scattered along the younger portion of the stem. There is some branching along the stems. The fleshy leaves measure 5''-7'' wide and 2 1/2''-3'' long at maturity. The upper surface of the leaves is a deep green with a fine line red margin and red veins; the under surface is a red-tinted lighter green. Both the upper and lower surfaces of the



leaves are covered with scaly hairs. The venation is palmate. The leaf shape is oblique ovate with uncut entire margins; the apex is long acuminate and the base is rounded or truncate. Dr. Doorenbos writes that the leaf shapes of this species can vary from falcate (sickle shaped) to very broad, but the leaves are always asymmetrical. Dr. Doorenbos has grown five different forms of this species. The petiole is thick, with a scattering of hairs of the same kind as on the leaves; the petiole measures between 1/2'' and 1''.

*B. poculifera* starts blooming in February. The peduncles (flower stalks) are 1'' to 1 1/2'' long, and they end with two broadly rounded, somewhat transparent, red-tinted light green bracts that form a subcampanulate (somewhat bell-shaped) cup that is about 3/4'' wide and long; this envelops the several-flowered inflorescence. The flowers seem to protrude from the envelope one at a time.

The male flower has two white tepals, highlighted with red veins at the lower portion of the tepal. The anthers are small, sessile (sitting directly on the base), and linear. The female flower has two white tepals that also have red veins at the lower portion. There are four branched styles. The ovary is not visible until it is fertilized, when it protrudes from the enveloping bracts as it grows larger and develops. The red-tinted white fleshy fruits are round or oval, and they measure 1/2'' across. The fruit is indehiscent; therefore, it remains closed at maturity.

For botanical classification, *B. poculifera* is placed in the section Squamibegonia. To my knowledge only one other species in cultivation is placed in this section, and that is *B. ampla*. Species placed in this section are trailing-scandent begonias that have scaly surfaces. The bracts, which envelop the inflorescences, are large and persistent (do not fall off). Inflorescences are characteristically short. The fruit is berrylike, indehiscent, and thick walled.

### CULTURAL REQUIREMENTS

If this species has conditions somewhat similar to its native environment, its cultural requirements are not demanding. It has been my experience, however, that at temperatures



*Begonia poculifera*

lower than 60°, *B. poculifera* will go into a semidormant or dormant state until the temperature increases. There must be sufficient humidity in the growing area — preferably 60% relative humidity or more.

It is best to place this species in an area where there is plenty of lightly filtered winter sunlight; in these light conditions, the growth will be vigorous and the red veins in the leaves and the red margin will become more pronounced. In the spring, summer, and fall, when the sun's rays are stronger it is necessary to provide more filtering of the sunlight. The amount will depend on your geographical area.

It is best to grow *B. poculifera* in a moss-lined wire container where it will have good drainage and aeration to the root system. Since this species is an epiphyte, it can tolerate some root restriction and grow better for it. It is advisable, therefore, to repot the plant only when the roots fill the soil ball, and then move it to a container only one size larger. As with all other begonias, it is important to fertilize with a well-balanced plant food at regular intervals. Spraying with broad spectrum

Continued on page 71.

## Clayton M. Kelly Seed Fund

Joan Campbell, Seed Fund Director

The Seed Fund is a service provided only for members of the society; it is a privilege of your membership. I have included notes about new contributions.

Seeds of *B. purpusii*, a trailing-scandant species from Mexico, have not been featured in the Seed Fund for more than 10 years. This plant is pictured and its collection site described in the *Begonian*, Sept. 1952. A delightful rambler, its four-sided leaves are distinctive, attaining a size of about four inches and having four or five long lobes. The inflorescence is described as a "crowded" cyme. *B. U007* is a cane from Lucban in the Philippine Islands. The bright green leaves are somewhat thick, and there are large clusters of everblooming pink flowers. This can be grown as a standard, an upright, or even as a basket begonia if properly pruned and pinched. It can grow to ten feet. This is the first time *B. U007* has been offered.

*B. salicifolia*, a canelike species from Brazil and an old favorite, is not difficult. It has medium-sized green leaves and white flowers in winter.

One of the three varieties of *B. hatacoa* (syn. *B. rubro-venia*) is spotted. This picturesque stemmed and branched begonia from Nepal has an underground rhizome, and it is noted for its speckled spear-shaped leaves and red-veined flower tepals.

*B. masoniana*, a rhizomatous species from Asia, is better known as the exotic Iron Cross begonia. Everyone recognizes it easily because of its round leaves with bullate texture, marked with a brown cross surrounding the veins. It has small greenish white flowers in summer.

*B. metallica*, a hirsute, shrublike species from Mexico, was poetically named for the luster of its leaves, which are wide and hairy. It produces pink flowers tipped with pink hairs in the fall.

*B. U031* is a canelike species from Brazil. Although identified as *B. minor* (syn. *B. nitida*), a form with spotted leaves is also grown as *B. U031*. The plant from this offer-

ing is described as a medium-sized cane with smooth green leaves, red under, and large clusters of mildly fragrant flowers. It can grow to four feet.

*B. heracleifolia* has large, pinwheel, deeply parted leaves which "fishtail" on the ends in an attractive fashion. The flowers are white. It is a native of Mexico.

*B. involucrata*, a thick-stemmed species, came from Costa Rica. This lovely begonia was featured in Dr. McLellan's talk at the 1987 convention because of the distinctive shape of its minutely pubescent leaves with the double drip points. The white blossoms reportedly are fragrant.

West Africa is the home of *B. polygonoides*, a trailing-scandant species. This is a small epiphyte with slender, dark green leaves. Small white flowers appear in the axils of the leaves.

*B. lindleyana* is a thick-stemmed species from Guatemala. Because of the variability of its leaf shape this plant has caused confusion and discussion among growers for many years. See pictures and article in the *Begonian*, September 1980, and the comments of the Director of Nomenclature in the ERABS Newsletter of August 1986. Or forget about the technicalities and try this one because it is easy to grow.

Seeds of *B. 'Rory'*, a cross, have been sent to be distributed at no charge for your pleasure by hybridizers Doug and Goldie Frost. The parents are *B. cinnabarina* × *B. boliviensis*, both tuberous species, so seedlings will need long days after germination.

**Clarifications:** In February, 1977, the Seed Fund offered seeds of *B. laciniata* var. *formosana* and in 1984 offered seeds as *B. formosana*; both offerings have now been re-identified as *B. chitoensis*. In 1976, the seeds offered as *B. laciniata formosana* were correctly named and this is the species grown today as *B. formosana*.

I have been asked for some seeds which are not on hand. Please try to set seeds of the following: *B. incisa*, *B. albo-picta* var. *rosea* hort., *B. mazae*, and *B. U003*. I've



been asked for seeds or for a source other than Thompson & Morgan for bearded or crested tyberhybrida seeds. Can you help?



*Begonia guaduensis*  
Original drawing by Alice Clark.

I have some more information on *B. guaduensis* which was offered as N-D 14 in the issue of Nov.-Dec. 1986. According to *Begonia Portraits* by Alice Clark, this plant name is believed to be synonymous with *B. 'Washington Street'*, a begonia widely grown in Southern California some years ago and probably in cultivation today.

## Clayton M. Kelly Seed Fund

- M-J 1 *B. purpusii*
- M-J 2 *B. U007*
- M-J 3 *salicifolia*
- M-J 4 *B. hatacoa* (spotted)
- M-J 5 *B. masoniana*
- M-J 6 *B. metallica*
- M-J 7 *B. U031*
- M-J 8 *B. heracleifolia*
- M-J 9 *B. involucreta*
- M-J 10 *B. polygonoides*
- M-J 11 *B. lindleyana*
- M-J 12 *B. 'Rory'*

I also have seeds of species *Streptocarpus* (named and described), miscellaneous succulents, and spores of *Platycerium bifurcatum*, all at 50 cents per packet.

This month I am offering plastic growing-dishes suitable for sowing begonia seeds. They are about 7" x 7" with snap-tight lids and, with care, should be reusable several times. Water can be added to your planting medium without taking off the lid, and condensation does not fall on the mix, two good reasons to try these planters. They were donated to the Seed Fund by Houston Knight of the Whittier Branch, and members may have them with their order this month by adding 75 cents postage, instead of the usual 45 cents. Overseas members, check with me before ordering as the dishes may be too large to qualify for the small packet mailing rate.

All packets of seed \$1.00 except for the last six which are 50 cents each. Growing from Seed pamphlet is 25 cents. Orders from U.S., Mexico, and Canada need 45 cents over seed price for postage (60 cents if over 12 packets are ordered). Overseas orders require \$1.20 for postage. Send checks or money orders in U.S. funds made payable to Clayton M. Kelly Seed Fund and mail to:

Joan Campbell  
814 NE Honey House  
Corvallis, MT 59828.



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944 S. Monroe Rd, Tallmadge, OH 44278  
Dues \$10 a year. **INDOOR GARDEN** issued  
6 times yearly. Seed exchange, round robins,  
cultural guides, slide library.

## ROUND ROBIN NOTES

Mary Ellen Taback, Round Robin Director

When one of the few **sources of begonias** closes, begonia growers mourn. Maxine Wilson's recent closing sent many cane lovers to rescue all they could of her stock. One of the principal buyers was Jeanette McCombs of the #7 Greenhouse Robin. She bought cuttings or plants of everything Maxine had. She scrubbed and sprayed her greenhouse, using a hose sprayer with a mixture of Tide and Clorox in the jar. She sprayed from the ceiling down, even soaking the sand trays. This procedure, she is convinced, killed all the mildew spores and enabled her to successfully root all her new cuttings. On Maxine's advice, she bypassed the prop box, potting her cuttings directly into pots containing potting mix. She kept her one-gallon vaporizer running in the greenhouse during this stage.

**Hybridizer** Joy Porter crossed *B. ludwigii* with *B. pearcei*, hoping to find yellow flowers from *B. pearcei* in the offspring. She reports so far all sorts of different leaf patterns resulted, and the tendency of each parent to go dormant was intensified. This winter she has crossed *B. ludwigii* with an ever-blooming type, and will report on results later.

Mildred Swyka reports that *B. 'Orange Rubra'* passes on its flower color, and hybridizes easily. If sometimes a hybrid does not seed, she suggests rooting a cutting of it for a restart.

**Seed growers** of #34 Robin have entered into a technical discussion of chromosome numbers in begonias. The  $2n$  numbers run from 22 to 156. In a count of successful crosses of known chromosome number, 48% are  $2n=28$  for both parents, while only 12% are  $2n=56$ . There were five hybrids reported between a 28 and a 56, resulting in a triploid of 42. The hybrids of parents of different numbers are usually sterile, for example, *B. dregei* of 26 and *B. cathayana* of 22. The popular canes 'Lucerne' and 'Gloire de Lucerne' are triploids, as also are

some of the most floriferous semperflorens, this robin reports. One of its members points out that the problem with continued vegetative reproduction is that systemic pests such as nematodes and viruses are carried along. Hence we must resort to seed to evade these pests.

The robins devoted to the **Odd, the Rare, and the Unusual** are likely to discuss all sorts of definitions for their topic. Betty Tillotson points out that difficulty of growing a begonia makes it odd, rare, or unusual, citing *B. luxurians* and *B. diadema*. Jeannette Gilbertson nominates *B. 'Hiro'* as very odd. Its hybrid offspring *B. 'Silver Surf'* is less sprawling and looks less like lettuce, having red color on the backs of the leaves. Arline Peck considers *B. stigmosa* odd; it has a stigmata, or spot, where the veins meet. *B. olbia* is considered rare because it is difficult to grow. Joyce Smith's first choice is the easily grown *B. 'Dancing Girl'*, because every leaf is different. *B. bogneri*, *B. incisa*, and *B. hispida* are certainly odd, while *B. serratifetala* Joyce calls rare, again because of its difficulty for her. Charlotte Kuhnle notes that *B. serratifetala* dislikes cool weather. Several members of Robin #45, Greenhouse, keep spares of this lovely begonia as "insurance". They don't want to be without its pink-spotted beauty.

The **General Culture** robins are always full of hints. A recent one concerned epsom salts. Evelyn Hurley uses a dilute spray to pep up all her various plants, while Marvin Kahr keeps his roses happy with both epsom salts and stale beer.

Kay Tucker has 250 kinds of begonias. Having lived in both Texas and California, she advises that Texas weather is kinder to canes than to other kinds of begonias. Never try to grow begonias in the ground in Texas, she warns; use pots always.

Two members of the **Propagation** robin have been doing comparison tests. Lee Thomas has found that a sphagnum-perlite



mix produces stronger roots on begonia cuttings, with less subsequent loss on repotting, than does a medium consisting of perlite-vermiculite plus 1/4 Jiffy Mix. Elaine Ayers tested plants each of 'Lulu Bower' and 'Lenore Olivier', putting one of each in the greenhouse, one under lights, and one in a lath house. She was interested in obtaining pollen for her crosses. She found that the plants under lights produced the most pollen for her use.

Alan Craig propagates in both water and soil mixes. He uses a Hyponex rooting product for water propagation which encourages quick root formation, and changes the solution every few days. Experience has shown that old or polluted water inhibits rooting. Begonias, impatiens, coleus, and geraniums are rooted this way. For soil propagation he adds vermiculite to a purchased light growing mix. He roots cuttings in wicked styrofoam cups kept in a plastic enclosure for 4-5 days. Then they are put under lights with bottom heat. He offers a suggestion to seed growers who have trouble with that first tricky transplant: transplant at the second-leaf stage by cutting a square around the seedling with a sharp knife. Place the square in the pot which was prepared with fresh growing medium.

Rhodora Buss prefers to use plastic party cups for rooting cuttings: first a layer of perlite, then a sprinkle of charcoal, then her mix, which is 2 parts vermiculite to 1 part perlite. She uses no plant hormones. The cups are placed on shelves, open to air, except for those plants requiring high humidity. These latter go into a sweater box. Weak fertilizer solution is used to keep the cuttings damp.

Lena Bussard successfully roots all kinds of begonias in the manner most growers use only for rex leaves. She slits the veins, then lays the leaf flat on a meat tray containing the moist mix.

New members who would like to join robins are welcome. Do write to the new director for more information.

Margaret Coats, Round Robin Director  
11203 Cedar Elm Street  
San Antonio, TX 78230

## MAL NEWSLETTER READY

The next newsletter is ready for the active network of members at-large. Chairman Thelma O'Reilly will send your issue on receipt of a stamped, self-addressed envelope. Address your request to MAL, c/o Thelma O'Reilly, 10942 Sunray Place, La Mesa, CA 92041.

## BEGONIAN MINI-ADS

Miniads are a service to our members. Miniads are \$1 per line per insertion with a minimum of \$4. A line is 36 characters including punctuation and spaces. Payment must accompany order. Make checks payable to ABS and mail to Marion Paris, 4793 Soria Drive, San Diego, CA 92115.

### NEW BEGONIAS, PERENNIALS

And much more! Lists + quarterly newsletter. Send \$3 to Robert Hamm, P.O. Box 160903, Sacramento, CA 95816

**CUTTINGS—BEGONIAS, GESNERIADS,** & succulents, List \$1.00. Mary's Indoor Gardens, 77 56th Street SW, Wyoming, MI 49508-5738.

### FAIRYLAND BEGONIA & LILY HYBRIDS

List 50¢. Visitors welcome. Leslie & Winkie Woodruff, Fairyland Begonia & Lily Garden, 1100-B Griffith Road, McKinleyville, CA 95521

### BEGONIA CUTTINGS & PLANTS

Send \$1.00 for list. Kay's Greenhouse. 207 W Southcross, San Antonio, TX 78221.

### BEGONIAS: THE COMPLETE REFERENCE GUIDE

by Mildred L. and Edward J. Thompson. 384 pages, 850 illustrations (165 in color). Culture, classification, and history. \$25.00 To order autographed copies write: The Thompsons; P.O. Drawer PP, Southampton, NY 11968. *Begonias: 1984 Update* \$6.75. Prices include shipping. Mastercharge and Visa available.

## ABS NEWS

### SUPPORT FOR SCOTT HOOVER'S EXPEDITION

The ABS voted to support Scott Hoover's next begonia research expedition, conservation and begonia study being among the Society's vital concerns. Hoover has also gotten grants from the Missouri Botanical Garden and the Explorer's Club for this trip. Scott plans to be in the field collecting specimens for an extended period, and thus this trip will be more costly than his earlier ones.

Conservation Committee Cochairman Martin Johnson points out that the ABS is fortunate to be allied with these prestigious organizations and is likely to gain national recognition as a result. Members who can assist financially are urged to contribute. Every donation is a help. The Explorer's Club will act as administrator of funds, but checks can be sent to Martin for forwarding to the project.

### TERRARIUM BULK PURCHASE

Recently Houston Knight located a manufacturer of plastic ware that agreed to make terrariums to order for a bulk purchase for the ABS. The ABS Board was rather reluctant to undertake the purchase and distribution, but agreed to investigate the feasibility. Branches were contacted by the national board to assess whether members would be interested in obtaining terrariums.

Persons would be needed to assist with the work of handling the terrariums, such as packing, mailing, etc. It was suggested that the terrariums could be made available at national and regional events. If you would be interested in expressing an opinion, in purchasing (prices in \$20 range plus shipping for larger sizes) or in assisting with the handling, please contact the ABS Secretary.

### BEGONIA MUSEUM DAMAGED

Last fall vandals broke into the Thompson Begonia Museum at Southampton and turned the plants topsy-turvy. Many of the large plants were crushed and battered, with leaves and soil scattered about, particularly in the front part of the greenhouse. Nothing was stolen but there was a tremendous mess. The situation was difficult since the rampage was on a weekend and the plants had to remain as they were until Monday before the appropriate officials could act. Since then Ed and Millie Thompson have cleared the mess, taken cuttings, pruned damaged begonias, repotted, etc., in a backbreaking effort to recover as much as possible. It takes a long time for plants to regain the size and cultural perfection of their former status.

Recently when asked about conditions and progress of recovery at the Museum, Millie wrote:

We are happy to report that things are taking hold better than we expected and that even some of the very "iffy" ones are showing signs of recovery. . . . the mild winter and early spring have helped a lot. However, it is still very depressing to go in and see empty spots where some of our "giants" stood.

The Museum was closed for only a short time, and is currently open for visitors. Many friends have donated to the re-establishment of the collection. Begonia fans who wish to assist in any further recovery should contact the Thompsons directly.

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P.O. Box 4687, Downey, CA 90241



## In Memoriam

### ABS LOSES A FRIEND

The American Begonia Society has lost one of its early and long-time friends. Thomas H. Everett, 83, for many years on the staff of the New York Botanical Garden, died in September 1986.

Internationally known as horticulturist, educator, and writer, Everett wrote articles on begonias as early as 1939 and 1940 that are still consulted by our researchers, as is his bibliography of begonia references. He assisted Helen Krauss with research for her book *Begonias for American Homes and Gardens*, published in 1947. Most recently he compiled the 10-volume *New York Botanical Garden Illustrated Encyclopedia of Horticulture*.

This May, the American Horticultural Society honors Everett posthumously with the society's Liberty Hyde Bailey Award. He received a number of other awards in the past, including the Garden Club of America's Medal of Honor, the Massachusetts Horticultural Society's Thomas Roland Medal, and the New York Botanical Garden's Distinguished Service Award.

### JOSEPH PATRICK

Joseph Patrick of Dallas, Texas, died March 15. He had been scheduled to speak at the Southwestern Get Together in San Antonio in April. He presented helpful programs at various times for the area branches. Joe conducted a seminar on pesticide use on begonias at the ABS National Convention held in Dallas in 1984, and he was responsible for the gifts in the conventioners' packets.

Active in the Texas Association of Certified Nurserymen, he has been employed for over 40 years by the Magnolia Seed Company. He was cofounder of the Pest Control School for the trade. He worked with Scouting and church organizations over the years.

He is survived by his wife Dorothy, who was chairman of the Dallas Convention and first president of the Dallas area branch of ABS.

### HAZEL SNODGRASS

Hazel Snodgrass, of Ventura, died in April at the age of 95. She was active in the Theodosia Burr Shepherd Branch for many years and had been a member of the ABS Board of Directors on several occasions. She seldom missed an ABS convention. Many people readily recognize B. 'Rose', a plant she grew so admirably that it is more frequently referred to as "Hazel's Front Porch."

### MARGARET BALDWIN

Margaret Baldwin of San Diego died at the age of 97 on March 29. She had served as treasurer of the Alfred D. Robinson Branch for 27 years. Long active in local civic organizations in the San Diego area, she had maintained her begonia collection until recently and continued friendships with the branch.

San Francisco County Fair • 1987  
**50TH ANNIVERSARY!**

## FLOWER SHOW

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San Francisco County  
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\$3 • \$2 Seniors  
Children under  
12 free

Preview Thursday  
August 27, 6:30 pm to 8:30 pm  
\$7.50



## TIME FOR NOMINATIONS FOR ABS AWARDS OF DISTINCTION

The deadline for nominations for the American Begonia Society's awards is July 5, 1987. You may submit names for the Eva Kenworthy Gray Award, the Herbert P. Dyckman Award, and the Alfred D. Robinson Medal.

Your written nominations must state the reasons for believing the candidate is deserving of special merit. The Awards Committee members make a decision on the basis of qualification. The winner may or may not have received the most votes.

### EVA KENWORTHY GRAY AWARD

This award may be presented to a person for one of two reasons:

1. For contributing something of spiritual value toward cementing good will and harmony among our members.
2. For contributing original material (other than begonias) toward helping our rank and file members in furthering their study of begonias.

Not more than one award may be presented in a calendar year.

### HERBERT P. DYCKMAN AWARD

To be eligible for this award a person must have rendered long time or very outstanding service above and beyond that usually expected of a member or officer of the American Begonia Society.

Each nomination for the Herbert P. Dyckman Award for Service must be accompanied by a list of specific reasons the nominee is deemed worthy to receive this award. No nomination will be considered without such a list.

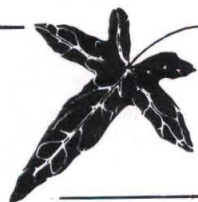
### ALFRED D. ROBINSON MEMORIAL MEDAL

One A. D. Robinson Medal may be awarded each year for an outstanding Registered *Begonia* Hybrid. Nominations may be made by any member of the American Begonia Society. The following rules are to be considered when making the nomination:

1. All *Begonia* nominees must be registered with the American Begonia Society Nomenclature Department.
2. Originator of the *Begonia* nominee, amateur or commercial, must be a member of the American Begonia Society.
3. The *Begonia* cultivar nominee must have been released to the public for at least five years, but not more than ten years prior to nomination.
4. The Nomenclature Director should provide all the information regarding release date and adequate description of the *Begonia* to the Committee upon request.
5. The Registered Hybrid Nominees must be judged by all members of the Awards Committee and receive a majority vote.

Please use your privilege as an ABS member to nominate the persons and plant you consider worthy of receiving one of these prestigious awards. I must receive your letters no later than July 5, 1987 for consideration by the committee. Send letters of nomination to:

Michael Ludwig, Awards Chairman  
7007 Mt. Vernon Street  
Lemon Grove, CA 92045



### THE AMERICAN IVY SOCIETY

is the International Registration Authority for *Hedera*; provides sources for new & unusual ivies; publishes *Ivy Journal* three times a year with reports on research, hardiness testing, life-sized photos of ivies. Memberships: General \$15; Institutional \$25; Commercial \$50. Information: The American Ivy Society, P.O. Box 520, West Carrollton, OH 45449-0520.



## RECIPIENTS OF THE EVA KENWORTHY GRAY AWARD

Bessie Buxton/1955  
Charlotte Hoak/1956  
Constance Bower/1957  
Alice Clark/1958  
Rudolf Ziesenhennel/1959  
Louise Schwerdtfeger/1960  
Helen K. Krauss/1961  
Bert Slatter/1962  
Bernice Brilmayer/1962  
Clyde Drummond/1963  
Mary Gillingwaters/1965  
May Taft Drew/1966  
Sylvia Leatherman/1967  
Drs. Lyman Smith and  
Bernice Schubert/1968  
Harry M. Butterfield/1969  
Ruth Pease/1970  
Elda Haring/1971  
Dr. Fred Barkley/1973  
Carrie Karegeannes/1974  
Dr. Jan Doorenbos/1975  
Alva Graham/1976  
Mildred & Ed Thompson/1977  
Jack Golding/1978  
Thelma O'Reilly/1980  
Edgar & Phyllis Bates/1983  
Scott Hoover/1984  
Hikoichi Arakawa/1985  
Karen Bartholomew &  
Chuck Anderson/1986

## HERBERT P. DYCKMAN AWARD RECIPIENTS

Florence Gee/1968  
Herbert Warrick/1968  
Alva Graham/1969  
Edna Korts/1970  
Everett Wright/1972  
Walter Barnett/1973  
Hazel Snodgrass/1974  
Mae Blanton/1975  
Gordon Lepisto/1976  
Gene Daniels/1977  
Paul & Margaret Lee/1978  
Margaret Taylor/1979  
Rudolf Ziesenhennel/1980  
Mabel Corwin/1981  
Clarence Hall/1982  
Douglas & Goldie Frost/1983  
Pearl Benell/1984  
Joy Porter/1985  
Martin Johnson/1986

## ALFRED D. ROBINSON MEDALISTS

Begonia/Year Awarded/Hybridizer  
'Silver Star'/1945/Elsie M. Frey  
'Freddie'/1946/Rudolf Ziesenhennel  
'Orange Rubra'/1947/Leslie Woodriff  
'Golden West'/1949/Frank Reinelt

'Ricky Minter'/1950/Marie Turner  
'Glendale'/1950/Eleanor V. Slocum  
'Virbob'/1951/Mabel Walker  
'Verde Grande'/1957/Susie Zug  
'Kumwha'/1961/Don Horton  
'Madame Queen'/1964/Beth Bath  
'Sophie Cecile'/1966/Belva N. Kusler  
'Purple Petticoats'/1968/Paul Lee  
'Lady Frances Jean'/1969/Sylvia Leatherman  
'Eunice Gray'/1972/Irene Nuss  
'Paul Bee'/1973/Ruby Mae Budd  
'Universe'/1974/Thelma O'Reilly  
'Wanda'/1977/Leo W. Porter  
'Bowtique'/1978/Chester Nave  
'Murray Morrison'/1980/Belva N. Kusler  
'Buttercup'/1981/Michael J. Kartuz  
'Nokomis'/1984/Margaret & Paul Lee  
'Withlacoochee'/1986/Frances Michelson

## NOTICE

Mention of a product in the *Begonian* does not constitute an endorsement of that product by the Society, its officers, or the author of the article. The ABS assumes no responsibility for reader's use of methods described.

## 50-YEAR MEMBERS

The ABS has kept no records of how long members have belonged to the American Begonia Society. Since it is more than 50 years since the organization has been formed, there are undoubtedly a number of members who have been part of the ABS for at least 50 years. Membership Secretary John Ingles would like to hear from anyone who has been affiliated for that time. He has a few names and would like to complete the list.

## NEW ROUND ROBIN DIRECTOR

Margaret Coats of San Antonio, Texas, was approved as the round robin director upon resignation of Mary Ellen Taback, who is planning several trips in the near future. Mary Ellen had been handling the round robins since November 1985.

The new director has been growing begonias for about 30 years and now has 250 different varieties in her collection. The canes are her favorites, but she is growing some of every class. Recently she tried hybridizing and finds it fascinating. Margaret worked for a number of years on the staff of a magazine.

## MINUTES OF THE BOARD OF DIRECTORS' MEETING

March 15, 1987

The March 15, 1987 meeting of the ABS held at Quail Gardens, Encinitas, Calif., was called to order at 11:30 a.m. Aims and Purposes were read by the secretary. Minutes of the January 12 meeting were approved as sent out. Two thank you letters were read.

The treasurer's report showed a balance of \$11,059.63 in checking and \$32,299.75 in savings as of March 1.

### Committee reports:

Conservation cochairman Martin Johnson requested that Conservation be changed from a committee to a department. He would like to have people working on projects on a regular basis. Board so moved. He is planning to visit the St. Louis Botanical Garden and Southwest Get-Together. He has started species seed, and has distributed seed from Belgium to be grown for the next convention. Board moved that 10% of net plant sales at ABS Conventions be placed in the Conservation Fund, starting with the 1987 Convention. The Conservation Fund currently stands at \$599.00.

Judging chairman Juana Curtis reported a new sophomore judge, Bill Voss from Virginia; Arlene Davis has started the judging course, and Bob Ammerman has received his senior judge's card.

Member At-Large Chairman Thelma O'Reilly sent a letter from Roberto Brin of Panama with suggestions to increase membership: (1) Invite past members to rejoin. (2) Make a cooperative effort with botanical gardens. In exchange for seeds, ask them to have a box for membership applications. (3) Advertise with other plant societies that grow shade-loving plants. (4) Give a discount to members who bring in a new member, and a prize to the person who brings in the most new members. (5) Campaign to get more foreign members. (6) Send invitations to botanic schools and universities. ABS is already doing (1) and (3), has done (4) in the past. Suggestions will be looked into.

The membership chairman reported, as of March 1, 1438 dues-paying members, 83 life members, and 109 institutions (primarily libraries and botanic gardens).

Nomenclature chairman Carrie Karegeannes reported three new registration applications in the Jan-Feb. period. She expressed thanks for the acknowledgement of the new book *Begoniaceae* in the Jan.-Feb. *Begonian*.

Board accepted with regret the resignation of Mary Ellen Taback as round robin director. President Lee appointed Margaret Coats as replacement.

A definite place and date have been set for the 1987 ABS convention—August 27-30 at the Breakers Hotel, 220 Ocean Blvd., Long Beach

Show Advisor Bob Ammerman reported the net profit on the 1986 convention was \$4791.70, with \$177.47 going to each of the three host branches.

Reports were also given or read from advertising, bookstore, business manager, and editor. Treasurer received checks of \$659.74 from the Seed Fund, and \$100 from the slide library.

A letter from Gil Estrada was read concerning the eight botanical prints, four of which have been used,

and the remaining four are in storage in Riverside. He asked when they would be used. Board members from Riverside will go to storage facility to locate the prints.

Paul Tsamtsis and Wanda Macnair were appointed to the awards committee. Paul Tsamtsis was appointed as research director. The president appointed Bob Ammerman as chairman and John Ingles, and Norma Pfrunder to the Nominating Committee. Their slate of officer will be due at the next board meeting.

Board moved that the old trophies stored in Bob Ammerman's garage be donated to the Palomar branch for their summer show.

Eastern Region will hold a convention in Washington, D. C., September 18-20.

Meeting was adjourned at 1:50 p.m.

Jeannette Gilbertson, secretary

### MEETING CALL

Next meeting will be 11:30 a.m. on May 3 at the Corona Steak House, Corona, Ca.

### JUDGING COURSE CHANGES

The ABS national board voted to halt all sales of the Judging Course and Point Scoring pamphlets immediately.

Judging Chairman Juana Curtis paid tribute to the pioneers who aimed to make begonia judging more consistent and objective, but said that she was eager to see the course revised.

After 20 years the Judging Course is outdated. Each new group of applicants has become more frustrated and bewildered by the lessons. A committee has been directed to start immediately on a new plan for training judges and to complete it with all due haste.

Anyone who is currently going through the course is entitled to complete it for accreditation, but no further candidates will be accepted until the new course is completed.

### *Pacific Horticulture*

**The color illustrated quarterly**

**for keen gardeners**

**\$12 a year**

**(\$14 Canada & Mexico,**

**\$16 elsewhere)**

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## 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 regards 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, see inside front cover. Include a self-addressed envelope when you write.**

**AT-LARGE MEMBERS** - Members who do not belong to branches are represented at board meetings by the members-at-large director. MAL committee works on projects by mail.

To find a branch in your area or to start a new one, contact the branch relations director for help.

**BOOKSTORE** - Books about begonias and back issues of the *Begonian*.

**JUDGING DEPARTMENT** - Mail order course for a member who wishes to become an accredited begonia show judge, \$10. Also available: a booklet on point scoring (\$2), the old (unofficial) classification booklet (\$2), information on fuchsia and fern judging, and other requirements to become a judge. Add \$1 for postage and handling on all orders and 6% tax for California residents.

**NOMENCLATURE DEPARTMENT** - Monitors newly published findings on *Begonia* names. Handles official international registrations of new *Begonia* cultivars and publishes these registrations. Gathers information about and assigns numbers to unidentified species.

**QUESTION BOX** - Prompt assistance with horticultural questions. Those of general interest will appear in the *Begonian* column.

**ROUND ROBINS** - Members exchange information about begonias and their culture through packets of letters which circulate among a small group of growers. There are dozens of these packets, called flights, on many specialized subjects. Contact the director for information.

**SEED FUND** - The Clayton M. Kelly Seed Fund offers seeds of begonia species and cultivars by mail. New acquisitions are discussed in the *Begonian*. Donations of seeds are encouraged.

**SLIDE LIBRARY** - List of programs available from slide librarian. Donations of individual slides and programs requested.

**SPEAKERS BUREAU** - The director maintains a list of speakers on begonias and related subjects.

## ABS Bookstore

**The Begonia Book.** Eva Kenworthy Gray, 1931. Facsimile copy of the first book about begonias published in the United States. \$4.00.

**Begonias:1980.** Japanese text by H. Arakawa with 431 excellent color photos. Paperback. \$25

**Begonias in Color.** Text by Yuji Murotani, color photographs by Hideaki Tatsumi. With English translation. \$12.50

**Growing Begonias.** Eric Catterall, 1984. Hard cover \$17.00

**Les Begonias.** Chevalier's classic 1938 study of the *Begonia* as translated by Alva Graham from the French in 1975. Illustrated. Paperback. \$5

**Mother Nature's Secrets.** Fundamentals of indoor gardening. Illustrations of 341 houseplants in color. Paperback. \$5.

**Buxton Check List.** Reprints of original and supplements. \$20

**Guidelines for National Conventions and Annual Shows.** \$2.50. Order of 5 or more to same address, \$2.00 each.

**Pamphlets.** *Begonias From Seed*, 35¢ each, with book order 25¢. *Culture of Begonias*, 75¢ each, with book order 50¢.

**Begonian binders.** Keep your issues together. No repunching. Black. \$5.25 each.

*All prices include shipping in the continental U. S. California residents add 6% sales tax. Send check or money order in U.S. currency payable to American Begonia Society.*

Bookstore Manager ..... Bob Bailey  
5190 Mission Blvd. Sp.90, Riverside, CA 92509

**The Begonian.** Individual copies of back issues more than a year old. Price depends upon year. Write for information to Back Issue Sales.

Begonian Back Issue Sales ..... Julie Panttaja  
8969 Hope Ave, Riverside, CA 92503

## Branch Directory Revisions

Send names and addresses of group officers, meeting place and time, and other information for the list of affiliated groups to the ABS Secretary. Keep your listing current.

## Mailing Notice

### For Those With New Addresses

Issues sent by Third Class Mail are not rerouted to a new address unless the recipient has arranged for this service with the Post Office. The issues are destroyed, and the ABS pays for the notification of the new address if it is available. If the member misses an issue for failure to notify the Membership Secretary, he may purchase it from the ABS Bookstore.

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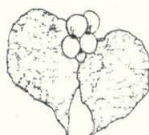
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