CROSSWORDS

THE GESNERIAD HYBRIDIZERS ASSOCIATION

NEWSLETTER

VOLUME NUMBER 2 ISSUE NUMBER 4 WINTER 1978

CO-ORDINATOR'S MESSAGE

Starting with the next issue, the new regime takes over the running of GHA and the publication of CROSSWORDS. It will be an experiment in long-distance communication and co-ordination, involving people on both shores, and in both the USA and Canada. We have a dedicated, enthusiastic group, and I am confident that everything will work out fine. BUT: we need the co-operation of every member! This means YOU!
Here are the responsibilities of every member:

First: renew now. Send your check for $5.00 to Jeanne Morton; see the renewal form in this issue. The extra dollar over last year's $4.00 dues is to help pay for getting material typed before being printed in CW. If we get volunteers to type the material, the money left over at the end of 1979 will go toward the 1980 budget. Renewing NOW will allow us to plan our 1979 budget. Renewing late also makes unnecessary work for Jeanne, Peg, and Zelda, who will all be involved in processing memberships.

Second: write something. Of course, successful or unsuccessful hybridizing experiences make good material for publication in CW. But many other topics are possible. Have you visited a commercial grower lately---perhaps you have seen some new plants there? "New hybrids seen at..." would be an interesting item of information for other members. If you aren't actively hybridizing, perhaps you could write about a particular goal that hybridizers should be working toward. Or a particular genus that has been neglected by hybridizers. Or one that has been overworked. Without articles from our members, there is no CROSSWORDS. Send your articles to either of our editors: Ron Myhr, Claremont, Ontario, Canada L0H 1E0; or Anne Crowley, 232 Austin Street, Hyde Park, MA 02136 USA.

(cont.)

The Gesneriad Hybridizer's Association is a non-profit organization. The newsletter is published quarterly, copyright by G.H.A. The membership year is the calendar year.

CO-ORDINATOR'S MESSAGE (cont.)

Third: spread the word. The GHA does not advertise. We depend on free plugs and word-of-mouth to let people know we exist. If you know anyone who'd be interested in joining, tell them how they can join. If you have the opportunity to put in a plug for us in a plant magazine, that would be terrific.

I would like to take this opportunity to thank Art and Peg Belanger for the hard work and all the time they have put into the GHA and CROSSWORDS during the past two years. Their idea has blossomed into an organization of hundreds of members, publishing 60 pages of useful information each year. Up till now, CROSSWORDS has essentially been a two-person operation. Let's prove that we can spread the workload out and still get things done.

Peter Shalit, Co-ordinator

PLEA FROM A NEW EDITOR

We will be hard-pressed to fill the boots of Art and Peg Belanger. Your kindest indulgence, continued patronage and generous contributions (in the form of material) are requested until we know what the hell we're doing.

Time has that nasty habit of slipping away. The article that you were intending to write is needed NOW. And thank you.

Anne Crowley, Editor

SPECIAL NOTE OF INTEREST FOR GHA CANADIAN RENEWALS:
Personal checks drawn on Canadian Banks are not honored at most U. S. financial institutions, so please send Postal or Bank Money orders in USA currency in payment of 1979 dues.

Jeanne Morton, Membership

???WHERE ARE THE OTHER FOUR PAGES???

You're right if you think CW is "thinner" with this issue. By deadline time we realized that the article you intended to write would not arrive on time. (one month before mailing date) We were left with four blank pages, so rather than print, collate, and mail four blanks, we simply eliminated them. To keep CW from similar losses in the future, please cooperate, send in your article to help maintain the 16 page format.

Peg Belanger, (former) editor

MUTATIONS BY RADIATION
Walter J. Pickett, Douglas, KS

Radiation in the form of X-rays have been used to produce mutations in many plants, including gesneriads. Indeed, some, if not all gesneriads are easier subjects for mutation work than are plants of most other families, because new plantlets, when started from leaf cuttings usually grow from single cells. Particles (or waves) of radiation are sent rhrough the cells, moving at speeds approaching the speed of light. If a chromosome is hit, a piece (containing one gene, many genes or only a part of a gene) may be displaced or broken off. For example: if the gene that produces the protein which makes a blue-purple pigment in the flower is damaged slightly, the protein may work, but not as well. The mutant flower would then be paler than the original. If the part of the protein that adds a hydroxl group to the pigment is damaged, the rest of the pigment is made, but without that hydroxyl, and it reflects a different frequency of light, namely red. This mutant flower would be red, instead of blue-purple like the original. In another cell, another bit of radiation completely destroys our hypothetical gene, so the pigment can not be made at all. When this cell grows into a plant, it has white flowers.

Another possibility is that the piece of chromosome carrying this gene is completely knocked loose from the rest of the chromosome. It may then be lost, and a gene for white will be there (actually a lack of gene for color, but it behaves as a recessive gene for white). However cells are not helpless against radiation, and the piece of chromosome might be tucked back into place and never missed, as any of the above mutations might also be repaired. But the repair mechanism can also make mistakes. The loose piece might be put on the other chromosome, which already has the gene. This probably would not be noticed until the next selfed generation, when the offspring might be 1 white: 2 normal: and 1 dark. The white would have two chromosomes from the one that lost its color gene. The 2 normals would be heterozygous, having two color genes on one chromosome, none on the other. The dark one would have four identical color genes, two on each chromosome. This shows how a blue-purple flower could mutate to red, white, pale, or dark. Depending on the actual damage, intermediate forms can be produced. Tetraploids are more complex because there are twice as many genes to mutate, twice as many genes to mask mutations (most mutations are recessive), more complex segregation ratios and more genes to buffer against large mutations. The buffering effect is due to there being 4 copies of a given gene (4 similar copies, i.e. alleles, not necessarily identical genes), and if one has a major mutation it leaves three other good genes on the job, doing its work. In a diploid, it would leave only one functional gene doing its job and result might be fatal to the plant. Probably for this reason, Broertjes found the apparent mutation rate of a tetraploid Achimenes to be 20 to 40 times higher than the same but undoubled Achimines cultivar. This was however in the M1 generation where only dominant mutations are usually expressed. In the M2 generation, many more mutations surely would have shown up. An irradiated F1 hybrid is also complex because it has so many recessive genes masked by dominant genes. Of course, some of the recessives are from each parent. When the dominant genes are

(cont.)

destroyed, the recessive genes are expressed. This gives a much higher rate of noticeable mutations in the M1 generation.

I said in the opening paragraph that some gesneriads had an advantage over other plants for mutation work, they are Saintpaulia, Streptocarpus, and Achimenes. When grown from leaf cuttings, they grow from single cells. This is important! If a growing bud is irradiated there are many growing cells and a mixture of mutated and unmutated cells result. These grow eventually into a flower. Self-pollinated, the cells that become the seeds will be a random mixture of mutant, and non-mutant cells, (likewise the pollen). One gets a mixture of a high proportion of seeds that do not carry mutations, another large proportion of heterozygous for mutations, and a very small proportion of homozygous mutant seeds. Growing the population is expensive, time-consuming, and maybe disappointing. When a plant grows from a single cell, as do some (if not all) gesneriads from leaf cuttings, and then selfed, the new mutants should segregate in a simple 3:1 ratio. Growing a few (10 to 20) seeds from each M1 plant will show the mutations from that plant (this is for diploids only, tetraploids are more complicated). If none are good, the plant may be discarded with its seedlings. In this way those with limited space can test one or a few plants at a time.

Broertjes suggests 3 K-rads of X-rays as optimum for Achimenes and Streptocarpus. This is at 250 volts, 15mA. If fast neutrons are used, about 1 to 1.5 K-rads (pronounced Kay-rads) would be used. However he was looking for mutations in the M1 generations. This much radiation may cause reduced fertility. Broertjes recorded mutations in 46.7% of the tetraploid Achimenes, 32.1% of these were promising. In other words about 14% of the M1 plants had potentially desirable mutations. (This was with fast neutrons. X-rays gave a lower percentage of desirable mutations, but they were of the same type). The desirability of growing plants from single cells was mentioned. Sinningia leaves may be treated as Streptocarpus leaves, i.e., the mid vein and leaves put down lengthwise. Using a whole leaf with its petiole produces a tuber first, before forming plantlets. If the plant you are working with does not grow from leaf cuttings your next best bet is seeds. In such small seeds, the embryo has few cells. They should be treated as they are about to germinate. Dormant seeds require much higher doses.

Now, where can you get seeds irradiated? First, check the nearest university. X-ray machines may be available in the physics, biology, chemistry, or agriculture departments. Any science professor should be able to at least direct you to someone who could do it. If none of your local universities can help you out, a hospital that gives radiation therapy might irradiate some material for you. You may expect varied mutations which affect degree of branching, vigor of a plant, size, color, or number of flowers, and fertility. Mutations in these traits will be most common, and apparently identical ones will occur repeatedly. Other changes occur less frequently, but anything can happen. One plant mutated from a summer-flowering plant to a winter-flowering plant. Mutations to more disease and insect resistant plants have occurred in other families, and mutations for earlier flowering are not uncommon. More erect and less erect plants

(cont.)

often are found. In agricultural plants, it is estimated that only 1 in 800 mutatations are desirable. Broertjes, however, found about 1 in 3 mutations were desirable in Achimenes. Streptocarpus 'Constant Nymph' also had a high proportion of desirable mutations. Unfortunately, the proportion of desirable to undesirable mutations varies from species to species, and until someone works with a given species, its anyones guess what mutations might appear. My own thought is that the other gesneriads will have similar desirable mutation rates.

Sometimes one looks for a specific mutation. No doubt many people have tried to cross Sinningia 'White Sprite' with S. 'Innocent' to obtain a white miniature Sinningia about the size of S. 'Dollbaby', and were disappointed. Crossing a recessive white with a recessive white should have produced a white. But it did not! Let's see why. Imagine a long road that crosses many rivers. If a bridge is out, you can't get to your goal. Now imagine another road parallel with the first, also with a bridge out, but over a different river. You can take one road across one river, get on the other road and get across the other river, and go on to your goal. A cross of S. 'White Sprite' x S. 'Innocent' is comparable. The pigment production lines are broken in different places. The pigment is partially assembled on, (guessing) S. 'White Sprite's proteins, but not completely. Then the unfinished pigment is passed on to S. 'Innocent's proteins and then finished. The color comes through. But if the F1 hybrid is irradiated, and the gene in S. 'White Sprite' is damaged at the same point as the gene in S. 'Innocent', a white plant results.

I am planning to cross S. cardinalis 'Skydiver' x S. eumorpha. I intend to select a white upright plant in the F1, then cross it with S. 'Snowflake'. The F1 from this cross will be irradiated. The more recessive genes present, the greater the chance of a mutation in the genes from one parent matching a recessive gene from the other parent. The S. cardinalis chromosomes do not pair well enough withS. pusilla chromosomes to give a segregating F2 generation, which is a good reason for attempting mutation. This paper will help you get started in mutation breeding. I suggest that you read Broertjes* articles which I found helpful in my research.

* C. Broertjes. Mutation Breeding of Achimenes., Euphytica, 21 (1972) 48-62.
* C. Broertjes. Mutational Breeding of Streptocarpus. Euphytica, 18 (1969) 333-339.
* C. Broertjes. Mutation Breeding of Autotetraploid Achimenes Cultivars. Euphytica, 25 (1976) 297-304.

MORE ON ENSTAR

Carla Petra Pavone, Associate Editor-HPPG Magazine

While researching an article on Nematanthus, I naturally talked with the hybridizer, Bill Saylor. He reiterated his faith in Enstar as an effective, legal and safe insecticide. Following up some industry rumors, I talked with the marketing department at Zoecon, the California company that manufactures Enstar. Unfortunately, Enstar has been pulled off the market. It seems that the product was too expensive to produce and not profitable enough to sell in low volumes. So, greenhouse hobbyists are back to base one when it comes to fighting bugs without resorting to dangerous, often illegal chemicals.

A LETTER FROM CANADA

Georgina Bull, 129 Trask St., Regina, Saskatchewan, Canada

Dear Mr. Belanger and Members;

It is time to write, altho there is not much but failures to speak about, so if it is to be failures then I do have them, all kinds, tons and tons. So here goes, get out the tissue box its a SAD tale.

1 - Had selfed some Episcias, got a seed pod but no germination, this was E Fire-N-Ice, perhaps this plant has no fertile seed.

2 - N . Tropicana- have selfed this plant, or I should say tried and tried and TRIED. No luck.

3 - N. Black Magic - have selfed this plant so many times I've lost count. Drat.

4 - C. Orange Beauty - selfed. Have several plants from this, seedlings are strong and growing well. There does appear to be some difference in the leaf, could be just my hopeful looking.

5 - Had attempted to cross some Av'S, there was a seed pod but no germination. Do feel that there are many and better qualified hybrifizers looking after the AV's so there is no need for monster makers.

6 - C. Flamingo and C. Cayugan - selfed. Have a very few plants and they all look alike, but keep telling myself that this is no indication of anything. Fingers crossed and all that stuff.

7 - Is the tissue box empty?. Well relax have two wonders of wonders to report.

A - Crossed a white bloom with yellow throat, sinningia, with a S. cardinalis and even know why I did it. Reason - light colour bloom, perhaps pink? The bright red of S. cardinalis and that glowing white of the unknown sinningis. However there is a great difference in the bloom shape. These seeds have been planted but it is too soon to see germination. Should mention that there are two seed flats, one with spagnum(long fibre) and one with the mix that Iuse, the dustings from a 1-1-1mix. The worst thing about all this is waiting, I can't, it will be peek every day and it will feel that this is taking forever.

B - A most recent success - Crossed C. Flamingo X C. Unknown. The columnea that I do not know the name was listed as C. linearis BUT C. linearis has hairy PINK flowers, as stated in the Miracle Houseplants.

The reason for crossing these two is - C. Flamingo has a soft look and this unknow columnea has bright orange, hooded flowers, blooms all the time (love it) C. Flamingo is mottled (not grown properly/?)but with a flower, scoop shaped, and I would like a soft colour hooded flower with the attractive semi-trailing they both do. This flower on the so called C linearis is notched and there are very slight touches of yellow on each side of the lip (for want of a better word), no this yellow does not go into the throat.

Now for some help, I hope. Using the Royal Horti Colour Chart---

So called C linearis is Bud 45 - A -
Flower 40 - B - Fan #1
yellow strip 13 - A -
old flower 34 - A -
Leaf - narrow , centre ridge,
Top 131 - A - Fan #3
Underside 146 - A -

With back light the flower of this plant has a shade difference down each (front) side of the throat.

What colour IS C. linearis, using this colour chart as reference, could anyone help? Help.

THIS IS GEORGINA'S SECOND CONTRIBUTION TO CROSS WORDS. IF EVERY ONE OF OUR MEMBERS SENT IN ONE MANUSCRIPT LIKE THIS WE WOULD HAVE TO INCREASE THE NUMBER OF PAGES PER ISSUE. (Thank you Georgina --- Art Belanger)

"BIG MOTHER" --- Sinningia 'New Zealand'
Peg Belanger, Warwick, R. I.

Sinningia 'New Zealand' crossed with compact Sinningias produced hybrids closer to the 10" size of the compact class than to the 5' height of a mature S. 'New Zealand'. To avoid repetition, the general description of the following plants also includes a vigorous, symmetrical growth habit, with erect stem and ovate leaves inherited from the 'New Zealand' parent and they bloom within six months from seed.

SINNINGIA

#9762 'New Zealand X canescens
Leaves medium green with silvery sheen from many white hairs, mature leaves are 12 cm long x 9 cm wide. Red tubular flowers (5) on axillary peduncles. (RHS color chart #58 B) Flowers are 4 cm long, narrow limb. Pollen fertile.

#9763 'New Zealand' X eumorpha
Leaves dark olive green, 12 cm long x 8 cm wide. Single flowers from each closely spaced axil. Corolla 3 cm long, purple (RHS color chart # 70 A) with alternating white and dotted purple lines on the lower lobes, limb 2 cm in diameter. Pollen fertile.
(Incidentally the interested hybridizer should be told that the S. eumorpha selected for this cross was pure white with a yellow throat, still it produced the underlying dominant purple in the hybrid)

#9764 'New Zealand' x Ted Bona's lineata hybrid
Dark green leaves with olive accents, 10 cm long x 7 cm wide. Flower, clear pink. (RHS color chart #58C) The tube is slightly inflated, 4 cm long, limb irregularly reflexed, 2 cm wide. Pollen sterile.

#9765 'New Zealand x 'Rex'
Leaves medium green, 12 cm long x 8 cm wide. Flower red, (RHS color chart #58B) with inflated tube 5 cm long and limb 2½ cm wide with darker red veining. Multiple flowers on axillary peduncles. Pollen fertile.

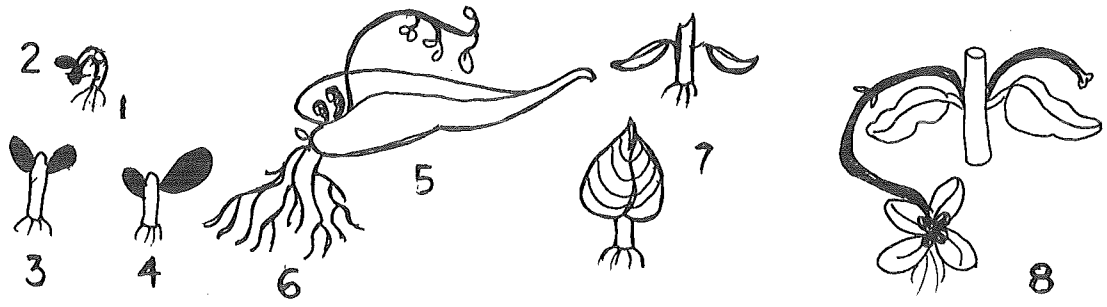
Art and I think that #9765 ('New Zealand'x 'Rex') has the most appeal, but we have hopes that one of the others will supply the bridge between S. 'New Zealand' and the smallest miniatures --- S. 'White Sprite' and S. 'Snowflake'. The direct cross between the large and miniature has eluded us to date but you all know that it is impossible for a hybridizer to look at a plant for its own beauty without immediately planning how to improve it.
'New Zealand' has also been useful when used as the pollen parent. We have fertile hybrids of 'New Zealand' x a sibling of S. 'Silhouette'. which are similar to 'New Zealand' x eumorpha #9763 but closer to the miniature class. We are looking forward to the day the next generation blooms as the f2 segregation of traits is always the most interesting.

GLOSSARY FOR HYBRIDIZERS PART III ROOTS AND STEMS
Frances N. Batcheller, Durham, NH

A germinating seed develops a short piece of stem with roots at one end - the radicle (1); and leaves at the other end - the plumule (2). The hairpin bend of the stem enables the plant to pull up through the soil without damaging the delicate first leaves or cotyledons. In gesneriads, the cotyledons are similar in shape and texture to the other leaves on the plant. In contrast, a bean plant has cotyledons which are thick and stocked with food, hence the usefulness of the seed; but totally unlike the subsequent green leaves. A peculiarity of gesneriads is the occurrence of two types of cotyledon pairing. One type is isocotylous, the New World group which has both cotyledons of equal size (3) (Sinningia, Episcia, Columnea). The other type is anisocotylous, the Old World group, which has a pair of cotyledons which develop unequally (4) (Saintpaulia, Chirita, Aeschynanthus). In Streptocarpus, this is sometimes carried to the ultimate, with one cotyledon withering while still small, and the enlarging cotyledon comprising the entire vegetative plant, with inflorescences developing along the midrib (5)

All gesneriads develop fibrous roots (6) at the base of the stem. In addition, they may also form adventitious roots developing from other parts of the stem, such as roots which form on cuttings (7).

Stolons are stems arising from leaf axils and developing terminal plantlets which will form roots under suitable conditions (8) (Episcia).



Rhizomes are subterranean stems. Some gesneriads have scaly rhizomes (9), stems with scale-like leaves closely packed together. Roots can form between the scales on the lower surface. A bud is formed in the axil of each scale, as it would between a leaf and and the main stem of a plant. Single scales are capable of generating a new plant from the bud at the base. The scales are formed from a thickened folded leaf, in shape somewhat like a section of a mandarin orange (10). There are two different arrangements of the scales around the central stem or core of the rhizomes. They can be set in flat rows like a brick wall (11) (Kohleria, Diastema, Gloxinia, Titanotrichum, Phinaea); or in a continuous spiral like a circular staircase (2) (Achimenes, Smithiantha, Niphaea). Rhizomes are annual structures, one or many forming at the base of the plant stem, usually near the end of the growing cycle. Spindle-shaped rhizomes which are smooth, not segmented or separable, are produced by Lysionotus (13). Propagules (14) are similar to scaly rhizomes but are produced above ground. They generally have more widely spaced, smaller scales; and are covered with a waxy coating to prevent dehydration (Gloxinia gymnostoma, Titanotrichum).

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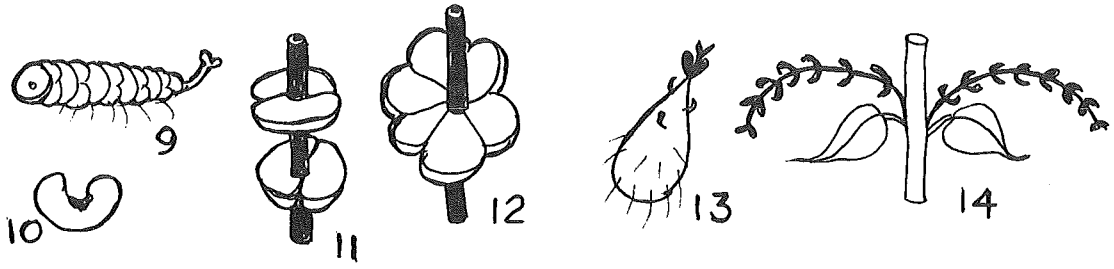
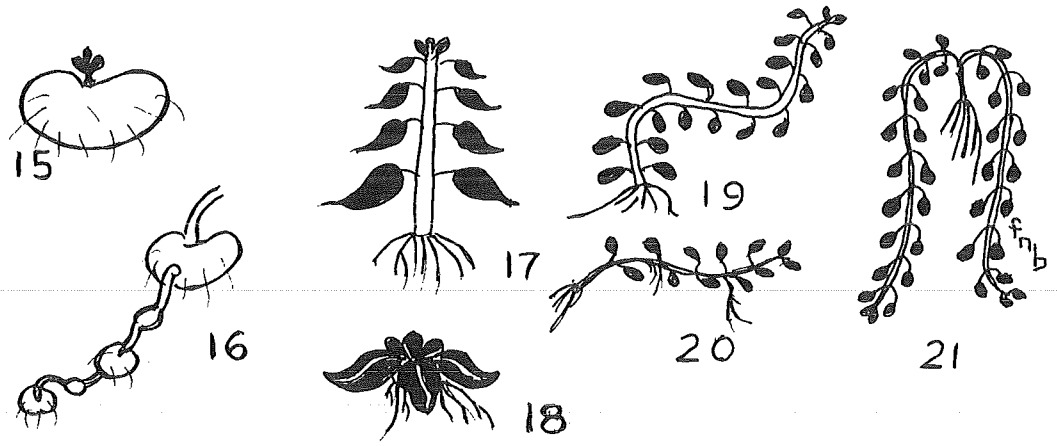


A tuber (15) is an enlarged section of stem, with small buds or "eyes" for future growth. More or less tomato-shaped, the rounded side is the base and the indented side is the top. The buds form around or in the center of the sunken crater. Tubers are perennial structures, increasing in size with age, but not normally dividing, although there may be loves or superimposed tubers which can be separated (Sinningia, Chrysothemis, Nautilocalyx picturatus, N. panamensis). Some Sinningias (S. tubiflora, S. richii) also produce accessory tubers on slender stems in addition to the main tuber, like beads on a string (16).

Plants may be caulescent, with a conspicuous stem or central axis (17) (Kohleria); or acaulescent with inconspicuous stem and lack a central axis (18) (Sinningia pusilla, Streptocarpus rexii). Most acaulescent plants have a rosette form of growth. Caulescent plants may have an erect stem growing up straight (Smithiantha); ascending, arching upward (Nemathanthus, Bellonia); repent, creeping along the surface of the soil and rooting at nodes (Sarmienta, Codonanthe) (2) scandent, with vine-like stems (Columnea microphylla) (21)



QUESTIONS from Russel White, Londonderry, NH

What is the difference between S. 'Krishna' (spontaneous tetraploid) and S. 'Pink Petite' (allo-tetraploid)? Are they only different by selection of particular clones? Both are listed as a cross of S. pusilla x S. canescens. Also if some one had a tetraploid canescens and crossed it with tetraploid pusilla should he get essentially the same type of plants? Does anyone know the background of S. 'Maidens Blush'?

We are repeating the list of new officers for the benefit of anyone who missed the listing on the cover of issue 3, Fall, 1978. We can't claim to have hand picked them, but they fulfill our idea of a dedicated group, well equipped to tackle the difficult task of perpetuating CROSSWORDS.

We plan to offer every assistance to the "New regime" as Peter puts it in his Co-ordinator's message, and feel obliged to tell you that we feel like we have deserted the group on one hand, but know that we had to pass the responsibilities on to a younger group for the sake of the association.

We will still write about our experiences for the benefit of anyone interested. We certainly will retain our membership, and participate in any future projects. We still think that hybridizng lends an aura of pride to the personality of one who can, or one who aspires to be a hybridizer. Why? A hybridizer does not read a periodical to find out how to keep a plant alive. (The plant family is not important). A hybridizer looks at plant species or hybrids and immediately thinks---that plant has some excellent points/traits ---how can I improve on them---? As a group, we know how to grow above average, or we would not dare to think about improving the WAY a plant grows or blooms naturally. On the minus side, we have been made aware of our deficiencies as improvers of Mother Nature by the hundreds of useless hybrids we have produced and discarded.

If all this were extremely easy, we would not have a GHA.

THE NEW REGIME CAN USE YOUR HELP. If you can type, or do paste-up work to get the book camera-ready for Martin Mines, the printer, please get in touch with Peter Shalit, Co-ordinator. If you cannot do any of these, please write anything you can about your hybridizing experiences. At whatever level your experience lies, there is always something in your message that will help a fellow member.

Yours sincerely,

A&P Belanger

--- THE NEW REGIME ---

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Jeanne Morton, Ayer, MA

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SUBJECTS

GESNERIAD HYBRIDIZERS ASSOCIATION MEMBERSHIP APPLICATION/RENEWAL
Please enroll me as a member of the G.H.A. Enclosed find $5.00 for one years membership and CROSSWORDS, the quarterly newsletter.
(based on the calendar year, 1979.)

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