CROSSWORDS

The Gesneriad Hybridizers Association

NEWSLETTER

Volume VI, Issue 2, 1982

Editors' Message:

It was very encouraging to see the large turnout at the annual meeting of G.H.A. at the A.G.G.S. convention held recently in Sarasota, Florida. However, the lack of new material for "CrossWords" has forced us to slightly reduce the number of pages in this issue. We do thank the people present at the meeting who contributed their comments and questions, which are printed elsewhere in this issue. We can also report that our treasury is healthy.

There was only one nomination received for the 1982 G.H.A. Hybrid Award! There were no nominations from the floor at the meeting, therefore, no award was given. Can it be that there were NO meritorious gesneriad hybrids produced in the past year? Our goal is to encourage the hybridizer, both commercial and amateur, by recognizing their efforts on our behalf. Please keep this in mind and next year, mail in your ballot.

Many members at the meeting requested more information about the basics of hybridizing. We will try to provide this information. Hans Wiehler's articles in this issue are an excellent introduction to gesneriad seed production and hybridizing. We strongly urge our newest members to send for the back issues of "CrossWords." They are a very good source of information. Details for ordering are on Page 5.

As always, your articles, questions and comments are welcome.

— Anne Crowley and Al Wojcik

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G.H.A. Seed Fund

David Zaitlin, Director

Hello again. Please excuse my absence from the last issue. These recent months saw the passage of my Ph.D. oral candidacy exams. I was a mess, but am now reapproaching normalcy. My plants have understandably suffered, and I have no new hybrid seed to list here. I am currently pollinating various Sinningia hybrids in the hope that I will soon have some interesting crosses.

For those of you interested in some colorful Streptocarpus hybrid seed, please write to my mother as she has many varieties. Her address is: Marjorie Zaitlin, 111 Northview Rd., Ithaca, New York 14850. Be kind enough to send the usual self-addressed, stamped envelope.

The ever-generous Mike Marriott (5 Trundle St., Enoggera, Queensland Australia 4051) now has a request. He desires fresh seed and pollen of the following Aeschynanthus species and hybrids:

A. evrardii	*A. longiflorus*	*A. longicalyx*
A. hosseussii	*A.* 'Red Elf'	*A.* 'Sumatra Sunburst'
A. ellipticus	*A. hartlyii*	*A.* 'Kew Pink'

He expects to have seed available from his primary Aeschynanthus hybrids "from about December on . . . " Please write him.

My own request is for seed of *Sinningia* 'Lavender Queen,' an unnamed species Sinningia mentioned by Ted Bona. Does anyone have seed? Also, I would like to know the particulars on my *Sinningia* 'Laura' X *S.* 'Silhouette' cross. I never planted any of the seed but I am anxious to know how the plants look.

In closing, I will of course make the obligatory plea for seed. Please. Send it now. Don't delay. Now that that's over, I want to inform you all that I still have some seed of just about every cross ever listed in this column. All have been kept refrigerated and should be at least partially viable. If there is something you didn't send for in the past, now is the time.

(Eds.' note: I planted the seeds from *S.* 'Laura' X *S.* 'Silhouette' about 2 months ago, and all germinated very well. They have already been transplanted to individual pots and are growing like crazy. I should have some in bloom by the next issue, and will report on them at that time. Anyone else have any in bloom yet? —A.W.)

Did you know . . .

. . . some pollen sacs must be cut open (with a sharp razor blade, for example) in order to get at the pollen grains. These include: Saintpaulia (African violets), *Boea hygroscopica,* Petrocosmea and, on occasion, *Sinningia concinna.*

. . . some so-called rhizomatous varieties of gesneriads do not make classic rhizomes. For example: *Pearcea hypocyrtiflora.*

. . . when attempting to cross plants with different size styles, pollen should be applied to the shorter style. The germinating pollen tubes from a short-styled plants may not grow long enough to reach the ovary of a long-styled plant.

. . . even though a mature seed pod appears to yield nothing but dust, you should try planting the chaff anyway. There is always a chance there may be a few fertile seeds present.

. . . a small pocket mirror is ideal for collecting pollen on. It makes the pollen much more visible and easier to work with.

G.H.A. Members Respond

We asked the attendees of our annual membership meeting of G.H.A. for their comments, questions and opinions about hybridizing and "CrossWords." Here is a sample of what we got:

"I think that you should have a real beginner's section, a glossary for the terms used and simple basic information, such as, when pollen is ready."

Good idea. Anne and I will keep that in mind. In this issue, we are introducing a new column called "Back to Basics." In this column, we will try to run articles that deal with the basics of gesneriad hybridizing. Hans Wiehler's article on pollination and seed production in gesneriads is an excellent introduction to the mechanics of plant fertilization. Meanwhile, read on . . .

"I have never hybridized but I am interested. I know that some gesneriads don't cross but where do I find a chart or basic information about what will cross?"

A reprint of Bill Saylor's "Gesneriad Cross Roads, Birds and Bees and Gesneriad Seeds" is available from A.G.G.S. Publications for 50 cents (Address: c/o Anne Crowley, 232 Austin Street, Hyde Park, Mass. 02136). It provides good basic information on hybridizing.

Jane Steffey, Horticultural Advisor at the American Horticultural Society (Box 0105, Mount Vernon, Virginia 22121) was kind enough to send the following list of books on plant breeding, the titles garnered from the A.H.S. library. She also writes: "One state extension circular is listed — the only one we have, but I suggest that others may be in print in other states. Usually state extension publications are free to residents of the state where the inquiry originates." For information about these circulars, contact your local Cooperative Extension Service. Check with your local library or book store for the books listed below.

Create New Flowers and Plants — Indoors and Out by John James, Doubleday & Co., Inc., 1964.
Fundamentals of Plant Genetics and Breeding by James R. Welsh, Colorado State University, John Wiley & Sons, Inc., 1981.
Genetics of Flowering Plants by Verne Grant, University of Texas, Columbia University Press, 1975.
Plant Breeding for Everyone by John Y. Beaty, Charles T. Branford Co., 1954.
Plant Breeding and Genetics in Horticulture by C. North, Scottish Horticultural Research Institute, John Wiley & Sons, 1979.
Plant Breeding as a Hobby. Circular 817, University of Illinois Cooperative Extension Service.
Principles of Genetics by Eldon J. Gardner, Utah State University, John Wiley & Sons, Inc., 1960.
Principles of Plant Breeding by R.W. Allard, University of California, Davis, John Wiley & Sons, Inc., 1960.
Simple, Practical Hybridizing for Beginners by D. Gourlay Thomas, St. Martin's Press, 1962.
The Story of Pollination by B.J.D. Meeuse, University of Washington, The Roland Press Co., 1961.

In addition, the Brooklyn Botanic Garden has two good books available for only $2.25 each, plus 60 cents postage for the first book, 10 cents for each

(Continued on next page)

additional book. The address is Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N.Y. 11225.
Breeding Plants for Home and Garden. Handbook No. 75, Brooklyn Botanic Garden.
African Violets and Their Relatives. Handbook No. 53, Brooklyn Botanic Garden.

"What type of magnifying glass is best for working with crosses involving small flowers such as Gesneria? Both hands are usually needed for handling the process."

Anne Crowley writes that she uses a 3X-power jeweler's loupe. I have a small eyepiece-type of magnifying glass that works great. You might want to invest in a magnifying glass on a flexible stand, such as the type used by an engraver or watch repairer.

"When you speak of distributing seeds of hybrids in the Seed Fund, are these hybrids reproducing true from seed? Or are they seed of cultivars that have proved to come true from seed?"

Seeds produced from the crossing of two species of gesneriads will usually produce plants that are rather consistent, that is, they produce plants which fairly evenly combine the characteristics of both species parents. Seeds from complicated hybrids can produce a real grab-bag assortment of plants. That's what's fun about growing them. Sometimes, you never really know what you will end up with. The G.H.A. seed fund may from time-to-time have seed of species varients (mutations or sports) or hard-to-obtain species. Irradiated or otherwise treated seed is also welcomed, although none has been offered to date. We try, in a small way, to be a testing ground.

"A column of selected definitions now and then would be instructive. It is of concern that growers learn to use correctly the terms: Species, variety, clone, etc. I have heard 'clone' used when the speaker meant hybrid — or something else."

Learning to use the proper terms is something that takes time and experience. We will keep that in mind when printing articles that contain confusing or vague terms. If an article contains words or statements that need defining, we'll run a glossary explaining them at the end of the article.

"What is known about the genetics of color inheritance in Sinningia?"

Sounds like a good title for an article, doesn't it? Anyone have any ideas?

"Suggestion for a Back to Basics column: Have amateurs try an actual cross, e.g.: Place pollen from plant "A" onto plant "B." Your cross should look like what? That way the beginner would gain confidence in their hybridizing ability. Also, you would know exactly what to expect of your first or second cross. I grow several miniatures but have never tried hybridizing."

This idea was tried a few years ago in "CrossWords." Members were invited to try crossing *Sinningia* 'Snowflake' with *S. pusilla* in an attempt to get the fringed effect of 'Snowflake' with the purple color of *S. pusilla.* Maybe it's time to start another similar project. We'll work on it. After reading Hans

(Continued on next page)

Wiehler's articles in this issue, why not try different crosses of your miniatures and let us know what the results are. We all learn from each other in G.H.A., and there's no better way to learn than to try it!

"I'm a professional plant breeder, currently working on African violets, chrysanthemums and kalanchoes. I'd like to learn about your organization, with an ulterior motive of finding a new plant with the potential of the African violet hybrids or Gloxinias. I'm not currently a member, but I'm sending in my application. I could write basic plant breeding articles for you." — Peter S. Hesse, Research Director, Pan American Plant Co., Box 64, Parrish, Fla. 33564.

Now that's what we like to hear! There are a great many gesneriads available that could (and should) have the commercial appeal of African violets and Gloxinias. We'd welcome an article on African violet hybridizing.

BACK ISSUES

Back issues of CrossWords may be obtained from Zelda Mines, 2206 East 66th St., Brooklyn, New York 11234.

Volumes I and II	$5.00 each
Volumes III , IV and V	$6.00 each

Individual issues of the current volume may be obtained for $1.50 each.

New Ventures

By Munnie Skog
30 Morris Thomas W., Cloquet, Minn. 55720

I received my first copy of "CrossWords" in May as a gift from my son, Dr. Larry Skog. I really appreciated the article on chromosome numbers of the various gesneriads. I shall use the knowledge I gained to its fullest extent because before, it was all guesswork for me.

I've been a gesneriad grower for many years but it's nice to try a new venture. I've crossed species of the same genus, now I have a new venture.

I have selfed blossoms of *Columnea mira, Sinningia* 'Laura' and *Columnea sanguinea* 'Trinitensis' and now have many seedlings. *C. mira* sets seed readily and the plant is in constant bloom. The individual tubular yellow/maroon-striped flowers last approximately a month. The plant is self-branching with a red reverse covering about one-half of mature leaves. This plant should be widely used commercially and in hybridizing.

Sinningia 'Laura' was a tuber that Larry sent home with me in early December 1981. It has flowered once and I selfed each blossom, which set seed readily. The beautiful purple flower is striking but the first two flowers were fringed. The tuber had 3 stems. I took off the one that flowered, along with several leaves and put them in my propagation box (vermiculite and peat mixture). They have already callused. The remaining 2 stems are now flowering — purple but unfringed. Why? I'm hoping that my seedlings or cuttings will have that lovely fringed blossom.

I have tried many times to self the blooms of *Drymonia varigata* that Larry collected in Colombia in 1980. It has beautiful fragile yellow fringed flowers that wilt at a touch. Plants almost seem to bloom themselves to death but new shoots appear on seemingly dead stems. *D. varigata* roots readily in spring but needs a clear plastic covering for the remainder of the year. I would suggest making cuttings often to keep the plant in bloom and available for pollinating. Constant moisture and a ready supply of ground limestone seem to be required.

(Eds.' note: Those first fringed flowers of *Sinningia* 'Laura' may have come from a stem that has sported or mutated. Hopefully, when the propagated stem blooms, the flowers will be fringed. Let us know.)

The Genus Episcia

By Hans Wiehler
Sarasota, Florida

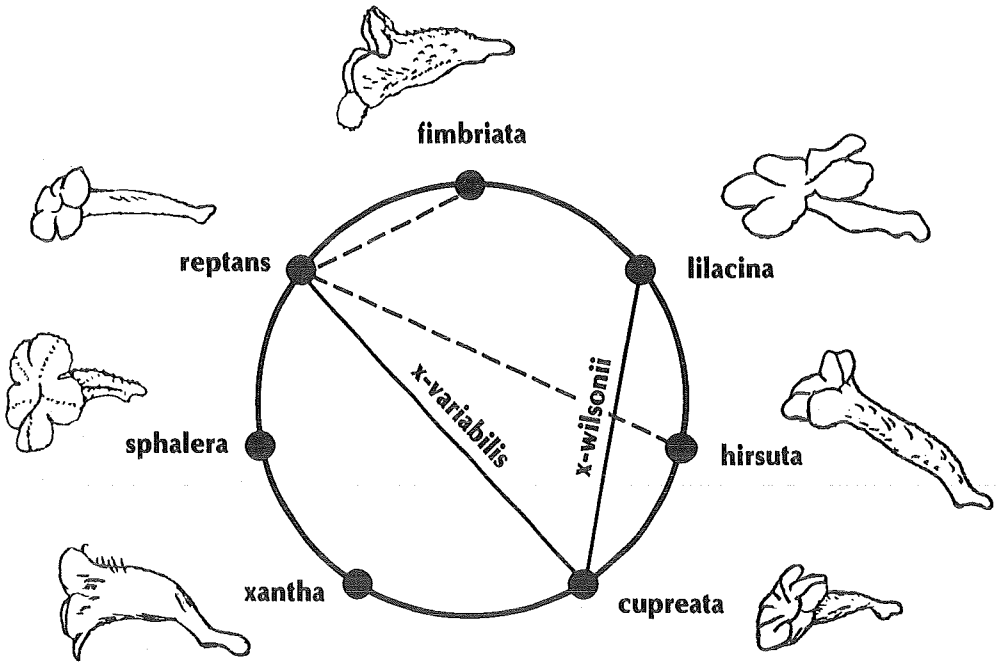
There is quite a bit we can learn about episcias from the wheel diagram of the crossing chart below. *Episcia xantha* from French Guiana was recently published by Dr. Leeuwenberg in Holland. "Xantha" means yellow in Greek, and refers to the pale yellow corolla which also has 4-5 red spots as a nectar guide in the throat. The leaves are green and bullate (quilted).

Each of the seven circles on the wheel represents a species of Episcia. The straight solid lines between the species indicate viable hybrids produced. The broken lines indicate offspring inviable: The hybrid seed did not germinate or died soon after sprouting. The chart shows also that all hybrids between *E. cupreata* and *E. reptans* will be known under the hybrid name of *E. variabilis* (such as *E. x variabilis* 'Noel'), and all hybrids between *E. lilacina* and *E. cupreata* are officially known under the hybrid epithet *wilsonii* (such as Harry Luther's hybrid *E. x wilsonii* 'Cotton Candy', which we usually shorten to *E.* 'Cotton Candy').

Episcia is an easy genus to practice your hybridizing skills on, because the flowers and sexual parts are quite large, and there are fairly quick results, if any. It is really somewhat odd that we have as yet no hybrids between *E. lilacina* and *E. reptans*; both species are in flower most of the year.

Episcia fimbriata is in limited cultivation, and so are three cultivars of *E. hirsuta*: *E.* 'Copper Leaf,' *E.* 'Silver Leaf' (both self-explanatory), and *E.* 'Avispa' from Cerro Avispa in Venezuela, with rounded plain green leaves. There will be some excess plants of these cultivars from Selby Gardens on the sales tables. See if you can hybridize them with any of the other episcias. We need this hybridizing information desperately, for I am not sure whether *E. hirsuta* is really an episcia. It does not produce stolons in cultivation and looks more like a species of Nautilocalyx. Yet there exist herbarium collections of this species with stolons.

— Reprinted from the Suncoast Gesneriette 4(6-7)



Episcia Crossing Chart

GESNERIACEAE CHROMOSOME NUMBERS VII. 1982 Supplement, with additions and corrections to parts I-VI.

Laurence E. Skog
Washington, DC

Since the compilation and publication of the first 6 parts of the Gesneriaceae chromosome numbers in CROSSWORDS, several additions and corrections have been noted. Please refer back to the earlier parts of this series for the complete list that appeared in CROSSWORDS as follows:

I.	Achimenes to Ancylostemon	Volume 4, number 3 (September 1980), pages 7-14
II.	Beccarinda to Columnea	Volume 4, number 4 (December 1980), pages 6-15
III.	Conandron to Gesneria	Volume 5, number 1 (March 1981), pages 3-10
IV.	Gloxinia to Niphaea	Volume 5, number 2 (June 1981), pages 3-11
V.	Opithandra to Seemannia	Volume 5, number 3 (September 1981), pages 5-11
VI.	Sinningia to Tydaea	Volume 6, number 1 (1982), pages 7-15

Please let me know if you have found any errors or additional counts that I have overlooked. My address is Department of Botany, NHB-166, Smithsonian Institution, Washington DC 20560.

Genus, species, author	n=	2n=	References
ACHIMENES			
erecta (Lam.) H. P. Fuchs	22		Davidse 1981
'Little Beauty'	11		Eberle 1956
longiflora DC.	11		Davidse 1981
AESCHYNANTHUS			
parvifolius R. Br.		64	Ratter & Milne 1970
ALLOPLECTUS			
tetragonus (Hanst.) Hanst.	9		Davidse 1981
sp. G-244 =Corytoplectus congestus (Linden ex Hanst.) Wiehl.	9		Lee 1962b
CHIRITA			
lavandulacea Stapf	18		Suguira 1938; Suguira 1940b

Genus, species, author	n=	2n=	References
CODONANTHE			
digna Wiehl.	8		Oliver & Skog 1981
luteola Wiehl.	16		Oliver & Skog 1981
COLUMNEA			
asteroloma (Wiehl.) L. Skog	9		Oliver & Skog 1981
billbergiana Beurl.	9		Oliver & Skog 1981
kucyniakii Raymond as Columnea sp. G-526	9		Lee 1962b
linearis Oerst.		18	Davidse 1981
sp. G-526 =Columnea kucyniakii Raymond	9		Lee 1962b
CORYTHOLOMA			
cardinale (Lehm.) Fritsch =Sinningia cardinalis (Lehm.) H. E. Moore	14		Sugiura 1936a; Sugiura 1936b
CORYTOPLECTUS			
congestus (Lind.) Wiehl.	9		Davidse 1981
CYRTANDRA			
stupantha St. John & Storey	17		Carr 1978
DRYMONIA			
mollis Oerst.		18	Ratter 1963
GESNERIA			
acaulis L.	14		Davidse 1981
X GOMIOCHARIS			
calliantha O. Schwarz		34	Lepper & Jungnickel 1980
HABERLEA			
rhodopensis Friv.		48	Contandriopoulos 1966

Genus, species, author	n=	2n=	References
JANKAEA			
heldreichii (Boiss.) Boiss.		56	Contandriopoulos 1966
KOHLERIA			
hirsuta (Kunth) Regel	13		Davidse 1981
tubiflora (Cav.) Hanst.	13		Davidse 1981
NEMATANTHUS			
perianthomegus (Vell.) H. E. Moore	8		Oliver & Skog 1981
wettsteinii (Fritsch) H. E. Moore	8		Oliver & Skog 1981
RAMONDA			
myconi (L.) Reichenb.	48		Contandriopoulos 1966
nathaliae Pancic & Petrovic	48		Contandriopoulos 1966
serbica Pancic	±96		Contandriopoulos 1966
RHYTIDOPHYLLUM			
tomentosum (L.) Mart.	14		Davidse 1981
SINNINGIA			
incarnata (Aubl.) D. Denh.	13		Davidse 1981

REFERENCES (includes only those not appearing in earlier parts of this series.)

Carr. G. D. 1978. Chromosome numbers of Hawaiian flowering plants and the significance of cytology in selected taxa. Amer. J. Bot. 65: 236-242.

Contandriopoulos, J. 1966. Contribution à l'etude caryologique des Gesneriacees d'Europe et de leur germination. 91 Congrès des Societes Savantes, Rennes 1966, 3: 271-280.

Davidse, G. 1981. Chromosome numbers of miscellaneous Angiosperms. Ann. Missouri Bot. Gard. 68: 222-223.

Lee, R. E. 1967 was actually published in 1968.

Lepper, L. & F. Jungnickel. 1980. Die Chromosomenzahl von X Gomiocharis calliantha O. Schwarz nach axenischer Kultivierung. Wiss. Z. Friedrich Schiller-Univ. Jena, Math.-Naturwiss. Riehe 29: 589-594.

Hybridizing With Gesneriads

By Hans Wiehler
Sarasota, Florida

The gesneriad family is now one of the plant groups used by man in extensive hybridization experiments. Plant breeding is man's effort to improve upon nature, to produce plants with higher ornamental or economic value. Other well-known groups used in plant breeding include the roses, orchids, day lilies, begonias, hibiscus, tomatoes, apples, citrus, corn, wheat, etc.

Gesneriads are hybridized to improve their ornamental value. There is something to be said for the untampered beauty of the botanical species from the wild — but which one of us does not enjoy such man-made gems as *Sinningia* 'Cindy-ella,' *Columnea* 'Early Bird,' or *Nematanthus* 'Tropicana'? Plant breeding or hybridization is, after all, responsible for the success of the gesneriad family as ornamentals or houseplants. African violets became popular only as hybrids, after their crossing potential was recognized. It is not just the fact that hybrids can be produced, but the ease with which the showy offspring can be obtained, that accounts for the still increasing success of gesneriads as ornamentals. Anybody who has mastered a few basic facts of biology can get into the act and create new forms. This can be done randomly by crossing anything at hand, to get yellow, everblooming, compact columneas. Our best commercial growers of gesneriads owe their success, in part, to their planned breeding program. Yet one does not have to be a commercial grower with ample greenhouse space to produce good hybrids. Successful hybridizing can be done on the home windowsill, especially if "planned parenthood" is practiced.

A successful hybridizer must also know what can be crossed with what, and which crosses have already been made. Can we cross *Streptocarpus saxorum* with *Episcia lilacina* to get larger blue flowers and a more cold-hardy plant? That's where some knowledge of plant taxonomy or plant classification comes in handy. Plants should be in at least the same tribe (what is a tribe, a family, a genus?) to produce viable offspring, and *Streptocarpus* and *Episcia* are not in the same tribe. A good hybridizer owns a chart of the tribes of the family Gesneriaceae, and he or she knows which of the important genera are in what tribes and subfamilies.

The most successful hybridizing of gesneriads is done among the species or hybrids of the same genus, that is, by crossing a columnea with a columnea, and not with a nematanthus. The offspring of such interspecific crosses is quite often partially or completely fertile, and can be used for further experimentation.

The most actively hybridized genera in the Gesneriaceae are, in the probable order of incidence of hybridization: Saintpaulia, Sinningia, Columnea, Episcia, Streptocarpus, Achimenes, Nematanthus, Kohleria, Smithiantha, Aeschynanthus and Trichantha. There exist also a few hybrids within species of Drymonia, Nautilocalyx, Gesneria, Alsobia, Paliavana, Moussonia, Pentadenia, Codonanthe and Dalbergaria. This listing shows that many of the gesneriad genera have not yet been tried in plant breeding. There is thus still ample opportunity for new experimentation.

The possibilities are endless. One can cross two species and self the resulting hybrid, or backcross it with one of the parental species, or cross the hybrid with another hybrid of different or similar parentage. Here we have to remember that not all crosses are fertile, that some species or hybrids are incompatible when tried to combine, and that not all hybrids are beautiful or possess ornamental value. A good hybridizer learns early in the game to discard rejects and save growing space.

For the past 20 or so years gesneriad enthusiasts have been working with a limited number of parental species in cultivation as stock for hybridization. The continuing introduction of a wealth of new species (from Selby Gardens in Sarasota and other sources) should provide "new blood" and new vigor for our hybridizing efforts.

— Reprinted from the Suncoast Gesneriette 2(7)

Questions

From Jack Pardo
25555 S.W. 147 Ave., Naranja, Fla.

"*Sinningia* 'Purple Crest' has shown up at our local chapter meetings and there seems to be a question as to whether or not it comes true from seed. Is it sterile? Must it be vegetatively propagated and what is an accurate description of the bloom?"

Answer: Marty Mines contacted Lyndon Lyon, the hybridizer of *Sinningia* 'Purple Crest' who reports that it is indeed fertile, but the offspring are variable. *Sinningia* 'Laura' was selected from a group of seedlings grown from a planting of *S.* 'Purple Crest' seeds.

"The *Columnea* 'Moonglow' X *C. pilosissima* that I have has set seed many times and I have grown the resulting seedlings to maturity. Though some seem similar to the parent plant, some are quite different. Are the resultant plants "new" varieties or are they supposed to be veritable copies of the parent plant?"

Answer: Since your original plant is the offspring of a Columnea hybrid ('Moonglow') and a Columnea species (*C. pilosissima*) the results you got from growing the selfed seeds are just about what you should expect. Because the parent plant has a Columnea species as one of its parents (and therefore is more genetically stable), the majority of the seedlings from the selfed flowers should resemble the original plant. However, since the other parent is a Columnea hybrid ([*C.* 'Great Horned' X *C. erythrophaea*] X self) the genes are less stable, and there will be some diversity in the resulting seedlings. Only if the varient plants are sufficiently different from the parent plant could you consider them "new" plants.

G.H.A. Financial Report

Balance, May 14, 1981	$1,715.45
Income	
Dues	863.00
Interest	93.21
	956.21
Expenses	
Publishing and Postage for "CrossWords"	
Mines Press C/W Volume 5, #2	200.90
Mines Press C/W Volume 5, #3	221.81
Mines Press C/W Volume 5, #4	212.03
Postage	
Meg Stephenson 1982 dues renewal reminders	28.60
Anne Crowley postage to Canada	3.12
Typing	
Ron Myhr C/W Volume 4	35.00
Ron Myhr C/W Volume 5, #1 & 2	26.25
A.G.G.S. Fund for Progress	100.00
1981 G.H.A. Award to Bartley Schwarz	25.00
	852.71
Balance, May 31, 1982	$1,818.95

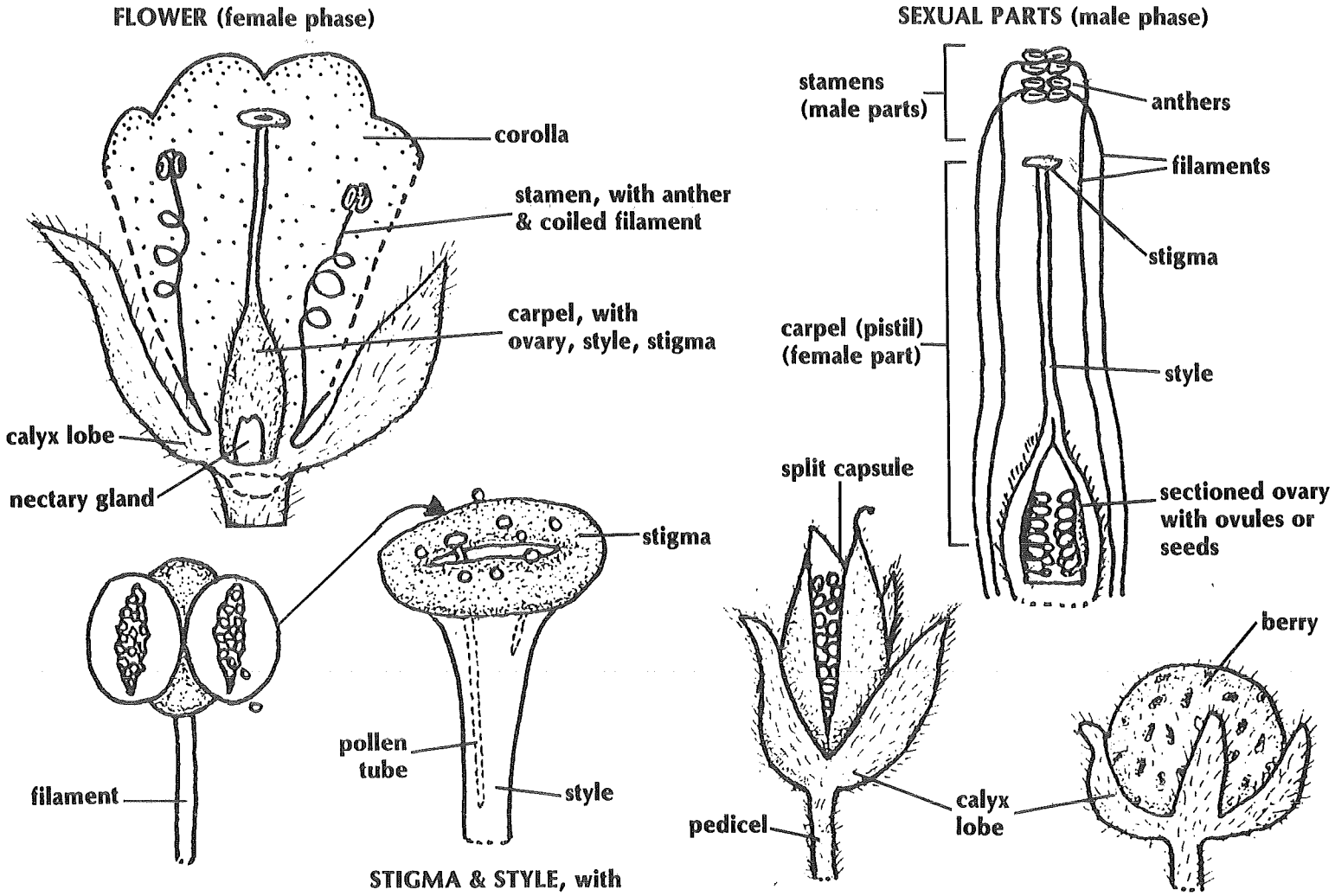
— Meg Stephenson, Treasurer

Pollination and Seed Production of Gesneriads in Their Natural Habitats

By Hans Wiehler
Sarasota, Florida

Gesneriads in cultivation have one fateful disadvantage in their life cycle: Their natural pollinators, very specific birds, bats or insects, are absent from the greenhouse, windowsill or light garden. Most cultivated gesneriads do not therefore produce seed, if left on their own. Usually we do not mind this absence of sexual reproduction in our choice plants, for the versatile gesneriads can reproduce themselves asexually by adventitious rooting and bud formation on severed leaves or stem cuttings, by the multiplication of rhizomes and tubers, or by the formation of stolons or other propagules. But if we want to obtain seed, or if we want to hybridize, man has to act as pollinator.

If we want to hand-pollinate or hybridize gesneriads, we need to know a few things about flower structure and seed production, or in other words, sex in plants. Gesneriads, unlike people, are hermaphrodites, that is, they have both male and female parts on the same body, in specialized structures — the flowers. As you read on, take a flower of Columnea, Episcia or Sinningia apart, and familiarize yourself with the terms used in the diagrams and text below. (Continued on next page)



The male parts of the flower are the stamens, consisting of the thread-like filaments and the anthers. Each anther has 2 anther cells containing the crucial pollen grains. The female parts of the flowers are the carpels, each with a stigma, style and ovary which, in turn, contains the second key element, the ovules or unfertilized seeds. Somehow the pollen grains of the anthers need to get to the ovules in the ovary to cause fertilization and seed production.

But there is a hitch. Most gesneriads and many other flowering plants do not like to be self-pollinated, that is, have the pollen of the same flower or the same plant fertilize its own ovules. Inbreeding usually tends to weaken plant populations. On the other hand, cross-fertilization (using the pollen of another plant of the same species, also called outcrossing) makes for vital and vigorous plant populations. Like people, each plant of a species in the wild differs genetically somewhat from another. Outcrossing guarantees a healthy mixing of the genes.

Did you ever ask yourself why you like gesneriads? Isn't it because many of them have such beautiful flowers? It may disappoint you to learn that these charming flowers were not meant primarily for our enjoyment. Gesneriads have devised these showy and appealing corollas, as well as the sweet, nourishing nectar or the alluring fragrances to attract birds, insects and bats to carry the important pollen from one plant to another of the same species. That is the reason why many gesneriads have flashy and large corollas, or such well-developed nectary glands. They are bent on attracting a particular pollinator (or pollen carrier) by hook or crook. Gesneriads depend on these pollen carriers for outcrossing, for keeping the species healthy, competitive and alive.

Besides the ability to attract pollen carriers for cross-fertilization, our plants have developed another device to insure outcrossing and to guard against inbreeding: The male and female phases of flowering. In the male phase (usually happening first in a gesneriad flower), the ripe anthers with their mature pollen grains stick out of the corolla or are at a strategic place inside the corolla. The female elements are still immature in this phase, the style is short and the stigma is small, not sticky and unreceptive. A flower in the male phase cannot be fertilized.

The female phase occurs usually 2-3 days later. The stamen filaments start to coil and thus withdraw the anthers and the pollen toward the base of the corolla. The style elongates and the stigma matures. The receptive stigma is now positioned in the same strategic place occupied before by the anthers.

As a pollinator, for instance a long-billed hummingbird visiting a population of an epiphytic Columnea species, flies from flower to flower and plant to plant to sip on a daily fresh supply of nectar, he finds some flowers in the male phase, and others in the female phase. From corollas in the male phase he gets sticky pollen dumped or brushed on his forehead or beak which he then inadvertently deposits on the sticky stigmas of flowers in the female phase. About 60% of the gesneriads in the American tropics are pollinated by hummingbirds.

The pollen grains "germinate" on the stigma by producing long tubes which grow down the hollow style to the ovules, and the nuclei of a pollen grain and an ovule unite to form the beginning of a seed. The ovary then matures within 3-8 weeks to produce the fruit, either a splitting capsule or a soft berry with ripe seeds.

Our clever gesneriads now employ other devices to get the seeds distributed to new growing places. The berries are designed to be eaten by birds, bats and monkeys which eventually scatter the seeds in their feces. The seeds in the capsules may be attached to special food bodies which are carried off and eaten by ants, or the seeds are blown away by wind, splashed out of the capsule by rain drops or washed away by the current of a forest stream. Some seeds find suitable places to germinate, and the life cycle of a species starts over again.

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Editorial correspondence may be sent to the editors. Editorial deadlines are April 1, July 1 and October 1 for publication two months later.

Coordinating Committee

Editors: Al Wojcik
1300 Lafayette East, Apt. 1010
Detroit, Mich. 48207

Anne Crowley
232 Austin Street
Hyde Park, Mass. 02136

Membership & Treasurer: Meg Stephenson
1415 Goldsmith
Plymouth, Mich. 48170

Printing and Mailing: Martin and Zelda Mines
2206 East 66th Street
Brooklyn, N.Y. 11234

Seed Fund: David Zaitlin
801 D Street #5
Davis, Calif. 95616

Gesneriad Hybridizer's Association
1415 Goldsmith
Plymouth, Mich. 48170

First Class Mail

Art + Peg Belanger
140 Howe Ave.
Warwick, R.I. 02888