CROSS WORDS

THE GESNERIAD HYBRIDIZERS ASSOCIATION

NEWSLETTER

Volume 4, Number 2, June 1980

The Annual Meeting of The Gesneriad Hybridizers Association will be held at the American Gloxinia and Gesneriad Society Convention, Holiday Inn, 17338 Pacific Highway South, Seattle, Washington on Friday, June 27, 1980 at 5:00 p.m. We hope that many of our members will have the opportunity to attend. We were pleased and gratified by the large turnout at last year's AGGS convention in Danvers, MA and we hope that membership response will be even greater this year.

We must continue the reminder that membership participation is our only source of material. Without your contribution of articles, questions and answers, or comments, we will cease to be a viable publication. And how much marvelously informative material on hybridizing will be missed. This issue is back to full size thanks especially to Marty Mines and his timely summary of recent work with *Sinningia*. While we have a few pages of material on hand, we cannot continue without your support. We may be the only non-profit organization that asks for articles instead of cash contributions!

House Plants and Porch Gardens, an excellent magazine for the indoor plant grower, reviewed our newsletter in their April 1980 issue. We were pleased and more than a bit surprised at such attention but it is nice to be appreciated.

Zelda Mines reports that a bargain price has been obtained for reprinting Volumes 1 and 2. These were hitherto unavailable, but may now be purchased for $5.00 per volume. Address requests to her.

Anne Crowley
Ron Myhr

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SEED EXCHANGE

David Zaitlin
Tucson, AZ

I am very happy to report that it appears that the seed exchange is rolling. As a direct result of my appeal last issue, I now have some contributions from other members of the GHA. (Maybe I stirred a dormant sense of guilt in a few of you!) I am glad that approach did the trick.

Peg Connor, 319 Bay Ave., Huntington, N.Y., 11743 sent me a list of the following items:

1) *Gloxinia perennis* X orange flowered, dark-leaved *Smithiantha* hybrid: Seed from May 1978 germinates in 17 days, eventually yielding compact plants similar to *G. perennis* with dark foliage.

2) *Sinningia canescens* X S. 'Alruth' (a Bona hybrid): Also from 5/'78, this seed has a germination time of 15 days and will produce compact floriferous plants. No information on the flower colors or forms was supplied.

3) *Sinningia* S-115 X *S. eumorpha*: The seed parent of this cross is a volunteer seedling of medium height with red, *cardinalis*-like flowers in a terminal raceme. Progeny are quite floriferous, some resembling 'Alruth'. Pollen fertile. Harvested in October 1978.

4) *Columnea* 'Orange Beauty' X *C. mortonii*: Seed harvested in August 1978. Pod parent described as an everblooming trailer producing multiple orange-edged yellow flowers in each axil.

5) *Columnea* 'Stavanger' X *C. mortonii*: Rapidly emerging seed (7 days) from 8/'78.

All of these seeds have been refrigerated in a dessicator and should still be readily viable. Those of you who are interested should write directly to Peg for these crosses. In all cases, please be sure to enclose a self-addressed, stamped envelope.

I would like to make available a few more things that have come up since last issue.

1) *Sinningia* 'Pink eumorpha' X *S. canescens* (compact): Harvested October 1979. Apple green, hirsute leaves with red petioles. No blooms at present. I have plenty of this to distribute.

2) Self of a purple-flowered *Streptocarpus* 'Constant Nymph': Fresh seed from a plant that laughs in the face of adversity and blooms continuously in the heat of an Arizona greenhouse in the summer.

3) *Sinningia magnifica* X S. 'New Zealand': Wow, are these seeds viable! The pod parent is the true *magnifica* which I grew from seed two years ago. Since both parents have very red flowers, I am looking for the same in the F_1. I expect this to be a hot item - order early.

4) *Chirita sinensis*: Harvested in November 1979 from a beautiful clone having broad, dark green leaves with moderate silver veining. Very floriferous. Only a very limited amount on a first come, first served basis.

5) I received seven hybrid *Sinningia* seed lots from Ted Bona in February. As I am unfamiliar with most of the parental name or number designations, I will not list them here. Anyone who wants some of these, write to me and I will send you a selection of these interesting crosses. As has always been the case, there will undoubtedly be some unique plants resulting from these seeds.

Gibberellic acid update - Several issues back, a question was raised concerning the actions of GA on gesneriads by one of the readers. In my reply, I stated that I was in the process of testing this compound on a sinningia seed. Although this was essentially a pilot experiment, I can say without a doubt that GA, at a concentration of 10^{-5} Molar (.0035 gram per liter) definitely reduces emergence time in the light and will induce germination in total darkness at room temperature. Sterilized seed was sown on agar plates with or without GA, and the plates placed either in the dark or under fluorescent lights on a 16 hour light cycle. It appeared that emergence time was reduced by about 35% in the light, while all of the treated seed germinated in the dark by 20 days. None of 200 seeds sown in the dark germinated without the presence of GA. Where germination occurred, it was with a frequency of nearly 100%, and only slight stem elongation was observed.

The significance of this phenomenon is unclear, but maybe we can take advantage of the situation and use GA as a tool to prod stubborn gesneriad seed to germinate in a reasonable length of time.

ANSWERS

Frances N. Batcheller
Durham, NH

In response to the request of Penny Shampaigne's question about crossing *Streptocarpus*-subgenus *Streptocarpella*, with *saintpaulia*, I can only report failure on my attempts some years ago.

I tried crossing *Saintpaulia confusa, S. diplotricha, S. grandifolia, S. Grotei, S. ionantha, S. magungensis, S. nitida, S. orbicularis, S. tongwensis,* and *S. velutina* with *Streptocarpus holstii* and *S. kirkii*. It might be interesting to try *Streptocarpus variabilis* with *Saintpaulia*.

HYBRIDIZING RELATIONSHIPS AMONG THE SINNINGIA SPECIES

- - Martin Mines, New York, N. Y.

I have been giving talks recently before plants society groups on the plants and relationships in the Sinningia species. In preparing these talks, I checked all available literature and communicated with many who are active in hybridizing.
This review is aimed to assist the home hybridizer by giving an overall view of Sinningia relationships. This presentation, I hope, will stimulate discussion, correction and new information from all who enjoy hybridizing Sinningias.

I have listed references to give sources and to point out additional pockets of information for those interested. These references, wherever possible, have been confined to the plant society publications which are most likely available to the amateur hybridizer. (1)

A study of the hybridizing relationships among the Sinningia species can well start with the work of Dr. Carl D. Clayberg, done for the most part at Connecticut Agricultural Experiment Station, New Haven Connecticut.

In the early 1960's, Dr. Clayberg, in an investigation of the genetic closeness of Sinningia and Rechsteineria, cross pollinated every possible combination of the species of these two genera that were then available.

Eight Sinningia species (S. eumorpha, S. pusilla, S. concinna, S. schiffneri, S. speciosa, S. regina, S. barbata, S. tubiflora) were pollinated in every possible combination among themselves and in every combination with seven Rechsteineria species (R. cardinalis, R. verticillata, R. cyclophylla, R. lineata, R. leucotrica, R. warszewiczii, R. sellovii) which were also paired among themselves.

During the period of this work, additional species plants become available (S. richii, S. discolor, S. hirsuta, R. aggregata, R. allogophylla) and were included in the study. About 3000 separate pollinations were made and more than 30 F1 hybrids were produced. Each hybrid that was produced was grown to flowering and a study made of the pollen production of the hybrid plant.

The fact that two species plants can, when mated, produce a hybrid indicates that the species plants are genetically close. The question is -- how close? More light on the genetic closeness of two species can be obtained by examining the pollen (or ovules) of the hybrid plant they produced.

In producing pollen, the pollen mother cells of the hybrid go through the process of meiosis. During this process, the chromosomes derived from each of the hybrid's parents, in this case, the species plants, line up parallel to each other. If these species plants are closely related, then this line-up is exact. In close relationships, it is possible to see, via the microscope, exactly thirteen (in Sinningia) pairs of chromosomes, neatly lined-up in the nucleus of a pollen mother cell in the hybrid. In the subsequent pollen formation from this cell, each pollen grain will have a full balanced haploid set of chromosomes. This pollen would be 100% viable and fertile.

If the species plants were more distantly related the line up of the chromosomes during meiosis in a pollen mother cell of the hybrid would be inexact. This lack of orderliness can be seen via the microscope. The pairing that had been counted as thirteen will now be noticeably less, possibly twelve or even less, down to close to zero pairing. In the subsequent pollen formation, each pollen grain will have less likelihood of containing a complete and balanced set of chromosomes. The pollen will be less than 100% viable and effective, even down to zero effectiveness or sterile, when used in future pollination attempts.

Dr. Clayberg estimated genetic closeness in the species studied as follows. First, he microscopically examined chromosome pairing in the pollen produced by the hybrids he formed. Second, he examined the pollen produced by the hybrid for stainability. Pollen with full and balanced sets of chromosomes, produced by closely related parent species, generally stain strongly when treated with certain dyes. The relative closeness of the species can be estimated on the microscope slide by this rather simple test.(55) Third, he selfed the F1 hybrids, and noted the seed production, germination and the vigor of the plants produced. Balanced full sets of chromosomes in pollen and ovule generally produce many viable seeds when the plant is selfed and also vigorously growing plants. Unbalanced and incomplete chromosome complements result in poor seed production and weakly growing plants.

Dr. Clayberg's experimental hybridizations and pollen checks made two points clear. One, the Sinningia and Rechsteineria species tested were more closely allied than their outward appearance would indicate. As a result, all the Rechsteineria in the test were later reclassified as Sinningia and a number of other taxonomic changes were made*. Two, and more to the hybridizers point of view, it became clear that some of the species were more closely allied to each other as evidenced by ease of cross hybridization. These groups of species, called cenospecies, could easily be remembered and pictured and knowledge of them would be of assistance in hybridization plans.

Dr. Clayberg's studies were reported in 1968 and 1970.(29, 35) He has, in addition, made numerous reports on individual species as plants become available. For those who enjoy hybridizing sinningias, a reading of the original is certain to be interesting. A summary of Dr. Clayberg's reports, by Peter Shalit, has appeared in the Gloxinian. (56)

DESCRIPTION OF HYBRIDIZING POLYGON

The polygon (figure 1) is taken from Dr. Clayberg's original chart of his 15 species and has been expanded (by this author) to include 4 of the additional species he later reported on.

I have in addition, accented the cenospecies groups, have indicated the names of the more important F1 hybrids (and their tetraploids in parenthesis) and have added two hybrid crossings not mentioned in the original work, the S. concinna x S. eumorpha cross 'Cindy', by Tom Talpey, and the S. concinna x S. aggregata cross 'Tinkerbells' by Elena Jordan.

*Dr. H. E. Moore reclassified all the Rechsteineria species in the study to the genus Sinningia. Also as a result of the study former Rechsteineria, R. lineata and R. cyclophylla, were replaced in the nomenclature by Sinningia macropoda with ' Lineata' and 'Cyclophylla' as varietal names. Rechsteineria leucotrica was renamed Sinningia canescens because of prior appearance in the literature of a S. leucotrica. Rechsteineria sellovii in the study turned out to be R. lindleyi which name was not transferable to Sinningia because of prior use. Dr. Moore then renamed this plant S. claybergiana.(11, 12, 56).

With respect to figure 1, the existence of a line between two species, (solid, double, dashed or dotted) signifies that an F1 hybrid has been successfully formed. The nature of the line indicates an evaluation of the closeness of the two parent species as a result of the above described tests on the hybrid.

A solid line denotes high pollen stainability and an almost perfect pairing of chromosomes, averaging close to 13. The pollen and ovules of these F1's are fully fertile and readily usable in hybridizing.Those with double lines have a chromosome pairing of about 12 down to 9. The pollen and ovules of these F1's are moderately fertile. At the low end in this range ovules may be fertile while the pollen of the same hybrid is sterile and ineffective. Normal diploid seed may sometimes be produced in these hybrids by application of fertile foreign pollen to the stigma, particularly pollen of one of the species parents. Some persistent application may be necessary in using these F1's in hybridizing.

Those denoted by single dash lines range in chromosome pairing down to zero. Hybrids in this class, like S. 'Freckles' (S. concinna x S. hirsuta) with a chromosome pairing of less than one, are pollen and ovule sterile.

Some of the F1 hybrids in this sterile group show apparent ovule fertility because of the occasional production of unreduced egg cells.(40) Unreduced egg cells occur during the disordered meiosis of this group. Instead of eggs being produced with the expected half chromosome number (haploid), eggs are produced which contain the full unreduced diploid count. When fertilized with fertile haploid pollen, triploids are formed, or if the pollen is diploid, tetraploids may be formed.

CENOSPECIES

The chart, fig. 1, can be very useful in considering the hybridizing potential among the Sinningia. The 18 species shown fall into 4 groups (called cenospecies) and a few isolated species. As can be seen, within a cenospecies the species easily form hybrids which are fully or partially fertile. Between cenospecies, hybrids are less likely to be formed or if formed are completely sterile.

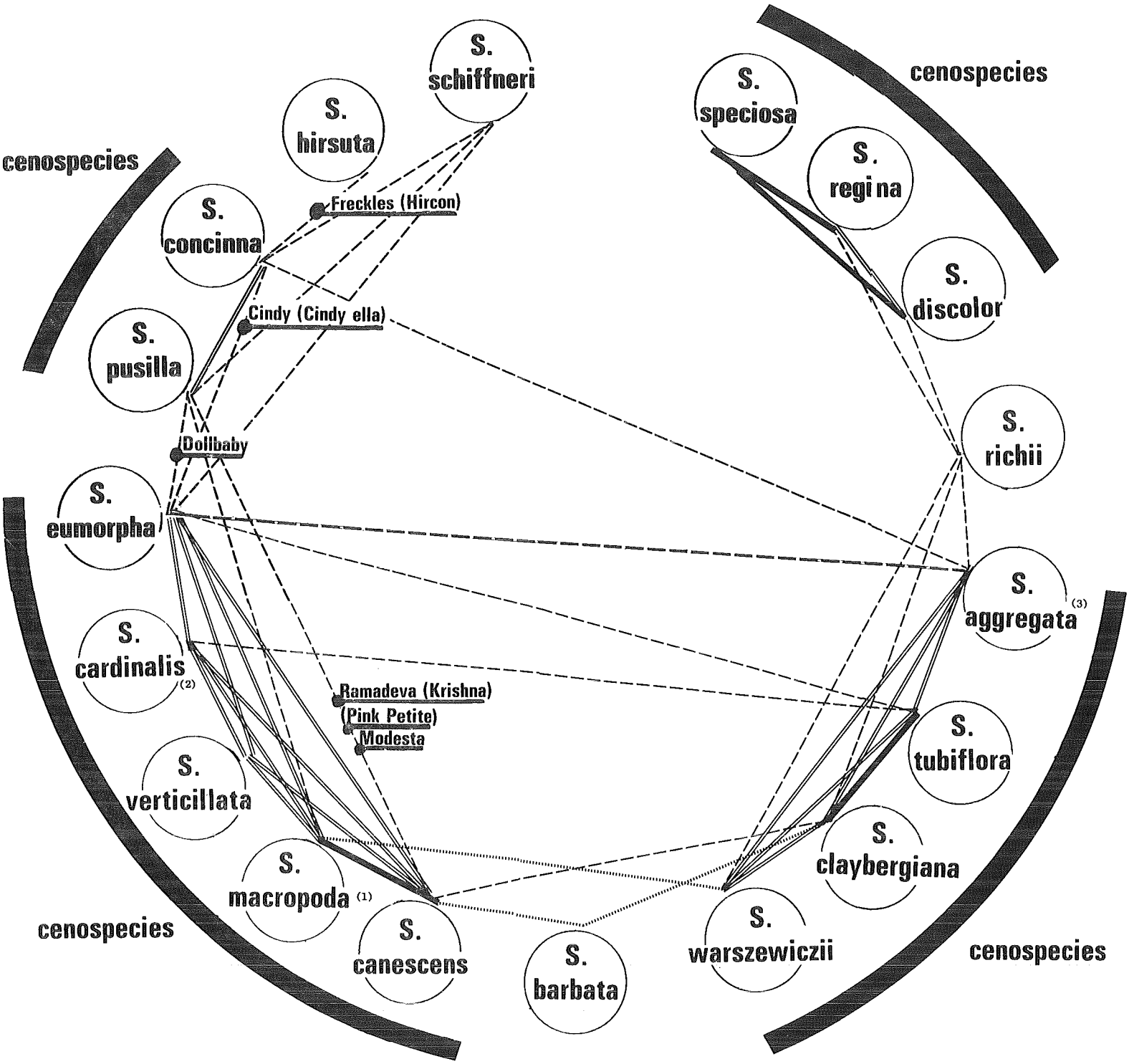
The cenospecies groups are roughly, but not exactly, related to sectional designation in taxonomic literature. See Dr. Clayberg's work for a full discussion.(29, 35)

TETRAPLOIDS

An F1 hybrid with sterile pollen and ovules because of inexact chromosomes pairing may frequently be made fertile by conversion to a tetraploid. This process, whether spontaneous or through the use of colchicine, results in doubling the number of chromosomes in the F1 and in so doing presents each chromosome with an exactly similar partner for pairing.(15, 41)

As a result, complete and balanced chromosome complements in pollen and ovules are produced but with double the chromosome count of the original F1. Tetraploids, compared to the original diploid plant, generally grow slower, are larger with fewer flowers, more brillant colors, thicker more brittle leaves. Stomata and pollen are generally about one third larger and this can be used as a quicker test than counting chromosomes, although a microscope is still required. Occasionally, tetraploids will have a distinctive leaf margin or other organ shape which makes them more easily distinguishable from the diploid.

Crossing among the Sinningia



Fully fertile hybrid

Partially fertile hybrid

Sterile hybrid

Weak hybrid, no flowers

(1) Closely allied varieties: S. macropoda 'Cyclophylla' and S. macropoda 'Lineata'.

(2) Closely allied varieties and species:
S. cardinalis 'George Kalmbacher'
S. cardinalis 'Innocence'
S. cardinalis 'Skydiver'
S. magnifica
S. macrorrhiza
S. Cooperi

(3) Closely allied varieties and species:
S. aggregata
S. aggregata 'Pendulina'
S. allagophylla

This hybridizing polygon was prepared almost entirely from the published reports of Dr. Carl D. Clayberg. See accompanying text for details.

-- Martin Mines

Figure 1

THE "XGLOXINERA" CENOSPECIES

The cenospecies shown at the lower left of fig. 1, the S. eumorpha through S. canescens group, has been throughly investigated by many early Sinningia and Rechsteineria growers. Most of the formerly named XGloxineras came from this group. As indicated on the hybridizing polygon, F1 hybrids with fully or partially viable pollen are usually readily formed. Hybridizing within this cenospecies should be relatively easy.

Some of the F1 hybrids from this group are named and are fairly well known:- S. 'Velvet Charm', (S. eumorpha x S. cardinalis), S. 'Rosebells', (S. eumorpha x S. macropoda), S. 'Erda', (S. eumorpha x S. canescens). In addition to the name 'Velvet Charm', there are a number of different names for the same S. eumorpha x S. cardinalis cross because of distinctive cultivars of S. cardinalis used: S. 'Longiflora', S. 'Harold', S. 'David' and more.(4)

There has been much second level hybridization using the F1's as parents with such results as S. 'Rex', 'Alruth', 'City of Reading' 'Rita L', 'Coral Belle', 'Margaret Heald' and many others. Some of these are available commercially. By selecting small growing specimens from within this cenospecies, hybridizers have been able to produce attractive plants as small as 4 inches tall ('Leprechaun' by Irwin Rosenblum, N. Y.). This last was formed without the addition of any gene from the miniature group. (P)

When hybridizing within this group different gene pools may be tapped by interchanging varieties. For example S. macropoda, S. macropoda 'Lineata', and S. macropoda 'Cyclophylla' may be tested in the same cross. Similarly, hybrids formed with S. cardinalis as one parent may be reformed with interesting variations by using the white mutant S. cardinalis 'Innocence' or the peloric S. cardinalis 'George Kalmbacher' (48) or its white equivalent S. cardinalis 'Skydiver'. There has been no report of a successful transfer and expression of this peloric trait to any other cultivar in this group. (54)

S. cardinalis is close in appearance to three less well known Sinningia species, S. magnifica, S. macrorrhiza and S. cooperi.(27) Dr. Clayberg checked the chromosome pairing of S. cardinalis x S. macrorrhiza and found it to be 12.9, very close to the perfect 13.(35) In view of this, it is likely that some of these species can be used in place of S. cardinalis in hybridizing with good expectation of F1 success, and the introduction of new genetic variants.

Corolla colors in this cenospecies are white, red, pink, coral, and orange. In some hybrids inside and outside colors of the corolla are strikingly different. Ted Bona has produced cultivars with colors of pale yellow but with a coating of red hairs which give a pink cast to the flower. A true bright yellow has yet to appear.

There are good reviews of this old XGloxinera group by Ted Bona and others.(2, 13, 17, 25, 26) More recent work has appeared in Crosswords.(61)

Paul Arnold's Sinningia Register (4) is a very good reference for this group as well as others to be discussed.

THE "MINIATURE" CENOSPECIES

Going clockwise around the chart at fig.1, the next cenospecies consists of the miniatures, S. pusilla and S. concinna. There are two well known mutants of S. pusilla, 'White Sprite' and the white fringed 'Snowflake'.(34) The F1 hybrid between S. pusilla and S. concinna is 'Wood Nymph'. Although S. pusilla and S. concinna resemble each other closely in size and growth habits, Dr. Clayberg's cytological examination of S. 'Wood Nymph' showed lower chromosome pairing than within any other cenospecies, averaging 9.5 out of a possible 13 chromosome pairs. The 'Wood Nymph' produced by Dr. Clayberg was pollen sterile and egg fertile both for S. pusilla x S. concinna and its reciprocal S. concinna x S. pusilla.(29, 35)

Dr. Clayberg backcrossed 'Wood Nymph' with the pollen of one of its parents, S. pusilla, and produced the weakly fertile S. 'Bright Eyes'.(31) Lyndon Lyon put S. concinna pollen on 'Wood Nymph' to produce "Wood Nymph Improved".(39) Tetraploids of S. pusilla, S. concinna, 'White Sprite' and 'Bright Eyes' are available (Kartuz, Lyon). Peg Belanger has produced the blue fringed miniature S. 'Star Eyes' ('Snowflake' x 'Bright Eyes').(16)

With respect to the reported pollen sterility of 'Wood Nymph', one of our miniature specialists states that when weather is cool, she can successfully self 'Wood Nymph'. This may indicate that a small quantity of viable 'Wood Nymph' pollen is sometimes produced and that failure to self may be due to hormones present or absent in the flower and pedicel. Since production of hormones can be influenced by environmental conditions, persistent application of pollen under a range of conditions may be required to achieve fertilization in marginal cases such as 'Wood Nymph' and other low to moderately fertile hybrids.

Dr. Clayberg has written interesting, detailed descriptions of the miniatures species and their culture.(21, 33)

S. hirsuta, S. schiffneri

S. hirsuta (30) and S. schiffneri (22) do not fit into any cenospecies, and are shown as single species in fig. 1.

The F1 S. 'Freckles', (S. concinna x S. hirsuta), (32) has a low pairing of 0.6 chromosomes out of 13.0, indicating genetic distance between the parent species, and is, of course, sterile.(35) The fertile tetraploid 'Hircon' has been created from 'Freckles'(49) and has proved a useful hybridizing partner. An "attractive hybrid", S. hirsuta x S. allogophylla, has been reported by Dr. Clayberg.(30)

The F1 S. concinna x S. schiffneri, while not tested cytologically, is probably pollen and ovule sterile. It is the seed parent of Frances Batcheller's attractive miniature S. 'Oengus' ((S. concinna x S. schiffneri) x S. 'Krishna'), probably because of the fertilization of unreduced egg cells.(14) Hybrids have been produced between S. schiffneri and S. pusilla and S. eumorpha but no description of them can be found.

SOME HYBRIDS WITH THE MINIATURES

With the increasing availabilty of the miniatures, attempts were made in the early 1960's to hybridize the XGloxinera cenospecies with the miniature cenospecies. The earliest crosses were with S. pusilla. (19) First was Dr. Clayberg's S. pusilla x S. eumorpha cross which he called S. X pumilla. (23) Ruth Katzenberger's cross of the same species produced a superior cultivar S. 'Dollbaby' which has replaced Dr. Clayberg's hybrid.(39) Other early crosses were Dr. Clayberg's "Connecticut Hybrids", approximately S. pusilla x (S. eumorpha x S. cardinalis), which he released as a fertile tetraploid (24) and Frances Batcheller's 'Ramadeva', (S. pusilla x S. canescens), a pollen sterile diploid.(10,39)

Sterile diploids were soon converted to fertile tetraploids. 'Ramadeva' was converted to the tetra 'Krishna', the same as Dr. Clayberg's older tetra 'Pink Petite'. Ruth Katzenberger and also Lyndon Lyon each produced a fertile tetraploid of 'Dollbaby'. (4) This parent group was complete when N. P. Bernard formed the salmon colored S. 'Modesta' ('White Sprite'x S. canescens). (50)

Almost all of the early compact pink, purple and salmon Sinningias which have miniature genes are crosses and backcrosses among the tetraploids 'Pink Petite', "Connecticut Hybrids", 'Dollbaby' (tetraploid), 'Ramadeva' and 'Modesta'. The last two were effective tetraploids as they were always used as seed parents and probably contributed only unreduced eggs. Among their offspring are such well known compacts as 'Little Imp', 'Pink Imp', 'Pink Flare', 'Merlin Hybrids', 'Cupids Doll', 'Patty Ann', 'Mod Imp'. (4, 37, 39, 44)

These compacts are presumably all tetraploids. They hybridize easily among themselves generally producing fertile pollen and viable seed. There are numerous named cultivars which have been selected from this population. When these compacts, or the original tetraploids which produce them, are mated with the species plants of the XGloxinera or miniature cenospecies the progeny is usually sterile (probably triploid) or very weakly fertile. Some examples:— S. 'Coral Baby', ('Modesta' x S. cardinalis 'George Kalmbacher'), S. 'Love Song', (S. macrapoda 'Lineata' x 'Dollbaby'), S. 'Grace M.' (S. eumorpha x 'Dollbaby'), S. 'Winkie', (S. pusilla x 'Dollbaby').(4, 51) Peter Shalit reports that he has no trouble mating the tetraploid compacts, as seed parents, with S. verticillata and with S. macrorrhiza in the XGloxinera cenospecies to produce attractive plants, although sterile. (P)

S. concinna came into the miniatures hybridizing picture when Tom Talpey produced S. 'Cindy' (S. concinna x S. eumorpha), a sterile diploid.(57) Bill Nixon converted this plant into the fertile tetraploid S. 'Cindy-ella'.(52) Hybrids of 'Cindy-ella' and the older S. pusilla group described above soon appeared. Lyndon Lyon's S. 'Renee' and S. 'Cindy Babies' are examples. There does not seem to be any problem producing plants when mating 'Cindy-ella' with the S. pusilla based hybrids but the pollen of the new plant may have lower fertility. Peg Belanger's S. 'Silhouette' is an example.(16) Pollen percent viability often may be restored to normal if it is possible to produce the next generation of plants. Other than 'Cindy', there have been no S. concinna to XGloxinera crosses reported. Peter Shalit was able to get seed pods but no plants in an attempt to cross S. concinna x S. verticillata.(P)

The S. concinna cross with S. hirsuta, 'S. Freckles', has been used in miniatures hybridizing via its tetraploid 'Hircon'.(49) Lyndon Lyon's 'Stuck Up', ('Purple Dollbaby' x 'Hircon') and also his 'Tiger', probably 'Cindy-ella' x 'Hircon', are attractive 'Hircon' hybrids. The latter, with its double dose of S. concinna genes and a set of S. hirsuta genes, exhibits highly accented spots in the throat. Bartley Schwarz (Berkley, Cal.) produced the very small floriferious 'Mollie L', ('Hircon' x 'Mother of Pearl'). 'Mother of Pearl' is a 'Modesta' x XGloxinera complex hybrid that is an excellent hybridizing partner. Bartley Schwarz has also produced an attractive group of compact hybrids, using 'Dollbaby', 'Cindy-ella' and 'Hircon', called 'Foxy Blue', 'Leo', 'Baby Blue' and 'Blue Boy'. (P)

There have been a number of S. pusilla to XGloxinera cenospecies crosses other than those noted above. All are sterile and generally show a lack of vigor. A short review of these follows:

—Al Buell's S. pusilla x S. verticillata: Reported in 1965. (23) Foliage "near black rosettes with crenate margins tipped with deep red." No report on flower. Extinct. (P)

—Peg Belanger's S. pusilla x S. macrorrhiza and 'White Sprite' x S. macrorrhiza: Former shown at AGGS convention in 1977. "Delightful" said Peter Shalit. Does not come out of dormancy. Lack of vigor. Extinct. (P)

—Peg Belanger's 'White Sprite' x S. macropoda 'Lineata'. Small, lacks vigor. Being propagated via tip cuttings. (P)

—Peg Belanger's S. 'Snowflake' x (S. barbata x S. macropoda 'Lineata'). Pollen supplied by Ted Bona. Looks like small version of Ted Bona's S. 'Love Song', with dark pointed leaves. Many sprouts, easy to reproduce via tip cuttings. Smaller than 'Dollbaby'. Sets some seed which, however, has not germinated.

The hybrids of the miniatures are available from specialists such as Lyon, Kartuz, Buell. Bartley Schwarz's hybrids are available from Kartuz.

THE "SPECIOSA" CENOSPECIES

The Florists' Gloxinia, S. speciosa, forms fully fertile hybrids with S. regina and with S. discolor as shown in fig. 1. There have been no definite crosses of the "speciosa" cenospecies with any other species except S. richii and S. barbata. The latter was reported in the late 1800's and is extinct. Hybrids with S. richii are all sterile.(28)

However, species of the "speciosa" group have been crossed with F1 hybrids from the miniatures. Bill Nixon's S. 'Mathild', ('Ramadeva' x S. regina) and Ted Bona's S. 'Bob W', ('Dollbaby' x S. regina) are examples. (P) Both these hybrids are probably sterile triploids.

Hybridizing within S. speciosa has been active since early 1800 with a large number of beautiful varieties produced by the end of that century. Included are slipper and trumpet varieties in a range of colors, white, pink, lavender, purple, red, many with striking borders and "Tigrina" or spotted types. Flowers may exceed 6 inches across with as many as 50 or more buds per plant. Frances Batcheller (8) and Al Buell (18) have good overall reviews of S. speciosa.

S. speciosa hybridizing in the 1960's and 70's has been towards sturdy stemmed double layered corollas, smaller compact plants, longer blooming plants as well as larger flowered smaller leaf specimens.

The compact plants have been obtained by selecting smaller growing specimens, not by introduction of genes from the miniature sinningias. Some named compacts are Fisher's 'Cinderella', 'Tom Thumb' and the compact double 'Prince Charming'.(43) Lyndon Lyon has developed the popular "Slipper Time" compacts.(9)

The early history of double flowered gloxinias has been reviewed and the claims of suppliers evaluated by Paul Arnold.(3) See also Mike Kartuz' article on "Double Gloxinia" in the same issue of the Gloxinian and Dr. Clayberg's genetic explanation of doubles.(20) Improved double corollas have been obtained by mating a homozygous double such as Parks 'Gregor Mendel' with superior single varieties.(6)

Working with S. speciosa varieties, Dr. Clayberg has made an analysis of the genes relating to corolla shape and color. This information should enable a knowledgeable hybridizer to produce a plant with specific characteristics. (42) Which specific result to aim at is dicussed by Iris August in her interesting "Amateur's Guide to Hybridizing Gloxinias".(6) W. J. Barry has an interesting article outlining his aims and procedures in a S. regina and S. speciosa cross.(7)

A complete range of new and old speciosa varieties can be obtained by checking with Buells, Kartuz, Lyon, Parks Seed, and Antonelli's.(S) Some nurseries may be a better source of the type desired than may others. Fisher Greenhouses, formerly among the foremost in hybridizing compacts, report no supply at present. Hopefully, they will reenter the field. Named F2's from the S. speciosa x S. regina cross, 'Florence K' and 'Blue Flicker' as well as others, may be available at some nurseries.

There are a number of good reviews. Elena Jordan's review, although old, contains sources of seed and tubers from European nurseries. (5, 45, 46)

THE POSITION OF Sinningia richii IN THE POLYGON

As shown in the hybridizing polygon, Dr. Clayberg's hybridizations with S. richii formed F1's with S. discolor and S. regina in the "speciosa" cenospecies and with all the species in the remaining cenospecies, S. aggregata through S. warszewiczii, except for S. tubiflora. These S. richii hybrids are all sterile, (28) and so indicate genetic remoteness between S. richii and the species partner.

Frances Batcheller has formed S. 'Kore', (S. 'Ramadeva' x S. richii), a sterile hybrid, which won the best new cultivar award in 1972. Renee White has formed S. 'Zoe', (S. 'Grace M' x S. richii), a sterile triploid.(58) 'Grace M' must have behaved like a tetraploid in this cross.

THE "CLAYBERGIANA" CENOSPECIES

For convenience, I am referring to the remaining cenospecies, see fig.1, by its most easily hybridized member, S. claybergiana.

The F1 S. claybergiana x S. tubiflora has almost complete chromosome pairing and is shown as a solid line in fig. 1. Also very closely paired, although not shown as a solid, is S. warszewiczii x S. claybergiana with pollen 90 to 99% viable. Also close is S. aggregata x S. claybergiana with pairing of 13 out of 13.(35) These S. claybergiana F1's are self fertile and good pollen and ovule donors in mating projects.

S. tubiflora, because it is the only Sinningia with a strong fragrance, has been used in hybridizing attempts to transfer this trait, but to no avail thus far. S. warszewiczii too has been used as a partner in attempts to transfer its genes for yellow corolla color to "speciosa" or the compacts, again with no reported success.

S. aggregata has close pairing with S. allogophylla (12.9 out of 13, Clayberg) and this latter may probably be used in producing hybrids successfully produced by the former and vice versa. The shrubby S. aggregata 'Pendulina' may also be considered a member of this "aggregata" group. Reinforcing this, S. richii has been crossed with S. allogophylla as it has also with S. aggregata and 'Pendulina' to produce F1's, albeit sterile.(35, 53) More reinforcement - - S. concinna has been crossed with S. allogophylla as it has been with S. aggregata to produce hybrids, again sterile.(47, 4) In passing, it should be noted - - Dr. Clayberg has formed S. hirsuta x S. allogophylla, which he has called "an attractive miniature".(30) Perhaps S. hirsuta may form a hybrid with S. aggregata or 'Pendulina'.

There have been a number of F1's formed from members of this "claybergiana" cenospecies to the XGloxinera and miniature species and they are noted on the polygon. All of these species to species crosses have been reported as sterile. Most prominent is Elena Jordan's S. 'Tinkerbells', a graceful compact between the miniature S. concinna and the 3 foot tall S. aggregata.(47) A cross S. cooperi x S. tubiflora, fertility unknown, was reported in the late 1800's and is extinct.

A number of crosses have been reported between species of this cenospecies and hybrids derived from the XGloxinera and miniatures. Frances Batcheller has produced S. 'Astrild' ('Ramadeva' x S. aggregata), S. 'Yarilo' (S. 'Ramadeva' x S. tubiflora), S. 'Iduna' ('Dollbaby' x S. aggregata) and an unnamed S. 'Ramadeva' x S. warszewiczii.(14) Ted Bona has his S. 'Esther Bona', (S. cardinalis x S. eumorpha) x S. tubiflora. Peter Shalit reports almost 100% success in mating the XGloxinera tetra compacts as seed parents with S. claybergiana.(P)

Dr. Hans Wiehler has noted that S. warszewiczii is synonymous with and should give precedence to the name S. incarnata. He also pointed out that S. claybergiana is synonymous with S. sceptrum and that this latter name has priority.(60) This is regrettable as the honor bestowed upon Dr. Clayberg by this plant name is very much deserved. Perhaps popular usage will justify continuing the name.

Dr. Wiehler has reported that S. sellovii is distinct from any of the above species as is also S. sulcata, a moderate size Sinningia with a "nice yellow" corolla.(59, P) It is likely that these two species are allied to this "claybergiana" cenospecies because of morphological similarities. It would be interesting to demonstrate this by forming hybrids between these species and the cenospecies members and checking stainability of pollen, quantity of seed and F2 vigor when the F1s are selfed. The "nice yellow" of this newly introduced S. sulcata may forshadow the introduction of a yellow gene to the miniatures or to the "speciosa" group.

Sinningia barbata CROSSES ARE RARE.

Dr. Clayberg has indicated on the polygon that the only hybrids of S. barbata he could obtain were with S. canescens and S. claybergiana and these never flowered. A hybrid of S. barbata with S. speciosa was reported in 1890 (4) and is extinct. S. barbata has a narrow range of conditions for flowering and Dr. Clayberg was not able to repeat pollinations with S. barbata as much as with other species.

Frances Batcheller has produced S. 'Benten', ('Ramadeva' x S. barbata), a sterile triploid. Ted Bona has produced a lovely compact, S. 'Lilac Time', which he says is a mixed hybrid, probably (S. eumorpha x S. macropoda 'Lineata') x S. barbata.(P) The corolla of 'Lilac Time' has a sharp constriction just before the flaring margin, indicative of S. barbata heritage. My own copy of this cultivar selfed easily and produced numerous seeds which germinated into vigorous plantlets.

Ted Bona recently provided Peg Belanger with pollen which he noted was from S. barbata x S. macropoda 'Lineata'. This pollen was used successfully in producing a hybrid with S. 'Snowflake'(discussed under "Some Hybrids with the Miniatures") thereby proving its viability and the genetic closeness of S. barbata and 'Lineata'. In view of this, it would be interesting to try crossing S. barbata with each of the species of the XGloxinera cenospecies. Perhaps S. barbata may be more closely allied to this cenospecies.

Sinningia tuberosa - (not on polygon)

This interesting Sinningia, which flowers first and then produces leaves, is not closely related to any other species. According to Dr. Clayberg, it has formed hybrids with S. aggregata, S. canescens, S. tubiflora and S. eumorpha. Only the last has produced flowers and this hybrid is sterile.(36)

Sinningia 'New Zealand' sp.

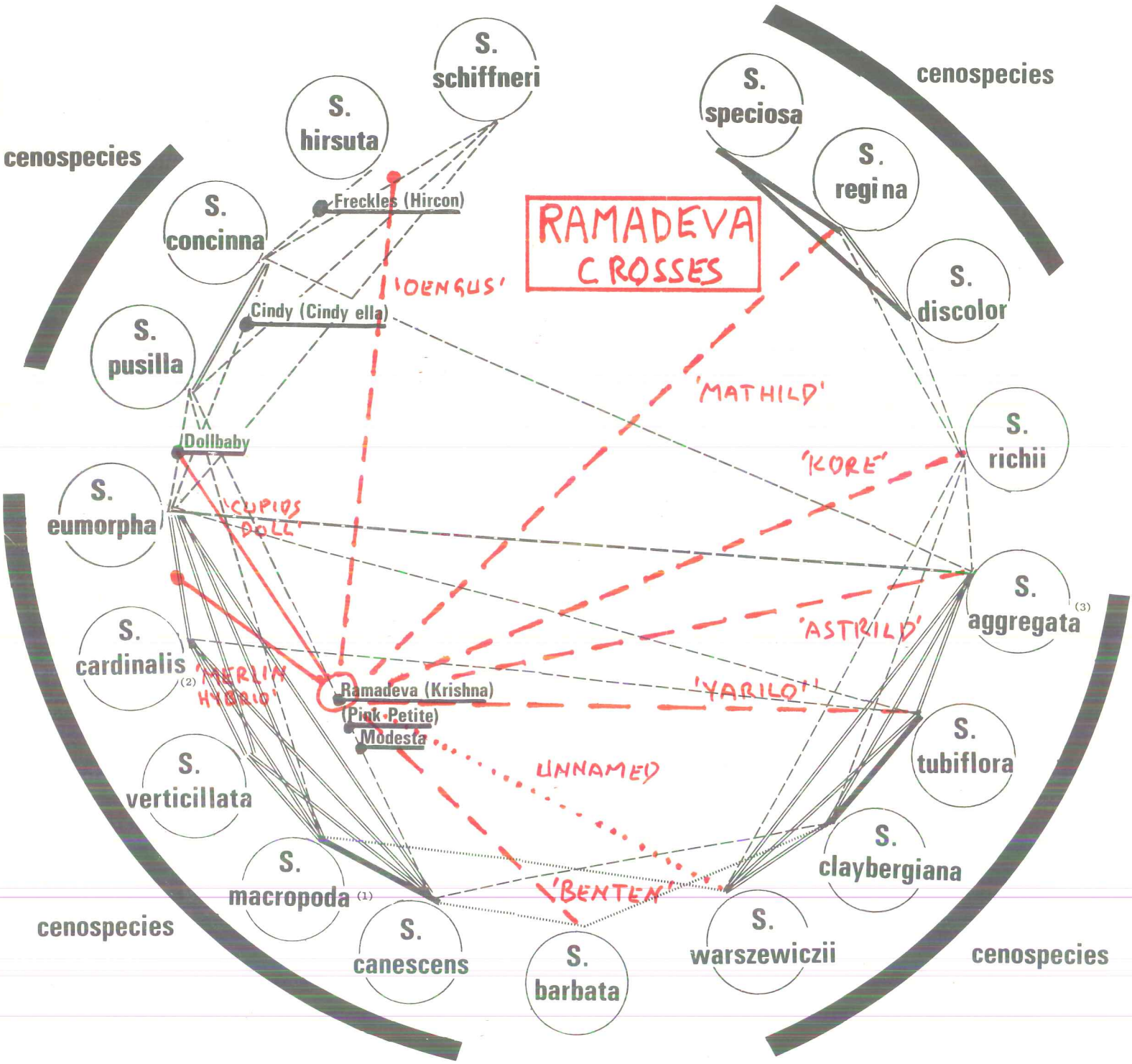
A review of the hybridizing affinities of the newly introduced species Sinningia 'New Zealand' will be left to others. There are a number of reports in recent issues of Crosswords of F1 hybrids of 'New Zealand' with other species. (See David Zaitlin's "Seed Exchange" in this issue.) Evaluation of these reports to determine cenospecies membership, if any, should be interesting.

It is hoped that the home hybridizer, without pollen staining technique or microscope, will nevertheless try to avoid a laconic "fertile" or "sterile" in evaluating fertility. Some questions to keep in mind are:

— How sure are you that the parent plants you started with are correctly named?
— How many times was pollination attempted?
— Was pollination attempted under a range of environmental conditions?
— How many seeds were produced?
— How many germinated?
— Did the resulting planlets grow vigorously?
— Did the new hybrids resemble both parents?

If some or all of these questions are answered a more accurate picture of hybridizing relationships will emerge.

Crossing among the Sinningia



Fully fertile hybrid

Partially fertile hybrid

Sterile hybrid

Weak hybrid, no flowers

(1) Closely allied varieties: S. macropoda 'Cyclophylla' and S. macropoda 'Lineata'.

(2) Closely allied varieties and species:
S. cardinalis 'George Kalmbacher'
S. cardinalis 'Innocence'
S. cardinalis 'Skydiver'
S. magnifica
S. macrorrhiza
S. Cooperi

(3) Closely allied varieties and species:
S. aggregata
S. aggregata 'Pendulina'
S. allagophylla

—— Fertile, probably tetraploid.
– – Sterile, probably triploid except 'Oengus' which is probably a sterile tetraploid.
. . . . No flower.

'Ramadeva' crosses are all by Frances Batcheller except 'Cupids Doll' by Ruth Katzenberger and 'Mathild' by William Nixon. See text for details.

This hybridizing polygon was prepared almost entirely from the published reports of Dr. Carl D. Clayberg. See accompanying text for details.

-- Martin Mines

Figure 2

A TALE OF 'RAMADEVA'

Frances Batcheller hybridized S. 'Ramadeva' in the early 1960's. Among the reviews she has written giving the details of this hybrid is included an interesting account of her use of appropriate figures from mythology in naming her plants. Her "Tale of Ramadeva" is recommended reading.(10)

S. 'Ramadeva' is a cross between cenospecies and has a low chromosome pairing, 3.5 out of 13. Its pollen has been reported as sterile by a number of sources. However, S. 'Ramadeva' has been pollinated by such a large number of species with successful production of hybrid plants that some explanation seems required. Fig. 2 shows S. 'Ramadeva' crosses superimposed on the hybridizing polygon.(14)

S. 'Ramadeva' has been crossed with S. richii, S. regina, S. aggregata, S. tubiflora, S. warszewiczii and S. barbata to produce sterile plants. The first and last of these have been identified as triploids.(44) Rather than assume that occasional fertile haploid egg cells of 'Ramadeva' are fertilized by haploid foreign pollen, I think it is more probable that diploid unreduced eggs of 'Ramadeva' are fertilized by haploid pollen with the production of sterile triploid plants. S. 'Ramadeva' must have an appreciable tendency to produce unreduced egg cells.

The sterile diploid S. 'Dollbaby' may also have this tendency to produce unreduced diploid eggs, as Frances Batcheller has reported it as a seed parent when pollinated by S. 'Krishna'.(10)

In the two cases where the S. 'Ramadeva' crosses are fertile tetraploids, S. 'Merlin Hybrids', ('Ramadeva' x (S. eumorpha x S. cardinalis)) and S. 'Cupids Doll', ('Ramadeva' x 'Dollbaby'), the pollen placed on the 'Ramadeva' stigma most likely was diploid from a tetraploid source.

The hybridizations of 'Ramadeva' seem to demonstrate the closeness of the species of the Sinningia genus. The cells of 'Ramadeva' contain in their nuclei a selection of S. pusilla and S. canescens chromosomes. These cells, which constitute the stigma and style of 'Ramadeva', recognize and offer no obstruction to the passage of sperm tubes with such different chromosome complements as S. regina, S. richii, S. aggregata, S. tubiflora, S. warszewiczii, S. barbata, S. eumorpha and S. cardinalis. The hormones required to keep the flower pedicel from abscissing and the enzymes to assist the sperm tubes in their passage are produced with adequate timing by the 'Ramadeva' tissue and the sperm successfully reaches the ovule. The newly formed embryo is not poisoned by the nourishing tissue, the endosperm, as is the case in most wide crosses, and viable seed is produced.

Of course the plants produced are sterile but only because they are triploids and so unable to produce sperm and eggs that are balanced and complete. The "Tale of Ramadeva" leads one to believe that many more crosses among the sinningias are possible than have thus far been made.

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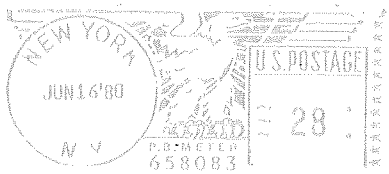

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