PAEONIA

Volume 7, No. 1 March, 1976

REQUIRED READING –

1. "The Peonies" by John C. Wister, $3.50 from American Peony Society.
2. The Bulletins of the American Peony Society.

SUGGESTED READING –

1. "The Peonies" by John C. Wister, $3.50 from American Peony Society.
2. The Bulletins of the American Peony Society.

The PAEONIA is authorized by Miss Silvia Saunders.

Our leader and teacher in hybridizing is Roy Pehrson.

Editors are Chris and Lois Laning, 553 West F Avenue, Kalamazoo, Michigan, 49007.

Suggested yearly contribution to cover expenses of printing and mailing is $2.00.

TABLE OF CONTENTS

MORE ON P. CALIFORNICA - By Chris Laning

This past season was a poor one for *P. californica* — a complete seed crop failure. And the blooms were small and off -color. The pollen which Mark and Sally sent was poor — or maybe no good at all.

With this *P. californica* pollen, I pollinated maybe 50 buds and blossoms on one plant of '**Primevere**'. The result was just 13 seeds, and I can't be sure that any one of them is hybrid though this '**Primevere**' was far away from my other peonies. This one grows next to the house.

P. californica is very, very insistent on growing in the wintertime. Neither older roots nor tiny seedlings show evidence of changing growth patterns to conform to regular peony blooming season.

Transplanting in January or February is comparable to transplanting lactiflora in June. They (the californica roots) don't like it — and proceed to become dormant. Even if given good growing conditions, they start to yellow and dry off in March. In the wild they usually stay lush until June, blooming any time from February 15 on. We saw blooms in Santa Barbara on January 15, 1974.

They have a distaste for window culture and resent basement conditions that we can give, because this is the time of year that they want to grow, flower, and set seed. Dew and rain along with bright light are needed for happy growth.

So — what to do? Maybe a bubble-plastic covered window well with basement window removed to afford circulation and forestall excessive heat buildup might work. Maybe you can find space in a local greenhouse that could supply at least minimum growing conditions.

Now let me tell you about my plants. They commenced growing in very early November. The protection provided is 5' x 5' x 2' high. The framework is made of 2 x 4's and wall of one inch thick Styrofoam. The top is a 54 x 56 thermopane window. Heat is provided by an electric soil cable. I expect that the 70° F soil temperature that the cable will maintain will stimulate these plants into rapid growth — and maybe provide bloom.

HIGHLIGHTS (MOSTLY) OF THE 1975 SEASON

Bill Seidl

In looking back over the past season, some highlights come to mind. The first to occur was the flowering of an herbaceous hybrid, 70H12, on June 9th, with five or six double fragrant blooms. It set some seed; pollen from stamens intermingled with the petals produced some seed on other plants. I described the color as rose-mauve. My notes for 1974, when it bloomed for the first time, reads "One bloom; 10 petals, pinkish-lavender". The seed came from Roy Pehrson in the fall of 1970 and was labeled "Quad F3". Given the "quick" germination treatment, top growth was proceeding so rapidly by Jan. 10, 1971, that it was potted and set on a window sill. Before eventual transplanting to open ground in May, it was tipped twice and knocked to the floor once and repotted. By July 18th its single leaf had dried up and the plant gone dormant. My next notes say "living in 1972" when it was dubbed "Mr. Perseverance" for its tenacity to life. After all the efforts to keep it alive and maintain an individual written record of its progress for five years, it is a gratifying coincidence that it should be my best seedling yet among mostly nondescript singles. Perhaps I had a premonition that this was going to be a good one.

One of the last highlights to occur was the harvesting, on Sept. 22, of 54 seeds from my lutea hybrids — 24 of these from a single clump of '**Age of Gold**'. This was a giant plant, about 5 feet across, bearing about a hundred blooms, counting laterals. The plant came from Sylvia Saunders in 1969, bearing three large blossoms in 1970 and more each year thereafter with the flower size decreasing steadily. I counted about 50 flowers open at once (and about 50 buds) on June 13th when I left to visit David Reath at his Peony and Tree Farm — another highlight. Returning with pollen from his A198 and A199, two fertile advanced generation lutea hybrids (out of '**Golden Isles**', I believe), I pollinated '**Age of Gold**', '**Gauguin**' II, and D223. These last two are Daphnis hybrids obtained from Gratwick's several years ago.

Results:

'**Age of Gold**' x A198	11 seeds
'**Age of Gold**' x A198	9 seeds
'**Gauguin**' II x A198	2 seeds
D223 x A198	14 seeds

In the latter cross there were 8 seeds in a single pod — two seeds in each of four carpels. Dave Reath had mentioned obtaining similar results in some of his lutea hybrid crosses .... including the dark red colors.

Other seeds came from '**Age of Gold**' x D223 (4 seeds), and D324 x D223 (14 seeds).

D324 and D223 both produce 10-petalled light yellow flowers; the former grows tall (5-1/2 feet topmost bloom, last season) and vigorously, the latter is of low stature with leaves that color solid red for most of the fall season, starting with attractive red variegations in mid-summer. D324 yielded seven divisions when dug up on Oct. 30 and 31, a two-day task as it had an immense and deep root system requiring alternate soaking and digging before it could be extracted from Mother Earth. Despite the large plant size, it had only about a dozen blooms as only the terminal buds from last year's stems bore flowers. About six blossoms were pollinated by D223; the other blossoms by lutea pollen, yielded no seed.

The seeds from these crosses were firm, medium to dark red in color. When fully mature they are black. They were all potted in soil the same day they were harvested and are presently (early December) at room temperature, to be transferred to cooler temperatures in late December.

Two interesting seedlings germinated last springs one from '**Age of Gold**', the other from an Ito cross: LACTI SDLG x '**Alice Harding**'. Both of these produced a 2nd and 3rd leaf, a big help in increasing the root size in the first season.

A lowlight of the year concerned seeds of Lacti x A198, A199 harvested two years ago. Few germinated but two of these were genuine Ito's. They were soon nipped off by rabbits, or other pests, and did not recover. I would not give up on this cross though, as the seeds were planted in sandy soil and it's possible that a dry spell during some crucial stage of development caused their demise.

Seven plants from Dr. Todd's "mloko-delavayi" seed grew well this past season. The stated parentage is unlikely as the leaves appear to be 100% lutea (or delavayi). At best I'm hoping for hybrids between the yellow and red of the lutea-delavayi subspecies.

While at Reath's Nursery, Dave suggested an interesting project for someone to pursue. Cross lactis with tet species and hybrids; treat the germinating triploid seedlings with colchicine to induce haxaploidy. These could be interfertile, producing a new race of hexaploid herbaceous hybrids. Furthermore, backcrossing to lactis might be feasible, with normal reduction in the gametes (1n + 3n) producing tetraploids (4n).

In June I spent an hour or so looking at pollen grains beneath a microscope at about 150x. There was a correlation between known fertile varieties and plump pollen grains compared with sterile varieties and small shriveled grains. '**Coral Fay**' had mostly poor grains; it sets seed occasionally and its pollen on fertile varieties caused poor seed set. '**Roselette's Grandchild**' II, a light yellow, had excellent grains and it is very fertile both ways. Seedling 70H12 had mostly good grains. '**Sparkling Windflower**' had grains of variable shape and size, estimated 25% normal grains. This variety reluctantly sets seed but seems to do fairly well as a pollen parent. '**Chinese Dragon**': mostly poor grains. '**High Noon**': very very few good grains. A198 and A199: many good grains, normal shape. "Normal" meaning ovoid with a narrow depression the length of the grain. D324 mostly poor grains, some good. But this was a good seedsetter; see 3rd paragraph. I did not use its pollen. D223: many large plump grains but often irregular in shape. D206, pollen from Dave Reath: similar to D223. I did get two seeds from '**Chinese Dragon**'x D206. Dave mentioned that a magnification as low as 10x can be helpful in determining likely fertility.

TISSUE CULTURE

You must belong to the American Peony Society if you are interested in getting the most out of our newsletter, PAEONIA. To do less will be like reading a book with some of the chapters missing. PAEONIA cannot reprint all of Dr. Meyer's tissue culture material which has been, and will be, published in the American Peony Society Bulletin. We have no permission, and also, this would be wasteful duplication.

This, however, should not stop our involvement in tissue culture: JOIN THE A.P.S. IF YOU HAVEN'T ALREADY DONE SO.

In the latest issue of the A.P.S. Bulletin (Dec. 1975), Professor Martin Meyer presents an article that may give you the feeling the whole process is too much for you. Re-read the article. The recipe for the nutrient solution stops you in your tracks? "Huh!" — well, on page 28 it states: "The above ingredients are commonly available from scientific supply houses and some companies will have ready mixed culture media." - Chris Laning

REPORT FROM NORTH DAKOTA

Ben Gilbertson
Kindred, North Dakota, 58051

In the June issue of the Bulletin, there appeared an article by Ms. Ona Skeiviene of the Kaunas Botanical Gardens, Kaunas, Lithuania, USSR, entitled "Peonies in Lithuania", listing among others, P. lactiflora (Pal), native of the far east and P. tenuifolia L., with dark purple flowers. These two interested me very much so I wrote to Ms. Skeiviene about the possibility of buying or exchanging roots of these in the fall of '76. She graciously advised me that they would not sell roots but would be happy to exchange for other kinds. She also sent me packets of seed from seven selections of peonies, including 2 of Tree Peonies, 1-Veitchi, 1-Kaychensis, and 3 selections of Lactifloras and a promise of roots next fall. I can hardly wait.

This season saw the first bloom on any of the four varieties imported from the USSR in '73. Anomala L. had one single bloom which I must call purple. This plant has developed very well and had 4 good stalks. Novestj Altai had 5 and Poceda had 6 stalks but no buds. They should all bloom well next summer as all were very vigorous and healthy looking plants. The variety "Pall" which had one potato like tuber for a root last year, came up with only one stalk, smaller than last year, and I thought it would surely die out, so I dug it in late August when the top had entirely dried down and found the remains of last year's potato like tuber almost completely rotted away but on the stem above it were 3 small radish-like roots that were attached just like typical tenuifolia roots.

New this year was a cross between double tenuifolia and '**Smouthi**' as the pollen parent. It is a very robust plant that looks all Tenui, but has a very much better root system. It bloomed a year ago for the first time and has a typical single Tenuifolia flower. I dug the plant in its second year of bloom and made three very nice divisions from it. I hope to use its pollen this coming season on the double type and hope to get a double and still retain some or most of its vigor. I know of no peony that needs improving as much as our common **Tenuifolia Flora Plena**. I think it can be done.

We also had many offspring from '**Kansas**' x '**Philippe Rivoire**' seedlings and '**Fayette**' pollen, only one of which I thought worthy of keeping, at least temporarily, as all the others were stark singles but of good color. This one was especially fine, bright red and near semi-double. None of them showed the fault so common with the seedlings I have had with the same seed parent and Lobata pollen being used, that of very severe fading of the fiery red to a sort of light flesh pink. One more that I saved was a large vigorous bomb type double with light pink guards and a very full fluff of narrow white petals for a center.

The last part of the blooming period was a near disaster as we had 18" of rain in 12 days which with our very level grounds the plot was in water many hours at a time for several days. No plants were lost.

Two new varieties were named and registered this year. These are '**Atlas**' and '**Goldilocks**'.

'**Atlas**' is without a doubt the strongest stemmed peony plant ever. Its parentage is all Lactiflora of the '**Kansas**' x '**Philippe Rivoire**' line, third generation, and has broad leaves, heavy dark green foliage that glistens in the sun.

The stems are very strong and carry their huge flowers straight up. The flower is a very full double rose type with some short anthers with pollen set in around the small, rather poor carpels. It does set seed in a small way and its pollen is effective on other peonies and we have a few small seedlings from it already. The color is a neutral blend of '**Kansas**' and '**Philippe Rivoire**', rather dark red, and does not fade but eventually dries up. It never shows magenta, so common in Kansas' older flowers. Averages 3 blooms per stem; midseason. We will not try to move this one out until we have a better supply as we had only five 3-year old plants this fall and dug and divided and replanted all of them.

We will, however, offer divisions of '**Goldilocks**' and '**Wine Red**' in the fall of 1976, but the supply of '**Multiflora**' is too small and will be held until the fall of 1977 when we will again have a small supply. There was such a fine response to our offer the past season to get these good breeders out directly to the hybridizers and peony breeders that we will continue on the same basis.

'**Goldilocks**' seed parent was '**Oriental Gold**' and my records show that it was pollinated with '**Claire de Lune**' pollen, but the plant does not show any resemblance to '**Claire de Lune**' except that the blooming time was much earlier than its seed parent. The mature plant resembles its seed parent in general but does not come out of the ground with the bright yellow-green sprouts of '**Oriental Gold**'. The bloom, coming with earliest Lacti, is medium in size, rather high rounded, with light yellow guards and a bright yellow full center of narrow petals. Produces seed beautifully as in 1974 when I pollinated all five smallish plants with '**Moonrise**' and harvested nearly 300 seeds. In '75 I used Mloko on all five much larger plants and had 3 seeds that might germinate. This is about normal for me with Mloko pollen. If only I could get some '**Oriental Gold**' pollen for '76. The root structure looks very much like any common Lactiflora.

I will try to get this one out to hybridists and breeders as it is too valuable as a breeder to sell as an ordinary garden peony.

Now, if I may change the subject completely -- I have just returned from a three-weeks stay at a Fargo Hospital where I had surgery on my left knee which has been giving me increased pain for some fifteen years and had become nearly useless. A new joint of plastic and aluminum was used to replace the deteriorated cartilage of the joint and it seems that the result will be well worth the trials of recuperating from surgery. The old pain is entirely gone. My right knee is also quite bad at times and maybe we will take care of that too next winter. One at a time is enough.

* * * * * * *

LETTER TO CHRIS LANING -- From: C. Harn, Radiation Breeding Lab
Korea Atomic Energy Research Institute
(11-18-75) P.O. Box 7, Cheong Ryang, Seoul, Korea

Dear Sir:

For the cytological works, any informations on Peonies, herbaceous as well as tree, are needed: catalog, list of species, varieties you are dealing with, month of possible shipment and others.

ED: In reply to Mr. Harn's request, I sent what materials I had on hand. If any of you readers can supply more stuff, send it to me and I'll mail it to him along with new catalogs.

AN OUTLINE OF SOURCES OF DOUBLING IN PEONY FLOWERS

Don Hollingsworth

Class A - Two Stage Flower or Flower-in-Flower

P. lactiflora, only. Distinguishable only in the presence of stamen transformation Types 1 or 2? Characteristic of the big full double flowered horticultural varieties. Inside the main flower there is a second complete flower, .?. sepals. This inner flower may be very small, fitted tightly within a circle formed by the inner parts of the outer flower as in 'Lady Alexandra Duff', ranging upward in size to nearly equal to the outer flower as in the classic full doubles.

Genetically may be dominant over the single stage form within the species. However, in hybrids with tetraploid species, which therefore contribute twice as much genetic material to the offspring, the two stage form has not appeared, presumably inherited as a recessive in these combinations. May be manifested in a multi-petal "semi-double" form as '**Laura Magnuson**'.

Class B - Regular or Single-stage Flower

P. officinalis, *P. suffruticosa*, and *P. tenuifolia* doubles and single flowers of all Paeonia species.

These flowers exhibit the normal progression of flower parts, commencing with the outermost leaflike sepal and progressing in sequence through a spiral series made up of sepals, guard petals, inner petals and/or stamens, disc, carpels and ending at the innermost carpel.

Transformation of stamens and carpels to petals or petal like structures --

Type 1 - All-over transformation of stamens with variable transformation of carpels to petal-like forms.

P. lactiflora, *P. officinalis, P. tenuifolia*

The all over transformation of stamens is the basic inheritance factor as well as the distinguishing characteristic. Modifications in degree of transformation are seen varying from minimal change of stamens to staminodes and ranging through petalodes to full blown petals; includes the flower forms Japanese, anemone, and Bomb. Carpels or stigmas may or may not show transformation. These modifications are possibly inherited at different sites on the chromosomes than is the basic form. Combined with Class A doubling, gives no stamen, classic doubles. Genetically recessive to Types 2 and 3 forms.

Type 2 - Progressive stamen transformations, carpels not usually transformed to petal-like forms.

P. lactiflora and *P. suffruticosa*.

Progressive as contrasted with the all over transformation seen in Type 1 forms. Stamens transformed completely into petals commencing at the outermost stamen bundle and continuing inward part way through the stamen series. Distinguishable from Type 1 with full confidence only when the progression is incomplete, leaving some normal stamens evident. Typically there is no modification of carpels into petals. However, in Class A, two-stage doubles, the carpels are commonly found ruptured or diminished to a vestige of their normal size, sometimes absent. Genetically dominant over Type 1 and possibly over Type 2, at least in the presence of Class A two-stage doubling.

Type 3 - Stamens normal, no transformation into petal-like forms. Carpels and stigmas normal. Typical of all species of *Paeonia* in wild form. Genetically dominant over Type 1 and probably recessive to Type 2 when in the presence of Class A two-stage doubling.

Other factors influencing the appearance of doubleness may include a multiplication of petals and/or stamen parts and enhancement factors such as the modifiers suggested above.

Some conclusions and implications:

1. To get more doubling in hybrids, use pollen of two stage lacti doubles for F1 or BC matings. Use pollen of F1 or species on carpels of two-stage double lacti — neither direction an easy approach. Stored pollen and shipment from more southerly zones in same season would be necessary to have the lacti pollen available. Those having demonstrated they carry the recessive genes for Type 1 stamen transformation would be preferable as that is necessary in order to get the no-stamens full doubles.

After re-reading the above material, I see that I did not mention some observations that support some of the conclusions. The two-stage doubling, you've seen as well as I. However, the 1970 G. H. Wild catalogue has some illustrations in it that may help confirm what I am trying to convey.

On Page 3, '**Albuquerque**' is a skimpy Glass A; see the red "bud" in the center of the stamens. Towards the upper right edge of that bud I think I see two stigmas showing above the anthers — these would be the innermost parts of the outer flower. Many times I have tried to strip anthers out of a '**Lady Alexandra Duff**' flower of about this same makeup trying not to get pollen on these stigmas only to discover the carpels all split up the back.

Page 8 - '**Lady of the Snows**' - Class A two-stage with Type 1 stamen transformation to petalodes. The center petals I believe to be the guard petals of the inner flower.

Page 7 - '**Hansina Brand**' - This picture permits no conclusion as to differences in origin of the petals. However, I had long marveled at the depth of this flower when full blown. I now presume it to be a Class A two-stage double with Type 1 stamen transformation to full blown petals. The point is that on the big doubles you really can't see this difference. It is the novelties or odd ball flowers that reveal these forms.

Page 9 - '**Minnie Shaylor**' - I've never seen this one since reaching these conclusion. In Wild's illustration it looks like a tree peony. Could this possibly be a Class B single stage with Type 2 stamen transformation? I think that is rare or absent in the lactiflora peonies I have grown.

Page 11 - '**Peppermints**' - I think this one has a ring of nearly hidden stamens outside that "ball" in the middle. Also, the red marked petals I think to be either transformed carpels of the outer flower or sepals of the inner — A Class A two-stage Type 1.

Page 13 - '**The Mighty Mo**' - In a full blown flower the guard petals of the inner flower hang out like a big balcony on a modern building.

Page 19 - '**Rosedale**' - This is what I judge to be the greatest expression of Class A inheritance in an F1 triploid. Multiple petals with no extra flower in the center. '**Laura Magnuson**' which gave '**Lullabye**' is my "proof". '**Lullabye**'s two-stage should not have come from '**Moon of Nippon**'. My proof is a little weak in that it is a single instance but it fits the overall proposition very nicely. I suppose '**Red Ensign**' on the same page, and possibly '**Robert W. Auten**' and '**John Harvard**' on the opposite page to be similarly constituted. I have a similarly formed seedling '**Karl Rosenfield**' x '**Good Cheer**'. '**Karl Rosenfield**' is Class A-Type 2, '**Good Cheer**' is Class B-Type 3.

Those give the idea — Oh, one other, page 2 '**Feather Top**'. This one aggravates me. It appears to be Type 2 Class A, but Type 2 isn't supposed to give a ring of staminodes (I said) but rather should be stamens. Think I'll have to grow it to see it in the flesh. Seems to have too many petals for a Type 1, before you get to the staninodes.

My other related observations are straight lactiflora and possible backcross seedlings from '**Cytherea**' out of '**Kickapoo**', an Auten red single. The 1968 seedlings are by '**Reine Hortense**' Class A Type 2. The seedlings include singles, Jap or bomb types, two-stage doubles mostly with, but some without anthers. 1969 seedlings from contaminated lutea crosses (probably . '**Karl Rosenfield**' and '**Reine Hortense**' pollen) include a semidouble, singles and full doubles both with and without anthers. If Type 1 is recessive, then '**Kickapoo**' carries it. However, I conclude one of the pollinators must also carry it. Also, since we got two stage doubles as well as singles which are one stage, the former must be dominant and the pollinators which were two stage all carried the inheritance for single stage — this is, of course, not at all ironclad sure, for what if there was self pollen (thus single x single) (or contamination from another single, though pollen was stripped from all singles in 1969) but the doubles simply defy getting it short of destroying the f lower. In event single flowered parentage gave the single seedlings then perhaps the double flowered parents do not carry single flowering as a recessive. However, as a matter of fact, most of my seedlings of single lacti are flowering double and I'm saying it is from the pollen parent.

Well, that's what I have on it. Can anyone add anything (support) or cast a light on it that will confound some of all of the parts? If you can, please do it. That's how we home in on whatever that can be found which is solid.

I have, as you can see, set my directions to work with doubles and those other flowers which have evidenced the ability to produce doubles.

My two oldest Itohs are out of a Class B Type 1 and the next one is out of a Class A Type 2. '**Alice Harding**' Lutea is a Class 3 Type 2 by this scheme. It will be interesting to see how the descendants work out against our theory of doubleness, whatever that may be by then.

ADDITION TO ABOVE ARTICLE — dated February 16, 1976

1. In the part on "Class 3 Regular or Single-Stage Flower" I omitted "P. lactiflora Japanese, anemone and bomb types ..." This is a key point and should be said. (A more straightforward statement would have been, "Japanese, anemone and bomb type flowers and the single flowers of all peony species."

2. In the paragraph on "Type 2, Progressive stamen transformation", toward the end of the paragraph I wrote, "'Genetically dominant over Type 1 and possibly over Type 2 (should be 3), at least in the presence of Class A, two stage doubling." The correction of "2" to "3" is one thing. The other is that this construction is overly simplified. Quite possibly the Class A doubling and the Type 2 transformation are genetically linked in P. lactiflora and these linked genes being on an entirely different pair of chromosomes than that for the Type 1 stamen transformation. Type 1 and Type 2 would then not be alleles at all, each one being inherited separately. Whether or not singleness is an allele to either of the others seems to be not important.

Either way it is always there, and, in the absence of the genes necessary for the expression of one of the other forms. Singleness is expressed in the flower form.

In my follow-up letter about illustrations in the 1970 G. H. Wild & Son catalogue, I cited '**Feathertop**' as possibly being outside the postulated pattern. This alternate construction would, I believe, allow for the small row of staminodes in what would otherwise have been a Japanese form flower, the presence of the linked genes for two-stage doubling and the progressive stamen transformation, which alters them fully into petals, has resulted in an overlay superimposed over the Japanese form except for the innermost stamen bundles, which were not altered by the two-stage progressive genes and remain at the staminode level of transformation, resulting in a row of more or less hidden staminodes rather than hidden stamens. Other double flowers have petalodes (anemone level of transformation mixed in with the larger inner petals, as I recall, which would have the same origin as the staminodes in '**Feathertop**'.

3. After the paragraph on Type 3 (no transformation of stamens), I included this clause, "such as the modifiers suggested above". There is, however, no direct mention of the term "modifiers" in the discussion which precedes that point. However, the term "modifier" covers a concept which is necessary in order to account for the different levels in the expression of both Type 1 and Type 2 stamen transformation. The modifier genes would act to intensify or suppress the degree of expression of a character which is inherited at a different gene location. Such genes that inherit separately, but (so the idea goes) do not uniformly dominate over the character governed by the basic gene, give rise to the endless gradations of forms color, etc., of plants and animals.

Some responses to comments in your letter of February 11:

"Using Type 2 blossoms" to achieve doubles. These are most dependably useful when they can be used as the pollen parent, for one can nearly always collect pollen from them. However, they are poor as seed producers in lactiflora for the carpels are usually deformed and/or very tiny, frequently rupturing as the seeds develop. The only other species in which I recognize Type 2 is the suffruticosa (and its hybrids). There, of course, the Class A two-stage doubling is not a factor and the carpels are nearly always normal and functional. Lutea Hybrid '**Alice Harding**' is a Class B, Type 2 with usually very few stamens not transformed.

"The view that just as many doubles can be produced by using the Japs and the Type l's." The logical extension of the Class A, two-stage doubling hypothesis postulates that one would have to use both Type 1 and a source of Class A form to get the fullest doubles. Type 1 flowers will be the best seed producers by far and all their seedlings will carry the genes for Type 1, for it is recessive. That is a key point. By the same token, single flowers (Type 3) would be expected to sometimes carry the Type 1 gene hidden and when bred to another single flower carrying the Type 1 recessive should give about 25% Type 1 flowers. Bred to Type 1 would give 50%. By using pollen from Class A (and, usually, Type 2) flowers, the logic says we have the opportunity of combining both sources of doubling, yielding a proportion of full doubles, some of which may be also without stamens, but only if the Class A pollen source carried a Type 1 recessive gene. To get rid of the stamens, both parents would have to carry the recessive Type 1 gene. Plants of the Jap - anemone - bomb, Class B, Type 1 series are the optimum choice for seed parent in planning such crosses, for they demonstrate outwardly that they are Type 1 — all of their offspring will get it from that side, for a recessive shows outwardly only when the individual is pure for it. This fully supports Roy's longtime position that Jap flowered peonies can produce the most doublesc On the other hand, if only pollen from single flower (Class 3, Type 3) of lactiflora were to be used, the results might

never include big full doubles, but be limited to the Jap - anemone - bomb series (Class B, Type 1) and singles (by the hypotheses being discussed here). The exception would be if a flower which appears single or near single but is actually a suppressed two-stage double were used for the pollen. This latter might occur in a straight lacti individual, or a triploid hybrid that had a Class A (either Type 1 or 2) lactiflora as one of its parents * (Or, actually, these should be possible from tetraploid advanced generation hybrids, except that there would have to be a concentration of the Class A genes, which, curiously has so far almost never shown up — perhaps Roy's Super D would be the exception). I think the triploids with many petals are good bets for pollen source in trying for doubles.

"Getting great big doubles to set seed." '**Kelway's Glorious**' will give a bit of useful carpel rather often, at least the plants I have do. Also one can occasionally get a bit of pollen from it. Auten wrote that his '**Moon of Nippon**' was from a bit of pollen excised from the edge of a staminode in one of the old doubles — was it '**Marie Lemoine**'? However, a good full double with hidden stamens may serve as the source of Class A form while using either Japanese - anemone - bomb Type 1 as seed parent or, and this is key when using triploid hybrids, a single flowered plant having a Jap-anemone-bomb type as one of its known parents.** Roy Klehm advocated '**Bowl of Cream**' for pollen and I'm hoping he knows it has given doubles with no stamens. However, since the most desired doubles have always been (historically) the full doubles without stamens, I expect that most of those now in the trade have been bred from kinds that also yielded no stamen doubles. Therefore, they should be, on the average, relatively good prospects, so the reasoning goes, for using in programs meant to produce "end of the line" doubles. By knowing the genetic source of those kinds we can guess which forms to use to get them.

Your seedling with candy striped petals — Since the outer petals are striped, then a ring of white petals, then another series of striped petals, I judge this to be a Class A two-stage, and since stamens are absent, it is also Type 1 — Class A, Type 1 double. You see the proposed format requires each flower to have both a Class and a Type — a single flowered peony is a Class B, Type 3. You did not say whether there are all-white petals in the center also. In the most advanced form of two-stage double, these inner petals would be repeated just as are the red and white striped petals. However, the thing about Class A is that there are all degrees of completeness of that inner flower, from very little to one equal to the outer flower. The show worthy semidoubles are somewhere in between with a relatively smaller number of transformed stamens — in other words a Type 2 stamen transformation but with the progression rather short, leaving most of the stamens normal.

* Of the SLP Hybrids, '**Red Red Rose**', '**Lustrous**', '**Carina**', '**Laura Magnuson**', '**Ellen Cowley**', '**Sophie**', '**Cytherea**', '**Ludovica**', '**Paladin**', '**Jean Cowley**', '**Nathalie**', '**Jeannette**', '**Alexander Woollcott**', '**Constance Spry**', and '**Nadia**' — all have Class A lactiflora parents.

Of the SLP Hybrids, 'Lovely Rose**', '**Fortune**', '**Rose Diamond**' and '**Rose Tulip**' are out of known Class 3, Type 1 lacti. '**Lovely Rose**' seems to set seeds more easily than other triploids I am using. It may be useful to try pollen of a full petalled Class A, Type 2 lacti on it as an approach to full doubles in lobata hybrids.

NOTE FROM DAVID REATH (David Reath Hybrid Peonies, Vulcan, MI 49892)

"I've decided to release three of my advanced generation hybrids to hybridizers this year (note dated 6-12-75). I have had a good chance to test their fertility and to see how well they perform in my garden and feel that they could be of use to the serious hybridizers in several ways ....."

ED: The Sept. issue of PAEONIA was sent out so late that taking advantage of this offer would have been difficult. This March issue will be the right time to place an order with David Reath. - Chris