PAEONIA

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Editors: Chris and Lois Laning
553 West F Avenue
Kalamazoo, MI.

Suggested yearly contribution:
$2.50 in the U.S.
$3.00 in Canada
$4.00 in Europe, New Zealand, and Australia.

SEED DISTRIBUTION FOR 1991

Lobata seed - open pollinated - from John Cote of Brooklyn, CT.

P. ludlowii species seed from Mrs. Julia A. Allan of New Zealand

lactiflora

lactiflora x macrophylla F_3

Roy's Best Yellow F_2 - flowers are of cream color

#122 tet mix

tall red - from Dad F_2 America F_2 and Burma Midnight F_2.

#113 and 114 - Sable x Super "D" F_2 seedlings

Quad F x Moonrise F_3

And a few tree peony seed (suffruticosa)

Please send $2.00 to cover packaging and mailing costs.

- Chris

"ALL ALBIFLORA — OUT"

This is taken from A. P. Saunders' "Big Notebook". There are many similar entries. He is, of course, referring to the fact that very frequently in using lactiflora (albiflora) (sinensis) as a seed parent in crosses, many or all of the seedlings obtained proved to be not hybrids at all, but pure lactifloras.

In the same notebook he attributes such happenings to "accidental self pollination." In another of his writings he explains this more fully. The following quotation is taken from an article "Some New Hybrid Peonies" written for Bulletin No. 27 of June, 1926, and reprinted in. Bulletin No. 133, June, 1954.

> "Thus, I am pretty well satisfied that I have never had any successes in crossing the various forms of shrubby peonies with any of the herbaceous species. It might seem an easy matter to be quite sure about the success or failure of a given cross, but it is not so easy as it looks. Of course if a cross is made and no seed is obtained it is plain enough that the cross has failed. But if the seed pod enlarges and in the autumn yields seed, it is by no means certain that the cross has been a success. For one must remember that the anthers of the peony often burst before the bloom has opened and consequently there is always a danger that a bloom may have fertilized itself, even though the petals and all the stamens may have been removed while the flower was still in bud."

It must be borne in mind that the passage quoted above was written early in Mr. Saunders' hybridizing career; at a time when he was blooming only his first generation of hybrid plants. It would be very interesting to know whether he may later have begun to have doubts about these accidental self pollinations having come about in just the way he explains them here. I began to be very puzzled about this several years ago.

Over the years my own experience has closely paralleled that of Mr. Saunders. I have bloomed out several thousands of pure lactifloras from supposed crosses and, except for the lacti x lobata cross, have found only a few hybrids. I guess I must admit though that carelessness may have played a bigger part in my poor results, even though Saunders often used single lactis as seed parents whereas I never did so. There should have been less chance of self pollination with the japs, anemones and bomb type doubles which I have used exclusively.

It was only when I started to try to make the lacti x "lutea hybrid" cross that I corrected my previous careless practices, trying by every means I knew to make only uncontaminated crosses.

I continued to use japs, anemones, etc, as seed parents. I chose buds at least one, and often two days away from opening. These were stripped very completely, pollinated and bagged immediately. I feel confident that many of the pollens I used could not have been

previously contaminated by lactiflora pollen. My "fingertip" technique is such as to rule out any possibility of contamination at this stage.
In spite of all this I still continued to get seedlings which were pure lactifloras. As the genuine hybrids are very distinctive in appearance there could be no doubts on this matter. Yet there they were! It simply could not happen but still it did! I was completely baffled by now, really desperate for an explanation. I even grasped at the thought that parthenogenesis was involved. This could not be true either since these plants were not uniform in appearance, nor did they resemble the seed parent very much.

This frustrating dilemma continued until this summer when an observation in my garden startled me into the realization that I had an explanation which satisfied me.
I had pulled off all the terminal blooms on a clump of '**Vista**' which had opened too far to be safely pollinated. When I returned to this plant the lateral blooms too had opened a little too far to be sure that insect pollination had not occurred, so I decided to use lobata pollen on them. This pollen is so effective that I could be sure that most of the seeds would be hybrid anyway. Then I noticed something unusual. About ten of these blooms had tiny yellow nodules or specks of what I assumed to be pollen, located at intervals within the "crease" formed by the incomplete fusing of the two edges of tissue on which the stigmatic surface is developed. If these are really tiny lumps of pollen they are ideally placed to effect the self-pollination of that particular carpel on which they are seen.

Beginning hybridizers, and especially those who use a brush to pollinate their blooms, may never have noticed the existence of these incompletely sealed edges at the active surface of the stigma. I notice it occasionally when applying pollen with the fingertip. Sometimes in rubbing the fingertip crosswise over the stigma the two surfaces will be seen to separate. I have seen this only on those varieties which have a narrow, attenuated stigma with a very narrow active surface. '**Vista**' is one of these. I think it is much less prevalent in those more "normal" kinds which have a much broader "easy to pollinate" stigma.

Because the fossil record of soft plant parts is very poor, botanists have not been able to trace the evolutionary steps involved in the development of flowering plants from simpler precursors. It seems clear however that each separate part of a flower has evolved by the modification of a single leaf. This has been accompanied by a shortening of internode spacing almost to nothing. Because the flower parts in the peony are far less elaborately specialized than in many other plants, the peony can be considered a flowering plant of a "primitive" sort. It is comparatively easy to imagine that the carpel and its attached stigma may have evolved from a single leaf of some remote ancestor. Let's do so, briefly. Let's say that a single leaf folds inward along its mid rib and that the edges fuse to enclose the ovules which somehow develop from cells on the enclosed leaf surface. Ripened seeds are released when these fused edges become "unstuck" later. The very tip of this leaf extends beyond the part which becomes the seed box. Its two edges normally fuse also and the stigmatic tissues develop along the line of these fused edges. Only a slight abnormality in development would be required to provide the incompletely fused edges I've described, and between which I believe I saw those small inclusions of pollen.

It is suggested that this idea is not a fantastic one when one considers the other sex reversals and abnormalities which have been seen. In doubling of any degree, stamens and even carpels become petals — a more leaf like form. Stebbins and Saunders (Genetics", Vol. 23, 1938) describe the occurrence of small outgrowths of stigmatic tissues on small atrophied stamens in a hybrid of lacti x Vietchii. Saunders obtained even more startling reversals (multicarpy) in many seedlings between lacti and several members of the "anomala" group of species. In these, the many stamens are changed to a mass of very small non-functioning carpels complete with stigmas. '**White Innocence**' is a perfect example of these. In corn I often see seeds formed in the tassel (the staminate bloom) of the plant.

I believe all the above is sufficient to establish that my conclusion could be correct. It should be tested microscopically by someone with the facilities and the opportunity to do so.

It's not a terribly important matter. Even if it proves to be correct there's still no way to guard against the unwanted seeds. We will still get self-pollinated lactifloras to discard but we will understand why it happens.

- Roy

SOME THOUGHTS ON POLLEN MANAGEMENT

Don Hollingsworth, 5831 N. Colrain Ave.
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(Reprint from PAEONIA Vol. 3 No. 3)

After two seasons of preparing peony pollen and making hybrid crosses, I am increasingly concerned that instead of preserving the pollen's potential I may be reducing its effectiveness.

As I look back over my results, it appears that not more than a few good seeds have been produced from hybrid pollens of anthers collected from newly opened blossoms. Conversely, my apparent successes may be generally associated with pollens taken from fully opened flowers, most of which had been cut and held for display.

Several Saunders lobata hybrids and a few lutea hybrids have been available locally. I have ordinarily gathered anthers rather than ask for a whole blossom from the gardens of others. When taken as the bloom opens there is little possibility of contamination by other pollens. When dried, the anthers give a nice quantity of pollen even from low yielding kinds. This process seemed good enough and the low seed production could easily be laid to the mixed up chromosomes of the hybrids.

However, at the 1969 Kansas City Peony Display, I acquired a bloom of '**Cytherea**' and one of a double lutea hybrid. The lutea was local and I also had its pollen from an earlier collection. At seed harvest, '**Cytherea**' pollen proved to have been about as effective as that of lactiflora varieties. The second take of lutea pollen gave 19 seeds from three carpels of eight flower heads while that from the first collection gave none. These results provided a dramatic contrast.

In 1970 my local collections of pollen performed about the same as before while limited experience with pollen from more slowly developed blossoms was again good.

In THE PEONIES (p. 120) we are advised, "one way to secure 'pure' pollen is to cut the bloom just before it is due to open and place it in water in a cool place, preferably in the house. Here its opening will be delayed, and as a result the anthers will have more time to come to full maturity or ripeness, and no pollen is lost."

No mention is made whether this conclusion is drawn from specific experimental results or is perhaps offered more by way of lore from an experienced breeder. While I had supposed this recommendation directed primarily to the task of securing uncontaminated pollen, I am now ready to accept a much more inclusive meaning. I believe there is enough possibility that slow maturity is a critical need in achieving viable hybrid pollen that I will follow the above passage until some specific comparisons can be made to test the proposition.

In the search for techniques by which we may better manage hybrid crosses, I think it worthwhile to thoughtfully search our experiences for clues, then test the clues. Although the above statement of experience comes through in the writing as a simple contrast of results, the whole array of experiences was much more complex and not at all clear. When this is tested more carefully we may well find that it does have a practical value with varieties having a greater degree of hybridity or other factors which reduce viability. Yet on kinds that have an abundance of good pollen there may be no practical benefit for the extra trouble.

If any of those who read this have comments after comparing the idea with their own observations or what has been heard from others, I would appreciate hearing the reactions.

NOTICE:

The cost of sending out our newsletter, PAEONIA, has increased at a steady pace over the past twenty years. Only one subscription rate increase has been effected over that period of time. While of late a number of our readers have been contributing more than has been asked for, now is the time to r4esolve our problem. To again raise the rate seems to be not wise, an alternative is needed. The December issue will be discontinued. This means spring, summer, and fall issues will continue but NO December issue will be produced.

- Chris

Marsal Paeonies
Old South Road
R.D. Dunsandel
Christchurch, New Zealand

Dear Mr. Laning,

Greetings from the N.Z. Paeony group. One of our members, our secretary in fact, Kathy Henderson, was at your American Paeony Society meeting and said that she spoke to you about seed swapping, etc. We had our biennial meeting at the end of last month where it was moved that the species convener have his/her duties extended to cover herbaceous and tree paeony seed collection, packaging, and posting to the American Peony Society. Postage from here would be in bulk to your seed distributor, presumably to yourself, at this given time. The only problem being that we have a smaller number of people active in this field compared with the U.S.A. but we will endeavour to name and tag as well as we can with our limited resources. Who knows what interesting variants may occur? As the person nominated to be seed distributor at this end, I wonder whether we can work out postage costs to the satisfaction of both groups. Our group seemed happy to pay postage from here to you and the redistribution postage costs to our N.Z. members. At this end, however, we have asked our members to send in to me their names if they are interested in growing, breeding, etc. of species, herbaceous x Tree Paeony, in order that the seed goes only to people genuinely interested in breeding and experimental growing. Hopefully, that would prevent disinterested people receiving hard to come by seed and leaving it uncared for. Any suggestions from you and your methods of distribution would be welcomed.

Until recently I was unaware that you had a separate Paeonia newsletter and have enclosed a sum of money whereby perhaps I could become a member. Enclosed is some "Ludlowii" and Mloko seed which is only a small amount due to a poor harvest I had this year. Having just moved my field to a new block over the last 18 months and trying to get it established, I have had little time for anything but open pollinated seed collection. We have an acre in paeonies for root production and have now over 80 varieties either imported from Klehms or divisions from Hamiltons of Lake Hayes or Craigmore (Elworthy's) which are from ex-Klehm stock. The paeony movement is on a high plane at the moment here, especially with the advent of the cottage and perennial "fashion" of gardening over these last 5 years. Despite the poor economic times people are staying home and finding that gardening is a very rewarding occupation. As farmers, due to retire from that to our paeony patch, we need to keep working as we have had some terrible droughts which, combined with low exports nationally and the depressed economic situation, have really put us on our "heels". Therefore, thank goodness for the paeony which really has been our saviour.

I have a small packet of Mloko seed from a friend's, one of good form, and can spare you this left-over packet. My species section is slowly extending - Mloko. rosea? a natural species deviant or garden x has been my latest acquisition - whether a species x

from the wild or from a garden source is debatable but the original history of this plant is that 25-30 years ago it was from Royal Hort. Soc. seed from U.K.

Fashions change, but there seems to be a movement toward yellows in some sectors - popularity of the Asiatic lily perhaps? Are there any seed sources which are likely to throw yellow doubles? I have '**Prairie Moon**' and a few other creamy white singles, but what about doubles. I understand that there has been some experimentation but how successful were the U.S.A. lines?

Well, I must away now and hope the frost hasn't been too hard and frozen the hot water. Our frosts have been more severe this winter after a 20 year mild period of winters. However frosts are excellent for the Paeonia!? Looking forward to hearing from you.

Yours sincerely,

Julie Allan
N.Z. Group President and Seed Person

CHRIS LANING
Editor, PAEONIA

553 West F Avenue
Kalamazoo, Michigan 49007

September 12, 1991

Julie Allan
New Zealand Group President
Old South Road
R.D. Durnsandel
New Zealand

Dear Julie Allan:

The seeds you sent arrived two days ago - September 10 - and I noticed your letter dating July 27 came one day earlier. Surface mail taking more than 1 1/2 months is too slow for sending peony seed! Air mail is expensive, $23.00 for the package, but the seeds are alive and need to be handled accordingly. Let me know if you think air mail is too costly and if so, the next shipment will be surface mail.

It would be of interest to us in the U.S.A. to know how well the tetraploid seeds compare with the lactiflora - our old standby. Usually the tetraploid seedlings produce flowers that are single but about 3% will be semi-double or double. Not more than one in a thousand of them produces yellow flowers. You probably already know that my two yellow introductions are fertile, giving highly treasured seed, but they are not for distribution as yet.

If the amount of seed sent is more than meets demand, why not plant the surplus - later sell one and two year old seedlings to the general public. This will expand interest in our favorite flower. But at least, keep me informed as to your needs.

Pages 3 and 4 of the June 1989 issue of PAEONIA list peony enthusiasts in New Zealand and Australia. This may be of some help in expanding your membership potential. Also, either in your country or in Australia, a newsletter was to be developed. I would be interested in its progress!

We will cooperate with you and are willing to be of help in any way possible.

Sincerely,

Chris

p.s. Thanks for the seeds, especially for the P. mloko.

INBREEDING

Chris Laning

Peonies are fertilized by their own pollens, protected from other (contaminating) pollen, and finally raising seedlings from the resulting seeds.

Compare seedlings with mother plant and record all differing characteristics, especially the flowers and plant structure. At this point in the program, a goal must be set since the process of selection should be initiated. Rogueing begins because of abundance of seedlings produced, but a reasonable population is necessary to include as many variables as possible. Population (number of seedlings to be saved) will be dictated by available land and amount of time to be invested. This, then, will be the F_1 generation.

If possible, the same process should be used with another plant so that further down the line the two inbred lines can be crossed, thereby giving hybrid vigor, but that should take place only as a last resort or as a side line to check the progress. After three or four generations of in-breeding (F_3 or F_4) fertility is so greatly reduced that only a few seeds will be produced and in succeeding generations the problem is augmented ending in an almost completely sterile crop of seedlings. At this point cross-pollination comes into play, by using pollen from the other line that hopefully has been produced. This crossing causes the regaining of fertility along with hybrid vigor. This stage can be delayed by backcrossing the almost sterile F_5 or F_6 to the mother plant. Maybe the process is getting confusing; let's use an example: Two plants that could be used would be '**Minnie Shaylor**' - the other, '**Big Ben**'.

'**Minnie Shaylor**' selfed = F_1
Subsequent seedlings = F_2
Next generation = F_3, etc. F_4, F_5, and so on and finally backcross the almost sterile seedlings to '**Minnie Shaylor**' and continue the process.

When patience is exhausted, outcross with the seedlings (the F_5 or $F_{something}$) of '**Big Ben**'. '**Minnie Shaylor**' is a white semi-double lactiflora and '**Big Ben**' is a full double red lactiflora.

The late Father Fiala reported that unexpected happenings result where in-breeding has progressed to the near limit. He had been working with lilacs as far as the seventh and eighth (F_7 and F_8) generations which produced dwarfs, flowers with almost woody texture and misshaped bushes.

Two of my inbreeding lines: The present F_4's of *P. mlokosewitschii* by *tenuifolia* seedlings have the phenotype (appearance) of a pale mlokosewitschii that is tetraploid. Lineage is: P. mloko. x P. tenui. = F_1. From this group of seedlings an occasional seed produced plants one of which was named by Professor Saunders. He called it an F_2 '**Playmate**'. It gave a seedling (an F_3) which he introduced, calling it '**Nosegay**'. This then being quite fertile gave a batch of seedlings (F_4 which in my garden are nice 24 inch plants with pale yellow flowers with abundant pollen which is being used on a host of advanced generation clones. The F_5 collection of seedlings has not yet bloomed.

The second series to be mentioned is in the dark red line. Starting with '**Sable**', a 1943 introduction of Lyman D. Glasscock, having parentage of lacti-flora x '**Otto Froebel**', pollen from Super "D" was applied resulting in two plants which were to be the parents of an inbreeding line of tetraploids. These two plants are numbered 113 and 114, the flowers are dark red and plants are quite tall — about 40 inches. (Note: '**Sable**' has lax stems which must be staked or else they fall over. 113 and 114 have good stems and stand erect until fall.)

The seedlings from these two clones are so similar to their parents that some of them will be used as pollen parents in trying to get a line that is less tall. Pollen from F_4 mloko x tenui will be used since this group is short — less than 24 inches tall. The goal in this case is a dwarf clone with flowers that are almost black, just like the '**Sable**' flower color.

For additional information, read the article from the late Samuel Wissing found on pages 125 and 126 in the American Peony Society's "Best of 75 Years".

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TWINS AND TRIPLETS

(Reprinted from Paeonia, V.3 #2, 6/72)

by Fred Cooper of Ottawa, Canada
November, 1971.

In the past I have only come across two or three twin seedlings that I can recall, and these were only regarded as curiosities. However, it is known that among such seedlings a small but reasonable percentage will be of changed ploidy. Thus from a tetraploid plant it is possible to obtain diploids, tetraploids, hexaploids, and octoploids and in addition aneuploids and homozygous plants.

This spring I carefully examined my 1970 crop of seedlings before planting out. In about 1800 seedlings I found 25 sets of twins and 3 sets of triplets -- about 3% overall. However, in some cases the frequency was surprisingly high: e.g. '**Roselette's Child**' x '**Rose Crystal**', 18%; '**Serenade**', open pollinated, 14%; and lacti x corsica F_2 selfed, 8%. On the other hand, many yielded no twins at all: e.g. '**Moonrise**', '**Good Cheer**', lacti x lobata, and tenuifolia x daurica. Pure lactiflora gave about 1%.

Even at the hypocotyl state either one or both twins in over half the pairs were "different" from "normal" single seedlings. Generally they were characterized by the slenderness of the hypocotyl, although in one case the hypocotyl was grossly swollen and short in length compared with the "normals". Top growth has pretty well confirmed these observations. I feel fairly certain that I have at least two plants that could be hexa- or octoploid, and one diploid (from a tetra). About 8 others, because of their form, bear close watch. None of the "weak" strains from the few pure lactifloras I had survive. It is possible they were monoploids, and hence had little survival value.

Obviously this method cannot compete with the colchicine technique for increasing ploidy, as we have no control over which plants or strains we would like to utilize. On the other hand it could be quite useful in obtaining haploids, aneuploid and homozygous plants that cannot readily be obtained by other methods.