

REQUIRED READING –

- 1. "The Peonies" by John C. Wister, \$3.50 from American Peony Society.. \_\_\_\_\_ 250 Interlachen Rd., Hopkins, MN 55343
- 2. The Bulletins of the American Peony Society. The PAEONIA is authorized by Miss Silvia Saunders.

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PEONY SEED PLANTING INSTRUCTIONS

- 1. Plant seeds in June or July.
- 2. Depth about 1 inch to 1½ inches and space seeds 1 inch apart.
- 3. Time of germination - the following spring many seeds will show growth above ground, some seeds however, will remain dormant for one year. Therefore, mark area where seeds are planted to protect them from being lost or dug up.
- 4. After one season of above ground growth, transplant seedlings. If plants are small, leave them in seed-bed for one more year.
- 5. Transplanting time is late July or early August. At this time the transplanted seedlings' tops will die off. That's OK.
- 6. Final spacing of mature plants should be at least 3 feet each way (3 feet between plants and the rows 3 feet apart.)
- 7. Prior to planting time keep seeds dry and at room temperature.

The tree peony seeds are to be treated in the same way as the herbaceous seeds excepting that germinating seeds should be protected from freezing.

- Chris

Dear Don: ( Hollingsworth)

November 15, 1980

I have just finished reading "Polyploids New In Plant World" in "Best of 75 Years", pages 155 and 156. What, in your opinion, had been accomplished by the Wolfe experiments? Have you seen any of his great developments? Can this experiment be of any use to us? Where are L.W. Cousins' "Inner Glow Hybrids"? Where are Sam Wissing's in-bred Minnie Shaylor's? Did Father Fiala produce great things? How can we prevent loss of valuable hybridizing plant material that resulted from untold hours hybridizing and much money?

Gratwick's advanced generation lutea hybrid: #258 is #95 x Choni (#95 is Red Cloud x F<sub>2</sub>A). The blossoms are plum color. Do you know what Choni is?

-Chris

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November 24, 1980

Chris –

The following series of short discussions are my observations and comments on the questions posed in your recent letter.

**WOLFE'S TREATMENT PROCESS:**

I've visited him on two occasions and saw "changed" plants both times. I saw perennials (woody kinds) at first. On the last visit I saw two buckets with wheat growing in them, the same variety, one having been treated, the other not. The treated plant (this was in April after autumn treatment of the seedlings) was much more vigorous and much more abundantly stooled out. The soil had not been fertilized. By then Harold had at last succeeded in prodding his alma mater into paying attention. (His account is he told them he wasn't going to give them any more money if they continued to brush him off.) Since then Southern Illinois University reported increased yield from not only the treated plant but that the increase was also found in the second generation. This was about four years ago, I think. Whether the process can be of any use in breeding, I think this unlikely. However, it could be of great importance through enhancement of vigor and growth in plants selected for introduction, also for the production of exhibition flowers. This is my view of what might be eventually found; I can't speak to the question of what Harold has found in results of flower quality.

**LYMAN W. COUSINS' INNER GLOW HYBRIDS:**

After Roy Klehm registered a couple of plants which he obtained from Mrs. Cousins, I asked him if he also obtained the others. He said "No". When I wrote to Mrs. Cousins, she responded that I should contact Roy (this is recollection — I didn't dig up the file, but I believe it accurately reflects the outcome of the contacts.) David Reath might know more. He showed me a white single flowered sibling of '**Ann Cousins**' in his field (maybe he has it as '**Fairy Tale**' although I may be confusing this name because he also has a white single seedling of '**Le Cygne**' from Bockstoce, I think, which may be '**Fairy Tale**').

Myron Bigger apparently furnished pollen to Cousins (according to Fiala's article on the little notebooks). He had '**Good Cheer**' and '**Good Cheer**' x PolyMacro from Cousins' seeds, which Ed Michau and I bought. I also have a Mloko which Bigger said came from Cousins' seeds. Also, Bigger's '**Topeka Coral**' was a seedling sent to him by Cousins. Bigger also declared '**Ann Cousins**' is '**Primevere**' x '**La Lorraine**' (a far cry from the generations of breeding which Fiala implied in his "little notebooks" article). Anyway, Bigger seemed quite conversant with Cousins' work so I expect they shared information often.

Roy Klehm is said to have reported Cousins used **'Little Dorrit'**.

Sam Wissing's productions may be in the hands of a son. Sam was in a round robin with me about ten years ago and it seems as though he indicated this. Again, Roy Klehm said "no" when I asked if he got the rest of Sam's things when he got **'Coral Charm'**.

It may be that Cousins' Inner Glows are nothing more than the result of using **'Little Dorrit'** and **'Good Cheer'** on double, flowered lactiflora peonies. That's a good hypothesis to work on since we can do something with it — repeat the crosses! However, we have to take the extra trouble to use double flowered lactifloras or we'll have nothing but bomb doubles and lesser or simpler forms, mostly singles, in the hybrid progeny. **'Little Dorrit'** is now three little pieces that may be another two or three years from flowering, if any survives. **'Good Cheer'** is also several pieces, but I may get flowers from it again in a couple of years.

#### GRATWICK'S ADVANCED GENERATION HYBRIDS -

"Choni" is red according to a note on scions I received from Landis. Leo Armatys used to refer to 'Choni' and "Little Rocks" and I supposed him to be using them interchangeably since Rock's Variety is reported to have come from Choni Monastery.

- Don Hollingsworth

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#### FLAWED PLANTS FROM THE ITOH CROSS

Don Hollingsworth

Some years ago, after Roy Pehrson's early successes from the Itoh cross had attained flowering age, he reported that there were some which produced curiously malformed flowers. In the most severe expression of this problem the petals are mere wisps of what one expects a peony petal to be. In others the petals are better, but sufficiently malformed that the plants are not suitable for introduction.

Also, it turns out that many Itoh Hybrid seedlings are surprisingly susceptible to leaf diseases — leaf blotch., measles, etc. While these diseases are widely known among garden peonies, they are seldom severe enough in the introduced kinds to warrant concern. (However, a Dallas, Texas park department employee once reported that most of their tree peonies and herbaceous peonies were being devastated by anthracnose, the disease agent that leads to leaf drop in sycamore trees all season long.) In a row of Itoh Hybrid peony seedlings some may be seen to have foliage which remains absolutely healthy until they color off and eventually drop in late fall, while others will be devastated with disease by midsummer. Still others are only partially susceptible. This early destruction of foliage (photosynthesis capability) no doubt proportionately decreases the accumulation of stored food in the roots and thus delays or prevents the attainment of full potential of flowering.

Chris Laning has raised the question whether these flawed hybrid seedlings may be characteristic for the Itohs obtained from using *Paeonia suffruticosa* cultivars (Japanese tree peonies) as one parent. He also notes that "it seems to take forever for them to mature enough to bloom!"

I can corroborate Chris' observations in the individuals of my small group of homebred Itoh hybrids and some of Roy Pehrson's culls which I've been growing for about three years. The one thing I can add is that these flaws are not confined to those which have a Japanese tree peony as one of their parents. My Itoh hybrids are all from lutea hybrid pollens.

The simple answer to reducing the proportion of, or avoiding these flawed plants, is to find and use the parent clones that give the wanted qualities in their offspring. Since there is a range of expression which includes entirely satisfactory individual on all three counts — flowers, foliage and early maturity — we know the available gene pool includes the means of producing additional individuals which are not flawed.

There is, however, some minimum record keeping required in establishing the identity of the parent plants which have the wanted capability. One has to keep track of the matings and to follow through in keeping track of the seeds and seedlings that come from each different mating. Right away upon seeing the attributes of the seedlings you can then begin classifying the parents used.

Although my collection of homebred Itohs is small and only a few have reached flowering, I already know some things about the parents. In hybrids by lutea hybrid '**Alice Harding**' the foliage is disease resistant without exception ('**Alice Harding**' itself has exceptionally good foliage.) Of four which have reached flowering age, three had fully developed petals in the first season, the fourth is only moderately flawed and shows signs of improved performance after three seasons.

By '**Demetra**' there is a predominance of weaklings in the few so far surviving and leaf diseases are a problem. By '**Tria**' the results are mixed in foliage health and the first flower had narrow petals but is a striking color novelty, about half scarlet red and half yellow. Two by '**Banquet**' have been slow and the foliage is malformed. And so it goes.

Results come slowly in the accumulation of this kind of information, for the cross takes poorly. In fact some Chinese peony parents have never produced a viable seedling of the cross while others are repeaters. '**Miss America**', '**Gertrude Allen**' and a plant of the old blush anemone which sprawls badly and has persisted for decades around old house places have repeated for me. Each of them has also produced hybrids which are of superior ornamental value when mated by '**Alice Harding**' pollen.

The answer to the problem of how to get ornamentally superior Itoh hybrid peonies lies in the genetic complement of the parent plants used. Put simply, the rule is? "If you're not getting the qualities you want in your seedlings, pick out some new breeding stock."

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The following letter was forwarded to PAEONIA by Greta Kessenich -----

The next part of my letter is a request for information regarding the availability of peony species seed. Do you know of any one in the States or elsewhere who may be able to supply me with some?

Peter Rafferty  
16 Aberdeen Street  
Reservoir, Victoria  
Australia 3073

## REPORT FROM NORTH DAKOTA

The year 1980 proved to be an uninteresting year in the "Peony Patch" starting out with a very dry period through April and May with a total amount of precipitation of ½ inch for the two months, plus two days in April when the temperature reached above 100°F mark.

The peonies got off to a very poor start and were very short stemmed and many mature plants failed to bloom at all. Our city water contains a good deal of alkali and we do not use it for watering. No plants were lost, but delayed for sure.

Early June brought us good rains and our moisture supply was ample for the rest of the summer, and now at freeze-up time we have a good supply of topsoil and subsoil moisture both, so come spring, we should be in good shape.

I did not dig and sell any peony stock this year as I sold so close last year and had such a poor growing season this year that my stock needed an extra season for growing. In the year 1981 I expect to move out all of my stock except what I shall want to keep for myself.

There was not much new this year. A medium pink double, a rather good near-yellow and a single red of a very brilliant dark red color, could be of value as a pollinator and was so used on '**Wine Red**' this year and could come up with some very fine dark reds.

The most interesting plant was missed altogether when we had a houseful of visitors from Canada and the peonies were neglected at that time. It was one of four tree peony seedlings from what my records say was a '**Hakuo Jishi**' pod parent and single Tenuifolia Pollen. All four had typical tree peony foliage. The three first to bloom — three years ago — were mere single light to medium pink flowers but the fourth one was very slow to develop into a blooming plant and bloomed about a week after all other peony was gone. When I did get to see it, it had a bunch of fallen petals below where the bloom had been. They were pretty well dried out but showed color very much like it should have been an '**Alice Harding**' bloom. There were two rather good looking carpels left on the stem or flower base. I could not tell whether it had any anthers or pollen.

My records also show that the flower that I pollinated in this case was not bagged and there were many '**Alice Harding**' plants growing near by so that pollen would have been most likely to have been brought in by a bee or other insect. It was noted that the flower instead of facing downward as '**Alice Harding**' usually does, it faced about halfway between straight up and 90 degrees or straight out. I am not going to miss out on this one next year. Its true parentage is without a doubt '**Hakuo Jishi**' T.P, a semi-double white T.P. and '**Alice Harding**', a very good yellow double.

Ben Gilberton  
Kindred,  
North Dakota

## ROOT ANATOMY AND CAMBIUM IN PEONY GRAFTING SUCCESS

Don Hollingsworth

Highest rates of peony grafting success should be obtainable if the grafter will deliberately place the cambium layers of root piece and scion in proximity to one another when fitting the parts together. The cambium is the layer of dividing cells from which stems and roots expand with growth. While the cambium of tree peony stems is close to the surface, that of herbaceous buds (from crowns) is variable. In roots, the depth of tissues overlying the cambium varies greatly between tree peony roots and herbaceous peony roots. Moreover the depth of the cambium below the surface varies in different roots from the same plant, depending on root size and perhaps upon the vigor of recent growth. If the grafter will take the time and effort to learn to identify the cambium layer, it is then possible to vary the fitting technique to make best use of whatever grafting materials are available.

While published descriptions of peony grafting seldom consider the question of cambium location, general textbooks on propagation theory and practice lay out the importance of this consideration. David Reath, whose successes in grafting are well recognized by Paeonia readers, has said that upon examining the graft union on poor-doing grafted tree peonies, he usually finds there is only a small area of live tissue connecting the scion and the nurse root. This connection arises from whatever amount of cambial union is established between the two parts. Presumably, the grafts that failed were unable to make any surviving connection before one of the parts expired.

The successful healing of a new graft into a viable propagation piece is a growth process. Thus anything which enhances the ability of the parts to make the required growth may contribute to the success of the graft. While some minimum suitability of the graft technique is required, there must also be an adequate level of food reserves in the parts, some minimum genetic capabilities must be present, and the buds of the scion must be able to produce whatever quantity of growth substances may be required to sustain the healing process to completion. I believe the healing of a graft is analogous to the healing of other kinds of wounds which plants sustain. Placing the cambiums of the two parts in proximity may contribute to the desired healing to the extent of reducing the distance which must be bridged in the formation of a continuous cambial connection between scion and stock. It cannot however, make up for insufficient bud strength, poor reserves of food nor lack of genetic adaptation for grafting on the part of a particular cultivar.

Lactiflora (Chinese) peony roots have long been accepted as suitable nurse roots for grafting tree peonies. Since they are the most available sort of peony and are obviously successful, no other justification for their acceptance seems to be required. However, writers have sometimes speculated that tree peonies seem more desirable, being more "natural". Upon examining the differences between these two roots with respect to the natural location of their respective cambium layers, while at the same time attempting to make grafts in which the cambiums are placed close together, I find lactiflora roots to be much more conveniently formed than tree peony roots.

The cambium of lactiflora roots occurs about 1 to 2 millimeters below the surface. This is about the same or only slightly deeper than is the cambium of the tree peony stem. Therefore it is generally easy to get the two cambiums close to one another when fitting the graft. Most of the diameter of a lactiflora root is within the space that is surrounded by the cambium. Both the internal and external tissues contain starch.

In tree peony roots, on the other hand, the cambium surrounds a hard, woody core which appears to contain little starch and is usually less than a third of the diameter of the root. The storage tissues are in a relatively thick layer external to the cambium. The tree peony root is also not much thicker than the stems. Thus it is very difficult to get a controlled placement of the scion cambium in proximity to the cambium of the tree peony root. When you place the cambium of one side of the scion in the desired place, the other side is liable to set out past the margin of the nurse root piece. The configuration is not only clumsy, it is unsuitable for application of the binding.

Having come to the conclusions set forth here, I am led to rethink what I have read concerning the suckering problem described of tree peonies that have been made by grafting the desired cultivar on seedling tree peonies. I am inclined now to believe that those scions were grafted to the seedling stems, which originate in the ground and already have latent shoot buds, not directly onto true roots. I had formerly supposed that what was being described meant the seedling tree peony nurse roots had the capability of forming adventitious buds, something I have never seen in tree peonies.

A very good justification for grafters not placing importance on the cambium layers is the difficulty in determining where it is. A course in plant anatomy may help, but let me tell you what I did in addition; it may help you. Iodine stains starch to a purple color. Roots contain starch as the principal form of stored food. Use some weak tincture of iodine with alcohol for the staining. (You can dilute the household product with alcohol, if it seems too strong.) Take slices across the roots you want to evaluate. Smear the iodine over the surface of each cross section slice. After a half minute or so, wash off the excess iodine with some alcohol. Wherever the most starch is, there will be the most color remaining on the face of the slice. There will be less starch in the young cells next to the cambium, which will form a paler circle all the way around, separating the inner tissues (xylem) from the outer tissues (phloem) (What is described here refers to older roots which are made up of secondary growth by which the young root anatomy has been lost.)

Once you know where to look for the cambium layer in lactiflora peony roots, you will be able to pick it out in unstained roots as a faint line of change in the tissues about 1 to 2.5 millimeters inside the surface of the root. You will also begin to recognize those roots which are rich in white starch, indicating they have been associated with vigorous shoots during the preceding growing season. Roots with a yellowish tinge indicating low levels of stored starch may be poor prospects for nurse root service.

In the tree peony stem (scion), the cambium layer is just outward from the woody center and under the green layer of the bark.

You will also begin to appreciate the fact that the triangular inset graft, illustrated in Reath's article on grafting, offers the prospect of putting more than half the cambium cross section of the graft in proximity to the cambium of the lactiflora root piece, regardless of great disparity between the diameters of the two parts. As you work with the inset technique, you may also come to appreciate that the scion is more easily made to stay where you put it as you apply the binding, than with either the wedge graft or the whip graft technique, both of which are faster and have been recommended for peony grafting.

Tree peony propagation remains something of a cottage industry, in the continuum of industrialization techniques. As long as this continues to be true it is less and less feasible for the major nurseries to carry out the work. Thus it becomes the task of those who wish to advocate

increased use of tree peonies by gardeners to find ways to help in the work of propagation. By studying the materials at hand it is possible for present tree peony growers to successfully develop good grafting skills.

For a complete program of tree peony propagation and the production of strong two-year grafts for distribution, see David Reath's article in APS Bulletin No, 213, 1975. The article is also reprinted in the current edition of the "Peony Manual" and in 'Best of 75 Years.'

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Dear Chris,

November 13, 1980

Thanks for the letter. I'd hoped those roots were the '**Serenade**' F<sub>3</sub>'s, but wanted to be sure.

Has anyone figured how many generations it would take to get a "pure" strain? In our mice we figure 20, but actually after about 8 generations the recessives have been weeded out.

Will certainly carry this project on and will try to select the best of each generation to self. Assume they are all single and white or blush by now.

We're still digging orders but sold out on most of the Saunders stock we had. ('**Athena**', '**Seraphim**', '**Chalice**', '**Great Lady**', '**Daystar**', etc.

We want to get more stock of things like '**Roselette**', '**Pageant**', '**Birthday**', '**Constance Spry**', '**Magnolia Flower**', '**Rose Tulip**', '**Rose Garland**', '**Nosegay**', '**Scarlet Tanager**' next year. I could probably swap some of the other things I have if anyone 's, interested.

Next April sure seems far away. '**Daystar**' opened our bloom season this year on April 25.

Sincerely,

Al Rogers - Caprice Farm Nursery  
15425 SW Pleasant Hill Rd,  
Sherwood, Oregon 97140

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Dear Allan:

December 11, 1980

Eight generations of inbreeding of peonies should give what I would regard as a pure strain. This leaves only a small fraction of 1% of heterozygosity (hybrid blood) remaining. You might say that maybe 10 or 12 out of 1000 plants would remain less than pure. This is good enough for me. But even in a pure strain there will be variations, differences in outward appearance and vigor amongst the seedlings. This, happily, gives room for selection even in a pure strain. In a pure strain variations will result since not all inherited characteristics are transmitted at the chromosome level — cytoplasmic inheritance is very definitely a factor but not yet well understood.

Example: lactiflora x macrophylla gives progeny that differ from macrophylla x lactiflora. I suspect Harold Wolfe's successes (see article on pages 155 and 156 of "The Best of 75 Years") were at the cytoplasmic level. A chromosome count of his changed plants could prove me wrong!



People are asking for species seeds. Do you have any species plants for sale? — especially *P. californica* and *P. brownii*, or seeds? Some Paeonian should take upon himself the task of locating species seeds from various parts of the world, a project of great worth to the hybridizer!

Sincerely,

Chris

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I WOULD LIKE TO PLACE AN ADVERTISEMENT FOR  
THE PEONIES: *Californica*  
*Brownii*  
*Coreacea*

Edward Halas  
P.O. Box 2682  
Detroit, MI 48231

NOTE: Paeonians, if anyone has any of these, let me know too.

- Chris

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Hopkins, Minnesota  
September 6, 1980

Dear Lois and Chris:

A letter from Mr. Domoto, with this enclosure. His remarks about the *P. brownii* seed belong to you, in answer to your comment. Hope you receive it in time for Paeonia. He called a few nights ago — we had a delightful talk, a long time just about peonies in general, etc. That always seems to be a good subject.

Worked with peonies all day yesterday, dug and prepared planting holes for a few divisions. It was hot, 90 degrees, but enjoyed every minute. In the evening planted some lily bulbs, took out some perennials that were not very pretty, so the border garden would look more tailored in the spring.

Greta (Kessenich)

LETTER TO GRETA FROM TOICHI DOMOTO

Read some of the Peonia articles over the holidays —

1. I grew *P. brownii* from seed — germinated just as readily as herbaceous tried them for root stock for tree peonies — no good. (between 1930 & 1940). Seeds were from Theodore Payne of Southern California (no longer operating).
2. Tree peonies on hillside in Seattle, Washington suburb, northeastern exposure. Was doing beautifully, (This was also during the 1930's).

Just reminiscing.

October 16, 1980

Dear Chris - This is just to send you my \$2.50 due for PAEONIA and tell you I enjoyed the latest issue very much. Several readers responded to my appeal for peony roots or plants for the Denver Botanic Gardens. They now have more than 100 peonies and about a dozen tree peonies including the new blue Smirnow introductions. Have you seen any blue ones yet? Sounds like a new color and wonder what the source of it was?

Harry Kuesel, 4 Larkdale Dr.  
Littleton, Colorado 80123

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1980 has been an interesting year for peony evaluation. All my best blooming seedlings had been divided in 1979 so they didn't put on too grand a show— but others were observed and some of the outstanding plants gave results I had not been looking for. Let me mention a few:

**'Roselette's Child'** F<sub>2</sub> cross gave one plant that is completely variegated. Every leaf is two-toned (green with yellow). Another - lactiflora x lobata — this one has very good single red flowers, foliage is very much variegated, but stems are lax causing the bush to sprawl.

One batch of seedlings (about 800 plants) germinated and grew very well. Parentage is Quad F<sub>3</sub> x **'Silver Dawn'** F<sub>3</sub>. More than 50% of those have thick blistered leaves, different and strange looking. The cause for this crazy happening is (at least this is what I think) naphthalene flakes (camphor or mothball flakes). This development is not new to me since I have been using this stuff for several years and have gotten a few blistered seedlings most of which had been lost because they grow slowly while others shade and discourage them. One plant, however, bloomed last May having smokey pink blooms on the blistered plant.

The full double yellow plant that I call Laning's Best Yellow did have big blossoms with red flares, but to me it seems to have a messy center. The double yellow clone that has no red flares has a more formal petal arrangement, a taller more sturdy plant that gives larger seeds. The three quarters double yellow is a hybridizer's delight, pollen is plentiful and it's good too.

There is a lobata hybrid that is almost a full double. The blooms are a very bright red. No seed was formed this year so it could be a triploid — too bad!

**'Halcyon'** F<sub>2</sub> is a fascinating bush that has small flowers and tiny side blooms. This one could be my most valuable peony of the whole garden. Its seeds are small and don't germinate too well, but I do have three seedlings two years old from the **'Halcyon'** F<sub>2</sub> so in two or three years we may see blooming F<sub>3</sub> **'Halcyon'** plants. One lutea hybrid has several blooms along the stem, probably something to strive for in the future. Another lutea hybrid has plum-purple flowers.

I'll try to show all of those new plants at the American Peony Society Show in Kingwood Center at Mansfield, Ohio, next June 11 and 12, so plan to be there. Besides, it's fun.

- Chris

p.s. Oh sure, there will be peach pink, rose pink, and pastel colored seedlings too.