

Intersectional Hybrids - Web-Sites Edward Westhead

I have twelve or so Intersectional Hybrids and am intrigued by these spectacular plants. It was with great interest therefore, that I came across a web-site produced by Don Smith, a retired American Physicist, who has devoted almost twenty years to their hybridisation and since his retirement in 2003 has worked exclusively on generating improved plants in his gardens in New England.

As might be expected from a scientist, he has produced splendid web-sites containing a wealth of information such as his experience in breeding many plants together with downloadable presentations he has given to various symposia, articles to the APS bulletin and absolutely mouth-watering images.

The Wonderful World of Intersectional Peonies:

www.intersectionalpeonies.com

The top of the home page of this site contains links to the various colour shades of Don Smith's hybrids, such as yellows, pinks, pink blends, light yellows and so on. There is also a section of so-called "reverse cross hybrids" where the normal direction of cross in which the herbaceous peony is the seed parent and the tree peony provides the pollen - written as (herbaceous name x tree name) - is reversed. This reverse cross is rare because less than 1% of the seeds produced are viable. There are images of two scrumptious reverse crosses under this link – "Reverse Magic" and "Impossible Dream." He is not blind to faults in his 'children' – note where he criticises one of his reverse crosses "Reverse Magic" (a wonderful peach-pink flower) which sadly develops brown spots all over its foliage as the season progresses.

There is a 'Parents' page and a 'Breeders' page giving tips on varieties to choose and how to pollinate. Further down the page, clicking on the "Plants in Bloom" link takes us to two downloadable pdf documents, "Skyview#1" and "Skyview #2" showing about 200 images of his different crosses, each named by catalogue number and giving evidence of Don Smith's industry and dedication.

Yellow Peonies and More www.yellowpeoniesandmore.com

I don't know which site came first, this or the one above, but they are somewhat different in content. At the top of the Home page there are links to his registered hybrids, unregistered hybrids and new varieties. There is also a link called "Impossible Dream" which is devoted to his hybrid of that name, claimed to be the only Intersectional hybrid with no *P.lutea* in its ancestry.

Interestingly, there is a link to "Published Articles" which takes us to 10 downloadable pdf articles written for the APS on such diverse topics as Propagation, Sidebuds, Basal Flares, Tips for Photographing yellow flowers and more besides.

Further down the page is a pdf download link to a presentation Don Smith gave to the APS in 2004. This is a 49 page, beautifully prepared and illustrated document with, as one would expect by now, some superb photographs. He comments on the colour and form differences seen in Intersectionals between the terminal flower and side flowers (I myself noticed this, very prominently, on my plant of Court Jester – see the side flower images for this variety on Carsten Burkhardt's web-site). Apparently some 82% of his hybrids produce between 1 and 3 side buds per stem and many side flowers are of a more double nature than the terminal flower. This is graphically illustrated by images of a hybrid called "Strawberry Blonde".

Pages 33 to 44 show bar charts, pie charts and summary tables of the characteristics of his hybrids (such things as 'height distribution', 'flower size distribution', 'flower colour effects', 'years to reach first bloom' and so on. Here again, Mr Smith's scientific training shows through and as a retired professional mathematician myself, I heartily approve.

Another link is to presentations made in 2005, the first to the Minnesota Peony Society and the second to the International Peony Symposium in Munich. The Minnesota documents (there are two of them) are an extension to the above mentioned 2004 APS presentation. An extra collection of images and statistics are included in the second one.

The Munich Symposium documents are presented as 5 links. The first is only for use if you have Microsoft Power Point on your PC (I haven't). The second is PDF version of the same file and is entitled "The Impact of Recent DNA Studies on the Classification of Section Paeonia" and presents the results of experiments carried out by Professor Tao Sang at Ohio State University. I am no expert on DNA and to be frank, don't understand the phylogeny charts, however I do understand the summaries which state that the analysis of nuclear and chloroplast DNA sequences allows the identification of:

- Hybrid species
- Parental species (often identifying maternal and paternal)
- Groups of closely related species sharing same parentage
- Identification of double, triple and quadruple hybrids
- Approximate time of origin

And the conclusions seem straightforward if at times somewhat surprising:

1. The grouping by Stern in 1946 of the genus into three sections Moutan, Onaepia and Paeonia is supported.
2. In section Paeonia ('our' herbaceous peonies) only *anomala*, *veitchii*, *tenuifolia* and *lactiflora* have no hybrid ancestry.
3. Which means that all the rest (*mlokosewitchii*, *mascula*, *peregrina*, *wittmanniana* etc.), are hybrids of varying degrees of complexity! For example *emodi*=*veitchii* X *lactiflora*

4. Because previous classification attempts relying solely on the morphological characteristics (form and structure) of the plants take no account of DNA, they should be rejected!

The third fourth and fifth links of the Munich list are of a presentation relating to Don Smith's own work and they re-present some of the earlier images with more besides. There is an interesting sequence showing the change in colour of ageing flowers and another showing the micro-propagation of Intersectionals.

Another link points to papers submitted to the APS journal. These are varied in content and one of the most interesting is Don Smith's view of the recent re-classification of the genus by Josef Halda. He (Smith) points out that Halda's work completely ignores the DNA analysis mentioned above. The review is pretty destructive, but in a thoroughly reasoned manner.

Another fascinating article is Don Smith's account of his (and others') efforts at propagation by tissue culture (micropropagation). This account gives definite hope that these currently costly plants will become cheaper in years to come.

His article on side buds is also most interesting – perhaps I should quote from it:

"Another interesting phenomenon is a result of the incredible color transformations that occur in many of the hybrids and is especially pronounced in the numerous varieties with flowers that are blends of pink and yellow. Sidebud flowers usually open several days to a week or more after the main buds. In the intersectional hybrids, this often creates a beautiful kaleidoscopic effect that slowly evolves over a period of several days as mature terminal flowers are continuously joined by newly opening lateral flowers, which are initially heavily flushed with pink or red. The overall effect is a pretty multicolored display that is

one of nature's little marvels to behold. This effect is created by the fact that many of the intersectionals have flowers that are basically yellow which is overlaid with red; combined with the fact that these two pigments react very differently when exposed to the sun. Some of these hybrids are extremely pink when first open yet become quite intensely yellow as the flowers age. This change occurs over a period of several days to a week depending on how sunny the days are. It is important to note that these two colors (pigments) cannot mix because they occur in different layers of the petal. Therefore, the colors simply overlay rather than actually blend or mix. This is the reason there are no true (lasting) orange lutea or intersectional hybrids. The yellow pigment is relatively unfading and often seems to intensify as the flowers mature whereas the red pigment is most intense when the flowers first open and then usually fades (sometimes quite rapidly) as the flowers age in the sun. When the sidebuds begin to open on mass, the entire plant can often exhibit a very pretty rainbow effect that is created by an array of many individual flowers (from both main and lateral buds) that are all at different color phases of their polychromatic cycle."

An indication of Don Smith's dedication to his cause is the article on Flares in his Intersectionals and the lengths he has gone to in order to get *rockii* or its hybrids to cross with *lactiflora*. Failure followed on failure until with great persistence, by using *Daphnis* hybrids (Zephyrus and an unnamed plant D-67 which contain *rockii* somewhere down the line), he succeeded. The image of the unnamed Intersectional (IC-99-17 / R5P17 in his garden images) is quite stunning, being palest yellow with pink picotee edges and large cherry red flares.

Finally, he is offering a 2009 Peony Calendar for sale. It looks beautiful, but I am inclined to pass – after all, I can't buy any of the plants shown in it.