



George Landis Arboretum NEWSLETTER

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The Trustees of the Arboretum are pleased to announce the appointment of Pam Rowling as full time Director/Horticulturist. She will be able to work at seed exchange, labeling, and starting seedlings during the winter months.

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Winners of our photo contest were: 1st - Jack Middleton, 2nd - Madeline Econome. The study of the old pump by the Lape Homestead driveway showed Madeline Econome's very real talent in photography. She has contributed in past competitions and has twice won an award for her excellence. Jack Middleton has demonstrated his abilities in the past also. His specialty has been photographing flowers and trees. It would have been very difficult for this editor to decide which was the most beautiful of those photos he submitted for this year's contest. Flowers were caught at their peak of beauty; our old oak, snow covered, was silhouetted against a winter sky; an enchanting floral composition came complete with watchful frog; and the winning photo was a close up of a dewy evergreen. All were a visual treat.

On August 21, we celebrated Founder's Day. We had chosen this date commemorating his birthday, to dedicate a large boulder in honor of the founder of the George Landis Arboretum, Fred Lape. Fred had insisted that no building be named for him but, if we chose, he would like a memorial rock to be located in the pinetum area. We think he would have been pleased with the great boulder we chose. It came from a nearby area, so is suitable to the terrain. It was on the property of Arboretum Friends, Nancy and Donald Rexford and was donated by them. A bronze plaque will be attached soon. Dale Morgan and several of the Trustees spoke of their memories of Fred, of their first introduction to Fred and the Arboretum, and their growing dedication to work for the success of the Arboretum. Pam Rowling spoke about our plans for the future. John Abbuhl led a walk around the grounds to pinpoint some of the very rare trees we are fortunate to have. To make this lovely sunny day complete, the Friends served refreshments at the Meeting House to a large group of members and guests.

We want to thank Mitsch Nursery who gave us permission to reprint the very interesting article Plant Origins from thier spring 1988 newsletter.

Picea pungens 'St Mary' is a most attractive, low-mounding form of Colorado spruce that originated as a witches'-broom. Pinus strobus 'Horsford' is a dense bun that was discovered as a seedling growing in Vermont. Pinus strobus 'Sea Urchin' is a dense bluish bun that came from a witches'-broom seedling. Picea abies 'Little Gem' is a tight, globose form of Norway spruce that originated as a witches' broom upon a plant - Picea abies 'Nidiformis' - that has originated as a witches'-broom itself. Chamaecyparis obtusa 'Oregon Crested' is a fast-growing plant with cusped sprays of foliage that developed as a fast-growing branch on Chamaecyparis obtusa 'Kosteri'.

Obviously all known cultivars had to originate in some manner. The ones just listed are examples of the various ways in which these origins come about. All of these plants are cultivars. They are selected variants of the normal species that have garden merit and can be propagated asexually to produce duplicates of themselves. Plants that are artificially induced to grow in a desired manner by propagating selected material are not to be included in this class and are considered cultivariants. A good example of a cultivariant is Abies procera 'Glauca Prostrata' which is described as a flat-growing plant. But it will invariably produce an upright leader and eventually become a tree form if this leader is not removed immediately. The grafting of a side branch of Abies will generally produce a cultivariant exhibiting this kind of behavior.

The mechanisms that produce cultivars are not very well understood, but there are some good observations and interesting theories about the various process at work. Cultivars tend to remain stable, and propagations grow like the parent plant. However, reversions back to species normal do sometimes occur and serve to confuse the issue.

I described Chamaecyparis obtusa 'Oregon Crested' as originating from a fast-growing branch on Chamaecyparis obtusa 'Kosteri', itself a slow-growing, seedling originated cultivar. This type of activity is really quite common in the species obtusa. Mutations occur in nature and are often induced by the background radiation present all around us. When cell divisions are occurring in growing tissues, they are most susceptible to damage by this radiation. If such damage occurs at the right time and place, a mutation may result. Since a typical plant of Chamaecyparis obtusa has a high number of growing tips, it is not very surprising that such mutations occur quite often in this species. In plants with a more open growth habit (fewer growing tips) such sporting is less common but does occur.

Pinus strobus 'Horsford' and Pinus strobus Sea Urchin both originated from seed. "Horsford" was found growing in the "wilds" of Vermont by William Horsford while "Sea Urchin" was grown in a controlled experiment by Sidney Waxman at the University of Connecticut. Both plants are obviously the products of mutations but as to just when the mutation of each one occurred is not so obvious. 'Horsford' may have resulted from a mutation during the

sexual activity that created the seed from which it germinated. However, the mutation may have actually occurred at an earlier time as evidenced by the work of Dr. Waxman. Dr Waxman has been collecting seed cones from congested masses of growth called witches'-brooms for over twenty years and growing seedlings from them. These seedlings have a high percentage of compact and dwarf forms among them. Several have exhibited enough merit and individuality to warrant cultivar designation and naming.

Witches'-broom seedlings are indicative of genetic aberrations in witches'-brooms since such a high percentage of dwarfs is produced. The percentage could easily be much higher except for the fact that witches'-brooms have only female flowers, and the fertilizing pollen must come from male flowers on normal parts of the tree.

Other dwarf plants from seed collected in the wild and grown commercially at seedling nurseries and those found in the wild like "Horsford" may often be produced from an unnoticed witches'-broom in the region of the seed's origin. If not, then the seed was produced by a genetically damaged sperm, egg cell, or zygote.

Cultivars originating from seed behave in a fairly stable manner and are relatively dependable. Those produced from cuttings taken from a witches'-broom are often another story altogether. Take for example, one plant not yet mentioned, Pinus sylvestris 'Riverside Gem'. This progeny of a witches'-broom develops into a dense, upright plant with a pleasingly conical habit. Interestingly, plants of "Riverside Gem" will consistently die after about twenty years, a trait observed in several cultivars propagated from witches'-brooms (with varying life spans). The Riverside Gem' witches'-broom was shaped like a broad cushion and appeared dense enough for a person to sleep upon. Plants grown from scion wood cut from this broom appear completely different.

The cultivar Picea pungens 'St Mary' is a much better behaved plant than Riverside Gem'. It maintains the dense, low habit of its originating broom and is a most desirable plant. One of its discoverers, Layne Ziegenfuss, has expressed some concern about its longevity, but his plants are twenty years old and have evidenced just some slight burn out in spots.

There are several ideas that attempt to explain the origin of a witches'-broom. Most brooms are thought to be of a viral origin. A virus upsets the hormonal balance in an elongating bud, causing it to grow little and produce many lateral branches. Such growth continues until the broom chokes itself or is shaded to death, provided the hormonal irregularities themselves are not fatal. If this type of broom is propagated, the progeny will fail immediately, or at least within just a few years. One clue that a discovered broom is of this type would be the observation of several brooms within a small area.

Brooms that do propagate successfully are attributed to other causes. These 'other causes' have never really been defined. But several interesting facts (clues) are known.

Cytokinins are found at a higher than normal level in a witches'-broom. Cytokinins are hormones that do not move very freely around the plant. Their presence stimulates cell divisions.

The hormone, giberillen, which encourages shoot elongation is present at reduced levels, especially in a virally produced broom.

How these unknown agents upset the hormonal balances in a bud in such a way that they persist into the resulting broom is a question that still needs explanation. And since these agents apparently have a genetic influence as well, the question is even more complex that it first appears. Grafting a small piece of a 'nonviral' witches' broom into a seedling will generally create a plant with the characteristics of the original broom. The hormonal imbalance apparently remains, even though a new stem and root system have been added. (Of course the broom itself was on a species-normal trunk and root system while attached to the parent tree.) Either a causative agent was in the piece of broom that was grafted or the genetic structure of the cells was imprinted with a new hormonal code equal to that of the whole broom.

All witches'-brooms that have been observed to flower have been female. If the egg cells are fertilized, the resulting seeds produce a high percentage of dwarf plants. These dwarfs result from normal sperm cell from the male flowers of the tree fertilizing the eggs of the abnormal witches'-broom. Either the eggs have an altered genetic structure or the causative agent is somehow encapsulated within the seed. The variation of growth rates exhibited by the seedlings, however, indicate genetic changes. A causative agent would be expected to produce a relatively uniform population of species normal and witches'-broom duplicates, with little or nothing in between.

Some seedlings from witches'-brooms will die at a young age, develop into weak, sickly plants, or consistently exhibit dead areas. Other seedlings from the same source will be normal in all observable ways and others will develop into compact or dense plants and some will become quite dwarf. Such variations within a population is thought to be due to genetic factors.

A cultivar produced from a witches'-broom is not free of the possibility that it may one day produce a witches'-broom itself. These are several very good examples of such an occurrence. Picea abies 'Little Gem' was propagated from a broom on Picea abies 'Nidiformis' which was itself propagated from a broom on Picea abies. Another broom on a Picea abies 'Clanbrassiliana' has produced a plant that Mitsch Nursery will introduce in a few years. It is not yet named but grafted propagations develop extremely dense plants that are mound-shaped and very fast growing. Such growth is possible because every 3" shoot generates many terminal and lateral buds, every one of which will burst into new growth in the spring.

Genetics appears to be the crucial factor affecting the origins of new cultivars. The agents affecting the needed changes in the genetics of a normal tree to produce aberrant growth or seed is not understood.

We can never sufficiently thank all those who help make the Arboretum a better place. Our speakers for the various programs have been excellent, informative, and entertaining. Our volunteers have labored at many tasks: weeding (Florence, Doris, Ann J., and Master Gardeners); applying linseed oil on the exterior of the Meeting House (Bill); building walks and stone walls (Dick and Paul Y.); repairing or replacing some foot bridges (Jack); mowing and brush clearing (Sam); etc. The Friends as always provide an invaluable resource catering tasty refreshments at special events, and, this summer, planning and carrying out the very popular family day (Anne B'R, Chuck, Don and Nancy, Jack and Marcia, a new volunteer, Mary Anne Finley).

We apologize for having to cancel the slide presentation of British gardeners by Paul Blair. There was a conflict in his schedule but he has promised to give us the program next year.

Pam reported meetings she and Paul Blair had with Harold Hagaman and Steve Englebright from the National Heritage Trust and with John Reed, Vice President for Education at NYBG, to discuss grants and familiarize them with our progress at the Arboretum.

We have been the recipients of some generous donations lately. Dr. Abbuhl has donated 3 rare pines and one larch to fill out our collections. Dr. Bloom added two new dwarf conifers to the library plantings. Kay MacArthur has donated \$1,000 for buying and planting tree peonies in honor of her late husband, John, who contributed much legal work for the Arboretum. She has also donated a year old John Deere riding mower/lawn tractor. Dr. and Mrs. Raymond have offered a wood frame/glass greenhouse and financial assistance for its erection as a memorial to their son. Marjorie and John Truax have offered a small Case lawn tractor with mower, rototiller and snow blower.

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THANK YOU

Members receive a quarterly newsletter and early admission to the annual rare plant sale.

Make checks payable and mail to: George Landis Arboretum
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We have already done some buying and ordering for next Spring's Rare Plant Sale. We will again have interesting dwarf conifers, including some written about in the Mitsch article, and a number of deciduous trees and shrubs you will want to consider. One of which we can describe now. Last year when this editor went to the home of Anna Martha Jones in Delmar to pick up the large collection of perennials she was donating to the Plant Sale, I saw an unusual shrub hedge which was *Myrica pensylvanica* or Northern Bayberry. I never thought of this shrub as suitable for inland planting. However, it has a great tolerance for salt and poor soil so it makes a very dependable roadside planting. It has glossy dark green leaves which make it attractive with other broad leaf evergreens and the small gray waxy coated seeds on its stems are highly visible when its leaves have dropped. These seeds or drupes are highly aromatic, as are the leaves and all parts of the shrub. (Candlemaking, anyone?) The list of plants and further descriptions will appear in a later edition of the Newsletter to help you conquer the winter blahs.



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