Rose Hybridizers Association

Newsletter

Vol. XL, No. 3 Fall 2009

'The Lighthouse'

Contents

ROSE HYBRIDIZERS ASSOCIATION - Board of Directors

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Editor's Notes

Our Cover. This issue's cover features 'The Lighthouse', a beautiful new introduction by Jim Sproul. Jim also updates us on his work with hulthemias, sharing some things he has noticed about the hulthemia seedlings, and some thoughts about the inheritance of the distinctive hulthemia traits. Pictures of the varieties he mentions are on the back cover.

Electronic Membership Dues Payments. We can accept payment for membership dues, RHA booklets and other items via PayPal. Just send an email to Larry Peterson and he'll assist you.

Losses in the Rose World. Since publication of the Summer *Newsletter*, we have lost two prominent rosarians and rose nurserymen. Both were hybridizers.

- **Mike (Malcolm M.) Lowe**—died August 6, just short of his 74th birthday. He lived in Nashua, New Hampshire. He is best known for 'Autumn Sunset'. He was a rose enthusiast, and he loved to share his enjoyment of roses.
- **Ralph Moore**—died September 14, nine months past his 102nd birthday. He lived near his nursery in Visalia, California. I won't try to name one rose variety that he is best known for. He's often referred to as "Mr. Miniature", and it's true that miniature roses were his best known creations, but they're only part of the story. He created mossed minis, striped minis, even striped rugosas. In recent years he introduced Hybrid Bracteatas and Hybrid Hulthemias. He had other projects underway. He was a member of RHA until the end: he renewed his membership for 2 years just this year. We will have more to say about Mr. Moore in a future issue of this newsletter. He was a generous soul, freely sharing not only his knowledge of roses but his joy in roses.

Please welcome the following members who have joined RHA since the Summer issue of the Newsletter:

Last Name	First Name	Address	City	State	Zipcode	Country
Australian Rose Breeders Association, Inc		PO Box 88	Modbury North	SA	5209	Australia

Castellana	Vito	Corso Umberto I, 147	Mola Di Bari	BA	70042	Italy
Lyon	Julie C.	1125 E. Chestnut Ct	Visalia	CA	93292	
McAdams	Leo	Box 10	Ste. Agathe	MB	R0G 1Y0	Canada
Peddle	James	99 New Jersey Rd	Tewksbury	MA	01876	
Raimond	Michelle	1704 Glenwick Dr	Plano	TX	75075	

Symposium topics:
This issue: ***Beginner's Luck***, and ***Breeding for Recurrent Bloom***
Winter issue (articles, notes, "Who we are" info in by November 20, please)**:**
Beginner's Luck**,** and ***Breeding Thornless Roses***

Director's Message

The World Federation of Rose Societies Convention in Vancouver, B.C. was well attended, with over 500 rosarians from 26 countries. A gathering of RHA folks didn't happen in the very busy schedule as only ten members were there, including two from Canada. It was interesting to visit and share hybridizing efforts with some members that we had not met before. All in all, it was a lot of fun seeing many rosarians again that we had met in Osaka a few years ago.

I hope that by now a lot of you have a good collection of hips maturing. This year we—and some of you, I'm sure—have been quite disappointed to see the stem turn brown and have the hip fall off on quite a few of our crosses. We had some unusually hot weather here in the PNW with temps hitting as high as 109º F! Mitchie and I know we had some timing problems sequencing crossing in with hospital trips, but that's what it's all about – we learn from it and try again! We didn't make many crosses this year but do have a few nice looking hips as I write this, so for us the waiting and anticipation will continue for another couple of months. We usually harvest sometime before Thanksgiving, but Mitchie did make several late crosses on some minis in pots, so I will move those to the greenhouse before the first killing frost.

Congratulations to a couple of members for their award winning roses in the trial grounds in Shreveport. Chuck Bock from Burnsville, MN was awarded a coveted Gold Certificate with a mauve Hybrid Rugosa that he has named 'Sniffer'. Another winner for 2009 was William Hemphill of Eugene, OR who received a Silver Certificate for a medium pink Shrub. I hope that those roses are still there at the American Rose Center to see next spring at the convention.

Peter Harris has made some excellent selections for the newsletter symposium topics. What we would like for you to do is to take a look at what he has for the next issue and write something. It doesn't have to be a lengthy article about what you have been doing, but WRITE! He has done a super job, but it is a lot easier for him if he doesn't have to plead for your contributions. The forum is a viable place to exchange ideas, but this is temporary compared to the info you can have for years with the newsletter. As always, he will accept an article on almost any aspect of the rose. Let's keep our newsletter something that hybridizers look forward to picking up at the mailbox, reading and filing for future reference.

Speaking of reference – I hope that many of you are enjoying the CD with all those back issues. Now there is a worthwhile reference! I know that they are still available, so check with Larry if you don't have one. $25 for members, $40 for non-members. Larry will probably bring some with him when he comes to the meeting in November.

The American Rose Society will be holding its fall convention this year in Palm Springs, CA. Our meeting is scheduled for 10 am on Friday, November 13th. I have asked Jim Turner, our webmaster from Watsonville, California, to talk to us about his hybridizing program and give us an update on our website. We will, depending on time, discuss an electronic form of the newsletter and how best to make it work. I will be bringing a new order of those nifty RHA caps. If you don't have one, this will be a good opportunity to purchase one. Hope to see many of you in Palm Springs.

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Some New Roses

Jim Sproul rosesbydesign@earthlink.net

'The Lighthouse' [see front cover] is a new miniature rose, coming from a cross of 'Fairhope' X 'Glowing Amber'. It has average disease resistance and little to no fragrance. The dark yellow color holds well, and the blooms are often of exhibition form.

On the back cover, the 2 striped seedlings are half-sisters. Their common pollen parent is K175-6, which was the result of a cross of 'Fourth of July' X 'First Impression'. The orange and yellow striped seedling is referenced in the last newsletter.

Hulthemia update: The last 5 photos are of newer Hulthemia seedlings. They are all repeat bloomers and show a variation in petal coloration that is showing up in the Hulthemias. The repeat-blooming Hulthemias are now exhibiting—in addition to the classic central blotch—new coloring patterns with blends, streaks and lines on the upper petal surface. Another important characteristic that I have noticed is that unlike the coloring of the halo roses, the Hulthemia blotch does not show through to the back side of the petal. Finally, I am now fairly certain that although the blotch tends to result from a dominant trait (there may be some rose traits that inhibit the expression of the blotch), there appears to be a "dose effect": more copies of the blotch gene in the ancestry increase the intensity and size of the blotch.

The Hulthemia seedlings, as a group, appear to have better general disease resistance and stronger fragrance than rose seedlings in general. More observations will follow in the next season.

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Symposium: *Beginner's Luck*

The Value of Peroxide

Larry Davis lindalarry3419@sbcglobal.net

Peroxide is more than a disinfectant.

Hydrogen peroxide, usually just called peroxide, is a reactive oxygen species (ROS). So are superoxide and hydroxyl radical. In white blood cells, these are used to kill bacteria. They also act as signal molecules in plants and animals. Reactive nitrogen species including NO, have some of the same reactive properties and also serve as signals.

Some recent papers should be of interest to people trying to root cuttings of roses, particularly for seedlings that have lost their roots. On the forum there was a discussion of what to do when a seedling gets broken, or has a root rot. I think someone suggested dipping it in peroxide and then planting in damp potting medium. The main obvious function of peroxide is to kill off unwanted bacteria. But it turns out that peroxide may have another very important role in the process of getting the little plant to grow roots.

An article by Li and others, in *Environmental and Experimental Botany* (vol 65, pp 65-71, 2009) describes some work with mung bean sprouts (seedlings). The authors did a whole series of experiments to show that peroxide acts as a signal molecule, downstream of auxin, in promoting formation of adventitious roots, when the primary root is removed from the seedling. Earlier they had shown the same thing in cucumber. In this study they tested different concentrations of peroxide, for different lengths of time and compared it to a standard treatment with the synthetic auxin IBA (indolebutyric acid). For this plant, with one seedling per 20 mL solution, the best results came with peroxide diluted to about 10 mM (1/100 from the usual 3 % stock that you buy at the drugstore). During short time treatments (8 hr) a 10x higher concentration was OK, but if left for 2 days, high concentrations were toxic. A 2 day treatment with IBA was somewhat better than any level or time for peroxide, but at shorter times results were very similar for IBA at its standard treatment level, and various doses of peroxide.

An enzyme that destroys peroxide (catalase) blocked the response. An antioxidant (ascorbic acid) blocked the process. An inhibitor of auxin transport prevented root formation but peroxide could partially overcome that effect. The same was observed with an inhibitor of an enzyme that naturally makes peroxide in plants that are wounded (NADPH oxidase).

The authors also showed that cutting off the primary root caused the plant to produce its own peroxide. This acted together with auxin to stimulate rooting. Beginning formation of new roots could be detected by microscopy in less than a day for sunflowers in other studies that the authors cite. In this study, peroxide levels rose within a few hours, especially when the synthetic auxin was present.

So far as I know, no one has tried systematically to improve rooting of cuttings from mature rose stems by peroxide treatment. With olive tree shoot cuttings, a dip in straight 3 % peroxide and IBA treatment together give the best rooting response in a difficult-to-root cultivar (you can find the details by a Google search). So there is some precedent for trying peroxide with hard to root plants. I would start with a dip in the straight stuff, or a soak of stem ends in10x dilution for 8 hr. The old idea of scraping or cutting the bark near the base of a cutting probably works by stimulating peroxide from wounding. It also increases the surface area in direct contact with the dipping agent, such as IBA, or NAA (naphthaleneacetic acid, which is used in Rootone), the other common auxin used in rooting powders. If you try it, let me know your experience.

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Symposium: *Breeding for Recurrent Bloom*

A Few Observations on Juvenile Flowering (presumably reflecting recurrence)

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Most people agree that most temperate zone rose species have one period of flowering. They bloom mostly on "old wood"—that is, with shoots initiated from buds that have experienced something like winter. Some tropical roses seem to bloom over a much longer season. Modern roses in the floribunda and hybrid tea classes carry the trait of blooming on new wood. When the two kinds are crossed, it is usual to find that the first generation (F1) offspring are mostly once-blooming.

The recurrent bloom trait is largely recessive. In diploids this means that crosses of two plants, each containing one each of the once-bloom and recurrence traits, give about 1/4 offspring (F2) with the recurrence trait. Because we haven't identified actual genes for these traits, I consider only the phenotypes (the apparent expressions of the genes through blooming or not). Probably they are a reflection of the genotype (the actual genetic makeup).

There seem to be modifiers of an environmental sort. In some instances a summer dormancy will stimulate flowering much as winter does. 'Crimson Glory' is an excellent repeater; 'Climbing Crimson Glory' is a poor one, at least in my hands. I have an open-pollinated 'Crimson Glory' seedling which looks exactly like its parent in flower form but is a spare bloomer, and repeats only in those summers when it gets a drought-induced dormancy. 'General Jacqueminot' is rather like that, sometimes blooming in fall, sometimes not, in this climate. All of this brings us to the subject at hand.

In trying to get a better-reblooming Gen Jaq offspring, I used General Jaq as pollen parent on 'Carefree Beauty' (C.B.) as the seed parent. Very few juvenile bloomers of any value were obtained. Some non-blooming but vigorous kinds were retained and bloomed in the second year. Ten of the best of those have been kept for a couple decades. About one plant in ten blooms one or two flowers in fall. Last fall I gathered many hips from most of these plants and germinated seeds over winter. Both parents (Gen Jaq and C.B.) are tetraploid, so the inheritance of recurrence will be more complicated than in the example above for a diploid. Roger Mitchell suggests that about 1/6 of F2 offspring of tetraploids ought to be reblooming.

Juvenile flowering, without an intervening dormancy, presumably reflects the potential for recurrence, though one could imagine hormonal effects in the seed development that induce early flowering, without further repeating. For now I will assume that juvenile flowering indicates the recurrence potential. The following numbers were obtained for seedlings that sprouted in the first large surge of germination, through April 1, from a late November stratification. All were kept on moist peat moss at 42 F (5 C) continually. Sprouted seeds were planted at about monthly intervals, beginning Feb 7.

Over 1200 seeds were available, and total germination through mid-Aug ranged from 34-65 % for different plants. For some plants almost all the germination happened by April 1; for others, as much as half occurred later. The frequency of juvenile blooming varied widely, but because overall numbers are small it is hard to do a reliable statistical analysis to compare differences in percentage. Still, it seemed wise not to include the later germinating seeds as they grew under rather different conditions than the early-germinating ones. They seemed less likely to bloom as juveniles, but only a couple plants (#1 & #5) were represented by large numbers of later seedlings.

Plant Number	Juvenile Flowering/total	ratio
1	8/36	0.22
2	6/20	0.33
3	1/19	0.05

4	5/29	0.17
5	9/46	0.20
7	3/12	0.25
Total	32/162	0.20

Because the parents of these seedlings were non-recurrent, they presumably had at least one, or perhaps two non-recurrence genes, but must have had two recurrence genes from Carefree Beauty, if indeed that parent is expressing a recessive gene. So we would expect 1/6 or better of recurrent seedlings in selfs, if Roger Mitchell's analysis is correct. That is the result. Including the later-germinating seedlings would lower the ratio to about 1/6. (Only about 2 of 60 later-germinating seedlings bloomed.)

Unfortunately the seedlings are mostly worthless, with mildew and blackspot, and purplish semi-double flowers. None come close to Gen Jaq in flower color or doubleness. So I won't be following up on these.

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Classifying the Pimpinellifoliae

Dr. Roger E. Mitchell II, Ferris State University, Big Rapids, Michigan mitchelr@ferris.edu

Rosa spinosissima and its relatives comprise one of the most distinctive and interesting groups of roses. They have long been grown in gardens for their beauty. Hybridizers have turned to *R. foetida* for yellow color, and to *R. spinosissima* (and its close relatives) for winter-hardiness and disease resistance. Unfortunately, confusion about the classification of this group of species makes it hard to discuss.

Systematic Chaos. The ancient science of systematics seeks to organize all living things into a system of classifications. Its sub-disciplines include taxonomy (the science of biological names) and phylogeny (the study of evolutionary relationships). These interlocking fields have made tremendous advances, but they depend very heavily upon specialized terminology (jargon), and the process of finally agreeing on a classification can create great confusion before it is completed. I am a geneticist, not a taxonomist, so my views are those of an outsider. I do feel that any system of classification needs to accommodate the needs of scientists, breeders, and growers alike.

Species. The first goal of systematics is to give each species one universally-recognized name. This sounds fairly easy, but many rose species are afflicted with more than one. Two names may be proposed for the same species when two taxonomists are unaware of each other's work or when the boundaries of the species are misunderstood (what was thought to be two or more species turns out to be one). In such situations, the community of taxonomists first agrees that the two names apply to the same species, and then applies the rule of priority: the older name is correct, if it was properly published. Unfortunately, the taxonomists of the mid-to-late twentieth century introduced sweeping concepts of "ambiguous" and "incorrect" names that sometimes undermine the rule of priority so badly that different researchers still use different names, centuries after the alternate names were first proposed. The *R. spinosissima/R. pimpinellifolia* confusion is a classic example. The name *R. spinosissima* has priority, but some scientists still prefer the competing name.

The standard usually applied to determine species boundaries is the "biological species concept." For plants, this means that the two species must interbreed infrequently enough to remain distinct from each other. In practice, there should be traits (visible or DNA) that are present in all or most members of one species, while absent (or nearly) from the second. Botanists also look carefully for intermediate forms, a sign that the two populations are interbreeding freely, and should be considered a single species.

The section Pimpinellifoliae. When breeders and growers become interested in any large genus, they naturally want a system that groups the numerous species into larger units with shared traits. This allows a better understanding of the growing requirements and breeding potential of even poorly documented species.

Traditionally, the genus *Rosa* has been divided into four sub-genera. Three of these contain only one or two species each, while the fourth contains all of the rest. Because it contains so many species, the fourth subgenus has been subdivided into sections. DNA studies and other evidence indicate that these subgenera should not be retained. That leaves all rose species to be grouped into new or existing sections. Pimpinellifoliae is one of these, named for the alternate name of *R. spinosissima*.

When determining the boundaries of sections, or any other category more general than species, systematists do not have an absolute biological concept to call upon: Such categories are essentially artificial. Still, they must be based upon shared traits, just as species are. Most modern scientists have accepted the ideas of cladistics, essentially the contention that evolutionary history alone should determine the boundaries of groups that species are placed into. In other words, every taxonomic group (taxon) should also be a clade, a group containing all of the descendants of a single common ancestor.

Traditional and molecular (DNA) traits. In the days before DNA technology, systematists examined morphology (anatomy), chromosome numbers, pollen and seed fertility, ability to hybridize with other species, geographic range, and the chemicals present in various parts of the plant, especially pigments and related compounds in the flowers.

The direct or indirect study of an organism's DNA has recently become the single most powerful tool of modern systematics. The DNA can provide an enormous amount of data, and is easier than visible traits to interpret without bias. On the other hand, DNA data can lead to errors when the amount of variation from species to species is low, as it is in roses. Furthermore, an investigation of a DNA sequence reveals only the evolutionary history of that particular sequence. The frequent occurrence of inter-specific hybridization means that any one sequence may not be typical of a species.

Problems of *Rosa* systematics. Any study must examine actual plants. Due to limited resources, however, many studies use only a single individual from each species, which may not represent its natural diversity. Worse, many plants examined come from botanical gardens, where they may have been propagated from open-pollinated seed. This makes the identity and purity of many specimens highly problematic.

Much of the field-work on rose species, including those in the Pimpinellifoliae, is published in the native languages of the countries where they grow, such as Russia and China. This can make it challenging for any one individual to examine all of the existing literature.

The diploid Pimpinellifoliae. The last comprehensive study of the Pimpinellifoliae was done by Roberts in 1977. He accepted the section, clarified which species ought to belong to it, and grouped some accepted species into a smaller number of more inclusive species. He recognized the following diploid species as belonging to the section: *R. sericea* (including *R. omeiensis*), *R. ecae* (including *R. primula*), and *R. xanthina* (including *R. hugonis*). Other taxonomists have varied in their acceptance of this reduction of species. All six older species are typically treated as distinct by growers and breeders, however. He excluded two other species, *R. farreri* and *R. koreana*, which he was able to show were more similar to the section Cinnamomeae. Since the publication of this paper, even the existence of the Pimpinellifoliae has been called into question. (Taxonomists currently disagree on which section, the Cinnamomeae or the Gallicianeae, should be called Rosa instead. Until they settle it, I am using the old names.)

The first problem has to do with the way the diploid species branch off of the rose family tree (called a phylogenetic tree, or phylogram). The DNA studies often disagree with each other, but the majority place the diploid Pimpinellifoliae in a fairly consistent position. Figure 1 summarizes this, and helps demonstrate why cladists object to the section. Although the two hypothetical Pimpinellifoliae species shown both split from the main line of rose evolution very early, their last common ancestor is also the ancestor of all other rose species (except *R. persica*). This is a violation of the technical definition of a clade. In the terminology of phylogenetics, this pattern makes the Pimpinellifoliae paraphyletic (bad) rather than monophyletic (good).

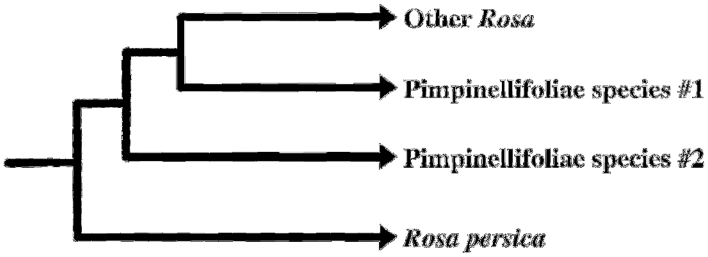

Figure 1. Hypothetical PhylogeneticTree

A useful analogy at this point would be apes and humans. Evolutionary scientists studying primate evolution believe that the common ancestor of apes was also the ancestor of humans, making the apes an illegitimate taxon by cladistic standards. Cladists also reject the traditional definition of reptiles, because the common ancestor of all reptiles was also the ancestor of birds. Although I accept that the cladistic approach is usually the more appropriate, I part company with a great many other biologists in feeling that it should not be indiscriminately applied in every case. In the case of the diploid Pimpinellifoliae, I feel an exception should be made, and the section retained.

The Pimpinellifoliae species (both diploid and tetraploid) share anatomical features, such as numerous symmetrical (often needle-like) prickles, numerous, small, round leaflets, solitary (or nearly solitary) flowers spaced along the stem, a lack of bracts (modified leaves) below the blooms, early bloom, similar and distinctive pigments and other chemicals, and a tendency to be adapted to cold or dry environments. I feel that the most critical factor in defining this section is that, as Roberts showed, interspecific hybrids among many different pair-wise combinations of diploid species tend to be fertile. Other work, including my own and that of many other RHA members, shows that hybrids between the diploid Pimpinellifoliae and species outside the section tend to have little or no fertility. This includes crosses with the Cinnamomeae, which many systematists favor combining with the Pimpinellifoliae.

R. persica. As mentioned above, most DNA studies tend to show *R. persica* branching off from the course of rose evolution in the same way, but earlier than, the Pimpinellifoliae diploids. Despite its many unique traits (leaves with one leaflet and no stipules, the red pigmentation at the base of the petals), I feel this rose is also a good fit for the Pimpinellifoliae on such traditional traits as flower color, prickles, and its adaptation to dry conditions. For this reason, I favor grouping *R. persica* in the Pimpinellifoliae.

The tetraploid species. Roberts included three tetraploid species in the Pimpinellifoliae: *R. foetida*, *R. hemisphaerica*, and *R. spinosissima*. While recent objections to the inclusion of the diploids in a single section are due to what most non-systematists would probably view as a technicality, the objection to including the tetraploid species is more serious: DNA studies show the tetraploid species scattered widely throughout branches of the *Rosa* phylogenic tree containing species from other sections, especially the enormous section Cinnamomeae. On the other hand, most researchers have acknowledged that the reason the tetraploid species end up distributed in this way is that they are hybrids. It seems likely that each is the result of crosses between a member of the Pimpinellifoliae and a member of the Cinnamomeae. This does not mean that the ancestral species contributed equally, or that they were necessary diploid in either case, or that they are still in existence. Whatever the ploidy of the original species, polyploid offspring are far more likely to be fertile. As an example, compare the generally sterile diploid intersectional hybrids mentioned above to the fertility of modern roses, most of which are tetraploids and are certainly intersectional in nature.

My position is that it is a mistake to abandon the section Pimpinellifoliae due to the existence of such hybrids. Instead, I feel that the hybrid species should be grouped into the section they most resemble, as is done when grouping artificial hybrids into the commercial rose classes. Such tetraploid species as *R. foetida* and *R. spinosissima* should then remain in the Pimpinellifoliae, with which they share the distinctive morphological and chemical traits of the diploid species.

R. foetida. When taxonomists say that the tetraploid Pimpinellifoliae are hybrids, they mean that they originated long ago as hybrids of some kind, but are now stabilized as normal, true-breeding species. *R. foetida*, on the other hand, is widely assumed to be a recent hybrid, maintained vegetatively by humans. In the west, three cultivars are recognized—‘Austrian Yellow’ (*R. foetida*), ‘Austrian Copper’ (*R. foetida bicolor*), and ‘Persian Yellow’ (*R. foetida persiana*). The two single-flowered “Austrian” forms are known to sport back and forth, but there is no direct evidence for the assumption that the double-flowered “Persian” form is also related to them by sporting. ‘Persian Yellow’ has very low female fertility, and pollen fertility that, while significant, is low for a species. The single forms are apparently more fertile, although much less studied.

What the parents of *R. foetida* might be is not known, but Phillips and Rix (1988) suggested *R. hemisphaerica* and *R. kokanica*. Both of these are yellow species almost unknown in North America. The recent discovery by David Zlesak that at least some individuals of ‘Persian Yellow’ are triploid, while the single forms are tetraploid, opens the possibility that the different forms might even have different parents. The reputation of *R. foetida* as a source of yellow color, winter hardiness, and black spot susceptibility mainly applies to ‘Persian Yellow,’ since it was the main form used for breeding. recent online discussions have suggested the possibility that ‘Persian Yellow’ might be a hybrid between a tetraploid, yellow Pimpinellifoliae species and a diploid Cinnamomeae species, possibly even something as exotic as *R. roxburghii*.

R. spinosissima. Apart from the controversy surrounding its name, *R. spinosissima*—in the broad sense used by Roberts—is probably more than one species. It has one of the widest geographical ranges of any rose species, encompassing a wide sweep across Eurasia. Widespread species do not split into two or more species because their ranges are continuous, and different populations are constantly interbreeding. Roberts pointed out that the range of *R. spinosissima* in Asia is poorly defined, and additional information is only now becoming available in Western languages. *Rosa spinosissima* var. *spinosissima* is the typical form found across much of Europe. It is most common in coastal regions in the north-west (especially Britain and Ireland), and in mountainous areas. Additional populations are scattered throughout central Europe, but these are far less common, and become very widely spaced before trailing off in the

European Russia/Western Kazakhstan region. Botanists have noted a tendency for coastal populations to be lower-growing than inland populations. DNA analysis, however, indicates that most genetic variation is from region to region, not habitat to habitat, indicating the inland forms are not a distinct variety (Ritz 2005). Unfortunately, this analysis excluded British and Eastern European populations.

Most taxonomists have recognized a second distinct variety, *R. spinosissima* var. *altaica*. Available evidence suggests that there are no *spinosissima*-type plants growing for hundreds of miles between the European range of var. *spinosissima* and the rather restricted range of var. *altaica* in the Altai Mountains of Russia, Kazakhstan, Mongolia, and China. Given its apparent isolation, it is unsurprising that DNA studies have shown that these two varieties are not closely related to each other. This is why I have adopted the old practice of treating *R. altaica* as a separate species. Certainly its much greater height and heavier but less numerous prickles make it distinct, although both clearly fit into the Pimpinellifoliae.

If *R. altaica* is a separate species, there may be others that are not yet acknowledged. For example, *R. spinosissima* is also native to the Caucasus/Northeastern Turkey region, and this population may well be geographically isolated. Botanists seem to disagree about whether *R. spinosissima* is native to Korea, but the Korean population is also isolated, if it exists. The study of East Asian populations of *R. spinosissima* seems to be complicated by the fact that the botanists of the nations concerned often seem to be unfamiliar with the true European form of *R. spinosissima*, so reports of its presence in unlikely places are common. Volkova and Melnikova (2001) listed only one species of the Pimpinellifoliae as native to Far Eastern Russia, *R. gracilipes*. They determined that it is a diploid. While this effectively proves it is not *R. spinosissima*, they note that previous authors have mistaken it for that species. Of course, *R. spinosissima* can escape from cultivation far from its native range, as it has done in North America.

One final point concerns the variety *R. spinosissima* var. *hispida*. This rose seems to be nearly unknown in North America, but various rose books describe is as a tall plant (like *R. altaica*) with light-yellow flowers, and fine, bristle-like prickles that nearly cover the stem. The authors of these books are clearly guessing about its native range, and botanists generally do not accept it as a legitimate variety. It may simply be an extreme form of inland *R. spinosissima* var. *spinosissima*, or even a garden hybrid, perhaps involving *R. altaica*. Its main claim to fame is as a parent to some of the Kordes shrub roses.

Additional species. In recent years, many central and eastern Asian floras have been translated into English. Some of these list more species than Western accounts. For example, The Flora of China lists 19 species in the Pimpinellifoliae, although it includes some species that were excluded by Roberts. A recently published list of Rose species in Kazakhstan seems to be based on a previous treatment published in Russian. Although it does not divide the species according to section, six species fit the traits of the Pimpinellifoliae, four of which are nearly or completely unknown in the West. How many of these species will eventually be accepted, and what value they might have to breeders, will probably take many years to work out.

Section Pimpinellifoliae. Figure 2 summarizes my approach to this section. The well-defined diploid species form the core of the section, with the addition of *R. persica*, to which they seem allied. The tetraploid hybrids between this and other sections are also included in the Pimpinellifoliae, provided that their properties resemble that section more closely than any other. Once whole-genome DNA sequencing becomes available (possibly in the near future), we will have much more precise data. I expect these new data will only increase our need to decide how we should classify species that hybridize readily.

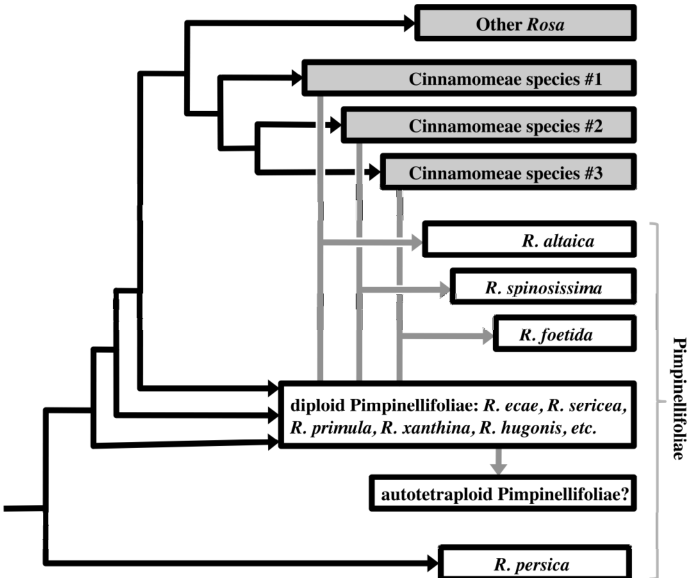

Figure 2. Pimpinellifoliae (detailed) in relation to Rose family)

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Fun with Numbers: The species ancestors of modern roses

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> *Figures often beguile me, particularly when I have the arranging of them myself; in which case the remark attributed to Disraeli would often apply with justice and force:*
>
> *"There are three kinds of lies: lies, damned lies, and statistics."*
>
> \- Mark Twain, *Chapters from My Autobiography*

Modern hybrid roses started out as species roses – but which ones? Often in books and research papers authors claim that there are some given number of species roses, and that only a fraction of these species have actually been used to breed modern hybrids. The numbers cited are always 'guesstimates', and differ from source to source. Now, with a little help from the gracious folks at HelpMeFind.com (HMF), we can pin down these numbers well enough to give us something to talk about. *[The numbers given in this article were correct in November 2008. Additions to the HMF database may have increased the numbers since then, but such changes only strengthen the support for the argument of this article. Ed.]*

The HelpMeFind.com database lists 529 different species roses. This number includes all varieties and subspecies. It does not include any roses listed as hybrids, although some of them probably are.

Out of these 529 rose species, only 135 have any known descendants. Most have fewer than 100 descendants identified. The roses with 100 or more descendants are given in Table 1. These numbers show clearly that only a handful of species roses have contributed their genes to modern roses.

R. chinensis	12,848
R. moschata	12,262
R. foetida persiana	9,906
R. multiflora	9,166
R. foetida	7,254
R. foetida bicolor	7,231
R. roxburghii	4,531
R. wichuraiana	4,273
R. setigera	2,202
R. chinensis minima	1,990
R. multibracteata	1,626
R. rugosa	1,001
R. rubiginosa	658
R. gallica	576
R. fedtschenkoana	509
R. spinosissima altaica	501
R. spinosissima	362
R. laxa	247
R. californica	186
R. gigantea	126
R. acicularis	113

Table 1. A snapshot of the total number of descendants of important species roses. These numbers are actually a moving target because the HelpMeFind database continues to grow at a surprising pace.

The greatest numbers of descendants for species roses listed in the HelpMeFind.com database are concentrated in the descendancies of only four species: ***R. chinensis***, ***R. moschata***, ***R. foetida*** and ***R. multiflora***. In this article we will show just how these four species became the foundation species for modern roses. The genetic contributions to modern roses by all other species, with a few exceptions, are relatively minor, but we'll show how some of these made their way into modern roses as well.

The first exception is ***R. gallica***. Nearly all the hybridizing of *R. gallica* occurred before breeders started keeping and publishing records of their breeding efforts (Henry Bennett of Stapleford, England is generally regarded as the first to do so, beginning around 1870, although Jacques-Louis Descemet had actually begun the practice nearly a century earlier). *Rosa gallica* has been known from antiquity, and we can confidently put it right at the top of our list of important ancestors despite the fact that in modern times it has been so little used.

Another exception is ***R. fedtschenkoana*** which, along with *R. moschata* and *R. gallica*, gave rise to ***R. damascena trigintipetala***. Like *R. gallica*, *R. damascena* has been known and hybridized since antiquity so its contribution to modern roses cannot be quantified except, perhaps, by future genetic analysis.

Also in the mix of uncertain genes are the four roses known as the “Stud Chinas”: **Slater’s Crimson China**, **Parsons Pink China**, **Hume’s Blush Tea-scented China**, and **Parks Yellow Tea-scented China**. These all factor in the modern gene pool in unknown (but very significant) amounts, though ‘Parson’s Pink China’, also known as **Old Blush**, has a unique and well documented role that we will be looking at in great detail. Old Blush is another name for the species rose *R. chinensis* whose descendants are tabulated above.

There is some evidence that ***R. pendulina*** and ***R. rugosa*** contributed to the gene pool of roses before records began.

Let’s pick up the trail of known ancestors.

Critical Mass

Three crucial events resulted in modern roses as we know them.

In the aftermath of the French Revolution, the nurserymen André Du Pont, Jacques-Louis Descemet, and Jean-Pierre Vibert in Paris, Christophe Cochet in Grisy-Suisnes, and others assembled a vast collection of plants, especially roses, for their royal patrons Josephine Bonaparte and Flore-Josephe Bougainville. These roses became the foundation of a hybridizing frenzy that spawned most of the roses known today as the Old Garden Roses. This marks the first of our three crucial events in the development of modern roses.

In contrast with the efforts in France to collect every known rose in the world, a single event across the Atlantic at the same time would have equal importance for the future of roses. A South Carolina rice farmer named John Champneys discovered a chance seedling in his garden. This rose, a cross between plants of *R. moschata* and *R. chinensis* that had been given to him by his neighbor, has become known simply as **Champneys’ Pink Cluster**.

The chief attraction of Champneys’ Pink Cluster was its repeating bloom, a character then possessed by few other roses. Champneys gave that neighbor seedlings of his repeat blooming cluster rose, and that neighbor promptly used them for hybridizing. The neighbor was French immigrant and plantsman Philippe Noisette, who sent rooted cuttings of his own seedlings derived from ‘Champneys’ Pink Cluster’ to his brother Louis in Paris, where it became a main ingredient in the simmering cauldron of the rose breeders there. This marks the second crucial event in the development of modern roses.

It is with ‘Champneys’ Pink Cluster’ that we begin to examine, in detail, the descendancies that gave us modern roses.

A curious rule

One pattern in the descendancies of roses holds consistently true: in any given generation of a rose’s lineage there are usually only one or two progeny whose descendants make up the lion’s share of all subsequent generations. That is, even where a rose may have dozens of first generation progeny, one of them will yield the most offspring across time.

We can demonstrate this phenomenon for the offspring of *R. chinensis* and *R. moschata* through Champneys’ Pink Cluster. Let’s follow the descendancy through the individual in each generation that has the most offspring, total, in all subsequent generations. This is not necessarily the one that has the most first-generation progeny, but the one whose own progeny yields the biggest family tree from that point down. Let’s call this lineage the ***major descendancy*** of *R. chinensis* and *R. moschata*.

Champneys’ Pink Cluster has only four known offspring. Two of these, **June Ann** and **The Charlestonian**, are modern and have no descendants. **Ami Vibert** (1828) has only three descendants. The fourth, **Blush Noisette**, has 12,293 descendants. Thus, Blush Noisette is a ***nodal point*** on the major descendancy of *R. chinensis* / *R. moschata*.

Blush Noisette itself has five first-generation offspring. **Jaune Desprez** is the next nodal point in the major descendancy of *R. chinensis* / *R. moschata*:

Offspring of Blush Noisette	
First Generation	***Total Offspring (all generations)***
Jaune Desprez	12,240
Smith's Yellow China	11,466
Lamarque	210
Sarasota Spice	0
Mistress Quickly	0

Following the major descendancy of *R. chinensis* and *R. moschata* through all subsequent generations we have:

Major Descendancy of R. chinensis / R. moschata			
Breeder	***Year***	***Node***	***Total Offspring (all generations)***
		R.chinensis x *R. moschata*	12,984
Champneys	~1811	Champneys' Pink Cluster	12,300
Philippe Noisette	1814	Blush Noisette	12,293
Jean Deprez	1830	Jaune Desprez	12,240
Mons de Beauregard	1839	Safrano	12,120
François Lacharme	1859	Victor Verdier	11,656
Joseph Pernet-Ducher	1895	Mme. Abel Chatenay	8,551
George Paul, Jr.	1901	Lady Battersea	8,278
E. Gurney Hill	1905	Richmond	8,272
Dorner	1915	Hoosier Beauty	7,857
Joseph H. Hill	1922	Sensation	7,831
Wilhelm Kordes II	1929	Cathrine Kordes	7,589
Wilhelm Kordes II	1935	Crimson Glory	7,574
Gene Boerner	1947	Fashion	4,363
Gene Boerner	1955	Spartan	1,957
Gene Boerner	1963	Zorina	738
Reimer Kordes	1972	Annabelle	248
Patrick Dickson	1978	Memento	161
Patrick Dickson	1981	Brass Ring	79
Patrick Dickson	1986	Sweet Magic	77
???	1992	**???**	64

Rosarians may feel that some very important roses are missing from this descendancy. There are, in fact, quite a few important ancestral roses that are not within the strictly defined major descendancy from *R. chinensis/R. moschata*. Nearly all of them, though, do appear in the **secondary descendancies**, those which originate as siblings of the roses within this primary lineage.

A case in point is **Smith's Yellow China**, which has nearly as many offspring as its sibling 'Jaune Desprez'. If we follow that secondary descendancy, we get:

Branch Descendancy of R. chinensis and R. moschata			
Breeder	**Year**	**Node**	**Total Offspring (all generations)**
		Smith's Yellow China	12,984
George Foster	1838	Devoniensis	11,465
Henry Bennett	1882	Lady Mary Fitzwilliam	11,442
Joseph Pernet-Ducher	1895	Antoine Rivoire	10,050
William Paul & Son	1912	Ophelia	9,980
E. Gurney Hill	1918	Madame Butterfly	8,105
Traendly & Schenck	1926	Rapture	6,213
Wilhelm Kordes II	1933	Golden Rapture	6,175

Wilhelm Kordes II	1940	Pinocchio	5,389
Gene Boerner	1947	Fashion	4,363
Gene Boerner	1955	Spartan	1,957
Gene Boerner	1963	Zorina	738
Reimer Kordes	1972	Annabelle	248
Patrick Dickson	1978	Memento	161
Patrick Dickson	1981	Brass Ring	79
Patrick Dickson	1986	Sweet Magic	77
???	1992	**???**	64

Remarkably, the side-branch starting with Smith's Yellow China converges back into the major descendancy again at Fashion (shaded portion of chart). This is a pattern that recurs repeatedly.

For instance the major descendancy of **Madame Falcot**, a sibling of **Victor Verdier**, includes (in order) **La France**, **Mrs. W. J. Grant** and **Liberty**, and converges back with that of *R. chinensis/R. moschata* at **Lady Battersea**. Other side branches begin with **Mme Caroline Testout**, **Superb** and an unnamed seedling of **Ophelia**. All converge back with the major descendancy of *R. chinensis/R. moschata* at **Cathrine Kordes**.

Every branch that re-converges with the major descendancy represents a form of back-cross. To be technical about it, this is a form of *introgression* that leads to *consanguinity*. That is, it shows that the majority of modern roses are heavily inbred in a pattern that concentrates the genes of *R. chinensis* and *R. moschata*.

There are, in fact, a great many instances of backcrosses in the major descendancy from *R. chinensis / R. moschata*. Smith's Yellow China, like its sibling 'Jaune Desprez', is a cross between 'Blush Noisette' and **Park's Yellow Tea Scented China**. **Devoniensis** is a backcross with Park's. **Safrano** is a backcross with Park's. **Mrs. W. J. Grant** is a backcross with **Lady Mary Fitzwilliam**.

We have so far ignored the fact that each generation requires two parents – every rose in the major descendancy had a partner. Many of these partners are actually roses in the descendancy, each back-crossed with its own ancestor. For instance, Blush Noisette is the partner of Jaune Desprez in the cross that gave Safrano. **Liberty** gave **Mrs. Battersea;** then Liberty *and* Mrs. Battersea gave **Richmond**. Liberty's own ancestry is a convoluted series of back-crosses.

Without exception, every generation within the major descendancy of *R. chinensis/R. moschata* has a significant degree of introgression. The situation is similar for the other major descendancies. To examine the subject in any detail would require a separate article, so we'll just acknowledge that it exists and move on.

Century of Progress

The nineteenth century saw the creation of most classes of what are now called Old Garden Roses as well as the first modern hybrid tea rose (**La France**, 1867). However, one goal eluded breeders until the turn of the twentieth century when Joseph Pernet Ducher crossed ***R. foetida persiana*** with **Antoine Ducher** to create **Soleil d'Or** – the first spectrally pure yellow (and fertile) hybrid rose. This breakthrough marks the third crucial event in the development of modern roses.

Although it begins fully a century later than that of *R. chinensis* and *R. moschata*, the major descendancy starting with *R. foetida persiana* contains nearly as many total offspring.

Breeder	**Year**	**Node**	**Total Offspring (all generations)**
		R. foetida persiana	9,930
Joseph Pernet-Ducher	1900	Soleil d'Or	9,929
Joseph Pernet-Ducher	1910	Rayon d'Or	9,257
Joseph Pernet-Ducher	1915	Constance	9,203
Joseph Pernet-Ducher	1920	Souvenir de Claudius Pernet	9,084
Joseph Pernet-Ducher	1927	Julien Potin	6,841
Wilhelm Kordes II	1933	Golden Rapture	6,175
Wilhelm Kordes II	1940	Pinocchio	5,389
Gene Boerner	1947	Fashion	4,363
Gene Boerner	1955	Spartan	1,957
Gene Boerner	1963	Zorina	738
Reimer Kordes	1972	Annabelle	248

Patrick Dickson	1978	Memento	161
Patrick Dickson	1981	Brass Ring	79
Patrick Dickson	1986	Sweet Magic	77
???	1992	**???**	64

When Pernet-Ducher set out to put yellow into modern roses he succeeded beyond his wildest dreams. Every rose in the major descendancy of *R. foetida persiana* for the first six generations is yellow.

The selection pressure of yellow pigmentation, alone, really accounts only for the roses in this lineage down to **Golden Rapture**. Beginning with **Pinocchio** a new selection pressure is apparent – the dense, cherry-red color of a pigment named pelargonin combined with the deepest yellow pigments to give, ultimately, the solid orange of ‘Zorina’. As the major descendancy progresses into the twenty-first century a dominating selection pressure continues to be complex colors that include these reds and yellows.

It is interesting to note also that beginning with the onset of the Second World War, the upright, longer-stemmed form of the hybrid teas gave way to roses with cluster flowering habits. This is a result of the convergence with another major descendancy beginning with *R. multiflora* (see below). These, in turn, yielded to miniature growth habits with **Brass Ring** and **Sweet Magic** toward the end of the 20th Century.

Although the major descendancy of *R. foetida persiana* progressed independently over seven generations, spanning nearly half a century, it eventually converged with that of *R. chinensis/R. moschata*. Fully a third of the offspring of those species are also offspring of *R. foetida persiana*. The overlap is actually somewhat higher when convergences with side branches are counted.

Secondary descendancies—side branches off the major descendancy—continue to be very important ancestries. For instance, **Soeur Therese**, sibling of Julien Potin, has 4154 descendants, and figures prominently in the ancestry of many recent roses.

A tough act to follow

Before Pernet–Ducher’s success, other breeders who had been seeking a source of strong yellow pigmentation had only managed crosses with *R. foetida* and these did not prove to be fertile. Pernet–Ducher’s success with *R. foetida persiana* spawned imitators. Two later breeders established lines that stand apart from the major descendancy of *R. foetida persiana* (though just barely).

Francis Meilland (apparently) created **Capucine Chambard** in an unknown cross with *R. foetida*. He used this to breed **Léonce Colombier**, which became a foundation for many Meilland roses although its major descendancy does not converge with those of either *R. chinensis/R. moschata* or *R. foetida persiana*. ‘Capucine Chambard’ has only 1,745 total descendants, including **Yellow Submarine**, **Marco Polo**, **Happiness** and **Joycie**.

A more prolific major descendancy from *R. foetida* occurs through **Austrian Copper** (***R. foetida bicolor***). Charles Mallerin crossed this with a dark red hybrid tea named **Mrs. Edward Powell**. He then crossed the unnamed seedling with Pernet-Ducher’s **Madame Méha Sabatier** to yield **Ami Quinard**. The lineage passed to Wilhelm Kordes, and then to Sam McGredy IV who added many interesting bicolor roses to it, showing the distinction and persistence of the color traits originating with ‘Austrian Copper’.

Major Descendancy of *R. foetida* and *R. foetida bicolor*

Breeder	Year	Node	Total Offspring (all generations)
		Rosa foetida	7254
		Rosa foetida bicolor	7231
Charles Mallerin	< 1927	unnamed seedling	6549
Charles Mallerin	1927	Ami Quinard	6548
Wilhelm Kordes II	1936	Baby Château	6361
Wilhelm Kordes II	1951	Independence	4,224
Wilhelm Kordes II	1950	Karl Herbst	2,227
Samuel McGredy IV	1960	Piccadilly	1,019
Samuel McGredy IV	1965	Arthur Bell	378
Samuel McGredy IV	1971	Yellow Pages	106

A side-branch of this major descendancy also accounts for most of the descendants of ***R. roxburghii***. A cross between **Baby Château** and *R. roxburghii* by Mathias Tantau gave **Floradora**, which has 3319 descendants including, in its first generation, **Queen Elizabeth**, **Sequoia Ruby**, and an unnamed seedling by Ralph Moore that alone generated over half of the remaining progeny from *R. roxburghii*. A different seedling of 'Baby Château' and *R. roxburghii*, also by Tantau, was a great grandparent of **Super Star** (**Tropicana**). **Super Star** is a node in the major descendancy of ***R. multibracteata*** (see below).

Floradora was edged out of the major descendancy of *R. foetida and R. foetida bicolor* by **Independence** which, like **Fashion** and **Spartan** in the *R. chinensis/R. moschata* major descendancy, is a source for dense red pelargonin genes. It is probably too soon to say where this lineage is headed but the descendants of **Yellow Pages** do seem to be dominated by complex color mixtures.

Flowers in abundance

There are actually two original forms of ***R. multiflora*** to be accounted for. One is the wild type and the other is a cultivated form that was found in Japan. As it happens, these converge within a couple of generations at **Madame Norbert Levavasseur**.

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Major Descendancy of *R. multiflora*

Breeder	**Year**	**Node**	**Total Offspring (all generations)**
		R. multiflora	
		A. Wild type	9167
Charles Turner	1893	Crimson Rambler	8801
Levavasseur	1903	Madame Norbert Levavasseur	8626
		B. Cultivated form	
	< 1827	*Rosa multiflora flore-pleno*	8953
Jean-Baptiste Guillot	~1868	unnamed seedling	8875
Jean-Baptiste Guillot	1880	Mignonette	8712
Jean-Baptiste Guillot	<1886	unnamed seedling	8628
Jean-Baptiste Guillot	1886	Gloire des Polyantha	8627
Levavasseur	1903	Madame Norbert Levavasseur	8626
	Descendancy from Madame Norbert Levavasseur		
Levavasseur	<1909	unnamed seedling	8478
Levavasseur	1909	Orléans Rose	8089
De Ruiter	<1917	Sport of Orléans Rose	8476
De Ruiter	1917	Miss Edith Cavell	8100
Joseph Pemberton	1927	Robin Hood	8089
Wilhelm Kordes II	1933	Eva	7969
Wilhelm Kordes II	1940	Pinocchio	5,389
Gene Boerner	1947	Fashion	4,363
Gene Boerner	1955	Spartan	1,957
Gene Boerner	1963	Zorina	738
Reimer Kordes	1972	Annabelle	248
Patrick Dickson	1978	Memento	161
Patrick Dickson	1981	Brass Ring	79
Patrick Dickson	1986	Sweet Magic	77
???	1992	**???**	64

Although *R. moschata* is not documented in its ancestry, Robin Hood no doubt brings a strong dose of *R. moschata* genes to this descendancy. The cluster-flowering traits of *R. multiflora* and *R. moschata* reinforce those similar traits already present in the major descendancies of *R. foetida persiana* and *R. chinensis/R. moschata* when it converges with those lineages to yield **Pinocchio** and its famous offspring **Fashion** (shaded portion of the chart).

Taller is smaller

Ask rosarians what types of roses would be found in the major descendancy of *R. wichuraiana* and they are likely to guess these would be climbers, ramblers and shiny, dark leaved, winter hardy shrubs. To be sure, this descendancy starts with a very famous rambler, **Dorothy Perkins**. Were it not for Ralph Moore, though, there would still today be relatively few descendants of *R. wichuraiana*. As a result of Moore's 1936 **Sierra Snowstorm**, most descendants of *R. wichuraiana* are actually miniature roses.

Major Descendancy of *R. wichuraiana*

Breeder	Year	Node	Total Offspring (all generations)
		R. wichuraiana	4,274
E. Alvin Miller	1901	Dorothy Perkins	1,881
Ralph S. Moore	1936	Sierra Snowstorm	1,654
Ralph S. Moore	1941	Carolyn Dean	1,640
Ralph S. Moore	1940	Zee	1,636
Ralph S. Moore	<1962	Red Mini	1,296
Ralph S. Moore	1962	New Penny	1,295
Ralph S. Moore	1973	Sheri Anne	595
F. Harmon Saville	< 1979	Party Girl	261

Ralph Moore's independent breeding philosophy is reflected here by the fact that this descendancy never converges with that of *R. chinensis / R. moschata* or with those of the foetidas. However, it does converge with the major descendancy of *R. chinensis minima*, one of two roses that gave minis their diminutive size.

Major Descendancy of *R. chinensis minima*

Breeder	Year	Node	Total Offspring (all generations)
		R. chinensis minima	
Jan de Vink	1935	Tom Thumb	1,759
Ralph S. Moore	1940	Zee	1,636

The other progenitor mini is Oakington Ruby, a 19th century foundling whose major descendancy converges with the previous two at Party Girl. It should be noted that although I have accorded *R. chinensis minima* the status of species for purposes of our discussion, it is actually another foundling of unknown ancestry.

Another maverick breeder who built his reputation with *R. wichuraiana* hybrids is the Hungarian immigrant Michael Horvath. Ironically, his legacy is more strongly felt though his *R. setigera* / *R. x foetida* hybrid, **Doubloons**. Gene Boerner exploited Doubloons's yellow genes to create **Goldilocks**. Goldilocks was picked up by many European breeders and resulted in another non-converging major descendancy.

Major Descendancy of *R. setigera*

Breeder	Year	Node	Total Offspring (all generations)
		R. setigera	2,236
Michael H. Horvath	1934	Doubloons	2,186
Gene Boerner	1945	Goldilocks	2,178
Gene Boerner	1949	Masquerade	951
Edward B. LeGrice	1956	Allgold	510
Svend Poulsen	1958	Rumba	331
Ralph S. Moore	1975	Watercolor	161
Harmon Saville	1984	Rainbow's End	83

Despite its non-convergence, the selection pressures in this line were still cluster flowering, dense and complex pigmentation patterns and, eventually, miniature growth form. Also noticeable in this descendancy are plants with dark, glossy foliage and a fair amount of hardiness and disease resistance. It includes one of Harm Saville's most successful minis, **Rainbow's End**.

Focus, focus, focus

The major descendancy of ***R. multibracteata*** illustrates both the benefits of introducing a less-used species to the modern rose gene pool and the intense hybridizing needed to transform it. By the time Mathias Tantau's breeding program yielded 'Super Star' (Tropicana), the descendancy was more heavily influenced by *R. roxburghii* and roses from within the major descendancy of *R. chinensis*/*R. moschata* than by *R. multibracteata*.

Major Descendancy of *R. multibracteata*			
Breeder	Year	Node	Total Offspring (all generations)
		R. multibracteata	1647
Mathias Tantau	<1960	Seedling 38006	1488
Mathias Tantau	<1960	Seedling 38006	1491
Mathias Tantau	<1960	Seedling 4016	1490
Mathias Tantau	<1960	Seedling 4206	1489
Mathias Tantau	<1960	Seedling 42206	1488
Mathias Tantau	<1960	Seedling 5135	1487
Mathias Tantau	1960	Super Star	1486
Mathias Tantau	1964	Color Wonder	1196
Reimer Kordes	1968	Peer Gynt	249
Samuel McGredy IV	1971	Yellow Pages	106

Masked by the code names of Tantau's seedlings are also some unusual ancestral roses such as **Danzig**, which brings in the genes of Rudolph Geschwind's **Gruss an Teplitz** and the Pernetiana **Château de Clos Vougeot**.

Although the major descendancy of *R. multibracteata* converges with that of *R. foetida bicolor* (at **Yellow Pages**, shaded portion of chart) rather than the descendancy from *R. foetida persiana*, this could easily change in the future. **Peer Gynt** is a sibling of **Annabelle** that just happens to have, at the time of this writing, one more offspring. Considering the similarity of **Zorina** and Super Star, pigmentation has been a common selection pressure in both lines.

A major difference of this descendancy from the others is that it favors large blossomed hybrid tea form over cluster flowering. This may reflect regional marketing differences in that many of the descendants of **Color Wonder** (the breeding heavyweight in the group) come from European breeders, especially the Kordes company.

Tough stuff

Thirty years elapsed from the creation of a first generation hybrid of *R. rugosa*, **Max Graf,** until Wilhelm Kordes managed to get a fertile seedling from it. Kordes remarked that he selected his ***R. kordesii* Wulff** in order to bring together "the hardiness of ***R. rugosa*** with the large, full flowers of our garden roses".

Major Descendancy of *R. rugosa*			
Breeder	Year	Node	Total Offspring (all generations)
		R. rugosa	1001
James H. Bowditch	1919	Max Graf	528
Wilhelm Kordes II	1950	*R. kordesii* Wulff	525
Reimer Kordes	1957	Parkdirektor Riggers	251
Alex Cocker	<1960	unnamed seedling	222
Alex Cocker	<1960	unnamed seedling	223
Anne G. Cocker	1978	Silver Jubilee	224
Anne G. Cocker	1984	Remember Me	66
Jack Harkness	1992	Livin' Easy	13

Alex Cocker and his widow Anne are responsible for the bulk of the roses in this descendancy, which does indeed have some winter hardy, large blossomed roses. A branch in the descendancy from *R. kordesii*, through **Hamburger Phoenix** and then **Maxi**, also includes some rather eclectic roses such as Sam McGredy's **Old Master** and Ralph Moore's **Playtime** and **Dahlia Rose**. These are probably due in no small part to the contribution of ***R. macrophylla*** through McGredy's 'Maxi'.

Summing up

We have listed the major descendancies for the species roses that have 1000 or more descendants. Taken together, these major descendancies contain only 100 roses, created by only 37 hybridizers.

There are a few other important ancestors of modern roses that are hybrids of uncertain origins, rather than species, and I leave it to the reader to trace out their major descendancies.

William Jesse is one of these. Its major descendancy includes **La Reine** and converges with that of *R. chinensis / R. moschata* at Lady Mary Fitzwilliams. **Kitchener of Khartoum** has 8,226 descendants and converges with *R. chinensis / R. moschata* at Pinocchio. **Regulus** has 10,478 offspring and converges with *R. chinensis / R. moschata* at **Mme. Abel Chatenay**.

We can be pretty confident that most other major descendancies of any size will also converge with that of *R. chinensis / R. moschata.* For that reason, we can refer to this as the ***principal descendancy of modern roses***. Every ancestry of every modern rose includes this lineage, usually multiple times.

A downloadable chart giving the principal descendancy and the major descendancies outlined in this article is available online at http://www.rosehybridizers.org/descendancies.html.

I have deliberately left out the name of the most recent rose in the principal descendancy. Have you guessed what it is?

The last rose in the principal descendancy that can be fixed with confidence is **Baby Love**, currently much in vogue with breeders in the RHA. It is also a rose that may mark a major turning point in hybridizing philosophies. It is the first modern rose in these descendancies to be a second generation offspring from a species rose - **R. davidii elongata.** It is also one of the very few to have an amateur, Len Scrivens, as the breeder.

Will the next rose in the principal descendancy be yours?

The Right Stuff

What will it take to have one of your roses become part of a major descendancy? There appear to be at least two common elements in these roses.

- Nearly all have exceptional coloration, with both the anthocyanins (reds) and carotenoids (yellows) present in abundance. Moreover, there seems to be a selection pressure for the specific anthocyanin pelargonin, and for the most advanced-stage carotenoids (see my earlier article "Fun With Color"). These roses also impart their color traits to their offspring, but in a variety of hues and intensities so that the offspring exhibit a spectrum of colors and a variety of patterns.

- Nearly all their hybridizers are backed up by strong production and marketing efforts. It is not enough to have the perfect rose: you have to be able to bring it to the attention of other breeders and put it in their hands. As Ralph Moore and Harm Saville have shown, there is room for self starters but you have to be prepared to carve out your own niche as they did with miniature roses.

There you have it

Using the database at HelpMeFind.com we have shown how it is that most modern roses came to be.

Three separate breeding lines starting with just four rose species, *R. moschata, R. chinensis, R. foetida persiana* and *R. multiflora*, are finally joined in the creation of a single exceptional rose, Gene Boerner's 'Fashion'. Two other separate breeding lines starting with *R. foetida* and *R. multibracteata* converged on each other at Sam McGredy's rose 'Yellow Submarine'. Three other breeding lines remain independent, those descending from *R. wichuraiana* and *R. chinensis minima*, *R. setigera,* and *R. rugosa.*

Every modern rose came from a branch of one or more of these lineages, which I have termed the *major descendancies.* The major descendancy of *R. chinensis* and *R. moschata*, which begins with 'Champneys' Pink Cluster', so dominates the ancestry of all modern roses that I have termed this the *principal descendancy of modern roses.*

Of course, this still leaves us with the descendants of another 124 species roses to talk about, but that's another story.

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Embryo Rescue for Dummies

Don Holeman don@holeman.org

On the left [*see the back cover*] is a picture of a rose embryo that has just been removed from a seed. The picture on the right is that same embryo ten days later.

It happens to be from an OP seed of 'Kilwinning', bred by Percy Wright in 1948. 'Kilwinning' is a cross between *R. spinosissima altaica* and 'Persian Yellow'. Seeds from 'Kilwinning' had never before germinated, but 'Kilwinning' now has 23 offspring, all germinated *in-vitro.* I grew eight of those seedlings, but the first ones to germinate were actually cultured by Margit Schowalter using a technique for embryo rescue that I developed. The seedling pictured here is one of hers.

Margit graciously agreed to review an instruction manual for embryo rescue that I had written and to give the technique a try. She also sent me a bunch of OP seeds from such roses as 'Yellow Altai', some Ross Rambler F1's grown by her father, and 'Prairie Peace', all notorious for having seeds that won't germinate. Erskine said of his 'Prairie Peace' that he had sowed more than 2,000 seeds and never got one to germinate. All of these now have seedlings, some for the first time. OP seeds from Peter Harris's R15-01 (Golden Showers x Hazeldean) and Ralph Moore's hulthemia hybrid 'Persian Autumn' have also been germinated. Both hybrids make seeds that are reluctant to germinate.

The technique is simple, straightforward and reliable. Using the method, I have germinated embryos from nearly 100 different rose hybrids and species, as well as from Asian pear, apple, sweet cherry, and even a rare Japanese sassafras, *S. tsumu*.

With a little practice you can do the same thing. All you need are a pair of nail clippers, some paper towels, a bottle of hydrogen peroxide, and some re-sealable sandwich baggies. You'll also need my manual, titled ***Simple embryo culture for plant breeders***, which you can download from http://www.holeman.org/embryoculture.pdf

Have fun, and good luck. I would appreciate hearing from people who give it a try – my email address is don@holeman.org.

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Who We Are

Bartolomeo Embriaco bartolomeo@embriaco.it

I was a professional rose grower for cut flowers and a breeder for many years. Now I am retired (I am 73 years old), but I continue to hybridize roses to grow in pots and in the garden. My cut-flower varieties obtained in the past include Gioiello, Isella, Cosetta, Sandrina, Candida, Baby Claudia, Ombretta, Renée, Lady Silvia and others (the first three were registered in *Modern Roses*). Their characteristics are: small to medium sized flowers and foliage, stems 60-70cm long, flowers usually one to the stem, or with clusters of only3-4, good disease resistance, and abundant flower production.

These varieties were originated from crosses between Floribundas and HT with some kinds of Mansuino roses, with the aim to bring in new colors and bigger flowers, greater disease resistance, and more abundant flowering.

My interest in roses extends also to some species. I have worked with *R. wichuraiana*, *R.pendulina*, *R. multiflora nana,* and *R. rouletii.* Particularly interesting crosses were *R. wichuraiana* x 'Tom Thumb' and *R. wichuraiana* x 'Ophelia'. I had an offspring which was partly climbing and partly bushy. Among the climbing seedlings of the first cross, some are almost completely thornless, with ornamental hips and foliage greatly disease resistant; the bushy seedlings were similar except in growth habit. Some short size bushes with single flowers can be cultivated in pots and improved for flower size and colour.

From *R.multiflora nana* crossed with some of my cut flower varieties I have selected very good seedlings for outdoor cultivations and for gardens. I continue to breed with *R.multiflora nana* to increase the range of colours. Currently, I am also evaluating seedlings derived from *R. indica major* (*Rosa.*x *odorata*), the rootstock utilized in my area (San Remo, Flowers Riviera, North-West Italy), in order to obtain a new rootstock more oidium [powdery mildew] resistant.

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To Join or Renew—Send your name, street address or PO Box, City/State/Zip, and e-mail address, with a check or money order payable to Rose Hybridizers Association, to Mr. Larry Peterson, RHA Treasurer, 21 S. Wheaton Road, Horseheads, NY 14845. You may also pay through PayPal by emailing Larry Peterson. Current yearly membership dues: New membership or renewal--$10.00. Foreign membership--$12.00.
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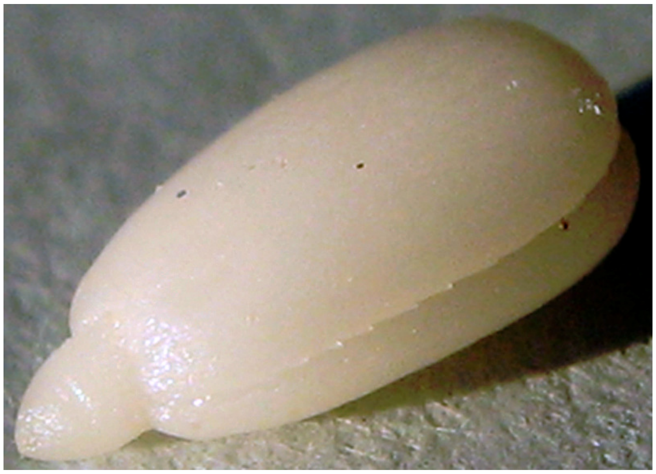
Seedlings by Jim Sproul

Rose Embryo Extraction



Rose embryo freshly removed from seed

The same rose embryo 10 days later