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Botany of Desire: Looking at the Rose Plant as a Manmade Tool of Love

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Abstract

The use of roses as a symbol of emotion (specifically love) and as a result, a model of artificial selection, is rarely questioned. These plants share a rich history with multiple humanities around the world and have been a subject of genetic interest to see exactly what genes are being expressed that signal those beautiful desirable traits. To answer the question of “why” these plants have been a vector for human love for so long, I have analyzed 7 articles, one of them outlining the cause of the favored “double flower” mutation found in so many modern roses today. Upon completing my research, I have discovered that Greek mythology, political conflicts and an old love story have all played a role in the use of the rose as a metaphor for affection. In addition I outline the research done to positively identify the gene, RhAG in roses, that humans have been selecting for hundreds of years to achieve the “double flower” phenotype. Human influence on roses has ranged from artificially selecting the most beautiful and fragrant varieties to making them a metaphor that has lasted centuries. The rose is the plant of choice that fulfills the human desire of love.

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The story goes that in 42 B.C., Cleopatra, the queen of Egypt, sailed to Tarsus on an extravagantly decorated Barge to discuss business with Marc Antony. The deep purple sails were perfumed with spices and flowers, not only catching the wind to thrust the vessel forward, but also spreading her scent as she made her way to meet with the emperor. With the many retellings of stories like this one, parts are changed or altered with time, but one piece remains constant: Cleopatra arrived at her destination lying in a bed of rose petals over a foot deep and Marc Antony was said to have been seduced by this scene, being absorbed by the romanticism of the rose and its scent, beginning their love affair (History's Greatest Love Affair: Cleopatra And Mark Antony).

For centuries, the rose has been used as a symbol more than any other flower. Its fame spread throughout the world and even small children recognize the tight whorls of petals crowning a thorny stem. The rose is absolutely unmistakable and has served humans by providing strong sweet fragrances along with its beauty, but more interestingly, as a symbol. Going back in time shows the various ways in which people attribute meaning to this flower; from a symbol for the two warring houses in England during the "Wars of the Roses" in the 15th century (The History of Roses), to today as the staple gift for your valentine. For my purposes, I will be looking at the rose mainly as a representation of emotion (specifically love) as well as a subject of artificial selectivity. To better understand these two subjects, the origin and rich history of this plant must be known.

Roses have a long and colorful history. In fact, according to fossil evidence, the rose is at least 35 million years old and although research has shown some uncertainty as far as where this plant originated, most sources point to Central Asia. Though this is said to be the most likely geological birthplace of the wild rose, the name is believed to have come from another part of the world (RoseFarm.com International). "Rosa" or "rhodon" translate from the romantic languages and Greek to "pink" or "red," implying that the rose received its name somewhere in Europe. The cultivation of garden roses most likely began in Asia around 5000 years ago, marking a clear beginning of the human influence on this plant (The History of Roses).

Growing up, I always had a distaste for roses. I never understood the reason behind their unrelenting popularity. I was a hopeless romantic who did not enjoy stories unless they ended with two people perfectly in love so one would think that I would have an appreciation for the one flower chosen more than any other to portray feelings of affection. Reflecting on this now, I know that it was the over-commercialization coupled with how cliché and mainstream the use of a rose is. It is as if the repeated use of this flower on February 14th, first dates, or anniversaries ruined this plant for me. I thought when I got my first job at a large scale greenhouse in Auburn, NY that I would see something in roses that I had not before. Customers would walk up and down the rose section at Dickman Farms and fawn over the galleries of different kinds of roses – and there were so many! There were small

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ones, large ones, some with a few petals, others with too many to count. Some roses could climb while others had a fragrance that trumped all the rest, but by far the most popular were the "Knock Out" roses, a hybrid developed by someone you could consider a master rose breeder, William Radler. These low maintenance plants tolerate the cold, self-clean, are disease resistant, and produce high yields of beautiful flowers (William Radler, Creator of The Knock Out Rose). This hybridization sparked my curiosity about how roses have been artificially selected by people throughout history.

When it comes to selecting certain rose plants for particular traits, the motives are essentially universal in all flowering plants. Factors like those we saw in the "Knock Out" variety (flower yield, maintenance, and disease resistance) are what rose breeders are looking for. Upon looking into the research that has been done regarding the artificial selection that has taken place over a great deal of time, I found it most interesting that breeders are so concerned about the number of petals each flower contains. The term "double flowers" has been coined and is used loosely in the language of plants. I say "loosely" because it does not mean that the flowers produce exactly twice as many petals as the original species. It typically has a great deal more, and this can be seen in roses. My findings led to me to a paper published on plosone.org, a peer reviewed open access journal.

When conducting the tiresome task of searching through databases, filtering out the useless articles with a fine tooth comb is an exhausting and frustrating chore, so when I found "Tinkering with the C-Function: A Molecular Frame for the Selection of Double Flowers in Cultivated Roses," published in 2010, I was relieved to see that eight scientists had put together a research paper written in a style of English that I, as a second year Biology student can completely comprehend. Their experiments concluded that a shift in RhAG expression domain (a gene involved in determining where the production of petals stop, and the formation of sexual organs begins) boundary occurred in rose hybrids, causing double-flower phenotype, and that this molecular event was selected independently during rose domestication in Europe, the Middle East, and in China. The authors discuss the ABCE model of flower development, though they focus on the C-function gene *AGAMOUS (AG)*, which plays a central role in specifying sexual organ identity. They specifically focus on the species *Arabadopsis*, giving its particular AG gene the name "RhAG." AG loss-of-function results in a "shift of the boundaries of the A gene class toward the center of the flower, which transforms stamens into petals and carpels into sepals" (Dubois et al. 9) Basically when this specific gene is turned off or is not expressed, fewer sex organs are produced, resulting in more petals. The authors were able to determine that this specific gene was actually the only one being expressed differently among the plant subjects and that the only differences seen as a result were in fact, the number of petals versus sex organs. Of course this secondarily affects fragrance and possibly reproduction, but genetically, only one variation occurs, painting a picture in my mind of a very lovely mutation indeed. This research is significant because it not only outlines the exact gene in question, but it also shows, by looking at several species from different areas of the world, that one trait or ortholog (genes in different species that evolved from a common ancestral gene by speciation) (Chris Lewis at the U of S) has been commonly favored globally, much like the symbolic role of the rose as a representation of love.

Roses come into play in the world of love in their earliest form as a sacred flower of the goddess of pleasure, joy, beauty, love, and procreation, Aphrodite. It is said that when Aphrodite's lover, Adonis was in threat of danger, she ran to him, scratching her feet on the thorns of a rose, staining the rose red with her blood. This Greek myth marks the beginning of the obsession of associating the rose with love. Aphrodite is also depicted as clothed in flowers, the rose being one of them, particularly for its fragrance (ESTATE & ATTRIBUTES OF APHRODITE). The sweet smell given off by a rose is something that any couple can enjoy together; possibly acting as something simple and beautiful two strangers can have in common, or as a reminder of something special shared between two people who know each other better than anyone else in the entire world.

To conclude my interest in the rose as a symbol of love and a model of artificial selectivity, I can honestly say that I have gained a new appreciation for this plant. I certainly would not go as far as to say that I will be happily planting this prickly specimen in my garden in the future, though I will say that I see it now as more than just an unoriginal gift that your significant other gets you on your special day, but as a truly classic metaphor for affection, and if I am ever to receive them as a gift, I will think back to my research and appreciate the simple tradition that has withstood the test of time in human society all over the world.

So do roses fulfill the desire of love in humans? In some cases they do directly; those like William Radler, who has dedicated his life to perfecting the keystone piece in every garden in his mind, but more specifically to my research, I believe the rose does so indirectly. It is the little things after all that make all the difference.

References

"Chris Lewis at the U of S." *Definition of Homolog, Ortholog and Paralog*. N.p., n.d. Web. 14 Apr. 2013.

Dubois, Annick, Olivier Raymond, Marion Maene, Sylvie Baudino, Nicolas Langlade, Veronique Boltz, Philippe Vergne, and Mohammed Bendahmane. "Tinkering with the C-Function: A Molecular Frame for the Selection of Double Flowers in Cultivated Roses." *PLoS ONE* 5.2 (2010): 1-12. *EBSCO*. Web. 14 Apr. 2013. <http://web.ebscohost.com.pluma.sjfc.edu/>.

"ESTATE & ATTRIBUTES OF APHRODITE : Greek Mythology." *ESTATE & ATTRIBUTES OF APHRODITE : Greek Mythology*. N.p., n.d. Web. 14 Apr. 2013.

"The History of Roses." - *Our Rose Garden*. N.p., n.d. Web. 13 Apr. 2013.

"History's Greatest Love Affair: Cleopatra And Mark Antony." *History's Greatest Love Affair: Cleopatra And Mark Antony*. N.p., n.d. Web. 13 Apr. 2013.

"RoseFarm.com International." *RoseFarmcom International*. N.p., n.d. Web. 14 Apr. 2013.

"William Radler, Creator of The Knock Out® Rose." *William Radler, Creator of The Knock Out® Rose*. N.p., n.d. Web. 14 Apr. 2013.