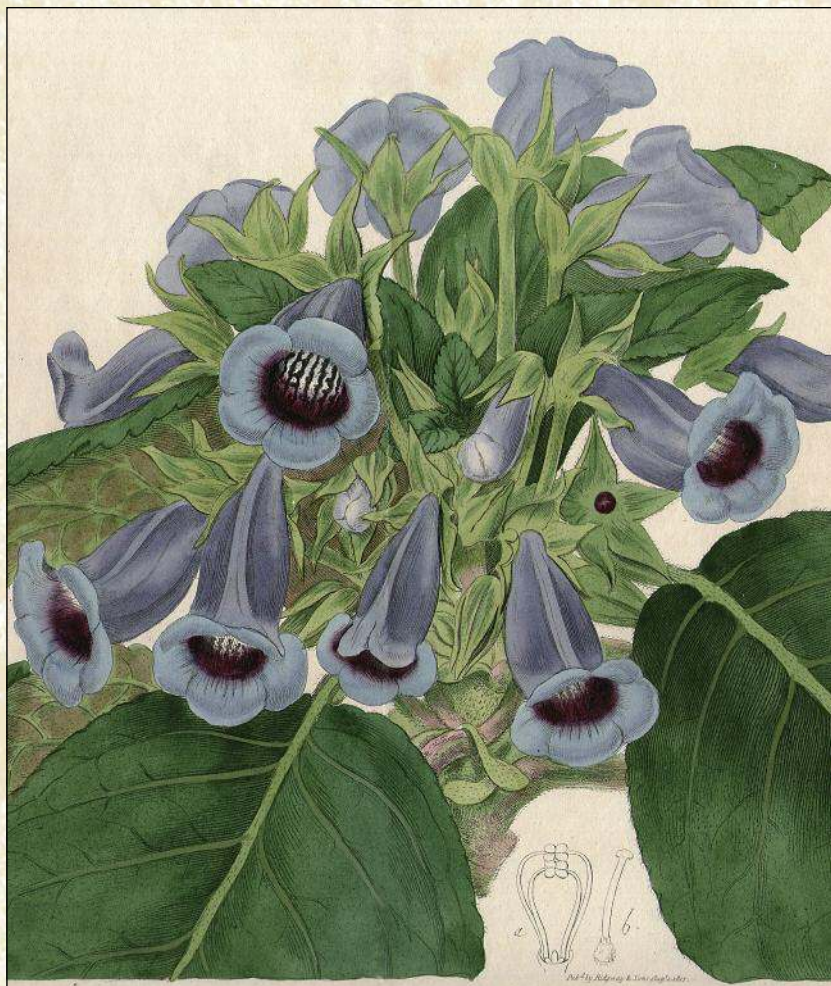


GESNERIADS

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Sinningia speciosa

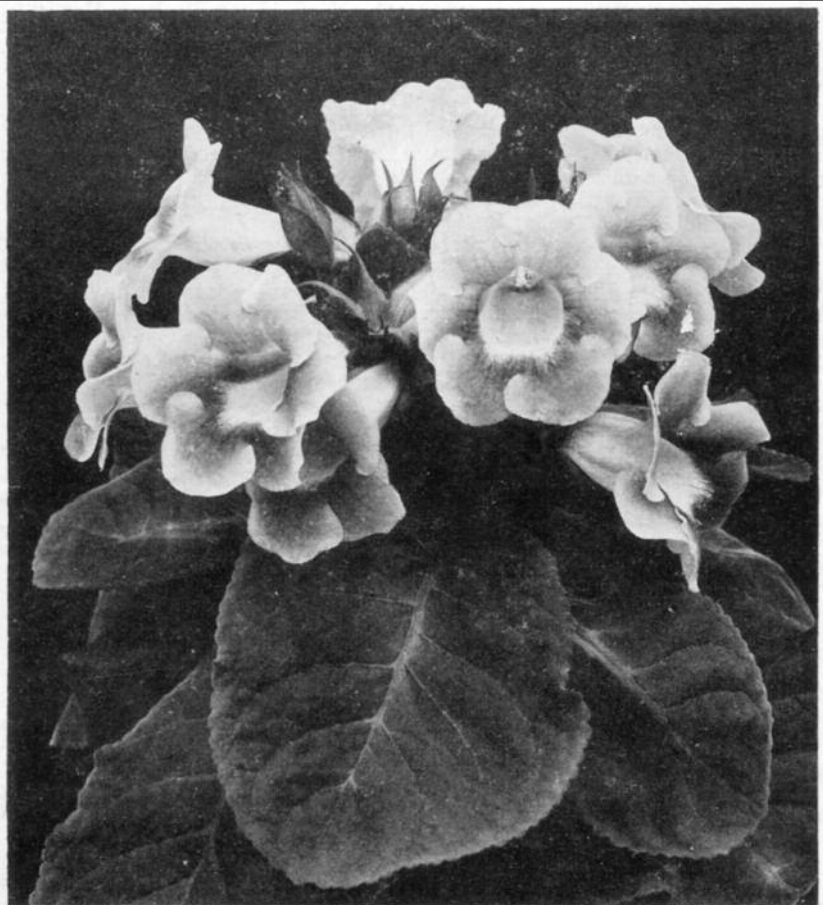


Photo by P. E. Genereux

Courtesy The Barnes Importers

BUELL HYBRID GLOXINIA

Sinningia speciosa (Buell "Gloxinia") hybrid
(1952 cover image from THE GLOXINIAN)

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Once Upon a Gloxinia ...

Suzie Larouche, Historian
<suzielaro@gmail.com>

Sixty years ago, a boy fell in love with a Gloxinia. He loved it so much that he started a group, complete with a small journal, that he called the American Gloxinia Society. The Society lived on, thrived, acquired more members, studied the Gloxinia and its relatives, gesneriads. After a while, the name of the society changed to the American Gloxinia and Gesneriad Society. The journal, THE GLOXINIAN, grew thicker and glossier. More study and research were conducted on the family, more members and chapters came in, and the name was changed again – this time to The Gesneriad Society.

Nowadays, a boy who falls in love with the same plant would have to call it *Sinningia speciosa*. To be honest, the American *Sinningia Speciosa* Society does not have the same ring. So in order to talk "Gloxinia," the boy would have to talk about *Gloxinia perennis*, still a gesneriad, but a totally different plant. Unless, of course, he went for the common name of the spectacular *Sinningia* and decided to found The American Florist Gloxinia Society. Still not right.

This may all sound crazy, but it illustrates how far the Society has come in the last 60 years. All the developments in gesneriad science have stemmed from its very existence. In addition to enthusiastic amateurs, the Society has always attracted serious researchers and encouraged delving into all aspects of the plant family. All this came about because *Sinningia speciosa* attracted the attention of a boy in small town Oklahoma. For years, it was front and center in the activities of the Society. It lent itself to hybridization and Albert Buell, Mr. Gloxinia himself, dedicated his life to it.

Many of today's hybridizers work on smaller varieties of *Sinningias* as well as with numerous other gesneriads. It has been a 60-year journey involving enlightened enthusiasts as well as botanists and taxonomists. Scientists now explore remote areas around the world to discover new species or save others from destruction. Habitats and genetics are studied and diversity is being preserved. Still, few outside our Society know what a gesneriad is. But show them a Florist Gloxinia and you will usually find that they have either grown it or seen it at the local garden center. After all, it was known already 60 years ago but, most importantly, it is still a beautiful plant whatever the color of its flowers or the size of its leaves.

On this 60th anniversary of what is now The Gesneriad Society, old issues of THE GLOXINIAN may read like so much nostalgia, but they recount a journey that is ongoing. More doctoral theses will be written, more taxonomic changes will be made, and still people will go on growing Florist Gloxinias in their homes. Thus things are as they should be.



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A History of the Florist Gloxinia in Pictures and Words

Dave Zaitlin <dzait2@uky.edu>
Lexington, Kentucky, USA

Introduction

I think it is reasonable to assume that any dedicated grower of gesneriads has, at one time or another, grown the plant generally known as the Florist Gloxinia or Brazilian Gloxinia (*Sinningia speciosa*). Many of us, myself included, began our involvement with the Gesneriaceae when we acquired one of the many cultivars of *S. speciosa* (or possibly another species of *Sinningia*). The society that publishes this journal was founded around this species, and its popularity with enthusiasts and the general public endures. As both a plant hobbyist and a plant molecular geneticist, I am fortunate to be able to merge my personal and professional interests in *S. speciosa*. In a recently published paper, a colleague and I reported nuclear genome sizes for 10 species of *Sinningia* (Zaitlin & Pierce 2010). This was a first for the neotropical Gesneriaceae, and nearly triples the number of gesneriad species for which genome size estimates are available¹. A major finding is that genome size can vary about 20 percent in *S. speciosa*. Such variation may reflect evolutionary trends within the species as intraspecific genome size variation is rare in higher plants. The long-term goal of the research is to isolate genes involved in tuber induction and development.

Despite a cultivation history of nearly 200 years, the origins of the cultivated *Sinningia speciosa* varieties are not well known. Those we grow today have large, erect (peloric) flowers that are often dark purple or red in color, with as many as nine petal lobes, whereas the wild forms have smaller nodding flowers in shades of lavender and purple (rarely white), and always with five petal lobes.

The genetics of flower shape in angiosperms (flowering plants) is of considerable interest to evolutionary biologists because this trait is intimately associated with pollinator preference and therefore reproductive fitness. Wild-type *Sinningia speciosa* flowers have only one plane of symmetry (they are zygomorphic) while the flowers of peloric "gloxinias" have multiple planes of symmetry (they are actinomorphic). I am very interested in how the peloric forms came about, and what caused the transition from wild-type to peloric flowers. Over the past several years, I have conducted an exhaustive search of the literature in an effort to understand the history and domestication of this interesting and beautiful ornamental. What follows is a comprehensive, but probably incomplete, summary of my findings. My intention was to compile a list of all known color images of *S. speciosa* from the 19th century; I think I came close, although much of the German literature was not available to me. As The Gesneriad Society celebrates its 60th year, I am honored to contribute an article to this special issue of GESNERIADS.

¹ Note from Peter Shalit: "The genome is the entirety of an organism's hereditary information (genetic code), encoded in DNA. DNA is a molecule made up of a chain of units ("base pairs"), like beads on a string. The base pairs are analogous to the letters that make up words in a written language. The genome includes both the genes and the non-coding portions of the DNA. "Genome size" refers to the total amount of DNA in one complete set of an organism's chromosomes. Different organisms may have very different size genomes, much as the texts of different books each are comprised of different numbers of letters."

The Antique Botanical Literature

To know the Florist Gloxinia, one must be familiar with the 19th century botanical literature. Today, nearly all of these historical documents are accessible to anybody with a computer and an Internet connection. Through Google Books, which has digitized an enormous number of old books, many classic horticultural titles from the libraries of the Arnold Arboretum and Gray Herbarium of Harvard University are now available. Botanicus <www.botanicus.org>, the digital library of the Missouri Botanical Garden, and the Biodiversity Heritage Library <www.biodiversitylibrary.org> are also excellent sources for older botanical publications. Only Google Books is fully searchable by keyword or phrase, but the other two have better image quality.

Scholarly research standards that included editorial peer review for the scientific literature did not exist until the mid-20th century, and many of the early medical and scientific publications were personal undertakings. As a result, the quality of scientific publications varied considerably at a time when both amateur and professional botanists rushed to name and publish the many new species brought back from exotic parts of the world by scientific expeditions. The confusion that often resulted is well illustrated by the taxonomic history of *Sinningia speciosa*. From its first publication in 1817 (as *Gloxinia speciosa*) until the last description in 1917 (as *Gesneria regina* Hort., an invalid name probably based on *Sinningia regina* Sprague, 1904), there are at least 37 discarded names in six genera for this single taxon (Skog and Boggan 2007). And nearly one-third of these rejected species names were published in the 30 years after *Gloxinia speciosa* was transferred to *Sinningia* in 1877 (Hiern 1877).

The Early Years

In considering the history of *Sinningia speciosa*, there are two stories associated with the discovery and domestication of this species that are worth repeating. The first is that it was originally collected in 1815 in Brazil and introduced into cultivation in England, where it was well received. Who actually collected the first plants, and from where, is unknown. Joachim Conrad Loddiges (c. 1738-1826), who owned a large nursery in the village of Hackney, near London, introduced *S. speciosa* in the first issue of *The Botanical Cabinet* (Loddiges 1817), published by his son George from 1817 to 1833. Loddiges noticed that the flowers of his new plant were similar to those of *Gloxinia maculata* (= *G. perennis*), a rhizomatous species that his nursery offered at that time, and he named it *Gloxinia speciosa*. It is fortunate that he chose the right botanical family, and his choice of genus (*Gloxinia* L'Héritier 1789) is understandable because *Sinningia* did not exist until 1825. *G. speciosa* became commonly known as the "gloxinia," and we are still stuck with the name today. The Loddiges firm is known to have both worked with and sponsored plant collectors in their quest for tropical orchids, so it is possible that *S. speciosa* was first collected for them.

The second story focuses on the ancestor of the modern cultivars. John Fyfe, a Scottish gardener, is credited in 1845 with being the first person to raise a "gloxinia" with peloric flowers. Images of this plant were published as *Gloxinia Fyfiana* in British and European periodicals in 1847 and 1848. The parentage of *G. Fyfiana* is obscure, because nothing written by Mr. Fyfe is known from that period. More on this important plant later.



Joachim Conrad Loddiges (portrait by John Renton II (image courtesy of London Borough of Hackney archives))



Gloxinia speciosa illustrated by Loddiges in The Botanical Cabinet (1817)

The early literature highlights how remarkably popular "gloxinias" were in the first half of the 19th century, especially in Great Britain. Plants were widely grown and admired in greenhouses and "stoves" (heated greenhouses), and new varieties and hybrids caused considerable excitement. English travelers were so fond of the plant that they took it with them to far-flung colonial settlements. There is a record of *Gloxinia speciosa* being among the exotic plants grown on the island of Mauritius, where it had been introduced by the governor, Sir Robert Townsend Farquhar, in 1822. We also know that it had reached India (Kolkata) by 1843; Barbados by 1848; the British Virgin Islands by 1851; Madeira and British Guiana by 1855; and Ceylon (Sri Lanka) by 1879. The earliest mention I can find of *G. speciosa* being grown in the United States is in *The American Gardener's Magazine* (vol. I, 1835), where it was seen in the hot-house of the Hon. John Lowell of Roxbury, Massachusetts. However, a cryptic listing in a catalogue from Bartram's Botanical Garden near Philadelphia may push this date back to 1819.

The "gloxinia's" transition from wild Brazilian rock dweller to painted lady of the tropical hothouse is chronicled in the many magazines and journals intended for a botany-crazed public in the 1800s. Periodicals such as *The Botanical Cabinet*, *Curtis's Botanical Magazine*, *The Floricultural Cabinet*, and *Edwards's Botanical Register* from Great Britain; *Flore des Serres et des Jardins de l'Europe* and *La Belgique Horticole* from Belgium; and *Revue Horticole* from France were all illustrated with detailed and meticulously hand-colored copper plate engravings or lithographs. *Sinningia speciosa* was featured in three publications in 1817, all of which show very typical wild "gloxinias" that have nodding, bilaterally symmetrical flowers with lavender or purple corollas.

Scholarly articles in botany journals always cite the Loddiges publication as being the first for the species, which is probably correct, because the other two from 1817 both followed Loddiges' lead in adopting the name *Gloxinia speciosa*. However, there is no type specimen designated for *Sinningia speciosa*, although it was 'lectotypified' as *Ligeria speciosa* by Morton and Denham (1972).

The image in *The Botanical Cabinet*, plate 28, was drawn by George Loddiges himself and engraved on copper by George Cooke. There were two versions, one of which is shown on page 16. As was common at that time, *The Botanical Cabinet* was sold by subscription in monthly installments known as "fascicles" each of which contained 10 colored plates with descriptions. Ten fascicles made up one volume, accounting for the 20 volumes published continuously over 17 years. The works could be purchased in either quarto (4°) or the smaller duodecimal (12°) size format (Garay 1969). The image size was the same in both, but it was only partially colored in the smaller version and thus cost less. According to Rudolph Jenny, the quarto fascicles sold for 5 shillings, while the duodecimal fascicles were half that price.

In the four decades that followed the introduction of *Sinningia speciosa* in 1815, several major changes occurred in the cultivated plants as a result of hybridization and breeding. They became larger with new flower colors and patterns, and the flower form changed. This progression is well documented in the antique literature (summarized in Table 1 as supplemental information to this article available on The Gesneriad Society Website). Introductions of diverse wild forms collected in Brazil continued for nearly 30 years (although *S. regina* pushes this to 1903). I was unable to find any images of new "gloxinias" published during the ten-year period from 1817 until 1827, when *Gloxinia caulescens* was figured in *The Botanical Register* as "Miller's Pernambuco Gloxinia."



Gloxinia caulescens illustrated as "Miller's Pernambuco Gloxinia" in *The Botanical Register* (1827)



Gloxinia speciosa var. *albiflora* illustrated in Curtis's *Botanical Magazine* (1833)



Gloxinia rubra
illustrated in Paxton's Magazine
of Botany (1840)



Gloxinia speciosa var. *macrophylla*
illustrated in Curtis's Botanical
Magazine (1842)

At least four images of *Gloxinia caulescens* were published up until 1849, and it is unclear why it was given a species name distinct from *G. speciosa*. One possible reason is that the original collection was said to be from Pernambuco (hence the name), a state in northeastern Brazil that is about 1500 km (925 miles) from the northeastern edge of the species' documented range in Espirito Santo. Given that this is the only record of *Sinningia speciosa* from Pernambuco, there is a very good chance that it is incorrect. The first image of a "gloxinia" with white flowers (*G. speciosa* var. *albiflora*) appeared in 1833, although there are references to *G. candida*, another white-flowered collection that was never properly published, as early as 1832 (*The Atheneum*, March 10, 1832; page 163). Plants with larger leaves, such as *G. speciosa* var. *macrophylla*, and also larger flowers, such as *G. Passinghamii*, were imported into Great Britain during this period.

An important wild introduction was *Gloxinia rubra* (*G. speciosa* var. *rubra*), which was collected by W.D. Brackenridge in Brazil in 1838². There are at least three known images of this singular plant, the first from *Paxton's Botanical Magazine* in 1840, shown above. The flowers of *G. rubra* were described as being "a deep rich blood-red colour" when they first opened, later fading to crimson with a small amount of blue in the throat (Paxton 1840). In his account of the discovery, written nearly 50 years after the fact, Brackenridge (1886) states that *G. rubra* was found growing amongst a large population of purple-flowered individuals of *G. caulescens* on wet rocks at the base of Corcovado Mountain in Rio de Janeiro. It was the only red-flowered plant found, and he considered it to be a "mere sport or variety" rather than a new species, as was advocated by Dr. (John) Lindley. He also

² Note from Larry Skog: "At this time in 1838, Brackenridge was employed as assistant botanist on the U.S. Exploring Expedition (also known as the "Wilkes Expedition"), an around-the-world multi-year research expedition, the first officially funded by the U.S. government. The collections from this trip were the basis of the collections of the Smithsonian Institution."

expressed his view that it should be crossed with other types of *G. speciosa* in cultivation to produce "intermediate varieties."

Brackenridge goes on to describe how he sent the tuber (illegally and without permission, "...my scruples about disobeying orders were overcome" [Brackenridge 1886, page 59]) to his friend, Robert Buist, in Philadelphia, who was able to propagate it. Buist then sold the entire stock to a nursery in England, unaware that some leaves had been stolen. When *Gloxinia rubra* turned up for sale at another English nursery, a financial dispute ensued, which was only resolved when Mr. Buist refunded some of the money he was paid for his plant. According to the article in *The Floricultural Cabinet*, this plant sold for three guineas each, which was quite a sum in 1841 (1 guinea = 21 shillings = £1+1 shilling). To the best of my knowledge, no other examples of wild *Sinningia speciosa* with true red flowers have ever been documented, so it is very probable that the modern Florist Gloxinia cultivars with red flowers are all descended from this one plant. *G. rubra* is encountered many times in the 19th century botanical literature, often in the context of its use as a parent in named hybrids.

"Gloxinia" hybrids began to appear in botanical periodicals before 1840, and as was the fashion at the time, these early plants were all given illegitimate species names. The first was an interspecific *Sinningia* hybrid known as 'Dr. Young's *Sinningia*' (*Sinningia velutina* × *S. speciosa*). This would have originally been considered an intrageneric hybrid because *G. speciosa* had not yet been transferred to *Sinningia*. Dr. Young's *Sinningia* seems to have had lasting popularity – there are four or five images of it known between 1836 and 1857. The first intraspecific hybrid was *G. maxima* in 1838, which was notable for its large flowers. The article accompanying the image states



Gloxinia Passinghamii illustrated in Paxton's Magazine of Botany (1846)



Sinningia 'Youngiana' illustrated in Curtis's Botanical Magazine (1856)

that it came from crossing *G. speciosa* (purple flowers) with *G. candida*, but that is all that is known.

A second unusual and popular hybrid went by the name *Gloxinia* 'Teuchleri', named for a Mr. Teuchler (or Teichler). This intraspecific hybrid involving *G. rubra* and *G. speciosa* had very unusual and unique flowers. The pattern of purple striping against a red background is faithfully reproduced in all five of the images published between 1846 and 1849. The random nature of the purple streaks and splashes is very similar to corolla patterning seen in some petunia cultivars. (In petunias, this is attributed to a transposable element (a so-called "jumping gene") that is inserted into one of the genes for pigment biosynthesis but that occasionally excises in some cells early in flower development (i.e., it is unstable, leaving a purple sector on the red background [inset on page 21].) Another hybrid was *G. rosea alba* from 1844, in which *G. rubra* was used as the male parent in a cross with the aforementioned white-flowered *G. candida*.

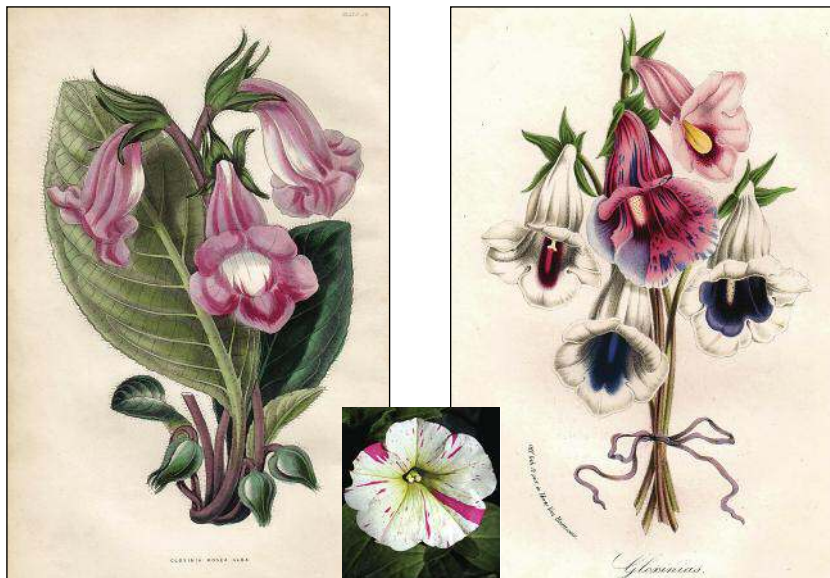
Unfortunately, none of these early "gloxinia" hybrids are known to have survived to the present. But it was the appearance of *Gloxinia Fyfiانا* in 1845 that marked a watershed event in the horticultural history of *Sinningia speciosa*. In addition to publication of its image in 1847 in Harrison's *The Floricultural Cabinet*, it was also featured, both individually and as part of a group, in at least four other publications in 1848 and 1849. The best image, which approaches the quality of a botanical illustration, is from *Flore des Serres* in 1848 (page 22). This exact image, along with a German translation of the French text by Charles Lemaire, was reprinted in *Deutches Magazin* in the same year.



Gloxinia 'Maxima' illustrated in Paxton's Magazine of Botany (1838)



Gloxinia 'Teuchleri' illustrated in *Flore des Serres* (1847)

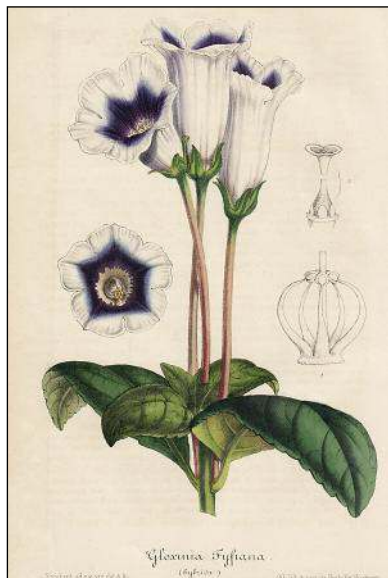


Gloxinia rosea alba (left) illustrated in *The Florist's Journal* (1844) and (right) five named *Gloxinia* hybrids (including *G. Teuchleri*) illustrated in *Flore des Serres* (1847). The inset shows a flower of *Petunia* W138 that carries an unstable transposon inserted into a gene required for anthocyanin biosynthesis (image courtesy of Cris Kuhlemeier)

Sinningia According to Fyfe

John Fyfe, the originator of the plant that bears his name, apparently left no written records from this time. Joseph Harrison, writing in *The Floricultural Cabinet* of March 1847, speculated that one parent of *Gloxinia Fyfiiana* must have been *G. maxima*, but the other was unknown. And although Harrison's opinion was restated many times in print well into the late 19th century, the matter was never really resolved.

A diligent Internet search turned up a very well-written article from *The Gardener's Monthly and Horticulturist*, December 1879 by a "Mr. Fyfe, Mount Auburn, Mass." – none other than the John Fyfe of "gloxinia" fame. Writing 35 years after he saved the seed that gave us *Gloxinia Fyfiiana*, Fyfe spends much of the article describing the "gloxinia" and providing tips on its cultivation, diseases, etc., but he also discusses the origins of *G. Fyfiiana*. He tantalizes the reader by confirming that the seed parent was *S. speciosa*, but he fails to name the particular cultivar. And his account only perpetuates the confusion because of the following baffling statement: "... the parent plant of *Gloxinia Fyfiiana* was profusely dusted with the pollen of *Digitalis purpurea* (foxglove), *Lophospermum scandens*, *Datura wrightii*, [and] *Brugmansia sanguinea*" (Fyfe 1879). The one thing that these species share with *Sinningia speciosa* is that all four are in the order Lamiales, but not one of them is classified in the family Gesneriaceae. The deep phylogenetic distances between the Gesneriaceae and both the Solanaceae (*Datura* and *Brugmansia*)



The two original depictions of *Gloxinia Fyfiana* – the left illustration from The Floricultural Cabinet, 1847, and the right from Flore des Serres, 1848

and Scrophulariaceae (*Digitalis* and *Lophospermum*) make this parentage extremely unlikely. Remarkably, there is at least one report of such a wide hybrid: Campbell's Hybrid Foxglove (*Digitalis hybrida*) was purported to have come from crossing *D. ambigua* (= *D. grandiflora*) as a female with *Sinningia speciosa* (Maund 1834-5). The accompanying image showed an inflorescence that strongly resembles that of *Digitalis*, with little apparent contribution from *Sinningia speciosa*, however.

Fyfe's article is enjoyable to read, and it ends humorously, with the tale of a theft similar to what happened with *Gloxinia rubra* a decade earlier. Fyfe had exhibited a large plant of *G. Fyfiana* at a meeting of the Dunoon Horticultural Society but left it in the care of others when he was called away to officiate as a judge. He returned to find that some leaves had been stolen, and later that year plants were being sold "for a sovereign each ... by some of the London Nurserymen." This sounds like a lot of money to spend on a houseplant at that time (a sovereign was equal to £1 sterling), which according to a money converter from the UK National Archives is equivalent to £58.53 (\$96 US) today.

I located a list of *New, Rare, and Choice Stove Plants* available from the nursery of Messrs. Henderson, Pine Apple Place, London, where *Gloxinia Fyfiana* could be purchased for 3s6d in 1850. *G. Fyfiana* was a very popular plant in its time, and the 19th century botanical literature is full of references to it being displayed in regional horticultural shows throughout the United Kingdom. There is even a record of "our old friend, *G. Fyfiana*" being shown at a meeting of the Pennsylvania Horticultural Society in 1855 (*Horticulturist and Journal of Rural Art and Rural Taste*, vol. 5, page 342).

Hybridizing

Mr. Fyfe's "Gloxinia" had a profound and lasting effect on *Sinningia speciosa* as a horticultural crop (Sprague 1904). Prior to the early 1850s, all named cultivars, with the exception of *Gloxinia Fyfiana*, had nodding flowers that were larger than those of wild-type plants and came in colors from white to red and purple. Commercial nurserymen, such as Mr. Haage of Erfurt (Germany), successfully incorporated the upright flower trait into improved "gloxinia" cultivars by crossing established varieties with 'Fyfiana' (Harrison 1855). In Belgium, the Établissement Horticole de Louis Van Houtte was very active in breeding and releasing named peloric cultivars, and this is reflected in the pages of several Belgian periodicals well into the 1870s.

The first image of an erect-flowered hybrid of *Sinningia speciosa* that I found was that of 'Princess de Prusse' (with red and white flowers) from *L'Illustration Horticole* in 1854. From this time until around 1895, there is a wide diversity of new commercial varieties being illustrated, many with proper cultivar names such as 'Don Pedro V' (pink and white), 'Fulgens' (red and white), 'Lady Grosvenor' (purple and white), 'Fairy' (pink and white), 'Helen of Orleans' (purple and white), and 'Cordon Lavande' (white with lavender border).

Plants of this type were extremely popular with the public and by the end of the 19th century had all but displaced the earlier forms with nodding flowers. To illustrate this, out of 37 named varieties grown for evaluation in the trials at Chiswick (west London, England) in 1862, 17 (46%) had erect flowers. By 1878, this number had grown to 78% (59 out of 76) at these same



Gloxinia 'Princess de Prusse', the first known illustration of a peloric hybrid other than *G. Fyfiana* (illustration from *L'Illustration Horticole*, 1854)



Gloxinia hybrids 'Lady Cremorne' and 'John Grey', the first images of double-corolla Gloxinias (illustration from *The Floral Magazine*, 1868)

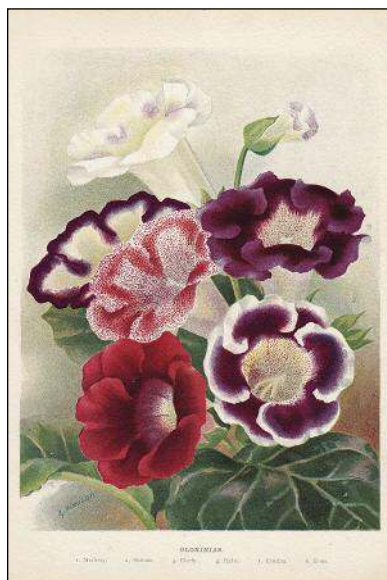
trials (T. Moore 1863; Barron 1879). The lists of cultivars in these two references provide brief descriptions of the plants, as well as the name of the originator, and give us a sense of what was current at that time. Harold E. Moore Jr. (1917-1980), a professor of botany at Cornell University and devoted student of the Gesneriaceae, established three groups or 'convarieties' within *Sinningia speciosa* based on flower type: *speciosa*, *maxima*, and *Fyfiana* (H.E. Moore 1957; page 312). He included all of the peloric cultivars in the 'Fyfiana Group', a taxonomic designation that is still encountered today.

Further Milestones

In addition to flower type, two other developments are important in "gloxinia" history: the development of plants with (1) spotted flowers and (2) double corollas. The class of "gloxinias" generally referred to as 'tigrinas' are characterized by having the corolla pigmentation distributed as very small spots rather than uniformly. The first images of such flowers were both published in 1867, in *Revue Horticole* and *La Belgique Horticole*. A third image, that of the highly spotted *Gloxinia variabilis*, is from *Revue Horticole* in 1877. Edouard Morren, writing in *La Belgique Horticole*, states that these types arose spontaneously from *Sinningia speciosa* (cited in H.E. Moore 1957, page 94). However, a Monsieur Duval, writing many years later, claims that Jules Vallerand crossed "the *Sinningia-Gloxinia*" with *Gloxinia erecta* (Duval 1900) to get the spotted types. "*Sinningia-Gloxinia*" refers either to *Sinningia guttata*, which has a heavily spotted corolla, or a hybrid between this species and *S. speciosa*. I located at least five references in the old literature where such hybrids are discussed, often with the other parent being *G. rubra*. From personal experience, I know that *S. speciosa* and *S. guttata* will produce viable hybrids, and that backcrossing the F₁ to *S. speciosa* can give "gloxinias" with fully peloric flowers in later generations – but that is another story.

Images of "gloxinias" with semi-double corollas were first seen in *The Floral Magazine* in 1868. According to the accompanying text, these plants came from Ireland in 1864 and were named for Lady Cremorne and her gardener, John Grey, their originator. This form of corolla doubling is different from the fully doubled flowers we know today: These early forms have extra petal tissue, which often arises from the calyx, on the outside of the corolla tube. In modern doubles, the stamens are converted to corolla tissue, which is why there is usually little or no pollen produced in these flowers. This mutation has been shown to be genetically dominant (Clayberg 1975), and seed of double-flowered cultivars give plants that are 50:50 singles and doubles. This mutation most probably arose in the latter 20th century, since double-flowered "gloxinias" are not mentioned by H.E. Moore (1957) or in either the first or second editions of Peggie Schulz's book *Gloxinias and How to Grow Them* (Schulz 1953, 1965). However, they do show up in chapter 19 of *Gesneriads and How to Grow Them* (Schulz 1967), where they were said to have originated in Europe.

The images on page 25 show two chromolithographs from the late 1890s that visually summarize the diversity of *Sinningia speciosa* cultivars available at the end of the 19th century. In the course of about 85 years, plant breeders with no quantitative knowledge of genetics had transformed this humble wild plant that is so well adapted to life in the Atlantic coastal forest of Brazil into an extravagant ornamental that can survive only in the care of humans.



Chromolithographs from *L'Illustration Horticole*, 1895 (left) and *The Flower Growers Guide* by John Wright, 1896 (right). These flowers represent the pinnacle of the *Gloxinia* breeders' art, and show the diversity of colors and patterns that had been achieved by the end of the 19th century.

Louis Van Houtte in Belgium, Jules and Eugène Vallerand in France, and the Veitch nurseries in Great Britain were among those responsible for this transformation and for popularizing the plant in Europe during the latter half of the 19th century. By the mid-20th century, the focus had shifted to the United States, where firms such as Antonelli Brothers, Earl J. Small, and Buell's Greenhouses continued to breed new "gloxinias" for the commercial market.

Genes and Flowers

Several of the genes that determine flower form were first isolated and characterized in the snapdragon (*Antirrhinum majus*), which has become a model for the study of floral symmetry in one group of angiosperms. The two most studied genes, *cycloidea* (*cyc*) and *dichotoma* (*dich*), arose through a duplication event and then diverged somewhat through evolution (they are paralogous). *Cyc* and *dich* are somewhat redundant in function, acting together to determine the dorsal identity of floral organs such as stamens and petals. Mutations that destroy the function of either of these genes produce plants with unusual flowers.

Wild-type snapdragons have flowers with five petals, all of which are different. The two dorsal and the two lateral petals are uniquely asymmetrical, and the ventral petal shows bilateral symmetry. When *cyc* alone is knocked out, the mutant flowers are "partially ventralized", with the dorsal and lateral petals resembling the ventral one. Plants carrying mutations in both *cyc* and *dich* have flowers that are fully ventralized and unrecognizable

as snapdragons – all petals are identical to the ventral one, and the flower is radially symmetrical. In addition, there are now six petals, and the flowers have five fertile stamens instead of the usual four (summarized from Cubas 2004).

Michael Möller and colleagues were the first to isolate a region of the homologous gene from species in the Gesneriaceae (Möller et al. 1999). The partial sequence of this gene, named *Gcyc*, was subsequently used to investigate the evolution of floral symmetry in both Old and New World gesneriads (e.g., Smith et al. 2004). Citerne and Cronk (1999) compared the DNA sequence of this part of *Gcyc* from a peloric "gloxinia" cultivar with the *Gcyc* sequence from *Sinningia schiffneri* (which does not have peloric flowers). They identified a mutation (deletion of one 'A' residue) in the gene from the peloric cultivar that would alter the predicted *Gcyc* protein sequence to the point where it would no longer be functional. These authors then state that the mutation "...is therefore quite likely to be the one that occurred by happy accident in 1845 on Bute, and is preserved in today's cultivars."

It would certainly be nice if such a straightforward explanation could account for the radical change in floral form in cultivated *Sinningia speciosa*, but much more research is needed before any such statement can be made. To date, no independent confirmation of the mutation has been published, nor have any gene expression analyses or inheritance studies. In my work, I have sequenced this region of *Gcyc* from 12 wild *S. speciosa* collections, several peloric cultivars, and the related species *S. guttata* and *S. macrophylla*, and I have never found the mutation described by Citerne and Cronk. I recently isolated and sequenced the entire *S. speciosa Gcyc* coding region from several wild-type and peloric plants. None of them had the single 'A' deletion, but I did find a different mutation in another region of the gene, and only in the peloric cultivars. Still, the presence of this mutation is only correlated with the peloric flower trait, and more genetics remains to be done.

Note: Supplemental information to this article is available on The Gesneriad Society Website: Table 1 (List of illustrations and references); additional images of *Sinningia speciosa* (wild forms, cultivars, and hybrids); article "Finding John Fyfe."

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Morphological diversity in *Sinningia speciosa*. Wild collections shown are 'Espírito Santo' (upper left) collected in the southern part of Espírito Santo state, 'Carangola' (upper right) from Minas Gerais, 'Cardoso Moreira-pink' (lower left) and 'Cardoso Moreira' (lower right), both from Rio de Janeiro state.

Growing Florist Gloxinias Down Under

Charles Lawn <mrgloxie@ozemail.com.au>
New South Wales, Australia

In the early 1930's, my mother showed me how to propagate cane begonias. When I was successful doing this, it gave me a real buzz. Then in 1946 when I was home from the war, I fell victim to a nervous breakdown. After some time, I found the courage to tell my doctor who immediately prescribed a course in gardening to concentrate on. I was fortunate to see *Sinningia speciosa* plants, which were grown by an English gentleman and a neighbor of my brother. The flowers really fascinated me, and early in 1947 my gesneriad journey commenced.

As the months went by, my health improved and I was completely hooked. The gloxies eventually helped me through my crisis and I subsequently put up greenhouses in my backyard. With hanging space and bench space to grow 600 or more *Sinningia speciosa* plants in five-inch pots, I could select the best for the Royal Easter Show where the competition was very strong and the classes called for twelve, single-cut blooms. I won my first champion ribbon in 1960.

Over many years I learned to have plants flower on time for the Royal Easter Show. Sowing the seed in November, I have flowering plants from early March through to April and May. During 50 years of attending the shows, I have accumulated more than 500 Champion ribbons.

The finale at these shows, which include rose, dahlia, bonsai and cactus growers, is to win a Banksian Medal for scoring the most points over the approximately ten days. When you win this medal you are not eligible for two years to compete for it. I have won ten Banksian Medals, the first one in 1967. The other medal, the John Baptiste, is for the most number of first prizes won during the show, and I have also won ten of those medals. In the later years (I think the 1970's), I was fortunate to find pollen on a double red *Sinningia speciosa*, which I used to pollinate my single types that had produced some delightful blooms in different shapes and colours with strong stems and also many blooms per plant. Evelyn (my wife of 65 years) has been involved with the growing of the plants and loves all the other gesneriads such as Kohlerias, Achimenes, Eucodonias, etc. She has also been helpful in selecting the show plants.

It was a very enjoyable day when Dale Martens visited my home in 2006. Thirty club members were present as Dale gave us an insight into the workings of The Gesneriad Society and a delightful time was had by all.

In recent times I have concentrated on producing a series named "Rainbow" which has variations in markings and color, plus the blooms are an excellent shape. I have been rewarded with lots of potential show blooms ... and the growing continues.

Sinningia speciosa hybrids by Charles Lawn





Dale Martens and Charles Lawn

Smell of Success: Hybridizing *Sinningia speciosa* for Scent

Dale Martens <dalemartens@mchsi.com>
Sherrard, Illinois, USA

About twenty years ago I ordered from the Seed Fund a packet of *Sinningia speciosa* "Small's Dwarf Mix," which the name implied would be small-growing plants. I'd never grown Florist Gloxinias from seed before, so I thought that would be fun. I think every seed sprouted in less than a week, and all were nicely compact in size. One day I happened to walk past the seedlings at around 4 a.m. (my normal wake-up time) and smelled something very sweet and cinnamon-spicy. Ah! It was one of the seedlings. So I selfed that seedling hoping to get a hybrid with a more intense scent.

It takes only around 30 days for the seeds to ripen and another five months to get a blooming plant, so time to bloom is pretty quick. The majority of the seedlings had scent, which caused a lot of "Happy Hybridizer Dancing." I took the seedling with the strongest scent, and selfed it. From that selfing, the seedling that was the prettiest and had the strongest cinnamon scent was named *Sinningia* 'Touch of Spice'. It was basically bright magenta-pink with a white center.

I thought I had the only scented *Sinningia speciosa* until I was asked to teach a judges' school in Toronto. Someone had brought a *S. speciosa* 'Diego' with bright red flowers in full bloom. The peppery scent from it was so strong I got a headache! So now I knew there were other *S. speciosa* plants with scent and that not all had a cinnamon scent.

In 2004 Marilyn Allen registered a seedling she grew from Robert Hall's cross of *Sinningia* 'Diego' × *S.* 'Touch of Spice'. The background story is that Marilyn suggested to Robert that the seedling she grew be named and he

responded that Marilyn should name it. She thought the name should have something to relate to Robert who had lived in the Caribbean. He mentioned a dish popular throughout the Caribbean known as "pepperpot," which is a spicy, peppery stew. The name Marilyn gave this hybrid with a peppery scent was *S. 'Scentsational Pepperpot'*.

Thinking about *Sinningias* with scent brings to mind another collaboration and this time I was involved. I had *Sinningia guttata* in bloom and wondered if it could be crossed with a miniature *Sinningia*. The miniature that was in bloom was an unnamed hybrid with purple and white flowers. It was too similar to *S. 'Flair'* to name, so I put its pollen on *S. guttata* and got seeds! At the time my husband and I were moving to Illinois, so I didn't have time to sow and grow out the seedlings but my friend David Harris, the commercial grower in Missouri who hybridizes the "Ozark" *Sinningias*, offered to grow out some for me. When the seedlings flowered, many had scent. David had several people sniff the flowers and the one with the strongest scent was selected for naming. I said he should have "Ozark" as the alpha name since he grew the hybrid. So we thought about a good name and came up with *S. 'Ozark Sentimental Journey'*. It has been propagated and distributed and received its first award at the 2007 Convention when Thad Scaggs won a blue ribbon in the *Sinningia* class as well as an award for Best Scented Gesneriad.

I know from hybridizing the scented *Streptocarpus vandeleurii* and *S. candidus* that scent can be passed on to progeny through the pollen parent. I hoped that was true for *Sinningias*. In 2009 I put pollen from a scented *S. speciosa* onto a non-scented Iain James hybrid, *S. 'Peridots Darth Vader'*, but did not get scent in the progeny. Later I put pollen from the very sweet, floral-scented *Sinningia richii* 'Robson Lopes' onto a miniature *Sinningia*. This resulted in seedlings with pretty flowers with yellow on them, but the scent was not passed on. The same thing happened when I used *S. guttata* as the pollen parent. So that may indicate that the scent in some *Sinningias* is passed on to progeny only when the seed parent is scented.

Whenever you see a grouping of *Sinningia speciosa* hybrids at a floral shop or garden center, give each bouquet a quick sniff. You just might be rewarded with scent.



Sinningia 'Touch of Spice'



Sinningia 'Scentsational Pepperpot'

Back to Basics: My Florist Gloxinia Finished Blooming, Now What?

Dale Martens <dalemartens@mchsi.com>
Sherrard, Illinois, USA

The Florist Gloxinia (*Sinningia speciosa*) is a very common gift plant as the dramatic, long-lasting flowers with their velvety texture make quite an impression. What most don't realize is that after the top of the plant looks dead there is a tuber in the pot that can be saved for another cycle of blooming. Tubers easily exist for ten or more years. When there are no more buds to bloom and the leaves on the plant begin turning yellow or brown, it's time to decrease the amount of water the plant receives. Keep the soil barely moist for at least a month after the plant begins to decline.

When the plant looks really bad, it's time to go to work to store the tuber. Remove the plant from the pot and, using scissors, remove the dead leaves. Keep about an inch or two of old stem attached to the tuber as new growth usually sprouts near the base of the old stem. Take off as much soil and roots as possible from the tuber and dunk the tuber repeatedly in a bucket of lukewarm water. I find it easiest to gently wash the tuber using an old, clean paintbrush. Be careful not to remove the outer "skin" off the tuber.

The clean tuber now needs to be stored for a few months, but it should not be allowed to dry out. One method is to store it in a zip-lock, plastic bag with moist sphagnum or vermiculite. Write the name of the plant and the date on the plastic bag. If sphagnum is used, soak the sphagnum, then squeeze out most of the moisture with your hands before putting it in the plastic bag. A medium that is too wet can cause the tuber to rot, so err on the side of the medium being too dry. To surround the tuber with moisture, I put the moist medium in the bottom of the bag, then place the tuber on top with more moist medium on top of the tuber. I then store the tuber in a box in the closet along with other tubers and rhizomes. I suggest having a plant calendar on which you can write reminders or write notes when something bloomed. African violet growers often mark on their calendar dates to increase tube light or change fertilizers for a show. Make a note to check the tuber in 30 days.

On the 30-day check, make sure the medium is still moist and add drops of water if it is too dry. If the old stem is dried out or rotted, use scissors to remove it. Check to see if there are sprouts and if there are none, mark the calendar to re-check in another 30 days. (Usually it takes only two or three months for the tuber to sprout again.) When the tuber sprouts, find a pot about an inch wider and two inches taller than the tuber. You will be transplanting in four weeks, so it is important to use a small pot at first. If the tuber just barely has a sprout (sprout is less than two inches), put enough soilless mix in the pot so that the tuber's top is one and a half inches below the surface of the soil. Clear the area right above the new sprout so it "sees" light. If the tuber has a long sprout (more than 2-1/2 inches) and there are at least six leaves on the sprout, remove the bottom two leaves. Put enough soilless mix in the pot so that when the tuber is placed in the pot, the soil line goes past where you just removed leaves and up to the base of the lowest set of leaves. Put the pot's top within 10 inches of tube light. This might mean

that you have to place something under the pot to raise it to that level. Feed the plant 1/4 teaspoon of balanced fertilizer per gallon of water.

In another 30 days, it's time to re-pot the plant into a four- or five-inch pot, depending on how big the plant is. If it has produced more than one growth stem, remove all but one so that the main plant won't have to compete for growing space. Set aside the extra cuttings. At this time remove the bottom two leaves and pot the plant deeper in the larger pot, up to the lowest set of leaves. This will firmly anchor the plant in the pot so it can support a nice head of flowers. Don't disturb the root ball. Because it's easy to overwater and tubers rot in soggy soil, I like to put 1/4 to 1/2 inch of perlite in the bottom of the final pot so that if the pot sits too long with a saucer full of water, the soil is less likely to become too soggy. It's best if the saucer is emptied within an hour of watering the pot. Continue feeding as in the past. You need to turn the pot a quarter turn at least once a week in order for the plant to grow symmetrically. If you grow under fluorescent tube light, put the plant's upper leaves within 12 inches of the tubes. The plant needs 11 to 13 hours of tube light per day.

If the tuber made extra sprouts that you removed, fill a small pot with moist (not soaking) wet sphagnum or vermiculite/perlite mix. Remove the bottom two leaves of the sprout and pot the cutting in the moist medium up to the base of the next set of leaves. You might need to use supports such as thin plastic straws to hold it upright. Place the newly potted cutting into a terrarium environment (or baggie) for at least three weeks to allow it to root. When you later transplant it, try not to remove any roots when you place it in your regular, soilless mix.

Now enjoy your tubers for a decade or more!



Achimenes Liepmannii
and *Gloxinia Cartonii*
(illustration from The
Floricultural Cabinet (1846))

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Coming Events

September 17 & 18 – California – Delta Gesneriad & AVS annual judged show and sale at Sacramento Garden & Arts Center, 3330 McKinley Blvd, Sacramento. Saturday 1 to 4 p.m.; Sunday 11 a.m. to 3 p.m. Free admission and parking. Contact <www.sacviolets.org> or Lynn Lombard 530-637-9000.

September 17 & 18 – Maryland – National Capital Area Chapter judged show and sale "Gesneriads on Broadway" at Behnke's Nursery, 11300 Baltimore Ave., Beltsville. Saturday noon to 6 p.m.; Sunday 9 a.m. to 5 p.m. Contact Jim Roberts <jim-roberts@hughes.net> or 410-227-2324.

September 24 & 25 – Massachusetts – New England Chapter combined show and sale, Tower Hill Botanic Garden, 11 French Drive, Boylston. Saturday 10 a.m. to 5 p.m.; Sunday 10 a.m. to 4 p.m. Participating with Buxton Branch American Begonia Society. Admission \$10 adults; \$7 seniors; \$5 youths (6-18). Contact <stuarthammer@charter.net> or 617-479-3680.

October 2 – New Jersey – Frelinghuysen Arboretum Chapter judged show and sale "In Tune with Gesneriads" at the Frelinghuysen Arboretum, Morris Township. Sunday 11 a.m. to 3:00 p.m. Free admission and parking. Contact Karyn Cichocki <kdc05@ptd.net>.

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1840 illustration of "Gloxinias" from Flora Universalis (Germany), Vol. 5, Gesneriaceae, showing the type species of the genus *Gloxinia*, *G. perennis* (lower left), with the currently named *Sinningia speciosa* var. *rubra*, then named *Gloxinia rubra* (lower right), and the *Sinningia* hybrid *S. 'Youngeana'*, then named *Gloxinia 'Youngeana'* (top).