The Fuchsia Breeders Initiative

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The Fuchsia Breeders Initiative

Contents of this issue:

Contributions for the next issue, which is scheduled for the end of July 2017, should be in the editor's possession ultimately on 10 July 2017.

Please send your contribution in Word, with the photographs attached separately. Large contributions can be transferred by uploading the file by e.g. WeTransfer.

Photograph on front page:

***F.* 'Silver Chime' (De Cooker, 2016)**

Old seedlings offer new challenges

A large number of new Fuchsia seedlings originates each year from various hybridization programs. Most of these are disposed off immediately or after a relatively short time. Several are retained for additional judgement on their merits, but most of these are disposed off as well already in the same or in the next season. Some however are retained for a longer time. Sometimes they exhibit attractive new traits or appearance, and even few might succeed in being introduced as a new named cultivar.

Many new seedlings are retained for quite some time without ever being introduced as a new cultivar. The underlying reasons can be quite different.

Sometimes new seedlings don't have the required quality for being introduced to a broader public, however exhibit visible genetic traits, inherited from one or both of their parents, which might be interesting for use in further hybridisation. Sometimes new seedlings lack such visible traits, but are simply believed to encompass interesting traits just because of their ancestry.

All in all, producing new seedlings each year will eventually result in 'promising' seedlings filling an appreciable part of the hybridist's precious limited space, also during the winter season. And as an insurance, often not only older plants are overwintered in the greenhouse, but also a couple of cuttings are preserved, taking still additional space.

And then, inevitably, the moment arises for making the awful decision as to which seedlings should be retained and which should be disposed off permanently.

Editor of The Fuchsia Breeders Initiative

Mario de Cooker

In hindsight, most of my own decisions seem to have been made well, some decisions however had better been made differently. An example of the latter is the disposal of a fertile, vigorously growing 'Speciosa' x F. *procumbens* seedlings, making 2-3 m long branches each year, and having medium sized *F. procumbens*-like flowers with a brown corolla.
But alas, such decisions cannot be reversed.

Over the years, knowledge builds up, and it becomes visible that some seedlings might have better/different/more potential than originally anticipated. This holds especially for seedlings originating from the 'Göttingen' x 'Our Ted' series. Knowledge has been generated on their genome, and some of these polypoid specimen demonstrate unexpected and peculiar behaviour. And then, together with other developments such as the appearance of the pink *F. triphyllas,* suddenly an ocean of opportunities arises for capitalizing on the inherently available, but sometimes hidden potential of older seedlings. More on this can be found on page 19.

I wish you and your family all the best for the coming year 2017, and a lot of pleasure with your new and older Fuchsias.

Mario de Cooker

Phenotypic plasticity of Fuchsia N 11-02, a 'Sparkling Whisper' sport

By Mario de Cooker

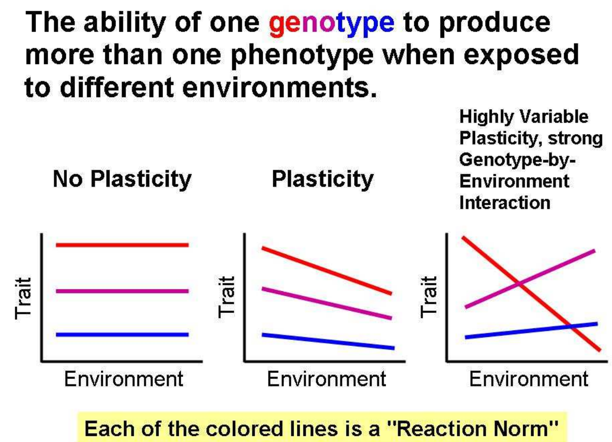
Photographs on p. 3-5 by Mario de Cooker

Introduction

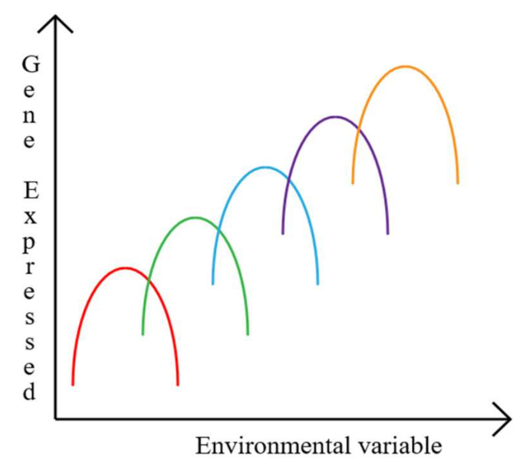
Phenotypic plasticity is the capacity of a single genotype to exhibit a range of phenotypes in response to variation in the environment. It can be visualized by the use of reaction norms, which plot values for a specific phenotypic trait across two or more environments.

Interest in phenotypic plasticity has grown exponentially in the last decades. Classic examples of phenotypic plasticity are leaf mass and root systems of plants, which highly depend on availability of sunlight and favorable growing conditions, respectively. Plastic traits vary in their permanency. In general, behavioral and physiological traits are rapidly reversible within individuals, whereas morphology and life history can be permanent.

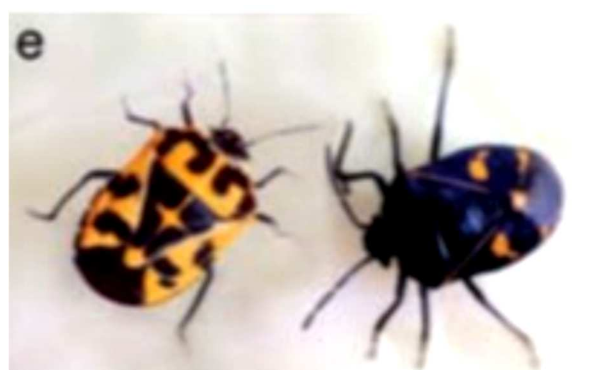
For evolution, phenotypic plasticity is beneficial when it allows an individual to alter its phenotype to adaptively match a changing environment. The greatest benefit of phenotypic plasticity may be that it generates adaptive genetic change. Acquired, phenotypic plastic traits can become absorbed into the genome, so can become genetically fixed.



Each of the colored lines is a "Reaction Norm"



In many cases of phenotypic plasticity, changes in environmental conditions (e.g. temperature) cause different genes to be expressed in organisms.



Some examples of impressive morphological changes induced by phenotypic plasticity.

Above: Wet-season (left) and dry-season (right) *Precis octavia* (fam. Nymphalidae) butterflies, from Africa (McLeod 2007). Photos courtesy of F. Nijhout.

At the right: Many insects alter body color in response to rearing temperature. Harlequin bugs, *Murgantia histrionica* (fam. Pentatomidae). Black and yellow individuals were reared at 22 and 30 °C, respectively.

Source: Douglas W. Whitman and Anurag A. Agrawal [1]

Extensive information on phenotypic plasticity can be found in [1, 5, 6, 7].

Fuchsia 'Sparkling Whisper'

F. 'Sparkling Whisper' (De Cooker, 2001) originates from the crossing ('First Succes' x (('Speciosa' x ?) x *F. splendens*)) x ((*F. splendens* x *F. procumbens*) x *F. splendens*).

It has a clear resemblance with one of its main ancestors *F. splendens* : it has a similar 2C DNA value, it is clearly pinched in near the base, but has a larger and more yellowish and often flat corolla.

Over the years it has been used a number of times in *Fuchsia* hybridization. Examples of its progeny are 'Careless Whisper' (De Cooker, 2000), 'Whispering Dawn' (De Cooker, 2003), 'Straat Kobe' (De Boer, 2004), 'Dragon Lady' (Koerts, 2007), and 'Jaspers Marieke' (Van Aspert, 2015).

It might also have some potential for making hardy cultivars. Experimentally it has been shown that its progeny systematically and frequently exhibits excellent winter hardiness properties [2] , which have most probably been inherited from *F.* 'Speciosa' and *F. procumbens.* Both of these *Fuchsias* have excellent hardiness properties [3].

F. splendens

'Sparkling Whisper' 's main flowering period is from January till June. Depending on the timing of making cuttings and the number of times these are pinched, it can however produce blooms throughout the year.

Phenotypic plasticity of *Fuchsia* 'Sparkling Whisper'

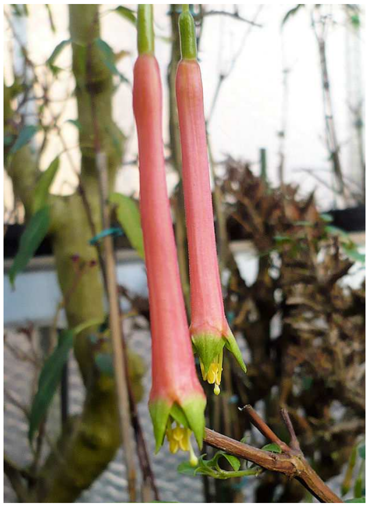
'Sparkling Whisper' shows modicum seasonal plasticity.

In the period January - June, it produces bright blooms and large amounts of pollen. In the summer season, especially the flower tube becomes smaller and less expressive. The corolla then turns somewhat more greenish. Until days again grow colder at the end of the season, pollen production is greatly reduced.

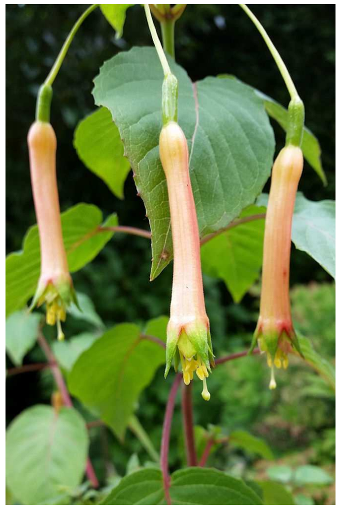
'Sparkling Whisper' (January)

'Sparkling Whisper' (March)

'Sparkling Whisper' (July)

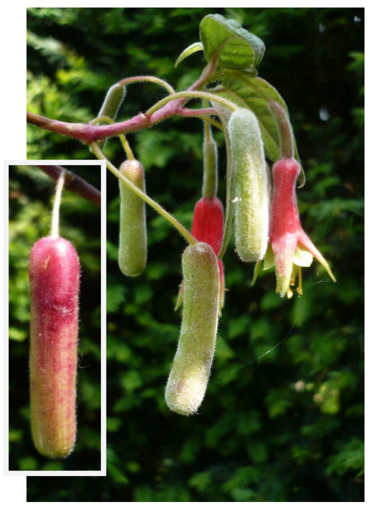


N 11-02 (mid January)



N 11-02 (end of June)

N 11-02 berry and foliage



***'Sparkling Whisper'* berry**

Phenotypic plasticity of *Fuchsia* N 01-02

'Sparkling Whisper' has sported, both in the year 2010 in the author's own garden, and at the Spek or Van der Velde Fuchsia Nursery (The Netherlands). The latter sports have originated most probably at an earlier stage, but were perceived as such in 2011 [4].

The author's own sport is referred to as seedling N 11-02. It has smoother leaves than 'Sparkling Whisper' and its berries are smaller. As well as 'Sparkling Whisper', it produces blooms throughout the year, its main flowering period ranging from December - May. Its 2C DNA value equals that of *F. splendens.*

As regards the N 11-02 blooms morphology, a major change has occurred as compared to 'Sparkling Whisper'. And moreover, its morphology varies appreciably over the year, showing large seasonal phenotypic plasticity.

As temperatures drop in late autumn/early winter, blooms are produced having a long (50-60 mm) rosy red tube, being only moderately pinched in near the base. Pollen is produced in large quantities.

As temperatures rise, morphology of the flowers changes gradually, and from June onwards blooms are produced having shorter, much flatter tubes of some 30-50 mm. Also a major shift occurs with respect to the bloom's color, which turns from rosy/red towards a kind of yellowish/ green with soft pink hues. These blooms do not produce any pollen, and are far less attractive than the blooms produced earlier in the season.

Could we capitalize on N 11-02 's phenotypic plasticity?

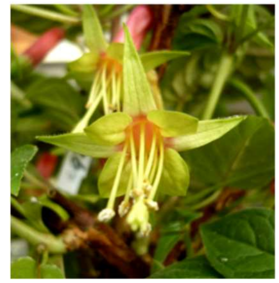
If N11-02 's phenotypic plasticity could be transferred to its progeny, it might bring advantage in creating new *Fuchsia* cultivars. Especially, in developing a yellow *Fuchsia* its properties might be of advantage. In crossings, aimed at creating a yellow *Fuchsia*, obtaining a yellowish/green corolla and sepals is not a major problem as is shown by 'Sparkling Whisper' itself and by, e.g., 'Martins Choice Improved' (Beije, 1997).

Biggest problem in obtaining a yellow Fuchsia is getting rid of the rather persistent red tube, originating from *F. splendens*. N 11-02 might offer opportunities in this respect if its summer season's yellowish/green tube could be combined with the already available green/yellowish corolla in several cultivars.

Making use of species other than *F. splendens* (e.g., *F. pilaloensis* which is contained in 'Martins Choice Improved') might be of help in introducing different tube color genes. Seedlings originating from *F. decidua* might also offer opportunities in this respect. By making crossings of 'Sparkling Whisper' and *F.decidua*, seedlings have been obtained showing interesting yellow/greenish hues as regards their corolla. An example is N 16-01, shown on page 4.

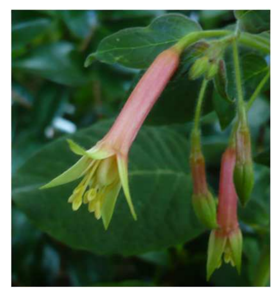
If N 11-02 's phenotypic plasticity could be introgressed into such seedlings, interesting combinations might result.

Yellowish-green hues are found in various *Fuchsia* cultivars



'Sparkling Whisper'

'Martins Choice Improved'



N 16-01

A combination of 'Sparkling Whisper' and *F. decidua*

Fuchsia N 11-02

Smooth-faced and amiable Dr. Jekyll vs his alter ego, the cruel and unsightly Mr. Hyde

References and remarks

[1] Douglas W. Whitman and Anurag A. Agrawal , Phenotypic Plasticity of Insects: Mechanisms and Consequences; Taylor & Francis Inc, USA, ISBN10: 1578084237 (2009). Provides an extensive overview of backgrounds and terminology of phenotypic plasticity. Chapter 1 is available on the internet.

[2] M. de Cooker, experimental results to be published. Several crossing combinations of 'Sparkling Whisper', *F. triphylla* and *F. decidua* have shown to have excellent hardiness properties, surviving at least -5 ^{o}C in pots above ground.

[3] www.xeraplants.com; Both *F. procumbens* and *F.* 'Speciosa' are mentioned as excellent hardy Fuchsias (hardiness rating -15 ^{o}C and -12 ^{o}C, respectively)

[4] Over the years, this sport has most probably erroneously been sold as 'Sparkling Whisper' at several Fuchsia nurseries.

[5] A. Forsman, Rethinking phenotypic plasticity and its consequences for individuals, populations and species; Heridity (2015) 115, 276-284.

[6] Sonia E. Sultan, Phenotypic plasticity in plants: a case study in ecological development; Evolution & Development 5:1, 25-33 (2003).

[7] Jacob J. Herman and Sonia E. Sultan, Adaptive transgenerational plasticity in plants: case studies, mechanisms, and implications for natural populations; Frontiers in Plant Science, December 2011, Volume 2, Article 102.

A Brief Resumé of Time

Photographs by Edwin Goulding

By Edwin Goulding

Introduction

This article is about the fourth dimension, time, and its influence upon *Fuchsia*. As hybridists, we ordinarily concentrate on the first three dimensions because space is of vital importance if we are to care for large numbers of seedlings across several years.

History

The time-line for the Genus is relatively well known. The first recorded finding and illustration of *F. triphylla* was at the end of the seventeenth century and the beginning of the eighteenth. This plant was located in the Dominican Republic. It was almost a hundred years later that a different species became the first one in cultivation, in London.

F. triphylla

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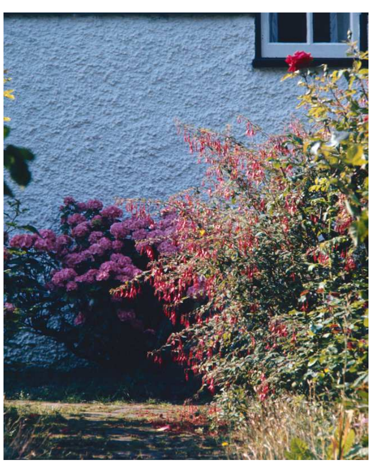
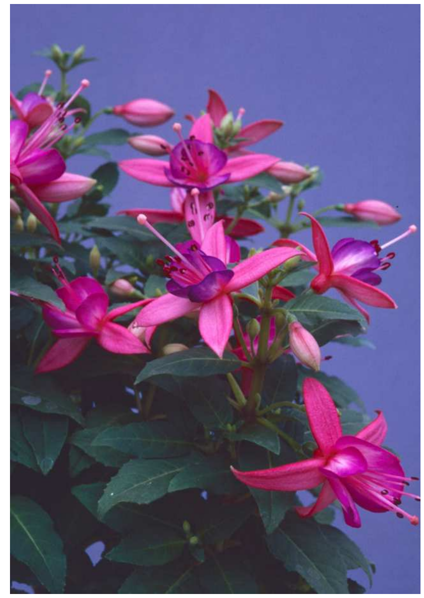


F. magellanica* var. *macrostema

Fuchsia has played no vital part in any economy; it is not a food crop, a medicinal source, or a plant with industrial uses[1]. It was grown, and still is, for its beauty as an ornamental plant. As such, periods of economic depression or political conflict tended to have an immediate and detrimental impact on its availability.

Because it is a plant of 'low' fashion, *Fuchsia* has not figured highly in plant hunting expeditions. Subsequently, new species have only been introduced to the horticultural world slowly; many have never entered cultivation. It is also likely that some species remain to be found and described. Ecological degradation could easily hasten their demise.

This lack of interest in locating and saving species affects not only nurseries and scientific institutions,



'Pink Fantasia'

'Nellie Nutall'

such as the Royal Horticultural Society in Great Britain. No country has been immune from this lack of enthusiasm. Club-land has been dominated by competitions and displays, rather than by enthusiasm for new plants and information.

All of these factors combine to prevent large scale research and development like that to be found in Orchids. Yet, many of these inhabit the same or similar territory and thrive in the same conditions. Hybridists can only use available plants to work with. Development of new types and markets depends upon their availability.

Fuchsias are one of the easiest plants to propagate. They are also one of the cheapest to buy. They are thought of as the "poor man's" plant. Sadly, however, as they now fade from fashion, it will become harder to locate species, variants and hybrids across a broad range. There is a danger they will again be seen as just a pretty red a violet roadside weed.

Cyclical changes

All of which has strayed from our fourth dimension, time. Now, of course, we live in the digital age and are often almost unaware of changes occurring in nature at large. Time used to be seen in the round, first as sundials and later in clocks like Big Ben. Fob and wrist watches found their place alongside items such as alarm and wall clocks.

F. venusta

F. boliviana* var. *boliviana

Lunar influences held a vital place in human history. Mental hospital staff recognised lunacy as being caused or made worse by the Full moon. Field crops were sown on a waxing moon rather than a waning one. Gradually, the industrial revolution pushed such theories into the background; where was the evidence, except anecdotal?

Even today, most people will have heard of SAD (Seasonal Affective Disorder). During the darkest months the Pineal gland often produces inadequate amounts of Seratonin. Plants, too, are affected by light intensity and duration. Some, most notably *F. boliviana* var. *alba*[2] and *F. venusta* even close their growing tips at night, like hands in prayer.

The majority of species bloom in long-day months. Most modern hybrids consequently flower from mid-summer until late-autumn in the United Kingdom. A significant minority of species, mainly from Central America, naturally bloom during the months with shorter and darker days. These come principally from Section *Encliandra.*

Seasons, unlike the traditional concept of time, recur. They, like night and day, circle dutifully around so that we barely even notice them. Global warming barely figures in the average human consciousness. Factors such as these are the ones affecting our plants most. Light, temperature, humidity are spin-off effects of time and cyclical changes.

Now, much of this might appear to be irrelevant, but not so. Successful hybridising depends to a large extent upon such things. Fertility usually improves dramatically as seasons progress. In our part of England it rises to its peak around mid-September and reduces in the following three months. Encliandras are another matter entirely.

F. encliandra **ssp.** ***encliandra*** **♀**

F. insignis

'Countess of Aberdeen'

'Shuna'

Artificial aids

Once we understand that plants from Central America are unused to frosts we can see temperature control is required to help them through our darker months. We are not talking about high temperatures. Cloud forests will be cold and wet at night. Our greenhouses can modify growing conditions for species from sections Encliandra and Hemsleyella.

We have seen in previous articles how heat, light and atmospheric humidity can be manipulated in order to grow such plants. Success in hybridising them can then be more assured. Modification rather than revolution is the order of the day. Attention to detail and cultural expertise can produce some startling seedlings to add to our interest.

Age

Every time I look at myself in the mirror I am reminded that this aspect of time affects me, everyone else, and everything around me. I am not thinking here of times when tectonic plates were joined; when New Zealand species became separated from those in Central and South America. No, this is the natural (average) life span of all living things.

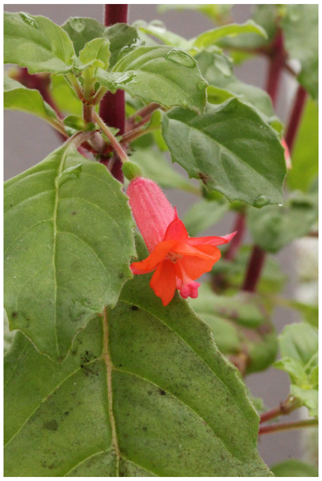
Changes often occur among *Fuchsia* cultivars. The most common of these are sports, either of foliage or flower. One strange occurrence that springs to mind is the year in which 'Shuna' appeared as a pink-petalled sport on 'Countess of Aberdeen'[3]. Concurrently the same thing had happened in the south of England and was released with a different name.

All of which brings me back to the aspect of time that started me thinking about the whole subject of the fourth dimension. Many very experienced growers and hybridists have observed that sexual form and fertility levels can change radically over a period of years. Not, in this case predictably or even expected; seemingly random.

Examples exist where cultivars changed sexual form completely. For several years they might have been pistillate. Suddenly, the observant grower notices that stamens and fertile pollen have been produced. Yes, that's right, produced and not induced. Perfect plants suddenly cease to carry seed pods. All of this is very strange..

The commonest occurrence of this type appears to be associated with a complete lack of pollen on many seedlings within a pioneering hybridising programme. Currently, here, this appears to be in the region of 40% - 60%. The wider the visible difference between parents the more likely this is to happen.

These things do not require highly sophisticated equipment or tests to establish; they are clearly visible. For this reason it is very surprising when, after many years, a plant that produced seed but no pollen completely changes its ways. It would be interesting to see what proportion of seedlings this could happen to, wouldn't it?



.NE.55. first opened perfect in form.

.NE.55. subsequently changed into a ♂ form.

.NAAC.535. had some stamens, some petaloids, no pollen.

.NAAB.534. had only petaloids; no stamens or pollen.

Time's first three dimensions

Sadly, it is not possible to keep the enormous numbers of seedlings and cultivars to establish such fine details. Length, height and depth are also finite, certainly in my own greenhouse they are. So, too, is my timeline. Experience is usually acquired by us over protracted periods. Sharing knowledge with others opens up a whole new universe, reducing time.

No, no, we are not going to discuss all those other dimensions possible within "String Theory"; there may be ten or more. In my world, string shrinks when it becomes wet. Perhaps, I will revert to the "Raffia Theory" in my Fuchsia growing and hybridising. And then, again, perhaps not. Time, like experience, has its advantages after all.

[1] *Fuchsia* has one significant advantage in being almost completely free of allergenic factors.

[2] *F. boliviana* var. *alba* is thought to be a sport deriving from the *F. boliviana* var. *luxurians* form of *F. boliviana* var. *boliviana*. Several other scandent or semi-scandent species from Section *Fuchsia* exhibit a similar nocturnal habit of closing.

[3] 'Countess of Aberdeen' (Cocker 1888).
'Shuna' (Travis 1973) one of two identical sports occurring almost a hundred years later at completely different locations but identical times. The second sport was introduced under a different name by Jack Putley.

New Fuchsias

***Fuchsia* 'Winter Has Passed'**

Fuchsia 'Winter Has Passed'

Fuchsia **'Winter Has passed'** (De Cooker, 2016) is a cultivar originating from the crossing ('Roger de Cooker' x {('Checkerboard' x 'Machu Picchu') x ('Checkerboard' x 'Machu Picchu')}. It is a seedling dating from 2008 as a spin-off from the program for developing white Triphylla cultivars.

The cultivar's name 'Winter Has Passed' refers to the first blooms showing up already early in the season, when winter has passed. Best flowers are however obtained during the summer season.

It cannot deny its lineage from 'Roger de Cooker'. Its blooms have a rather long white tube and a pale pink corolla, but its tube is thinner and sepals are longer than 'Roger de Cooker' 's.

'Winter Has Passed' can best be grown as a relatively small semi-trailing plant, both as an older plant or starting from autumn or early season cuttings. Overwintering in the cold greenhouse will not cause any problems.

It has been used a couple of times in the hybridization programme. It produces not any pollen, but has successfully been used as the female parent for producing 'Aphaia' and 'Pavilion Princess'.

***Fuchsia* 'Phaenna'**

Airedale Terrier Phaenna

Fuchsia 'Phaenna'

Fuchsia **'Phaenna'** (De Cooker, 2016) is a cultivar originating from the crossing ('Strike The Viol' x 'Delicate White') x {('Checkerboard' x 'Machu Picchu') x ('Checkerboard' x 'Machu Picchu')}. Also this cultivar is a spin-off from the program for developing white Triphylla cultivars.

'Phaenna' has been named after the Benjamin Airedale Terrier of the family. It has a rather long tube and a small pink corolla. From the end of July onwards the corolla's color turns into creamy hues, which creates a special contrast with respect to the tube and sepals.

'Phaenna' can best be grown as a small to medium sized semi-trailing plant, both raised from young cuttings or as an older plant. Overwintering in the cold greenhouse is without any problems.

Fuchsia ‘Silence Is Golden’

Fuchsia **‘Silence Is Golden’** (De Cooker, 2016) is a mini-Triphylla cultivar originating from the crossing (‘Göttingen’ x ‘Our Ted’) x *F. fulgens* var. *gesneriana*. It has been produced in the hybridization project aimed at investigating the presumed gene silencing effect induced in the above mentioned crossing. More information on this project can be found in The Fuchsia Breeders Initiative, Issue 7 (July 2016).

The cultivar's name ‘Silence Is Golden’ refers to the gene silencing effect inducing the small blooms in the progeny of this crossing. It brings of course, for many of us, back to mind also the beautiful song **Silence is Golden**, launched and sung by the English rock and roll band The Tremeloes in 1967.

‘Silence Is Golden’ has an extremely small, Encliandra-like pink tube of only 10 mm, a small whitish pink corolla and attractive dark green-brown foliage. It can be grown as a small bush, or mini-standard. Overwintering in the cold greenhouse does not cause any problems.

Mini-Triphylla
***Fuchsia* ‘Silence Is Golden’**

Fuchsia ‘Skyward Dwarf’

Fuchsia **‘Skyward Dwarf’** (De Cooker, 2016) is a mini-Triphylla cultivar originating from the crossing (‘Göttingen’ x ‘Our Ted’) x *F. fulgens* var. *gesneriana*. Also this cultivar has been produced in the hybridization project aimed at investigating the gene silencing effect induced in this crossing.

The cultivar's name ‘Skyward Dwarf’ refers to the small upstanding pink blooms, having a tube length of only 11 mm. It has beautifully contrasting dark green-brown foliage.

‘Skyward Dwarf’ can best be grown as a small bush or standard. Overwintering in the cold greenhouse is without any problems.

Mini-Triphylla
***Fuchsia* ‘Skyward Dwarf’**

In 2017 several more floriferous mini-Triphyllas will be introduced. Also these have rather small tubes, however a little bigger than the tubes of ‘Silence Is Golden’ and ‘Skyward Dwarf’.

Fuchsia 'Mighty Mathijs'

Fuchsia **'Mighty Mathijs'** (Kreijkes, 2016) is a trailing Fuchsia, named after the hybridizer's sun Mathijs. It originates from the crossing 'Amélie Vos' x 'Swingtime'.

The plant has big double flowers and has best bloom and foliage colour in limited light.

***Fuchsia* 'Mighty Mathijs'**

Indian Summer with Fuchsia

Indian summer is a period of unseasonably warm, dry weather that sometimes occurs in autumn in the Northern Hemisphere. In such period, weather conditions are sunny and clear with above normal temperatures, occurring late-September to mid-November.

Temperatures in September 2016 have been extremely high, and even a third local heat wave this year occurred in the Southern part of The Netherlands.

A succession of warm, sunny days and cool, crisp but not freezing nights brings about the most spectacular leaf colour displays. Well, this is exactly what seems to have happened also with this N 11-02 ('Sparkling Whisper' sport) x *F. decidua* seedling.

The Indian Summer seems to reside in the *F. decidua* genes.

Photograph by Mario de Cooker, 4 October 2016

A picture is worth a thousand words

By ir. Eddy de Boever, Administrator FuchsiaFinder.com

FUCHSIAFINDER.COM : THE ONLINE FUCHSIA CULTIVAR PICTURE DATABASE

Long winter evenings are ideal to reflect about past growing season and making plans for the next one. Countless hours are spent sniffing through fuchsia books and catalogs of nurseries in order to obtain a particular cultivar that was seen on a past show or during a garden visit.

As a result of the digital revolution and the use of the internet, information can be exchanged faster than before. Also fuchsia lovers take full advantage of the possibilities. The Fuchsia Breeders Initiative newsletter stands as an example. Fuchsia associations can quickly reach their members and target audiences by setting up a website or the use of social media. At exhibitions and shows numerous pictures are taken with digital cameras or smartphones. Numerous Facebook groups bring together people from all over the world to experience all facets of our fuchsia hobby. Breeders present their latest creations on their own website or on their societies website. In short, there is an abundance of information.

Because the information is scattered, it seemed a good idea to bundle all available information about existing and new fuchsia cultivars. Valuable information on fuchsia cultivars that might be lost forever if we don't preserve it. We should make it easy to access and communicate it broader.

"After all, a picture is worth a thousand words"

At the end of 2014, the online fuchsia cultivar database FuchsiaFinder.com was launched with that particular idea in mind. Unlike older databases, FuchsiaFinder.com focuses on presenting photographs. After all, a picture is worth a thousand words. Moreover, efforts were made to quickly filter the vast amount of information and pictures. Search functions were installed, making it possible to find cultivars from a certain hybridiser or a group of cultivars with similar features.

Up to now, a lot of fuchsia enthusiasts, breeders and fuchsia societies responded and gave permission to use their pictures and written information. Many thanks for that!

After two years FuchsiaFinder.com has become the most comprehensive online fuchsia cultivar photo database. Currently nearly 17,000 cultivars are listed. Thousands of written descriptions were added and about 6,500 cultivars have one or more photos available. The total number of pictures exceeds 10,000, and that number is growing steadily. The database thrives on the commitment of fuchsia lovers who allow to use their pictures in the database for the benefit of other fuchsia enthusiasts. It is a database for fuchsia lovers built by fuchsia lovers. The site is strictly non-commercial and copyright credit is always given to the original photographer both on the pictures themselves and on a special page with contributors. Pictures for the database are never stolen from the internet.

"a database for fuchsia lovers built by fuchsia lovers"

The FuchsiaFinder.com database is not only valuable for regular fuchsia collectors who are on the lookout for 'that special cultivar'. Breeders that do not have the skill or time to maintain an online presence of their work by themselves, can mail information and pictures of their creations to ***fuchsiafinder@gmail.com*** or ***info@fuchsiafinder.com*** . That way they will have an a attractively presented spot on the internet that bundles information about their creations.

I would like to end with a quote. Mario de Cooker, editor of The Fuchsia Breeders Initiative wrote in the very first issue of TFBI :

"For achieving optimal results in our hobby: hybridizing fuchsias, communication is essential!"

On the genome of Fuchsia 'Göttingen'

By Mario de Cooker

Photographs: by Mario de Cooker

Introduction

Fuchsia 'Göttingen' is a Triphylla hybrid Fuchsia cultivar, bred by the German hybridist Carl Bonstedt, and introduced in 1906. It's still one of the most rewarding and floriferous Triphylla hybrid Fuchsias available. Many nurseries still have it for sale in their collection. 'Göttingen' has been, and still is frequently used in Fuchsia hybridization.

'Göttingen' was announced for the first time in 1905 [a], and introduced and described in 1906 in an article by Georg Bornemann, published in the German garden magazine Die Gartenwelt, Volume 10, nr. 20, page 239-240 (10 February 1906). In the article also Bonstedt's Triphylla hybrid cultivars 'Koralle' and 'Gartenmeister Bonstedt' are described and introduced. All three new cultivars originate from the crossing *F. fulgens* x *F. triphylla*. Previous to these cultivars, another triphylla hybrid: 'Mary' (1897) had already been introduced by Bonstedt.

According to the hybridist, previous own seedlings and Triphylla hybrid introductions from other breeders, although perfectly retaining their foliage, were missing *F. triphylla* 's floriferous properties and its beautiful blooms. For this reason, he had tested the use of *F. triphylla* as the male and *F. fulgens* as the female parent instead of the other way around. He was extremely pleased with the results of using this type of crossing.

New Fuchsia introductions by Carl Bonstedt as shown in Die Gartenwelt (1906).

Note that because of space limitations in the magazine the mutual ratio of the blooms is not fully correct. Furthermore, all cultivars shown, especially 'Traudchen Bonstedt' have in reality a slightly lighter colour.

Photograph by Hans van Aspert

***Fuchsia* 'Gottingen'**

From the *F. fulgens* x *F. triphylla* crossings, a number of quite different seedlings has originated. According to the description in the article, *F.* 'Koralle' has green foliage, whereas the two other seedlings have very dark blackish coloured leaves. The 'Göttingen' blooms have a different colour and are bigger than 'Koralle' 's, the latter cultivar however growing to the largest plant.

Annexed to the article in Die Gartenwelt a colour print (see above) was provided showing the new introductions.

Flow cytometry measurements

As ‘Göttingen’ is still frequently used in Fuchsia hybridization, it would be very beneficial to have some knowledge about its genome composition. In this respect Flowcytometry measurements could be of great help.

At the request of the author, Flowcytometry measurements have been carried out on a selection of *Fuchsia* species and cultivars by the Plant Sciences Unit - Applied Genetics and Breeding of ILVO, the Belgian (Flemish) Institute for Agricultural and Fisheries Research [b].

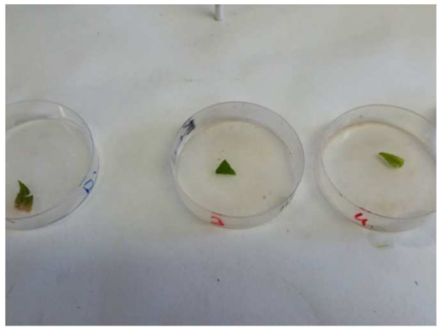
The DNA value of the chromosomes contained in the genome (indicated as pg/2C) was measured with the fluorochrome propidiumiodide, using *Pisum sativum* L. as the internal standard with a 2C DNA value amounting to 9.09 pg [d]. A small part of the young leaf samples was chopped together with the internal standard and subsequently mixed with a buffer solution and incubated before making the measurements.

For a detailed description of the procedure the reader is referred to [c].

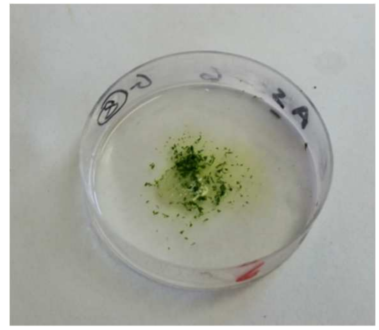
2C DNA values as measured by ILVO are as follows:

F. triphylla	2C = 4.02 pg	(tetraploid)
F. fulgens	2C = 2.95 pg	(diploid)
F. ‘Göttingen’	2C = 5.30 pg	

Photographs by Mario de Cooker



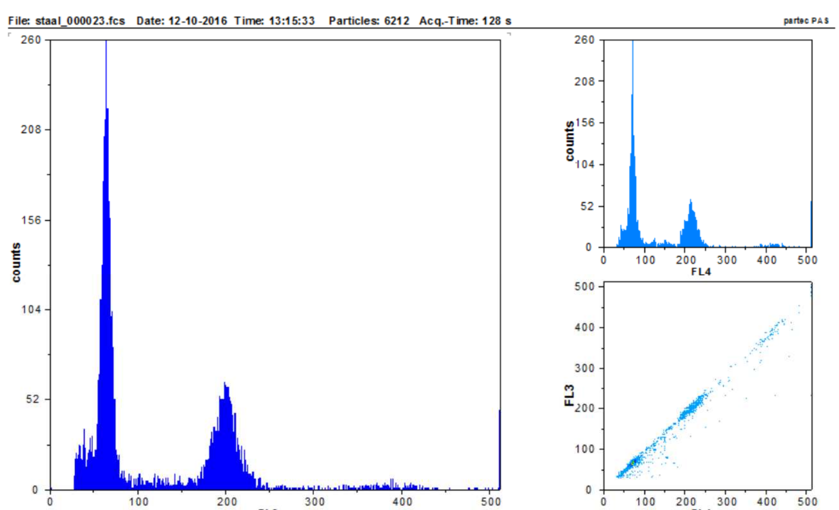
Samples of Fuchsia seedlings



Chopped samples

Leen Leus and Mario de Cooker watching the building of the histograms

Mrs. Dr. ir. Leen Leus preparing the samples



Histogram of *F. fulgens* var. *gesneriana*

Assessment of the *F.* 'Göttingen' genome

From the measured 2C DNA value of 'Göttingen' it follows that in the crossing at least one unreduced gamete has played a role.

Indeed, if Bonstedt's 'Göttingen' would have originated from standard haploid *F. fulgens* and *F. triphylla* gametes, a mid-parental 2C DNA value for 'Göttingen' amounting to 0.5 x (2.95 + 4.02) = 3.49 pg would be expected. This value however differs substantially from the measured value of 5.30 pg.

If 'Göttingen' would have originated from a combination of a haploid *F. fulgens* and an unreduced 4n *F. triphylla* gamete, a 2C DNA value amounting to 1.48 + 4.02 = 5.50 pg would be the expected value, which is in fair agreement with the measured 2C DNA value of 5.30 pg for a T T T T F genome. In this genome, a single set of *F. triphylla* chromosomes is represented by T, a single set of *F. fulgens* chromosomes by F.

Another possibility for arriving nearby the measured value would be the combination of an unreduced *F. fulgens* and a dihaploid *F. triphylla* gamete [e], providing a 2C DNA value of 4.96. This would correspond with a T T F F genome for 'Göttingen'. Such combination would, however, most probably produce a different phenotype, showing more *F. fulgens* characteristics as regards flowers and foliage than the 'Göttingen' phenotype.

This is indeed found for a T T F combination in 'Koralle' (see below).

Moreover, tendency for the 2C DNA value in producing polyploid specimens is to decrease, not to increase upon polyploidization [f], which would make the T T T T F genome the most acceptable.

Fuchsia triphylla

Male parent of *F.* 'Göttingen'

Fuchsia fulgens

Female parent of *F.* 'Göttingen'

In previous Flowcytometry measurements, for 'Koralle' a 2C DNA value of 3.5 pg has been found [g], which is in excellent agreement with the expected mid-parental value for the outcome of the *F. fulgens* x *F. triphylla* crossing represented by T T F, resulting from standard gametes.

It can thus be concluded, as an acceptable estimate, that:

a. **'Göttingen'** is a pentaploid Triphylla hybrid Fuchsia with genome **T T T T F**,

b. **'Koralle'** is a triploid Triphylla hybrid Fuchsia with genome **T T F.**

Further refinement of the *F.* 'Göttingen' genome

The 'Göttingen' genome can be further refined by taking into account phenotypical indications of other Triphylla Fuchsia cultivars and 'Göttingen' crossings.

The presence of a recessive trait for interruption of anthocyanin production.

In the experiments aimed at making a white *F. triphylla* it has been found that the experimental results can be adequately described by assuming that the *F. triphylla* genome contains a recessive trait for the interruption of (or the defect for) anthocyanin formation [j]. As the *F. triphylla* seedlings reveal, this recessive trait affects the entire *F. triphylla* phenotype, namely the colour of the foliage, twigs, blooms and berries.

As mentioned by Bonstedt, he had succeeded in obtaining Triphylla hybrid seedlings having pink and whitish hues, 'Traudchen Bonstedt' being an example. Therefore, in the *F. triphylla* used for making his crossings, such trait for the interruption of anthocyanin formation may well have been present in the genome.

Furthermore, one of the *F. triphyllas* obtained from the seeds provided by Dr. Paul Berry [h] has shown to be capable of producing a pink corolla as well [i], which would imply the presence of the trait not only in the genome of *F. triphylla* 'Herrenhausen' from which the pink *F. triphyllas* have been derived [j], but in the genome of at least one of these new *F. triphyllas* as well.

Apparently, the presence of a defect for anthocyanin formation could be more the rule than the exception for *F. triphylla* specimens.

The strongest indication of the potential presence of the defect is derived from the near white *F*uchsia 'Our Ted' (Goulding, 1983), which has originated from a selfing of 'Thalia'. Also 'Thalia' has been bred by Bonstedt by crossing *F. fulgens* and *F. triphylla* . As no indications exist for the defect being part of the *F. fulgens* genome, it has most probably been supplied to 'Thalia' by *F. triphylla.* As may be assumed, the same *F. triphylla* has been used in the crossing for making 'Thalia' as has been used for making 'Göttingen'. And as 'Göttingen' has most probably originated from an unreduced gamete of this *F. triphylla*, the defect for anthocyanin formation should then inevitably also be present in 'Göttingen'.

The set of *F. triphylla* chromosomes containing the recessive trait for interruption of anthocyanin production can be indicated as Tw.

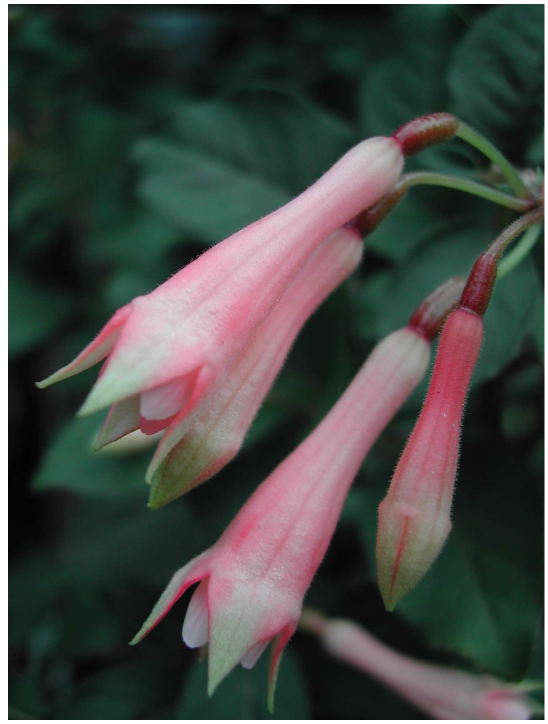
It is therefore assumed that the 'Göttingen' genome, following the same notation, can be represented by Tw T T T F.

The presence of a second defect for anthocyanin formation

The phenotype of Triphylla hybrid cultivar 'Jaspers Triphywhite' (Van Aspert, 2007) may serve as an indication for the presence of a second trait in 'Göttingen' for the interruption of anthocyanin formation. 'Jaspers Triphywhite' has presumably originated from a self-fertilization of 'Göttingen'. It has dark foliage and pink/white blooms. If it has indeed originated from a selfing, then at least on one of the 'Göttingen' chromosomes a defect for anthocyanin formation must be present.

Because it apparently only affects the colour of the blooms, it is clearly not identical to the recessive trait affecting the entire genome [l]. For distinction this defect shall be indicated as T_w. By double reduction, 'Göttingen' gametes containing T_wT_w could then be produced.

A 'Jaspers Triphywhite' genotype represented by TT_wT_w , $T T_wT_wT_w$, Tw T_wT T , etc. (potentially, but not necessarily in combination with F or even FF), could then most probably produce the pink/white 'Jaspers Triphywhite' blooms in combination with dark foliage as shown on the photographs.



Photographs by Hans van Aspert

'Jaspers Triphywhite'

'Jaspers Triphywhite', a combination of a light coloured Triphylla hybrid bloom and dark foliage

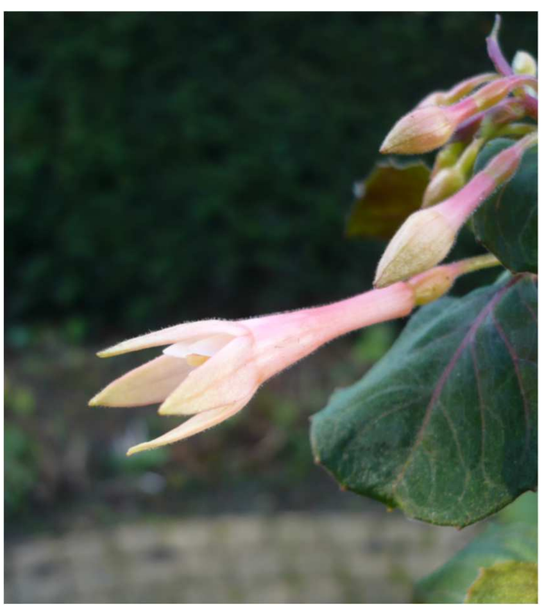
If 'Jaspers Triphywhite' should not have originated from a 'Gottingen' self-fertilization, it would be highly unlikely obtaining such phenotype with dark foliage and pink/white blooms, clearly resembling *F. triphylla* [k].

Further striking observation is, that amongst 'Göttingen' x 'Our Ted' seedlings having dark foliage clear differences exist as to the influence of low winter temperatures on the colour of the blooms. Some seedlings develop white hues in their blooms at low temperatures, others don't, which is also an indication of differences in the genome as to the amount of certain genes T_w affecting the anthocyanin production. An example is 'Strike The Viol', shown in the photographs below.

From the available information it cannot be determined whether the traits for interrupted anthocyanin production Tw and T_w are located on the same or on separate chromosomes.

As a final conclusion, it is assumed that as a working hypothesis the 'Göttingen' genome can be represented by TwT_wTTF.

'Strike The Viol' summer blooms



'Strike The Viol' winter bloom

References and remarks

[a] Communications by the editor of Die Gartenwelt, Volume 9, nr, 52, page 616 (1905).

[b] ILVO, the Belgian Institute for Agricultural and Fisheries Research, Caritasstraat 21, 9090 Melle (Belgium), www.ilvo.vlaanderen.be

[c] Katrijn van Laere, Leen Leus, Johan van Huylenbroeck ,Erik van Bockstaele; Interspecific hybridisation and genome size analysis in Buddleja; Euphytica (2009) 166:445-456.

[d] The DNA 2C value is the amount of nuclear DNA of the entire genome. Its value is expressed as picograms(pg).

[e] No uniform notation exists for gametes resulting from a polyploid specimen. If a 2n gamete is produced by e.g. the tetraploid *F. triphylla,* it may be indicated as a haploid or dihaploid gamete. As many Triphylla hybrid cultivars are triploid or pentaploid specimens, using the single haploid notation makes only little sense because gametes can be produced having one, two or three sets of chromosomes for the triploid and pentaploid, and even four or five sets of chromosomes for the pentaploid specimens. Therefore throughout the article, if it would be addressed, the gametes will be indicated as haploid, dihaploid, trihaploid etc. gametes.

[f] J. Ramsey, D.W. Schemke, 2002; Neopolyploidy in Flowering Plants; Annu. Rev. Ecol. Syst. 33: 589-639.

[g] Flowcytometry measurements using DAPI have been performed by the NKvF Hybridists Group. By comparing these DAPI measurements with the PI measurements performed by ILVO, a DNA value of 3.5 pg is estimated for 'Koralle', which seems a quite reliable value.

[h] A couple of years ago, fresh *F. triphylla* seeds have been obtained from Prof. Paul Berry. These seeds were sown by Mr. Gerard Rosema from the NKvF. Seedlings were distributed amongst the members of the NKvF's Botanical Group. Especially the seedlings *F.triphylla* 'PB7760#6' and *F. triphylla* 'PB7760#7' proved to be vigorous plants. They differ appreciably from the *F. triphylla* 'Herrenhausen' which was until recently the only *F. triphylla* available in the Netherlands for Fuchsia hybridization.

[i] G. Rosema, private communication to the NKvF Hybridists Group.

[j] M. de Cooker, The Fuchsia Breeders Initiative, Issue 5, July 2015, p. 2-6.

[k] At the time of introduction of 'Jaspers Triphywhite' (2007) no pink or white *F. triphyllas* were available for hybridization.

[l] The presence of such gene is also suggested by the phenotype of certain seedlings originating from 'Göttingen' x 'Our Ted' crossings. One of such seedlings, having white buds (N 14-34), is shown in The Fuchsia Breeders Initiative, Issue 6, December 2015, p. 8.

Old seedlings and vintage cultivars offer new challenges

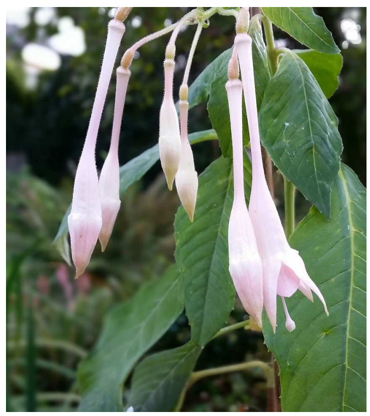
By Mario de Cooker

Photographs by Mario de Cooker

Triphylla Fuchsia N 16-05.
Female parent seedling dates from 2005.

Triphylla Fuchsia N 16-48.
Female parent seedling dates from 2012.

2016 has been a satisfying new seedlings year. A selection of new seedlings is shown on this page. Many of these have originated starting from seedlings or vintage cultivars being available already for many years. Of course, this year's new seedlings have to be tested for several more years, and they will probably not all make it to the introduction stage. But it shows the value of the year to year preservation of old material, for capitalizing on it in a later stage.



Triphylla hybrid *Fuchsia* N 16-54.

Female parent seedling dates from 2005.

The Fuchsia Breeders Initiative uses the following definitions for characterizing the type of Triphylla seedlings and cultivars.

F. triphylla

Seedlings characterised by a 100% *F. triphylla* genome, e.g. the species itself and the pink *F. triphyllas*.

Triphylla hybrid

Seedlings characterised by having, according to the hybridisation scheme, at least a 50% *F. triphylla* genome.

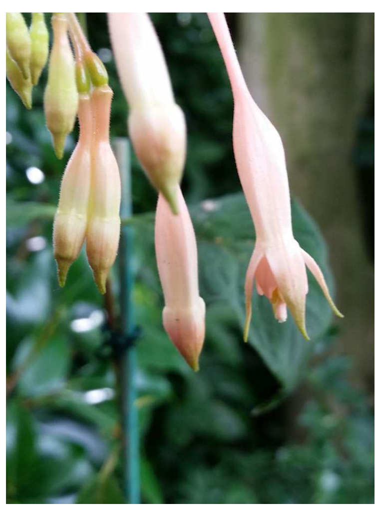
Cultivars originating directly from *F. triphylla* are by definition Triphylla hybrids. Also, cultivars originating from, as an'example, a crossing 'Göttingen' x 'Göttingen' are indicated'as Triphylla hybrids because the 'Göttingen' genome encompasses (according to the hybridisation scheme) 50% *F. triphylla* genes.

Triphylla

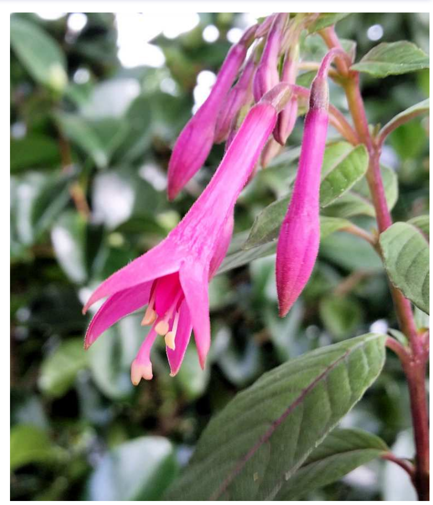
Seedlings characterised by having, according to the hybridisation scheme, at least a 25-50% *F. triphylla* genome.

An example is a seedling originating from the crossing "Göttingen" x *F. magellanica*, having an arithmetic 25% *F. triphylla* genes.

Wafer-thin tubed Triphylla hybrid *Fuchsia* N 16-19.
Female parent is vintage *F*uchsia 'Thalia'.



Near white Triphylla hybrid *Fuchsia* N 16-29.
Female parent is vintage *F*uchsia 'Göttingen'.



Triphylla *Fuchsia* N 16-51

Female parent is a seedling dating from 2002, male parent is a seedling dating from 2001.

***Canis lupus familiaris* Irish Terrier 'Nephele' is dreaming of a White Christmas.**

At the end of December still several Fuchsias are in bloom in the cold greenhouse.

Photographs have been taken using flashlight for obtaining special bright color effects.

Photographs: Mario de Cooker

Contents of the next issue

The next issue is scheduled for the end of July 2017.

Quote & Clichet

(by Edwin Goulding)

Rudyard Kipling, in his *Just So Stories*, described his *"six honest serving-men"*. Next time we will examine ways of utilising his experience to our advantage.

Going through the learning curve.

(By Mario de Cooker)

The learning curve is a well known concept in Science & Technology. It represents the amount of knowledge acquired on a certain subject as a function of time. Knowledge accrues with time, but might in the end disappear as well. Sharing and securing knowledge is therefore of the utmost importance at any stage of development.

Want to learn more about all this? Then stay connected!

Your contribution to the The Fuchsia Breeders Initiative is highly appreciated. Contributions for the next issue should be made available at the latest on 10 July 2017.

The Fuchsia Breeders Initiative

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