

# The Fuchsia Breeders Initiative

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## The advantages of being polyploid.

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Contributions for the next issue, which is scheduled for the end of July 2019, should be in the editor's possession ultimately on 15 July 2019.

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

Any new Fuchsia cultivars being released? Please provide a photograph and some descriptive information, and it will be seen and get attention all over the world!

Photograph on front page:

*Fuchsia* 'Elisabeth Honorine'  
(De Cooker, 1991)

In a review article in *Nature*, November 2005, Luca Comai, professor at the UC Davis College of Biological Sciences (California, USA) describes the advantages and disadvantages of being polyploid. Polyploids are very common among plants. They possess more than two complete sets (the diploid count) of chromosomes and are usually fit and well adapted. All kinds of interesting phenomena occur in polyploids. As an example, the organization and function of the genome changes at both genetic and epigenetic level. Epigenetic remodelling leads to both the activation and suppression of gene expression. In *Fuchsia* we see this happen in the creation of mini-triphyllas. Furthermore, in polyploid crossings the production of aneuploid seedlings is more the rule than the exception, which might lead to an increase of phenotypic variability in the progeny. Polyploids have huge potential for making new geno- and phenotypes. In *Fuchsia* this has resulted in the creation of thousands of new cultivars over the years,



Editor of The Fuchsia Breeders Initiative

**Mario de Cooker**

and still thousands of unexplored opportunities exist. In this issue of The Fuchsia Breeders Initiative one of such opportunities is described. A special and unexpected series of events has led to the creation of the presumably hexaploid purple triphylla seedling N 16-20. The crossing delivered just one berry, carrying only two seeds, of which one seedling survived. And this one seedling produced its first flowers only in the second year. And finally, just this seedling has brought about a breakthrough in the creation of purple triphyllas. Indeed, here it shows the advantages of being polyploid—combined of course with lots of luck! Therefore, when working on our fuchsia crossings we should always keep in mind Shel Silverstein's child poem 'Listen To The MUSTN'TS'. We should never stop dreaming about new chances in *Fuchsia* hybridisation. Which seems to be an excellent thought to start the new year.

*I wish you and your family a Very Merry Christmas and all the best and happiness for the New Year 2019!*

*Mario de Cooker*

### Listen To The MUSTN'TS

By Shel Silverstein

Listen to the MUSTN'TS, child,  
Listen to the DON'TS  
Listen to the SHOULDN'TS  
The IMPOSSIBLES, the WONT'S  
Listen to the NEVER HAVES  
Then listen close to me—  
Anything can happen, child,  
ANYTHING can be.

# Evolutionary Niche

By Edwin Goulding

Photographs by Edwin Goulding

## Introduction

An amplified version of Darwin's theory of evolution has been proposed by Kevin Laland. It has been called the "Expanded Evolutionary Synthesis".<sup>1</sup> Four key areas of differentiation are listed: developmental bias, developmental plasticity, inclusive inheritance and niche construction. Already work has commenced on research projects aimed at examining these selected areas in a scientific way. But, it is the last of these concepts that I wish to explore in this article.

## Niche construction

An example of one special evolutionary niche is to be found among the South American *Fuchsia* species. Co-evolution has developed between the Chilean *Fuchsia lycioides* and its humming bird pollinator, *Rhodopsis vesper atacamensis*. Co-dependency affects the length of flowering season of *F. lycioides* in order to provide a continuous food source for the bird upon which it depends for its very existence.<sup>2</sup> However, in an arid climate plant food resources are scarce so two types of flower can be found. Hermaphroditic blooms produce nectar unpredictably. Female ones although smaller and producing much less nectar are more predictable in its presence.

Now, we might assume that this niche construction would isolate *F. lycioides* genetically from others in the Genus. After all, it is separated by ecological features like the up-swelling Andes mountain range. Pollinator specialisation has taken place.

Time alone would have had an enormous impact on speciation. The likelihood of out-crossing in the wild between *F. lycioides* and any other species from the Genus does not exist. It inhabits a different and very difficult ecological niche along a narrow and restricted coastal strip of land. Surely, it can't be used successfully by *Fuchsia* hybridists, can it?



*Fuchsia lycioides*

## Ploidy

This *Fuchsia* species, the only one in Section *Kierschlegeria*, shares one feature with all of those from Section *Quelusia*; it is a polyploid.<sup>3</sup> The two Sections inhabit the Chilean and Brazilian regions of South America. Their geographical separation and radically different habitats are no bar to success when cross fertilisation is carried out by hand. Their ploidy levels mean they are more compatible with each other than with any others that have the more normal ploidy level of twenty two and haploid counts of eleven. Further, progeny are much more likely to be fertile and so able to pass-on



inherited characteristics to future generations. In the normal way, as we have discussed in previous articles, fertility drops steeply in interspecific-hybrids and frequently disappears altogether. Everything we know about the ecological niche inhabited by *F. lycioides* would lead us to expect species incompatibility to be complete. Examination of the literature, pollen analyses and chromosomal findings proves this might not be the case.

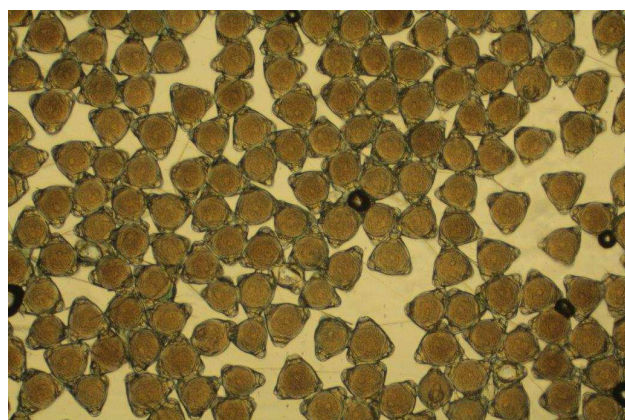
### Herman de Graaff

It is this compatibility that has been exploited in the past by one creative Dutch thinker in particular. Herman was one of the key members of the Dutch Fuchsia Society and intensely interested in the work and ideas expounded by John Wright.

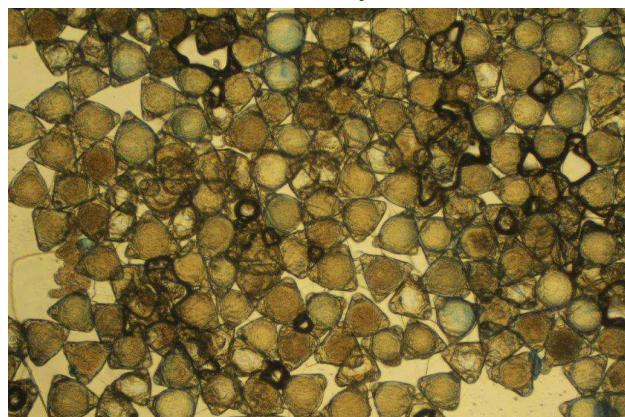
Principle among these thoughts was that a much wider range of genetic material was so far unused but available to interested hybridists. This idea was novel at the time and alien in a competition orientated club world that constantly harked back to winter hardiness, *F. magellanica*



*F. magellanica* var. *macrostema*



Pollen *Fuchsia lycioides*



Pollen *F. magellanica* var. *macrostema*

and “the good old (war time) days”. It became evident that Herman was both extremely well read and practically able. He proved more than capable of exploring new possibilities in his search for a much wider public interest in the Genus. Now is not the time to examine the full range of his work or of his major contributions to the *Fuchsia* world. Here, we are looking at a few of his early introductions featuring both *F. lycioides* and *F. magellanica* in their parentage.<sup>4</sup>

### 1985 introductions

#### ‘Aafje’

(*F. lycioides* x *F. magellanica*) x (Dorothea Flower x Golden Glow)

#### ‘Petite Fleur’

(*F. lycioides* x *F. magellanica*) x (Dorothea Flower x Golden Glow)

#### ‘Pink Rain’

(*F. lycioides* x *F. magellanica*) x (Dorothea Flower x Golden Glow)

#### ‘Wentelwiek’

(*F. lycioides* x *F. magellanica*) x (Dorothea Flower x Golden Glow)

## 1986 introductions

### 'Kolibrie'

(*F. lycioides* x *F. magellanica*) x (Dorothea Flower x Golden Glow)

### 'Lady's Smock'

(*F. lycioides* x *F. magellanica*) x *F. paniculata*

### 'Tempo Doeloe'

(*F. lycioides* x *F. magellanica*) x (Bicentennial x Golden Glow)

## Creative thinking

(three essential facets)

### Fertility

This is essential if new linear developments are to be made and progress maintained.

Near-crosses are more likely to have high fertility and so are those between polyploid plants. Far-out-crosses are much more likely to be sterile or minimally fertile. Researching written material allied to practical experience are the two most essential adjuncts if successful outcomes are to be achieved.

### Potential

Examine the introductions arising from such crosses and the possible directions to be taken in hybridising. Multi-flowering has been one such feature exploited by Jan de Boer. There are many others waiting to be found and developed. All that is required is the enthusiasm, energy, incentive and ability among Fuchsia hybridists. It cannot be stated often enough that to stand still is to ossify and die.



'Pink Rain'

### Novelty

The public expect and enjoy different things in their gardens and homes. Greater heat tolerance is one vital feature in today's world; triphyllas fill this market need. Winter flowering Encliandra hybrids that bloom in low light levels and can be grown in the average house would be a marvellous development. *F. lycioides* has two major advantages, drought resistance



'Petite Fleur'



'Lady's Smock'

and year round blooming but it is not used to extremes of heat or cold. However, opinions matter little in the world of commerce; money talks.



## New un-named seedlings (Goulding)



**Seedling .NO.515.**

(*F. jimenezii* x *F. paniculata* {tetraploid}) x  
(*F. ravenii* x (*F. microphylla* ssp. *microphylla* x  
*F. lycioides*))



**Seedling .OA.566.**

'Straat Flores 2' {un-named seedling} x  
(*F. ravenii* x (*F. microphylla* ssp. *microphylla* x  
*F. lycioides*))

### Existing knowledge

One of the reasons why hybridists are not more adventurous is because of lessons already learnt. Unfortunately existing knowledge can be based upon mistaken interpretations of existing information. You will remember that it took a very long while for the Copernican idea that the sun, and not the earth, was the centre of the universe to be accepted as true.<sup>5</sup>

*F. lycioides* has earned itself a bad reputation. Its progeny are particularly prone to attacks of red spider mite and rust. I have experience of this in the past and many other growers and

hybridists share this view. Its reputation is well earned. Sadly, this opinion might have been caused by the choice made in selecting Section *Quelus*, and *F. magellanica* in particular, as its partner.

The two sections inhabit entirely different environmental zones. *F. lycioides* comes from an exceptionally dry area with relatively little variation in year round air temperatures. *F. magellanica* is more familiar with extremes of cold and rainfall. Perhaps, in this pairing we have the makings of a mismatch and a sorry reputation.

## Great explorations

The days of the great explorers might seem to be past. Captain Cook and many others sailed in hope and were only proved right in their endeavours following enormous efforts. Our work as hybridists is miniscule by comparison and yet there is so much to find out. There is only one place to start and that is at the beginning. It requires an open and enquiring mind combined with a different idea. Now is a good time to move on. I am not suggesting that *F. lycioides* has to be your starting plant, much less *F. magellanica*. Only keep an open mind. Here is the germ of an idea.

Fertility: *F. lycioides* is not only highly fertile it is also a polyploid and that is certainly a rare natural advantage.

Year round blooming in clusters, given minimal protection, allows its use with short-day-length flowering and with long-day-length cultivars.

Potential: There are more than a hundred species to choose its partners from; female or male. Each has its own different characteristics. Because one cross gives poor results this is not a guarantee that all others will do so too.

Novelty: Species from Section *Hemsleyella* have been under explored. *F. apetala* has been shown to have tetraploid as well as diploid versions. There are polyploid versions of many other species like *F. fulgens* and *F. paniculata*.

Vive la difference.

## Other species from Section *Quelusia*



*F. brachelinae*



*F. brevilibis*



*F. campos-portoi*



*F. glazioviana*

## Conclusion

This article started with an idea that might help to enlarge our perception of evolution and genetics, the “Expanded Evolutionary Synthesis”. It discussed one environmental “niche” that affects *F. lycioides* and its co-dependant pollinator.

From these points things moved on to ploidy levels and the advantages offered to plant breeders by polyploids. Then we talked about hybridising examples that took place more than thirty years ago, were radical at the time, and still are.

In discussing three essential facets: fertility, potential and novelty, we thought about the drawbacks and advantages that working with *F. lycioides* might offer. An existing

enormous genetic pool of partners remains to be explored.

From this we learnt that it is too easy to assume lessons learnt from one experience are any guide to universal rules. Only by exploring new territory in hybridising are we able to keep learning and developing.

In fact, boredom itself is the biggest killer of enthusiasm, for us and for the wider gardening public. No wonder *Fuchsia* club membership is declining across the world. All of which can best be summed-up for the hybridist by a simple dictum.

***“It is better to come from a niche  
than to be stuck in a rut.”***



## AFTERWORD

There, - just when you thought it was all over.

This article purported to be about an Evolutionary Niche as suggested by Kevin Laland in the *Expanded Evolutionary Synthesis*. As you can see, it is too easy to let our experiences of *Fuchsia* in cultivation encompass our whole experience of the Genus.

The reason I began thinking about this was that all the specimens currently in cultivation appear to be fully hermaphroditic. Within its limited native geographical range things are so very different. There, *F. lycioides* is subjected to a semi-arid Mediterranean climate. Resources are extremely limited, especially as far as annual rainfall is concerned.

In an effort to maintain its pollinator these resources have to be carefully allocated. Subdioecy exists. There are approximately equal numbers of plants bearing small female flowers and those with larger hermaphrodite blooms. In some of the hermaphrodite flowers no style exists and the blooms are functionally male in type.

Moisture stress seems to play a large part in the percentage of flowers affected.

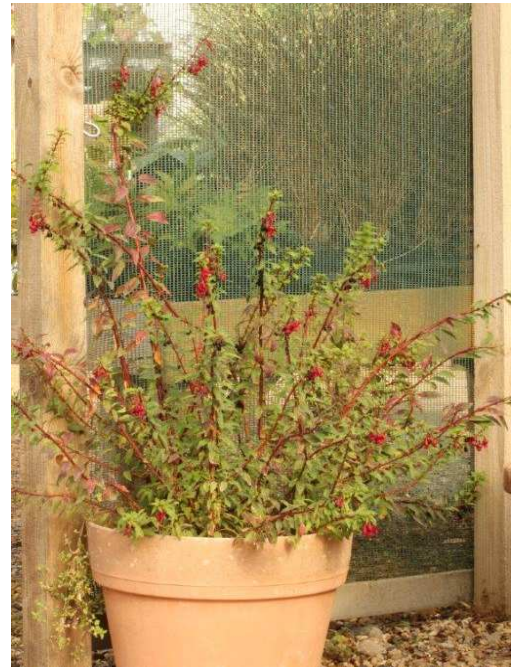
Scarcity of resources also affects the pollinator; the further north in the range the more such stresses occur. This leads to tube piercing, and nectar robbing, where nectar is present. However, even seemingly styleless flowers will produce some seed pods, especially early in the season. Continuity of nectar production is essential for plants and pollinators however scarce resources might be.

It has been found that temperature can affect female fertility in gynodioecious species such as *F. microphylla* and *F. thymifolia*. Dioecious and subdioecious species may alter their sexual state in response to size, age and the ambient environment. It is thought that the development of subdioecy in *F. lycioides* has been driven by its obligate outcrossing need.

Because of the stiff on-shore winds insect pollination is not an option for *F. lycioides*. The flower colours reflect its bird pollinator's preference; red. Even the length of its tube is governed by the length of bill found in *Rhodopsis vesper atacamensis*.

Insects such as flies tend to be attracted by white colouration in blooms.

In all then, a niche to beat all niches. Thank goodness we hybridists have rather more room to manoeuvre.



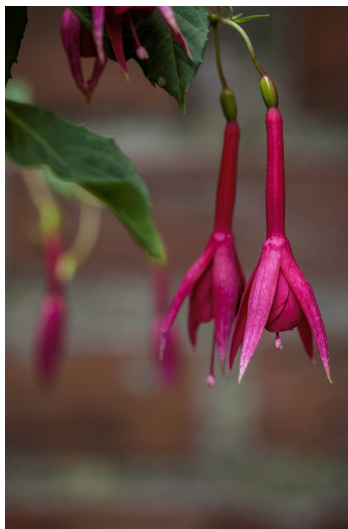
*Fuchsia lycioides*  
Plant at Beth Chatto's nursery<sup>6</sup>

## References

- <sup>1</sup> LALAND, K.N., et al, 2015, The extended evolutionary synthesis: its structure, assumptions and predictions. *Proc. R. Soc. B.* **282**: 20151019. <http://dx.doi.org/10.1098/rspb.2015.1019>
- <sup>2</sup> ATSATT, P.R., & RUNDEL, P., Pollinator Maintenance vs. Fruit Production: Partitioned Reproductive Effort in Subdioecious *Fuchsia lycioides*: in *Annals of the Missouri Botanical Garden* 1982, vol. 69, no. 1, pp.199 – 208.
- <sup>3</sup> HOSHINO, T. & BERRY, P., Observations on Polyploidy in *Fuchsia* Sections *Quelus* and *Kierschlegeria* (Onagracea): in *Annals of the Missouri Botanical Garden* 1989, vol. 76, no. 2, pp.585 – 592.
- <sup>4</sup> DE GRAAFF, H., *Fuchsia's uit Nederland*, Gottmer: Haarlem, 1990, p.28.  
(Note: ROSEMA, G., *Fuchsia Breeding* – 6. Chromosome numbers: in *Fuchsiana* April 2010: pp.47-49. gives 'Rosea' = *F. magellanica* x *F. lycioides*.)
- <sup>5</sup> GOULDING, E., *It ain't necessarily so*: in *The Fuchsia Breeders Initiative* July 2016, Issue 7, p.5.
- <sup>6</sup> CHATTO, B., *The Dry Garden*, Orion: London, 1978.

## New Fuchsias from Hans van Aspert (NL)

Photographs by Hans van Aspert



**'Jaspers Experience'**

### 'Jaspers Experience'

*Fuchsia* **'Jaspers Experience'** (Van Aspert, 2018) originates from the crossing (*F. magellanica* x *F. fulgens*) x selfing seedling *F. juntasensis*.

The cultivar is a self-branching fuchsia variety. Flower colour is light beet red. It's best grown as a semi-trailing bush and prefers a location with bright filtered light, away from direct sun.



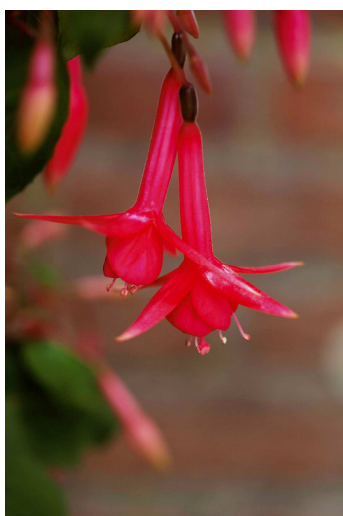
**'Jaspers Sprietje'**

### 'Jaspers Sprietje'

*Fuchsia* **'Jaspers Sprietje'** (Van Aspert, 2018) originates from the crossing 'Göttingen' x 'Ting-a-Ling'.

It's a small to medium sized plant with single flowers having a long tube.

Best grown as a bush in filtered light.



**'Jaspers Sunshine'**

### 'Jaspers Sunshine'

*Fuchsia* **'Jaspers Sunshine'** (Van Aspert, 2018) originates from the crossing selfing seedling 'Göttingen' x 'Landgoed Groeneveld'.

It is a semi-trailing fuchsia with semi-double orange/pink flowers.

It's best grown in filtered light.



**'Elize'**

### 'Elize'

*Fuchsia* **'Elize'** (Van Aspert, 2018) originates from the crossing 'Göttingen' x (('Gruss aus dem Bodetal' x 'Rohees Alami') x 'Stad Elburg').

Its double flowers have a shiny dark beet-red colour. Best grown as a bush in filtered light. The Fuchsia is named after one of the hybridist's granddaughters.



**'Fuchsiana'**

### 'Fuchsiana'

*Fuchsia* **'Fuchsiana'** (Van Aspert, 2018) originates from the crossing 'Göttingen' x (('Gruss aus dem Bodetal' x 'Rohees Alami') x 'Stad Elburg').

This bush fuchsia has single aubergine flowers and is best grown in filtered light. It has been chosen by the Dutch Circle of Fuchsia Friends to be named after its magazine 'Fuchsiana'.



**'Peter Rijkoort'**

### 'Peter Rijkoort'

*Fuchsia* **'Peter Rijkoort'** (Van Aspert, 2018) originates from the crossing *F. triphylla* 'PB#7' x *F. fulgens* 'Rubra Grandiflora'.

It's a vigorous plant with shiny orange blooms, resembling *F. triphylla*. Peter Rijkoort, who deceased at age of 94 in 2011, was employed by the KNMI, the Dutch Weather Institute. He successfully applied his broad knowledge on statistics also for *Fuchsia*.





'Henk Westerhuis'

***F.* 'Henk Westerhuis'**

*Fuchsia* '**Henk Westerhuis**' (Van Aspert, 2018) originates from the crossing 'Jaspers Jeroen' x 'Jaspers Jeroen'.

It has light orange-red sepals and petals, and a brownish red corolla.

Best grown as a bush in filtered light.

Henk Westerhuis is one of the hybridist's Fuchsia buddies.



'Jaspers Jeroen'

'Jaspers Jeroen' = ('Toos' x 'Whiteknights Amethyst') x 'Prince Syray'.

## Ornamental Crops

In July 2018 the Springer publishing company has published in their Life Sciences series a book on **Ornamental Crops** as part of the **Handbook of Plant Breeding**. It covers a broad range of the breeding of ornamental plants. *Fuchsia* is one of these. All chapters can be purchased separately for € 30.

For more information on all subjects covered, please visit the Springer website  
[tps://www.springer.com/gp/book/9783319906973](https://www.springer.com/gp/book/9783319906973)

» Life Sciences » Plant Sciences

Handbook of Plant Breeding



© 2018

### Ornamental Crops

Editors: Van Huylenbroeck, Johan (Ed.)

Features the most up-to-date research on ornamental plant breeding

Includes discussions on plant traits and breeding techniques from the eminent research groups

Provides plant-specific chapters dedicated to all economically-major ornamental species

## Chapter 16 Fuchsia

**Mario G. R. T. de Cooker, Edwin J. Goulding, Jan H. Waldenmaier and Paul E. Berry**

**Abstract** *Fuchsia* hybridization and selection of cultivars have been taking place since the 1830s. Much of it was carried out by early horticulturalists who were reluctant to divulge their sources or else more recently by amateur growers who were often opportunistic in their approaches and selection of material. Through DNA sequencing, we now have a fairly robust understanding of the evolution of the genus and how it can be divided into 12 sections, each containing one or more closely related species. This can help guide the selection of species for future hybridization work as well as to better understand the dynamics of some of the past crosses. The base chromosome number in *Fuchsia* is  $n = 11$ . The different ploidy levels in species and cultivars of *Fuchsia* are described, including how polyploids have been produced artificially through chemical treatment. A greater understanding of variation in flower color and search for novel colors can be gained by examination of anthocyanidin pigments. *Fuchsia* breeding has now shifted away from selection for cold tolerance toward utilization of a much wider array of intersectional crosses involving triphylla hybrids and smaller-flowered sections, as well as short-day-length (winter-flowering) species.

**Keywords** *Fuchsia* · Breeding · Interspecific hybridization · Anthocyanidins · Flow cytometry · Phylogenetics

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# In search for new purple triphyllas

By Mario de Cooker

## Part 1: Current range of purple triphyllas and running projects.

### Introduction

The triphyllas form a special group within the assortment of fuchsias. They are all directly (the triphylla hybrids) or in a short straight line descendants of *F. triphylla* and are for a large part characterized by their well-known distinctive shape, i.e. having a long tube and a single corolla with relatively short sepals. New cultivars are regularly added to the triphylla assortment. The color scheme is for the majority orange, often with pink or reddish shades. White and pastel-colored triphyllas are still very scarce, but recent developments for extending the assortment are promising. Also dark shades such as purple and aubergine hues are rare in triphylla, but also in this area interesting developments are taking place in recent years.

Subject of this article is discussing a number of possible routes for creating new purple triphylla fuchsias, thereby providing an up-to-date overview of the author's running projects, their ups and downs, their successes, expectations and unavoidable frustrations. A breakthrough has recently been achieved in one of these projects. It will be demonstrated how *F. jundasensis* plays a decisive role in making purple triphyllas. In a subsequent article in next year's July issue of The Fuchsia Breeders Initiative the genome of a number of triphyllas used in these projects will be explored.

**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. Examples are the species itself and, e.g., the pink and orange/pink bi-colour *F. triphyllas*.<sup>1</sup>

#### Triphylla hybrid

Seedlings characterised by having, according to the hybridisation scheme, at least a 50% *F. triphylla* genome are indicated as triphylla hybrids, but can be indicated as triphyllas as well. Cultivars originating directly from *F. triphylla* as the male or female parent are by definition triphylla hybrids. Also, cultivars originating from, as an 'example, a crossing 'Göttingen' x 'Göttingen' are considered triphylla hybrids because the 'Göttingen' genome includes (according to the hybridisation scheme) 50% of *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% of *F. triphylla* genes.

### Current assortment of purple triphyllas.<sup>2</sup>

The current assortment of purple-colored triphyllas is relatively limited.

#### *Triphylla hybrids*

**'Whiteknights Ruby'** (Wright, 1976).

Created from the crossing *F. triphylla* x *F. procumbens* by John Wright (UK).

**'Maori Pipes'** (De Graaff, 1987).

Created from the crossing *F. excorticata* x *F. triphylla* by Herman de Graaff (NL).

**'Sander Boschker'** (De Groot, 2017).

Created from the crossing *F. triphylla* (PB7760#6) x *F. perscandens* by Jan de Groot (NL).

**'Frans van Zon'** (De Keijzer; not AFS registered, year unknown).

'Frans van Zon' was created from the crossing *F. triphylla* x *F. jundasensis* by Dutch hybridist Broer de Keijzer.



*F. 'Whiteknights Ruby'*



*F. 'Whiteknights Cheeky'*



*Triphyllas*

**‘Whiteknights Cheeky’** (Wright, 1980).

‘Whitenights Cheeky’ was made by John Wright (UK) from the crossing ‘Whiteknights Ruby’ x *F. procumbens*.

**‘Nippon’** (Bögemann, 1992).

‘Nippon’ was created from the crossing ‘Thalia’ x ‘Foolke’ by German hybridist Lutz Bögemann.

**‘Catharina’** (Smits, 1994).

‘Catharina’ was created from the crossing ‘Gartenmeister Bonstedt’ x *F. procumbens* by Dutch hybridist Arie Smits.

**‘Sparky’** (Webb, 1997).

‘Sparky’ was created from the crossing *F. procumbens* x ‘Thalia’ by Peter Webb (UK).

**‘Jaspers Lange Jaap’** (Van Aspert 2000).

‘Jaspers Lange Jaap’ was created from the crossing ‘Göttingen’ x ‘Whiteknights Amethyst’ by Dutch hybridist Hans van Aspert.

**‘Daryn John Woods’** (Goulding, 2000).

‘Daryn John Woods’ has been created from the crossing ‘Thalia’ x *F. juntasensis* by Edwin Goulding (UK).

**‘Winter Hymn’** (De Cooker, 2014).

‘Winter Hymn’ originates from the crossing ((‘Göttingen’ x ‘Our Ted’) x (‘Göttingen’ x ‘Our Ted’)) x (*F. inflata* x *F. juntasensis*).

Several of these triphylla hybrids and triphyllas have been sporadically used in crossings aiming at making new purple triphylla cultivars. So far, only



***F.* ‘Daryn John Woods’**



***F.* ‘Winter Hymn’**



***F.* ‘Frans van Zon’**

few of such crossings have delivered interesting results. Recently, however, a breakthrough has been achieved by using ‘Daryn John Woods’ as the female parent (see page 16).

### Creating new purple triphyllas

Obvious approach for creating new purple triphylla cultivars is starting from dark cultivars having a long tube and a single corolla: the purple triphylla hybrids, purple triphyllas and dark-colored triphylla look-alikes. If crossed with *F. triphylla* these could deliver interesting triphylla hybrid seedlings. *Fuchsia* species that have been involved in making such long tube purple cultivars are *F. fulgens* and *F. magdalenae* for introducing a long tube, and *F. juntasensis* for introducing purple hues. Dark colours could or have been introduced also by using species such as *F. excorticata*, *F. perscandens*, *F. x colensoi* and *F. nigricans* or dark-colored *F. magellanica* derived cultivars, of which numerous have become available over the years.



***F.* ‘Maori Pipes’**



When starting from dark-colored cultivars, not being a triphylla look-alike, a severe hurdle has to be taken. Not only the color has to be transferred to the progeny, but also a triphylla type shape should be created. Examples of the progeny of such crossings are 'Fuchsiana' and 'Elize', both having a triphylla background and created recently by Dutch hybridist Hans van Aspert (see page 8). Although purple colors of these seedlings are quite satisfactory, the shape of the blooms and flowering characteristics have drifted away from the real triphylla type. They could, however, serve as interesting precursors for new purple triphyllas.

Some other potentially interesting non-triphylla purple cultivars for serving as a starting point are

**'War Pipes'** (De Graaff, NL, 1989), originating from the crossing *F. perscandens* x *F. magdalenae*.

**'Radings Kees'** (Reimann, NL, 1989), originating from the crossing *F. magdalenae* x *F. excorticata*.

**'Elma'** (Van den Bergh, NL, 1990), originating from the crossing *F. x colensoi* x *F. magdalenae*.

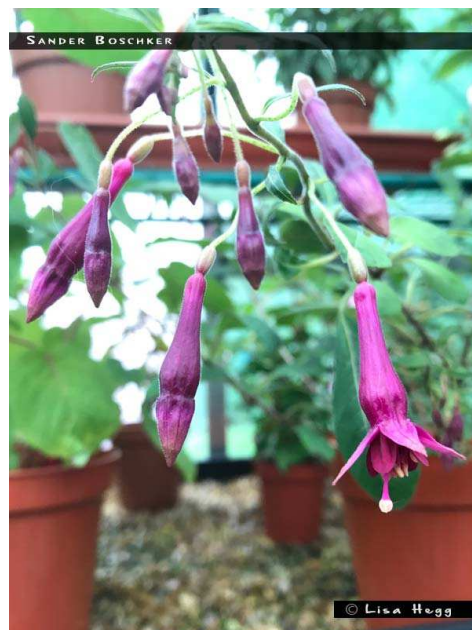
**'Monti'** (Van den Bergh, NL, 1990), originating from the crossing *F. x colensoi* x *F. pilaloensis*.

**'Winter Charm'** (De Cooker, NL, 2011), originating from the crossing (*F. inflata* x *F. juntasensis*) x *F. magdalenae*.

**'Winter Joy'** (De Cooker, NL, 2011), originating from the crossing (*F. inflata* x *F. juntasensis*) x (*F. inflata* x *F. juntasensis*)

Over the years, many hybridists have created their own private stock of non-released unnamed seedlings, having all kinds of shapes, colors and hybridization characteristics, for being used in their hybridization programs. A couple of such purple seedlings, stock-kept by the author, will be addressed in this article:

**I 89-04-02** (Van den Bergh, 1989), originating from the crossing *F. x colensoi* x *F. magdalenae*. I 89-04-02 is a fertile sister seedling of 'Elma' (Van den Bergh, 1990).



***F. 'Sander Boschker'***



***F. 'Winter Charm'***



***F. 'Nippon'***



***F. 'War Pipes'***

**N 01-02** (De Cooker, 2001), originating from the crossing ('Checkerboard' x 'Machu Picchu') x *F. juntasensis*. This fertile *F. juntasensis* look-alike, having one to four petals, has been described earlier in The Fuchsia Breeders Initiative, Issue 1, July 2013. p. 8-9.

**N 05-23** (De Cooker, 2005), originating from the crossing I 89-04-02 x 'Delicate White'.

**N 16-20** (De Cooker, 2016), originating from the crossing 'Daryn John Woods' x *F. triphylla* 'Purcellian Elegancy'.



## Making purple triphyllas starting from seedling I 89-04-02.

Both Hans van Aspert and the author have extensively used and still make use of this seedling in their programs for making purple triphyllas. Many of such crossings make excellent blooms. Growth properties of the seedlings however are in general rather poor, as is often experienced at progeny having *F. excorticata*, *F. perscandens* or *F. x colensoi* (= *F. excorticata* x *F. perscandens*, a natural hybrid) in their genes.

Typical examples of seedlings created via this route are the following.

**N 12-14** (De Cooker, 2014) = I 89-04-02 x *F. triphylla* PB7760#6. Good Triphylla bloom, good root system and satisfying growth properties. Quality of foliage however becomes rather poor in the summer season, which disqualifies this seedling for being released.

**HvA 12-05-02** (Van Aspert, 2012) = I 89-04-02 x *F. triphylla* PB7760#7. Excellent bloom, however very poor growth properties. Has been lost after a couple of years.

**HvA 15-13-01** (Van Aspert, 2015) = 'Göttingen' x I 89-04-02. Slow growing plant, good branching properties, moderately fertile.

**HvA 16-17-22** (Van Aspert, 2016) = I 89-04-02 x *F. boliviana* var. *typica*. Not a triphylla, however excellent triphylla shape and interesting colour of the blooms. Satisfying growth, but poor branching properties. Has unfortunately been lost in the 2018 summer season.

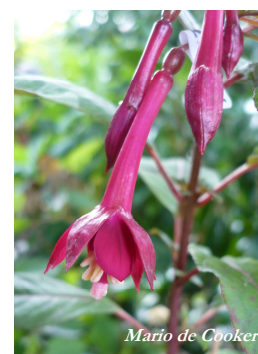
From the crossing results shown it can be concluded that seedling I 89-04-02 has clearly proven its potential for creating purple triphylla blooms having excellent colour and shape. However, the seedlings' growth properties are in general rather poor. Best approach for using I 89-04-02's potential seems therefore, as a first step, improving the seedlings' growth properties by carrying out non-triphylla crossings, followed by making triphylla crossings. Of course, under the condition that the purple colour hues could be retained and the triphylla flowering properties could be restored.

## Making purple triphyllas starting from N 05-23.

Seedling N 05-23 (De Cooker, 2005) originates from the crossing I 89-04-02 x 'Delicate White'. It has a reasonably, however not optimal purple bloom and has excellent fertility both as the male and the female. If used as the female parent it has the tendency to deliver progeny often having more phenotypic parental than maternal properties. Although N 05-23 is able to



**F. I 89-04-02**



**F. N 12-14**



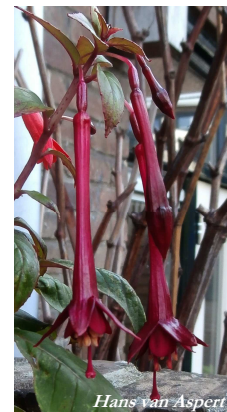
**F. N 12-14**



**F. HvA 12-05-02**



**F. HvA 15-13-01**



**F. HvA 16-17-22**



create even white progeny (depending, of course, on the type of crossing) it can also easily transfer its purple color to the progeny.

Some typical examples of purple seedlings originating from N 05-23 are addressed below. Goal of producing seedlings N 11-05 and N 14-10 was introducing genetic variability while preserving good growth properties and the purple colour, and intensifying the triphylla-look.

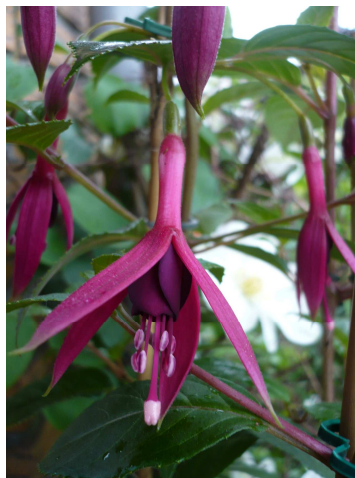
**N 11-05** (De Cooker, 2011) = N 05-23 x 'Grasmere'. It has excellent fertility and good growth properties, and is occasionally used in the purple triphyllas programme (see *F. P18-A1*, p.16).

**N 14-10** (De Cooker, 2014) = N 11-05 x ('Papy René x Papy René'). The seedling resembles N 11-05 but has a bigger bloom and longer tube. It has excellent fertility and good growth properties. Also this seedling is occasionally used in the purple triphyllas programme. Seedlings N 05-23, N 11-05 and N 14-10 all produce blue pollen.

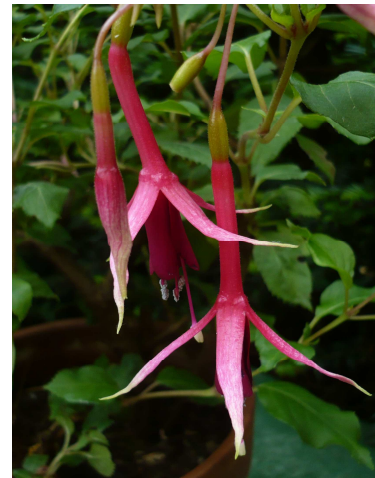
**N 13-06** (De Cooker, 2013) = N 05-23 x *F. triphylla* PB7760#6. This triphylla hybrid seedling has good shape and color, and good growth properties. It is, however, not really floriferous and produces no pollen. Also female fertility is rather poor. It has shown to be able transferring its colour in crossings with *F. fulgens*. The resulting seedlings, although having blooms with proper colour and shape, have rather poor flowering properties. These have therefore been disposed off. Occasionally some crossings with N 13-06 are still being made. Using this seedling could however well be a cul-de-sac, and has therefore only little priority. Seedlings N 11-05 and N 14-10 seem to have by far better potential for creating interesting progeny (having some brownish hues) in combination with triphyllas.

### Making purple triphyllas starting from N 01-02 and *F. juntasensis*.

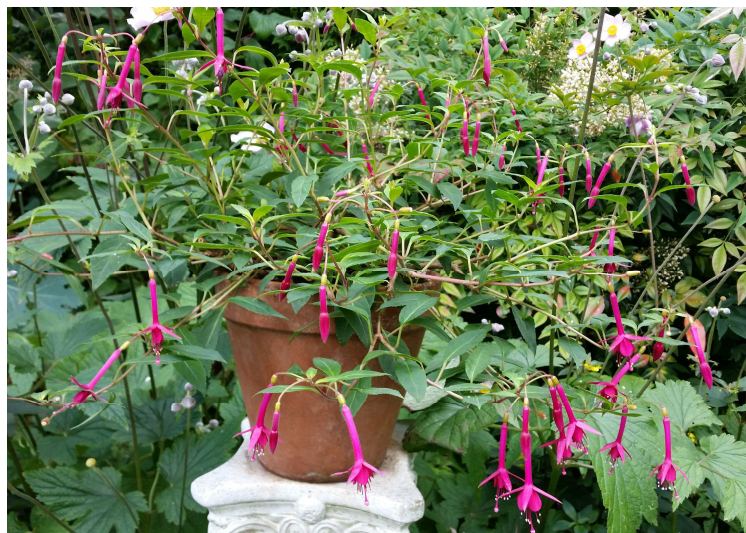
Seedling N 01-02 has unexpectedly originated from the crossing N 91-16 (= 'Checkerboard' x 'Machu Picchu') x *F. juntasensis*. Phenotypically, it has strong resemblance to *F. juntasensis*, and moreover, its 2C DNA value equals that of *F. juntasensis*. It would therefore be quite possible that in this crossing the entire N 91-16 genome has been eliminated as is



*F. N 05-23*



*F. N 14-10*



*F. N 13-06*



*F. N 01-02*



*F. juntasensis*



also described in literature for various other genera.<sup>3,4,6</sup> Result would be a seedling having a set of *F. juntasensis* chromosomes combined with a N 91-16 mitochondrial DNA environment.

Seedling N 01-02 has acceptable male and female fertility (albeit less than *F. juntasensis*) and has occasionally been used for making purple triphyllas. In general, it transfers a smaller corolla to its progeny than *F. juntasensis*.

Example of the outcome of such crossing is seedling **N 16-51** = ('Göttingen' x 'Our Ted') x N 01-02. Unfortunately this seedling has been lost last year for unclear reasons.

A couple of successful triphylla crossings using *F. juntasensis* as the male parent has produced seedlings **N 16-47** and **N 16-48**. Both of these seedlings originate from the crossing N 12-24 x *F. juntasensis*. Seedling N 12-24 itself has originated from the crossing 'Strike The Viol' x (('Göttingen' x 'Our Ted') x ('Göttingen' x 'Our Ted')). Main difference between these seedlings is their growth properties, which are rather lax for N 16-47 and vigorously upward growing for N 16-48. Both seedlings N 16-47 and N 16-48 have good fertility, however are short-day flowering specimens. Their main value would therefore probably be in transferring their interesting lilac-purple colours to their progeny, thereby hopefully also changing flowering time of the progeny towards the summer season.

### Making purple triphyllas starting from I 90-01 and 'Winter Joy'.

Unfortunately, seedling I 90-01 has, after 30 years of loving care, been lost this summer during the severe heat waves. Fortunately however, 'Winter Joy' has strong resemblance to I 90-01 and also its 2C DNA value equals that of I 90-01 (= *F. inflata* x



*F.* N 16-51



*F.* N 16-47



*F.* N 16-48



*F.* N 18-31



*F.* N 16-51 berries



*F.* I 90-01



*F.* 'Winter Joy'



*F. juntasensis*, producing the genome JJI). So comparable crossings could still be carried out.

Seedling **N 17-23** (no photograph available) has been obtained from the crossing 'Touch The Lute' x I 90-01. It has excellent male and female fertility. Its potential is not yet clear as first seedlings will be obtained in 2019 from this year's crossings.

Seedling **N 18-31** (photograph on p.15) has been obtained from the crossing 'Winter Joy' x pale pink *F. triphylla* F2-65. It makes long branches, which undesirable trait has been inherited from 'Winter Joy'. Its main value might therefore be in serving as a crossing parent in follow-up crossings for transferring its interesting shape and colour to its progeny, however fertility has still to be confirmed.

The yellowish-orange berries of N 16-51 (photograph on p.15) reflect the strong influence of *F. juntasensis* in the genome of such seedlings.

### Making purple triphyllas starting from N 16-20.

A breakthrough has recently been achieved by creation of seedling N 16-20, a vigorously growing plant originating from the crossing 'Daryn John Woods' x *F. triphylla* 'Purcellian Elegancy'. Flowering starts rather late in the season, typically at the end of July, but can be brought forward by growing it from un-pinned autumn cuttings. Also the non-pruned older plant starts making blooms earlier in the season, starting already in April/May.

N 16-20 has excellent fertility, both as the male and the female parent. Best pollen is obtained late in the season. Seeds are vigorous and typically need only 3-5 days for germinating.

In 2018 a first series of purple triphyllas has been produced starting from N 16-20 as the male or female parent, predominantly from crossings made in 2017 with various *F. triphylla* and *F. fulgens* specimens.

Variability is huge, and various interesting shapes and colour hues have been obtained (see the photographs on this page and p.17). Fertility of the newly bred triphyllas has still to be fully explored, but first indications are positive. This might open additional new ways for producing a broad range of purple cultivars. Triphyllas of course in the first place, but presumably different other types of progeny as well.

The genome of N 16-20 and its progeny, and consequences for fertility, are still under investigation. First



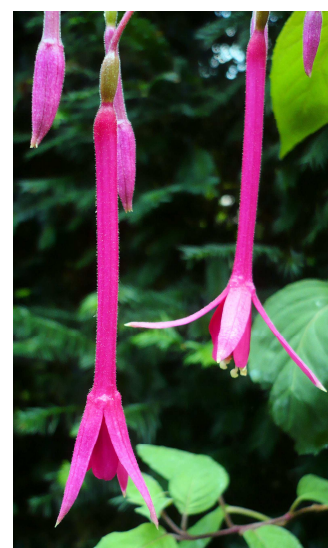
***F.* N 16-20**



***F.* P18-B3 = N 16-20 x  
*F. triphylla* PB7760#7**



***F.* P18-C1 =  
B 83-5 x N 16-20**



***F.* P18-A1 =  
N 16-20 x N 11-05**

results of flowcytometry measurements will be discussed in the July 2019 issue of The Fuchsia Breeders Initiative.

### Next steps.

From flow cytometry measurements it shows with high probability that Seedling N 16-20 has a hexaploid genome<sup>5</sup>. From the results of initial crossings as described in this article it has become clear that it has excellent fertility. It will be investigated how fertility and phenotypes of N 16-20 and its the progeny relate to the N 16-20 genome and how we could capitalize on this for transferring the reddish and lilac purple colours to the tubes, sepals and corollas of all kinds of different new seedlings, both triphyllas and other Fuchsia forms.





Mario de Cooker

### Selection of purple triphyllas, showing all different kinds of shapes and colour hues.

- |  |   |
|--|---|
| 1 = 'Winter Hymn'  | 10= P18-H3 = N 16-20 <i>F. fulgens</i> var. <i>gesneriana</i> (seedling 'dark')   |
| 2 = N 16-20 = 'Daryn John Woods' x <i>F. triphylla</i> 'Purcellian Elegancy'       | 11= P18-H5 = N 16-20 x <i>F. fulgens</i> var. <i>gesneriana</i> (seedling 'dark')   |
| 3 = P18-C1 = B 83-5 x N 16-20  | 12= P18-F8 = N 16-20 x <i>F. triphylla</i> 'Purcellian Elegancy'  |
| 4 = P18-M1 = N 16-20 x <i>F. fulgens</i> var. <i>gesneriana</i> (seedling 'light') | 13= P18-F6 = N 16-20 x <i>F. triphylla</i> 'Purcellian Elegancy'  |
| 5 = P18-A1 = N 16-20 x N 11-05   |   |
| 6 = P18-B3 = N 16-20 x <i>F. triphylla</i> PB7760#7                                | 'Winter Hymn' = ((('Göttingen' x 'Our Ted') x ('Göttingen' x 'Our Ted'))) x ( <i>F. inflata</i> x <i>F. juntasensis</i> ) |
| 7 = P18-A2 = N 16-20 x N 11-05   | B 83-5 = <i>F. magdalenae</i> x <i>F. fulgens</i> 'Rubra Grandiflora'   |
| 8 = P18-G1 = N 12-24 x N 16-20   | N 12-24 = 'Strike The Viol' x ((('Göttingen' x 'Our Ted') x ('Göttingen' x 'Our Ted')))                                   |
| 9 = P18-L1 = N 16-20 x <i>F. fulgens</i> var. <i>gesneriana</i>                    |   |

### References and notes

1. Examples of various *F. triphylla* specimens are given in The Fuchsia Breeders Initiative, Issue 4, Dec. 2014, p. 11-14.
2. Many thanks to Mr. Hans van Aspert for his help in making the Triphylla assortment overview.
3. Comai L. (2014) Genome Elimination: Translating Basic Research into a Future Tool for Plant Breeding. PLoS Biol 12(6): e1001876. doi:10.1371/journal.pbio.1001876
4. Ravi, M. et al. A haploid genetics toolbox for *Arabidopsis thaliana*. Nat. Commun. 5:5334 doi: 10.1038/ncomms6334 (2014).
5. M. de Cooker, Using Species in *Fuchsia* Hybridization. Presentation at the BFS Annual General Meeting, 80th Anniversary Celebration, 24 March 2018. The hexaploid N 16-20 genome 'TTTTTJ' as suggested in this presentation is most probably incorrect.
6. Chan S.W.L. (2010); Chromosome engineering: power tools for plant genetics; Trends in Biotechnology, December 2010, Vol. 28, No. 12, 606-610.

Photographs on p. 14-17 by Mario de Cooker.

# Thrum Eyed

By Edwin Goulding

Photographs by Edwin Goulding

## Introduction

We live in a “virtual” world. Many people seem to have eyes for nothing else but the screen in front of their face. Observational skills are becoming scarcer as the years pass. Yet, by losing the ability to see things in nature when they are before us we lose so much more. Seeing things in detail and having the ability to think about their implications are vital to the success of Fuchsia hybridists. “Seeing is not just believing” but is often the gateway to creativity for plant breeders.

## Extraordinary

Hybridising usually starts here in Suffolk around the second week in September each year. It continues spasmodically for a few months after the initial fevered rush of the first two or three weeks. At the moment, during the middle of October, plants are standing out of doors in the garden. This is unusual as they are usually kept in the greenhouse throughout the year. Photographs are then taken of the blooms and of pollen as they become available.

Every year new and unfamiliar stock are bought and examined. This makes sure my knowledge is kept up-to-date. Among those Fuchsias acquired this spring was *F. ‘Martin’s Trompet’* (Beije, 2003). It is a pendant plant that closely resembles *F. fulgens* in many of its characteristics and was almost written off as being just another look-a-like. What a mistake.

A close look at the two photographs will show that what seems at first glance to be very similar to many others, unoriginal, is in fact extraordinarily different. A casual glance would have missed the difference completely. Indeed, it had already been thought that it would not be possible to use it as a seed bearing parent because it didn’t seem to have any stigmas.



*F. ‘Martin’s Trompet’* (Beije, 2003)





Again, how wrong can you be? Inside the tubes, and extending about two thirds of their length, the style and stigma lie hidden underneath the stamens.

### Encliandras

Early lessons in botany illustrated two types of Primrose flowers, each with different style lengths and presentations. These are “pin eyed” and “thrum eyed” flowers. The first of these has its stamens and anthers set low down in the floral tube; its style and stigma extend to the tube opening. The second has stamens and anthers near the tube entrance whilst the stigma and style is very short and placed low down in the tube.

Breedlove in his monograph on Section *Encliandra*<sup>1</sup> described the presence of perfect flowers; that is, those having normally functioning female and male parts. He also speaks about other blooms that carry only partially effective characteristics. Male flowers with no female parts carry their anthers near the floral tube entrance. Female flowers appear with no male parts or ones that cannot function..

With the exception of *F. procumbens* the sole example from Section *Procumbentes* this condition is unknown throughout the rest of the Fuchsia world. That is, if you'll excuse the exception, of the year in which wasps removed male and female parts of many different Fuchsia flowers with gay abandon. Of course we know that they sometimes bore holes in the tubes in order to rob blooms of nectar. Possibly the

anthers were taken for their pollen. This is not a feature of the *Fuchsia* genotype.

Other examples relating to the sexual characteristics of encliandras were described in TFBI, Issue 8, December 2016. On page eight an example is shown of a female plant of *F. encliandra* ssp. *encliandra*. On its facing page a seedling is shown that started life as perfect (having fully functioning organs of both sexes) next to a photograph of this same plant after it had spontaneously changed into a staminate one.

### Conclusion

In this article we have discussed just how important keen observation and thoughtful appraisal can be when growing Fuchsias. The unexpected is always likely to happen when we least expect it. At this stage it is impossible to be sure whether *F. 'Martin's Trompet'* will prove to be a successful parent, either as a seed bearer or as a pollen contributor. In the meantime a valuable lesson was re-learnt, keep your eyes wide open and be prepared to see things anew as they happen. Happy hunting!

Oh, by the way, the tubes must be shortened carefully with fine sharp scissors before the anthers start to de-hisce in order for this plant to be used as a seed bearing parent.

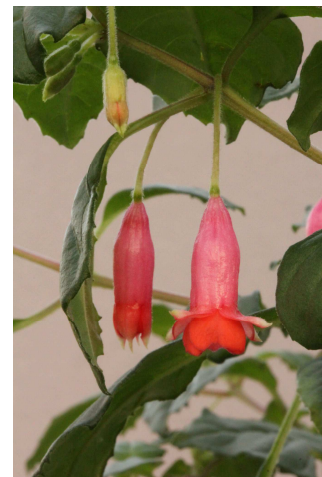
### Notes

1 BREEDLOVE,D.E., The systematics of Fuchsia Section Encliandra (Onagraceae), University of California Press, Vol.53, 1969, Library of Congress Catalog No. 72-6261-40.

**.NE.55. first opened perfect in form.**



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



## Breeding toads

Well, actually of course they take care of that themselves. Each year at the end of February they drop their eggs in the pond. At night they wander through the garden and across the terrace, looking for spiders, slugs, beetles and flies and anything else that fits their menu. In the daytime they keep calm, finding a place for dozing. During the severe heat waves as we have experienced this 2018 summer they felt quite comfortable in the damp environment between the fuchsias, even in the pots of fuchsia seedlings. Brilliant idea, maybe they could catch and consume some vine weevils!



## Contents of the next issue

The next issue is scheduled for the end of July 2019.

### Little Known Treasures (by Edwin Goulding)

Previously, we have considered unusual niche aspects of Fuchsia growing. In our next article we will examine Section *Hemsleyella*. This time however the uplifting of the Andean mountains has created multiple niches and massive difficulties in accessing these unusual plants.

### In search for new purple triphyllas.

#### Part 2: exploring the genome (by Mario de Cooker)

It will be explored if the excellent fertility of seedling N 16-20 could be understood and explained by its genome, containing the genetic material for making purple triphyllas. And how will this work out for the phenotypes and fertility of its progeny?

## 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 15 July 2019.

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