Metasystemisches Ergebnis zum

DFR gene

- a **red** rose becomes **blue**

Bensberg, den 27.11.2007

Roses are famous for their beautiful colours including red, pink, orange, yellow and even white. These colours have been developed through traditional breeding but never has a blue rose successfully been bred.

Some mauve roses have been bred but as it turns out these colours are actually produced by variations of red pigment not by the production of blue pigment.

To develop the world's first blue rose with blue pigment three steps had to be achieved:

1. Turn off the production of red pigment;

2. Open the 'door' to production of blue pigment; and then

3. Produce blue pigment.

One gene involved in flower colour, is the dihydroflavonol reductase (DFR) gene. The DFR gene makes the enzyme dihydroflavonol reductase (DFR) which turns on the manufacturing process in the plant that produces pigment that in turn colours flowers.
In roses the DFR gene is very good at producing red pigment and hence the range of commonly seen rose colours. However, the rose DFR gene is particularly bad at producing blue pigment, hence the difficulty in breeding a blue rose.

The first critical step in producing a blue rose was to stop the rose DFR gene making red pigment.

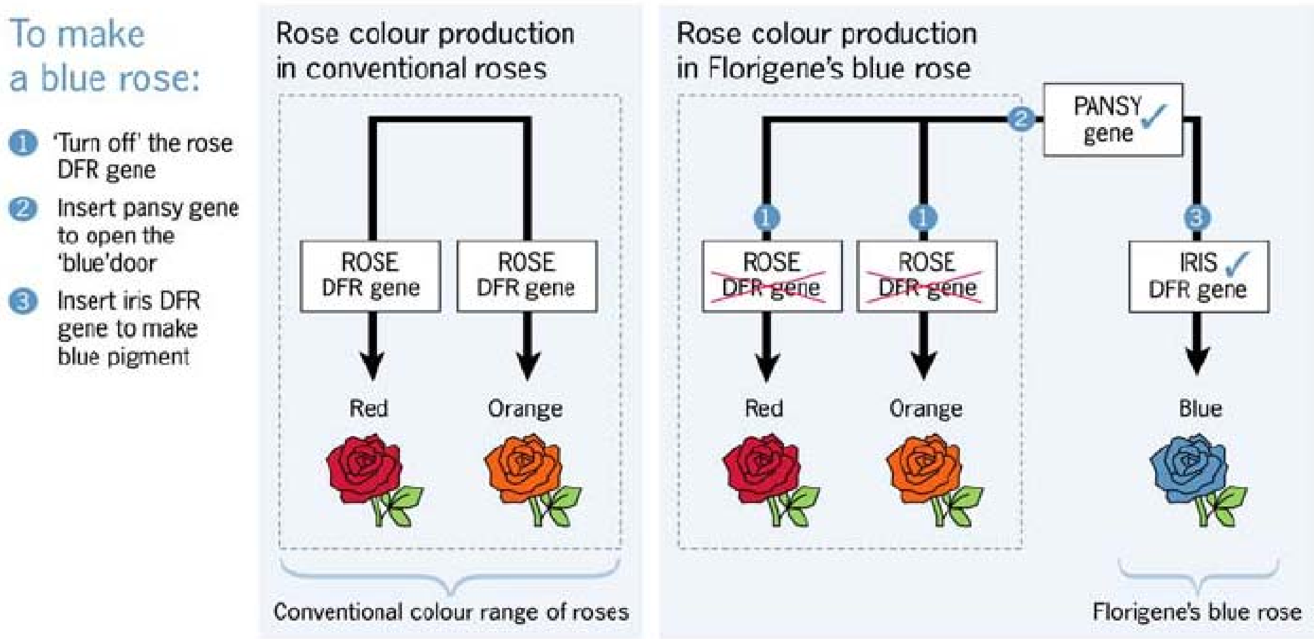
The blue rose – developed using CSIRO's hairpin RNAi

Opening the blue door

The second step towards a blue rose was to open the 'door' to allow for blue pigment to be produced.

The production process of colouring flowers is like a pathway. In roses the pathway to producing red pigment is open, but the blue pathway is closed.

Florigene and Suntory inserted a gene commonly called a delphinidin gene from pansy that opened the door to the production of blue pigment in the rose flowers.



Importing the blue colour

With the red pigment production turned off using CSIRO's gene silencing and the door open to the production of blue pigment, the final task was to find a DFR gene good at producing blue and placing it in the rose.

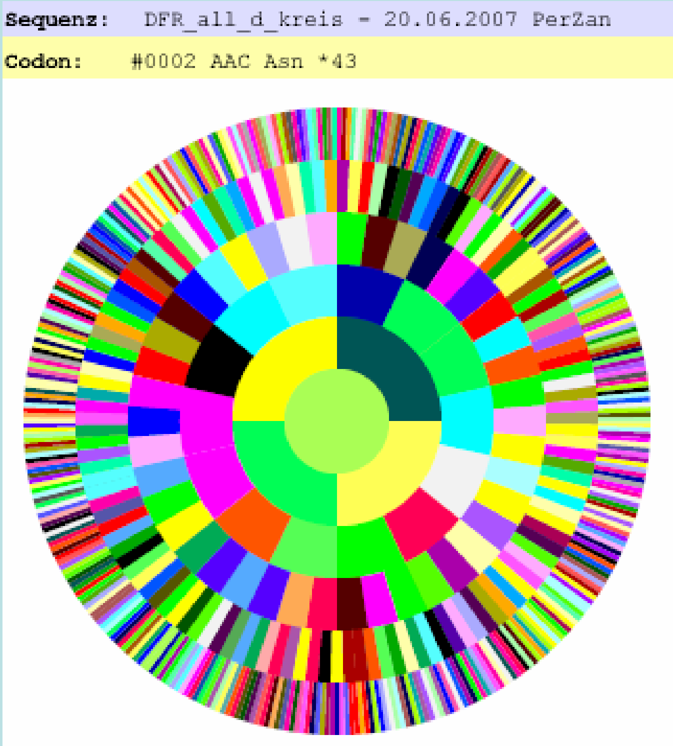
Florigene and Suntory decided to replace the rose DFR gene with a DFR gene from an iris, which is excellent at producing blue pigment. The iris DFR gene was inserted into the rose and subsequently a rose with a blue flower was produced.

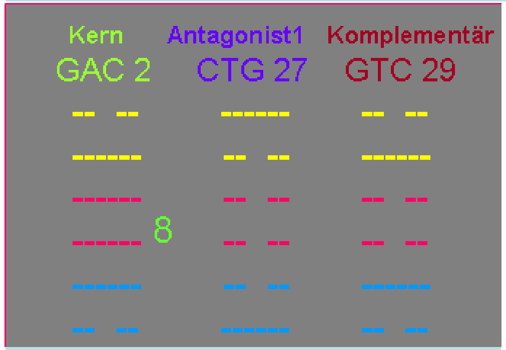
A bluer rose

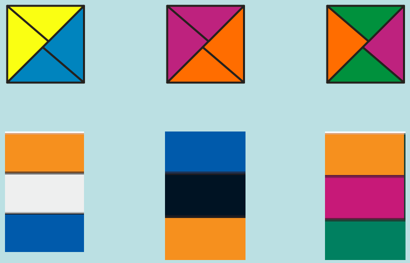
While the prototype blue rose made by Florigene and Suntory is in fact a pale violet colour it is the first rose of this colour that comes from blue pigment. The colour of other 'blue' roses currently on the market is only a modification of red pigment.
Even bluer flowers should be achievable if rose petals can be made less acidic, as acidity inhibits blue pigment.

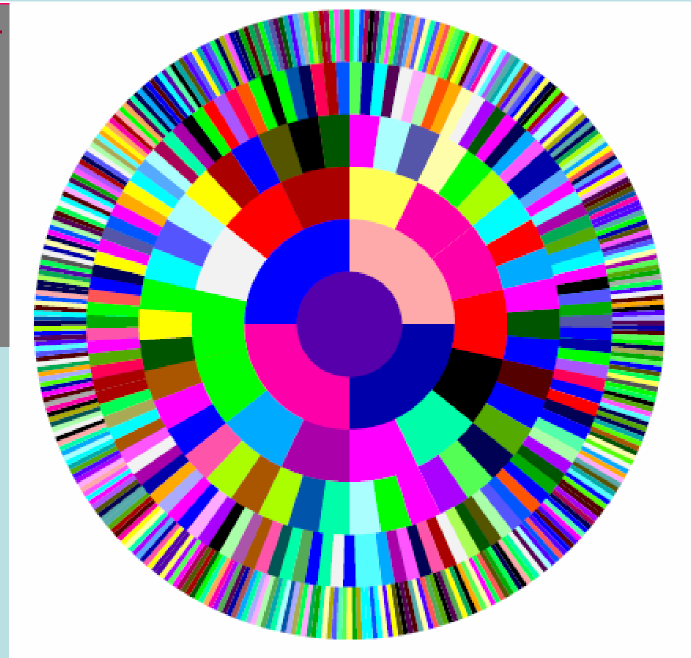
DFR Farbkreis

Der Farb-Antagonist









Von innen nach außen steigt hier bei angenommen antagonistischer Umkehrung des Kernwertes zum peripheren DNA- Radius der Rotanteil von 0 → 100 % => **gAc** → **cTg**

Dies wird durch eine farbantagonistisch gezeugte Abbildung simuliert („Der Farbantagonist“), wobei der dabei ausgewiesene Kern-Wert jetzt das Außen, den Farbwert der ursprünglichen Peripherie, repräsentiert.

Die Blau- und Gelbanteile kehren sich dabei nur geringfügig (G=33% >< C=66% Farbanteile) um, sodass als Struktur- und Farb-Antagonist das Blaurot CTG-27 entsteht.

Da jedoch hier im Absorptionsspektrum abgebildet wird , aber der Emissionswert erfahren werden soll („Farbe“), muss man die „Gegenrichtung“ = G><C-Tausch ermitteln, das wäre GTC-29, welches sich als ein tiefes Purpur-Rot („Purple“) definiert:

die „natürliche“ Farbe der Rose….

Kommentar:

Aus anderen Prozessen im Farbkreis wissen wir, dass der Farbkern häufig in farbig (=) funktional komplementärer Beziehung entweder zum eigenen äußeren Radius oder zum korrespondierenden Kern eines interagierenden Proteins (Schloss-Schlüssel-Prinzip) steht. Das erklärt auch, warum hier zunächst ein „gelbgrüner Kern“ für die Information „blaurote Rose“ codiert.

Wenn es gelingt, das „rote“ DFR Gene abzustellen („turn off“), dann sollte sich tatsächlich die „unterdrückte“ Blau-Emission durchsetzen können, so wie es im abstract gefordert und beschrieben ist.