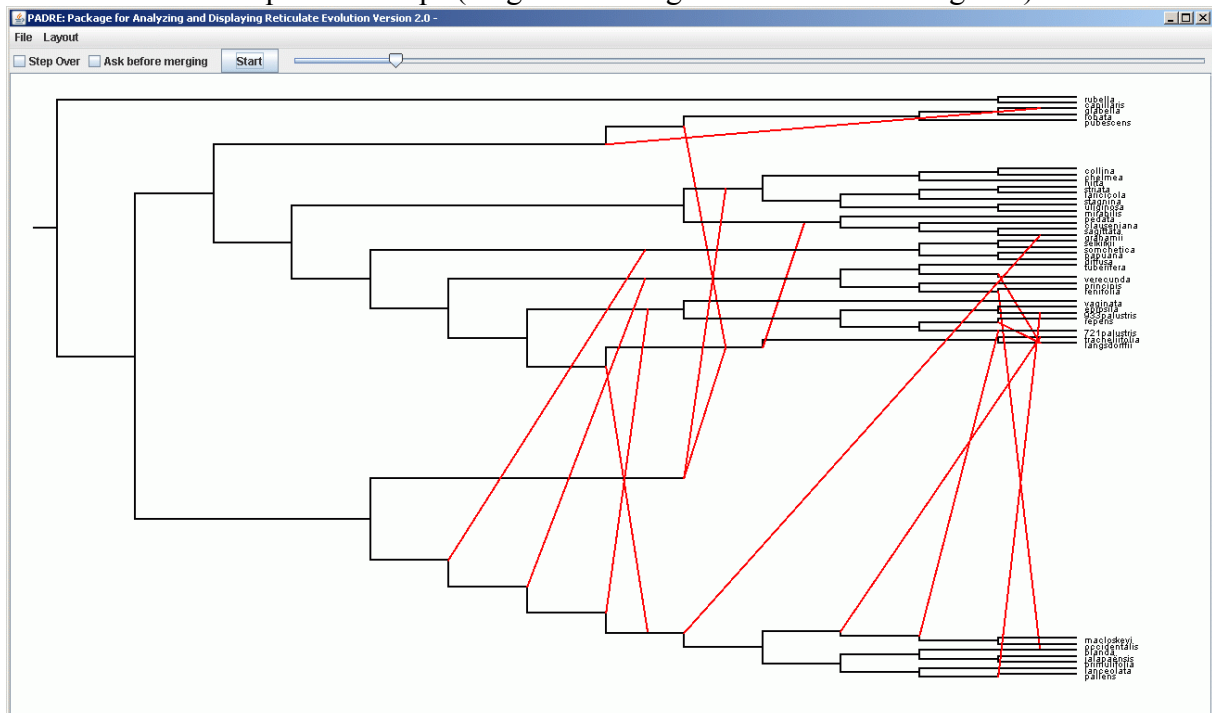


PADRE analysis #1: Assuming no loss/absence of homoeologs in the high-polyploids.

NEWICK input tree file:

```
((rubella, capillaris), (((((glabella, lobata), pubescens), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), glabella), (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), (pedata, (clauseniana, (sagittata, grahamii))), ((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), (repens, langsdorffii), 721palustris))), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))))) , (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), (tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))), ((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), (repens, langsdorffii), 721palustris))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))));
```

PADRE network requires 15 steps (15 genome mergers and no homoeolog loss):

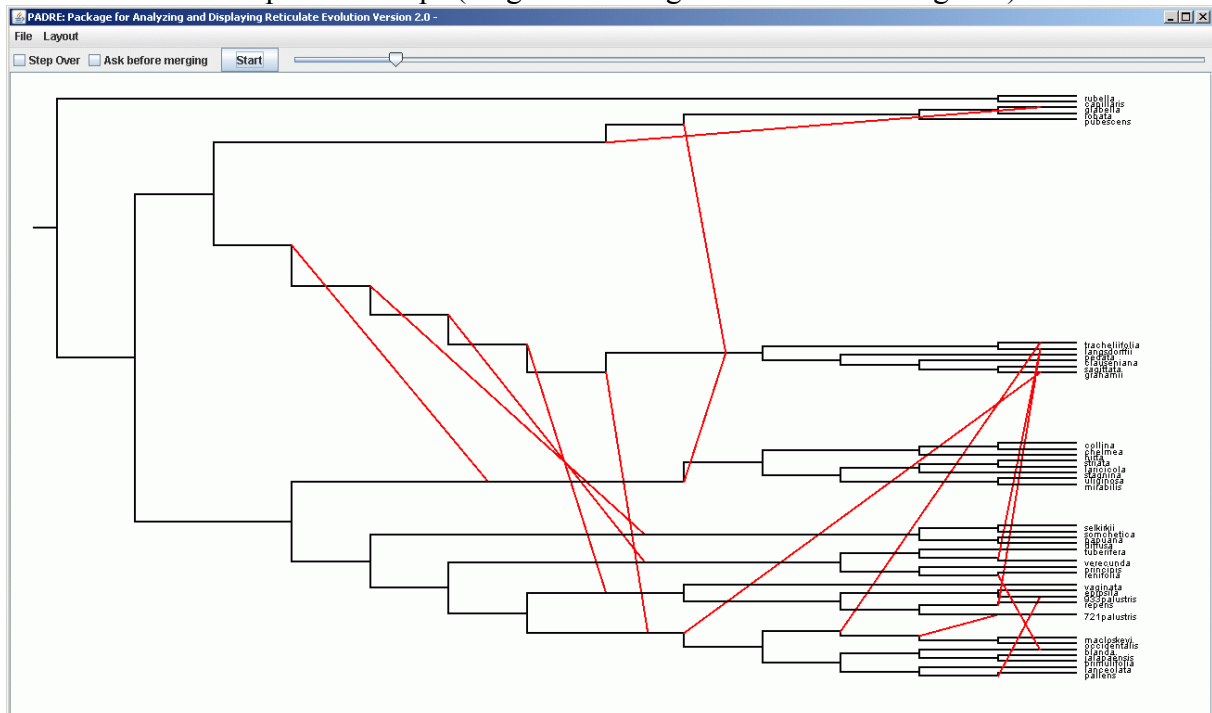


PADRE analysis #2: : Assuming loss/absence of CROs homoeolog in *Viola langsdorffii* and *V. tracheliiifolia*.

NEWICK input tree file:

```
((rubella, capillaris), (((((glabella, lobata), pubescens), ((tracheliiifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), glabella), (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), (tracheliiifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), (((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), ((repens, langsdorffii), 721palustris))), (((tracheliiifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), (grahamii, ((tracheliiifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))))) , (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), ((tracheliiifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), ((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), ((repens, langsdorffii), 721palustris))), ((grahamii, ((tracheliiifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))));
```

PADRE network requires 15 steps (14 genome mergers and 1 homoeolog loss):

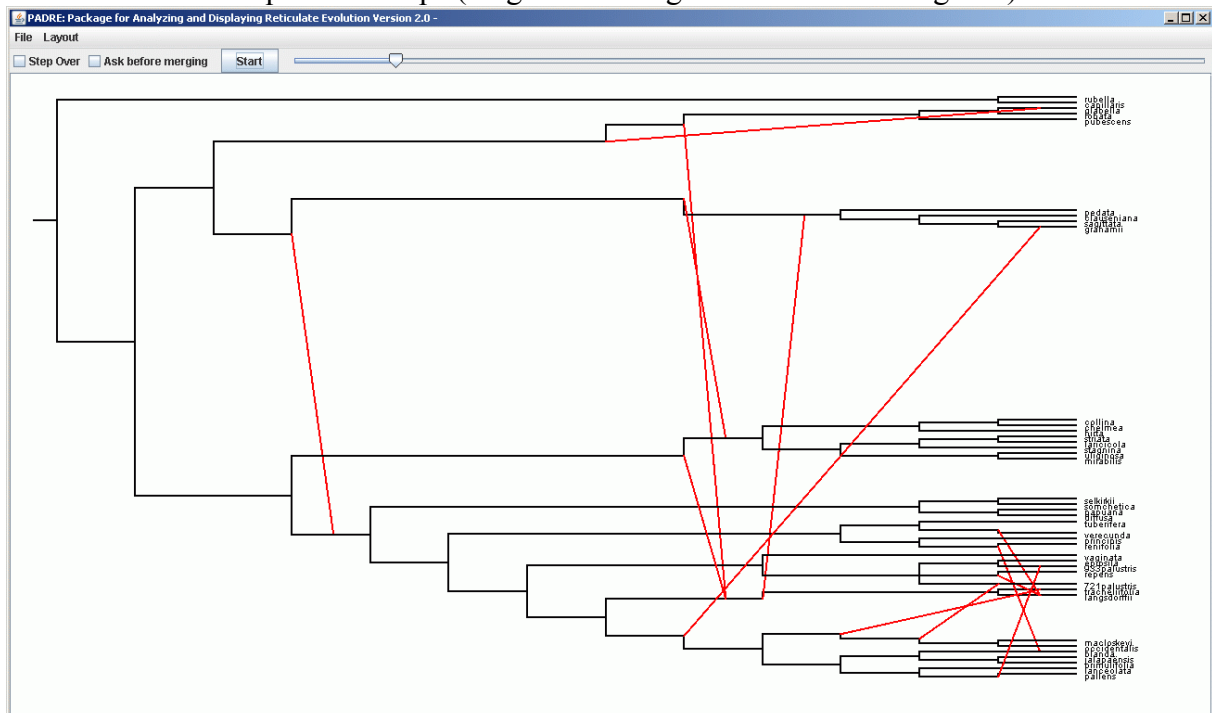


PADRE analysis #3: Assuming loss/absence of **MPLa** homoeolog in all high-polyploids.

NEWICK input tree file:

```
((rubella, capillaris), (((((glabella, lobata), pubescens), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), glabella), (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), (pedata, (clauseniana, (sagittata, grahamii))), ((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), (repens, langsdorffii), 721palustris))), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))))) , (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))), ((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), (repens, langsdorffii), 721palustris))), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii)))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))));
```

PADRE network requires 12 steps (11 genome mergers and 1 homoeolog loss):



PADRE analysis #4: Assuming loss/absence of CROs homoeolog in *Viola langsdorffii* and *V. tracheliifolia* and of MPlA homoeolog in all high-polyploids.

NEWICK input tree file:

```
((rubella, capillaris), ((((((glabella, lobata), pubescens), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), glabella), (((((collina, chelmea), hirta), (((striata, laricicola), stagnina), (uliginosa, mirabilis))), (tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), (((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), ((repens, langsdorffii), 721palustris))), (((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))))) , (((((collina, chelmea), hirta), ((striata, laricicola), stagnina), (uliginosa, mirabilis))), ((tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))))), (((selkirkii, somchetica), (papuana, diffusa)), ((tuberifera, (langsdorffii, verecunda)), (principis, (renifolia, blanda))), (vaginata, ((epipsila, 933palustris), ((repens, langsdorffii), 721palustris))), (tracheliifolia, langsdorffii), (pedata, (clauseniana, (sagittata, grahamii))), (grahamii, ((tracheliifolia, (721palustris, (macloskeyi, occidentalis))), (blanda, (jalapaensis, primulifolia)), (lanceolata, (pallens, 933palustris))))))));
```

PADRE network (Figure 5) requires 11 steps (9 mergers and 2 homoeolog losses):

