Theo Sanders November 2019

Narcissus x barrae and Narcissus grandae

In 2018 I got some bulbs of Rafa Díez Domínguez with the name N. x barrae. N. x barrae is a natural hybrid (CB) of N. cantabricus (CC) from Spain and the diploid N. bulbocodium (BB). B and C are the chromosome sets of the plants. Abílio Fernandes (1) found out that twelve of the fourteen chromosomes of N. cantabricus and N. bulbocodium look different and therefore N. x barrae cannot have a normal reduction division and is infertile. I found such a plant some years ago near Puertollano and saw that it had no pollen fertility. It was not vigorous and I could not grow it in Germany for a longer time.

Pollen of Narcissus grandae

The bulbs of Rafa flowered this spring and I looked at the pollen and could confirm his opinion that they are fertile. I measured a value of about 80 % fertility. The pollen grains have a volume of approximately 0.0001 cubic mm. The volumes of the diploid N. cantabricus and the diploid N. bulbocodium have only around half of this value. The haploid pollen grains of N. x barrae should have nearly the same value, if it were fertile. That means: The plants from Rafa are tetraploid, whereas the regular N. x barrae is diploid. The tetraploidy should be confirmed by the determination of the nuclear chromosome content or better by a chromosome analysis.

Narcissus grandae

The tetraploid and therefore fertile plant cannot be N. x barrae but should have developed from it. Meanwhile it has been described as the new species ‘N. grandae’ with alkaloids from N. cantabricus and N. bulbocodium, which proofs that they are the ancestors (2). The shortest way for the generation of N. grandae from N. x barrae is that it is formed within a flower by the combination of two unreduced gametes (CB) by selfing. They linked to an allotetraploid embryo CCBB. The possibility of this event is low. These unreduced gametes can sometimes appear on infertile plants. Another way is that an unreduced pollen grain (CB) combines with the egg cell of N.

cantabricus or N. bulbocodium forming CCB or BBC as triploid daffodils. When these again generate unreduced pollen, which combine with the egg cells of N. cantabricus or N. bulbocodium the allotetraploid CCBB is born. The model is called the 'triploid bridge'. I think selfing of the triploids by mating CB- gametes is also a possible path. Other alternatives for the emergence of a tetraploid N. grandae are imaginable. It must not be a pure allotetraploid, but may reside somewhere between allotetraploid and autotetraploid.

The establishing of an allotetraploid hybrid can afford a very long time and is an important process for forming new species by evolution. The new species can be better adapted to the ecological conditions of the site than the ancestors. When one allotetraploid plant is created, it can produce many seeds by selfing and later on cross with other plants of the same new species. N. grandae is very good in forming daughter bulbs. You get a big host in a short time even for pot culture. It originated obviously at different places. I did not yet saw it in nature but it can be found near Oliva de Mérida, San Román de los Montes, San Lorenzo de Calatrava and Andujar. There should also be many new triploids of the type CBB or CCB which developed by backcrossing of the new species with N. bulbocodium and N. cantabricus. Moreover, of course N. x barrae should grow there.

The appearance of N. grandae can be compared with the formation of N. miniatus and N. tortifolius, which are also allotetraploid. N. miniatus seems to be more vigorous and fit to grow at different sites than the ancestors N. elegans and N. serotinus. It can be found at many places around the Mediterranean Sea, where sometimes N. serotinus and only seldom N. elegans can be seen. If it lives together with its ancestors, the correspondent allotriploids should be found and N. x obsoletus as the diploid hybrid of N. elegans x N. serotinus. At the sites of N. tortifolius the forefathers N. papyraceus and N. assoanus do no more exist. N. tortifolius seems to be a specialist for very particular locations. Perhaps the new species N. milagrosus(2) with the ancestors N. fernandesii and N. bulbocodium is also an

allotetraploid. It is interesting in this context, that Abílio Fernandes considers N. romieuxii as an allotetraploid plant, which developed from tetraploid forms of N. cantabricus and N. bulbocodium (1). N. cantabricus foliosus from Morocco is such a plant and tetraploid yellow bulbocodiums ought to grow in northern Africa too.

Other allotetraploids are N. x xanthochlorus (N. cavanillesii x N. viridiflorus) and my transformed ‘Hawera tetra’ from ‘N. jonquilla x N. triandrus’. If they should be described as new species is another question.

For the hybridizer N. grandae is of interest because it can supposedly be combined with tetraploid standard daffodils. I crossed it in December 2018 with TS 108 (3W-R) as the pollen parent and got 25 seed grains. I hope that they are not from open pollination. Good partners in the bulbocodium section are N. cantabricus foliosus, N. romieuxii and different bulbocodium varieties. Crosses between N. cantabricus foliosus and tetraploid yellow bulbocodiums ought to generate plants, which are similar to N. grandae and N. romieuxii.

Literature

(1) Abílio Fernandes. Contribution à la connaissance de la biosystématique de quelques espécies du genre Narcissus L. 1967
(2)Ángel Sánchez García et al. Narcissus grandae y Narcissus milagrosus (Amaryllidaceae) dos nuevas especies en Extremadura (Españia). Fol. Bot. Estremadurensis, 13(2): 5-22. 2019