

## Chromosome analyses of prickly pear cacti reveal southern glacial refugia

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This is a polyploidy of species of *Opuntia humifusa*. Credit: Lucas C. Majure et al.

Analysis of chromosome number variation among species of a North American group of prickly pear cacti (nopales) showed that the most widespread species encountered are of hybrid origin. Those widespread species likely originated from hybridization among closely related parental species from western and southeastern North America. This study was published in the open access journal <u>Comparative Cytogenetics</u>.

The prickly pear cacti (of the genus **Opuntia**) are endemic to the



Americas. The genus is well known for the taxonomic difficulties it poses, as a result of hybridization and morphological variation, as well as lack of intense study. Studies of chromosomal differences among species have been beneficial with regards to recognition and determination of hybrid origins of many taxa. Those studies of the differences in chromosome number have shown that a majority of species of the genus have undergone genome duplication (also known as polyploidy).



This is a hypothetical origin and subsequent dispersal of *Opuntia* polyploid species. Credit: Lucas C. Majure et al.

This study suggests that a group of well-known prickly pear species occurring primarily in the United States are mostly derived from <u>hybridization</u> and genome duplication, which occurred as a result of the genetic separation of closely related parent species through <u>habitat</u> <u>fragmentation</u> during different times of the <u>Pleistocene</u>. Those closely related species, which were restricted to the southern United States, after thousands of years of separation, came back in contact and formed the common hybrids in the group, which in turn became dominant and more successful in distribution over their progenitors. Their <u>progenitors</u>



remained confined to the southern part of their distribution likely as a result of their non-adaptability to adverse environmental conditions, which hybrid taxa were more than able to cope with. This scenario results in the distribution pattern of species that we see today.

This study underscores that genome duplication has had an important effect on the evolution of prickly pear cacti and that understanding patterns in chromosome numbers can be used, in part, to infer the historical biogeography of certain plant groups.

**More information:** Majure LC, Judd WS, Soltis PS, Soltis DE (2012) Cytogeography of the Humifusa clade of Opuntia s.s. Mill. 1754 (Cactaceae, Opuntioideae, Opuntieae): correlations with pleistocene refugia and morphological traits in a polyploid complex. Comparative Cytogenetics 6(1): 53-77. <u>doi: 10.3897/CompCytogen.v6i1.2523</u>

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