

Does polyploidy play a role in the onset of the Italian endemic flora?

May 22 2012



Colchicum gonarei Camarda, the species with the highest known chromosome number ($2n = 180, 182$) among Italian endemics. Credit: Giuliano Mereu

Besides the obvious differences between plants and animals, subtle ones lie concealed within the cell, even within the nucleus. In both plant and animal cells, the nucleus contains DNA, which condenses into chromosomes during cell division. Chromosomes can be counted at that stage, revealing the chromosome number for each species. Here comes a difference: while the chromosome number spans a relatively short range across animal species (2-296: 46 in man), some plant species have over 1000 chromosomes. The adder's-tongue *Ophioglossum reticulatum*, a fern ally from the tropics, has 1440 chromosomes in its vegetative cells.

High chromosome numbers are generally linked to polyploidy, i.e. the occurrence of more than two haploid sets of [chromosomes](#). In this

research, the chromosome number variation of endemic Italian plants was evaluated. Endemics are species that are unique to a defined [geographic location](#), where they establish through some form of isolation – geographic or reproductive – from other species. As polyploidy can bring about reproductive isolation, it was interesting to study to what extent this process was involved in the evolutionary pathway leading to the endemic species of the Italian flora.

Using data from the online database "Chrobase.it", the researchers found that for about 55% of endemic species, the chromosome number is known. Statistical analyses of these chromosome numbers suggest that similar evolutionary trends acted upon endemics and species with wider distribution. Based on estimates for a subset of data, it was also shown that the vast majority (above 70%) of Italian endemics are diploid. The study was published in the open access journal *Comparative Cytogenetics*.

An intriguing result was obtained by comparing the number of species with even ploidy level (diploid, tetraploid, hexaploid, octoploid, etc.): it was discovered that those parameters are linked by an exponential function, implying that the higher the (even) ploidy level, the lower its frequency in terms of number of species.

The biological implications of this find are not yet clear and must be further investigated. To say the least, this phenomenon opens a new line of investigation in cytogenetics, aimed to clarify the evolutionary mechanisms giving rise to these constant relationships among increasing even ploidy levels.

More information: Bedini G, Garbari F, Peruzzi L (2012) Chromosome number variation of the Italian endemic vascular flora. State-of-the-art, gaps in knowledge and evidence for an exponential relationship among even ploidy levels. *Comparative Cytogenetics* 6(2): 192. [doi: 10.3897/CompCytogen.v6i2.3107](https://doi.org/10.3897/CompCytogen.v6i2.3107)

Provided by Pensoft Publishers

Citation: Does polyploidy play a role in the onset of the Italian endemic flora? (2012, May 22)
retrieved 23 April 2024 from

<https://phys.org/news/2012-05-polyploidy-role-onset-italian-endemic.html>

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