

## Analysis of recent polyploid gene evolution on the example of *Capsella bursa-pastoris* (Shepherd's Purse)

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**Motivation and aim:** Polyploidy is a common mode of speciation in plants that increases genetic diversity and contributes to ecological adaptations. The majority of flowering plant lineages have undergone one or more rounds of polyploidization. Moreover, important crops such as bread wheat, canola, cotton, coffee and others are allopolyploids. Therefore, it is necessary to build understanding on the consequences of polyploidy for gene evolution and content. One of the plant model organisms suitable for such research is *Capsella bursa-pastoris* (Shepherd's Purse) – an annual self-pollinating allotetraploid plant from the Brassicaceae family that emerged 100–300 thousand years ago. In this study we aimed to shed light on the mechanisms of *C. bursa-pastoris* gene evolution upon polyploidization.

**Materials and methods:** DNA-sequencing data corresponding to different populations of *C. bursa-pastoris* and its parent species *C. orientalis*, *C. rubella*, *C. grandiflora* were analyzed. These samples were collected from diverse climate zones all over the world. The analysis included such steps as orthologization of parent species genes, read quality control and trimming, mapping, calling, as well as gene presence-absence variation analysis and functional annotation.

**Results:** Orthologous genes were identified for parental species. The genome sequencing data of *C. orientalis* and *C. rubella/grandiflora* were used to select core genes which are present in all parental populations. Next, homeologs corresponding to the core parental genes were studied in different populations of *C. bursa-pastoris*. Reduced genes were identified, as well as patterns of mutation accumulation.

**Conclusions:** Gene reduction events in *C. bursa-pastoris* upon polyploidization were studied. Analysis of synonymous, non-synonymous mutations, frameshifts, and emergence of stop-codons was conducted. System gene evolution patterns of recent polyploid *C. bursa-pastoris* were identified.

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