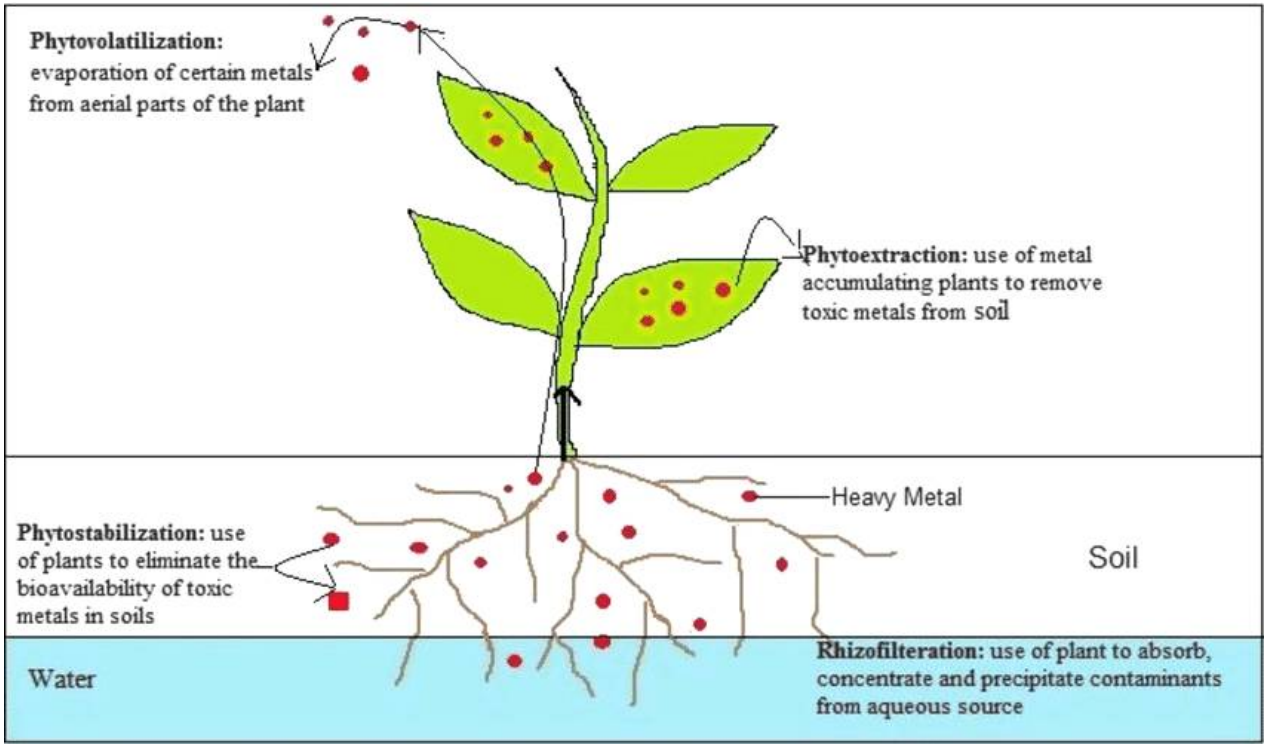
Institute of Biochemistry and Genetics - Subdivision of the Ufa Federal Research Centre of the Russian Academy of Sciences

Tomato plants carring *pph6* gene for phytoremediation

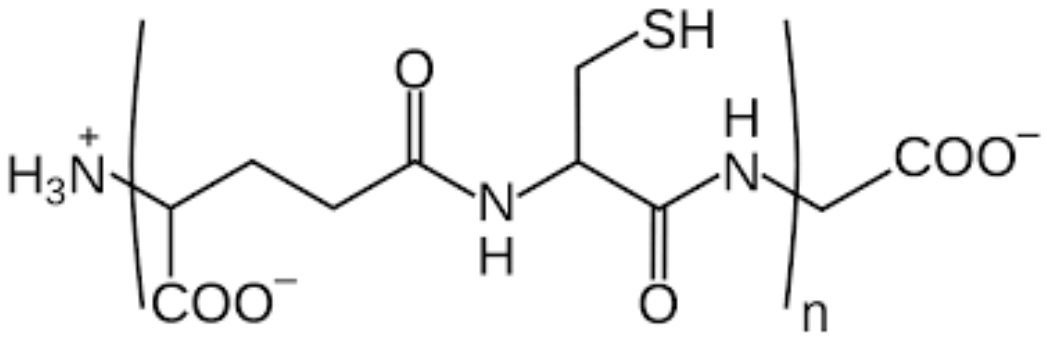
Vershinina Z.R.

Phytoremediation is the elimination, neutralization or conversion of pollutants to a less toxic form with the help of plants. This method is often used for heavy metal (HM) contaminated soils. It is important to select suitable plants – hyperaccumulators of HM to restore the biological productivity of ecosystems. Tomato is widely cultivated in agriculture. In recent years, studies on the accumulation of HM in tomato plants and the potential use of tomatoes for phytoremediation have become popular.



Kushwaha, Anamika, et al. "Heavy metal detoxification and tolerance mechanisms in plants: implications for phytoremediation." Environmental Reviews 24.1 (2015): 39-51.

It is known that phytochelatins protects plant cell from HM harmful effect and results in accumulation of metals in plant in low toxic form. Phytochelatins contain a gamma peptide bond, therefore, the use of pseudophytochelatins with an alpha peptide bond is relevant in biotenology.



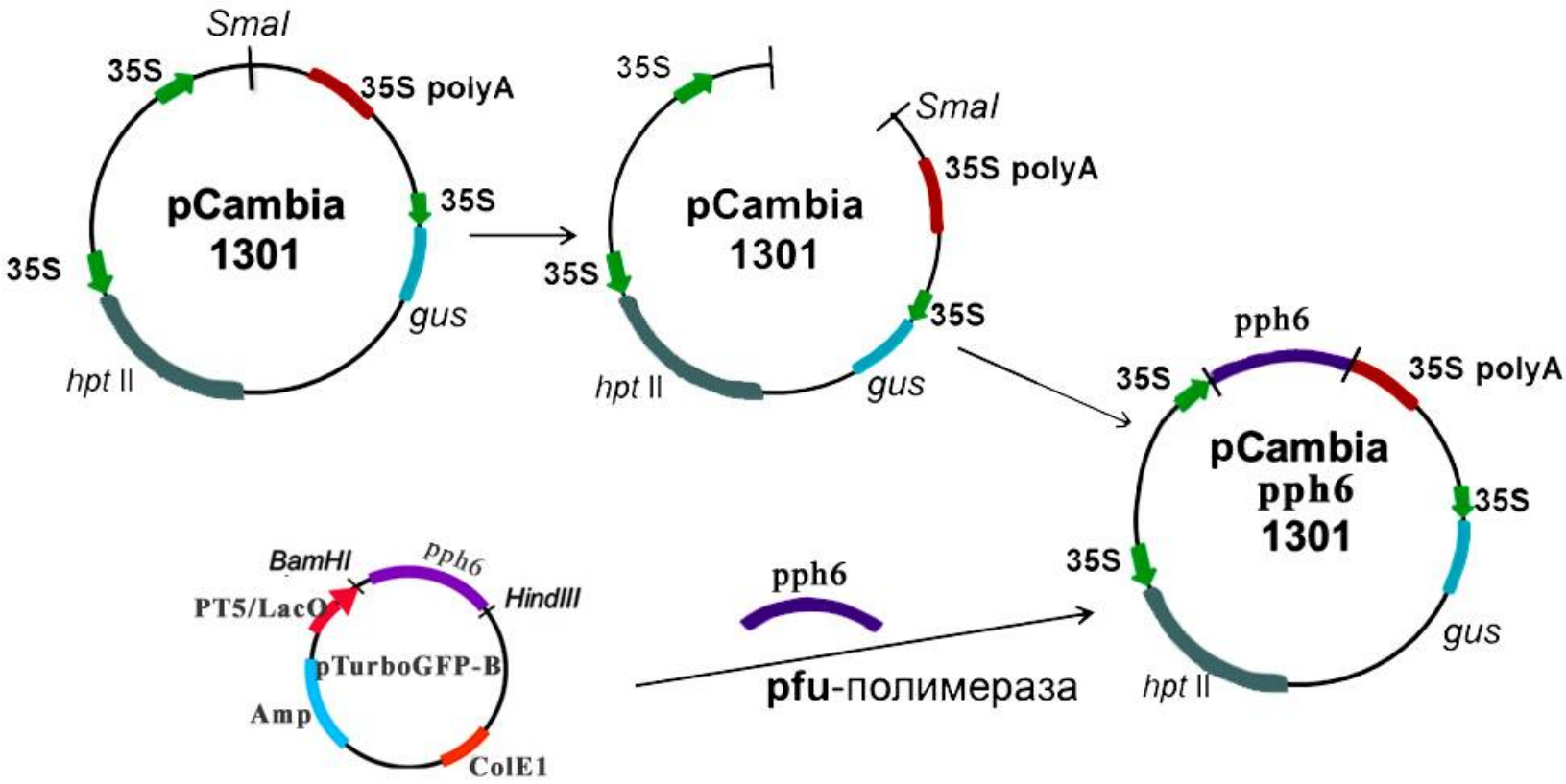
Plant phytochelatins **(γ-Glu-Cys)$_n$Gly**

Pseudophytochelatin *pph6* **Met(α-Glu-Cys)$_6$Gly**

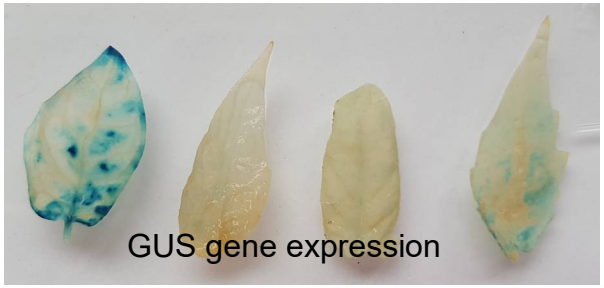
Artificially synthesized *pph6* gene assembled from complementary blocks

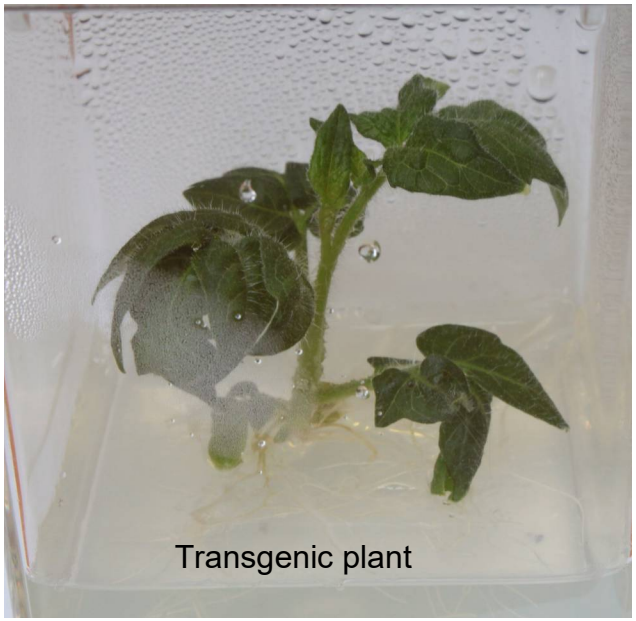
P6ph1 5'CCATGGAATGCGAATGTGAGTGCGAGTGCGAGTGCGAATGCGGCTAAG3'

P6ph2 5'CTTAGCCGCATTCGCACTCGCACTCGCACTCACATTCGCATTCCATGG3'



After stitching these blocks, the sequence was cloned into a vector for plant transformation pCambia 1301 under the control of the 35S promoter of the cauliflower mosaic virus.





pCambia 1301-*pph6* used to obtain transgenic tomato plants by agrobacterium transformation method. Then, the positive effect of the expression of the *pph6* gene on the resistance of transformed plants to the effects of heavy metals (Cd^{2+} and Ni^{2+}) was shown.

Thus, a system of agrobacterial transformation of the industrial variety of tomato plants Gruntovy Gribovsky 1180 with the pseudophytochelatin *pph6* gene was developed, which made it possible to obtain plants that would potentially efficiently accumulate heavy metals for further use in phytoremediation. This work was performed as a part of State Assignment no. №AAAA-A21-121011990120-7; it was financially supported by the Russian Foundation for Basic Research, project no. 18-34-20004 mol_a_ved.