DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Chelidonium majus L. is a model medicinal plant from the family *Papaveraceae*, with antiviral, antimicrobial, proapoptotic and cytotoxic activities. Although the extracts from these plants have long been used in traditional folk medicine, the molecular mechanism of their antiviral action still remains unclear. The plant produces orange/yellow milky sap, also called latex, which contain numerous substances built of small (like alkaloids) and larger and complex molecules (like proteins). Especially 2 proteins are very interesting – **major latex protein (MLP) and glycine-rich protein (GRP)**, because preliminary studies have shown that they bind nucleic acids, which are the main constituent of viral particles. They have also possibility to bind low-molecular molecules, what could enhance their biological activity. They belong to pathogenesis-related proteins (PR), which are induced among others after the attack of pathogen. Host plants intensively use such proteins for defense against viral infections - some host RBPs have been involved in the inhibition of RNA virus replication, movement, and translation by RNA-specific binding. These proteins are presumably involved in plant defense responses against virus infections, but the molecular mechanism of this activity is unclear.

Therefore it is hypothesized that MLP and GRP proteins of *C. majus* latex are important factors of latex antiviral activity, their expression is enhanced under different biotic and abiotic stress conditions, and that this action can be strengthened by other latex components. Proteins can facilitate transport of low-molecular compounds into the cell or even play a role of their transporters. Hence, the goal of the Project is to elucidate the structure, functions and molecular mechanism of *Chelidonium majus* GRP and MLP proteins and their antiviral and anticancer activity by analyses of MLP- and GRP-deficient *C. majus* mutants as well as using selected cell lines.

The Project involves identification of *MLP* and *GRP* coding sequences, biotechnological production of 2 proteins of *C. majus* latex: MLP and GRP, molecular testing of antiviral and antitumor activities of their combinations and modified forms with alkaloids using HPV pseudovirions (PsVs) and tumor cell lines. Plant RNA virus inoculation of modified *C. majus* plants will be conducted after “gene knock-out” of MLP and GRP coding sequences to understand their physiological function in plant.

Plant viral infections are of important economic concern. Although this Project is dedicated to basic research aiming at understanding molecular background of plant immune system, the knowledge resulted from the Project will be important for future improvement of breeding of crop and pharmacologically important plants, which could be stimulated for the higher expression of such proteins enhancing their defense against pathogens. Such treatments could help to avoid transgenization of crop plants in order to stimulate their defense potential. Increased control of plant viral diseases by stimulation of plant defense-response, may help to overcome significant barriers in agriculture by avoiding the development of further crop transgenization. Therefore, the research conducted during this Project has **the future potential of a strong economic, societal and environmental impact**.