**The role of GTPase Era1 in chloroplast ribosome biogenesis and translation**

Proteins are fundamental components of the living organisms, which are responsible for the proper progression of various molecular processes occurring within cells. Proteins are produced through the expression of genes located in the genetic material in the form of DNA. However, this process is highly complex and l utilises different mechanisms in eukaryotic and bacterial organisms. The first stage of gene expression involves transcription, in which genes are transcribed into messenger RNA (mRNA). Subsequently, these molecules are translated into the ”language” of amino acids in the process called translation, resulting in the synthesis of proteins. Translation is catalysed by ribosomes, which are composed of multiple proteins and ribosomal RNAs (rRNAs). Ribosome consists of two subunits, small and large, each serving different functions. Only when functioning together as an integral whole, they can successfully synthesize proteins. Thus, ribosome biogenesis is crucial for most cellular processes.

Our research focuses on the process of ribosome formation in typical plant organelles - chloroplasts. These organelles are best known for carrying out photosynthesis, but are equally important for the progression of many other processes. Importantly, the genetic material in plant cells is not only located in the cell’s control centre (i.e. the nucleus), but also in organelles - plastids (including chloroplasts, which provide "fuel" in the form of sugars) and mitochondria (the "powerhouses" generating energy). Therefore, chloroplast translation is crucial for the functioning of the entire plant organism, which needs to coordinate all processes occurring within the cell. It has emerged that the disruption of one gene's (*Era1*) function, likely involved in chloroplast ribosome biogenesis, significantly impairs plant functioning, particularly under cold and high light stress.

The aim of the PRELUDIUM research project, funded by the National Science Centre, is to understand the molecular function of the protein encoded by the *Era1* gene and its significance in chloroplast translation. Additionally, we plan to characterise genetic interactions of Era1 and other factors that are equally important for chloroplast ribosome biogenesis. In the research project, state-of-the-art techniques such as next-generation sequencing will be employed. In the future, the results of the experiments may find applications in biotechnology, especially in companies focused on breeding plants acclimatized to unfavourable environmental conditions. The obtained results will be communicated through publications in the top scientific journals and presentations at international conferences.