Abstract for the general public

Photosynthesis is an energetic process that enables the synthesis of organic compounds through light energy conversion. Plants utilize the absorbed energy via the activity of numerous enzymatic complexes located within the inner membranes of chloroplasts, with photosystems I and II directly responsible for converting light into chemical energy. Dark-germinating seedlings aim for rapid autotrophic growth initiation and photosynthetic apparatus activation. During dark treatment, the synthesis of components necessary for the organism's quick response to light starts, including the synthesis of appropriate proteins, lipids, pigments, and altered transcriptional activity. However, it is the light signal that is a main factor initiating numerous transformations, including the conversion of dark-grown plastids – etioplasts – to photosynthetically active mature chloroplasts. One of the many complex processes involved in this transition is the assembly of protein-pigment photosynthetic complexes. A commonly accepted hypothesis regarding the subject of photosystem I biogenesis states that light is essential for the appearance and correct assembly of proteins constituting photosystem I. However, there are reports that one of the main proteins of photosystem I – PsaA – is detectable in plants, even in darkness. Therefore, the main aim of this project is to uncover the mystery of PsaA's presence in plant etioplasts before light exposure. We plan to verify the sequence of core subunits of PSI appearance and investigate in what form PsaA may occur within etioplasts. Most studies related to the photosystem I biogenesis were conducted on mature, photosynthetically active monocotyledonous plants or single-celled organisms, but little is known about the biogenesis of photosystem I in the developing photosynthetic apparatus of angiosperm plants. By applying biochemical, biophysical, and molecular methods, we intend to reinitiate a discussion on the subunits synthesis and assembly of one of the most crucial protein complexes in the natural systems and verify its unexpected but documented presence in the etioplasts of angiosperms.