

The D1 protein of Photosystem II (PSII), encoded by the *psbA* genes, is an indispensable component of oxygenic photosynthesis. Due to strongly oxidative chemistry of PSII water splitting, the D1 protein is prone to constant photodamage requiring its replacement, whereas most of the other PSII subunits remain ordinarily undamaged. This, and the fact that D1 binds major cofactors of the photosynthetic electron transport chain makes the functional characteristics of this protein important for the overall photosynthetic efficiency of the cell. In cyanobacteria, the D1 protein is encoded by a *psbA* gene family, whose members are differentially expressed according to environmental cues. Until recently, a limited amount of information existed relative to different D1 forms present in cyanobacteria and are encoded by *psbA* gene family. The aim of the project is to functionally characterise the D1 forms from species where genomic data exists and investigate the diversity of D1 protein forms from cyanobacteria living in various environments in an effort to enrich the information about the diversity of these proteins and their roles as well as identify new, previously unknown D1 functional forms. This effort, will have a positive impact on the ongoing efforts of generating artificial devices mimicking natural photosynthesis where an artificial, natural similar, D1 is of key importance and also on all the efforts aimed at using photosynthesis as a renewable and green source of energy.