

Role of GATA-family transcription factors in the regulation of chlorophyll biosynthesis in green unicellular algae *Chlamydomonas reinhardtii*

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The adaptation of photosynthetic cells to light mostly based on the expression regulation of genes that control both the metabolism of chloroplast pigments – chlorophylls (CHLs) and carotenoids, as well as the structural organization of the cell. The aim of our work is to investigate the genetic mechanisms of transcriptional regulation of the CHLs biosynthesis in heterotrophic growth conditions and during adaptation to the light of *Chlamydomonas (C.) reinhardtii* cells. Unlike higher plants, unicellular green algae *C. reinhardtii* are able to synthesize CHLs not only in the light, but also in the dark, which allows to study the genetic control of the dark chlorophyll biosynthesis. Until recently, it was believed that the ability of plants and phototrophic microorganisms to synthesize CHLs in the light and in the dark depends only on the presence of two enzymes that converted of protochlorophyllide (Phld) to chlorophyllide (Chld) in the pigment biosynthesis chain. Light-dependent catalysis is carried out by Phld-oxidoreductase (POR), and the dark reaction are provided by dPOR enzyme, encoded by chloroplast genes, originating from eubacterial nitrogenases. In evolution, the angiosperms lost their dPOR, and ancient forms, including algae, retained this enzyme. The study of chlorophyll-less in the dark and light-greening *C. reinhardtii* mutants on the *LTS3* gene allowed us to assume the existence of other ways to regulate the CHLs biosynthesis. We showed that the *LTS3* gene encoded the GATA-transcription factors (TF), which, under heterotrophic conditions activates the expression of genes encoding magnesium chelatase enzyme. Little is known about the functioning of GATA-TF in green algae. Recently, their role in the control of development and nitrogen metabolism was shown in higher plants. In addition to *LTS3*, in the genome of *C. reinhardtii*, we found six more genes encoding GATA-TF factors. To study their role in the adaptation of algal cells to light, we chose the Targeted Insertional Mutagenesis method based on the CRISPR/Cas system.