Institute of Microbiology
Czech Academy of Sciences
Center Algatech
Novohradská 237 - Opatovický mlýn
379 81 Třeboň
Czech Republic

Supervisor's evaluation of PhD thesis "Biogenesis of the cyanobacterial Photosystem II complex: involvement of selected accessory factors with emphasis on the novel Psb35 protein" by Guillem Pascual Aznar

Photosystem II (PSII) is a crucial membrane embedded pigment-protein complex of oxygenic phototrophs (cyanobacteria, algae and plants) that drive the photosynthetic electron transport chain producing highly reduced compounds and ATP for synthesis of carbohydrates. The great complexity of PSII (at least 19 structural proteins and almost 100 pigments and other co-factors) is most probably reflected by a number of so called assembly factors that are needed for optimization of PSII biogenesis. In this context, the PhD thesis of Guillem Pascual Aznar provides new original data contributing to the knowledge of this process. The thesis is written as a commented collection of three articles published in the period 2018-2021 and focuses on the structure, localization and function of three PSII–related assembly factors Ycf48, RubA and especially the newly discovered Psb35 protein. The model organism used in all studies is the cyanobacterium *Synechocystis* PCC 6803 but the results presented in the thesis can also be applied for algae and plants since homologs of these factors are also present in these organisms.

Guillem came to the laboratory in 2014 mostly without practical skills with methodologies needed for the fulfilment of the thesis tasks. Despite this, he managed to master them in reasonable time and then he was able to work independently on the individual topics. During the time he became a very useful and favourite member of the lab who was easy to collaborate with other lab members. He also liked to guide new students in the laboratory and also students doing practical courses in the frame of his pedagogical practice. He showed a lot of enthusiasm for the work and when there was a reason, he was also quite excited by the results. In my view he preferred the biochemical work with proteins while work with DNA sometimes took him a longer time than I expected. Concerning the efficiency of his work in general, in fact I expected that his thesis will include a detailed description of more PSII assembly factors than includes now as his involvement in the study of Ycf48 and RubA was not so extensive. In my view it did not happen from several reasons. He struggled for a long time with finding phenotypic manifestation of the Psb35 deletion and this in my view a bit ground down his enthusiasm and significantly slowed down the progress of the work. Here I admit that my expectations about Psb35 phenotype were possibly too optimistic and now I would have chosen a different assembly factor for the start of the Guillem's work. Guillem also had problems with performing more experiments in parallel and low reproducibility of some experiments required their extensive repeating before reaching the clear conclusion. Nevertheless, Guillem finally obtained a large number of valuable results and here is necessary to mention that his extensive first-author article about

☎+420 384 340 431 ☎Fax +420 384 340 415

Psb35 was presented in the issue of the Plant and Cell Physiology as "The editor choice" article and a short description of Guillem's scientific carrier was presented there. In my opinion, the very complex characterization of all aspects related to the localization and function of Psb35 is the most valuable part of the thesis. The thesis is written in reasonable English but Guillem needs further training in future to do writing more effectively.

In summary, the thesis documents a high quality of results obtained by Guillem Pascual Aznar which in my view clearly meets the criteria for the PhD degree.

Třeboň, ,July 16, 2021

Prof. Josef Komenda, DSc.

☎+420 384 340 431

☎Fax +420 384 340 415