

DISSERTATION SUMMARY

Studies on the signal transduction cascades responsible for the control of the expression of NiFe hydrogenases and photosynthetic apparatus in purple sulfur photosynthetic bacteria

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The photosynthesis and hydrogen metabolism play important role in the energy metabolism of photosynthetic bacteria. If they are energetically linked, the expression of their components should be regulated by common factors. A pigment mutant strain of the purple sulfur photosynthetic bacterium, *Thiocapsa roseopersicina* BBS was isolated by plasposon mutagenesis. About 19 *orf*-s, most of which are thought to be genes involved in the biosynthesis of carotenoids, bacteriochlorophyll and photosynthetic reaction centre were identified surrounding the plasposon in a 22 kb long chromosomal locus. The carotenoid biosynthetic genes, *crtDC* and *crtE* genes were shown to be regulated by oxygen, and

apparently not effected by H₂, as indicated by hydrogenase activity measurements and *lacZ* fusion constructs, but repressed by traces of oxygen. The expression of the *hydSL* was also shown to be enhanced in the absence of oxygen. Upstream from the determined promoters a region was identified as an essential *cis* element for this anaerobic activation. The regulation of the *hyd* operon by O₂ could be observed in *Escherichia coli* and *Rhodobacter capsultus*, as well. The role of the FNR, but not the ArcAB or RegAB systems in the anaerob activation was demonstrated in *E. coli*, and in *R. capsulatus*. The comparison of these regulation styles will be discussed.