Effect of temperature and light on the physiology and biochemistry of the new Bulgarian cyanoprokariota *Chroococcus* sp. R-10

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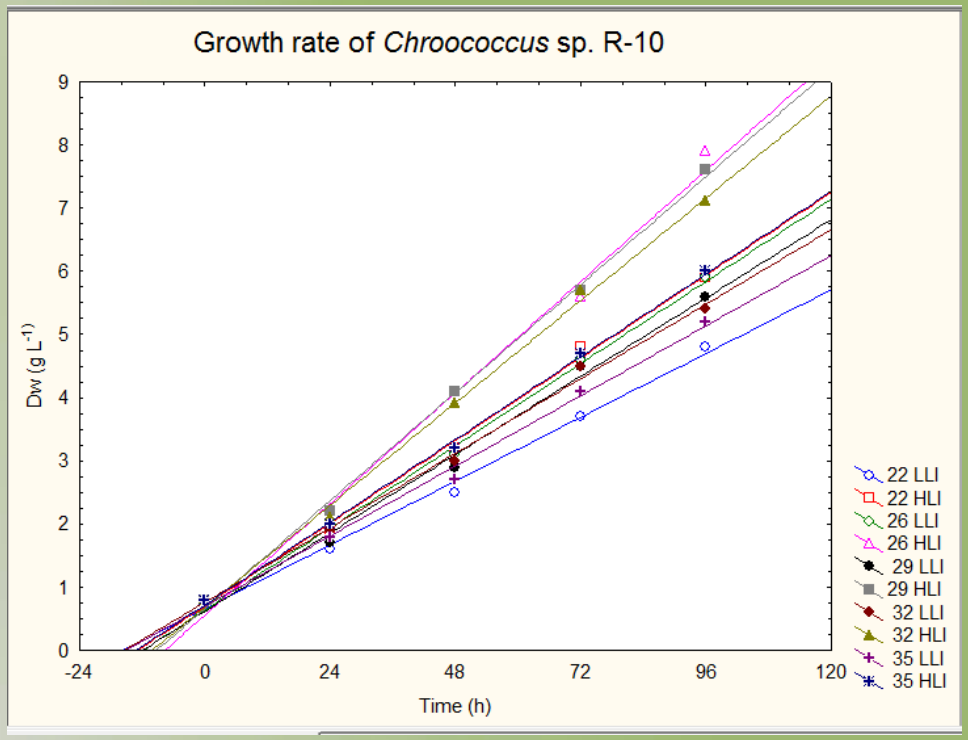
How cultivation conditions such as temperature and light intensity affect the growth of *Chroococcus sp.* R-10*?*



Exponential growth can be achieved regardless of the chosen light intensities and temperature conditions. Best conditions for biomass accumulation include high light intensity and a temperature of 26ºC. Good growth can also be achieved at temperatures of 29 and 32 ºC.

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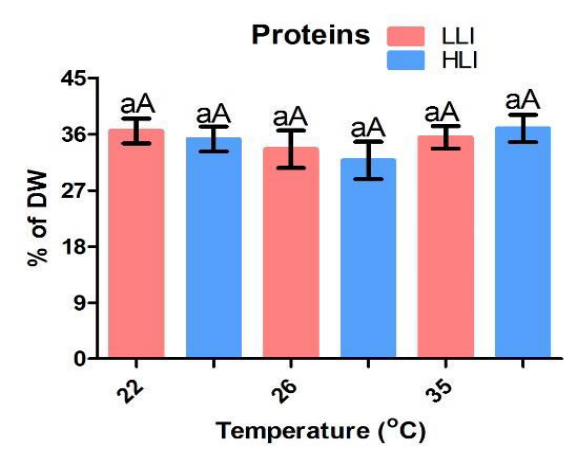
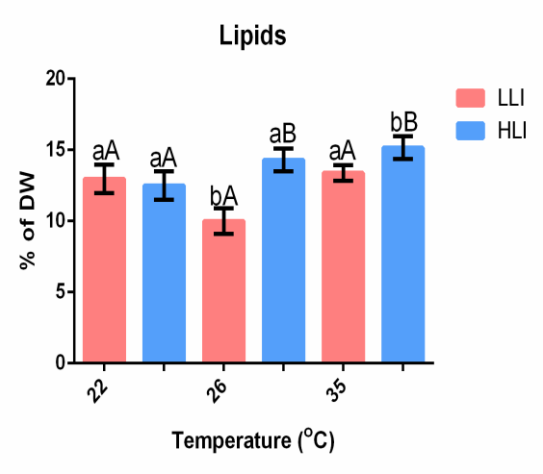
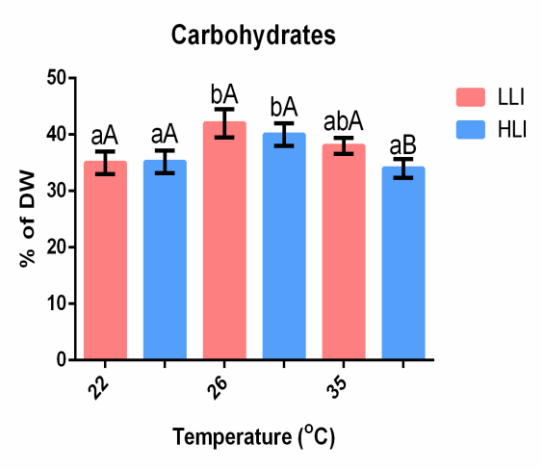
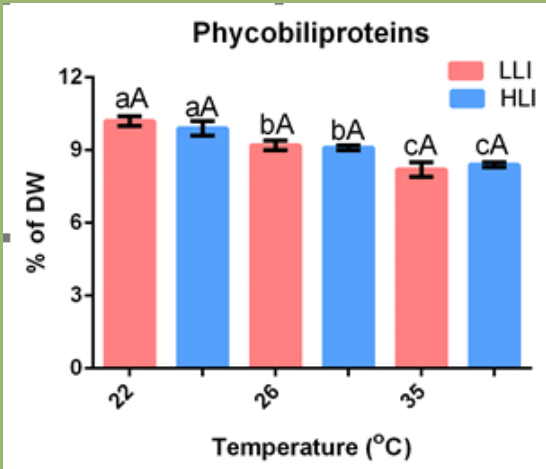
How cultivation conditions such as temperature and light intensity affect the composition of the biomass?









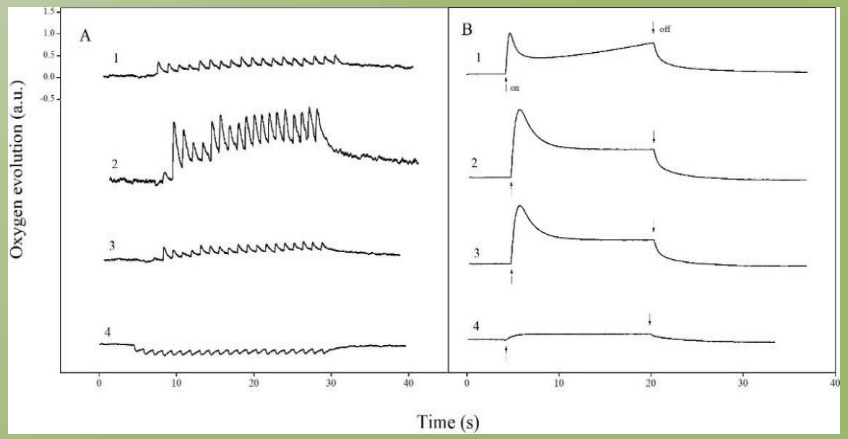
From this experiment it can be concluded, that the optimal temperature stimulates the accumulation of biomass and carbohydrates, while the lowest one – of phycobiliproteins.

The optimal temperature and the LLI are connected to lowered lipid synthesis as the conditions are the least stressful from the examined ones.

All studied cultivation conditions affect the protein synthesis in a similar way.

How cultivation conditions such as temperature and light intensity affect photosynthesis?

Parameters of lightning-induced oxygen accumulation and oxygen evolution.
1. 22 ºC LLI
2. 26 ºC LLI
3. 35 ºC LLI
4. 35 ºC HLI



Sample	S_0 (%)	α	β	Y (%)
1 (22 °C LLI)	40±2	0.141±0.012	0.068±0.001	58±4
2 (26 °C LLI)	28±3	0.133±0.008	0.058±0.001	100
3 (35 °C LLI)	31±2	0.111±0.005	0.079±0.002	84±6
4 (35 °C HLI)	-	-	-	-

After oxygen consumption in result of the first flash, the maximum oxygen yield was observed after the third flash. The maximum oscillated with periodicity of four for the samples, grown at 26 and 35 ºC and to some extent, at 22 ºC LLI, indicating the functional integrity of PSII oxygen evolving complex of Chroococcus sp. R-10 under these cultivation conditions.
Similarly, oxygen induction curves demonstrated different shape and amplitude in the samples grown at different conditions. After the sharp oxygen burst the signal reached a saturated evolution rate at 26 and 35ºC LLI. The sample grown at 22ºC did not achieve saturation until the continuous light was switched off, while the sample grown at HLI showed a weak signal without initial oxygen burst, indicating the deactivation of the PSII reaction centers.

The kinetics parameters of the oxygen evolution observed after flashes and the oxygen burst magnitude under continuous illumination (Y) which were used to assess the efficiency of growth conditions on oxygen production in this cyanobacteria showed an increase of the PSII centers in the most reduced state S0 and rise in the misses (α) at the lowest temperature. The obtained values for dark distribution of the S0 and S1 states, misses (α) and the double hits (β) for the samples grown at 26 and 35 ºC LLI, corresponded to a fully functional PSII oxygen evolving complex in these samples.