

Cultivations of *Synechocystis* sp. PCC6803 (ALG_App010)

Background

Synechocystis sp. PCC6803 is a unicellular freshwater cyanobacterium commonly employed as a cyanobacterial model system. It is capable of both photo- and heterotrophic growth making it useful for studying photosynthetic processes, and has a well defined circadian clock. *Synechocystis* sp. PCC6803 is naturally competent allowing direct uptake of recombinant DNA, and has a well defined molecular toolbox including a sequenced genome. There has also been interest in the use of *Synechocystis* sp. PCC6803 for biofuel applications, both in itself and as a model for other third generation biofuel platforms.

Experimental Design

A *Synechocystis* starter culture was inoculated from solid medium into BG11 medium and cultivated at 40 μ E, 25°C to late stationary phase. The culture was then diluted ten fold and split to give two equivalent 400ml cultures for growth in the Algem. The profile used consisted of continuous white light at either 50 or 100 μ E, at 26°C with mixing at 120rpm. CO₂ was provided on a pH modulated basis, with the pH kept level at 7.5.

Results

Synechocystis grew well under both conditions, with faster growth and a higher final optical density seen at 100 μ E.

Algem cultivation of *Synechocystis* sp. PCC6803

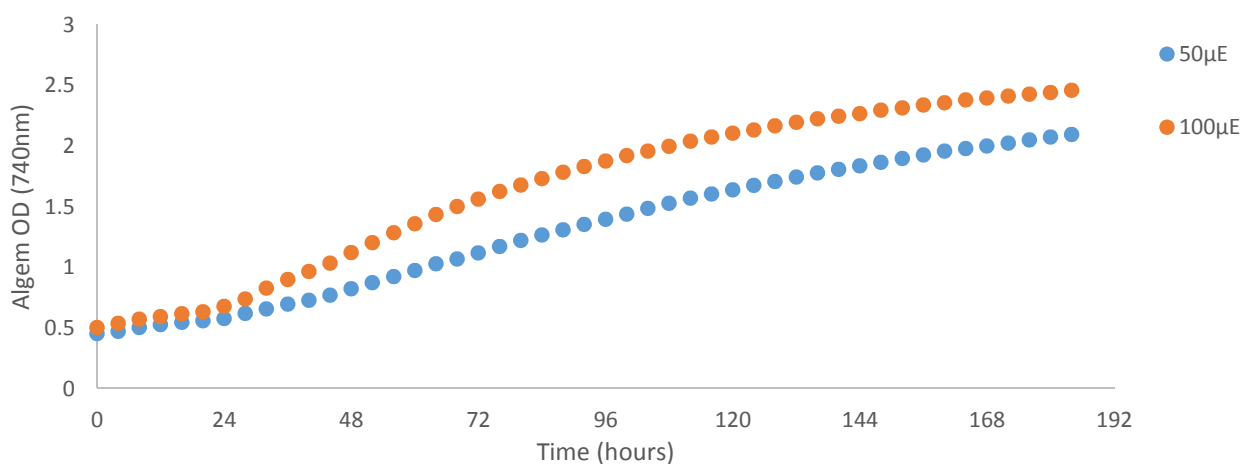


Figure 1 - Algem growth profile for *Synechocystis* sp. PCC6803 grown at 26°C and pH 7.5 with either 50 or 100 μ E white light

Discussion

As expected, the higher light intensity resulted in more productive log phase growth and a higher stationary phase culture density. Under phototrophic conditions growth is often limited by light intensity, particularly at higher cell numbers where self-shading becomes a factor. Now that successful cultivation of *Synechocystis* in the Algem has been demonstrated, the logical next step would be to run ramped light and temperature profiles to establish optimal conditions for this organism.