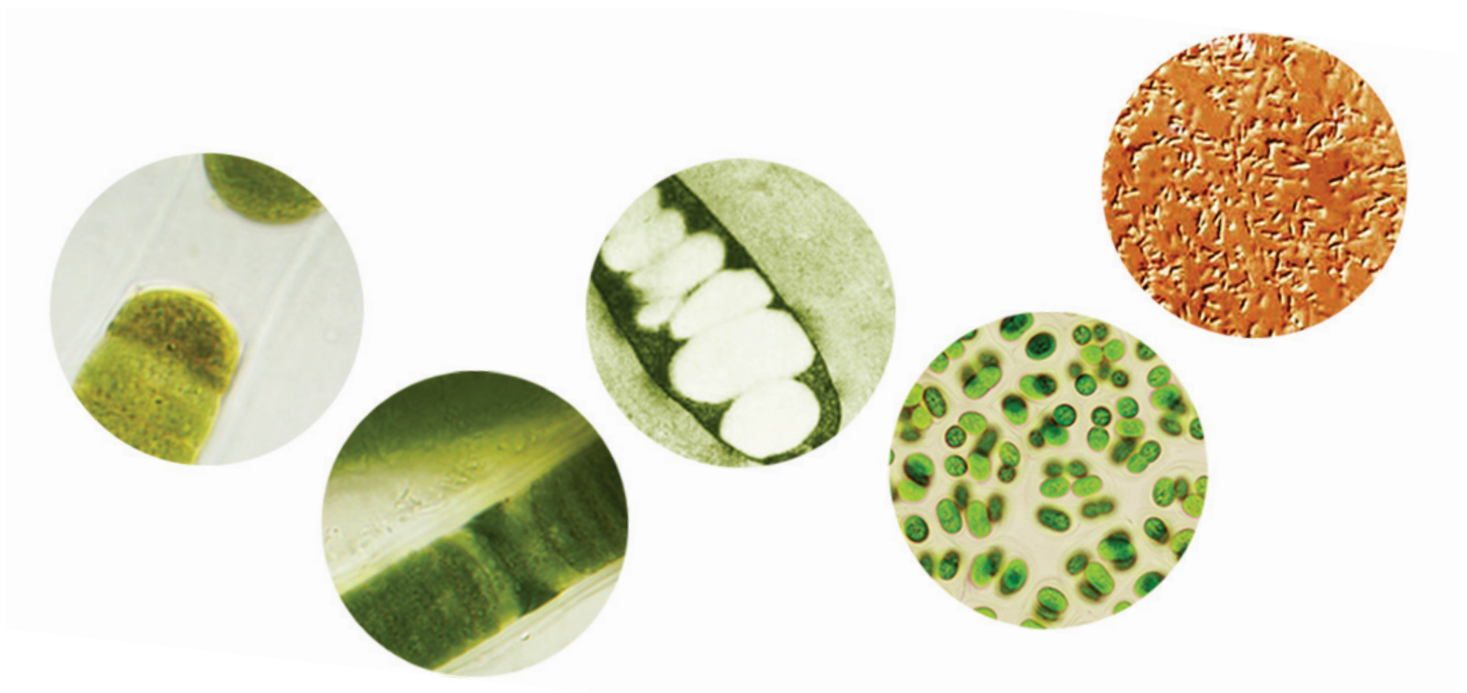


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P25: Embryotoxicity assessment of a *Microcystis* extract with *Daphnia* *in vitro* egg test

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Microcystis aeruginosa is a colonial unicellular cyanobacteria, usually found in eutrophic and hipereutrophic waters. Microcystins are the main toxins produced. As chronic toxicity test for daphnid is time consuming, the developmental stages of *Daphnia* eggs *in vitro* has been used in several works as an alternative to the 21 days reproduction test [1,2,3]. The sensitivity of different species of *Daphnia* to cyanobacteria varies depending on the species and strain and on the mode of exposure. Eggs are an early undifferentiated stage of development and may be a way to compare the differences of sensitivity between species. The main aim of this study was to assess the effects of a *Microcystis aeruginosa* extract on the *in vitro* survival and development of the parthenogenetic eggs of *D. pulex*, *D. pulicaria* and *D. magna*. The parthenogenetic eggs used in this study were obtained from adult females. At the beginning of the test eggs were at stage I and II in their development and were removed from the female body by applying gentle pressure to the posterior region of the brood chamber with a dissecting needle. Extruded eggs were collected in M4 medium. Tests were performed in 50 ml glass flasks and 10 eggs were exposed for each extract concentration. Eggs were incubated at 20±1 °C with 16 h photoperiod and were examined microscopically every 24 h during the test period. We examined embryos for stage of development and recorded mortality. EC50 values were determined by the probit method. In all the concentrations tested there was arrested development in embryos, EC50 (mg/ml) for the three species of daphnia were only slightly different. *Daphnia magna* was the most resistant specie with EC50 0,34 (mg/mL). As EC50 values for egg *in vitro* development were lower than CL50 values for neonates and adults survival from the same species, we consider this test as an alternative test assessment for cyanobacteria toxicity in daphnia development.

[1] Obreshkova, V., Fraser, A.W., 1940. Growth and differentiation of *Daphnia magna* eggs *in vitro*. Biol. Bull. 78, 428-436; [2] Ohta, T., Tokishita, S., Shiga, Y., Hanazato, T., Yamagata, H., 1998. An assay system for detecting environmental toxicants with cultured cladoceran eggs *in vitro*: malformations induced by ethylenethiourea. Environ. Res. 77, 43-48; [3] Sobral, O., Chastinet, C., Nogueira, A., Soares, A., Goncalves, F., Ribeiro, R., 2001. *In vitro* development of parthenogenetic eggs: a fast ecotoxicity test with *Daphnia magna*? Ecotoxicol. Environ. Saf. 50, 174-179.

P26: Are the cyanobacteria inhibiting biological sand crust indeed high light organisms?

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Biological soil crusts play an important role in stabilizing sandy areas and can influence the biotic composition of deserts. Destruction of these crusts is considered an important promoter of desertification in arid and semi-arid regions. The crusts are formed by the adhesion of the sand to extracellular polysaccharides (EPS) secreted mostly by filamentous cyanobacteria (including *Nostoc*, *Microcoleus*, *Chroococcidiopsis* and *Gloeocapsa*). These organisms, the main primary producers in biological desert crusts, are able to acclimate to extreme temperatures, frequent hydration/dehydration cycles and high light intensity. The mechanisms involved, however, are largely unknown. It is likely that the ability to activate metabolism and grow when water is available and to shutdown metabolic activities during dehydration plays an important role in this acclimation.

One important example is the photosynthetic activity: It is well-established that photosystem II (PSII) is highly susceptible to photoinhibition due to rapid degradation of core proteins. Coordination of light energy flux to the reaction centers with the rate of electron transport and CO₂ fixation is extremely important, particularly during dehydration; otherwise, photodynamic damage of the photosynthetic machinery may occur.

To uncover protective mechanisms from excess light during desiccation, we compared the response to excess light of several desiccation-tolerant cyanobacteria with well-studied model freshwater cyanobacteria. Measurements of oxygen evolution and fluorescence parameters were taken on crusts and isolated strains from the sand dunes of Nizzana, NW Negev, grown on sand or liquid media.

Surprisingly our results showed much less resistance of the desiccation-tolerant cyanobacteria to excess light as compared to model cyanobacteria. Further, the desiccation-tolerant cyanobacteria within the crusts showed a rapid decline in fluorescence yield already at light intensities 1/10 of full sunlight and a faster QA re-oxidation after high light treatment.

Use of microelectrode for oxygen, pH and light penetration showed that maximum oxygen evolution occur at very low light levels. Apparently, the structure of the crusts and reflection of light therein leads to the formation of "light pockets" beneath the "photot zone" enabling the photosynthetic production of oxygen in this depth.

These results and those to be presented suggest that photosynthetic activity of the cyanobacteria in the crust mostly occurs at low light levels and that protection mechanisms are activated as soon as direct sunlight hits the crust. This protection mechanism may involve a cyclic electron flow within PSII.