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Global warming promotes adaptive changes in the freshwater cyanobacterium *Microcystis aeruginosa*

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Abstract

Global warming has a substantial impact on aquatic ecosystems, especially on microalgae, influencing their growth and physiology (Padfield *et al.,* 2015; Sandrini *et al.,* 2015; Schaum and Collins, 2014). In this study, three strains of freshwater cyanobacterium Microcystis aeruginosa have been grown in two different conditions (22°C: A - ambient temperature and 26°C: H - the estimated temperature for the end of the century) for a period of 12 months. In order to observe their response to global warming, thermal reaction norms were calculated in a temperature range of 20-40°C. The results showed that after 100 generations, the H lineage gained remarkable competitive skills, being able to grow even at 38°C, whereas the A lineage did not survive. Moreover, after being re-incubated in the ambient temperature, the development of H strains was reduced, representing an irreversible change suggesting adaptive evolution. This study highlights the necessity of adaptive evolution experiments during a long period of time and with multiple strains, in order to understand the effects of climate change upon aquatic ecosystems.

Keywords: adaptive evolution, cyanobacteria, freshwater, global warming, *Microcystis*.

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