Photosynthesis and Heat Response of the Green Alga *Micrasterias denticulata* (Desmidiaceae)

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Cells of the green alga *Micrasterias denticulata* cultivated at 15 °C, 20 °C or 25 °C were exposed to heat shocks at different temperatures (30–40 °C) for varying duration (5–90 min). Cell pattern formation, division rate as well as photosynthesis and respiration by measuring oxygen production and consumption have been studied. The degree of cell shape malformations was found dependent on the preceding cultivation temperature along with the mode of the heat shock. Cells cultivated at 15 °C and 20 °C could counteract a 90 min heat shock at 35 °C much better than those cultivated at 25 °C, which was seen by a less reduced young semicell. Cells cultivated at 15 °C and 25 °C reveal a reduced division activity compared to those grown at 20 °C even with a marked retardation when affected by a preceding heat shock.

Photosynthesis and the level of plastid pigments (carotenoids, chlorophylls, β-carotene, lutein) of controls determined by HPLC analysis reached a plateau after about 26 days when starting with 22-day old cultures. Photosynthesis and respiration were determined in a range between 15 °C and 40 °C in defined *Micrasterias* cell cultures of about this age (cultivation temperature 15 °C, 20 °C or 25 °C). Both processes rose steadily with increasing temperature starting with 15 °C and reached peaks between 30 °C and 32 °C, followed by a considerable drop when increasing the incubation temperature up to 40 °C. The experiments reveal that primary processes of energy formation and consumption are much less affected by temperature influences than cell shape formation and division rate.