Modelling the response of ion transporters to hyperosmotic shock in cells of salt-sensitive *Chara australis* and salt-tolerant *Lamprothamnium succinctum*

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We compared the response of salt-sensitive *Chara australis* and salt-tolerant *Lamprothamnium succinctum* to hyperosmotic shock. Media osmolarities were increased to 285 mOsmol/kg by adding sorbitol. Current-voltage scans were obtained as function of time in sorbitol medium. The data were modelled by a parallel combination of proton pump, inward and outward rectifiers and background currents (Beilby & Walker, 1996).

The response of *Lamprothamnium succinctum* was to increase the average membrane potential up to −151 ± 10 mV (n=5) after 148 ± 74 minutes (Al Khazaaly & Beilby, 2007). Modelling indicated increased rate of proton pumping. The half activation potential of the inward rectifier depolarized above the resting membrane potential, so K^+ ions could be imported into the cell, contributing to turgor regulation. In contrast to *Lamprothamnium succinctum*, most *Chara australis* cells became strongly depolarized, conductive and showed varying rate of plasmolysis. The *Chara australis* proton pump responded to osmotic shock, but did not maintain rates high enough to keep membrane potential negative. Eventually all cells became plasmolysed and their conductance increased considerably to 5.5 $S.m^{-2}$ and higher. The failure of *Chara* to regulate turgor (Bisson & Bartholomew, 1984) appears to arise from insufficient activation of the proton pump to turgor decrease.

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