

Cadmium detoxification in *Physcomitrella patens*

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The moss *Physcomitrella patens* tolerates cadmium concentrations up to 10 μM . While only small amounts of the metal were found to be adsorbed to the cell wall most of the cadmium is taken up into the cells. Our investigations have shown a strong increase of the intracellular thiol pool (cysteine, γ -glutamylcysteine and glutathione) in response to cadmium stress while no phytochelatins were detectable. After 3 days of exposure to 10 μM Cd^{2+} the total glutathione pool as measured by HPLC increased up to threefold. Therefore we suppose cadmium is detoxified by formation of $\text{Cd-}[\text{GS}]_2$ complexes in *P. patens*. This hypothesis was supported by *in vivo* labelling of GSH with monochlorobimane (MCB). MCB is a non-fluorescent, membrane-permeable dye which is conjugated by glutathione-S-transferases in a phase II reaction to form fluorescent, membrane-impermeable glutathione-S-bimane (GSB). These bimane conjugates can be quantified after separation by RP-HPLC. In contrast to the threefold increase in total glutathione the amount of GSH accessible to *in vivo* labelling with MCB was significantly reduced compared to non-stressed cells. The diminished GSH content accessible to MCB is consistent with the formation of $\text{Cd-}[\text{GS}]_2$ complexes in Cd^{2+} treated cells.