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CHEM48835 The coastal environment affects lead and sodium uptake by the moss *Hypnum cupressiforme* used as an air pollution biomonitor

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Abstract

Several studies suggest that potential competition exists between marine cations and heavy metals for binding sites on the cell wall of mosses. This competition would impact the heavy metal concentration measured in mosses by biomonitoring programs, which may underestimate air pollution by heavy metals in a coastal environment. In the present study, we aim to identify possible mechanisms affecting lead uptake by mosses in a coastal environment, specifically, the competition between lead (Pb^{2+}) and sodium (Na^{+}) for binding sites in *Hypnum cupressiforme* (Hc). We also compared the response of continental and coastal Hc populations to Pb^{2+} exposure by immersing the moss samples in artificial solutions that comprised six experimental treatments and subsequently locating and quantifying Pb^{2+} and Na^{+} using the sequential elution technique and X-ray microanalyses with a scanning electron microscope. We demonstrated that high concentrations of Pb^{2+} prevented Na^{+} from binding to the cell wall. We also examined the effect of the salt acclimation of Hc on Pb^{2+} and Na^{+} accumulation. Coastal Hc populations accumulated more Na and less Pb than continental Hc populations in all treatments. Moreover, our results showed treatment effects on the intra/extracellular distribution of Na^{+}, as well as site. This feedback on the influence of salt stress tolerance on Pb^{2+} uptake by mosses requires further study and can be investigated for other heavy metals, leading to a better use of mosses as biomonitoring tools.

Keywords: atmospheric pollution; biomonitoring; bryophytes; competition; stress tolerance; salinity