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Arsenate and phosphate relationships during the uptake in lichens

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Arsenate, As(V), the most common form of arsenic in oxic environments, is characterized by almost identical chemical properties as phosphate (O'Day 2006) and is taken up into the cells via the phosphate transporters (Rosen 2002, Meharg & Hartley-Whitaker 2002, Maciaszczyk-Dziubinska et al. 2012). Typical As(V) uptake curve in lichens consists of two phases: in the first phase As(V) is quickly taken up, while in the second phase it is excreted out of the thalli in the form of arsenite, As(III) (Mrak et al. 2008). It was shown that lichens are able to take up phosphate from very diluted solutions (Ahmadjian 1993). The presence of the second anion in water solution can inhibit or stimulate the uptake of the first anion, but sometimes more complex changes may occur (Nieboer et al. 1984). To test the effect of phosphate on As(V) uptake, two species of lichens were tested, epiphytic *Hypogymnia physodes* (L.) Nyl. and terricolous *Cladonia furcata* (Huds.) Schrad. In both species we observed the inhibitory effect of phosphate on As(V) uptake. The influence was stronger for *C. furcata*. The influence was less pronounced when lower molar ratios of As(V) to phosphate were used and also when lower As(V) concentrations were used. Extremely high concentrations of phosphate had a very strong inhibitory effect on the uptake of As(V) which also influenced the shape of the uptake curve – the uptake curve lost its excretory part.

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