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The Effect of Mercury on Glutathione S-transferase Activity in the Marine Phanerogam *Posidonia oceanica*

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Shoots *of Posidonia oceanica* were collected in the northwestern Mediterranean Sea, in a clean area: Villefranche-sur-mer, France, and in an area known for its mercury contamination: Rosignano, northwestern Italy. Foliar shoots of this phanerogam collected at Villefranche-sur-mer were treated for 48 h with different mercury concentrations (0; 0.01; 0.1 and I .µg Hg L^{-1}). Photosynthetic parts (adult and intermediate blades) showed a higher capacity for mercury uptake than that found in the sheaths. Glutathione S-transferase (GST) activities in foliar tissues of *Posidonia oceanica* from Rosignano were always higher than those from Villefranche-sur-mer. The mercury uptake experiment *(in vivo* experiment) also showed an increase in GST activity as a function of mercury concentrations. This increase was higher in the photosynthetic parts. The GST activity was then measured in an *in vitro* experiment where different foliar tissues from both sampling sites were put in contact with mercury. A significant decrease in GST activity was observed as a function of mercury concentrations whatever the foliar tissue or the sampling site considered. This phenomenon allowed the determination of the IC_{50} for mercury. The GST activities measured in *Posidonia oceanica* from the Rosignano area were more sensitive to mercury than samples from Villefranche-sur-mer. Foliar tissues also showed a different sensitivity to mercury; photosynthetic parts from Rosignano being more sensitive than basal parts. The kinetic parameters of GSTs were also determined in the sheaths of *Posidonia oceanica* from both sites. The results of the *in vitro* experiment seem to indicate that the isoenzyme composition of the GSTs may vary from one site or from one foliar tissue to another. The *in vivo* and *in vitro* effects of mercury appeared to be opposite. When *Posidonia oceanica* was exposed to mercury in the field or *in vivo* in the laboratory, both induction and inhibition of GST activities may have existed. Nevertheless, induction seemed to be the predominant process. Mercury may be involved in GST enzyme induction in this marine phanerogam and in the differences observed in GST activities in the field.