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EXPOSURE OF THE DIATOM SKELETONEMA PSEUDOCOSTATUM TO HEAVY METALS: EFFECTS ON GROWTH, PHYSIOLOGY AND POSSIBLE BIOREMEDIATION STRATEGIES

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Environmental contamination by heavy metals (HM) is one of the major concerns of the modern society due to their non-biodegradable and their long persistence. Furthermore, they can be easily accumulated along the food chain enhancing biomagnification risks, thus posing a serious threat for human and environmental health. Despite the facts that copper is involved in many important vital processes high exposure to elevated concentrations leads to toxicity issue. Sediments are considered the main reservoir of HMs, since they accumulate in this matrix through adsorption mechanisms, hydrolysis, and co-precipitation. However, HMs can be released in the dissolved phase through remobilization processes, including bioturbation and resuspension. Microalgae also be used as bioindicators are largely considered as suitable candidates for metal depletion from any water bodies and sediments, since they are able to immobilize metals onto their cell wall and/or accumulate them by active transport in the cytosol or their organelles. In this study, we exposed the diatom *Skeletonema peseudocostatum*, isolated from the highly HM-polluted Sarno River, to different copper concentrations (0, 10, 25 microM). Cell density and biomass yields were assessed in order to detect eventual variation in algal growth among control and Cu-treated cultures. Copper biosorption/accumulation was assessed through ICP-MS analysis. *Skeletonema pseudocostatum* exhibits a good tolerance to copper and the non-inhibiting concentrations (10 microM) were, indeed, much higher than those found along the Sarno River, considered "the most polluted river in Europe". Cellular growth rates and copper biosorption/accumulation are influenced by the treatment in a dose-dependent manner. Cultures treated with 10 microM copper cells were able to remove about 14% of copper within three days and sustaining a positive growth. In addition, we also evaluated the oxidative status of cell by evaluating the enzymatic activities of CAT, APX and the content of polyphenols. The enzymatic activity of ROS scavenges in cells grown at 10 microM is comparable with control cultures, indicating that is not a stress induced concentration, while at 25 microM both enzymatic activities are significantly higher. Interestingly, phenolic content shows the opposite trend: it is markedly reduced at the highest copper concentration (25 microM) when compared to non treated and 10 microM. These data suggest that this species may be used for copper phycoremediation even if further investigations, such as longer-term exposure and the combined effect of various metals, are mandatory.