

EXECUTIVE SUMMARY: (State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project for California.)

Phytoremediation is a technology based on the ability of plants to take up, accumulate, and detoxify contaminants from the environment. In the search for plants that are most efficient at this process, scientists have studied plants known as metal hyperaccumulators. In California, phytoremediation of selenium is of special interest because selenium present in agricultural run-off and irrigation drainage water in the Central Valley was found responsible for mass deaths and deformities in wildlife. This project represents a molecular investigation of a selenium-hyperaccumulating plant, *Stanleya pinnata* (Prince's plume). Unusual among metal hyperaccumulating plants, *S. pinnata* grows fast, large, and over wide areas so it has great potential for decontaminating high selenium soil. Selenium-hyperaccumulators are able to discriminate between sulfur and selenium analogs, making the sulfur-containing molecules they need while detoxifying and storing the selenium. *S. pinnata* is particularly interesting because it appears to accomplish this using a different process than other well-studied selenium-hyperaccumulators. This project's goals are to 1) determine how Se accumulation differs in *S. albescens*, a non-accumulating relative, and two ecotypes of *S. pinnata* when they are exposed to different concentrations and chemical forms of selenium, and 2) identify *S. pinnata* proteins that are likely to play key roles in the selenium hyperaccumulation mechanism based on the fact that their expression is altered depending on whether selenium is present or absent.