Arsenic is a highly toxic element, which is widely present in the environment. Numerous studies showed that arsenic is a potent carcinogen that increases the risk of developing lung, skin, kidney liver and bladder cancer. Humans are exposed to arsenic mainly through contaminated drinking water or eating arsenic-containing plant food. Therefore, it is important to find the ways to decrease arsenic accumulation in crops to reduce potential risks to human health. The most common pathway of arsenic detoxification is its extrusion out of the cell via the Acr3 transporter. While fungal and bacterial Acr3 proteins have been studied for well over two decades, little is known about Acr3 transporters from plants. In this project, we aim to functionally characterize several Acr3 transporters from various systematic groups, including algae, liverworts, mosses, lycophytes and gymnosperms. Our studies will expand the knowledge on the function of Acr3 transporters in the mechanisms of arsenic detoxification in plants. In addition, characterization of plant Acr3 transporters would greatly enhance possibility to use novel natural or transgenic arsenic accumulators for clean-up of contaminated soil or to develop safe crops with low accumulation of arsenic. Both strategies may result in reduction of arsenic accumulation in the food chain.