Proteomics Research

Proteomics is the study of gene expression through analysis of the array of extant proteins. Protein expression is subject to change by age, disease, nutrition, tissue, medication, and other factors. Two-dimensional gel electrophoresis with silver or fluorescent staining reveals proteins present in a tissue extract at the nanogram level.

A major project in our lab is expression comparison between related plant species. Currently, efforts are focused on allergy inducing ragweed plants. Giant and common ragweed protein expressions are compared with each other and with related less allergenic vegetation. The protein profiles of these plants displayed with two-dimensional gel electrophoresis are evaluated via ImageMaster software. Further understanding the differential expression of proteins is pursued through mass spectral analysis in conjunction with bioinformatics to determine the molecular mass, sequence, and class of expressed proteins. A long-term goal is discovery of allergenic related proteins, which are inherently allergenic or participate in the metabolic pathway for production of allergens.

An image of a two-dimensional electrophoresis gel of sample taken from the Giant Ragweed leaf. The proteins are stained with the Sypro Ruby fluorescent dye and appear as bright spots on a reddish background. The horizontal axis represents a gradient in pH from 3 to 10. Vertically from top to bottom the molecular mass range is 200,000 to 10,000 kDaltons. Each protein viewed on the gel is characterized by it isoelectric point and molecular mass.