

The management of phosphorus by organisms is a key activity that determine their metabolic efficiency. Among phosphorus-contained constituents of living cells, are numerous metabolites (i.a. ATP, ADP AMP), enzyme cofactors, as well as substances that compose the structures of the cells, including: phosphorylated peptides, phosphoric derivatives of polysaccharides, phospholipids. Some of living beings also contain less typical, specific phosphorus compounds - organophosphonates whose role is currently recognized.

The study on transformations of phosphorus forms is not so easy, because of the lack of proper methods and analytical tools that enable the differentiation of mentioned forms. Hope for progress in this area is imaging of metabolic activity of the organism, based on changes in all metabolites made by him - the so-called metabolome. In case of our project, we are focused on metabolites, which are various organic connections of phosphorus, called operatively phosphorome, since their presence and interrelations creates the phosphorus profile of whole organism. Phosphorome can be treated as a metabolic fingerprint, because it reflects the current state of many key biochemical processes occurring in organism.

Our study are carried out in the area of phosphoromics and the main objective is the creation of phosphorus profiles of organisms and determination the relations between these profiles and the dynamics of the growth and development of organisms that are maintained in optimal conditions, as well as in conditions of controlled physiological stress. Such an approach allows for simultaneous diagnosis of: (i) the growth potential of organism, (ii) the range of the influence of physiological stress (i.a. temperature, osmotic stress, pesticides) on its energetic state, and (iii) the qualities of the habitat of organism.

Our research initiates the studies in the area of phosphoromics, providing the new tools for the diagnosis of metabolic status of organisms. The results of planned research will allow for the introduction of the new methods of evaluation e.g.: the quality of plant seeds, rhizomes, and cultures of microorganisms in terms of their propagation, and the resistance to different types of stress.