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INTERNATIONAL CONFERENCE
BIOCATALYSIS-2015:
FUNDAMENTALS & APPLICATIONS

**PROGRAM AND
BOOK OF ABSTRACTS**



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360 Biocatalysis: catalytic mechanism and protein engineering of enzymes

FORMATE DEHYDROGENASES FROM EUKARYOTES

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Formate dehydrogenase (FDH, EC 1.2.1.2.) is an enzyme which is widely occurred in different prokaryotes and eukaryotes. FDH is also used in biotechnology. It catalyses the reaction of formate oxidation to carbon dioxide coupled with reduction of NAD(P)^+ to NAD(P)H . Due to the irreversibility of catalyzed reaction, low price of formate ion and wide pH optimum of activity, formate dehydrogenase is an excellent biocatalyst for cofactor regeneration.

New technologies of recombinant protein production allow us to obtain enzymes from different sources. Genes, encoded FDH from different bacteria, yeasts and even plants were successfully cloned and expressed in our laboratory. Now we've focused on eukaryotic genes due to the fact that FDHs from eukaryotes may have better kinetic properties than bacterial enzymes.

Several years ago two genes of plant FDH were cloned – from the model plant *Arabidopsis thaliana* (AthFDH) and soybean *Glycine maxi* (SoyFDH). It was shown that SoyFDH has the lowest values of Michaelis constants among all studied FDHs but is not thermally stable compared to bacterial formate dehydrogenases. More than 10 mutant forms of SoyFDH were obtained by genetic engineering method and some of them are as stable as bacterial enzymes, but have kinetic properties as plant FDHs. Now two more eukaryotic genes were cloned – from moss *Psychomitrella patens* (PpaFDH) and yeast *Ogataea parapolymorpha* (OpaFDH). In the present work we provide the comparison of properties of new formate dehydrogenases from different eukaryotes

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