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"Gheorghe Asachi" Technical University of Iasi, Romania

NEW FOOD FOR AN OLD MOUTH: NEW ENZYME FOR AN ANCIENT ARCHAEA

Elif Oztetik

Anadolu University, Science Faculty, Department of Biology, 26470 Eskişehir, Turkey

Abstract

Similar to halophilic bacteria, halophilic archaea can have potential biotechnologic applications. Such as increasing salt production in salt-crystallization lakes, usage of *Haloferax* and *Haloarcula sp*. for viscosity stabilization, producing PHA for recyclable plastics, usage of ether-binding lipids of halophilic archaea to make liposomes for medicine and cosmetics, usage of a protein in *H. salinarum* as an antigen to detect certain cancer types, etc. Some of these applications are dependent on enyzmatic activities, like the usage of exoenzymes (amylase, amyloglucosidase, protease and lipase) produced by archaea in the destruction of macromolecules in high salt concentrations. As a multifunctional group of enzymes, glutathione *S*-transferases (GSTs) are also capable of inactivation, degradation or excretion of wide range of compounds catalytically or non-catalytically. However, to date, against the number of researches in bacteria with GSTs, no study has been addresses the presence of GSTs in archaea based on their enzymatic functions. In this study, the determination of GST activity in halophilic archaeon called *Haloarcula hispanica* ATCC 33960 were aimed by using 1-chloro-2,4-dinitrobenzene as a substrate spectrophotometrically. For detection of optimized activity conditions, several buffer systems and pH values, different salt concentrations and protein amounts, varying substrate and co-substrate concentrations and different temperatures were measured during the study. According to the results, specific activity was determined as 19.68 nmole/min/mg protein. The V_{max} and K_m values for *H. hispanica* GST activity towards CDNB and GSH were calculated by Lineweaver-Burk plots. To the best of our knowledge, GST enzymes have not been identified in archaea yet, at least based on their catalytic activities. Therefore, it is the first report on this area.