

Endo- α -1,4-polygalactosaminidases and their homologs: Structure and evolution

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Abstract

Endo- α -1,4-polygalactosaminidase is a rare enzyme. Its catalytic domain belongs to the GH114 family of glycoside hydrolases. It is shown by phylogenetic analysis that the evolution of the corresponding genes involved duplications, elimination, and horizontal transfer. The domain and secondary structures of endo- α -1,4-polygalactosaminidases are discussed. A hypothesis is put forward as to the structure of the active center of the enzyme. Iterative screening of a protein database reveals evolutionary relationships of the GH114 family with the GH13, GH18, GH20, GH27, GH29, GH31, GH35, GH36, and GH66 families of glycoside hydrolases and with the COG1306, COG1649, COG2342, GHL3, and GHL4 families of proteins with unknown enzymatic functions. Unclassified homologs are grouped into 13 new families of hypothetical glycoside hydrolases: GHL5-GHL15, GH36J, and GH36K. © 2011 Pleiades Publishing, Ltd.

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Keywords

CAZy, COG2342 family, endo- α -1,4-polygalactosaminidase, gene annotation, GH114 family, GH36 family, GHL families, glycoside hydrolase, hierarchical protein classification, horizontal transfer, multiple sequence alignment, new protein families, protein evolution, protein phylogenetic tree, PSI Protein Classifier, PSI-BLAST, search for homologs, TIM-barrel fold