Title:	An ultra-stable glucanotransferase-cum-exoamylase from the hyperthermophile archaeon Thermococcus onnurineus
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Keywords:	Exoamylase Glucanotransferase Smallest acceptor maltose Thermostability
Issue Date:	2019
Publisher:	Elsevier
Citation:	Archives of Biochemistry and Biophysics, 665, pp. 114-121.
Abstract:	The genome of the hyperthermophile archaeon Thermococcus onnurineus (strain NA1) encodes a 652 residues-long putative 4-α-glucanotransferase of the GH 57 family which we have expressed in Escherichia coli. The enzyme (TonAmyGT) appears to remove glucose from the reducing end of a donor glucan and transfers it to the non-reducing end of an acceptor glucan, creating a pool of oligosaccharides through disproportionation of any substrate maltooligosaccharide, with maltose acting substantively as the smallest donor glucan as well as the smallest acceptor glucan. Additionally, glucose is also cleaved from maltooligosaccharides and released into solution without being transferred to an acceptor, causing the enzyme to function as an exo-amylase (which can digest starch) in addition to its activity as a glucanotransferase. TonAmyGT functions over a broad range of temperature (20–100 °C) and pH (4.0–9.0), and shows extreme resistance to chemical and thermal denaturation, displaying a melting temperature of 104 °C, at a pressure of 35 psi, in a differential scanning calorimeter. An interesting characteristic is that the glucanotransferase activity shows feedback inhibition through glucose (which the enzyme itself generates), indicating that the exo-amylase and glucanotransferase activities regulate each other.
URI:	https://www.sciencedirect.com/science/article/pii/S0003986118310531 (https://www.sciencedirect.com/science/article/pii/S0003986118310531) http://hdl.handle.net/123456789/2118 (http://hdl.handle.net/123456789/2118)
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