Title:	N-terminal domain replacement changes an archaeal monoacylglycerol lipase into a triacylglycerol lipase
Authors:	Tiwari, Prince (/jspui/browse?type=author&value=Tiwari%2C+Prince)
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Abstract:	Lipolytic enzymes of hyperthermophilic archaea generally prefer small carbon chain fatty acid esters (C2–C12) and are categorized as esterases. However, a few have shown activity with long-chain fatty acid esters, but none of them have been classified as a true lipase except a lipolytic enzyme AFL from Archaeglobus fulgidus. Thus, our main objective is to engineer an archaeal esterase into a true thermostable lipase for industrial applications. Lipases which hydrolyze long-chain fatty acid esters display an interfacial activation mediated by the lid domain which lies over active site and switches to open conformation at the oil–water interface. Lid domains modulate enzyme activities, substrate specificities, and stabilities which have been shown by protein engineering and mutational analyses. Here, we report engineering of an uncharacterized monoacylglycerol lipase (TON-LPL) from an archaeon Thermococcus onnurineus (strain NA1) into a triacylglycerol lipase (rc-TGL) by replacing its 61 N-terminus amino acid residues with 118 residues carrying lid domain of a thermophilic fungal lipase—Thermomyces lanuginosus (TLIP).
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