Detecting the Structural Determinants of Glycosyl Hydrolase Family 11 Xylanase Inhibition

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Microbial (endo)xylanases (endo-*β*-1,4-xylanases, E.C.3.2.1.8) are frequently used to modify the functionality of (arabino)xylan in feed and food applications. In cereals two types of endogeneous proteinaceous xylanase inhibitors were discovered, *i.e.* TAXI-type (*T. aestivum* xylanase inhibitor) [1] and XIP-type (xylanase inhibiting protein) [2] inhibitors.

Probing the inhibition activities for different isolated TAXI-isoforms against both *A. niger* and *B. subtilis* xylanases, led to the definition of TAXI-I type, with inhibiting activity against both GH family 11 endox, and TAXI-II type, with inhibition specificity against the *B. subtilis* endoxylanase only [3].

Studies on the molecular identification and characterization of the TAXI-encoding genes showed that TAXIs are a new class of plant proteins to which a function as plant protective microbial glycoside hydrolase inhibitor can be ascribed [4].

Both structures of TAXI-I in complex with *A. niger* xylanase and in complex with *B. subtilis* xylanase were determined. Detailed comparison of both complexes reveals the xylanase and inhibitor amino acid residues that are critical for complex-binding and stabilization. Extrapolation towards TAXI-II type inhibitors shows that TAXI-I inhibition activity is independent of the pH optima of xylanases, while TAXI-II inhibition of xylanases with low pH optima will be weak or absent [5].

[1] Debyser *et al*., *J. Am. Soc. Brew. Chem*., 1997, **55**, 153. [2] McLauchlan *et al*., *Biochem. J.*, 1999, **338**, 441. [3] Gebruers *et al., Biochem. J*., 2001, **340**, 441. [4] Fierens *et al*., *FEBS Letters* 2003, **540**, 259. [5] Sansen *et al.*, *J. Biol. Chem.*, 2004, **279**, 36022.

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