Researchers' new advance in quest for second generation biofuels

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Credit: Julia Walton

Scientists at the University of York are part of an international research team that has made a significant step forward in understanding the processes naturally occurring enzymes use to degrade microbe-resistant biomass, a key aim in the development of biofuels.

The research is part of ongoing study of a recently discovered family of enzymes produced by fungi and bacteria, which are able to break down tough cellulose-based materials such as plant stems.

Understanding the chemistry behind these natural processes will help scientists to recreate and potentially improve them for industrial purposes, principally the production of biofuels from sustainable sources.

The team, including Professor Paul Walton and Professor Gideon Davies of the Department of Chemistry at York, today presents the first published molecular structure of one of the key enzymes (lytic polysaccharide monooxygenases or LPMOs) involved in these processes.

Reported in *Nature Chemical Biology*, the research shows in unprecedented detail how the 'active site' of the enzyme changes when it binds to plant cell wall cellulose, and this knowledge is important in advancing understanding of the reaction chemistry.

Professor Walton said: "LPMOs have overturned our thinking about biomass degradation in biology; they are also essential components in the commercial production of bioethanol from cellulosic feedstocks. This new structure will help chemists and biochemists improve the efficiencies of these important enzymes."

Professor Davies added: "When we can understand structure and chemistry we can improve environmentally-friendly processes for the benefit of all. This work, by a combined European team, gives us unparalleled molecular insight into one of the key reactions catalysed by fungi. It is truly exciting."

More information: Kristian E H Frandsen et al. The molecular basis of polysaccharide cleavage by lytic polysaccharide monooxygenases, *Nature Chemical Biology* (2016). DOI: 10.1038/nchembio.2029

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