Carpet beetle enzymes for sustainable valorisation of keratin

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Summary

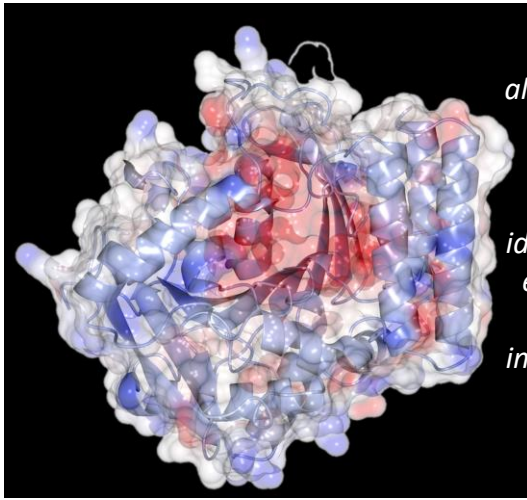
This project aimed to identify and characterise keratin-degrading enzymes from carpet beetles, and explore their potential applications in the sustainable valorisation of abundant keratin waste from the food and textile industries.

Aims

- Isolate high-quality RNA and digestive proteins from the carpet beetle *Anthrenus flavipes* fed on wool.
- Construct a de novo transcriptome and perform proteomics to identify keratin-digesting enzymes.
- Produce recombinant *A. flavipes* enzymes in yeast.
- Characterise the enzymes and evaluate their ability to break down keratin into peptides and amino acids.

Outcomes

- Isolated high-quality RNA, proteins and purified keratin-degrading enzymes from carpet beetle larvae, followed by successful RNA sequencing and transcriptome assembly.
- Identified key keratin-degrading enzymes and expressed eight target enzymes in Pichia pastoris.
- Scaled up, purified, and confirmed correct folding of three enzymes, now being tested for keratin-degrading capabilities and potential industrial applications.



"The POC fund has allowed us to conduct omics studies on carpet beetles, leading to the identification of novel enzymes that will be assessed in the industrial valorisation of keratin waste"
Federico Sabbadin
University of York

This proof-of-concept project was awarded by the Biomass Biorefinery Network and funded by BBSRC. For more information visit bbnet-nibb.co.uk.