Isolation and cultivation of cellulolytic and xylanolytic bacteria and molds extracted from the gut of the termite *Reticulitermes santonensis (3DV.1.14)*

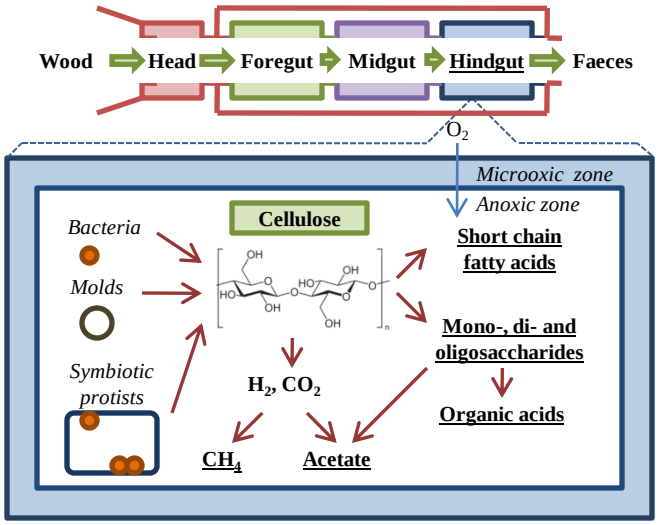
Tarayre Cédric[1], Bauwens Julien[2], Mattéotti Christel[3], Brasseur Catherine[4], Millet Catherine[3], Destain Jacqueline[1], Vandenbol Micheline[3], Portetelle Daniel[3], De Pauw Edwin[4], Haubruge Eric[2], Francis Frédéric[2] and Thonart Philippe[1]

1 - Bio-Industries unit – University of Liege Gembloux Agro-Bio Tech
2 - Functional and evolutionary entomology unit – University of Liege Gembloux Agro-Bio Tech
3 - Animal and microbial biology unit – University of Liege Gembloux Agro-Bio Tech
4 - Mass spectrometry laboratory – University of Liege

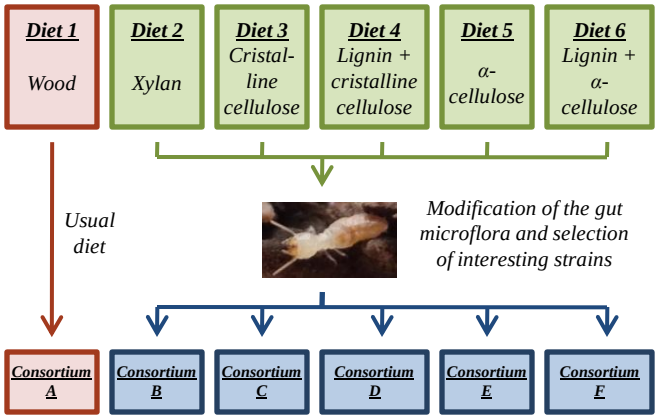
Introduction

Biofuel production can be based on the use of agro-residues, consisting in a complex lignocellulosic structure which is not easily hydrolysable. The digestive tract of the termite *Reticulitermes santonensis* contains a diversified microflora able to hydrolyze the wood components. Bacteria, molds and protists form efficient consortia, able to break the lignocellulosic complex by producing enzymes, such as xylanases and cellulases. Our purpose is the isolation of microbial strains from termite guts in order to evaluate their potential for hydrolysis of lignocellulosic materials. Termites were fed using different diets chosen to improve the xylanolytic and cellulolytic microflora: wood, microcristalline cellulose (added with lignin or not), α-cellulose (added with lignin or not) and birchwood xylan. Then, dissections were realized to isolate the potential xylanolytic and cellulolytic strains. This approach led us to isolate and to study several strains of bacteria (*Bacillus* sp. strain CTGx and *Chryseobacterium* sp. strain CTGx) and molds (*Trichoderma virens* strain CTGx and *Sarocladium kiliense* strain CTGx). These microorganisms were able to hydrolyze starch, xylan, cellulose, carboxymethylcellulose, esculin, β-glucan and Whatman® filter paper. They can produce glucose and xylose monomers and oligomers which can be further fermented to produce bioethanol.

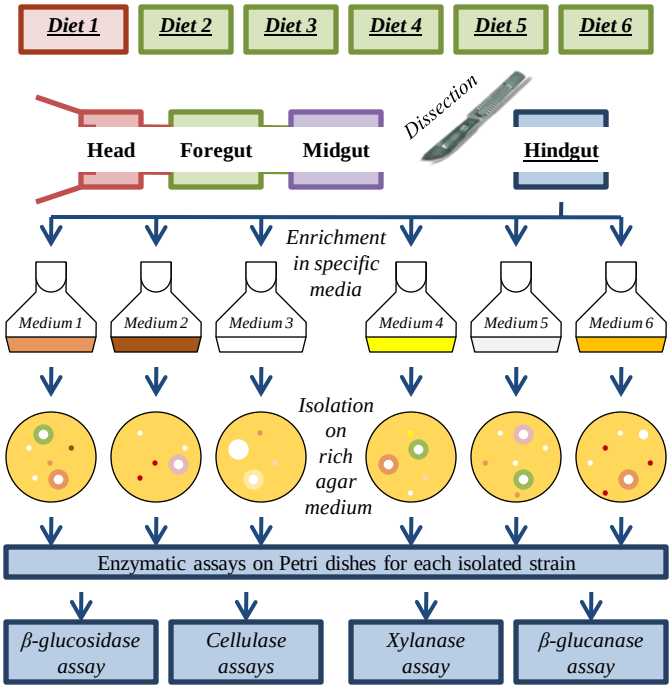
The gut of lower termites: a complex and microscopic ecosystem



Modification of the termite gut microflora through specific diets



Isolation of xylanolytic and cellulolytic strains



Identification of the most interesting strains and their activities

Strain	*β-glucosidase activity*	*Cellulase activity*	*Xylanase activity*	*β-glucanase activity*
***Bacillus* sp. strain CTGx**	***Not detected***	***Positive test***	***Not detected***	***Not detected***
***Chryseobacterium* sp. strain CTGx**	***Positive test***	***Positive test***	***Positive test***	***Not detected***
***Sarocladium kiliense* strain CTGx**	***Positive test***	***Positive test***	***Positive test***	***Positive test***
***Trichoderma virens* strain CTGx**	***Positive test***	***Positive test***	***Positive test***	***Positive test***

In conclusion, the gut of the termite Reticulitermes santonensis contains many interesting strains that can be further used in the field of the production of fermentable sugars from lignocellulosic materials.

Acknowledgements

This work was supported by an ARC contract (Action de Recherche Concertée; agreement Gembloux Agro-Bio Tech no. ARC 08-13/02).