Insects – novel source of biomaterials

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For some years now, the biopolymers have attracted greatest interest from both academia and industry. Some of them being investigated for a long time, such as rubbers [1], the interest in others, such as PHA [2], was mainly driven by the ecology concerns.

Chitin is somehow apart from this mainstreaming interest in biopolymers. Indeed, the second major biopolymer worldwide after cellulose, it is mainly produced as by-product of shellfish industry. Therefore its production was less a concern than its valorization through different applications and subsequent purifications and derivatizations [3]. The hatching of the insect industry contributes to a tremendous change of the situation. Indeed, the main purpose of this industry being the production of consistent protein meal, the synchronization of the generations is a key point, then it induces the consistence and the reproducibility of the cuticle, and from there extracted chitin, as well; as long as the extraction and purification processes are consistent.

In this regard, several species of insects and processes were evaluated for the production of chitin. Even if all the screened species drove to a high quality biomaterials – the degree of crystallinity (DC) above 0.2 - significant differences were found among the tested species and processes.

Indeed, flying insects (*H. illucens* and *G. melonella*) which contain less proteins, were found to be easier to purify, whereas *A. domisticus*, on the contrary, was found to be the most recalcitrant, whatever the applied process was. For the process, the pressing step was found to be crucial for the enhancement of the gravimetric purity and of the purity by difference, especially by lowering the amount of alanine and tyrosine present in the cuticle, whatever the studied insect was.

Finally, besides its ecological interest, the enzymatic extraction also presents the interest of lowering the degree of acetylation, thus facilitating the deacetylation step, required for the synthesis of chitosan, the most used chitin derivative. Thus, the combination of pressing step and the utilization of Prolyve enzyme allowed the production of chitin with the purity by difference higher than 70% and the acetylation degree below 80% for *H. illucens*, *G. melonella* and *T.molitor* [4-6].

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