Assessment of subterranean termite symbiotic fauna under different diets

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Subterranean termites are known as serious pests of wood, having highly efficient lignocellulose degradation ability which largely relies on flagellate protist symbionts present in the hindgut. It is clear that the symbiotic association between lower termites and their hindgut symbionts have advantages for both, since the termites are able to receive an extra energy supply resulting from lignocellulose degradation, while hindgut symbionts have shelter, protection and food, supplied by the termite host. Termite gut microbiota and respective cellulosic activity may be a strategic target for designing molecular-based bio-pesticides for termite control. For such an innovative strategy, the characterisation of the flagellate protist symbiotic fauna should be pursued.

The effect of different diets on termite flagellate protists community of the lower termite *Reticulitermes grassei* (Clément), the principal subterranean termite species in Portugal, was investigated. The main objectives of this STSM were to obtain high quality microscopy images of flagellate protists and to assess the correct methodology to perform a transcryptomic analysis of flagellate protists.

Termites were collected in Portugal and offered six different diets (natural diet (pieces of the wood from where they were collected), pine wood (*Pinus pinaster* Aiton), European beech (*Fagus sylvatica* L.), thermally modified beech (submitted to 180 °C during 4 hours), cellulose (cellulose powder mixed with deionised water) and starving (no source of cellulose offered to the termites) for 14 days. After this trial, termites were evaluated in terms of flagellate protists diversity and abundance and prepared for microscopical and molecular analysis.

The results obtained showed clearly that termite flagellate protist communities living inside their hindgut change according with the type of diet. The RNA and DNA extraction techniques experimented, although not as successfully as expected, were a step forward towards the optimization of the methodology to be applied to achieve good quality samples for further analysis. The use of Transmission Electron Microscopy enabled the first visualisation of flagellate protists from *R. grassei* hindgut, allowing the further analysis of their internal physiology, important for their correct identification.

The search for new wood treatments and biobased materials must take into consideration their resistance to biological degradation agents, as subterranean termites. On the other hand, further knowledge of the effect of the different products on the symbiotic interactions on the termite gut might lead to interesting developments in future termite control.

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