

Different species of termites display great variability in digestive carbohydrase profiles

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Termites are detritivorous insects of order Isoptera. Considered one of the most important bioreactors on the planet, they play a key role in the decomposition of dead plant tissue and form the basis of a detritivore food chain in tropical terrestrial ecosystems. While current termites feed on a variety of plant materials, they are all derived from a wood-feeding ancestor. Despite their importance, studies on the biochemistry of termite digestion are relatively rare. Digestive carbohydrases were determined in termites of nine genera: *Coptotermes*, *Cornitermes*, *Orthognathotermes*, *Grigiotermes*, *Heterotermes*, *Microcerotermes*, *Nasutitermes*, *Spinitermes* and *Syntermes*, and their enzymatic profiles compared. Prompt dissection and conservation of samples are critical, as enzymatic activities change after 1-2 days of insect removal from the colonies. The enzymatic specific activities found in the termite midgut were: range, enzyme (substrate): from 0.42±0.02 to 22±1 mU/mg for beta-1,3-glucanase (laminarin), 0 to 44±6 mU/mg for xylanase (oat spelt xylan), 1.23±0.09 to 17±2 mU/mg for pectinase (apple pectin), 0 to 20±3 mU/mg for CMCase, 1.1±0.2 to 94±3 mU/mg for beta-glucosidase (p-nitro-phenyl-beta-glucopyranoside) and 1.0±0.2 to 58±4 mU/mg for beta-xylosidase (p-nitro-phenyl-beta-xylopiranoside). The diversity of termite lineages and feeding groups seems to be reflected in gut enzyme levels. Phylogenetically related genera have similar carbohydrase profiles, with variations possibly related to specific feeding habits or carbohydrate-digesting microbiota. Wood-feeders have high CMCase and pectinase levels while soil-feeders and litter-feeders have high beta-1,3-glucanase activities. Surprisingly, *Orthognathotermes*, a soil-feeder, showed very low beta-glucosidase and beta-xylosidase activities. These results show that generalizations about termite digestive enzymes can not be done and that detailed comparative studies of this insect group are necessary.

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