

## ABSTRACT

Analytical chemistry plays a crucial role in studies on chemical ecology and only the development of sophisticated methods enables the detection of biologically active compounds that are usually present in minute quantities and often in very complex mixtures. My thesis is dedicated to the application of modern analytical techniques and instrumentation to unravel the identity, chemical diversity and function of semiochemicals and defensive compounds used by various species of termites.

The first section of this thesis aims at the identity of chemicals used in communication, the pheromones. I studied the chemistry of the trail-following communication in three selected species of termites. Besides the identification of (3Z,6Z,8E)-dodeca-3,6,8-trien-1-ol, the most frequent termite trail-following pheromone, as the trail-following pheromone in *Psammotermes hybostoma* (Rhinotermitidae), I participated in the description of two new structures, (10Z,13Z)-nonadeca-10,13-dien-2-one in *Glossotermes oculatus* (Serritermitidae) and *syn*-4,6-dimethylundecan-1-ol in *Hodotermopsis sjoestedti* (Archotermopsidae). We identified (3Z,6Z,8E)-dodeca-3,6,8-trien-1-ol to be the female sex pheromone in *Psammotermes hybostoma*, and *syn*-4,6-dimethylundecanal to be the male sex pheromone in *Hodotermopsis sjoestedti*. I also identified the chemical composition of the complex multi-component alarm pheromone secreted by the soldiers of *Termitogeton planus* (Rhinotermitidae) and the volatile specific to reproductives, dodecane-2,10-diol, in *Prorhinotermes simplex* (Rhinotermitidae).

In the second section, I summarize the studies on the chemistry of termite defensive compounds. In soldiers of *Psammotermes hybostoma*, I detected altogether 33 defensive chemicals belonging mainly to sesquiterpenes and fully identified majority of them. Qualitative and quantitative comparison of defensive blends among colonies clearly distinguished three different chemotypes, corresponding well with the localities of their origin. In workers of *Neocapritermes taracua* (Termitidae), I participated in the description of a previously unknown multi-component defensive mechanism, resulting in the production of benzoquinone(s), converted from hydroquinone(s) through the catalysis by a copper-binding protein.

To conclude, my results highlighted the complexity of chemicals used in communication and defence in termite societies, and contributed to the understanding of the evolution of pheromones and defensive chemicals in these oldest social insects.