AC21 Special Project Fund 2015

Antimicrobial Peptides in Biomaterials

The aim of the AC21 special project fund was to bring together scientists and students from

Stellenbosch University,
the University of Minnesota
the University of Freiburg and
the University of Strasbourg (representative)

with the goal to establish collaborations that will allow us to create materials resistant to infections by incorporation of antimicrobial peptides. In view of a worldwide re-emergence of infectious diseases and a rapid increase in pathogens that are multi-resistant to commercially available antibiotics new strategies to fight such infections have to be developed. Novel agents with completely novel mechanisms of action are desirable where natural compounds such as antimicrobial peptides are effector molecules of innate immunity and provide a first line of defence against a multitude of pathogenic microorganisms. Therefore, naturally occurring antimicrobial peptides have been studied to develop new concepts for novel pharmaceutical compounds with increased efficiency and these have also been used to biofunctionalize the surfaces of medical devices, implants and other biomaterials. In lipid membranes, antimicrobial peptides form nanopores and channels, or they disrupt the membrane assembly in a different manner.

The goal of the AC21 Special Project was to establish collaborations that would bring together the fields of peptide and material sciences. The center of events was a full-day workshop on October 22, 2015 with about 60 participants. The good response reflects the need of such a meeting and allowed us to arrange for additional exchange visits between laboratories already during the ongoing visit of the overseas partners.

At the workshop 15 talks were presented including from PhD students, junior and established scientists which allowed to get a comprehensive view on the ongoing research activities at different departments of the four AC21 member institutions. Whereas a number of talks were dedicated to
I : The Innate Immune System and New Antimicrobial Peptides, a second series of lectures was about
II. Novel Biomaterials, which was concluded by
III. Techniques to Investigate Biomaterials and Antimicrobial Peptides.

For the first time the data, expertise and instrumental capacities of the participating research teams were presented in a comprehensive manner and links between different teams and research subjects were established. By allowing this global view on so far unconnected research topics the scientific program turned out highly interesting. The newly established contacts lead to a great number of planned collaborations that promise to extend well beyond this initial stimulus.

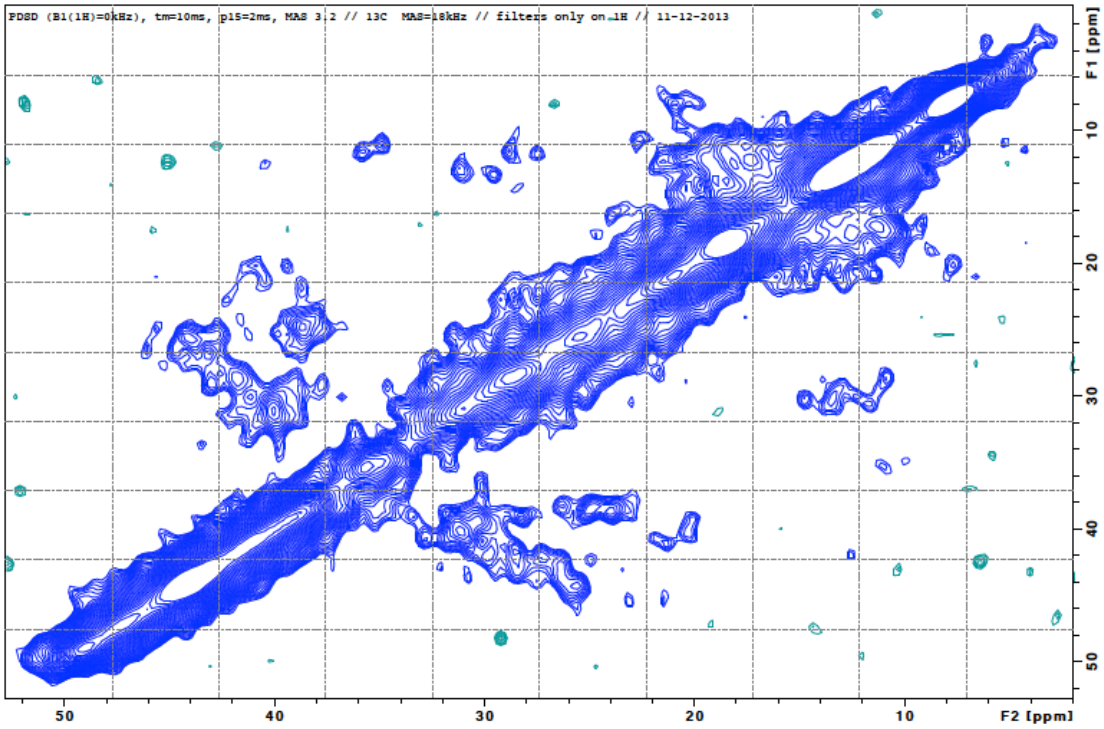
Group photo of workshop participants on October 23.

It should be emphasized that AC21 Special Project funding has allowed us to go well beyond this one-day event. The days before and after the workshop were used to investigate a great number of tyrocidine antimicrobial peptides from Stellenbosch at the analytics and NMR centers of the University of Strasbourg as well as at the University of Freiburg. In a related manner, were investigations of the GL13K antimicrobial peptides initially designed in Minnesota conducted in Strasbourg.

In conclusion the meetings funded by the AC21 Special Project fund much exceeded our best expectations. Having members of the four institutions meet for several days, even weeks, not only allowed exchange of interesting data as would be the goal of the workshop but went well beyond by creating innovative ideas, establishing new collaborations in the much unexplored field of Antimicrobial Peptides in Biomaterials and starting first experiments!

The lecture hall at the Collège Doctoral Européen during the workshop on Oct 22.

Wilma van Rensburg, Stellenbosch, Dr. Conrado Aparicio, Minneapolis, Professor Jan Behrends, Freiburg and Dr. Cécilia Ménard-Moyon, Srasbourg presenting their lectures.



^{13}C-^{13}C solid-state NMR correlation spectrum of tyrocidine C prepared by the team of Marina Rautenbach in Stellenbosch and investigated first at the solid-state NMR center of the Chemistry Institute in Strasbourg during the workshop-related visit of the South African team funded by AC21.

This report was prepared by Pr Burkhard Bechinger, Strasbourg on November 3, 2015 with feed back from the co-organizers.