PD Dr. Gregor Hagelueken

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Research Expertise

The research in my group focuses on two related topics. The first topic is bacterial immunity. The discovery of CRISPR defense systems has shown that bacteria have very complicated immune systems that protect the microorganisms from attack by phages, viruses that are specialized to infect bacteria. In addition to CRISPR, there are many other bacterial defense systems, many of which are strikingly similar to parts of the human immune system.

The second theme is the interface between pathogens and our immune system, such as the tricks that pathogens use to outmaneuver the immune system. One example is a process by which pathogens such as Haemophilus influenzae scavenge a sugar molecule called sialic acid from our tissues and incorporate it into their cell wall to hide from our immune system.

Using general biochemistry and structural biology, we are trying to understand these systems and learn about the origin and function of our immune system.

Education / Training

I studied Applied Natural Sciences at the Technical University of Freiberg. For my diploma thesis I joined the research group of Dirk Heinz at the Department of Structural Biology at the Helmholtz Centre for Infection Research (HZI) in Braunschweig. I stayed there for my PhD in the laboratories of Dirk Heinz and Wolf-Dieter Schubert and worked on virulence-related proteins of *Pseudomonas aeruginosa* and *Yersinia pestis*.

After completing my PhD, I moved to the University of St. Andrews in Scotland and worked as a postdoctoral fellow with Jim Naismith. There I studied membrane proteins involved in bacterial lipopolysaccharide synthesis. In St. Andrews I was introduced to EPR distance measurements on proteins by Olav Schiemann. Combining both techniques, I completed my habilitation in "Biophysical Chemistry" at the Institute of Physical and Theoretical Chemistry in Bonn.

Appointments / Positions Held

2012-2018 Junior Group leader, Institute of Physical and Theoretical Chemistry, University of Bonn.

Since 2019, Gregor is a group leader at the Institute of Structural Biology.

5 Most Relevant Publications for PD Dr Gregor Hagelueken

1. Rouillon C, Schneberger N, Chi H, Blumenstock K, Da Vela S, Ackermann K, Moecking J, Peter MF, Boenigk W, Seifert R, Bode BE, Schmid-Burgk J-L, Svergun D, Geyer M, White MF and **Hagelueken G**, "Antiviral signaling by a cyclic nucleotide activated CRISPR protease." Nature (2023) 614:168-174, doi:10.1038/s41586-022-05571-7

2. Peter MF, Ruland JA, Depping P, Schneberger N, Severi E, Moecking J, Gatterdam K, Tindall S, Durand A, Heinz V, Siebrasse J-P, Koenig P-A, Geyer M, Ziegler C, Kubitscheck U, Thomas GH and **Hagelueken G**, "Structural and mechanistic analysis of a tripartite ATP-independent periplasmic TRAP transporter", Nat. Commun. (2022) 13:4471 doi:10.1038/s41467-022-31907-y

3. Peter MF, Gebhardt C, Mächtel R, Moya Muñoz GG, Glaenzer J, Narducci A, Thomas GH, Cordes T and **Hagelueken G**, "Cross-validation of distance measurements in proteins by PELDOR/DEER and single-molecule FRET", Nat. Commun. (2022) 13:4396, doi:10.1038/s41467-022-31945-6

4. Glaenzer J, Peter MF, Thomas GH and **Hagelueken G**, "PELDOR spectroscopy reveals two defined states of a sialic acid TRAP transporter SBP in solution", Biophys. J. (2017) 112:109-120, doi:10.1016/j.bpj.2016.12.010

5. **Hagelueken G**, Clarke BR, Huang H, Tuukkanen A, Danciu I, Svergun DI, Hussain R, Liu H, Whitfield C and Naismith JH, "A coiled-coil domain acts as a molecular ruler to regulate O-antigen chain length in lipopolysaccharide", Nat. Struct. Mol. Biol (2015) 22:50–56, doi:10.1038/nsmb.2935