Open PhD position. NEUTROLECT: Neutron diffraction for deciphering how pathogens interact with human glycolipids

Many pathogens recognize sugar antigens as the first step of infection. Among them, some bacteria produce toxins that specifically recognize the carbohydrate head of glycolipids from the cell membrane of host tissues. Such toxins contain carbohydrate binding domains, which are able to cluster the protruding oligosaccharides, therefore affecting the dynamic and structure of the glycolipids. This results in membrane deformation that allows for internalization of toxins or whole bacteria. A detailed structural knowledge of the interaction may serve as the basis for the design of new inhibitors that could act as alternative strategies to antibiotic treatment in some infections.

The project will use neutron macromolecular crystallography for characterizing the interactions of two bacterial toxins, from toxigenic *Shigella dysenteriae* and enterohemorrhagic *Escherichia coli*, with glycan moieties of glycosphingolipids. Since deuteration of biomolecules is a crucial step for neutron structure determination, proteins will be produced in perdeuterated form in the Deuteration Laboratory (D-Lab) at the Institut Laue-Langevin (ILL). Trisaccharides of interest and analogs will be produced recombinantly in *E. coli* through a synthetic biology approach by engineering of *E. coli* strains at CERMAV, before production and purification of deuterated form in the D-lab at ILL. Characterization of the interaction by biophysical methods will be done at CERMAV while crystallization and subsequent neutron diffraction data collection, which will be carried out at the ILL on the ILL instrument LADI-DALI.

We are looking for a highly motivated candidate with an M.Sc. in Biochemistry or Chemistry with an interest in Structural Biology and interdisciplinary work. The candidate should be fluent in English and will benefit from an International working environment. Experience in protein purification and molecular biology is desirable.

The total duration of the PhD is 3 years with research periods at ILL and CERMAV, both sites being easily reachable by public transportation in Grenoble. The project is co-financed by ILL and Université Grenoble Alpes (UGA), under the program GATES "Attractivité et Excellences à l'Université Grenoble Alpes". The student will be registered at the Doctoral school of Chemistry and Life Sciences (EDCSV) of UGA, with a work contract at ILL, and will benefit from the environment of both UGA and ILL. The position will stay open until filled. The expected starting date is 1st October 2023.

How to apply: Please send an email to Anne Imberty (anne.imberty@cermav.cnrs.fr), Juliette Devos (devosj@ill.fr) and Matthew Blakeley (blakeleym@ill.fr), with a single PDF including a brief motivation letter, CV, Master certificate (with scores), a short abstract of your Master thesis and at least one contact person to act as a reference. Do not hesitate to contact the scientists above if you have questions.