Project 9.2 Mechanistic and structural studies of th replication of (+)ssRNA viruses (NCN/OPUS)

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www: http://bityl.pl/h8ZOw

Background:

The most numerous group of viruses that cause disease in humans are those that encode their genetic material in the form of ribonucleic acid (RNA). These include, for example, the viruses that cause influenza, SARS, COVID-19, Zika disease, or Ebola. One subgroup of RNA viruses contains a single strand of RNA that can directly serve as a template for the production of component proteins of new virus particles in an infected cell. These viruses are called (+)ssRNA viruses. In order to produce new copies of the virus, the RNA must be multiplied. A special enzyme called replicase first copies the RNA strand into its complementary form. The complementary RNA is then used to synthesize multiple copies of the RNA strand, identical to the starting form, which can be incorporated into new viruses.

In this project, we will study replicases from two groups of (+)ssRNA viruses. The first is togaviruses, which include one of the most important new pathogens, the Chikungunya virus that causes epidemics in tropical countries. Symptoms of infection include fever and joint pain that may persist for months. The mortality rate is about 1 in 1000 cases. The second group is the matonaviruses, which include rubella virus, a fairly common infection with relatively mild symptoms. However, rubella can cause fetal damage if a pregnant woman becomes infected.

Aim:

The goal is to determine the three-dimensional structure of replicases at the level of individual atoms. We plan to use, among other approaches, cryo-electron microscopy (cryo-EM). Determining the structure of replicases will allow us to understand how they work.
Currently, no drugs are available to combat toga- and matonavirus infections. Another goal of this project is to identify substances that can inhibit replicases from these viruses.

Requirements:

- Master's degree in biology, biochemistry or related field,
- eligibility for PhD studies in Poland,
- experience in molecular biology, biochemistry/protein purification, crystallization, proteins, cryo-EM sample preparation will be a definite benefit,
- written and spoken fluency in English,
- willingness to learn and take new challenges, ability to work independently, analytical thinking,
- good interpersonal skills and a collaborative attitude.

Number of positions available: 1

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