

Fonds pour la Formation à la Recherche dans l'Industrie et dans l'Agriculture

Appel/Call FRIA 2025

Jury report

APPLICATION REFERENCE

FRIA (1st grants) [FRIA-B1]

Jury : LS1 - jury 1

Application ID : 40038435

Host institution : Université de Liège

Participants :

- **PROPS Charles-Henri [Applicant]**
- **DUMOULIN Mireille (ULiège) [Promoter]**

Title in French :

Développement de nano-anticorps (VHHs) contre les facteurs de virulence de *Pseudomonas aeruginosa*

Title in English :

Development of Nano-Antibodies (VHHs) against *Pseudomonas aeruginosa* Virulence Factors

JURY REPORT

Quality of the research project: Feasibility, originality, host laboratory, work plan, and activities report (applicable only for applicants to a 1st Grant 2nd Year)

Indicate a comment below.

The proposed research project demonstrates a high level of scientific quality and innovation. Its originality lies in the development of multitarget anti-virulence nano-antibody (VHH) therapeutics directed against key extracellular enzymes of *Pseudomonas aeruginosa* (LipA and EstA). This multitarget strategy is at the forefront of alternative approaches to conventional antibiotics, addressing the urgent need for novel interventions against multidrug-resistant pathogens and minimizing selective pressure for resistance. The feasibility of the project is strongly supported by the applicant's thorough methodological plan, which details each experimental step from antigen production and immunization, through VHH selection and characterization, to comprehensive in vitro and in vivo efficacy studies. The host laboratory, NEPTUNS at the Center for Protein Engineering (CIP), ULiege, offers an outstanding research environment with access to state-of-the-art facilities, specialized platforms for protein production and high-throughput screening, and robust interdisciplinary collaborations. The work plan is well-structured and realistic, with clear milestones and contingency strategies, ensuring that risks are anticipated and mitigated. Overall, the project is ambitious yet achievable within the proposed timeframe.

Competencies of the applicant with respect to his/her speciality (CV)

Indicate a comment below.

The applicant's competencies are highly aligned with the requirements of this project and demonstrate strong potential for success. Through his master's thesis, the applicant has gained hands-on experience in the selection and characterization of Nanobodies® (VHHs) via phage display, ELISA screening, and recombinant protein production in *E. coli*. He has developed technical skills in molecular biology, protein purification, and biophysical characterization, which are directly applicable to the proposed research. The applicant's integration into a collaborative and interdisciplinary laboratory environment further strengthens his profile, providing access to expert mentorship and complementary expertise in the fields of protein engineering, microbiology, and therapeutic antibody development. Collectively, the applicant's background, host laboratory, technical and research experience demonstrate strong preparedness and suitability for undertaking and successfully completing the proposed project.

Presentation and answers given to questions about the project

Indicate a comment below.

The presentation was clear, well-structured, and closely aligned with the written proposal. Despite evident stress, the candidate delivered an effective and engaging oral overview of the project, demonstrating good communication skills and a solid grasp of the research objectives. While the candidate was able to address the questions posed during the review, there is room to further strengthen responses by providing more detailed and specific examples, particularly regarding the justification for targeting LipA and EstA, lessons learned from previous research experiences, and the planned mid-project controls. For instance, connecting the choice of targets more explicitly to their roles in *P. aeruginosa* pathogenicity, outlining concrete methodological improvements since the master's thesis, and detailing interim checkpoints would help to showcase critical thinking and a strategic approach. Overall, the candidate still demonstrated a good grasp of the project and communicated the key objectives of each work package clearly.

Scientific knowledge in general

Indicate a comment below.

The candidate demonstrated a strong foundation in general scientific knowledge and positively impressed the jury during the Q&A session. Notably, the candidate made effective use of the board to visually explain fundamental concepts, such as biochemical inhibition via the Michaelis-Menten equation, and illustrated a rhamnose molecule to clarify its distinction from other polysaccharides. This proactive and clear communication style reflected the candidate's ability to engage the audience and convey basic concepts with confidence.

Final comment and grading

Final comment

Overall, the candidate has presented a research project that combines innovation, methodological rigor, and a clear translational vision. The project is ambitious yet feasible, supported by a well-structured work plan and the outstanding resources and expertise available in the host laboratory. Although the rationale for prioritizing LipA and EstA as targets was not strongly justified in the proposal or oral responses, the platform-based nature of the project is a notable strength; the established methodologies and infrastructure will enable the selection and characterization of alternative anti-virulence factors should initial efforts with LipA and EstA prove unsuccessful. However, a key weakness of the project is the potentially significant time required to confirm the good functionality of the LipA and/or EstA VHHs, which could limit opportunities for timely redirection. The applicant's technical competencies and previous research experiences align well with the project's requirements, and his ability to communicate scientific concepts effectively during the oral presentation and Q&A further reinforce his suitability. While there is room to enhance the depth and specificity of the scientific justification for target selection and mid-project controls, the candidate's overall performance and adaptability indicate good potential for successful completion of the proposed research.

Final grading

A : Excellent

Decision of the Board of Trustees

Although well evaluated, the project cannot be funded due to the strong competition in the field. / Bien qu'évalué positivement, le projet ne peut être financé étant donné la forte compétition dans le domaine.