- **ORGANISATION**
  Université Paris Saclay (France)
- **RESEARCH FIELD**
  Organic Chemistry - Peptide Chemistry –
- **APPLICATION DEADLINE**
  20/02/2021 23:00 - Europe/Brussels
- **OFFER STARTING DATE**
  01/04/2021
- **EU RESEARCH FRAMEWORK PROGRAMME**

H2020-EU.1.2.1. - FET Open
Topics : FETOPEN-01-2018-2019-2020 - FET-Open Challenging Current Thinking

- **GRANT AGREEMENT NUMBER**
  828940

Post-Doctoral position: Peptide/peptidomimetics synthesis for crop protection as an alternative to conventional chemical pesticides

The Post-Doctoral fellow chosen for this position will take part in the EU-funded FETOPEN Network NoPest. NoPEST gathers research groups with complementary skills and infrastructures from five universities based in four EU countries and the associated state Israel together with SIPCAMOXON, a global company specialized in the synthesis, formulation and commercialization of active ingredients and (bio)chemicals for agriculture.

Objective of NoPest : Members of the oomycete phylum represent highly problematic crop pathogens and a threat for global food security. For instance, P. infestans is the agent of potato late blight, and P. viticola of grapevine downy mildew. Oomycete infections are currently controlled by frequent applications of copper-based compounds, but the massive use of these compounds leads to pollution, residual toxicity and adverse effects on human health. The discovery of innocuous and reliable alternatives to traditional inorganic fungicides remains challenging and has been set as a high priority by EU and other countries. NoPest aims to develop an environmentally friendly approach for crop protection as an alternative to conventional chemical pesticides. The strategy, inspired by medical and pharmaceutical research, relies on peptide aptamers to counteract oomycetes infections by i) identifying small peptides (linear/cyclic peptide aptamers) that inhibit vital enzymes involved in oomycete cell wall formation and cell stability; ii) optimizing aptamer efficiency through peptidomimetics designed for field applications; iii) searching, using chemo-informatics approaches,

for non-peptide small molecules that mimic the activity of aptamers. These objectives will be addressed by selecting peptide aptamers from combinatorial libraries, based on their affinity and specificity for selected protein targets. Key benefits will be i) low probability to select resistant oomycete strains and no risk of co-selection of bacteria resistant to heavy metals; ii) no impact on animal and human health; iii) low environmental impact, as the approach is based on peptides that consist of natural amino-acids; iv) potential to develop additional products that confer antimicrobial resistance to any crop pathogen. Furthermore, in order to make the new molecules competitive in the pesticide market, precision farming non-invasive sensing tools will be developed, leading to reduced pesticide usage for field treatments.

Objective of the recruited Post-doctoral researcher:

The Post-doctoral researcher enrolled in this position, will synthesize peptide and peptidomimetics with the aim to optimize the effectiveness of the peptides selected from the previous aptamers screening and from the biological evaluations carried out within the consortium partners. The applicant will be involved in the synthesis of unnatural scaffolds, i.e. non-natural amino acids (Aas), as for example fluorinated Aas, and in the synthesis of the designed peptide derivatives.

The Post-doctoral researcher will be enrolled by the University of Paris-Saclay *(https://www.universite-paris-saclay.fr/en)* under the supervision of Prof. Sandrine Ongeri and Dr. Benoit Crousse *(FLUOPEPIT/BioCIS, https://www.biocis.universite-paris-saclay.fr/?-FLUOPEPIT-&lang=en)* and will participate to all the meetings and activities organized by the international consortium.

Candidate profile

The ideal candidate for this position is a highly motivated, excellent researcher with a PhD degree in organic or medicinal chemistry. The candidate should enjoy the challenge of novel scientific concepts and have a highly motivated, persistent and results-oriented attitude. We are looking for candidates interested to work in a multidisciplinary research environment, who have excellent communication skills and are self-motivated, critical and trustworthy. The candidate should be able to work well both independently and in an interdisciplinary team.

Good oral and written communication skills in English are essential.

Good organisational and planning skills are necessary.

Duration : 18-24 months

Contact information

To get more details please write to **sandrine.ongeri@universite-paris-saclay.fr** and the **website https://www.h2020nopest.org/**

Representative Publications of S. Ongeri and B. Crousse

-1- Synthesis and Conformational Studies of a Stable Peptidomimetic β-Hairpin Based on a Bifunctional Diketopiperazine Turn Inducer. L. Vahdati, R. Fanelli, G. Bernadat, I. Correia, O. Lequin, S. Ongeri, U. Piarulli, *New J. Chem*. **2015**, 39, 3250-3258.

-2- Electrophilic amination of fluoroalkyls groups on azodicarboxylate; M. Mamone, E. Morvan, T. Milcent, S. Ongeri, B. Crousse, *J. Org. Chem.*, **2015**, 80, 1964–1971.

-3- Designed Glycopeptidomimetics Disrupt Protein−Protein Interactions Mediating Amyloid β-Peptide Aggregation and Restore Neuroblastoma Cell Viability. J. Kaffy, D. Brinet, J-L Soulier, I. Correia, N. Tonali, K. F. Fera, Y. Iacone, A. R. F. Hoffmann, L. Khemtemourian, B. Crousse, M. Taylor, D. Allsop, M. Taverna, O. Lequin, S. Ongeri, *J. Med. Chem.* **2016**, *59*, 2025−2040.

-4- β-Hairpin mimics containing a piperidine-pyrrolidine scaffold modulate the β-amyloid aggregation process preserving the monomer species, S. Pellegrino, N. Tonali, E. Erba, J. Kaffy, M. Taverna, A. Contini, M. Taylor, D. Allsop, M. L. Gelmi, S. Ongeri *Chem. Sci.* **2017,** *8*, 1295 - 1302.

-5- Synthesis and characterization of hairpin mimics that modulate amyloid beta-peptide early oligomerization and fibrillization. L. Vahdati, D. Brinet, G. Bernadat, I. Correia, S. Panzeri, R. Fanelli, O. Lequin, M. Taverna, S. Ongeri, U. Piarulli, *Eur. J. Org. Chem*. **2017**, 2971–2980.

-6- N-difluoromethyl-triazole as constrained scaffold in peptidomimetics. M; Mamone, R. S. B. Gonçalves, F. Blanchard, G. Bernadat, S. Ongeri, T. Milcent, B Crousse, *ChemComm* **2017**, *53***,** 5024 - 5027.

-7- The use of 4,4,4-trifluorothreonine to stabilize extended peptide structures and mimic β-strands, Y. Xu, I. Correia, T. Ha-Duong, N. Kihal, J-L Soulier, J. Kaffy, B. Crousse, O. Lequin, S. Ongeri, *Beilstein J. Org. Chem.* **2017**, *13,* 2842–2853.

-8- Asymmetric synthesis of new cyclic fluorinated amino-acids. Hao J., Milcent T., Soloshonok V., Ongeri S., Crousse B. ; *Eur J. Org. Chem.*, **2018,** 3688–3692. Special issue on Fluorine chemistry in Europe.

-9- Structure-activity Relationships of β-Hairpin Mimics as Modulators of Amyloid β-Peptide Aggregation, N. Tonali, J. Kaffy, J-L Soulier, M. L. Gelmi, E. Erba, M. Taverna, C. van Heijenoort, T. Ha-Duong, S. Ongeri, **2018**, *Eur. J. Med. Chem. 154*, 280-293.

-10- Towards a general synthesis of di-aza-amino acids containing peptides" F. Bizet, N. Tonali, J.-L. Soulier, A. Oliva, J. Kaffy, B. Crousse, S. Ongeri, *New J. Chem*., **2018,** *42***,** 17062-17072.

-11- Introducing sequential aza-amino acids units induces repeated β-turns and helical conformations in peptides" N. Tonali, I. Correia, J. Lesma, G. Bernadat, S. Ongeri, O. Lequin*, Org. Biomol. Chem.* **2020,** *18*, 3452-3458. HOT article collection. Cover picture.

-12- Helical γ-peptide foldamers as dual inhibitors of amyloid-β peptide and islet amyloid poly*peptide oligomerization and fibrillization*, J. Kaffy, C. Berardet, L. Mathieu, B. Legrand, M. Taverna, F. Halgand, G. Van Der Rest, L. Maillard, S. Ongeri, *Chem. Eur. J.* **2020**, 14612-14622. Hot Topic: Amyloids Wiley-VCH.

-13- *Emerging Fluorinated Motifs. Properties, Synthesis and Applications : Synthesis of NCF3, NCF2H and NCH2CF3 motifs*. T. Milcent, B. Crousse. Wiley-VCH Verlag GmbH & Co. **2020**

-14- Fluorinated Triazole Foldamers: folded or extended conformational preferences, by J. Laxio Arenas, Y. Xu, T. Milcent, C. Van Heijenoort, F. Giraud, T. Ha-Duong, B. Crousse, S. Ongeri. *ChemPlusChem*, *special issue: Synthesis, Properties, and Applications of Foldamers*, **2021**, Minor revisions.