



## Postdoc position on computational approaches to food microbial ecosystems

Fte 1.0

Faculty of Science, Vrije Universiteit Amsterdam

VU University Amsterdam is one of the leading institutions for higher education in Europe and aims to be inspiring, innovative, and committed to societal welfare. It comprises twelve faculties and has teaching facilities for 25,000 students.

The Vrije Universiteit Amsterdam is searching for a Postdoc in a project funded by EraCoBiotech, a transnational program on biotechnology. In this European project, four academic institutes (Teusink VU Amsterdam The Netherlands, Takors Stuttgart Germany, Kummer Heidelberg Germany and Lahtvee, Tartu Estonia), and a large industrial partner that is leading the sector of fermented milk products (Chr Hansen) will develop methods to study, model and design yogurt cultures.

We will combine experimental microbiology, genomics, proteomics, metabolomics, bioinformatics and mathematical modelling. The omics analyses together with bioinformatics will provide input for modelling dynamics of interspecies interactions, which in turn will be used to generate rational community design for experimental verification. The task of the VU is to apply and develop computational methods for community modeling. The project will take place in the Systems Bioinformatics group from the Amsterdam Institute for Molecules, Medicines and Systems (AIMMS). The group, led by profs Bas Teusink and Frank Bruggeman, currently has 13 PhD students and 3 postdocs ([www.teusinkbruggemanlab.nl](http://www.teusinkbruggemanlab.nl)).

### Project Description

Many industrial biotechnological processes are carried out by consortia of bacteria, rather than single strains. To improve performances of such processes, the biotech industry currently relies mostly on screening-based selection of isolated strains with desired properties. However, these properties are very often influenced by other consortium members in unknown ways. Screening consortia is challenging, because only a tiny subset of all the many possible combinations can ever be tested. There is therefore a need to develop methods that can predict performance of strains in consortia, on the basis of the genome and selected phenotypic traits. This project aims to develop an integrative bioinformatics and modeling approach to predict microbial community functioning from the properties of the constituent isolates.

We will do this through a real industrial use case: the design of microbial cultures for the production of yogurt. Industrial-scale yogurt production is carried out with a broad range of cultures consisting mainly of *Streptococcus thermophilus* and *Lactobacillus delbrueckii ssp. bulgaricus* strains. Different cultures (a blend of typically 2 to 5 different strains) are formulated to obtain desirable characteristics in the final product, such as fast acidification to a desired acidity, optimal texture, reduced fat levels, proper sweetness or desired flavor profile. Understanding the genetic determinants of variability between strains related to such functionalities is a key question in the industry. However, the overall function of milk-fermenting strains can largely be modulated by the metabolic interactions between the individual strains. Yogurt fermentation therefore is an excellent test case to develop rational community designer methods, as it consists of relatively few species and its interactions and industrially-relevant properties are based on metabolism – an area amenable to rigorous experimental and computational analyses.

## **Tasks**

The PhD candidate at the VU will develop and apply different computational approaches, including constraint-based methods for ecosystems, metabolic reconstructions and data-driven (machine-learning) methods. Strong interaction with the experimental groups will be essential.

## **Requirements**

We are looking for a highly motivated, critical, and ambitious postdoctoral researcher with a background and experience in computer science (bioinformatics), (bio)physics or (computational) systems biology. You are eager to work in a research consortium in a multidisciplinary and dynamic setting. You are flexible and willing to travel and work in different labs.

## **Further particulars**

The appointment will be for a period of 1 year with potential for extension to a total duration of 3.5 years.

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- discounts on collective insurances (healthcare- and car insurance).

We aim to start the project on the 1<sup>st</sup> of March 2018.

## **Salary**

The salary will be in accordance with university regulations for academic personnel.

## **Information**

For additional information please contact prof dr. Bas Teusink ([b.teusink@vu.nl](mailto:b.teusink@vu.nl)).

## **Application**

Applicants are requested to write a letter, in which they describe their abilities and motivation, accompanied by their curriculum vitae and the names and contact information of at least two referees. Written applications should be sent before **14<sup>th</sup> of January 2018** by email to: [b.teusink@vu.nl](mailto:b.teusink@vu.nl). Please mention "vacancy yogurtdesign" in the e-mail header

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