

## Faculty of Mathematics and Natural Sciences

**Profile report: *Evolutionary Medicine, Medische Wetenschappen vanuit een evolutionair perspectief***

- Discipline: Medical Biology and Evolution Biology
- Level: tenure-track assistant or associate professor
- Fte: two full time positions (2\*1,0fte)

### 1. Scientific discipline

Medical Biology studies the fundamental biological mechanisms underlying human health and disease. Although evolution is a key characteristic of biological approaches in the life sciences, evolution is often not a crucial ingredient of the Medical Biology. There is now growing awareness that both fields should become better integrated for mutual fertilization. This is the core of Evolutionary Medicine.

### 2. Vacancy

These positions are opened by the Board of the Faculty (letter JK/gl/16/00664 of August 9 2016) and will be embedded in the Groningen Institute for Evolutionary Life Sciences, either in the expertise group Neurobiology or in one of the groups that focus on evolutionary processes, depending on the research field of the selected candidate. The position falls within the framework of 'Career Paths in Science 3' ('Bèta's in Banen 3'). Please see link for [criteria and conditions](#).

### 3. Selection committee (BAC)

Prof.dr Ton Groothuis (director GELIFES)  
Dr. Louis van de Zande (Deputy director teaching programme)  
Prof.dr Joanna Falcao-Salles (Microbial ecology GELIFES)  
Prof.dr Leo Beukeboom (Evolutionary Genetics GELIFES)  
Prof.dr Martien Kas (Behavioural Neurobiology, GELIFES)  
Prof.dr Norbert Sachser (Behavioural Biology, University of Münster, Germany)  
Mirjam Borger (Student member GELIFES)

Advisors:

Lourens Boomsma (HR)  
Prof.dr Jon Laman (Immune physiology and neurobiology, Medical faculty)  
Prof.dr Franjo Weissing (Theoretical Biology, advisory group Adaptive Life)  
Prof.dr Randolph Nesse (Centre for Evolution and Medicine, Arizona, USA)

### 4. Research area

Evolutionary Medicine is a fast growing new research field within the life sciences that applies modern evolution theory to the study of health and disease. It aims at understanding not only how people become sick (based on molecular, physiological

and neurobiological mechanisms), but especially why people become sick, based on our evolutionary history and general evolutionary principles. It uses key concepts in evolutionary research, such as constraints in mechanisms and resulting trade-offs between different optimal solutions, different modes of Darwinian selection, our limits to adaptation, both in the past and in our currently rapidly changing world. It has yielded important progress in cancer research and immunology, but has also great potential for understanding other aspects of human biology such as ageing, vulnerability to infections, and metabolic diseases.

This field is currently growing rapidly, with a few centres on this topic recently being founded in the USA and North Europe. It has great potential for bridging biology and medical sciences, strengthening the connection between the Faculty of Mathematics and Natural Sciences FMNS and the Medical Faculty, as well as strengthening the societal topic of healthy aging at our university. As the integration between mechanisms and evolution for understanding adaptation is a key element in Evolutionary Medicine, the position is an outstanding opportunity to strengthen the research program Adaptive Life. It is envisaged that the new research field will attract extra students, both nationally and internationally.

### **5. Embedding: institute**

In Groningen, the integration of mechanistic and evolutionary approaches, a key part of evolutionary medicine, is one of the core focus areas of the new Faculty strategic theme Adaptive Life. The institute in which the position will be embedded, The Groningen Institute for Evolutionary Life Sciences (GELIFES), is the main home basis for this theme. The institute provides excellent embedment for the new positions in Evolutionary Medicine as it is internationally renowned for its eco-evolutionary research, and has at the same time tight connections with the Faculty of Medical Sciences (FMS) and University Medical Centre Groningen (UMCG). It coordinates master programs in evolution and ecology as well as in medical and behavioural neurobiology, providing a sound basis for teaching in Evolutionary Medicine.

It has, apart from outstanding facilities for animal housing, a unique human isolation facility for research of, among others, human rhythms in behaviour and physiology.

The institute has currently 6 expertise groups, each consisting of several professors and tenure-trackers and with a non-hierarchical internal structure. At least four of these could provide embedding of the new staff members, depending on their specific research themes: *Theoretical Research in Evolutionary Life Sciences*, (focusing among a variety of topics on eco-evolutionary dynamics), *Genomics Research in Ecology & Evolution in Nature* (with research on microbial ecology, marine biology and plant-eco-physiology), *Neurobiology* (including chronobiology, behavioural physiology of social behaviour, molecular neurobiology, including ageing, and neuroendocrinology focusing on metabolism and eating disorders), and *Evolutionary Genetics, Development and Behaviour*, (focusing among others on behavioural genetics and behavioural development from an evolutionary perspective). The two other groups are *Conservation Ecology* (focusing on species' adaptation to changing circumstances) and *Behavioural and Physiological Ecology* (working on behaviour and life history evolution mainly in birds).

Apart from these six groups the institute has set up so called “integrative topic groups” in which researchers of several expertise groups collaborate. One of the topics currently in development is Evolutionary Medicine.

## **6. Local and (inter)national position**

Local: Our neurobiological research focusses on behaviour and cognition and is complementary to that of the FMNS/UMCG that focusses on molecular mechanisms in neurobiology. There is substantial collaboration between both faculties, including the BCN-Brain group and Biological Psychiatry. We also collaborate with the Faculty of Behavioural and Social Sciences (among others on behavioural lateralization and human cooperation). Within the FMNS collaboration exists with the institute ALICE, (modelling cognition), the Groningen Biomolecular Sciences and Biotechnological Institute GBB (evolution of microbial systems) and the Johann Bernoulli Institute for Mathematics and Computer Science (JBI; theoretical work). The institute participates in the interfaculty research school Behavioural and Cognitive Neurosciences, coordinating its selective master program, and has its own Research School in Ecology and Evolution. GELIFES is the main driver of the research program Adaptive Life, a focus area of the faculty. A key element is the integration of mechanistic (physiological and neurobiological) approaches with evolutionary approaches to understand adaptation. As this is also a key element in Evolutionary Medicine, the position is an outstanding opportunity to strengthen this research program.

### National:

GELIFES has a strong reputation in especially the study of the ecology, evolution and neurobiology of social behaviour. Many collaborations exist with other universities and research institutes in The Netherlands on a wide variety of topics, including the universities of Wageningen, Utrecht and Amsterdam and the Royal Dutch Academy Institutes Netherlands Institute for Ecological Research and Netherlands Institute for Sea Research.

GELIFES is the only life science institute in the Netherlands that specifically aims at integrating the study of physiological mechanisms with those of ecology and evolution. It is also setting up a for the Netherlands unique research and teaching program in Evolutionary Medicine. It also has the only established educational program in Medical Biology that is embedded in the Biology curriculum, as part of the Faculty of Mathematics and Natural Sciences, outside a medical faculty. The institute plays an important role in the inter-faculty selective master Behavioural and Cognitive Neuroscience.

### International:

There is no other institute in the Netherlands, and only very few in the world, that specifically aim at the integration of ecological and evolutionary approaches with neurobiology and physiology in the Life Sciences. Our international collaborations are too many to list but our research topics that are internationally very well

recognized and relevant for the advertised position are among others the evolution and physiology of animal personalities, biological clocks, maternal effects, and the ecology and neurobiology of aging. The field of Evolutionary Medicine is currently growing rapidly, with recently a few centres on this topic being founded in the USA (Arizona) and North-Europe (Kiel, Munster, and Zurich), and we are coordinating our new program with the first three. We are also coordinating an international top master program in evolutionary biology.

### **7. Expected contributions to research**

The new staff member is expected to set up an independent research line within the field of evolutionary medicine, resulting in publications in high ranking journals, substantial external funding and successful supervision of PhD students. She/he is expected to collaborate with other staff members of the institute, especially in the fields of either: chronobiology, neurobiology, endocrinology and metabolism, ageing, microbiology or behaviour and with a clear link to evolutionary research with either a theoretical or experimental approach. She/he is expected to contribute to the development of “Evolutionary Medicine” within the university of Groningen, preferably in collaboration with the medical faculty, and the institute’s integrative topic Evolutionary Medicine.

### **8. Expected contributions to teaching**

The candidate is expected to play a leading role in setting up a teaching program in Evolutionary Medicine, attracting new students, and contribute to other courses of the bachelor and Master curriculum depending on her/his expertise.

### **9. Expected contributions to the organization**

The candidate is expected to have an active interest in the management and organizational tasks of the institute. The candidate will participate in relevant national and international organisations.