Faculty of Science and Engineering

Profile report: Behavioural neuroscience, Gedrag- en Neurowetenschappen

- Discipline: Behavioural Neuroscience, Physiology
- Level: Tenure-track assistant professor with education profile
- Fte: 1.0 fte

1. Scientific discipline
Neuroscience is a multidisciplinary science that studies the nervous system. A central role of the nervous system is to control how an organism interacts with its environment by orchestrating adaptive physiological and behavioural responses. These responses include for instance social interactions, learning and memory, sleep, biological rhythms and nutrition. They are shaped by genetics and development and can go awry causing major health and performance issues. Understanding how the nervous system functions in health and in disease requires functional brain imaging, neuroanatomy, behavioural analysis and physiological measures combined with targeted manipulation of cellular and molecular brain substrates.

This position will focus on developing a coherent educational program integrating neurobiological, behavioural and physiological knowledge in several courses in Bachelor programs. These programs include Biology, Pharmacy and Life Science and Technology. The appointed candidate's research should preferably integrate with the current research interests in the behavioural neurosciences in the Groningen Institute for Evolutionary Life Sciences. The candidate is also expected to contribute to research in the field of behavioural neurosciences.

2. Vacancy
This position is opened by the Board of the Faculty (PT/gl/21/00266) and will be embedded in the Groningen Institute for Evolutionary Life Sciences (GELIFES). The criteria and conditions pertaining to the position are described in the document 'Assistant professor with an education profile'.

3. Selection committee (BAC)
- Prof. dr Rampal Etienne (Director GELIFES)
- Prof. dr Theo Elzenga (Education director; Chair)
- Prof. dr Jean Christophe Billeter (Program Director BCN Research master)
- Dr. Bauke Buwalda (Program Director Master Biology)
- Dr. Dineke Verbeek (Program Director Biomedical Sciences)
- Vacancy (*external member)*
- student member, (*Ella Rees-Baylis from the PC biology Email: ellarb@live.co.uk*

   Advisors: Linda Bosveld Verburg (HR)

4. Area of expertise
The ability to adjust to varying environmental conditions is a key characteristic of all organisms. The nervous system is central to individual adjustment and evolutionary adaptation because it perceives and determines what represents a threat or an

opportunity, stores past experiences, and regulates the behavioural and physiological response to these environmental challenges.

A common theme in behavioural neuroscience is understanding how brain circuits and associated genetic, cellular and molecular mechanisms integrate both environmental and interoceptive information to drive complex behaviours and endocrine/physiological processes that are necessary for optimal adaptation. Though these integrated responses are aimed at adaptation and building resilience, challenges can also be beyond the adaptive capacity leading to pathological disruptions in the fine-tuned molecular regulation of neural and neuroendocrine systems resulting in disease. The capacity to adapt is, however, individual. An important question is why seemingly similar stressors and stressful life histories make one individual sick while leaving others unaffected. In this context, another common theme in neurosciences is the advancement of knowledge on disease processes, not only in relation to environmental stressors but also to congenital neurobiological malfunction or endogenous factors contributing to aging disorders. What molecular/cellular changes happen in the brain before the onset and during expression of nervous system disorders and which genetic or developmental vulnerabilities underlie the expression of brain pathology? How can the neurobiological understanding of pathological processes be translated in the development of targeted therapeutic strategies for neuropsychiatric disorders and somatic diseases?

In the integrative approach to address these questions it is important to study not only the structure, function and plasticity of the brain circuitry but also physiological and behavioural responses as most important peripheral readouts of neuronal activity. Various animal models and state-of-the art techniques are used in the field of molecular and behavioural neuroscience to acquire knowledge on causes and consequences of disturbances in brain functionality: e.g. transgenic animal models, detailed analysis of cognitive, emotional and social behaviour, high resolution imaging of neuronal structure and plasticity, pharmacological, optogenetic and pharmacosynthetic intervention studies on causal relationships, studies on social interactions in semi-natural environments, studies on sleep and sleep disorders, metabolic disorders, etc.

For this reason, our education in the bachelor and master programs on neuroscience and behaviour as well as biomedical sciences aims to teach this integrative neuroscientific approach to students in order to prepare them for studying these scientific questions.

5. Embedding: institute (and expertise group)

The Groningen Institute for Evolutionary Life Sciences (GELIFES) aims to enhance the understanding of adaptive processes and the maladaptive consequences of their limitations, across all levels of biological organization (from molecules and genes to individuals and ecosystems), to inform the society and contribute solutions to societal problems. The institute has tight connections with the Faculty of Medical Sciences (FMS) and University Medical Centre Groningen (UMCG). It coordinates master programs in medical and behavioural neurobiology as well as in evolution and ecology.

GELIFES is organized in a non-hierarchical manner, and staff associate with one (or more) informal expertise groups. The tenure-track assistant professor is free to choose their expertise group. GELIFES currently has six expertise groups, each consisting of several professors and assistant professors with their groups: *Neurobiology, Genomics Research*

in Ecology & Evolution in Nature (GREEN), *Theoretical Research in Evolutionary Life Sciences* (TRES), *Evolutionary Genetics, Development and Behaviour* (EGDB), *Behavioural and Physiological Ecology* (BPE)*, and Conservation Ecology* (CONSECO).

The candidate will have access to GELIFES' excellent facilities for experimental research in neurobiology, including well-equipped indoor and outdoor animal facilities and laboratories, light and confocal microscopy, biotelemetry systems, as well as behavioural observation and quantification systems in experimental setups including semi-natural social environments.

6. Local and (inter)national position

Local:
Within FSE we teach the basics of physiology and neurobiology in the Biology, Pharmacy and Life Science & Technology bachelor programs. Therefore, our institute has strong links with the medical sciences at the UMCG. A hallmark of our educational profile is the integration of neurobiology, physiology and behaviour at several organizational levels in order to understand mechanisms involved in adaptation and maladaptation.
National:
GELIFES has a strong reputation in research and education in behaviour, neurobiology, ecology and evolution. 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. Many collaborations exist with other universities and research institutes in The Netherlands on a wide variety of topics, including the universities of Utrecht, Amsterdam, Maastricht and Wageningen.
International:
There is no other institute in the Netherlands, and only very few in the world, that explicitly aims to integrate 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 new staff member are among others the evolution and physiology of animal personalities and ageing, the mechanisms and function of social interactions, biological and seasonal clocks, microbial genetics and ecology, maternal effects, theoretical biology, the avian flyways & population dynamics, adaptation to climate change, facilitation in plant communities, ecological community resilience, genetics and evolution of life histories.

7. Expected contributions to teaching

The candidate will teach within the Biology, Life Sciences and Technology (LST) and Pharmacy curriculum, with focus on the Bachelor level. They will teach basic principles of human physiology and neuroscience and research skills in the field of neuroscience. The candidate will coordinate a number of courses in these areas and maintain contacts with colleagues that teach related fields such as behavioural biology and behavioural genetics/neurogenetics. As the candidate will also be involved in teaching courses that are mandatory for large groups of students, they will develop innovative teaching methods that are both efficient and effective in training large groups of students, while also paying attention to the needs of individual students. Particularly for these innovative aspects, we expect that the candidate will play a leading and inspiring role for colleagues that are facing similar challenges. Another urgent innovation in teaching required in this field is the development of methods to train students to think and act in a multi-disciplinary manner, e.g. both from a proximate (mechanistic) and ultimate

(evolutionary) perspective. The candidate will stay up to date with the latest developments in the fast-developing field of behaviour and neuroscience, and integrate these developments in their teaching program. This includes the participation in bachelor research projects.

The new staff member is further expected to evaluate the outcome of courses that they are coordinating and implement improvements across courses. Typical courses to be taught by the candidate are:

- Human Physiology Research
- Skills in behavioural neuroscience
- (Behavioural) Neuroscience (BSc minor)

8. Expected contributions to research

The new staff member is expected to associate with an existing research line of behavioural neuroscience in GELIFES. This embedding in a research program ensures that their teaching is fuelled by modern research in the field and includes the translation of research activities into the teaching program (e.g., practicals) as well as instruction and (co-) supervision of Master and PhD students. The new staff member will have a clear affinity with modern empirical approaches for behavioural neuroscience research that they can help to introduce to GELIFES research.

9. Expected contributions to the organization

The candidate is expected to have an active interest and to provide a positive contribution to the management and organizational tasks of the institute. At the level of FSE, the candidate will contribute to the organization of the faculty, for example by participating in working groups and committees in the area of education. The candidate will participate in relevant national and international organizations.