

## Faculty of Science and Engineering

**Profile report:** Ecology and Evolution, Ecologie en evolutie

- Discipline: Biology, Ecology, Evolution
- Level: Tenure-track assistant professor with education profile
- Fte: 0.8 - 1.0 fte

### 1. Scientific discipline

The disciplines Ecology and Evolution focus on organisms in their natural context. It studies how species interact with their environment, how the ecological interaction network supports biodiversity and ecosystem services, and how organisms adapt to the multitude of challenges they are faced with. Knowledge from all levels of biological organization are integrated to study the causes and consequences of diversity in individual traits, populations, communities and species.

This position will predominantly focus on strengthening the understanding of these causes and consequences of diversity in various courses in the Biology Bachelor and Master programs, in particular in the Ecology & Evolution Master. The appointed candidate's research should preferably contribute to current research lines in the Groningen Institute for Evolutionary Life Sciences on Ecology and Evolution in the broadest sense.

### 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). In addition, the appointed candidate will join one or more expertise groups that match the candidate's area of research expertise. 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. Sander van Doorn (Program Director Bachelor Biology)
- Prof. dr. Bregje Wertheim (Program Director Master Ecology and Evolution)
- Prof. dr. Klemens Britas Eriksson (Program Director Master Marine Biology)
- Prof. dr. Astrid Groot (Professor Population & Evolutionary Biology, University of Amsterdam; external member)
- student member

Advisors: Marlies Beuving (HR), Prof. dr. Christiaan Both

### 4. Area of expertise

The stunning biodiversity on Earth is the product of ecology and evolution. Ecology and evolution are the scientific disciplines that aim to explain this diversity - in terms of distributions, abundance and characteristics of organisms - as the outcome from ecological and evolutionary processes, both at contemporary and historical timescales. Ecology is the field that studies the interactions of individuals with their environment (i.e., abiotic conditions and all the organisms that exist in their habitat), the interactions between populations of

different species, and the exchange among communities at both local and regional scales. Evolution is the field that studies adaptive traits and natural selection as drivers of adaptation, as well as non-adaptive processes, such as genetic drift, mutation and migration. The combined ecological and evolutionary processes can eventually lead to the formation of new traits (evolutionary innovations) or trait optimizations, new species (speciation), as well as the loss of species (extinctions).

The research fields of ecology and evolution are highly dynamic. Powerful new techniques (e.g., GPS-tracking of migrating birds over the whole planet; remote sensing; tracking of individual cells in a culture of microorganisms; genome-wide sequencing; individual-based simulations; new methods to analyse 'big data') allow us to resolve long-standing puzzles. These modern approaches lead to new insights and concepts that change our way of thinking, including a range of new integrative disciplines (e.g. eco-evo-devo; evolutionary medicine; evolutionary community ecology; ecological immunology; evolutionary systems biology; adaptation and conservation genomics).

A profound understanding of ecology and evolutionary biology is crucial for facing various grand challenges of our time. Landscapes and ecosystems worldwide are increasingly dominated by the ever-increasing ecological footprint of humanity. As a result, biodiversity is lost at an alarming rate, ecosystem services are under pressure, and natural resources become exhausted. At the same time, climate change forces us to adapt our conservation strategies of nature and land use practices to deal with new threats to the biosphere. In our education, we thus need to train our students in both the extensive theory and the modern practices of ecology and evolution. In this, coherence between ecological and evolutionary elements in introductory courses and field-specific applications across different biological specializations, is highly needed. This requires a high commitment to education, educational innovation and didactic skill development.

## **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 evolution and ecology as well as in medical and behavioural neurobiology.

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: *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), *Conservation Ecology* (CONSECO) and *Neurobiology*.

The candidate will have access to GELIFES' excellent facilities for experimental research in ecology and evolution, including well-equipped laboratories, plant and animal culturing

facilities, greenhouses, outdoor aviaries and experimental ponds, a field station (at Schiermonnikoog) and IT facilities for large data processing.

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

### Local:

Within FSE we teach the basics of ecology and evolution in the Biology and Life Science & Technology bachelor programs. Our institute has strong links with the medical sciences at the UMCG as we educate medical biology students in evolutionary medicine and animal physiology. A hallmark of our educational profile is the integration of mechanistic with functional approaches, to understand diversity and adaptation.

### National:

GELIFES has a strong reputation in research and education in ecology, evolution, behaviour and neurobiology. 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 Wageningen, Utrecht and Amsterdam and the Royal Dutch Academy Institutes Netherlands Institute for Ecological Research and the Netherlands Institute for Sea Research as well as the Naturalis Biodiversity Center.

### 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 new staff member are among others the avian flyways & population dynamics, adaptation to climate change, facilitation in plant communities, ecological community resilience, genetics and evolution of life histories, the evolution and physiology of animal personalities, sociability and ageing, microbial genetics and ecology, biological and seasonal clocks, maternal effects, and theoretical biology.

## **7. Expected contributions to teaching**

The candidate will teach at all levels within the Life Sciences and Biology curriculum, with focus on the Bachelor level. They will teach basic principles of ecology and evolution, with strong emphasis on laboratory and field practicals and the research skills for this discipline, as ecological and evolutionary research relies heavily on acquaintance of experimental skills and design, and the analysis of experimental data sets. The candidate will coordinate the educational activities in the fields of ecology and evolution and maintain contacts with colleagues that teach related fields such as genetics, animal and plant physiology, and behaviour. The candidate will also be expected to develop new course materials, new courses and/or innovations in teaching in general. Another urgent innovation in teaching 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 ecology and evolution, and integrate these developments in their teaching program. This includes the coordination and organization of bachelor research projects and ensuring that these projects are embedded in state-of-the-art research programs within GELIFES. This also entails the expansion of institute-driven student research projects into project-laboratories

run by SSE staff, a cross-organizational structure that spans the different majors (i.e., cross-curricular activities) of the BSc Biology.

The new staff member is further expected to evaluate the outcome of courses and training sessions and implement improvements across courses. In addition, the new staff member will develop best practices, and transfer this knowledge to others (Teach the Teachers). In order to facilitate this, the candidate is expected to apply for grants to further develop and apply novel teaching techniques (e.g. from ErasmusPlus or local funds).

Specifically, the candidate will be involved in the following (non-exhaustive list of) teaching activities, and improve the coherence between them:

- Basic ecological and evolutionary processes (systems ecology, species interactions, evolutionary ecology)
- Experimental design and research skills in ecology and evolution
- Statistical analyses and interpretation of empirical datasets
- Field ecological approaches
- Advanced technologies for the spatio-temporal tracking of organisms (e.g. remote sensing, GPS-tracking) and is involved in teaching and coordination of the following courses
- Research Skills for Ecology and Evolution I
- BSc Research Projects

## **8. Expected contributions to research**

The new staff member is expected to associate with an existing research line of ecology and evolution in GELIFES. This embedding in a research program ensures that their teaching is fueled 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 candidate is expected to contribute to ecological research of other staff members in the institute, especially in the fields of life-history traits, behavioural ecology, microbial ecology, conservation biology, chronobiology, and community ecology. They will have a clear affinity with modern empirical approaches for ecological and evolutionary research.

GELIFES is known for its strong research in the field of ecology and conservation of both terrestrial and marine ecosystems in relation to global change, being especially recognized for in long term studies on bird trophic and migratory biology, and being a lead scientific player in research on the Wadden Sea. Together with our fundamental research on behavioural biology, physiology and life history theory, we are enhancing the understanding of adaptive capacity of life and the maladaptive consequences of their limitations, across all levels of biological organization (from molecules and genes to individuals and ecosystems).

## **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.