**PhD topics in Adaptive Life**

The Faculty of Science and Engineering at the University of Groningen offers 9 PhD scholarship positions for PhD projects within our research theme Adaptive Life. This document gives information about the research theme and the topics to which candidates can apply. For more information on the PhD scholarship positions that we offer and on how to apply, please see the vacancy text on the website of the University of Groningen.

**Description of the research theme**

A core aspect of living systems is their ability to adapt to their environment and to environmental change. There are two different forms of adaptation: 1) the short-term physiological, neurobiological and behavioural processes of organisms and their interactions as a response to their local conditions, 2) the long-term eco-evolutionary response of populations, ecological communities and ecosystems to challenges imposed by their environment. Traditionally, these two forms of adaptation have been studied largely separately, by different scientific communities. Yet, the short-term responses of individuals have been shaped by evolution, while the course and outcome of evolution strongly depends on the possibilities and limitations of the short term changes allowing phenotypic plasticity.

In the Adaptive Life program we aim to integrate both approaches, crossing traditional borders of research fields and institutes, providing new foundations for the life sciences.

Our current focus areas are (a) Modes of adaptation (among others developmental, phenotypic and behavioural plasticity, maternal effects and epigenetic inheritance, learning, and environmental engineering); (b) Adaptive diversity and diversification (such as various forms of selection, dispersal and migration, speciation and adaptive radiation, competition and facilitation; (c) Architecture of adaptive systems (including genomic architecture and gene regulation networks, the holobiome (e.g. gut flora), neural networks and brain architecture, behavioural syndromes, food webs and ecosystems).

**Topics and supervisors**

Candidates are invited to apply to one of the following topics, listed in alphabetical order of the 1st supervisor. Superscripts indicate institute affiliations with 1[Groningen Institute for Evolutionary Life Sciences](https://www.rug.nl/research/gelifes/), 2[University Medical Centre Groningen](https://www.rug.nl/umcg/), 3[Groningen Biomolecular Science and Biotechnology Institute](https://www.rug.nl/research/gbb/), 4[Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence](https://www.rug.nl/research/bernoulli/), 5[Faculty of Spatial Sciences](https://www.rug.nl/lustrum/party/throwback-saturday/spatial-sciences), 6[Groningen Research Institute of Pharmacy](https://www.rug.nl/research/grip/), 7[Stratingh Institute for Chemistry](https://www.rug.nl/research/stratingh/), 8[Zernike Institute for Advanced Materials](https://www.rug.nl/research/zernike/).

You may contact the supervisors associated with a topic in case you have questions. Please be advised that our supervisors receive very many emails and it may take a while before you receive an answer.

1. Leo Beukeboom1 (l.w.beukeboom@rug.nl)/Bregje Wertheim1/Sébastian Lequime1*:*

*How bacteria control the sex of their insect host.*

1. Leo Beukeboom1 (l.w.beukeboom@rug.nl)/Bregje Wertheim1/Per Palsboll1*:*

*Genetic load in small populations of insects.*

1. Jean-Christophe Billeter1 (j.c.billeter@rug.nl)/Martien Kas1:

*From evolutionary conserved genetic pathways to sociability*.

1. Hannah Dugdale1 (h.l.dugdale@rug.nl)/Martien Kas1:

*Social networks and senescence.*

1. Mick Elliot1 (m.g.elliot@rug.nl)/Jocelien Olivier1/Torsten Plösch2*:*

*Sex differences in the response of fetuses to stressed pregnancy.*

1. Theo Elzenga1 (j.t.m.elzenga@rug.nl)/Joanna Falcao1/Oscar Kuipers3:

*Healthy Soils: plant-microbe interactions.*

1. Klemens Eriksson1 (b.d.h.k.eriksson@rug.nl)/Per Palsboll1*:*

*Identifying the main drivers of fish population decline.*

1. Rampal Etienne1 (r.s.etienne@rug.nl)*/*Marco Grzegorczyk4*:*

*The computational biology of phylogenies.*

1. Rampal Etienne1 (r.s.etienne@rug.nl)*/*Sancia van der Meij1*:*

*Drivers of adaptive diversification in marine host-symbiont systems.*

1. Robbert Havekes1 (r.havekes@rug.nl)/Jean-Christophe Billeter1:

*Linking sociability, sleep and health.*

1. Robbert Havekes1 (r.havekes@rug.nl)/Uli Eisel1/Geert van den Bogaart3*:*

*How sleep links to immune responses in the brain and Alzheimer’s disease.*

1. Barbara Helm1 (b.helm@rug.nl) /Daniella Vos5:

*Disorientation of birds migrating in illuminated landscapes.*

1. Charlotte Hemelrijk1 (c.k.hemelrijk@rug.nl)/Jacolien van Rij4:

*Understanding hierarchy formation, social tradition, and other social behaviour in groups through computational models of self-organisation and error-driven learning.*

1. Roelof Hut1 (r.a.hut@rug.nl)/Robbert Havekes1/Robert Henning2:

*The cool brain: how hibernators maintain neuronal integrity.*

1. Jan Komdeur1 (J.Komdeur@rug.nl)/Sietse de Boer1:

*Understanding individual variation in aggressiveness.*

1. Martine Maan1 (m.e.maan@rug.nl)/Rampal Etienne1/Marthe Walvoort7*:*

*Visual adaptation in fish.*

1. Martine Maan1 (m.e.maan@rug.nl)/Barbara Helm1/Maurine Dietz1:

*Cool coloration - how plants and animals adapt their visual and thermal properties to city life.*

1. Peter Meerlo1 (p.meerlo@rug.nl) /Robbert Havekes1/Martina Schmidt6*:*

*Neurobiological consequences of chronically restricted sleep.*

1. Peter Meerlo1 (p.meerlo@rug.nl)/Simon Verhulst1*:*

*How sleep patterns and sleep homeostasis are affected by environmental factors and quality.*

1. Sancia van der Meij1 (sancia.van.der.meij@rug.nl ) /Ida van der Klei3:

*Comparing environmental stress responses in photosymbiotic organisms to identify adaptations facilitating stress mitigation.*

1. Han Olff1 (h.olff@rug.nl)/Barbara Helm1*:*

*How the extinction of large herbivore migration changes ecological interaction networks.*

1. Jocelien Olivier1 (j.d.a.olivier@rug.nl)/Joana Falcao salles1/Sahar El Aidy3*:*

*The gut-feelings of serotonin; how cross-talk between the gut and brain take place to influence physiology and behavior of the host.*

1. Jocelien Olivier1 (j.d.a.olivier@rug.nl)/Ton Groothuis1*:*

*Serotonin mediated maternal effects, mechanisms, sensitive period, and long-term behavioral outcomes.*

1. Jocelien Oliver1 (j.d.a.olivier@rug.nl)/Ton Groothuis1/Sietse de Boer1:

*Mechanism and function of female masculinization in the wild.*

1. Per Palsboll1 (p.j.palsboll@rug.nl)/Klemens Eriksson1/Rampal Etienne1:

*Ecosystem iron retention and recycling in the pelagic phase via top predators.*

1. Ido Pen1 (i.r.pen@rug.nl)/Leo Beukeboom1/Jan Komdeur1*:*

*Towards an eco-evo-devo theory for the evolution of eusociality.*

1. Chris Smit1 (c.smit@rug.nl)/Barbara Helm1/Petra Rudolf8:

*Light-pollution and its effects on plant and pollinator biodiversity.*

1. Irene Tieleman1 (b.i.tieleman@rug.nl)/Joana Falcao Salles1:

*Microbiome-mediated functions of avian preen glands.*

1. Irene Tieleman1 (b.i.tieleman@rug.nl)/Barbara Helm1/Bregje Wertheim1:

*Year round breeding in tropical birds, individual strategies and population level patterns.*

1. Marjon de Vos1 (m.g.j.de.vos@rug.nl)/Sander van Doorn1/Oscar Kuipers3:

*The spread of antimicrobial resistance via horizontal gene transfer in infectious microbial communities.*

1. Simon Verhulst1 (s.verhulst@rug.nl)/Hannah Dugdale1/Per Palsboll1:

*DNA-methylation as an epigenetic clock of biological age.*

1. Franjo Weissing1 (F.J.Weissing@rug.nl)/Jan Komdeur1*/*Sander van Doorn1:

*Social determinants of evolvability.*

1. Eddy van der Zee1 (e.a.van.der.zee@rug.nl)*/*Arjan Kortholt3:

*Combating Parkinson’s disease by non-pharmacological interventions.*