

research agendas and funding mechanisms, student interests and their employability, and by increasing the dissemination of findings to the public at large and other stakeholders.

The vision on GELIFES' role in society is primarily to provide fundamental knowledge to (1) help develop new solutions to mitigate societal problems and (2) satisfy and stimulate societal interest in basic biological processes. As reflected in the media, there is increasing interest among the public in fundamental questions varying from how the complex human brain works to the amazing biodiversity created by evolution, core topics in the institute. In addition, given the available expertise within GELIFES and its public funding, the institute has the responsibility to help solve more directly the current severe societal challenges with a huge potential impact on the next generations.

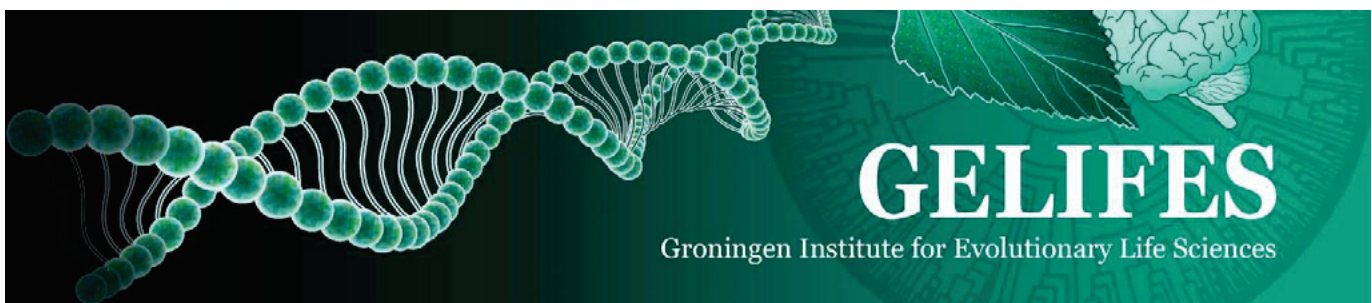
The ongoing human population and consumption boom is accelerating the pace of climate change, strains the availability of key resources such as fresh water, food, and health care, increases social instability, and threatens biodiversity around the globe. Solutions to these societal sustainability challenges lie within the understanding of the adaptive capacity of life (including humanity), a core aspect of GELIFES research and education. Therefore, GELIFES tailors part of its research to contribute knowledge and solutions to help overcome these challenges or prevent them from becoming worse.

At the core of GELIFES' successes is a unique expertise that allows high-quality science and collaborations, promotes participation and dialogue, as well as knowledge dissemination leading to ground-breaking answers with a tangible societal impact.

GELIFES hosts excellent facilities for keeping a wide array of organisms both in laboratory conditions and in semi-natural environments and in addition, investigators operate field stations at long-term ecological research sites both in the Netherlands and abroad and apply innovative digital technologies for real world behavioural phenotyping in a variety of species, including birds and humans. These facilities reflect GELIFES' vision that for a real understanding of the biology of organisms, results must be validated through, for example, genetically modified organisms under artificial lab conditions or in wild organisms housed in an ecologically relevant setting.

7 Public Summary

Established in 2015, the Groningen Institute for Evolutionary Life Sciences (GELIFES), housed by the Faculty of Science and Engineering of the University of Groningen, aims at strengthening its connections to national and international



APPENDIX C CASE STUDIES

The following case studies have been selected from a large number of flagship projects and programs, as well as from various initiatives and positions taken by GELIFES research staff. Additional case studies that highlight GELIFES performance in terms of research quality, societal relevance and pathways for impact can be found here: [GELIFES | Research | Case Studies](#).

C1 Leadership in EU funded Innovative Medicine Initiative consortia grants

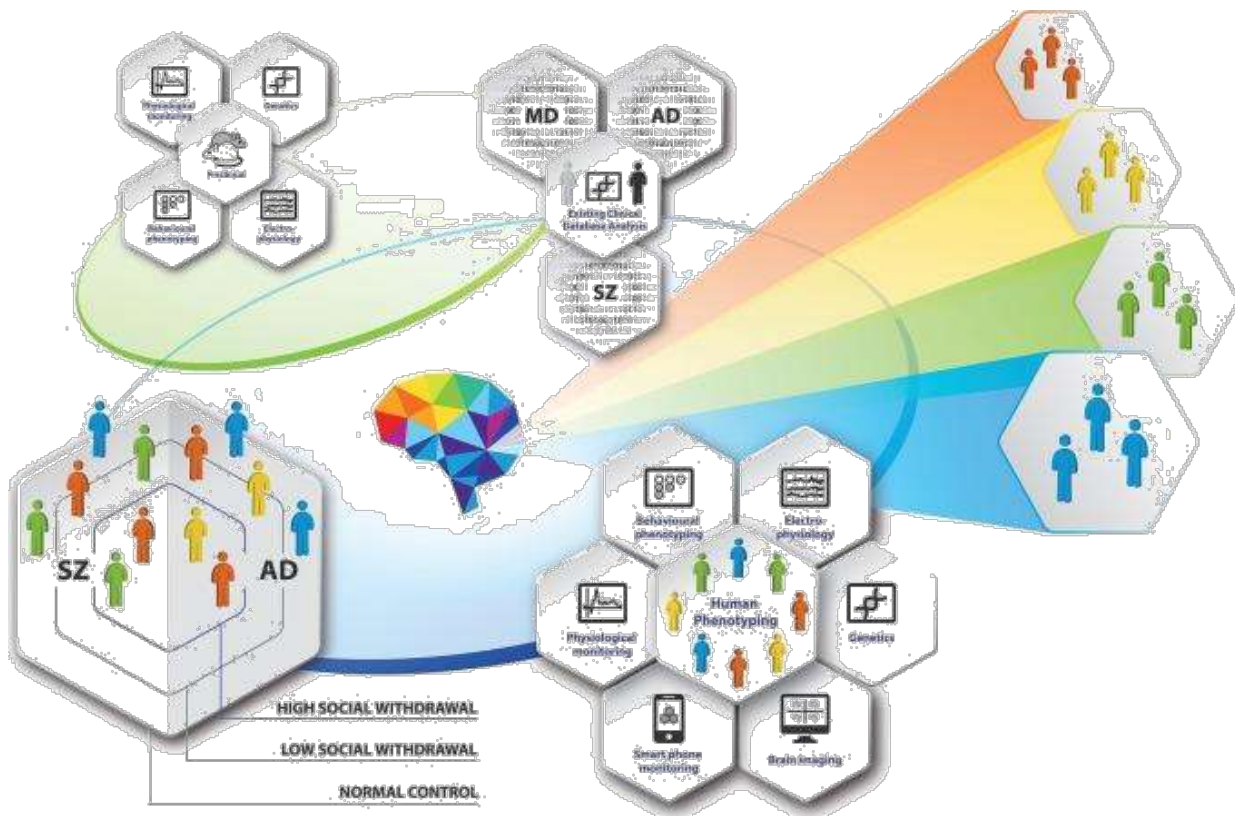
The development of treatments for neuropsychiatric conditions, such as Alzheimer's disease and Major Depressive Disorder, forms one of the major challenges of our time in public health. According to the World Health Organisation report on priority medicines, neuropsychiatric conditions rank third on mortality for the EU and rank second on burden of disease as measured in disability, adjusted for life years. The research of Prof. dr. Martien Kas (GELIFES) aims to develop a quantitative, transdiagnostic neurobiological approach to the understanding of neuropsychiatric disorders in order to accelerate the discovery and development of better treatments for patients with those disorders. The ability to precisely link neuropsychiatric symptoms to underlying neurobiology will not only facilitate the development of better treatments, it will also allow physicians to provide patients with a better understanding of the complexities and management of their illness. To realise this ambition, he has introduced a paradigm shift that is needed to raise awareness and to build an understanding of how neuropsychiatric diagnoses can be based on quantitative biological parameters. As project coordinator of two major EU funded projects (total budget of 24 million euro), Prof. Kas has implemented this innovative strategy that also allows for back translation of human quantitative findings to animals to expand the knowledge of the underlying neurobiological mechanism and to facilitate the drug discovery process.

These two large EU consortia, funded through the Innovative Medicine Initiative (IMI), include partners from leading European academic centres, patient-family organisations, and large pharmaceutical companies (such as Eli Lilly, Boehringer Ingelheim, Novartis, Roche, Takeda, Janssen Pharmaceutica). The recent granting of the PRISM2 project was based on the successful implementation and management of the [PRISM1 project](#) under his leadership.

Novel technologies have been implemented by Prof. Kas to stimulate this innovative approach, including a [smartphone application Behapp](#), to assess real world daily social functioning. This digital innovation from his research group has led to new national and EU consortia grants, such as the ZonMW memorable project that he leads on social health in dementia, the IMI [ROADMAP project](#), and the Horizon2020 funded [PSY-PGx project](#). As part of the PRISM2 project, Prof. Kas and his team are now generating a regulatory report that will be submitted to the European Medicines Agency (EMA) for a scientific advice of a digital endpoint for social functioning which they developed and validated. Furthermore, he is a leading expert in animal studies to investigate neurobiological mechanisms relevant for neuropsychiatric disorders. In that role, he is currently involved in four major national and EU projects targeting neuropsychiatric disorders, including the IMI [Aims-2-trials project](#), a 113 million euro grant on Autism Spectrum Disorders, and the Horizon2020 funded [CANDY project](#).

Schematic representation of the PRISM project. In order to provide new classification tools for neuropsychiatric disorders based on quantitative biological parameters, schizophrenia (SZ) and Alzheimer's disease (AD) patients with high or low social withdrawal will be selected for a deep phenotyping study. This study will focus on assessing social withdrawal, attention, sensory processing, working memory and epigenetic biomarkers. In addition, a cross-disorder genome-wide genetic analysis will be performed in the largest world-wide available samples of SZ, AD, and major depression (MD) patients to identify shared genetic factors potentially related to the common social withdrawal symptom observed in these disorders. Data integration of genetic and epigenetic studies through a molecular landscape building approach will lead to new biological substrates and candidate genes for construct validation studies in genetic rodent models. Together, these studies will provide new classification and

assessment tools for social and cognitive performance across neuropsychiatric disorders, clinically relevant substrates for treatment development, and predictive, preclinical animal systems for subsequent neurobiological and pharmacological testing. From Kas et al, Neuroscience and Biobehavioral reviews, 2019.



C2 The Dutch nitrogen crisis: A key role for scientists in the public debate



After the first warnings by scientists around 1980, the past 40 years have shown a strong increase in the negative impacts of atmospheric deposition of nitrogen on natural ecosystems. As a result, diversity of plants and various insect groups and birds characteristic for nutrient-poor ecosystems as fens, bogs, heathlands and diverse grasslands has strongly declined. This increasingly conflicts with the international agreements, now embedded in national law, that the Netherlands has made in the context of the EU [Birds](#) and [Habitats](#) Directives. In this context, the Dutch government has legally guaranteed the persistence of a range of characteristic species of nutrient-poor ecosystems in habitats protected under the [Natura 2000](#) framework. However, key conservation and restoration goals have been poorly achieved yet. A major source of anthropogenic nitrogen deposition over the last decades has been the emission of ammonia from the livestock industry, especially dairy farms, where insufficient reductions through technical measures have been taken to save the nutrient-poor ecosystems of the country, due to continuous lobbying from agricultural sector combined with poor political enforcement of existing regulations, where emission permits were granted for farm expansions only based on the promise of future innovations. In 2019, based on a lawsuit filed by a group of environmental organisations, the highest court of the Netherlands ruled a [negative verdict](#) on the government nitrogen policies until then. This led to a direct ban on all larger construction activities in the Netherlands, such as housing or road constructions (as these also emit nitrogen, as NO_x), or any new agricultural activities (farm expansions, etc.). This “nitrogen crisis” remained largely unsolved by the government, until a new cabinet that was formed in march 2022 came to an agreement to now really tackle the problem. In June 2022 the government launched the “National Rural Area Program” ([NPLG](#)) in which drastic emission reductions were decided, to be further worked out by the provinces to be ready by 1 July 2023. This led from July 2022 onwards to massive [farmer protests](#), some violent, that drew international media attention and are still ongoing (march 2023).

Since June 2022, prof. Han Olf rose in the media as a spokesperson on behalf of the national scientific community on the soundness of the scientific basis for more stringent policies on nitrogen emissions. He led an [opinion paper](#) in a national newspaper of [36 Dutch leading scientists](#) in the field of ecology and agricultural sciences. The article argued that there is strong scientific consensus on how emissions and depositions of nitrogen and the ecological sensitivity of ecosystems to this are calculated. And, that “calls for more research due to scientific uncertainties” by various politicians and agricultural organisations should therefore be interpreted as mostly reflecting delay tactics, rather than true interest in scientific progress. His subsequent frequent media appearances on the subject (see table below) focussed often on explaining to the public the intrinsic relations between scientific progress, scientific doubt and critique, consensus on certain topics and intensification of research on the new and remaining questions. He is also frequently involved as a ‘fact checker’ in the debate to debunk false interpretations of scientific evidence. His [twitter account](#) has close to 5000 followers, ranking him in the top 10 of University of Groningen social media outreach on this platform, with a total count of 2 million Twitter impressions for March 2022 - Feb 2023, reflecting a commercial outreach value (if it would represent advertisement impact) of 7 million Euro.



HIGH-VISIBILITY MEDIA COMMUNICATIONS BY PROF. HAN OLFF ON THE NITROGEN CRISIS (IN TOTAL >50 SEPARATE MEDIA OUTINGS)

Date & link	Media type	Media	What	Message
7-Mar-2023	National television	OP1 talkshow	Expert comments	Negative impacts of nitrogen on nature still not solved
18-Feb-2023	National newspaper	Trouw	Opinion paper	Use rewilding to fight the nitrogen crisis
6-Nov-2022	National news site	Groene Ruimte	Opinion paper	Robust nature provides perspective for farmers
6-Oct-2022	National newspaper	Trouw	Expert comments	Remkes' report is a possible gamechanger
5-Oct-2022	Regional television	TV Noord	Interview	Policy action is urgently needed in the nitrogen crisis
3-Sep-2022	National television	Nieuwsuur	Interview	Technological innovation cannot solve the nitrogen crisis
22-Aug-2022	National television	OP1 talkshow	Interview	Strong scientific consensus on Dutch nitrogen crisis
22-Aug-2022	National radio	Dit is de dag	Interview	The scientific evidence on nitrogen impacts is solid
21-Aug-2022	National newspaper	Trouw	Opinion paper	36 scientists : stop casting doubts on nitrogen crisis
10-June-2022	Scientific journal	Science	Letter	Nitrogen availability increases despite climate change

C3 Neurobiology and industrial partners

The Neurobiology group of GELIFES studies the adaptive nature of animals (including humans) to deal with opportunities, challenges and threats in the environment, as well the maladaptive consequences that may occur if changes in the environment are beyond the capacity of animals to cope with these changes. Maladaptive consequences often underpin the development of certain pathologies, with many striking examples of human diseases in the current 24/7 society. Neurobiology PIs have access to unique facilities where they study human and animal fundamental processes of sleep, ingestive and affective behaviour, social functioning, learning and memory formation, circadian rhythms, as well as the pathological changes that can occur in these behaviours. As such, the engagement between the neurobiology group and industrial partners offer opportunities to spur innovation and societal impact. In the past years successful frameworks between neurobiology PIs and industrial partners have been set up or intensified for the following topics:

- 1) **Nutrition and development.** In collaboration with Nutricia Danone (the Netherlands) the van Dijk lab studies foetal programming effects on energy balance regulation, and how early dietary interventions could reduce the risk of cardiometabolic derangements later in life. Dietary interventions in relation to preclinical studies in phenylketonuria, a metabolic disease causing brain dysfunction already at early age, are performed in the van der Zee lab with food companies Nutricia Danone (the Netherlands), Vitaflo International (Germany), Arla Foods (Denmark) and PTCBio (USA).



- 2) **Passive exercise and motion simulation.** Collaborations in the field of passive exercise and motion simulation as interventions to promote health in both rodents and humans are done with various types of medical equipment made available by NovoTec Medical (Germany), Marodyne Liv (USA), and Pactive Motion (the Netherlands). This approach is being used in the van der Zee lab in the context of brain stimulation (neuro-exercise), neurodegenerative diseases, healthy aging and recovery from surgery.



- 3) **Social and cognitive functioning in brain disorders.** As project coordinator of the nationally funded ZonMW memorable and EU funded PRISM1 and PRISM2 projects, Prof. Kas worked on transdiagnostic and translational research with respect to social and cognitive functioning in psychiatric disorders and dementia with Janssen Pharmaceutica (Belgium), and with Eli Lilly and Company (UK), Boehringer Ingelheim Pharma GmbH & Co KG (Germany), Novartis Institutes for Biomedical Research (Switzerland), Roche (Switzerland), Takeda (Japan), and Janssen Pharmaceutica (Belgium), respectively. In these projects, a total of 2 postdocs and 7 PhD students were hired in Groningen, and provided a number of collaborative publications. In collaboration with Atlas Pharmaceuticals (Belgium) new drug targets are tested for their effectiveness in treating premature ejaculations, a common sexual complaint, in the Olivier lab. A post doc, technician and the project costs were financed by Atlas Pharmaceuticals. In collaboration with Psychogenics (USA) potential drug targets were tested for their anti-aggressive properties in the de Boer lab which is followed up in the Olivier lab. Psychogenics financed a technician and project costs.



4) Biological rhythms and sleep. Chronobiology has a strong societal relevance for health and biodiversity. The chronobiology spin-off company Chrono@Work, led by CEO dr. Marijke Gordijn, has led to stable collaboration projects bridging between industry and fundamental research EU Horizon2020 'EnlightenMe', EU Interreg Food2020 'NiteBite', PCH EcoSystems 'SleepInSync', PBM Seaborough. Prof Hut, Prof Meerlo and Chrono@Work have close collaborations with lighting companies, industry (shift work), and policy makers. Seaborough finances 2 projects (1 publication), Philips co-financed the 'Energy4All' project (1 PhD, 6 publications). Within the NWO/NWA project BioClock, Prof Hut (board member) and prof. Meerlo collaborate (together with LUMC, UVA, Erasmus) with 13 companies and 5 associations (MediLux, GoodLightGroup, DarkSkyAssociation, Agricultural Associations), 10 governmental policy organisations (city, province), and 10 Knowledge and Health Care associations. In total 4 PhD students are financed at GELIFES. Collaborations between Chrono@work, Prof. Hut and lighting companies (Philips Lighting, Signify, Peira, Exmore, Seaborough) led to several projects where novel light applications and spectral adjustments were tested for health benefits. In addition, hibernation research (with Henning, UMCG) has led to spin-off products marketed by Sulfateq BV (Groningen).



5) Neuroimmune modulation of neurodegenerative diseases. By using modulators of the Tumour Necrosis Factor receptors the Eisel lab investigated in preclinical models of Alzheimer's disease and Multiple Sclerosis the ameliorating effects of either TNFR1 antagonists and TNFR2 agonists in mouse models and humanised TNFR mouse models. The Eisel lab is collaborating on these models with BioNTech SE (Germany) and Baliopharm (Switzerland). One Postdoc was supported by BioNTech SE. The Eisel lab also investigates the use of cAMP signalling molecule Epac2 in improving memory retrieval by the use of a selective agonist provided by Biolog (Germany).



C4 GELIFES' external involvement in Science Policy

The institute deliberately stimulates its PIs to engage in external science policy, affecting science agenda's at the national and international level. As for the first, two major and related events took place over the past recent years in which PIs were strongly involved. The first concerned the development of a so-called Sector Plan for Biology in the Netherlands. Sector Plans consist of a structural and very substantial additional funding directly from the central government to universities. This is to strengthen a particular discipline, based on clear scientific spearheads and task division among universities. In the last decade such Sector Plans have been implemented for chemistry, Informatics and mathematics but the initiative for Biology failed due to lack of consensus. A new initiative was started by a so-called Task Force Sector Portrait Biology describing the state of art and a SWOT analysis of Dutch Biology (a prerequisite for a final Sector Plan), of which Ton Groothuis was a member. This was followed by a Sector Plan, describing more specifically the needed long term future investment for Biology research and education for each of the Dutch universities. Normally, such an initiative is launched on special request from the government, but GELIFES took a proactive initiative. This was met with great enthusiasm and consensus in the field and the minister and was finally funded for the coming 10 years with 200 million per year of almost 2 million per year for GELIFES and part of its neighbouring institute GBB.

Part of its substantial support (being of the utmost importance) was due to the broad involvement this time of the research field itself. This was made possible by a substantial improvement of the organisation of the life sciences in the Netherlands. Dutch biology had been traditionally less well organised than other disciplines, and the Dutch Science Foundation (NWO) took the initiative to set up five new research communities each with a steering committee. Gelifes PIs became again proactive in this initiative, with profs Both and Groothuis becoming chairs of two of these research communities, further organising these communities and providing feedback to the section of the Lifesciences of NWO, of which Martine Maan was a member. Each of these communities provides input for the Sector Plan. To improve the organisation further, the Task Force mentioned above was moulded in a permanent platform called the Dutch Council for Biology, (<https://www.raadvoordebiologie.nl/en/>) of which Groothuis is still a member.

At the national and international level many PIs are involved in other organisations to influence science policy. This includes among others: board members of biology societies and advisory committees such as: Billeter: Dutch Society for Behavioural Biology; Both: National Biodiversity Pact and Dutch Ornithological Union; Both and Olf: (Netherlands Ecological Research Network; van Dijk: Dutch Diabetes Foundation; Groothuis: Scientific council of the Seal Centre research Pieterburen and the International Council for Behavioural Biology (IEC); Hemelrijk: Netherlands Platform Complex Systems (NPCS); Kas: President of European College of Neuropsychopharmacology; Klaassen: National Initiative Deltaplan Biodiversity Recovery; Olf: Figurehead of the route "Environmental Quality" of the Dutch Research Agenda (NWA) and supervisory board WNF Nederland and advisory committee Netherlands Institute for Sea Research (NIOZ); Olivier: Dutch Neurofederation and Brain, Cognition and Behaviour platform; Stefels: NWO Advisory Committee on Polar Infrastructure and National Delegate for SCAR (Scientific Committee on Antarctic Research); van der Zee: Royal Dutch Zoological Society. Obviously almost all PIs are regularly refereeing grant applications for grant bodies abroad and from the Netherlands, advising Nature conservation societies, and many have been steering the scientific program of international conferences of which PIs organise themselves several. Including more recently the Behavioural Ecology Conference and The European Conference on Behavioural Biology.

C5 Towards agroecological, regenerative and nature inclusive agricultural landscapes



The transition of agri-food systems from circular nature-driven, solar energy-based to linearized industrialised agriculture driven by external energy, has generated many ecological, environmental, climatological and societal problems. Current agriculture contributes to high energy consumption per unit of food energy produced, degrading soils, large greenhouse gas emissions, phosphorus and nitrogen leaching, large water footprint, pesticides, loss of biodiversity, deterioration of landscapes, and foods with reduced nutritional value (impacting health). Moreover, the financial outlook for many farmers is grim, while social appreciation of farmers has declined. Agriculture in the north of The Netherlands is no exception to these global trends, with the aggravating consequences of high land and labour prices and elevated degrees of financial indebtedness among farmers. Yet the northern region of The Netherlands, comprising the provinces of Friesland, Groningen and Drenthe, has a great potential for agricultural production thanks to its favourable environment in terms of soils and climate, and to the know-how of a highly professionalised and innovative agricultural sector. The region also hosts a large and vibrant food industry, and centres of knowledge and excellence. The diversity of soils and environments in the North means that a large diversity of agricultural activities can take place, with the potential to create a solid base for a more local and circular agricultural sector. These regional features also represent a complexity of ecosystems and habitats with the potential to host a wide range of biodiversity at different scales on the landscape, if properly managed, and a diversity of livelihoods and food traditions that represent an important cultural heritage. Biodiversity has been declining in the North over the last four decades, chiefly as a consequence of agricultural intensification. Additionally, the nitrogen crisis that affects The Netherlands nowadays is also played out in the North, no less because the region receives the excess nitrogen 'exported' from other regions of the country. A redesign of the agricultural systems and landscapes is urgently needed in the north of The Netherlands, a region that has the potential to become an example and lead the way towards sustainable food production, playing a key role at national and international levels.

Exploring solutions together with farmers

Pablo Tittonell, Raymond Klaassen and Ruth Howison have developed a number of regional initiatives involving farmers, farmer advisory firms and regional knowledge organisations (e.g. Van Hall Larenstein School; Open Teelten Valthermond WUR) to address the challenges the agri-food system faces in the north of The Netherlands. Their aim is to contribute to developing resilient, multi-functional landscapes that can host biodiversity while meeting farmers' and societal needs, through exploring and testing new agricultural practices, technologies and business models together with farmers. Biodiversity is seen as an integral part of a production landscape, where it contributes to delivering ecosystem services of local and global importance.

The AReNA innovation platform (since 2021)

In October 2020, a group of farmer representatives and regional knowledge brokers approached recently arrived Prof. Tittonell to establish a research collaboration with farmers in the north of The Netherlands. This is how the AReNA (Agroecology, Regenerative and Nature-driven Agriculture) innovation platform started. The aim of this platform is to induce a paradigm shift towards agroecology and regenerative agriculture, recognized by the UN (cf. UN Food Summit solution clusters) as sustainable solutions to address the above-mentioned problems. This is done through (i) regenerative agriculture demonstration projects on farmers' fields to support co-creation and co-learning activities between scientists, students,

farmers and relevant stakeholders in the region; (ii) training activities for farmers and students; and (iii) advocacy and communication activities to provoke a change in societal and political mind-set on the present agri-food system and the potential for agroecology, regenerative and nature-driven agriculture. A total of 116 farmers from Friesland, Groningen and Drenthe provinces have already signed up to participate in the platform.

Life-IP project Grassland Bird Habitat (2021 - 2031)

Reversing the curve of biodiversity decline requires a thorough redesign of production landscapes, particularly those that are crucial to the life cycle of key species. Western Europe hosts a wide diversity of grassland-nesting birds, which spend the initial phases of their life cycle in the region before migrating to warmer climates. Current intensification of grassland management reduces habitat quality and hence bird populations drastically, through simplification of grass species diversity, high N fertilisation rates as slurry, drying out and hardening of soils, low water table, less feed availability for birds (earthworms, insects), pesticide use, nest destruction through mechanical grass mowing instead of direct animal grazing. The project aims at restoring grassland bird habitats by engaging with farmers to develop and test alternative farming business models and management practices, while measuring their impact on bird population dynamics. The project has case study regions in Friesland (The Netherlands) and Lower Saxony (Germany) and a budget of 26 million euros.

Regio Deal Nature Inclusive Agriculture Northern Netherlands (2021-2024)

The Northern Provinces initiated the Regio Deal 'Nature Inclusive Farming' to stimulate the transition to more sustainable farming systems in the Northern Netherlands. The Regio Deal has a bottom-up approach where farmers and other stakeholders design avenues towards nature-inclusive farming in seven core areas. Ideas and principles are applied and tested in a number of front-runner projects. Dr. Klaassen (RUG) is leading the knowledge consortium of the Regio Deal (Kadaster, WUR Van Hall Leeuwarden, Aeres, Terra, Proefboerderij Kollumerwaard) for knowledge transfer, education, training and advice. In addition, RUG participates in three front-runner pilots, in which it is responsible for ecological monitoring. Front-runner projects turn out to be notably successful acceleration points where farmers, scientists, policy makers and other stakeholders harmonise. An important additional task of the knowledge consortium is the monitoring of the governance of the transition (together with Hennie van der Windt-RUG).



Postdoc and PhD projects

Barbara Prack McCormick (2023-2025) is a postdoc researcher exploring the impact of regenerative agricultural practices on soil biodiversity, to inform practices better suited to habitat restoration and soil-mediated ecosystem services. Luis Barba Escoto (2021-2025) is a PhD candidate exploring the relationship between landscape complexity and habitat quality as well as the effectiveness of different agri-environmental measures at restoring bird populations. Jean-Yves Duriaux (2020-2024) studies in his PhD project the willingness of farmers to adhere to conservation strategies and their perception and preferences to opt for alternative subsidy mechanisms oriented towards landscape restoration. Ciska Nienhuis (2023-2027) is developing a PhD proposal to assess ecosystem services and economic results associated with nature inclusive agricultural practices, with a focus on crop diversification.

Teaching and training

The experience and knowledge generated through these initiatives is translated into two postgraduate courses: (i) The course 'Ecology of Sustainable Farming', which is an elective course within the MSc Program Ecology and Evolution; and (ii) the summer school course 'Designing Sustainable Landscapes within Regional Food Systems', which is attended by both RUG postgraduate students and international participants. Furthermore, about 5-8 MSc students conduct MSc projects in this research field. Competition for the limited number of MSc projects on this topic is fierce, indicating a great interest among students in this applied research field.

C6 Excellent research-oriented educational programme: Erasmus Mundus Joint Master in Evolutionary Biology (MEME)

The Erasmus Mundus Master Programme in Evolutionary Biology ([MEME](#)) is a world-renowned educational programme in evolutionary biology delivered by five European universities that have joined their complementary forces (with Harvard as Associate Partner). The University of Groningen, and specifically GELIFES, is the coordinating institution of the MEME programme and houses the central MEME Office, which includes the MEME director (currently Leo Beukeboom, and previously Franjo Weissing).

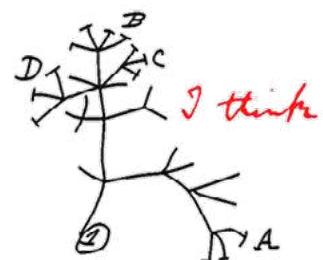
MEME is a two-year research-oriented MSc programme for talented and motivated students interested in understanding evolution and its application. The focus is not only on how evolution shaped life on our planet in the past but especially on how understanding the principles underlying evolution can provide new insights for present-day challenges in a variety of fields, including ecology (global change, biodiversity crisis), epidemiology (pandemics), genetics & genomics (big data science), medicine (Darwinian medicine), economics (evolutionary algorithms), agriculture (biological control, pest management) and the social sciences (cultural evolution, evolutionary psychology).

MEME recruits students from all over the world and is designed to provide optimal preparation for a subsequent PhD trajectory and eventually a career in academic and non-academic research. In line with this goal, the emphasis is less on teaching textbook knowledge but on motivating the students to explore knowledge gaps and the current borders of knowledge. To this end, students are offered the opportunity to compose a highly flexible and individually tailored study programme. The students are exposed to the latest scientific insights, use state-of-the-art techniques and facilities, and are embedded in a high-quality international network.

MEME students have to study at several partner universities, where they are embedded in local MSc programmes. In the end, they graduate from two MEME universities. Most students (>85%) graduate in nominal time, typically with high marks. About 90% of the graduates find PhD positions at leading research institutions, and students of the first cohorts are now acquiring academic positions, including professorships. Some alumni pursued and found positions outside academia, such as in industry and governmental agencies.

Several MEME alumni have acquired prestigious prizes. For example, Stefany Moreno-Gamez (who did her PhD at GELIFES) won a L'Oréal-UNESCO For Women in Science Award in 2019, the John Maynard Smith Prize of the European Society for Evolutionary Biology (ESEB) in 2021, and the SciLife Prize of the journal Science in 2022. Some MEME graduates have impressive research output, with publications in journals like Nature, Science, or PNAS. They also regularly initiate contacts and collaboration between their new research environment and their former MEME supervisors. Such MEME-mediated extension of research networks has several times proven to be relevant, e.g. in the formation of research consortia applying for major EU grants.

The MEME students and alumni are not only excellent researchers but also conscious members of the global society. Together with other students from their network, they initiated and developed a crash course on Evolutionary Biology (<https://evobiocrash-course.github.io/>) in order to help prospective students from the global south achieve a better understanding of the field and increase their chances of having access to high-level master's programmes and an opportunity at a career as future evolutionary biologists. Many members of the team worked or are currently working on their Master's or PhD research projects in GELIFES. For the first edition (in 2022), 710 students from 62 countries registered (about 1/4 from Africa, 1/3 from South America, 1/3 from Asia and the remainder from Europe/North America), of which a large group were very active participants. The course was very well received and the next edition will be organised in the summer of 2023. The team is currently also organising a mentoring program for



prospective students. The effort is supported by MEME and sponsored by the Equal Opportunities Initiative Fund of the European Society for Evolutionary Biology and the Inclusion, Diversity, Equity, and Access (IDEA) initiative of the Society for Molecular Biology & Evolution.