

Goedgekeurde onderwerpen

Lijst gegenereerd op: Sat, 01 Apr 2023 04:18:39 +0200.

Laatst ingediende onderwerp: 31840

30663: A fungal monitoring project in Honduras: community ecology and taxonomy

Promotor(en): Danny Haelewaters, Annemieke Verbeken
Begeleider(s): Jeff Stallman, Danny Haelewaters
Contactpersoon: Danny Haelewaters
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background

Discovery of fungal biodiversity is ongoing with only 3-10% of the estimated 1.5 – 6 million species currently described. While biodiversity discoveries can be made anywhere, like for plants and animals, increased diversity and endemism of soil fungi in many groups is concentrated in tropical environments, which generally have seen less formal scientific collecting than temperate regions. Beyond species discovery and inventories, documenting fungi allows comparisons with future data, which may be relevant for conservation planning. This is important as increasing calls are made to include fungi in conservation assessments and goals, yet baseline data is needed to evaluate the conservation status of fungal species. An effort to document the fungi in one tropical location, Cusuco National Park, began in 2019, in cooperation with Operation Wallacea. The park is a 23,440-ha protected area in the Merendón mountain range in northwestern Honduras with elevations ranging from 500 to 2,242 and various vegetation communities, including those dominated by ectomycorrhizal Pinus and Quercus species. Preliminary collecting in 2019 showed several species of fungi that may be new to science.

Problems

Biodiversity data on Honduran fungi is lacking, even compared with other Central American countries such as Panama and Costa Rica. Additionally, long-term fungal monitoring projects in the tropics that can detect rare species and monitor more common species in the face of climate change and increased risk of extinction are mostly non-existent. Finally, it is unclear if any environments are particularly species rich, nor what biotic and/or abiotic factors in general may drive fungal species richness and abundance.

Doelstelling:

A long-term fungal monitoring project began in Cusuco National Park in 2022 following incidental collecting in 2019. First, this student will join this project during the 2023 summer field season, learning fungal collection, identification, and processing skills in a remote location. Second, data from the 2022 and 2023 field seasons will be used to examine biotic and abiotic factors that may drive fungal diversity in Cusuco National Park, such as elevation, soil density, canopy cover, and presence of Pinus species. Finally, the student will have the opportunity to describe new species found during their fieldwork. The student will become familiar with analyzing biodiversity data and modern taxonomy and systematics in mycology. By completing this project, the student will continue biodiversity exploration of Honduras fungi that may be used in the future for conservation purposes, describe new species, and determine the drivers of fungal diversity in Cusuco National Park.

Locatie:

Campus Ledeganck, Honduras (pending funding)

Website:

Meer informatie op: www.dannyhaelewaters.com/a-fungal-monitoring-project-in-honduras-community-ecology-and-taxonomy/

Onderwerp voorbehouden voor Libelje Mortier

Deze masterproef werd reeds 1-maal toegekend!

30932: A global analysis of *C. elegans* globins: a quest for RNAi phenotypes (Ahringer library) with focus on reproduction, food taxis and mechanosensing.

Promotor(en): Bart Braeckman
Begeleider(s): Vimbai Samukange
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Globins are an ancient and functionally diverse gene superfamily, occurring in all major phylogenetic groups, including bacteria, Archaea, unicellular eukaryotes, plants, fungi and animals. In animals, typical globins are compact proteins showing a 3/3 alpha-helical sandwich structure which harbors an iron-containing heme group. The genome of intensively studied nematode model *C. elegans* encodes an impressive number of 34 globins. To date, only few of these have been characterized and showed widely divergent functional roles, such as reproduction, behavior, oxygen sensing, and redox signaling. The function of most of the *C. elegans* globins, which are mainly expressed in specific sets of neurons and few other tissues, remains to be discovered.

Doelstelling:

In this master thesis project, we will analyze potential functions of the globins that have not been characterized earlier (about 30 globins) by performing an RNAi screen. Globins for which RNAi clones are available (Ahringer library) will be knocked down in the neuron-sensitive strain TU3402. Knockdown efficiency will be assessed with qPCR. General phenotypes will be scored: reproductive activity (brood size counting) and general behavior. If no clear phenotypes can be found, we will analyze phenotypes based upon the function of the neurons/tissues where the respective globins are known to be expressed (data from CenGen or other scRNAseq databases). These phenotypes could include food taxis and mechanosensing.

In case one or a few globins provide very clear phenotypes, further analysis may include CRISPR/Cas9-based deletions of exons or substitutions of crucial aminoacids (acylation sites, targeting sequences, cysteins...) followed by phenotypic analysis.

Locatie:

Campus Ledeganck

Onderwerp voorbehouden voor June De Groot

Deze masterproef werd reeds 1-maal toegekend!

30933: A global analysis of *C. elegans* globins: a quest for RNAi phenotypes (Vidal library) with focus on chemotaxis and automated behavioural analysis.

Promotor(en): Bart Braeckman
Begeleider(s): Vimbai Samukange
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Globins are an ancient and functionally diverse gene superfamily, occurring in all major phylogenetic groups, including bacteria, Archaea, unicellular eukaryotes, plants, fungi and animals. In animals, typical globins are compact proteins showing a 3/3 alpha-helical sandwich structure which harbors an iron-containing heme group. The genome of intensively studied nematode model *C. elegans* encodes an impressive number of 34 globins. To date, only few of these have been characterized and showed widely divergent functional roles, such as reproduction, behavior, oxygen sensing, and redox signaling. The function of most of the *C. elegans* globins, which are mainly expressed in specific sets of neurons and few other tissues, remains to be discovered.

Doelstelling:

In this master thesis project, we will analyze potential functions of the globins that have not been characterized earlier (about 30 globins) by performing an RNAi screen. Globins for which RNAi clones are available (Vidal library) will be knocked down in the neuron-sensitive strain TU3402 and general phenotypes will be scored: reproductive activity (brood size counting) and detailed behavior (TIERPSY video analysis). If no clear phenotypes can be found, we will analyze phenotypes based upon the function of the neurons/tissues where the respective globins are known to be expressed (data from CenGen or other scRNAseq databases). These phenotypes could include chemotaxis, and potentially oxygen sensitivity and thertotaxis.

In case one or a few globins provide very clear phenotypes, further analysis may include CRISPR/Cas9-based deletions of exons or substitutions of crucial aminoacids (acylation sites, targeting sequences, cysteins...) followed by phenotypic analysis.

Locatie:

Campus Ledeganck

Onderwerp voorbehouden voor Giuliano Lecompte

Deze masterproef werd reeds 1-maal toegekend!

30935: A simulation study on sex-biased dispersal in haplo-diploids

Promotor(en): Dries Bonte
Begeleider(s): Femke Batsleer, Felipe Kauai Pereira
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Haplodiploid mating systems (as can be found in Hymenoptera: bees, wasps and ants) give rise to asymmetrical inheritance of alleles (males are unfertilized eggs of diploid females, females are fertilized eggs of diploid female and haploid male). On top of that, possible sex-biased dispersal—either males or females disperse further—can have implications for conservation and ecological and evolutionary processes. The population genetic consequences of the combination (sex-biased dispersal and haplodiploidy) on the spatial distribution of alleles and possible detection biases have not been considered previously.

Doelstelling:

The student will build step by step a spatially explicit simulation model (e.g. in Python) considering sex-biased dispersal and a haplo-diploid mating system to study the arising patterns of allele distributions across populations.

Locatie:

campus Ledeganck, from home

31022: Abiotic factors influencing the presence and prevalence of parasitic microfungi on an invasive ladybird, *Harmonia axyridis*

Promotor(en): Danny Haelewaters, Annemieke Verbeken
Begeleider(s): Michiel De Groot, Danny Haelewaters
Contactpersoon: Michiel De Groot
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background

The introduction of and dramatic spread of non-native species is one of the main environmental threats to global ecosystems. One of the worst invasive species in Europe is the Asian ladybird, *Harmonia axyridis* (Coccinellidae). *Harmonia axyridis* is native to eastern Asia. Initially used as biocontrol in North America and later as augmentative biocontrol in Europe, *Ha. axyridis* has now spread at a very fast rate to every continent except Antarctica. However, the qualities that make *Ha. axyridis* a good biocontrol agent also result in it being a very effective competitor of locally native ladybird populations. *Harmonia axyridis* has a negative effect not only on native insects, but also on food production and human health. In assessing how invasive species like *Ha. axyridis* can be controlled, it is important to determine its natural enemies, how they spread, and which role they can have in regulating invasive populations.

Problems

One of these natural enemies is *Hesperomyces virescens* (Ascomycota, Laboulbeniomyces, Laboulbeniales). It is part of a peculiar group of fungi, the Laboulbeniales, which are ectoparasites on arthropods. Laboulbeniales, with about 2,325 described species in 145 genera, are among the least studied groups of the Kingdom Fungi. They are obligate ectoparasites of arthropod hosts and form microscopic, three-dimensional fruiting bodies—thalli—instead of mycelia. *Hesperomyces virescens* is a globally occurring species and it causes mortality of ladybird hosts under laboratory conditions. The spread of *He. virescens* on *Ha. axyridis* is an invasion in action; the fungus was for the first time recorded in Europe during the winter of 2006–2007 but is currently already known from eleven European countries. We do not know which factors have contributed to this dramatic spread.

Doelstelling:

Knowing how biotic and abiotic factors influence the infection of Laboulbeniales on invasive ladybirds will help understand their global spread, as they cross many different ecosystems and environmental conditions. Resolving this question will also inform potential biocontrol strategies because it will inform us under which conditions fungal infection may (not) thrive. The aim of this project is to assess how temperature and humidity may affect presence and prevalence of *He. virescens* on *Ha. axyridis* ladybirds. Ladybirds (sampled by collaborators) will be screened for *He. virescens*, climatic data will be extracted from the WorldClim database for each sampling locality, and landscape variables will be extracted from Copernicus Corine Land Cover (European Environment Agency). Second, direct effects of temperature and humidity on the development of *He. virescens* will be assessed directly during controlled laboratory conditions. This will be done in the lab of collaborator Dr. Oldřich Nedvěd at the University of South Bohemia. The student will learn about statistical modeling and other methods in community ecology.

Locatie:

Campus Ledeganck

Website:

Meer informatie op: www.dannyhaelewaters.com/research/student-research/

Deze masterproef werd reeds 1-maal toegekend!

31000: Agro-ecological farming and nature restoration in (peri-)urban protected areas

Promotor(en): Sander Jacobs, Myriam Dumortier
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

INBO conducted a study on synergies between agro-ecological farming and nature restoration on former agricultural land in (peri)-urban protected areas. Interviews with agro-ecological farmers illustrated how these farmers can become important partners in nature restoration. But do nature conservationists see it the same way?

Doelstelling:

This thesis will explore their perspective and analyse convergences and divergences. https://purews.inbo.be/ws/portalfiles/portal/82541227/Lauwers_VanKerckhove_Dumortier_2022_AgroEcologicalFarmingInPeriUrbanProtectedAreas.p

Locatie:

Deze masterproef werd reeds 1-maal toegekend!

30957: Anthropogenic change and the benefit of multilevel societies in a cooperatively breeding bird

Promotor(en): Laurence Cousseau
Begeleider(s):
Contactpersoon: Laurence Cousseau
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

It remains poorly understood how effects of anthropogenic change, such as large-scale habitat fragmentation and climate change, impact complex form of sociality in animals. Multilevel societies, where social levels are hierarchically nested within each other, are considered one of the most complex forms of animal societies. A recent study suggested that multilevel societies may be common in cooperatively breeding birds and particularly during the non-breeding season when species are usually less territorial, and environmental conditions more challenging. Multilevel societies are hypothesized to provide flexible social responses to environmental variability without compromising the integrity and composition of the social units. However, it is currently unknown whether and how such social flexibility is affected by anthropogenic changes or whether it may buffer against environmental uncertainty and harshness.

Doelstelling:

The objective of the thesis is to study multilevel group dynamics in the cooperatively-breeding placid greenbul (*Phyllastrephus placidus*) inhabiting the fragmented cloud forest archipelago of the Taita Hills in Kenya. The practical work for this study consists in daily social groups observations and social network analysis.

Locatie:

campus Ledeganck

Onderwerp voorbehouden voor Frouke de Witte

Deze masterproef werd reeds 1-maal toegekend!

30968: Are human activities such as marine sand extraction reshaping benthic food webs?

Promotor(en): Ulrike Braeckman, Annelies De Backer
Begeleider(s): Nanou Goedefroo
Contactpersoon: Nanou Goedefroo
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The demand for marine sand and aggregates has been increasing over the past decades as these valuable natural resources account for a significant share of materials used in the construction sector (i.e. for the production of concrete, asphalt...) and for coastal protection in view of sea level rise. But the extraction of marine sand also has a large ecological impact on the seabed. Many studies have already shown that both biotic (benthic diversity, species composition) and abiotic (sediment, seabed morphology) components are affected by sand extraction activities, while the impact on ecosystem functions is still understudied. From an ecosystem management perspective, it is necessary to better understand and quantify the effects on important ecosystem functions, among which food web stability. This will give us a better insight in how the quality and quantity of ecosystem functions and services may change in response to anthropogenic activities and what this means for us humans.

Doelstelling:

This Master Thesis aims to understand the impact of sand extraction on the functioning of benthic food webs (food web stability, carbon flows, trophic interactions) through parameterization of existing food web models using data gathered in a sand extraction area in the Belgian Part of the North Sea. Different compartments of the food web (suspended particulate organic matter in the water column, meiobenthos, macrobenthos, epibenthos, hyperbenthos and fish) have been sampled for biomass, stable isotope (SI) and fatty acid (FA) analyses. Additional epibenthic organisms will be sampled on the RV Belgica campaign from 21 September – 5 October 2023. The thesis student can take part in the field work and will be involved in the sample preparation process for further SI and FA analyses, analysis and interpretation of food web data and set-up of food web models. By constructing food web models for this impacted area, we will gather valuable knowledge on how these human activities impact trophic interactions between different species groups and what this eventually means for important ecosystem services such as food provisioning.

Locatie:

ILVo Oostende

31004: Are warming temperatures accelerating fish growth? A case study of Common sole in North East Atlantic waters

Promotor(en): Marleen De Troch, Jochen Depestele
Begeleider(s): Tuan-Anh Bui, Karen Bekaert
Contactpersoon: Tuan-Anh Bui
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background:

Growth (or somatic growth) is a key individual process influencing other processes (recruitment, natural and fishing mortality) and thus influence population dynamics. Over the world, fish are growing faster but to a smaller maximum size as temperature increases. This is referred to as the Temperature size rule (TSR) and is considered the third universal response of fish to climate change, besides changes in distribution and phenology. This MSc thesis aims to investigate how fish growth changes with warming temperatures. The thesis will focus on Common sole (*Solea solea*), a warm-favouring fish species in the Northeast Atlantic Ocean, facing various temperature increases across its populations. Sole populations in North Sea waters for instance are heating faster (0.45°C/decade) than soles in the Celtic Sea (0.17°C/decade).

Doelstelling:

What will you do?

Specific research topic within the theme is open for discussion depending on student's interest and experience. Two examples of research topic are presented below:

1. Unlock broken fish ear bone (otolith) to "listen" to climate change

Otolith is deposited along a fish lifetime and can reflect the biological and environmental histories that the fish experienced. Therefore, long-term series of otolith data will help us to "listen" to climate change at an unprecedented level of spatial and temporal detail (Morrongiello et al. 2012). A challenge to reconstruct the long time series of otolith data lies in the different processing approaches. The otolith is now sectioned by machine, while in the past it was broken by hand. This leads to variation in measurements between sectioned and broken otoliths. Thus, it is very important to unlock this difference.

From the collection of sole otoliths, you will select a set of test otoliths and perform the two processing approaches: sectioned and broken. You will then measure otolith increments using the SmartDots software (smartdots.ices.dk) and statistically test for differences between the two approaches across ages, in particular (1) between sectioned and different broken shapes, (2) among different broken shapes.

2. Synchrony of sole growth changes and warming temperature across regions?

There has been evidence of synchrony of growth changes across species related to warming temperature. Baudron et al. (2014) found a synchronous trend of smaller maximum size across six species in the North Sea, while Ikpewe et al. (2021) found a synchronous trend of bigger juvenile but smaller adults across four species in the North Sea and the West of Scotland. However, it remains unclear if there is a synchrony in growth changes of different populations within the same species.

You will investigate the synchrony of sole growth changes (in maximum size and in size at age) across populations in the Northeast Atlantic Ocean using the dynamic factor analysis (Baudron et al. 2014; Ikpewe et al. 2021). The effect of temperature can be tested for using a generalized linear mixed model (GLMM) (Morrongiello and Thresher 2015) or general additive mixed model (GAMM) (Oke et al. 2022). Long-term data series of sole can be obtained from the ICES survey data (<https://datras.ices.dk/home/descriptions.aspx>). For this topic, the student is expected to be eager to do a lot of data analysis and modelling.

Where will you work?

ILVO - Jacobsenstraat 1, 8400 Oostende. In person working is a must for practical work (as in example 1). Remote working might be exceptionally accepted for data analysis and modelling work (as in example 2), but in person presence at ILVO is highly encouraged for experience of the professional environment and interaction with other colleagues.

Reference

John R. Morrongiello, Ronald E. Thresher and David C. Smith. 2012. Aquatic biochronologies and climate change. *Nature Climate Change* 2:849-857. <https://doi.org/10.1038/nclimate1616>.

John R. Morrongiello and Ronald E. Thresher. 2015. A statistical framework to explore ontogenetic growth variation among individuals and populations: a marine fish example. *Ecological Monographs*, February 2015, Vol. 85, No. 1 (February 2015), pp. 93-115

Alan R. Baudron, Coby L. Needle, Adriaan D. Rijnsdorp, and C. Tara Marshall. 2014. Warming temperatures and smaller body sizes: synchronous changes in growth of North Sea fishes. *Global Change Biology* (2014) 20, 1023–1031. doi: 10.1111/gcb.12514

Idongesit E. Ikpewe, Alan R. Baudron, Aurore Ponchon, and Paul G. Fernandes. 2021. Bigger juveniles and smaller adults: Changes in fish size correlate with warming seas. *Journal of Applied Ecology*. <https://doi.org/10.1111/1365-2664.13807>

Locatie:

ILVO - Jacobsenstraat 1, 8400 Oostende

31006: Assessing cell size dynamics and sexual reproduction events in natural diatom populations

Promotor(en): Wim Vyverman, Gust Bilcke
Begeleider(s): Nadine Rijdsdijk
Contactpersoon: Wim Vyverman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Diatoms are an evolutionary very successful group of microalgae that have a unique life cycle. During vegetative growth, their cell size gradually diminishes by consecutive cell divisions. When diatoms reach a minimal size-threshold, they are able to sexually reproduce and restore their original cell size through the expansion of a unique cell stage called the auxospore.

Even though sexual reproduction is a very important process in the life cycle of most diatom species, it has rarely been observed in nature. Because sexual reproduction in diatoms is size-dependent and diatoms restore their original cell size through sexual reproduction, analyzing cell size distribution dynamics of diatom populations can shed light on the frequency and timing of sexual reproduction events in nature. For example, a sudden increase in cell size suggests that a recent sexual reproduction event has taken place. Insight into sexual reproduction events of diatom populations in nature are important for understanding their population dynamics and genetic diversity.

Doelstelling:

The main objective of this MSc thesis is to study the cell size distribution patterns of natural diatom populations occurring in the Belgian coastal region. The student will optimize techniques for high-throughput quantification and morphological analysis of selected diatom species with a plate reader and image flow cytometer, in order to track abundance and cell size distribution parameters. In parallel, light microscopy will be used to screen the samples for the presence of sexual cell stages. Regression and time series analysis will be used to explore links between population density, cell size distribution and the occurrence of sexual events. By analysing samples taken over longer time periods and linking cell size distribution dynamics with environmental parameters and data on the presence of sexual reproduction detected with sex marker genes, we can get an idea about the timing of sexual reproduction events and the environmental conditions that might trigger them.

Locatie:

Sterre S8, Ledeganck, VIB

31021: Assessing the impact of marine solar panels on phytoplankton growth, community structure and marine gel production in the Belgian Part of the North Sea

Promotor(en): Koen Sabbe, Wim Vyverman
Begeleider(s): Auria Kallend, Luz Amadei Martinez
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The Belgian Part of the North Sea (BPNS) is a hydrodynamically and bathymetrically complex area under strong anthropogenic impacts (pollution, intensive

fisheries, wind farms, etc.). One potential future development in the BPNS is the installation of marine photovoltaic systems (MPVs), basically floating solar panels. Because this is a new and innovative technology, the environmental effects of MPVs are largely unknown. MPVs extract sunlight energy, which will lead to changes in the quality, quantity and variability of the light climate in the water column and changes in the heat exchanges at the air-sea interface. This will result in local and possibly also regional reductions in primary production, and changes in phytoplankton community structure. In addition, phytoplankton produces marine gels that flocculate with suspended particulate matter (SPM; composed of sediments and organic debris), which can have an impact on the sediment dynamics of the area because the aggregation of SPM causes the suspended particles to increase in density and therefore to sink. Such changes may thus have knock-on effects on coastal carbon flows through altered trophic interactions (e.g., trophic efficiency) and particle flocculation dynamics.

Doelstelling:

Little is known about the impact of changes in the quality, quantity and variability of the light climate on the growth and marine gel production of phytoplankton species. The aim of this MSc thesis is to determine if the installation of MPVs would impact (1) phytoplankton growth, (2) phytoplankton community composition, and (3) the production of marine gels by phytoplankton and hence the sequestration of carbon in the BPNS. To evaluate these effects, the student will set up growth experiments under different light and temperature conditions for single species and for combinations of the most common species found in the BPNS. The student will be trained in designing and executing experiments with phytoplankton cultures, the use of Pulse Amplitude Modulated (PAM) fluorometry, microplate reader, and EPS and marine gel analysis.

Locatie:

Sterre S8

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English.

Deze masterproef werd reeds 1-maal toegekend!

30977: Benefits of co-cultivation of seaweeds and shellfish: microbiome composition in multispecies nurseries

Promotor(en): Olivier De Clerck, Jessica Knoop
Begeleider(s): Willem Stock
Contactpersoon: Jessica Knoop
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Cultivation of low-trophic organisms can be an effective way of producing protein with minimal environmental impact. The co-cultivation of seaweeds and shellfish (oysters & mussels) is one example. While oysters and mussels filter particulate matter for their main source of nutrition, seaweeds take up released dissolved nutrients (nitrogen, phosphate). In a combined cultivation setting, oysters or mussels and seaweed can have positive environmental impacts enhancing water quality. Seaweeds are also known to alter microbial communities and could therefore have further beneficial effects beyond nutrient removal. This master thesis project aims to investigate how seaweed can alter the microbial community in co-cultivation with mussels and/or oysters and will investigate effects of co-cultivation beyond pure nutrient cycling. The thesis will include experimental work, monitoring growth as well as biochemical composition of co-cultivated organisms and the bacterial community using 16S amplicon sequencing.

Doelstelling:

Locatie:

Ghent University, Campus Sterre, Campus Ledeganck, Campus Coupure (Coupure

Onderwerp voorbehouden voor Silke Bouckennooghe

Deze masterproef werd reeds 1-maal toegekend!

30989: Brittle but flexible bio-inspired designs: comparative functional morphology of arm use in brittle-stars

Promotor(en): Dominique Adriaens, Francis wyffels

Begeleider(s): Mona Goharimanesh, Dries Marzougui
Contactpersoon: Dominique Adriaens
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Brittlestars or ophiuroids form a highly diverse group of highly mobile echinoderms, a mobility that they have thanks to their very flexible and movable arms. In contrast to other echinoderms, the arms are comprised of a series of ossicles, to some degree resembling a vertebral column, onto which a segmented muscle complex acts. Across clades and paraphyletically distributed, two main types of articulations can be found on the central ossicles (a streptospondylous or hourglass-shaped articulation and a zygospondylous articulation). However, very little to nothing is known about the muscular architecture that powers arm movement, and how differences in the musculoskeletal anatomy explain the extensive differences observed in arm mobility. This information would, however, be very helpful to further define what it takes to make a flexible grasping system, and thus how robotics design for such applications would have to be conceived.

Doelstelling:

In this study, the focus would be on the 3D anatomy of the musculoskeletal system in at least two species (representing one of each ossicle morphotypes) using μ CT scanning and 3D reconstructions, as well as using histological sections of the arms. Using 2D data of the anatomy, 3D models will be generated to (1) visualise the 3D anatomy, (2) to compare differences in anatomy between the morphotypes, and (3) to generate 3D printed models to evaluate joint mobility in relation to joint shape. Based on that information, computer simulations will be run to test the relation between musculoskeletal organisation and arm kinematics, as well as arm kinematics can be quantified in living species (if time allows). In the end, the arm architecture of brittle stars will be compared with what is already known about seahorse tails, to identify key traits that define flexible grasping systems.

Locatie:

campus Ledeganck, onderzoeksgroep Evolutionary Morphology of Vertebrates

Website:

Meer informatie op: https://www.ugent.be/we/biology/evo-morph/en/research/projects/project_now/project-tail-prehension

Deze masterproef werd reeds 1-maal toegekend!

30961: Can the microbiome influence whether an individual is specialist or generalist?

Promotor(en): Karen Bisschop, Dries Bonte
Begeleider(s):
Contactpersoon: Karen Bisschop
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Species are constantly challenged to adapt to novel conditions. However, the broader the niche of a species is, the more resilient it is to fast changes in the environment. Many studies indeed highlight that resource specialists are at greater risk than generalists. Interestingly, generalist species are often composed of individuals with more specialised diets. This points towards different levels of generalism depending on the specific individuals in the population. Given that higher levels of generalism may help, it is crucial to know which factors may influence this.

Doelstelling:

In this thesis we want to explore whether the bacterial community living inside an organism may influence the level of generalism. We will address this question using the two-spotted spider mite, *Tetranychus urticae*, as model system. This species can occur on more than 900 different host plants. Nevertheless, on the level of the individual, the species is characterized by small, specific individual niches. We will collect field populations and subject them to performance tests (e.g. measuring fecundity, longevity, and growth rate) in the labs to quantify the level of generalism. The sampled populations will then be sequenced to obtain data about the bacterial communities inside the spider mites. We hypothesise that the microbial diversity or specific bacterial strains may assist for larger niche widths. As many species are confronted with fast changing environments, it is very important to know the driver

of niche width and hence a species' resilience.

Locatie:

Ledeganck

Opmerkingen:

Given that the largest populations of spider mites are found in August, the collection of spider mites should start early August and the student is expected to start working on the project during the summer break.

30992: Carbon export from coccolithophore blooms in the Black Sea using remote sensing and autonomous profiling floats

Promotor(en): Griet Neukermans
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Coccolithophores are a group of phytoplankton that build a calcite armour. Alongside foraminifera, coccolithophores are the most productive pelagic calcifiers on the planet and they play a crucial role in ocean biogeochemistry and various climate change feedback mechanisms. For example, they alter the Earth's radiation budget or are thought to enhance the carbon flux to depth by providing calcite ballast to sink organic particles.

Among coccolithophores, the species *Emiliana huxleyi* (*E. huxleyi*), forms extensive blooms in the Black Sea every year. *E. huxleyi* is unique in the sense that it overproduces coccoliths, the calcite platelets that make up its armour, which are released into the water at the final bloom stage. The resulting accumulated *E. huxleyi* cells and detached coccoliths in surface waters scatter so much light they colour seawater bright milky-turquoise, making these blooms easily detectable from space by so-called ocean colour satellites. These satellites provide daily observations since 1998 at 1km spatial resolution. Furthermore, since 2013 a growing fleet of autonomous profiling floats equipped with optical and biogeochemical sensors, so-called Biogeochemical-Argo (BGC-Argo) floats (<https://biogeochemical-argo.org/>), profile between the surface of the ocean down to 1000 m deep at sub-weekly to daily frequency. Recent work has shown that these floats are capable of detecting *E. huxleyi* blooms as well as carbon fluxes, paving the way to study how these surface ocean blooms impact the carbon flux to deeper waters.

Doelstelling:

The main goal of this master thesis is to examine the impact of *E. huxleyi* blooms on the carbon flux to depth in the Black Sea.

First, we will use daily ocean colour satellite observations to study the seasonality and spatial extent of blooms of *E. huxleyi* and other types of phytoplankton in the Black Sea.

Next, we will match ocean colour satellite data with data from BGC-Argo floats to identify floats that sampled *E. huxleyi* blooms and those that did not, and study the carbon flux associated with each bloom from the surface to 1000 m deep.

Lastly, we will compare and contrast carbon flux from *E. huxleyi* blooms to carbon flux from other phytoplankton blooms.

Suggested reading:

<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020GL090559>

More on robotic profiling floats :

<https://biogeochemical-argo.org>

Requirements:

This thesis involves analyses of large datasets which requires good programming skills.

Basic statistical skills will be required for data analyses.

Locatie:

30949: Chloroplast genome reconstruction for robust species delineation in the green algal genus *Bryopsis*

Promotor(en): Olivier De Clerck, Willem Stock
Begeleider(s): Frederik Leliaert
Contactpersoon: Willem Stock
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Bryopsis is a globally distributed genus of marine green algae. It is well-known aquarium pest, can sometimes form large coastal blooms and some species might be invasive. Currently about 60 species names are accepted within the genus, but there is still much uncertainty about the diversity of *Bryopsis*.

Doelstelling:

Over a hundred metagenomes are available from *Bryopsis* spp. collected from all over the world. The student will compare different pipelines to extract and assemble chloroplast genomes from the metagenomes. The chloroplast sequences will then be used for comparative phylogenetic analyses. This work will shed new light on the genetic diversity and biogeography of *Bryopsis*. The student will be working with different tools in a command line based environment (Linux) and write scripts (in Bash and/or python). The student should therefore have a profound interest in bioinformatics and programming.

Locatie:

30940: Coastal dunes as a nature based solution to improve coastal defence under future sea-level rise

Promotor(en): Dries Bonte
Begeleider(s): Dries Bonte
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Coastal lowlands worldwide are becoming increasingly vulnerable to flooding by storm events at sea because of a suite of human- and climate-related drivers. Ecosystem-based approaches, that complement functional parts of the natural system with engineering, provide such an alternative to conventional coastal defense ('hard engineering'). The most important natural barrier for much of the European coastline, including that of Flanders, is formed by coastal foredunes. North Sea dunes develop from the supralittoral wrack zone by colonization of sand couch-grass *Elytrigia juncea*, that becomes replaced by marram grass *Ammophila arenaria* as one moves inland. Both species act as sand traps by slowing down the wind shear stress, and the latter species in particular is accountable for the heightening of dunes.

Doelstelling:

The aim of the project is to integrate plant-environment interaction in an existing model (coded in Python). The student will be involved in a large experiment in which marram grass dynamics are monitored by drones (Middelkerke; duin voor dijk), and integrate results from these experiments in the model to quantify how fast dunes may build-up and hence contribute to coastal protection. The student will also test the sensitivity of dunes as nature based solutions to environmental parameters and disturbances associated with climate change.

Locatie:

campus Ledeganck, ook off-campus, veldwerk

Website:

Meer informatie op: endure-tool.eu

30759: Composition of bacterial biofilms on insect-associated Laboulbeniomyces fungi

Promotor(en): Danny Haelewaters, Annemieke Verbeken
Begeleider(s): Maarten Lubbers, Michiel De Groot, Danny Haelewaters
Contactpersoon: Danny Haelewaters
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background

Bacterial biofilms are a complex system consisting of a consortium of bacteria lodged in a three-dimensional extracellular matrix and have been described as a "city for microbes". This matrix protects the bacteria from environmental, chemical, and mechanical stresses, and organisms embedded in a biofilm possess a high rate of survival and persistence compared to planktonic bacteria. Biofilms are ubiquitous and can be found in almost any non-sterile environment, but the species composition can be specific to a particular surface.

Fungi of the class Laboulbeniomyces (Ascomycota) are obligate associates of arthropod hosts. Most taxa in this class are microfungi that form three-dimensional fruiting bodies—named thalli—instead of mycelia. These microfungi, with about 2400 described species in 147 genera, form the most diverse fungal assemblage associated with representatives of the Phylum Arthropoda, predominantly insects. Laboulbeniomyces are an understudied group, with most research focusing on taxonomy. Very little is known about their associations with other organisms, including bacteria.

Problems

It was recently discovered that the thalli of some Laboulbeniomyces are covered with a biofilm consisting of rod-shaped bacteria. These include thalli of taxa in the genera *Herpomyces* associated with cockroaches (Blattodea), *Hesperomyces*, associated with ladybirds (Coccinellidae), and *Laboulbenia*, associated with a large number of arthropod groups. There are only descriptions of the observation of these biofilms (by scanning electron microscopy); the species composition of the biofilms is unknown, as is anything regarding interactions between the fungi and their biofilms.

Doelstelling:

The aim of this project is to gain a better understanding of the species composition of bacterial biofilms on thallus-producing Laboulbeniomyces. As biofilms do not persist in ethanol (often used to preserve arthropods), experiments will need to be done with living hosts. Host specimens will be collected through fieldwork as well as by ordering insects online (from pet stores, e.g., cockroaches). The hosts will then be screened for fungal thalli, and the presence of biofilms on thalli will be confirmed by scanning electron microscopy (SEM). A literature study will be done on how previous studies have dealt with the identification of species composition of biofilms. DNA will be extracted from the biofilms and the species composition will be determined by sequencing the 16S rRNA gene region. Statistical analyses may be performed to compare biofilm communities among different host species. The student will become familiar with a variety of research methods, including entomological fieldwork, light and electron microscopy, DNA extraction, PCR amplification, and sequencing.

Locatie:

Campus Ledeganck

Website:

Meer informatie op: www.dannyhaelewaters.com/composition-of-bacterial-biofilms-on-insect-associated-laboulbeniomyces-fungi/

30984: Conservation mycology: can we construct a red list of fungi from citizen-science data?

Promotor(en): Annemieke Verbeken
Begeleider(s): Glen Dierickx, Arno Thomaes
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Fungi are one of the most diverse groups of organisms, playing key roles in terrestrial ecosystems. Due to their hidden nature they have long been poorly understood and subsequently were largely neglected in conservation efforts. How can we act if we barely know which species to protect? Usually the answer is to check the red list data. Unfortunately, the last red list is outdated (1999) and was only treating some groups of macrofungi, not covering the whole diversity. A revision is urgently needed.

Doelstelling:

Within this thesis we would like to address that pressing issue. The goal is to make Flanders a test-case for the compilation of a fungal red-list by using data from the citizen-science platform observations.org. To test the quality of this database, a similar analysis will be run on FUNBEL (high quality mycological database). And both outcomes will be challenged with a reference work: (A. Fraiture & P. Otto, 2015 : Distribution, ecology and status of 51 macromycetes in Europe).

For the analytics part, we have a strong collaboration with INBO.

Locatie:

Onderwerp voorbehouden voor Klaas Van Gansbeke

Deze masterproef werd reeds 1-maal toegekend!

31060: Developmental variation in aggression and sex between chimpanzee's and bonobo's

Promotor(en): Nicky Staes, Philippe Helsen
Begeleider(s): Jonas Torfs
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The social behaviours of chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*) are known to differ in multiple ways, despite these sister species being closely related. Chimpanzees live in male-dominated hierarchical communities, where aggression plays a large role in dominance and conflict resolution. In past research there exists a trend to classify the matriarchal bonobo societies as more docile, with individuals relying on sociosexual behaviour to alleviate social tensions and showing overall lower rates of severe aggression. The evolutionary process leading to this end result is attributed to the bonobos', adaptation to an environment where food is plentiful and benefits to socio-positive behaviors outweigh agonistic competition. This process is sometimes labelled self-domestication, similar to the process in domesticated animal species following artificial selection for docility. Selection for reduced aggressiveness might have resulted in delayed onset of maturation in bonobos resulting in juvenile levels of social tolerance compared to chimpanzees. Most studies claiming bonobos are generally more docile than chimpanzees were conducted on adolescent individuals, and large-scale comparisons of individuals belonging to both species of a wide age-range are needed to confirm to what extent social behaviors like aggression and sex differ between the two species across the entire life-span to establish which differences are fundamental, or a consequence of an extended juvenile period.

Doelstelling:

collected will be used to compare the development of aggressive and sexual behaviour with age between chimpanzees and bonobos using existing data from additional groups of bonobos and chimpanzees that were previously collected. Observations are performed on a laptop (software "the observer") using a standard protocol that alternates focal sampling with scan sampling of the apes in their day to day lives to capture all behaviors as established by an extensive ethogram, combined with continuous all occurrence scoring of aggression.

Locatie:

European zoo(s)

Deze masterproef werd reeds 1-maal toegekend!

30945: Dispersal evolution as a driver of biodiversity

Promotor(en): Dries Bonte
Begeleider(s): Felipe Kauai Pereira, Dries Bonte
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

The organization of biodiversity on Earth is assumed to be ruled by processes related to spread, niche evolution and speciation. Dispersal allows species to take advantage of novel ecological opportunities and hence to adapt to new conditions. However, such spread dynamics should also hamper any speciation as it impacts gene flow. The importance of dispersal for biodiversity is thus dual: on the one hand it opens novel ecological opportunities and on the other hand, it hampers any genetic adaptation. Dispersal, is however, an evolving trait and these evolutionary dynamics are anticipated to underlie biodiversity patterns on Earth.

Doelstelling:

The student will use and further develop existing mechanistic birth-death models to explore how the evolution of dispersal leads to the emergence of biodiversity in heterogeneous environments, and particularly focus on mainland-island dynamics.

Locatie:

Deze masterproef werd reeds 1-maal toegekend!

30923: Dissecting the role of ecology in postzygotic reproductive isolation using a genus of hybridizing spider mite species

Promotor(en): Nicky Wybouw, Dries Bonte

Begeleider(s): Nicky Wybouw, Dries Bonte

Contactpersoon: Nicky Wybouw

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Mating with an incompatible partner can result in hybrid offspring that suffer from fitness penalties. Selection against hybrids contributes to postzygotic reproductive isolation, driving speciation. Recent work has started to suggest that ecology may be a major determinant of the strength and direction of selection against these hybrids and may thus play an important role in maintaining species barriers.

Doelstelling:

Here, we will dissect the role of ecology in hybrid dysfunction using a genus of Tetranychus mite species that hybridize in nature. We will study the impact of species hybridization on the feeding and mating ecology of spider mites. We will also test whether hybrids display divergent dispersal behavior.

Locatie:

Onderwerp voorbehouden voor Lennert Beele

Deze masterproef werd reeds 1-maal toegekend!

30773: Distribution and Ecology of Earthworms in Belgium

Promotor(en): Pallieter De Smedt, Bart Muys

Begeleider(s): Stephanie Schelfhout

Contactpersoon: Pallieter De Smedt

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Earthworms are important ecosystem engineers and are involved in multiple ecosystem functions such as nutrient cycling, litter decomposition, water retention and carbon storage. However, their ecology and distribution in Belgium is still understudied. There is no central database and the status of different species is uncertain. Even the total species number for Belgium is not entirely known. With this thesis, we would like to bring together all data on the occurrence of earthworms in Belgium and summarize knowledge on the species' ecology. Additionally, in the autumn of 2022, earthworm sampling will be done in different monitoring sites in Flanders to complement the existing data. In a final step, the distribution data will be linked to soil and landscape conditions with analyses to better understand distributional patterns of Belgian earthworms. This thesis contains fieldwork, lab work (identification of species) and GIS and multivariate data analyses.

Doelstelling:**Locatie:**

31025: Diversity and species delimitation in Arthrorhynchus

Promotor(en): Danny Haelewaters, Annemieke Verbeken
Begeleider(s): Danny Haelewaters
Contactpersoon: Danny Haelewaters
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:**Background**

Laboulbeniales (Ascomycota) are obligate associates of arthropod hosts. Species in this order are microfungi that form three-dimensional fruiting bodies—named thalli—instead of mycelia and are associated with a living host for the entire duration of their life cycle. These microfungi, with about 2325 described species in 145 genera, form the most diverse fungal assemblage associated with representatives of the Phylum Arthropoda, predominantly insects. Laboulbeniales are a poorly studied group, with most research having focused on alpha taxonomy^{3/4}species descriptions based on morphology alone. Our research group studies tritrophic interactions that involve Laboulbeniales associated with bat flies (Diptera: Nycteribiidae and Streblidae), which are bloodsucking ectoparasites of bats (Mammalia: Chiroptera). Species of bat fly-associated Laboulbeniales are found in four genera, Arthrorhynchus, Dimeromyces, Gloeandromyces, and Nycteromyces.

Problems

The species diversity of bat fly-associated Laboulbeniales in the American tropics has been studied using an integrative taxonomy approach by our research group. Our work has revealed multiple undescribed species in the genera Gloeandromyces and Nycteromyces, as well as phylogenetic species with multiple morphotypes as a result of position-induced morphological plasticity in Gloeandromyces. While more work is needed, the Laboulbeniales on bat flies from the Eastern Hemisphere remain unstudied. A preliminary phylogenetic reconstruction of a small dataset with large subunit sequences of Arthrorhynchus shows that one species may be a species complex. Arthrorhynchus is a genus currently consisting of 4-5 species that are all poorly characterized or only known from a single collection.

Doelstelling:

The overall goal of this thesis project is to improve our knowledge of bat fly-associated Laboulbeniales in the Eastern Hemisphere. Our main focus will go to Arthrorhynchus but also other finds will be documented. Bat flies were collected during fieldwork in Croatia, Romania, Serbia, and Kenya and sent to Ghent University for this thesis project. Bat flies will be screened for the presence of Laboulbeniales. Infected specimens will be separated and assigned a unique label. The student will then perform morphological (permanent slide mounts) and molecular work (DNA extraction, PCR amplification of informative DNA regions, sequencing). Newly generated sequences will be supplemented with sequences available in public databases for building single-locus and multi-locus phylogenies. Morphology, phylogenies, sequence-based species delimitation methods, and ecological information (host association) will allow for an accurate overview of species diversity in Arthrorhynchus (studied material). The student will write up-to-date species descriptions of the known and potentially new species of Laboulbeniales following best practices.

The student will become familiar with a variety of research methods, including light microscopy, DNA extraction, PCR amplification, sequencing, phylogenetic approaches, species delimitation analyses, and integrative taxonomy. Pending approval from our local partners and funding, fieldwork will be possible during the summer of 2023 in Krka National Park, Croatia.

Locatie:**Website:**

Meer informatie op: www.dannyhaelewaters.com/diversity-and-species-delimitation-in-arthrorhynchus/

30960: Do ants and their symbionts take advantage of each other 's cleaning services?

Promotor(en): Thomas Parmentier, Claire Detrain
Begeleider(s):
Contactpersoon: Thomas Parmentier
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Ant nests attract a wide diversity of arthropods, known as myrmecophiles. The ant nest environment provides multiple advantages for these symbionts, including a constant access to food, protection against enemies and a thermoregulated environment.

Soil organisms are exposed to different parasites and pathogens. Ants possess behavioral and chemical adaptations to target pathogens and keep their load lower in the nest than in the surrounding soil. Likely, myrmecophiles also benefit from this lower pathogen pressure in the nests, but this additional advantage of living in association with ants has not been demonstrated yet.

Alternatively, different myrmecophiles feed on debris and fungi. They may help to keep the nest environment clean, which could result in a better functioning of the ant colony. Thus, both ants and myrmecophiles may benefit from each other's presence.

Doelstelling:

The aim of this thesis is to test whether:

1. Ants indirectly protect their symbionts against pathogens
2. Myrmecophiles indirectly protect their host ants against pathogens
3. Myrmecophiles can act as a vector of pathogens between different colonies.
4. Myrmecophiles avoid nest localities infested with pathogens

These objectives will be tested with a series of well-thought lab experiments with ants, different myrmecophile species and the entomopathogenic fungus *Beauveria*.

Locatie:

Ledeganck Terec

Website:

Meer informatie op: www.researchgate.net/profile/Thomas-Parmentier

31009: Does bedrock type affect the functional potential and carbon and energy acquisition of microbial communities in Antarctic polar desert soils?

Promotor(en): Wim Vyverman, Elie Verleyen
Begeleider(s): Bjorn Tytgat, Jill De Visscher
Contactpersoon: Elie Verleyen
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Ice free-regions in Antarctica cover only a minute fraction of the continent and occur in geographically isolated patches along the coastline and more inland in exposed nunataks and mountain chains. They represent some of the most extreme and oligotrophic environments on Earth, with a general lack of moisture, high levels of ultraviolet radiation during summer, and extremely low and seasonally fluctuating temperatures. It has been recently shown that some of the classical heterotrophic bacterial phyla are metabolically flexible, and capable of growing and persisting in these ultra-oligotrophic soils through a combination of heterotrophic, carboxydrotrophic and/or hydrogenotrophic strategies by using atmospheric trace gases (H₂, CO) as primary energy source. In the absence of photoautotrophs or in limiting nutrient conditions, these bacteria are therefore able to generate organic carbon independently. Recent research in our laboratory has revealed that different types of bedrock (i.e. gneiss, granite, marble and moraines) in the Sør Rondane Mountains (Queen Maud Land, East Antarctica) are inhabited by different microbial communities. We hypothesize that the energy and carbon acquisition potential of these communities might similarly vary in response to differences in reductive ion availability and water retention in the different bedrock types.

Doelstelling:

In the Austral summers of 2018 and 2019, samples were collected along gradients in moisture, exposure and microclimatic conditions in several regions of the Sør Rondane Mountains. Samples were taken from different bedrock types and ranged from barren rocks to visible biological soil crusts consisting of i.a. cyanobacteria, green algae, fungi and mosses. We sequenced the metagenomes in 65 samples using the latest Illumina NovaSeq platform, which provides an unprecedented opportunity to cast a deep look into the microbial communities in these extreme ecosystems. In this MSc project the student will contribute to the analysis of these shotgun sequencing data using standardized pipelines and downstream analyses. After a first explorative analysis, the focus will be put on the analysis of selected pathways and functions involved in carbon cycling and energy acquisition in these soil communities.

Locatie:

Sterre – S8

Opmerkingen:

R skills will be heavily relied upon, but you will be well supported. Scripting (Python, bash) abilities are a plus. The willingness to learn to work in a Linux based environment and interest in bioinformatics are a necessity.

30953: Does Muller 's ratchet spin slower after a whole genome duplication? An experimental approach

Promotor(en): Olivier De Clerck, Yves Van de Peer
Begeleider(s): Antoine Van de Vloet, Lucas Prost, Quinten Bafort
Contactpersoon: Antoine Van de Vloet
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Muller's ratchet theory states that in the absence of recombination, there is an accumulation of irreversible deleterious mutations. This is based on the assumption that without recombination the mutational load of the offspring is at least as high as that of the parents and reverse mutations are rare. In small asexual populations where genetic drift is high, deleterious mutations accumulate fast and may eventually lead to mutational meltdown and extinction.

Polyploidization, or whole genome duplication (WGD), is considered a major factor contributing to evolution, especially in plants. In fact, all angiosperm species are ancient polyploids. However, the evolutionary potential of WGD remains something of a paradox since both advantages and disadvantages are associated with this macromutation. Polyploids are often believed to have an advantage because the redundant genome copy can 'mask' deleterious mutations. On the other hand, this allows these mutations to persist in the population longer, which only increases the mutational load and may decrease fitness later on. Most of the evidence concerning this matter comes from a theoretical perspective and experimental data, especially from the 'green lineage', is both scarce and inconsistent.

Doelstelling:

This thesis investigates whether polyploids have an initial fitness advantage because of masking effects. The student will set up a small evolutionary experiment: haploid, diploid, and possibly tetraploid asexual populations of the micro-alga *Chlamydomonas reinhardtii* will evolve in parallel and be subjected to regular (severe) bottlenecks, ensuring that even deleterious mutations, which would otherwise be erased from the population by selection, are passed on to the next generation. Every so many generations, the fitness of the cultures is measured.

A more specific overview of the range of tasks:

- Microalgal culturing in in the context of an evolutionary experiment
- Monitoring the ploidy level of the cultures using molecular markers and flow cytometry
- Measuring and modelling the growth of the cultures to gain an understanding of their fitness
- Monitoring fitness across generations and comparing across ploidy levels

Locatie:

Campus Ledeganck, VIB-Ugent Center for Plant Systems Biology

31010: East Antarctic lakes as glacial refugia for micro-invertebrates and microbial eukaryotes

Promotor(en): Elie Verleyen, Wim Vyverman
Begeleider(s): Marina Buffoli, Bjorn Tytgat
Contactpersoon: Elie Verleyen
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Coupled climate and earth-system models predict increased temperatures and altered precipitation regimes in vast regions of Maritime and coastal Continental Antarctica. These climate perturbations will likely result in more extensive glacial melt, the expansion of ice-free areas and increasing connectivity between regions. In turn, this will potentially result in biotic homogenization between regions, as well as range expansions and the spread of invasive species. Combined with environmental changes, these exotic species will potentially affect the native Antarctic biota which are more biogeographically structured and globally distinct than previously believed. It is becoming increasingly clear that this uniqueness and biogeographic distinctness of Antarctic terrestrial and lacustrine food webs is underlain by the past climate and tectonic history of the region. The formation of the Antarctic Ice Sheets c. 35 millions of years ago resulted in the extinction of temperate taxa, followed by the disappearance of tundra biomes since the Mid Miocene cooling event c. 14 Ma. The formation of the Antarctic Ice Sheets not only resulted in increased fragmentation between ice-free regions, but facilitated the evolution in geographic isolation of cold tolerant taxa in scattered glacial refugia. Identifying the location of these refugia is largely based on biodiversity data and molecular phylogenies of contemporary biota. However, in some cases, the available biological data disagree with reconstructions of the deglaciation history of the regions based on radiometric dating of landforms and sediments. It is evident that the observed disparity between geological and biological data regarding the exact location of glacial refugia needs to be tackled by interdisciplinary research combining approaches from biological and earth sciences.

Doelstelling:

This MSc project is aimed at studying the key processes that contributed to the present-day community structure in Antarctic lakes and their catchments, including long-term persistence of biota in glacial refugia, and extinction, colonization, diversification and biological succession in response to past environmental changes. In this thesis, we will extract ancient DNA (aDNA) from a sediment core from a lake in the Larsemann Hills, which spans the Last Glacial Maximum (LGM) and the Holocene. The use of aDNA, in combination with fossil diatom and pigment analyses will allow us to assess which organisms survived in the lake during the LGM and which taxa colonized the system during the past 40,000 years.

Locatie:

Campus Sterre, S8 and K.L. Ledeganckstraat

31036: Effect of forest stand characteristics on the thermophilization of insect communities in forest stands in Flanders

Promotor(en): Frederik Hendrickx, Wouter Dekoninck
Begeleider(s): Frederik Hendrickx, Wouter Dekoninck
Contactpersoon: Frederik Hendrickx
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1

Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Significant climate change over the past decades has already resulted in marked effects on biodiversity, such as shifts in phenology and distribution, and changes in species composition and traits. Climate change accelerates species extinction and alters species interactions. Studies projecting future distributions of European plants and insects, based on climate envelope models, suggest that between 8 and 30 % of the species may become extinct and that without mitigation, 57 % are likely to lose $\geq 50\%$ of their current climatic range by the 2080s. However, topographic variation may play a crucial role in creating microrefugia, which can substantially reduce extinction risk from climate change. Local factors such as forests and green areas may affect the global warming trends and as such mitigate the negative effects of climate change on biodiversity and ecosystem functioning. The extent at which climate change and forest factors (e.g. tree species composition, tree density, soil type,...) affects changes in species composition and biodiversity patterns of arthropods in forests in Flanders is currently poorly understood. Quantifying these effects may provide important information to design proper forestry guidelines that may mitigate the effect of climate change.

Doelstelling:

The proposed research aims to investigate and quantify the buffering effects of forests on local climate change. The effects of climate change on biodiversity will be investigated by resampling soil arthropods in 56 experimental plots spread over Flanders and comparing them with already available data from 25 years ago. For both plants and soil fauna, we will test (i) whether climate change leads to an increase of species that prefer higher temperatures (thermophilisation), (ii) which functional traits of organisms are selected in this process, (iii) how this leads to changes in local and regional forest biodiversity and (iv) to what extent this is controlled by site characteristics of the forest plots (such as forest structure or soil characteristics) and the presence of urbanised surroundings. The insights obtained will allow the formulation of measures that can locally mitigate the effects of climate warming.

Locatie:

Koninklijk Belgisch Instituut voor Natuurwetenschappen en Ugent, campus Ledeganck

Deze masterproef werd reeds 1-maal toegekend!

31002: Effects of climate change on physiology, growth, reproduction and fatty acid profiles of benthic copepods

Promotor(en): Marleen De Troch
Begeleider(s):
Contactpersoon: Julieta Vigliano Relva
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Global change, primarily driven by rising anthropogenic CO₂ emissions, leads to ocean warming, a complex processes that alter life-history traits and affect the physiological performance and productivity of marine organisms in coastal food webs, and thus the overall functioning of the ecosystem. Understanding the links between physiological responses at individual organism level with larger ecosystem functioning implications is one of the pressing challenges marine ecologists are currently facing.

Copepods are first-level consumers and form an important link between primary producers and higher trophic levels. They have a pivotal role not only by transferring large amounts of biomass but also in terms of food quality by providing essential nutrients to higher trophic levels. More specifically, fatty acids have been identified as key factors modulating the efficiency of this energy transfer: essential fatty acids for example have a key role ensuring fish growth and reproduction. Temperature increase has shown to affect the fatty acid content of copepods to a varying degree. In addition, these stressors may also trigger trade off mechanisms on copepods life history traits (e.g., metabolic traits, growth and reproduction). Such trade-offs can affect copepods population dynamics and ultimately, copepod biomass. A decrease in the amount of essential fatty acids (such as certain omega 3) together with a decrease in copepod biomass could have important effects on benthic food web dynamics.

Through a multi-stressor experimental approach, we aim to characterize changes in benthic copepods fatty acid dynamics and life history traits under a temperature increase scenario. To characterize life history traits in copepods the student will be involved with respiration and feeding rates measurements as well as growth and reproduction. The data obtained from such experiments will allow us to understand the underlying mechanisms driving the responses as well as to predict changes in fatty acid quantity and quality in response to climate change. We welcome interested students to discuss how we can fit their interest into this research line. The practical work will be very diverse including: field sampling, copepod and diatom culturing, incubation experiments, measurements of metabolic rates, growth and reproduction as well as biochemical lab work.

Doelstelling:

This master is framed within my PhD research. The objective is to be able to untangle the effects of climate change on copepods life history traits and the underlying physiological mechanisms driving them. By making a link between life history traits and fatty acid dynamics we hope to better understand how the responses in fatty dynamics driven by temperature increases, affect growth and reproduction and what this potentially means for benthic trophic webs.

Locatie:

Marine Biology Research Group Ghent University Campus Sterre S8 Krijgslaan 281 B-9000 Gent, Belgium

Website:

Meer informatie op: <https://www.marinebiology.ugent.be/>

30934: Effects of forest structural complexity on year-round insect abundance and relationships with avian body condition

Promotor(en): Luc Lens, Diederik Strubbe
Begeleider(s): Bram Catfolis
Contactpersoon: Bram Catfolis
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Forest management has long focused on maximizing economic profit, but has recently begun to focus more on conservation, restoration and sustainable management of natural resources, and the provision of multiple ecosystem services. This is a favorable development as forests host a wide variety of organisms that depend on the natural niches and resources these habitats provide. A quick and reliable way to assess forest quality is to measure the degree of structural complexity. As more complex forests are believed to provide higher and more stable food availability, organisms living in more complex forests are predicted to have a better nutritional status. Nutritional condition can be assessed through individual-based proxies such as the width of growth bars on bird feathers (ptilochronology sensu Grubb 2006). However, in order to assess how the condition or health of forest birds varies with the degree of structural complexity of forest, it is important to measure food availability also in a more direct way.

Doelstelling:

In order to assess relationships between forest complexity, food availability and individual-based proxies of condition and health, temporal variation in insect abundances will be estimated in a network of 19 forest plots ranging from low to high structurally complex during the course of one full year. In summer and spring, the biomass of caterpillars will be estimated by collecting frass (sensu Dekeukeleire et al. 2019). Other methods to estimate insect availability include sweep netting on different types of vegetation, flight interception trapping (e.g. Knuff et al. 2019) and manual insect counts on leaves. Statistical modelling will be used to assess how insect richness and diversity change along a structural complexity gradient and to what extent this is reflected in individual-based proxies of condition and health (data available from previous fieldwork). It is expected that the results of this study can be translated into recommendations for forest management.

Locatie:

campus Ledeganck

Opmerkingen:

Voorbehouden voor Lotte Van De Weghe

Deze masterproef werd reeds 1-maal toegekend!

31008: Egg reflectance and heating rate in phasmids

Promotor(en): Matthew Shawkey, Liliana Dalba Altamirano
Begeleider(s): Gerben Debruyn
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Eggs are essential components of reproduction in insects. They are multifunctional structures with extraordinary properties. Their structure is closely tied to its function. But we know very little about how the diversity of egg morphology is influenced by environmental pressures, nesting ecology and egg laying strategies, especially in stick insects. Their eggs are equally diverse, differing in size, shape and color. As well as the egg laying strategy (drop, glue, pierce or burrow) and the incubation time, ranging from a few weeks up to months.

Doelstelling:

In this project the student will measure egg reflectance both in uvvis and nir and perform heating experiments on the eggs of these insects, to test whether egg reflectance is linked to heating rate. Next, they will also test whether eggs that are laid above ground have higher reflectance in NIR in comparison to the ones laid underground to prevent overheating.

Locatie:

ledeganck

Website:

Meer informatie op: eongent.ner

Onderwerp voorbehouden voor Bauke Rombaut

Deze masterproef werd reeds 1-maal toegekend!

30918: Empirical assessment of environmental DNA heterogeneity within a stream

Promotor(en): Rein Brys, Dries Bonte
Begeleider(s): Charlotte Van Driessche
Contactpersoon: Charlotte Van Driessche
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Last decades, robust methods for ecological status assessment in aquatic environments across EU member states have been developed, which have led to the implementation of monitoring schemes that cover all water categories, i.e. rivers, lakes, coastal and transitional waters and groundwater. Until now, these monitoring programs focus on community assembly data obtained via conventional methods such as traditional electrofishing (TEF), which is time consuming and costly, requires skilled staff, and is often associated with substantial sampling biases that can be highly variable among replications. With the development of new genetic methods that detect environmental DNA (eDNA) (i.e. allochthonous DNA released by a species in its environment), new opportunities have come into play to make these monitoring campaigns less invasive, and more cost-effective and standardized, with the potential of maintaining quality, robustness, and comparability across studies. Environmental DNA, as released in the water by fish under the form of scales, mucus or faeces, can be used to detect the fish's presence. To implement this novelty in rivers for biodiversity monitoring, questions, however, remain on the interacted effects of eDNA emission, transport, decay, water sampling, and the ultimate molecular detection.

Doelstelling:

For the small rivers and brooks that characterize the Flemish landscape, we wish to assess the potential heterogeneity and spatial scale at which shifts in eDNA-based fish community structure can be observed within a stream. A combined approach with traditional fishing should lead to hands-on advice on sampling method and distance, as well as a quality comparison between the two methods' efficacy. The practical work of this Msc thesis is planned in August/September of 2023 and includes an outdoor fishing experiment with traditional electrofishing preceded by environmental DNA sampling. The student will contribute to the laboratory work which comprises eDNA extractions as well as preparatory steps for eDNA metabarcoding.

Locatie:

campus Ledeganck alsook in het veld (verspreid in Vlaanderen)

Samenwerking met bedrijf of non-profit organisatie

Deze masterproef werd reeds 1-maal toegekend!

30950: Enhancing the nutritional value of seaweeds for food applications

Promotor(en): Olivier De Clerck, Jessica Knoop
Begeleider(s): Loes Vandecasteele
Contactpersoon: Jessica Knoop
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

In order to feed the ever increasing world population and at the same time remain within the boundaries of the capacities of our planet, humans need to start looking for alternative proteins next to the classical sources such as fish and meat. Seaweeds are nutritional and can be cultivated sustainably with a low carbon foot print. Even though the food applications of seaweeds are mainly known in Asia, Europe has a lot of local species with similar potential that could be grown and used in our future dishes.

Doelstelling:

In the SEATAMIN project the Phycology lab of Ghent University has developed a land-based system for the cultivation of macroalgae (*Palmaria palmata*, *Porphyra* sp. and *Ulva* sp.). The aim of this thesis project is to investigate the environmental conditions (light quality, light intensity, etc.) that have an effect on the growth and biochemical composition (e.g. proteins) of these species and consequently their nutritional profile. Also potential hazardous components such as heavy metals will be looked at. The subject is diverse and can be reoriented in different directions depending on the personal interest and skills of the student.

Locatie:

Ghent University, Campus Sterre, Ghent University, Campus Coupure, SEATAMIN facilities in Ostend

31032: Environmental preferences of Laboulbeniales microfungi obligately associated with insects

Promotor(en): Danny Haelewaters, Annemieke Verbeken
Begeleider(s): Michiel De Groot, Danny Haelewaters
Contactpersoon: Danny Haelewaters
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background

Laboulbeniales (Ascomycota) are obligate associates of arthropod hosts. Species in this order are microscopic in size and produce 3-dimensional structures—named thalli—instead of hyphae and mycelia. These fungi are dependent on a living host for the entire duration of their life cycle. With about 2325 described species in 145 genera, Laboulbeniales form the most diverse fungal assemblage associated with representatives of the phylum Arthropoda, predominantly insects. Laboulbeniales are a poorly studied group, with most research having focused on alpha taxonomy, which refers to species descriptions solely based on morphology. Our research group at Ghent University studies the Laboulbeniales using an integrative taxonomy approach (meaning that we also use evidence from ecology and molecular phylogeny). In addition, we focus on trophic interactions and community ecology.

Problems

To date, community ecology research of Laboulbeniales is in its infancy, with only three published studies. Szentiványi et al. (2019) investigated whether climatic variables (temperature, humidity) influenced the distribution of ant- and bat fly-associated Laboulbeniales. They found that both the presence and prevalence of Laboulbeniales on their hosts were positively associated with low annual mean temperature and humidity. Gippet et al. (2021), based on the

study of more than 9,374 workers of the invasive ant *Lasius neglectus* in 66 colonies, found that the presence of *Laboulbenia formicarum* on the ants was positively linked to warmer and dryer conditions at lower elevations. Haelewaters et al. (2022) studied the prevalence of *Hesperomyces harmoniae* on *Harmonia axyridis* ladybirds in Europe considering biotic and abiotic factors. These authors found that elytral color had a significant effect on the parasite prevalence, whereas host sex, climate, and landscape composition did not.

These first community ecology studies do not give us a full picture of general patterns that are in play. On the contrary, the results from Szentiványi et al. (2019) and Gippet et al. (2021) are seemingly contrasting, while the data from Haelewaters et al. (2022) point at no influence by climate factors. Are our current datasets too small? Are ant-associated fungal patterns governed by ant nest-specific factors rather than outside climate factors? Do different study systems simply show different patterns? We do not know the answer to these questions at this time.

Doelstelling:

Laboulbeniales occur in many different ecosystems but we have currently no idea about their environmental preferences. Knowing how abiotic factors influence infection of Laboulbeniales on their host will help to improve our understanding of their global distribution. This master thesis will use multi-year specimen data from Zuid-Kennemerland National Park in The Netherlands to test the effect of selected climate and landscape variables. Insect specimens were collected using standardized pitfall traps between 2017 and 2022 and then screened for the presence of Laboulbeniales. Infected specimens were sent to the laboratory. The student that takes on this project will identify the Laboulbeniales based on available keys in combination with molecular methods (to confirm ID, if necessary). Parasite prevalence will be analyzed in light of selected characters: temperature, humidity, season, landscape composition. This will be done for the overall dataset as a whole but perhaps also at the species-level for the most frequently collected species—depending on sampling. The student will learn about statistical modeling and methods in community ecology. Finally, there will also be the opportunity for fieldwork in Zuid-Kennemerland National Park.

Locatie:

Campus Ledeganck, Zuid-Kennemerland National Park

Website:

Meer informatie op: www.dannyhaelewaters.com/research/student-research/environmental-preferences-laboulbeniales-microfungi-obligately-associated-with-insects/

Opmerkingen:

References Gippet JM, Colin T, Grangier J, Winkler F, Haond M, Dumet A, Tragust S, Mondy N, Kaufmann B. 2021. Land-cover and climate factors contribute to the prevalence of the ectoparasitic fungus *Laboulbenia formicarum* in its invasive ant host *Lasius neglectus*. *Fungal Ecology* 51: 101045. Haelewaters D, Hiller T, Ceryngier P, Eschen R, Gorczak M, Houston ML, Kisło K, Knapp M, Landeka N, Pfliegler WP, Zach P, Aime MC, Nedvĕd O. 2022. Do biotic and abiotic factors influence the prevalence of a common parasite of the invasive alien ladybird *Harmonia axyridis*? *Frontiers in Ecology and Evolution* 10: 773423. Szentiványi T, Haelewaters D, Rádai Z, Mizsei E, Pfliegler WP, Báthori F, Tartally A, Glaižot O, Christe P. 2019. Climatic effects on the distribution of ant- and bat fly-associated fungal ectoparasites (Ascomycota, Laboulbeniales). *Fungal Biology* 39: 371-379.

30978: Estimating the impact of fisheries on ecosystem functioning in the Belgian part of the Northsea.

Promotor(en): Karlina Soetaert, Ulrike Braeckman
Begeleider(s): Gert Van Hoey
Contactpersoon: Ulrike Braeckman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Bottom trawling has a large impact on the Northsea sediment ecosystems and thus on the ecosystem services that the sediment provides. Recently, a model has been created that estimates the mortality and subsequent recovery of benthic taxa after fishing, and the consequences on sediment biogeochemistry. This model combines data on benthic community composition, and benthic trait information, with a mechanistic description of the benthic ecosystem, which includes a biological and a biogeochemical component. It has been applied on the Dutch part of the Northsea for which an extensive data set on benthic infauna exists.

Doelstelling:

Another extensive dataset is available for the Belgian part of the Northsea. In the master project, the student will evaluate the effects of several fisheries scenarios, using the Belgian Northsea benthos data. The impact on several ecosystem functions will be determined, including biological characteristics such as bioturbation, bioirrigation, biodeposition, biomass production,... Additionally, the impact on biogeochemistry, and therefore nutrient removal, carbon burial,... will be assessed.

Such ecosystem-based fisheries assessment promises to become a useful tool to help managers in assessing best fishing practices.

The topic requires a good knowledge of the statistical software R, as both the data handling and the mechanistic modelling will be performed in this language.

One of the supervisors (Soetaert) works in the Netherlands Institute for Sea Research, in Yerseke, the Netherlands; the other supervisor (van Hoey) is located in Oostende. Supervision can be done either remotely, via video conferencing, or the student may be hosted in the NIOZ itself.

For more information, please contact:

Karline Soetaert <karline.soetaert@nioz.nl>

Gert Van Hoey <Gert.Vanhoey@ilvo.vlaanderen.be>

Locatie:

NIOZ Yerseke (NL) or ILVO oostende

30931: Evaluating ecological management actions in het Zwin tidal lagoon

Promotor(en): Carl Van Colen, Tom Moens
Begeleider(s): Carl Van Colen
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The biodiversity found in coastal habitats is on the frontline of current environmental change resulting from anthropogenic activities related to the expanding exploitation of coastal areas. For example, changes in sedimentation regimes and water-borne suspended sediment concentrations resulting from changes in land-use and engineering activities in the coastal zone (e.g. dredging, aggregate extraction, beach nourishment) affect biodiversity and ecological value in coastal soft-sediment habitats. One such habitat are coastal lagoons where suspended sediments may deposit depending on interactions between geomorphological, hydrological and biological factors. Such infilling is enhanced in sheltered habitats further facilitated by pioneering vegetation that trap fine sediment particles resulting in increasing elevation, and a reduction in inundation time and the surface of low intertidal areas, illustrative for the succession towards a marsh habitat. In the Zwin tidal lagoon (Belgium and the Netherlands), sand deposits have led to the gradual filling up of the lagoon, causing loss of safe breeding opportunities and sleeping sites for the birds, as the former islands are becoming connected to the mainland and accessible to ground predators. The deposited sand probably originates from the increased marine erosion of the sandy beach and fore-dunes, so that the loss of biodiversity can be considered an example of coastal squeeze as a consequence of climate change. This situation has also led to the loss of mud and sandflats that provide a high biomass of intertidal prey organisms for wading birds, nektonic fish such as crustaceans, polychaetes and molluscs. The Flemish regional nature and forest agency is aiming to restore the rich biodiversity of this internationally important Natura 2000 site by carrying out large-scale restoration of the ecological dynamics in the Zwin area, and by turning former agriculture land into tidal nature. This thesis aims at studying the macrobenthos and nekton communities in the lagoon to evaluate the restoration success in the current and newly created tidal nature in the area.

Doelstelling:

Locatie:

Deze masterproef werd reeds 1-maal toegekend!

30765: Evolution of melanosome shape and diversity in birds and its implication for avian colours

Promotor(en): Matthew Shawkey, Michaël Nicolai
Begeleider(s): Liliana DALba Altamirano
Contactpersoon: Matthew Shawkey
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1

Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

One of the main pigments in birds are melanins. These pigments occur in organelles called melanosomes. In birds the shape and diversity of these melanosomes is remarkably high. Furthermore, the shape is linked to the colours they producing which can be black, brown, reddish or even iridescent. However, how this diversity evolved through time, and whether melanosome diversity was always as rich, remains mostly uninvestigated.

Doelstelling:

In this thesis, the student will use a combination of SEM and TEM images of feathers from extinct and extant avian (and non-avian) dinosaurs together with phylogenetic comparative analyses to reconstruct the evolution of avian melanosome diversity to pinpoint how variation varied through time.

Locatie:

campus Ledeganck

Onderwerp voorbehouden voor Emilia Demoen

Deze masterproef werd reeds 1-maal toegekend!

30976: Evolution of sex-determining regions in green algae

Promotor(en): Olivier De Clerck, Agnieszka Lipinska
Begeleider(s): Kenny Bogaert
Contactpersoon: Olivier De Clerck
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Sex-determination mechanisms control reproductive cell differentiation and development of sexual characteristics in all organisms, from algae to animals and plants. While the underlying processes defining sex (meiosis and recombination) are conserved, sex-determination mechanisms are highly labile. In particular, a flow of new discoveries has highlighted several fascinating features of the understudied haploid UV sex determination, in which sex is determined in the haploid-phase (e.g. green algae, bryophytes, and brown algae).

It appears that the sex determining master gene is conserved in green algae, but the structure and evolution of the sex determining regions or sex chromosomes has only been studied in volvocine algae (*Chlamydomonas*, *Volvox*, etc.). Recent genomics resources of other green algae (e.g. *Ulva*, *Bryopsis*, *Ostreobium*) facilitate a much broader perspective on the evolution of UV sexual systems in green algae and will shed light on the origin of the sex determining regions. Most importantly, are repeated findings of genes encoding RWP-RK or HMG transcription factors as putative sex-determination genes in UV systems the results of deep homology or convergence?

Doelstelling:

The student will reconstruct the evolution of sex determining regions in green algae. Thereto, she/he will use existing genomics resources, identify sex determining regions and interpret the evolution of gametologs and sex-specific genes which will allow to test if sex determining regions have deep homology or arose multiple times convergently.

Locatie:

31014: Exploring bacteria from underexplored habitats as novel sources of pigments for biotechnology

Promotor(en): Anne Willems, Peter Vandamme
Begeleider(s):
Contactpersoon: Emmelie De Ridder
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1

Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The use of synthetic dyes is associated with health and toxicity issues, resulting in an increased demand for pigments of natural origin. Bacteria provide an attractive source of naturally derived pigments due to factors such as their rapid and (relatively) cheap growth and independence of weather conditions. Bacterial pigments are secondary metabolites with applications in the pharmaceutical, textile, paper, food and cosmetics industry. They are used as a colorant to make food more attractive and as dyes for paper and textile fabrics. Bacterial pigments are also known to possess a range of bioactivities, including antimicrobial, antiparasitic and anticancer activity, making them interesting sources for the discovery of new drugs. Furthermore, due to their antioxidant and UV-protective properties, bacterial pigments have applications in the cosmetic industry in e.g. anti-aging creams and sunscreens. Although many different pigments have already been discovered over the years, most researchers tend to focus on taxonomical groups known for their secondary metabolite production. This project however, focuses on pigment-producing bacteria from underexplored habitats, including the road surface.

Doelstelling:

This project focuses on pigment-producing bacteria from underexplored habitats and particularly those taxa for which no pigments have been documented. It aims to characterize their pigments, study some of their bioactive properties and ultimately identify new and interesting pigments for biotechnology. Depending on the state of the research, pigments will be chemically characterized using HPLC, NMR and/or FT-IR and some bioactive properties will be assessed; whole genome data will be used to try and identify the gene clusters associated with pigment production; or new species of bacteria will be described.

Locatie:

Campus Ledeganck

Deze masterproef werd reeds 1-maal toegekend!

31024: Exploring the function of body scales in basal insects

Promotor(en): Liliana DALba Altamirano, Thomas Parmentier
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Scales are modified hair structures that play an essential role in the ecology of insects. They prevent desiccation, help to release pheromones, give protection, and are key in colour production. Body scales have been thoroughly investigated in highly derived insect taxa such as butterflies and beetles. However, scales are much more widespread in basal lineages of insects, but scale evolution and function remain elusive in these primitive groups.

Doelstelling:

The aim of this project is to examine the structural evolution of scales in the basal insect groups of silverfish (*Zygentoma*) and bristletails (*Archaeognatha*) and to link this to different ecological strategies observed in these groups. Both groups are wingless insects completely covered in body scales. Preliminary tests have demonstrated a striking diversity in the structure of the scales of these primitive groups.

We will investigate whether the morphology and nanostructures (e.g., ridges) of the scales are related to functions such as colour production and defence strategies. We will compare this in groups with different phylogenetic history and with different biology (e.g., ant symbiotic species vs free living species). In addition the student will do manipulative experiments to test the role of scales (e.g. to test their function in lineages that integrate in ant colonies).

The student will make use of different techniques, including optical, scanning and transmission electron microscopy, micro-spectrophotometry and behavioral experiments.

Locatie:

Deze masterproef werd reeds 1-maal toegekend!

31001: From how many angles can you look at a woodside? Supporting Flemish woodside policy initiatives.

Promotor(en): Sander Jacobs
Begeleider(s): Jomme Desair, Francis Turkelboom
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

For decades farmers were encouraged to intensify and upscale their agricultural practices. Woodsides, formerly multipurpose fences, were one of the first things to be uprooted by this system. By the time woodsides were appropriately protected, only a fraction of them remained. This meant not only a loss of a former cultural landscape, but also of structural and functional diversity in Flanders. Policy is now taking a turn and recently introduced its *Houtkantenplan* or *Woodside Strategy*. This *Woodside Strategy* aims at reinstating a part of the cultural landscape through incentives for planting and managing woodsides as will play an important role in a multifunctional and resilient landscape and bio-economy. However, to efficiently construct incentives for woodsides, it is imperative to know the values a woodside has for different stakeholders.

Doelstelling:

In this thesis you will apply the recently published IPBES values framework to woodsides in Flanders. You will perform a stakeholder analysis and key stakeholder interviews to get a broad understanding of the values of woodsides and thereby support the Flemish woodside policy.

Locatie:

31062: Functionele agrobiodiversiteit in de praktijk

Promotor(en): Geert Haesaert
Begeleider(s): Eline D'Haene
Contactpersoon: Geert Haesaert
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

'Intercropping' met vlinderbloemigen en perceelsrandbeheer (bloemenmengsels) zijn twee van de mogelijkheden om onze gewasproductie te verduurzamen en een belangrijke bijdrage te leveren aan de functionele agrobiodiversiteit. Tevens dragen deze twee maatregelen bij tot een verminderde externe inputs en een positieve landschapsbeleving. Niettemin dient nog bijkomende kennis opgebouwd worden m.b.t. welke gewascombinaties en bloemenmengsels leveren de sterkste bijdrage tot de diverse ecosystem services. 'Intercropping' met vlinderbloemigen en perceelsrandbeheer (bloemenmengsels) zijn twee van de mogelijkheden om onze gewasproductie te verduurzamen en een belangrijke bijdrage te leveren aan de functionele agrobiodiversiteit. Tevens dragen deze twee maatregelen bij tot een verminderde externe inputs en een positieve landschapsbeleving. Niettemin dient nog bijkomende kennis opgebouwd worden m.b.t. welke gewascombinaties en bloemenmengsels leveren de sterkste bijdrage tot de diverse ecosystem services.

Doelstelling:

De thesis zal uitgevoerd worden op de proefhoeve van UGent te Bottelare waar twee veldproeven aanliggen met verschillende granen-vlinderbloemige combinaties en verschillende bloemenmengsels op perceelsranden zijn uitgezaaid. Met deze proeven willen o.a. volgende onderzoeksvragen beantwoorden:

- Wat in de diversiteit aan bestuivers die de verschillende gewascombinaties aantrekken? Is er een effect op de zaadzetting?
- Welke bloemenmengsels leveren de grootste diversiteit aan bestuivers en natuurlijke vijanden op? Kunnen we met een bepaalde samenstelling van bloemenmengsels specifieke bestuivers aantrekken?

Om deze onderzoeksvragen te beantwoorden zullen vanaf de bloei op zeer regelmatige tijdstippen waarnemingen gebeuren hierbij gebruik makend van diverse observatietechnieken om een zo groot mogelijke diversiteit vast te stellen.

Locatie:

30881: Gefaseerd maaibeheer in graslanden: Hoe optimaliseer je in functie van ongewervelden?

Promotor(en): Lander Baeten, Pallieter De Smedt
Begeleider(s):
Contactpersoon: Pallieter De Smedt
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Graslanden zijn een belangrijk habitat voor tal van organismen. Door veranderend landgebruik, stikstofdepositie en vermessing gaat de hoeveelheid en de kwaliteit aan graslandhabitat sterk achteruit in West-Europa. Natuurherstelmaatregelen en bijhorend beheer leggen vaak de focus op plantendiversiteit door zoveel mogelijk biomassa af te voeren en graslanden te verschrallen. Dit maaibeheer is echter veel minder geschikt voor ongewervelden met een vaak heel complexe levenscyclus en zeer uiteenlopende habitatvereisten. Gefaseerd maaibeheer moet ervoor zorgen dat er meer structuurvariatie behouden blijft binnen een grasland en er bijvoorbeeld steeds overstaande vegetatie beschikbaar is. Dit gefaseerde maaibeheer wordt al vele jaren toegepast en lijkt op basis van ervaringen bij beheerders heel bevorderlijk voor vele soorten ongewervelden. Toch is concrete onderzoeksdata nog steeds schaars.

Doelstelling:

Deze thesis zal voor verschillende diergroepen uitzoeken wat de effecten zijn van gefaseerd maaibeheer op hun populatiegrootte. Heel praktisch bekijken we wat het effect is van de hoeveelheid overstaande vegetatie, de grote van de ongemaaide "eilandjes" enzovoort. De thesis omvat naast een grondige literatuurstudie, veldwerk in natuurgebieden rond Mechelen waar zowel structuurvariatie gemeten zal worden als ook een uitgebreide bemonsteringscampagne van verschillende groepen ongewervelden in de zomer van 2022.

Locatie:

30991: Genome editing of regulatory elements to improve maize yield

Promotor(en): Hilde Nelissen, Arthur Beauchet-Craon
Begeleider(s): Pieter Wytynck, Christian Lorenzo
Contactpersoon: Hilde Nelissen
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The main focus of the research in our team is to understand how plant organs grow, starting from the maize leaf, which offers an accessible model to study the dynamic changes in the molecular and physiological growth processes. One line of research focuses on the impact of drought, which poses a major threat for crops like maize and is likely to be worsened by climate change, on these growth processes. The plants with altered growth characteristics are not only evaluated for leaf growth in the lab, but also for plant yield – both biomass and grain yield – in field trials.

Both seed yield and plant biomass are the result of a complex interplay of growth processes that determine the number of cells (cell division) and the size of cells (cell expansion). Over the past years, we showed that ectopic expression of several maize genes enhance both biomass accumulation and grain yield in field trials. The recent realization that these yield enhancing genes are co-expressed in certain cell types, opens perspectives to use in house bulk RNAseq, single cell and spatial datasets in maize to identify novel putative growth regulators based on co-expression. Although co-expression analysis on bulk RNAseq datasets of lines with improved yield showed co-expression at the organ level, in situ hybridizations often show tissue-specific expression of the genes within one organ. The application of single cell RNAseq and spatial transcriptomics, however, now highlights that there is co-expression of the key yield enhancing genes in certain subpopulations of cells within the maize shoot apex.

Doelstelling:

The importance of these subpopulations of cells is the starting point to identify cell-type specific regulatory elements that will be used for tailored network perturbations. Using multiplex genome editing or prime editing the identified regulatory elements will be perturbed and the effect on gene transcription and phenotype will be assessed. The project fits within a larger project called BREEDIT, where a novel crossing scheme is being developed that allows for an expeditious evaluation of combinations of potential yield contributing alleles by unifying 'classical' breeding with gene-centric molecular biology. The acronym BREEDIT, a word fusion of breeding and editing, reflects the basic concept of combining breeding with multiplex genome editing of yield related genes. Instead of creating knock-outs, the focus of this project will be to multiplex variations in regulatory sequences of yield related genes.

Locatie:

technologiepark 71, 9052 gent

Onderwerp voorbehouden voor Elia Veirman

Deze masterproef werd reeds 1-maal toegekend!

30982: Glow in the dark Mycenas: who? what? why?

Promotor(en): Annemieke Verbeken, Jorinde Nuytinck
Begeleider(s): Annemieke Verbeken
Contactpersoon: Annemieke Verbeken
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Bioluminescence is a phenomenon that originated on multiple occasions in the fungal kingdom, but is especially common in the mycenoid lineage (with genera as *Mycena*, *Panellus* and *Roridomyces*). It is more common and especially known in tropical areas, although even in our temperate forests we encounter bioluminescence, e.g. in *Panellus stipticus*. The variation in the phenomenon is striking, including differences in wavelength and color of the light, differences in parts of the basidiocarps that glow in the dark (sometimes stipes only, sometimes hymenophore only, sometimes the whole fruitbody). Evident question that triggers everyone that learns about these bioluminescent fungi: why this light? Does it have a function in attracting vectors for spore dispersal? Or is it just a by-product related to the metabolites and enzymes formed in these basidiomycete fungi?

Doelstelling:

This master dissertation has the following aims:

- Studies in bioluminescent fungi are increasing. An in depth literature study will be translated in a ready-to-use exposition (for GUM) about this fascinating subject.
- Culturing bioluminescent fungi, either as mycelium, or as fruitbody. Growing kits are available online, but local species, such as *Panellus stipticus*, will also be used. These cultures are needed for aim 1 (to show an object on an exposition) and aim 3.
- Experimental part where it will be tested whether bioluminescent mushrooms attract nocturnal insects in our climate zone. In a first phase this will be tested with models of fungi (or dried fungi) treated with glow in the dark photoluminescent paint, if aim 2 is successful, real mycelium or fruitbodies will also be used.

Locatie:

Onderwerp voorbehouden voor Mattie De Jonghe

Deze masterproef werd reeds 1-maal toegekend!

30995: Green Gentrification in Flanders

Promotor(en): Sander Jacobs
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in de stedenbouw en de ruimtelijke planning
Niet behouden voor:
Nog onbeslist voor:

Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Green gentrification (and climate gentrification) is the displacement of social groups as a consequence of (urban) greening projects and strategies. Research shows that investment in green infrastructure is often unevenly spread across neighbourhoods, benefits are unevenly distributed across income class, race, origin and age; and participation in the decision making process and design of public green spaces is biased towards privileged groups. This presents a potential problem, as public spaces risk to propagate inequalities or even increase polarisation in neighbourhoods, cities and regions.

Doelstelling:

This thesis explores research on green gentrification, and verifies the hypothesis that greening is a cause of gentrification in Flemish cities.

Locatie:

Samenwerking met bedrijf of non-profit organisatie

Bedrijf: INBO
Samenwerking: promotor + INBO research program urban nature

30941: How competition affects dispersal and the assembly of communities in space

Promotor(en): Dries Bonte
Begeleider(s): Dries Bonte
Contactpersoon: Dries Bonte
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Connectivity conservation is mainly studied and applied from a functional perspective based on landscape permeability. Yet connectivity is an outcome of species dispersal. To date little attention has been given to understanding departure rules (i.e. the process of leaving patches) in complex communities, despite its central role in setting the baseline for connectivity in spatial networks.

Doelstelling:

While the demographic context of species interactions is key to understanding local population dynamics and coexistence, it has still been poorly considered in our understanding of dispersal and therefore ecological connectivity. Conditional changes in movement and dispersal, i.e. their dependency on the local environmental and demographic context, do largely determine patterns of species coexistence in space. Simple density-threshold responses are identified as the appropriate dispersal strategy maximizing fitness under intra-specific competition. When considering multiple, rather than single species, a similar argumentation based on interactions with other species, teaches us that also interspecific interactions should affect dispersal patterns in communities. The dependency of dispersal on the density of their own and other species will obviously feed back on the strength of intra- and inter-specific interactions and therefore on the dynamics of metacommunities. While simple in theory, a thorough validation on the relevance of biological interactions for dispersal needs to be based on research using multiple species from different systems. The student will perform experiments to understand this diversity dependence of dispersal, and as such develop an understanding how interspecific competition affects fluxes of organisms and their genes across populations.

Locatie:

Ledeganck

Deze masterproef werd reeds 1-maal toegekend!

30952: How do birds stop and change inappropriate behaviour? An experimental study of response inhibition and relationships with behavioural trait variation

Promotor(en): Luc Lens, Frederick Verbruggen
Begeleider(s): Anneleen Dewulf

Contactpersoon: Luc Lens
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

How individuals are able to cope with novel or unpredictable environments is becoming increasingly relevant as animals (as well as humans) are increasingly exposed to such conditions, for example through rapid urban sprawl or other human-induced changes. In this context, the concept of 'inhibition' is receiving increasing attention across many disciplines, including (but not limited to), neurosciences, experimental psychology and animal ecology. At the neurophysiological level, inhibition refers to the suppression of neural activity, while at the neurocognitive level, it refers to the suppression of inappropriate or no longer relevant responses. Finally, at the behavioural level, it is often used as an umbrella term to denote an individual's tendency to show restraint, and more specifically, to scrutinize the environment for potential threats, to withdraw from unfamiliar environments, or to avoid interacting with novel stimuli. However, how these different processes are connected (especially at the neurocognitive and behavioral levels), and how they are linked to other types of behaviour such as the ability to learn or avoidance of aggressive interactions, remains poorly understood.

Doelstelling:

This study aims to quantify individual variation in response inhibition at the neurocognitive level and to examine whether, and to what extent, this variation is reflected in behavioural variation when faced with novel or unpredictable (social or environmental) conditions. To answer these questions, the student will participate in ongoing experiments (part of a long-term Methusalem research program jointly executed by experimental psychologists and animal ecologists) conducted both on individual birds - in highly controlled test arenas - and on groups of individuals - in large aviaries under semi-natural conditions ('mesocosms'). All experiments will be carried out at the Wildlife Rescue Centre ("opvangcentrum vogels en wilde dieren") in Ostend and conducted on captive-bred Japanese quails (*Coturnix japonica*) and/or white leghorn chickens (*Gallus g. domesticus*). To choose this subject, enrollment at the laboratory animal science course (offered as part of the MSc biology program) and regular work in Ostend are required.

Locatie:

Onderwerp voorbehouden voor Pauline Blerot

Deze masterproef werd reeds 1-maal toegekend!

30887: How does anthropogenic stress determine the evolution of plant-herbivore metapopulations?

Promotor(en): Nicky Wybouw, Dries Bonte
Begeleider(s): Nicky Wybouw, Dries Bonte
Contactpersoon: Dries Bonte
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Species interact strongly with each other within a tangled bank and also show a strong spatially structured distribution. Population dynamics, dispersal, and environmental changes influence the evolutionary trajectories of populations. In turn, evolutionary changes reciprocally influence population dynamics. These eco-evolutionary processes are central to the functioning of populations and the maintenance of biodiversity. To understand the functional importance and relevance of these eco-evolutionary dynamics in nature, we need to gradually add new dimensions to our empirical research. One important dimension is the impact of human activity via urbanization on natural metapopulations.

Doelstelling:

This master project will provide the highly needed next step for our understanding of the evolution of trophic interactions. The project will provide answers to the question how eco-evolutionary processes affect the population dynamics of the interacting species, and how changes along an urbanization gradient affect their overall performance and stability in metapopulations. Depending on the preferences of the student, we can integrate fieldwork, experimental metapopulations, genetic-molecular-biochemical work, and modeling, using a highly tractable plant-herbivore system.

Locatie:

campus Ledeganck

30959: How social interactions drive the microbiome structure of highly specialized ant-associated beetles

Promotor(en): Nicky Wybouw, Thomas Parmentier
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Ants harbour a hidden diversity of beetles in their nests. Some beetle lineages have evolved extreme adaptations that deceive their ant host using chemical and behavioral strategies. These beetles are completely integrated in the host colony and engage in intimate interactions with their host. The beetles are transported, cleaned and even mouth-to-mouth fed by their ant hosts.

Recent research underlined that the gut microbiome, including vertically inherited symbionts, is essential for exploiting different food sources in insects. Several factors have been suggested to drive the structure of these gut communities going from evolutionary histories to environmental variables. The intimate relationship between the parasitic beetles and their ant host gives a unique possibility to test the importance of close interspecific interactions in structuring the microbiome of insects.

Doelstelling:

Five unrelated groups of beetles (*Lomechusa*, *Amphotis*, *Dinarda*, *Paussus*, *Claviger*) that engage in trophallaxis have been collected with their respective host ant species. The aim of this thesis is to assess the factors that shape the composition of the microbiome in these highly specialized ant-associated beetles. Because of the intimate physical contact and the exchange of gut fluids, we expect a strong overlap between the microbiome of the host ant and beetle parasite.

The student will characterize the microbiota of the different beetles and their ant host using various molecular techniques. Depending on the interest and skill of the student, these can include qPCR, amplicon-based sequencing, Sanger sequencing, metagenomics, and in vitro culturing. The student can also conduct behavioral manipulation experiments between beetles and host ants to further elucidate the role of social interactions on microbiome assembly.

The student should ideally start the thesis in July 2024.

Locatie:

campus Ledeganck

30975: How Ulva blooms, generating and phenotyping mapping populations

Promotor(en): Olivier De Clerck, Tom Jacobs
Begeleider(s): Jonas Blomme
Contactpersoon: Jonas Blomme
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Coastal ecosystems are heavily impacted by human activity, including habitat destruction and a large influx of nutrients. As a consequence, macroalgal populations belonging to the genus *Ulva* (Sea Lettuce) can bloom into so-called "green tides". Green tides have intensified in tropical and temperate latitudes, including European coastlines. In the Yellow Sea of China, *Ulva prolifera* can cover up to 20,000 km² and negatively impacts ecosystems and local economies (aquaculture, clean-up, tourism). Various traits can be associated with bloom formation such as faster colonization rates, larger tissue expansion, or better utilization of a nitrogen source. Still, the genetic regions and molecular mechanisms underlying green-tide behavior are not known.

This master thesis is part of a larger research project aiming at studying local adaptation of *Ulva compressa*/*mutabilis* lines to nutrient-rich conditions. The student will assist the generation and phenotyping of mapping populations that originated from a eutrophic or oligotrophic background. Ultimately, the research aims to identify and characterize genetic regions associated with green tide formation. *Ulva* is a model species for green seaweed research and currently the only seaweed for which genetic tools are available.

Doelstelling:

In this project, the student will establish mapping populations (via crossing) for novel and laboratory *Ulva compressa* lines. Using the phenotyping platform IGIS, growth characteristics will be investigated over time to determine if there is a competitive advantage of utilizing high/low concentrated nitrogen sources ($\text{NO}_3^-/\text{NH}_4^+$) and whether a strain has bloom-forming capacities. Mapped *Ulva compressa*/*mutabilis* populations create the foundation on which the observed traits will be linked to genotypes (QTL-identification), of which the student will partly be involved in the preparatory phase (DNA extraction, PCR with/without mating specific markers, ...).

Genetic tools need to be developed to functionally characterize genes of interest. The student will build upon expertise in the group of developing molecular tools for *Ulva* to further optimise targeted mutagenesis in *Ulva compressa* via CRISPR/Cas systems. In a next step, candidate genes will be characterized using mutant studies.

Locatie:

Sterre S8 (Phycology Research Group), Technologiepark 71 (VIB-PSB)

30924: Huidige opsporingstechnieken van Aziatische hoornaarsnesten optimaliseren

Promotor(en): Dirk de Graaf
Begeleider(s): Ellen Danneels
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Bijenpopulaties op standen van Honeybee Valley op campus Sterre en op locaties in Merelbeke worden belaagd door Aziatische hoornaars. Het opsporen en verdelgen van de nesten zou de bijenpopulaties minder onder druk zetten. Momenteel is men aangewezen op de lokpotmethode om de nesten op te sporen. Hiernaast tracht men ook met allerlei zenders nesten te lokaliseren. Daarna worden de nesten door professionele verdelgers afgedood en verwijderd (indien mogelijk). Zowel op gebied van opsporingstechnieken als op gebied van verdelgingsmethoden is nog veel ruimte tot verbetering en bijsturing. Anderzijds proberen imkers hun bijenvolken op allerlei manieren te beschermen tegen nieuwe belager. Hierin is er dringend nood aan duidelijke aanbevelingen voor de sector.

Doelstelling:

Locatie:

campus Sterre

Onderwerp voorbehouden voor Lia Baeteman

Deze masterproef werd reeds 1-maal toegekend!

31027: Impact of alternative mowing regimes on structural heterogeneity and plant and insect diversity

Promotor(en): Jan Van Uytvanck, Dries Bonte
Begeleider(s): Jan Van Uytvanck
Contactpersoon: Jan Van Uytvanck
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Vegetation structure plays a crucial role in grassland ecosystems and is anticipated to be an important driver of insect-plant interactions. We rely on ongoing field campaigns organised by INBO aiming at assessing vegetation structure heterogeneity in a selection of mesophilic grassland habitats in Flanders. Traditionally, management measures in these grasslands -such as mowing- aimed to improve vegetation composition (by the suppression of productive grass species), neglecting vegetation structure and animal diversity. Here we study two alternative mowing regimes - sinus mowing and rotational block mowing, (both 2 times each year)-, conceived to improve habitat quality for insects and arthropods in general. Six study sites are located in the provinces of West- and East-Flanders, each of them containing nearby sinus- and blockmowing subsites.

We will use measurements at different scales (small plots on transects vs larger plots at the (sub)site level) to assess the impact of structural heterogeneity on plant diversity, flower abundance and diversity and abundance of flying insects (butterflies, hoverflies, bees and bumblebees).

Besides testing the direct relationship between structural and biodiversity components, we aim to advance our understanding of the long term impact of nature management measures on a wider biodiversity range.

Doelstelling:

Using this data we will establish general insights on how spatial vegetation structure affects and relates to grassland biodiversity and the use of grassland habitats by flying insects. Data have been collected during past years using small plots on transects. We want to expand the data using collection techniques at a larger scale, i.e. using larger plots or/and data collection at site level, probably more appropriate for flying insect responses. If possible, the students will (may) assist in further data collection in summer 2023 or spring 2024.

Locatie:

Campus Ledeganck

30990: Impact of climate change on future distribution of Malagasy Annonaceae

Promotor(en): Lars Chatrou, Diederik Strubbe
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Madagascar's imperilled biota are experiencing the effects of climate change. With more than 90% endemism among plants, mammals, reptiles and amphibians, the stakes are high. The pristine landscapes that allowed this exceptional biodiversity to survive past climate changes are largely gone. Deforestation has claimed approximately 90% of the island's natural forest and what remains is highly fragmented, providing a poor template for large-scale species range shifts. The impacts of current and future climate change may therefore be much different than past impacts, with profound implications for biodiversity.

Modelling approaches may help to understand the response of plant species to future climatic changes. Species distribution models are a useful tool, as these are extrapolations that indicate the potential distribution of species, based on the current distribution and climate variables in the localities where a species occurs. These models can be used to infer past changes of distribution areas, but also to make projections based on future climate models.

The Annonaceae is a family of basal angiosperm with pantropical distribution which has been the subject of several biogeographical studies focusing on how and when the family has achieved its current distribution. The ca 2500 species of Annonaceae are important elements of tropical rain forests, and reconstructing the evolution of these species teaches us a lot about the evolution of the rain forest biome. The availability of a wealth of specimen data of Annonaceae offers a unique opportunity to model species distributions. Madagascar is home to some 100 species of Annonaceae trees and lianas, all of which are endemic. Two out of eight genera of Annonaceae occurring on Madagascar, *Ambavia* and *Fenerivia*, are endemic to the island. As Annonaceae in general are a good proxy for tropical rain forests, species distribution modeling in the of future climatic conditions, will provide insights into the responses of the rain forest biome to climate change.

Doelstelling:

The goal of this project is to investigate the impact of climate change on the future species distribution of species of Annonaceae from Madagascar, and the identification of species with greatest resilience to heat and drought.

Techniques and analyses methods that you will use include:

- Data mining of virtual herbarium specimens: databasing and georeferencing of taxonomically verified botanical collections (using databases of institutes in Kew, Paris Leiden, St. Louis), supplemented with observations made during fieldwork.
- Species distribution modelling using WorldClim bioclimatic variables, software packages (Maxent) and R scripts.

This project suits a student with a strong interest in ecology, climate change science and computational biology. The output will be written in the form of a scientific article, aiming at publication in a peer-reviewed journal.

Locatie:

Campus Ledeganck

Onderwerp voorbehouden voor Kaat Laureys

Deze masterproef werd reeds 1-maal toegekend!

30969: Impact of human activities on fish diet in the Belgian Part of the North Sea

Promotor(en): Ulrike Braeckman, Annelies De Backer
 Begeleider(s): Nanou Goedefroo
 Contactpersoon: Nanou Goedefroo
 Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
 Niet behouden voor:
 Nog onbeslist voor:
 Aantal studenten: 1
 Aantal masterproeven: 1
 Motivering voor deze opleiding:

Probleemstelling:

The demand for marine sand and aggregates has been increasing over the past decades as these valuable natural resources account for a significant share of materials used in the construction sector (i.e. for the production of concrete, asphalt...) and for coastal protection in view of sea level rise. But the extraction of marine sand also has a large ecological impact on the seabed. Many studies have already shown that both biotic (benthic diversity, species composition) and abiotic (sediment, seabed morphology) components are affected by sand extraction activities. For example, in heavily disturbed areas, macrobenthic scavenger species may increase in abundance and consequently attract more fish. Studying the diet of commercially important fish species in sand extraction areas will therefore allow us to identify possible important feeding grounds.

Doelstelling:

This Master Thesis aims to uncover possible changes in the diet of four fish species, among which commercially important species, as a result of marine sand extraction activities. Stomachs of four fish species, such as dab, plaice, lesser weever and common dragonet, were recently sampled in a heavily impacted sand extraction area in the Belgian Part of the North Sea. The student will get the opportunity to examine and compare the diets of these four species between impact and control areas. This will be done by morphological observations of the different stomachs (i.e. identifications of prey taxa under stereo microscope). Identifying possible changes in the diet of (commercially important) fish species will tell us something more on how these human activities change their feeding behavior and what is ultimately could mean for ecosystem functions such as secondary production.

Locatie:

ILVO Oostende

30966: Impact of melting glaciers on food webs in Greenland's fjords

Promotor(en): Ann Vanreusel, Ulrike Braeckman
 Begeleider(s): Marius Buydens
 Contactpersoon: Marius Buydens
 Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
 Niet behouden voor:
 Nog onbeslist voor:
 Aantal studenten: 1
 Aantal masterproeven: 1
 Motivering voor deze opleiding:

Probleemstelling:

Polar regions are situated at the forefront of climate change. During summer 2021, rain fell at the highest point of the Greenland Ice Sheet instead of snow,

an event never recorded before. Last September, 3.9 million km² ice melted, a new monthly record exceeding the previous one by more than two times. Today, Greenland's massive Ice Sheet is melting at a rate which has not been surpassed for 12,000 years.

As Greenland's landscape continues to change, so is its enigmatic underwater realm. Due to the ongoing melting of the Ice Sheet, glaciers are retreating out of the fjords, thereby altering the hydrology within the fjord basins. The effects of this changed hydrology in fjord systems on marine food webs are not yet uncovered. In addition, as fjords are important carbon sinks, it is crucial to understand how climate change will have an impact on the carbon flow through the food web and finally ending up into the seabed.

Doelstelling:

For this topic, we seek an enthusiastic student motivated to elucidate the processes at work deep down Greenlandic fjord systems. The interested thesis student will be involved in lab work, processing samples from Greenlandic pelagic and benthic communities and accompanying environmental samples.

Locatie:

campus Sterre S8

Deze masterproef werd reeds 1-maal toegekend!

30970: Impact of shellfish aquaculture on macrobenthic communities in the Belgian part of the North Sea

Promotor(en): Ulrike Braeckman
Begeleider(s):
Contactpersoon: Ulrike Braeckman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Since summer 2022, a shellfish aquaculture farm is being developed in front of the Belgian coast. The zone is located in an area designated for marine protection (EU Natura2000 Habitat directive) for its high biodiversity of benthic communities. Installing long lines for shellfish aquaculture can alter several aspects of the benthic ecosystem, both in the positive and negative sense. In the concession area, no fishery is allowed, which means that direct anthropogenic disturbance of the seabed communities will be excluded. The (pseudo)faeces of the shellfish can enrich the sediments with organic matter. This may in the first instance lead to increased food availability for detritivores, but on the long term, it can also lead to hypoxia when organic matter accumulates. Shellfish may drop down to the seabed and form small patches of biogenic reefs, which increase habitat heterogeneity and potentially increase local biodiversity.

By law, the effect of the sea farm on the local marine ecosystem needs to be monitored. As part of a larger monitoring programme, the Marine Biology Research Group at UGent is responsible for the monitoring of the macrobenthos community and the sediment habitat.

Doelstelling:

For this thesis topic, the student can take part in the field work on RV Belgica (October 2023). Macrobenthos samples will be processed in the lab, involving sorting and identification at species level. Statistical analysis involves relating patterns in macrobenthic biodiversity to environmental variables and position with respect to the location of the sea farm.

Locatie:

campus Sterre S8

30948: Improving kelp restoration efforts with probiotics

Promotor(en): Olivier De Clerck, Willem Stock
Begeleider(s):
Contactpersoon: Willem Stock
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1

Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Kelps are large brown seaweeds that form vast underwater 'rainforests', referred to as kelp forests. Due to the high productivity of the kelps and the complex, three-dimensional habitats they create, kelp forest are one of the most diverse and productive marine habitats on Earth. Golden kelp (*Laminaria ochroleuca*) is a warm-water kelp species that has declined in southern Europe. To restore *L. ochroleuca* in areas where it has disappeared, we are out planting small rocks seeded with lab reared juveniles.

Doelstelling:

Within the framework of this thesis we will investigate how to use bacteria to increase survival of our kelp propagules. We will screen which kelp associated bacteria can reduce heat stress and pathogen susceptibility and how best to supplement these bacteria to the propagules. The work will involve kelp and bacterial cultivation, cocultivation experiments and the analyses of bacterial (met)genomic data.

Locatie:

Sterre S8, Ledeganck (potentially University of the Algarve, Portugal)

Website:

Meer informatie op: www.restoreseas.net

Opmerkingen:

Thesis topic in the framework of the European project Restoreseas (see <https://www.restoreseas.net/>). Phycology - Ugent investigates seaweed-microbial interactions as a means to enhance restoration success of kelp species in Portugal.

Deze masterproef werd reeds 1-maal toegekend!

30997: Increasing policy coherence through result based agri-environmental schemes

Promotor(en): Sander Jacobs
Begeleider(s): Dieter Mortelmans
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Nature in multifunctional landscapes is often regulated through agri-environmental schemes. Farmers, who are traditionally the stewards of the landscape, are engaged to continue to do so through payments schemes, which permit to manage what happens in the landscape, but also provides an income source for farmers outside of the (often industrialized) production option. These schemes have traditionally been "action based", meaning that payments are linked to what the farmer does. However, there is a growing interest in result based agri-environmental payments schemes (RBAPS). These are based on the changes (e.g. instead of leaving a grass strip for a rare breeding bird, the farmer is paid if breeding birds appear). Several pilot cases have successfully been completed, notably in Ireland (Burren Programme, Wild Atlantic Nature). RBAPS can avoid farmers to focus on finding the most effective measures to get a subsidy, towards thinking about tangible landscape elements and structures for a range of habitats.

Doelstelling:

This thesis explores if RBAPS approaches in Flanders could lead to such improvements and aid application of policies, and how these could be structurally scaled up.

Locatie:

30962: Influence of spatial context on the level of generalism or specialism within the same species?

Promotor(en): Karen Bisschop, Dries Bonte
Begeleider(s):
Contactpersoon: Karen Bisschop

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Species are constantly challenged to adapt to novel conditions. However, the broader the niche of a species is, the more resilient it is to fast changes in the environment. Many studies indeed highlight that resource specialists are at greater risk than generalists. Interestingly, generalist species are often composed of individuals with more specialised diets. This points towards different levels of generalism depending on the specific individuals in the population. Given that higher levels of generalism may help, it is crucial to know which factors may influence this.

Doelstelling:

In this thesis we want to explore whether the spatial context influences the level of generalism. We will address this question using the two-spotted spider mite, *Tetranychus urticae*, as model system. This species can occur on more than 900 different host plants. Nevertheless, on the level of the individual, the species is characterized by small, specific individual niches. While sampling natural spider mite populations, we will assess different characteristics of the landscape in terms of heterogeneity and connectivity (e.g. number of different host plants, percentage of ephemeral plants or host plants turnover, shielding from wind, distance from the road, possible dispersal). Afterwards the populations will be subjected to performance tests (e.g. measuring fecundity, longevity, and growth rate) in the labs to quantify the level of generalism. We hypothesise that the more connected and heterogeneous a certain landscape is, the higher the level of generalism in the population. As many species are confronted with fast changing environments, it is very important to know the driver of niche width and hence a species' resilience.

Locatie:

campus Ledeganck

Opmerkingen:

Given that the largest populations of spider mites are found in August, the collection of spider mites should start early August and the student is expected to start working on the project during the summer break.

30937: Investigating diet shifts of the European garden spider along replicated urbanisation gradients

Promotor(en): Dries Bonte
Begeleider(s): Katrien De Wolf
Contactpersoon: Katrien De Wolf
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Recent research in Flanders shows that decreasing species diversity, biomass and homogenization across cities is prominent in arthropods. As many arthropod species form the basis of food webs, changes in species richness and abundance may impose cascading effects for higher trophic levels, especially when larger species are disappearing. The prey spectrum of generalist predators is largely affected by prey community composition, especially for sit-and-wait predators and ultimately affecting fitness. However, effective prey consumption will additionally depend on the species' behaviour, or in the case of orb web spiders, on their web building. Recent advances in the field of metabarcoding enable the investigation of trophic interactions on a larger scale. The spider diet quantified by means of metabarcoding will be compared with the data on prey community composition determined by insect traps (sticky traps and window traps) at the same collection sites.

The student will learn to work with automated picture processing and bio-informatic pipelines. The student will identify and sort prey species (Arthropods) to order or suborder taxonomic level.

Doelstelling:

Locatie:

campus Ledeganck

Onderwerp voorbehouden voor Nele Verstraelen

30936: Lipid metabolism of *Calanus* species in relation to development or climate stressors (Experimental Research)

Promotor(en): Marleen De Troch
Begeleider(s):
Contactpersoon: Robyn Sahota
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Copepods are lipid rich and play an important role in the transfer of essential fatty acids from primary producers to higher trophic levels, including commercially relevant fish species. *Calanus* species in particular are of high importance as they constitute the majority of the copepod biomass in the North Atlantic Ocean and European shelf seas (Strand et al. 2020), serve as the primary diet for cod and herring stocks and are even the target of fisheries themselves (<https://zooca.eu/>).

Due to the size of their naupliar stages, little research has been conducted on evaluating the impact of multiple stressors on the lipid metabolism of these organisms. Depending on the students' interests in either development or climatic stressors the student will have the opportunity to design an experiment evaluating:

1. Lipids associated to stage-specific development
2. Energy allocation strategy in response to climate stressors (warming, algal food quality, ocean acidification, etc.)

This research will contribute to the PhD research of Robyn Sahota, with a specific focus on the evaluation of food quality and warming stressors on the *Calanus* lipid metabolism – and if their energy allocation strategies vary between more northern and southern species. Robyn is currently working in collaboration with NTNU SeaLab (Trondheim, Norway) and Plymouth Marine Laboratory (Plymouth, United Kingdom) for access to *C. finmarchicus* and *C. helgolandicus* respectively. Therefore, depending on the adult abundances (stage CVI) at the time of the experiment, this will dictate the species used.

This is a well-rounded project where the student will have the opportunity to interact and grow algae and copepods, design and conduct their own experiment, be involved in new research, and complete laboratory and statistical analyses in R. After undertaking a stage-specific or multi-stressor experiment, the student will have the opportunity to become familiarized with fatty acid and lipid class analysis, in addition to gene expression analysis associated to lipid metabolism.

Doelstelling:

The objective of this research is to determine the stage-specific controls on lipid metabolism OR the effect climate stressors have on the regulation of lipid metabolism in *Calanus* species resolved by means of fatty acid and lipid class analysis and differential gene expression of the associated enzymes controlling these pathways.

Locatie:

campus Sterre, Marine Biology Research Group, Building S8

30946: Living on the edge: Understanding the resilience of the brown seaweed *Dictyota dichotoma* towards heatwaves in a multi-stressor seascape

Promotor(en): Olivier De Clerck, Sofie Vranken
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Anthropogenic climate change is impacting ecosystems worldwide. As climate change proceeds, extreme events such as marine heatwaves are expected to

increase both in intensity and frequency. While there is a decent understanding of the impact of general temperature increase for a lot of organisms, the effect of short-term extreme events such as marine heat waves remains less well understood. Especially knowledge about the interaction effects of multiple environmental stressors is limited.

Doelstelling:

This master thesis will focus on unravelling the effect of marine heatwaves on the enigmatic seaweed *Dictyota dichotoma* using culture experiments. By focusing on multiple environmental variables (temperature, nutrients, light ...), the interaction effects among multiple stressors will be clarified. This thesis will use populations from various European locations (e.g., Atlantic, Mediterranean ...) and will identify how seaweeds from different localities vary in their resilience or vulnerability to marine heat waves in a multi-stressor seascape. The student conducting this research is expected to be able to work in a culture lab context and perform data analysis. In case the timing is right, the option to join fieldwork can be discussed.

Locatie:

Sterre S8, Ledeganck

Website:

Meer informatie op: phycology.ugent.be

Opmerkingen:

Topic in collaboration with University of the Mediterranean (Marseille)

30981: Living through a cataclysm: how to be a successful polyploid in a diploid world

Promotor(en):	Dries Bonte, Yves Van de Peer
Begeleider(s):	Silvija Milosavljević
Contactpersoon:	Silvija Milosavljević
Goedgekeurd voor:	Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:	
Nog onbeslist voor:	
Aantal studenten:	1
Aantal masterproeven:	1
Motivering voor deze opleiding:	

Probleemstelling:

Whole genome duplication (polyploidization) is the increase in chromosomal set size, arising mostly due to the fusion of unreduced gametes. Polyploid plants are widespread and extensively explored, but polyploidy is also found in animals, fungi and prokaryotes. Upon polyploidization, most commonly found change is the change in cell size and/or body size as most polyploids are larger than their diploid parents. This gives rise to the question of how metabolism must adapt to the new cellular conditions and how can newly formed polyploids survive and reproduce successfully while being surrounded by diploids. Being larger may confer advantage to the polyploids (for example, taller plants may escape the shade and be competitively superior), but may also be maladaptive (for example, larger plants may be more easily eaten by grazing animals). So these kind of trade-offs are central to understanding cost-benefit balances of polyploidization and ecological/evolutionary models are a great tool to explore when polyploids can be successful in nature. The genomic signature of polyploidy in extant species demonstrated occasional success, which seemed to coincide with periods of stress and environmental upheaval. For instance, it has been observed that many ancient WGDs in plants seem to cluster around the K/Pg boundary (around 66 million years ago great extinction event, triggered by a large meteorite impact). That suggests that polyploidy facilitated establishment - or could avoid extinction - during periods of environmental upheaval, making it interesting to think about in the light of the ongoing/future extinction events due to the global climate change we are facing. Having these ideas about polyploidy and related eco-evolutionary dynamics they may have in population/community settings, a systematic study on their emergence under gradients of stress needs to be conducted to further advance our mechanistic understanding of WGD success and failures in nature.

Doelstelling:

We try to answer questions on polyploid establishment and invasion using ecological modeling approach. This master's thesis will include learning how to make individual-based models, with focus on coding in Python and formulating hypotheses that can be answered by model modification and simulation. Although the focus of an existing model is plant asexual polyploids, during this thesis adapting the model to answer questions about sexually reproducing organisms and animal polyploidy is expected.

Locatie:

Campus Ledeganck, (VIB Plant Systems Biology in Technology Park)

30926: Long-term impact of offshore windfarms on macrobenthos communities

Promotor(en): Ulrike Braeckman
Begeleider(s):
Contactpersoon: Ulrike Braeckman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

In an effort to combat climate change, many coastal nations invest in renewable wind energy. Belgium was among the first in Europe to construct large offshore windfarms in the Belgian part of the North Sea. More than 15 years after installation, the underwater foundations of the wind turbines are colonized by sessile fauna such as mussels, anemones and amphipods that thrive on hard substrates that are usually a rare find in the sandbank system off the coast. Their organic deposits and detritus seem to fine and enrich the sediments around the turbines, supplying food for benthic infauna. The otherwise organic- and species poor sands seem to turn gradually into richer and finer sands that are inhabited by a more diverse infaunal community. When installed on species-poor sandbanks, the offshore windfarms seem to enhance benthic biodiversity, but the patterns are patchy and not well understood.

Doelstelling:

After 15 years of monitoring, the first phase of the monitoring programme comes to an end. With this thesis subject, you will contribute to the long-term insights on the changes in macrobenthos biodiversity as a result of the offshore wind farm presence, identifying the environmental factors that drive the observed biodiversity patterns .

The student will be integrated in the Marine Biology Research Group at UGent. The student can take part in the integrated sampling campaign with RV Belgica (11 days in October), collecting macrofauna samples in the offshore windfarms. In the lab, the work involves sorting macrofauna and identifying to species level. The effect of offshore windfarms on macrobenthos biodiversity will be explored statistically, making use of data on environmental and biotic drivers that have been collected in parallel with the macrobenthic samples.

Locatie:

campus Sterre S8

31003: Mapping mangrove vegetation and shoreline morphodynamics along the coastal fringe of Gazi Bay, Kenya

Promotor(en): Frieke Vancoillie, Tom Van Der Stokken
Begeleider(s): Tom Van Der Stokken
Contactpersoon: Frieke Vancoillie
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Mangrove forests are known for the broad range of ecosystem services they provide, including resources for local communities, coastal protection, and carbon sequestration and storage. As these forests thrive along the intertidal zone of tropical and subtropical regions, their development is linked to the physical processes operating in the coastal zone. Changes in depositional and erosional dynamics could have important implications for mangrove gain and losses. Understanding the local and regional processes that govern the spatial and temporal dynamics of mangrove forests is challenging due to complex interactions and various feedbacks.

Doelstelling:

In this study, we use timeseries of Sentinel imagery to characterize rates of mangrove cover change and shoreline morphodynamics along the coastal fringe of Gazi Bay, Kenya. We anticipate that results and insights from this study will be valuable for coastal management, particularly in the context of assessing coastal vulnerability, resilience and adaptation to environmental change.

Locatie:

Onderwerp voorbehouden voor iris Boey

30979: Mass-extinctions and Misfits: Fossil Teratologies through time

Promotor(en): Thijs Vandenbroucke
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Until recently, teratological (malformed) palynomorphs (organic walled microfossils) have been widely viewed as miscellaneous specimens with little scientific value. However, a number of recent high-profile studies are leading to a sea change in how we view these biological aberrations, abnormalities and misfits. Emerging data suggest that teratological palynomorphs are a ubiquitous feature of mass-extinction intervals and may be widespread during these upheavals in both the marine and terrestrial realm.

Teratological palynomorphs provide the potential of linking the marine and terrestrial realms as recorders of changing paleo-environmental conditions during the onset of mass extinctions. The supervisor's international HFSP project brings together international researchers (from Ghent, Nottingham, Utrecht and Berkeley) working on multiple aspects of teratologies in palynomorphs (including their morphology, geochemistry and modern analogues) to explore what information can be recovered from these X-files. This master's project will integrate with the research efforts of this new consortium and the student will be able to tailor the project to their particular interests in this topic.

Doelstelling:

This MSc project is part of an interdisciplinary research programme that will test a set of related hypotheses linking malformed palynomorphs to either: (i) metal toxicity related to marine anoxia (Hg, Cd, Ni, Pb), (ii) increased UV-B radiation due to ozone loss, or (iii) environmental stress related to climate change. We use these microfossils and their modern analogues in experimental and field settings to explore the true potential of teratology as a proxy to test, integrate, and refine the many existing models for biotic crises across time and space.

The MSc project will be tailored to the student's interest, with choices on testing our hypothesis of the predicted presence of malformations during ancient extinction events (e.g., in the Silurian, Triassic or Jurassic, linked to ongoing PhD research in the research group with field sites in the USA) or their modern equivalents in metal-polluted sites (e.g., the Houtdok area in Ghent, famous for its heavy metal pollution from the industrial revolution onwards).

Outcomes of this work will be publishable, and as a student, you will be trained how to best present your data in the form of a scientific paper or a presentation at an international meeting.

Locatie:

Campus Sterre: Research Group Palaeontology and Palaeo-environments (Dept. of Geology, UGent)

Opmerkingen:

(International) promotors/supervisors will be added in accordance with the expertise required once the student has chosen their preferred angle to the topic (time period, fossil work, modern equivalents ...)

31028: Microbial pelagic community structure and functioning in contrasting fjord systems in Greenland

Promotor(en): Koen Sabbe, Lorenz Meire
Begeleider(s): Marta Mikhno
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Fjords around Greenland are of regional and global importance. Regionally, these fjords support highly productive and diverse food webs, including fisheries. Globally, Arctic fjords in general play an important role as carbon sinks resulting in burial of large amounts of organic carbon in their sediments. Global warming significantly impacts these systems through the accelerated melting of the Greenland Ice Sheet with a doubling of annual ice mass loss between 2006 and 2012. This does not only increase total freshwater input into the fjords and other coastal ecosystems, but also leads to an accelerated retreat of coastal glaciers. Between 2000 and 2010, 90 % of the glaciers currently terminating in the sea (= marine-terminating glaciers, MTGs) showed an accelerated retreat, and in many parts of Greenland these glaciers will retreat above sea level in the near future to become land-terminating (LTG). There is increasing evidence that MTG and LTG have very different impacts on the fjord's ecosystems and biogeochemistry. It is hypothesized that while MTG stimulate primary production by microphytoplankton (> 20 µm) in the fjords, LTG lead to a decrease in primary production and a dominance of pico- and nanophytoplankton (< 20 µm), which is less efficiently taken up in food webs. This could lead to the collapse of highly productive fjord ecosystems. In this dissertation, we will test this hypothesis.

Doelstelling:

During the summer of 2023, two contrasting fjord systems (MTG vs LTG) in Greenland will for the first time be visited by the Belgian Research Vessel Belgica. An extensive set of pelagic samples will be taken which will be used to characterize pelagic community structure and functioning in these fjord systems. The MSc student will be involved in the analysis of microplankton community composition (based on pigments, DNA/RNA metabarcoding and imaging techniques). The data obtained will be then linked to variability in environmental parameters (inorganic nutrients, temperature, salinity, turbidity, ...) and functional features (such as primary production). Depending on progress, additional parameters such as marine gels/snow can be analyzed as well.

Locatie:

Sterre S8

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English. All the data will be analyzed using the software R, and an interest in acquiring bioinformatics skills is a necessity.

30974: Mind your fossils: total-evidence dating and biogeography of a pantropical plant family

Promotor(en): Lars Chatrou
Begeleider(s): Federico Fabriani
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Dated phylogenetic trees (i.e. chronograms) are fundamental tools in reconstructing the past natural history of organisms and therefore are widely employed in biogeographical and evolutionary studies. One critical aspect of molecular dating is the application of calibration points which are based on fossil records or past geological events, like continental splits and islands emergences. In the overwhelming majority of studies the application of calibration points is based on interpretation of the available fossil data by an expert and therefore it can be considered 'arbitrary'. An important consequence is that alternative interpretations of fossils and geological events can lead to very different estimates of the timing of past biological events (e.g. speciation events, colonization of new habitats, onset of adaptive radiations). Thus, subsequent analyses based on those results, like biogeographical reconstructions and evolutionary rate estimations, are subject to error propagation and will likely lead to biased conclusions. A method called 'total-evidence dating' offers the attractive perspective of a more objective application of calibration points by computing fossil placements using Bayesian analyses.

The Annonaceae is a family of basal angiosperm with pantropical distribution which has been the subject of several biogeographical studies focusing on how and when the family has achieved its current distribution. The ca 2500 species of Annonaceae are important elements of tropical rain forests, and reconstructing the evolution of these species teaches us a lot about the evolution of the rain forest biome. The availability of some well-documented fossil Annonaceae and a wealth of molecular data offers a unique opportunity to use a total-evidence approach to reconstruct the biogeographical history of this family. However, to date no study have adopted this approach, and this project is innovative in that respect.

Doelstelling:

In this project you will:

- Produce a first dated phylogeny of the Annonaceae family based on total-evidence approach.
- Reconstruction the biogeographical history (= ancestral area reconstruction) of representative clades.
- Estimate evolutionary rates in representative clades.
- Assess the impact of dating methods (total-evidence dating vs. node-dating) on node dates estimate, biogeographical reconstruction and evolutionary rates estimate.

This project will suit a student with a strong interest in evolution, phylogenetics and bioinformatics. The student will learn how to use a variety of software and programming languages. The output will be written in the form of a scientific article aiming to submit it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck

30958: Modeling habitat suitability in a cooperatively breeding bird in the Eastern Arc Mountains biodiversity hotspot

Promotor(en): Laurence Cousseau
Begeleider(s):
Contactpersoon: Laurence Cousseau
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Spatio-temporal variation in food availability is an important ecological driver of complex social systems. In response to global change, environmental conditions are predicted to become harsher and less predictable which can affect the cost-benefit balance of sociality. The cooperatively breeding placid greenbul (*Phyllastrephus placidus*) is facing rapid and strong anthropogenic challenges across the Eastern Arc Mountains (EAM) in Africa (i.e. habitat fragmentation and degradation, and climate change), which makes the species an ideal model system to study sociality under global change. However, it is currently unknown how food availability varies in space and time across the different regions of the EAM.

Doelstelling:

Ptilochronology reflects nutritional condition of individuals and can thus be used to predict large scale patterns of food availability. Based on known relationships between ptilochronology and habitat fragmentation and climatic conditions in the Taita Hills, the student will model habitat suitability for placid greenbuls across fragmented forests of the EAM.

Locatie:

campus Ledeganck

Onderwerp voorbehouden voor Valentijn Hermans

Deze masterproef werd reeds 1-maal toegekend!

30999: Natural Intelligence: wilding versus gardening of urban green

Promotor(en): Sander Jacobs
Begeleider(s):
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Empty plots or areas, in the city or elsewhere, often naturally evolve to multi-layered, complex and functional ecosystems. On the other hand, most urban green spots, especially small ones, are planted with monospecific green to minimize maintenance and for aesthetic reasons. In between these extremes, city parks or green spots are designed, planted and managed with varying degrees of spontaneity.

Doelstelling:

This thesis will verify whether spontaneity or 'wildness' is linked to the functional ecological quality of urban green, and how this trades off with desired uses, aesthetics, and maintenance costs. Local use, formal or informal, interacts with these spaces and ecosystems. New structures such as informal paths, are created despite the preconceived designs. The hypothesis, inspired by the concept of Natural Intelligence, is that self-developed urban socio-ecosystems

(including humans within them) are better adapted to the local context.

Locatie:

30883: Niet zeldzaam, maar toch bedreigd: een analyse van vlinders tot vogels op basis van Vlaamse Rode Lijsten

Promotor(en): Lander Baeten, Dirk Maes
Begeleider(s):
Contactpersoon: Lander Baeten
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Internationale rapporten trekken aan de alarmbel over de toestand van de globale biodiversiteit. Het IPBES berekende bijvoorbeeld dat in de meeste soortgroepen ongeveer 25% van de soorten met uitsterven bedreigd zijn. Maar over welke soorten gaat het vooral? Als we weten welke soorten de hoogste kans op uitsterven hebben, dan kunnen we daar een gericht beleid en beheer naar voeren. Rode Lijsten geven aan wat de kans op uitsterven van een soort is in een bepaalde regio. De lijsten zijn zo een belangrijk handvat voor beleid en beheer. Voor Vlaanderen werd er intussen voor ca. 20 soortgroepen en >3000 soorten bepaald hoe ze ervoor staan. Op al deze gegevens kunnen we nu een synthese maken over taxonomische groepen heen. Van planten, over vlinders, tot vogels.

Doelstelling:

In deze thesis mobiliseren en integreren we gegevens van verschillende databronnen, zoals GBIF en lokale databanken. Er zijn veel boeiende en opgeloste vragen te beantwoorden met deze massa gegevens die beschikbaar zijn. Welke soorten zijn in Vlaanderen bedreigd, maar toch niet zeldzaam als we naar Europa kijken? Moeten we hier dan wel een doorgedreven beheer voor voeren? Maar ook omgedraaid: welke soorten doen het in Europa niet goed en zijn in Vlaanderen nog goed vertegenwoordigd? Zijn de bedreigde soorten typisch soorten die heel kieskeurig zijn in hun leefgebied? Deze thesis loopt in samenwerking met het INBO. Zij coördineren de opmaak van de Rode Lijsten voor Vlaanderen.

Locatie:

Samenwerking met bedrijf of non-profit organisatie

Bedrijf: INBO
Samenwerking: promotor

30994: Noord-Aziatische modderkruiper in Vlaanderen, waar zitten ze, wat drijft hen en wat betekenen ze voor het voortbestaan van grote modderkruiper?

Promotor(en): Sander Jacobs
Begeleider(s): Jeroen Vanwichelen
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Sinds 2019 is de invasieve Noord-Aziatische modderkruiper vanuit Nederland aan een opmars bezig in het stroomgebied van de Lossing (Molenbeersel), een van de laatste vindplaatsen van grote modderkruiper in Vlaanderen. Een beheerprogramma dringt zich op maar ecologische gegevens van deze slechts zelden bestudeerde vis ontbreken grotendeels, wat de risicobeoordeling voor deze IAS en de efficiëntie van het beheerprogramma belemmert.

Doelstelling:

Hiertoe zullen gegevens over (eDNA) verspreiding, populatiestructuur, mobiliteit, vruchtbaarheid en dieet worden verzameld en geanalyseerd op basis van watermonsters en gevangen individuen uit het geïnfesteerde gebied.

Locatie:

Deze masterproef werd reeds 1-maal toegekend!

30951: Population genomics of the red alga *Porphyra umbilicalis*: Enhancing understanding of population identity, connectivity and life history strategies

Promotor(en): Olivier De Clerck, Jessica Knoop
Begeleider(s): Sofie Vranken
Contactpersoon: Jessica Knoop
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie, Master of Science in Biochemistry and Biotechnology
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The red alga *Porphyra umbilicalis* belongs to the bladed Bangiales, which forms the base of extensive aquaculture in South-East Asia for Nori production – an essential ingredient for sushi. As typical for bladed Bangiales, *P. umbilicalis* has a complex life cycle consisting of two different life history stages – the macroscopic gametophyte (blade phase) and the microscopic sporophyte (conchocelis phase). Furthermore, gametophyte can be bypassed by an asexual life cycle where spores released from the blade phase directly develop into young blades. Both life histories (asexual and sexual reproduction) have been observed in wild populations from Northern France, Belgium and The Netherlands. However, crossing between asexual and sexual strains has not been observed in the lab so far. With the help of population genomics, this thesis project aims to characterize patterns of genomic variation and investigate whether crossing between sexual and asexual strains occurs in natural populations. Different populations of *P. umbilicalis* will be genotyped via whole genome resequencing and genomics patterns will be compared within and between populations. This research will mainly involve work in the molecular lab and genomic data analysis.

Doelstelling:

Locatie:

Ghent University, Campus Sterre, Campus Ledeganck

30983: Resolving phylogenetic relationships in a clade of South and Central American rain forest trees

Promotor(en): Lars Chatrou
Begeleider(s): Jenifer C. Lopes
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The application of phylogenetic trees has revolutionized the field of botany in the past 30 years or so. For a long time, chloroplast markers have been the most widely used type of data to infer phylogenies. With phylogenies, based on chloroplast DNA sequence data, all kinds of fascinating questions have been addressed, for example related to ecology, biogeography, molecular evolution, or the evolution of life history features. The application of next generation sequencing techniques is particularly exciting for plant phylogenetics. Using a relatively cheap sequencing approach called genome skimming, it is possible to routinely generate genomic data from all three plant genomes, so not just from the chloroplasts only. An ongoing project on a genus of South and Central American tropical trees has demonstrated the value of a genome skimming approach, even when sequencing from herbarium material. So far, this project has revealed something remarkable: the phylogeny based on chloroplast data is in strong conflict with the phylogenies based on nuclear and mitochondrial data. The most probable explanation so far is an old hybridization event that facilitated chloroplast capture. This is how far we have got, and you can take this project further.

What tree species are we talking about? The project focuses on the tribe Malmeeae, which belongs to the soursop family, with the scientific name Annonaceae. The Annonaceae consist of roughly 2500 species of trees and lianas, almost exclusively confined to wet tropical rain forests on all continents. You may know the delicious fruit of *Annona muricata*, 'zuurzak' in Dutch, or the enticing smell of *Cananga odorata*, better known as ylang-ylang, both of which are species of this family. The tribe Malmeeae consists of twelve genera with ca 180 species, that range from tiny treelets to large trees up to 50 m.

They occur from Mexico down to the Atlantic rain forests of Brazil, with many species having their home in the Amazon. One of the genera in this tribe is *Oxandra* with 27 species. Interestingly, this genus is polyphyletic when considering phylogenetic trees based on chloroplast data. Nuclear and mitochondrial data, on the other hand, indicate that most species of *Oxandra* are monophyletic, that is, did evolve from a single common ancestor.

The phylogenetic context of *Oxandra* has not been resolved sufficiently. In other words, more data are needed from the other genera in the tribe to answer some interesting biological questions. Especially the genera *Unonopsis*, *Pseudoxandra* and *Crematosperma* are undersampled in the data set we have gathered so far. The main questions are related to biogeography (what is the center of origin of tribe Malmeeae?) and to reproductive systems (how many times has androdioecy evolved within the tribe?).

Doelstelling:

Questions that you will focus on in your project are:

- Does the resolution of the phylogeny of tribe Malmeeae improve with the addition of species of *Unonopsis*, *Pseudoxandra* and *Crematosperma*?
- How often has androdioecy evolved in tribe Malmeeae?
- What is the biogeographic origin of the tribe?

Techniques that you will use are:

- laboratory techniques: high throughput sequencing, involving DNA isolation, DNA library preparation, and sequencing (genome skimming)
- bioinformatics: data assembly and annotation
- phylogenetics: aligning, likelihood and Bayesian phylogenetics, optimization of biogeographic and life history characters.

This project will suit a student with a strong interest in evolution, phylogenetics and bioinformatics. The student will use a variety of techniques from DNA extraction to bioinformatics. The student is expected to be passionate about the project, to have a proactive mindset, and to be able to work independently. The supervisors will provide all necessary guidance and training needed. The output will be written in the form of a scientific article in the aim of submitting it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck

Onderwerp voorbehouden voor Gerlinde Van Hecke

Deze masterproef werd reeds 1-maal toegekend!

31034: Revision of sequenced fungarium specimens of *Lactifluus*: morphology, analysis of amplicon sequence data, and linkage to ecology

Promotor(en): Annemieke Verbeken, Danny Haelewaters
Begeleider(s): Bobby Sulisty, Annemieke Verbeken, Danny Haelewaters
Contactpersoon: Annemieke Verbeken
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Background

It has been estimated that nearly 75% of the earth's biodiversity is already collected and present in biological collections around the world. These include zoological collections, herbaria, and fungaria. With respect to the kingdom of Fungi, researchers have described approximately 148,000 species of fungi since the start of modern mycology in 1737. However, this only represents about 2.5–6.7% of the estimated diversity in the kingdom. At least part of this dazzling undescribed fungal diversity is likely already present in our fungaria.

DNA barcoding is a modern tool to detect species diversity—and thus to discover undescribed species—faster and more accurately. Researchers identified the internal transcribed spacer (ITS) region of the ribosomal DNA as the universal barcode of fungi. For the majority of fungi, the interspecific variation within ITS exceeds the intraspecific variation. Other secondary barcode regions, such as the second largest subunit of RNA polymerase II gene (RPB2), have been developed for certain groups of fungi for which ITS is difficult to amplify. Such secondary barcodes may be equally good or better in delimiting species compared to ITS.

Problems

Lactifluus is a genus of milkcaps. Approximately 25% of the known milkcaps, about 150 species, belong to this genus. *Lactifluus* is most diversified in the tropics, especially in Africa and Asia. Members of Russulaceae, Russulales, species of *Lactifluus* form ectomycorrhizal associations with host plants in the

following families: Dipterocarpaceae, Fabaceae, Fagaceae, Myrtaceae, and Phyllanthaceae. A previous study sequenced *Lactifluus* specimens from the Herbarium Universitatis Gandavensis. This work resulted in good-quality ITS and RPB2 sequences for some 60 specimens. Analysis of these sequences seems to suggest that at least some of the herbarium specimens may be inaccurately identified—potentially harboring undescribed species.

Doelstelling:

The goal of this project is to revise species names of the sequenced herbarium collections of *Lactifluus*. Sequences will be added to a curated dataset of *Lactifluus* to help with identification. The morphology of herbarium specimens will also be studied using stereoscope and light microscope. Material not matching existing species will be formally described following best practices in the field. Finally, there will be the option to link specimens with miombo woodland soil sequences—to further our understanding of the ecology and host associations of these understudied fungi.

Locatie:

Campus Ledeganck

Website:

Meer informatie op: www.dannyhaelewaters.com/research/student-research/

31005: Role of citizen science for urban green mapping

Promotor(en): Sander Jacobs
Begeleider(s): Toon Spanhove
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Nature lovers and species experts often have an enormous knowledge on the nature nearby their homes. Just by frequently going outside, they know all corners of their favourite city park or know exactly which species grow in the road verges. With this thesis, we want to explore how we can integrate citizen knowledge in some policy-relevant maps, such as the biological valuation map or an urban green map. To what extent can widely-used systems such as waarnemingen.be be explored to improve the maps? Do we need to build new tools? What motivates people to collect data? What kind of information is easily passed, and what is not? And are there pitfalls in such a citizen-science based system?

Doelstelling:

This thesis proposal must be seen as the initial scope for a thesis. The specific research questions and methods still need to be refined, based on the interest and the expertise of the student.

Locatie:

31029: Seasonal dynamics of microplanktonic communities in the Belgian Part of the North Sea

Promotor(en): Koen Sabbe, Maarten De Rijcke
Begeleider(s): Auria Kallend, Jens Dujardin
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Until the 1980s-90s, the Belgian part of the North Sea (BPNS) was impacted by heavy eutrophication, due to intense agriculture and urbanisation in the

Scheldt river basin. This led to harmful algal blooms (HABs) which are composed of species that are very competitive under high nutrient concentrations. Subsequent regulations of fertiliser use and sewage water disposal since the 1990s resulted in decreases in nitrogen (N) and phosphate (P) concentrations. However, these changes in N and P concentrations, and the resulting N:P ratios, over relatively short periods of time have an impact on the composition of the phytoplanktonic communities, which further affects the composition of mixo- and heterotrophic microplankton. Furthermore, as the succession of species unfolds throughout the year, the uptake by each species keeps lowering nutrient concentrations and reshaping their ratios. Microplankton community composition has a significant impact in trophic interactions and hence carbon flows and biogeochemical cycles in the North Sea.

Doelstelling:

This thesis aims at contributing to our knowledge of the seasonal dynamics in microplankton community structure in the BPNS in relation to variation in the environment. During monthly Belgica campaigns over the course of 2022 and 2023, water samples for identification of the microplanktonic community have been taken along the tidal cycle in 3 different stations. The student will learn to identify the common species in the North Sea microplankton, and will carry out microplankton counts using a FlowCam (located at Flanders Marine Institute (VLIZ), Ostend), as well as light microscopy for identification confirmation. The FlowCam is an imaging device for particles of size 20 to 200µm, allowing to take pictures of the microplanktonic cells (and other particles) for qualitative (identification) and quantitative (counts) analysis. These counts will then be subjected to image analysis and statistically interpreted in relation to environmental (nutrients, temperature, etc.) and biological (pigment data, eDNA data, zooplankton community composition) variables, which in turn will be used to model the community composition as a function of environmental parameters.

The thesis will contribute to the BG-PART project, which is coordinated by the Royal Belgian Institute of Natural Sciences (RBINS), Operational Directorate 'Natural Environment' (OD Nature), with Ghent University (UGent, Protistology & Aquatic Ecology Lab) and the Flanders Marine Institute (VLIZ) as partners.

Locatie:

Sterre S8 and Vlaams Instituut voor de Zee (VLIZ, Ostend)

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English.

31030: Seasonal dynamics of the zooplanktonic community in the Belgian Part of the North Sea

Promotor(en): Wim Vyverman, Maarten De Rijcke
Begeleider(s): Jens Dujardin, Auria Kallend
Contactpersoon: Wim Vyverman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Until the 1980s-90s, the Belgian part of the North Sea (BPNS) was under heavy eutrophication, due to intense agriculture and urbanisation in the watershed of the Scheldt river. This eutrophication caused an increase in the overall phytoplankton biomass and shifts in their community structure to favour species that are competitive under high nutrient conditions. These changes also affected the zooplankton community and cascaded through the food web affecting fish recruitment etc. Regulation of fertilisers use and sewage water disposal since the 1990s led to lower nutrient concentrations. This in turn again caused changes in phytoplankton biomass and composition with cascading effects on the rest of the food web. Furthermore, the succession of phytoplankton species throughout the year changes prey availability and quality for the zooplankton community, potentially causing major changes in the zooplankton community composition.

Doelstelling:

This thesis aims at contributing to our knowledge of the seasonal dynamics in zooplankton community structure in the BPNS in relation to variation in the environment. During monthly campaigns over the course of 2022 and 2023, water samples for identification of the zooplanktonic community have been taken along the tidal cycle in 3 different stations. The student will learn to identify the common species in the North Sea zooplankton community, and will carry out zooplankton counts and identification using a ZooScan (located at VLIZ, Oostende). The ZooScan is an imaging device for larger planktonic particles, allowing to take pictures of the zooplankton found in a sample for qualitative (identification) and quantitative (counts) analysis. These counts will then be statistically interpreted in relation to environmental (nutrients, temperature, etc.) and biological (phytoplankton counts, pigment data, eDNA data) variables.

The thesis will contribute to the BG-PART project, which is coordinated by the Royal Belgian Institute of Natural Sciences (RBINS), Operational Directorate

'Natural Environment' (OD Nature), with Ghent University (UGent, Protistology & Aquatic Ecology Lab) and the Flanders Marine Institute (VLIZ) as partners.

Locatie:

Vlaams Instituut voor de Zee (VLIZ, Ostend) and Sterre S8

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English.

30971: Short-term survival of coastal breeding gulls under urban sprawl: are there fitness costs associated with captive breeding?

Promotor(en): Luc Lens, Frederick Verbruggen
Begeleider(s): Reinoud Allaert
Contactpersoon: Reinoud Allaert
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

As part of scientific or conservation projects, eggs in danger of being lost or deliberately removed to avoid nuisance, are often hatched in wildlife rescue centres for subsequent release at the juvenile stage. There is, however, a growing concern that such practices are associated with phenotypic or fitness costs (e.g. The phenotypic costs of captivity, *Biological Reviews*, doi: 10.1111/brv.12913). Thus, for captive breeding programs to be successful, there is a need for further monitoring of release experiments.

Doelstelling:

Due to a steady increase in ground predators and loss of suitable breeding habitat, Herring Gulls (*Larus argentatus*) and Lesser Black-backed Gulls (*L. fuscus*) are increasingly breeding in urbanised areas. This sometimes leads to human-wildlife conflicts and the controlled removal of eggs. As part of a long-term research project on animal cognition jointly conducted by experimental psychologists and biologists, eggs of both species removed annually from Flemish coastal villages are hatched at the Wildlife Rescue Centre Ostend, and the chicks take part in various behavioural experiments. After these experiments, the young birds are banded and released back into the wild. In addition to these hand-raised chicks, around 600 chicks brought to the WRC each year for rehabilitation are also raised, banded and released. Finally, along the Flemish coast, chicks from natural colonies are also being banded as part of long-term research programs. This results in a unique dataset of three groups of fledged chicks along a gradient of natural development.

In this master thesis, the short-term survival of all these colour-banded fledglings will be analysed and compared between the three groups. This is possible because a dense network of volunteers provides a large number of observations of colour-banded birds, all stored in a database managed by the Institute for Nature and Forest Research. The student's main task will be to retrieve, document and model all available release-resighting data. If interested, the student may also go into the field and supplement the sighting database with his/her own observations (optional).

Locatie:

campus Ledeganck, VOC Oostende

Deze masterproef werd reeds 1-maal toegekend!

31840: Skin galactose content in salamander skin

Promotor(en): An Martel
Begeleider(s):
Contactpersoon: An Martel
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Host susceptibility to chytridiomycosis correlates with the skin glycosylation pattern of salamanders. The cutaneous galactose content can predict variation in intensity of *Batrachochytrium salamandrivorans* (Bsal) colonization between amphibian species. Galactose acts as a receptor for Bsal and induces fungal virulence mechanisms that promote colonization. In the hypersusceptible host species, galactose is abundantly and uniformly present in the glycoproteins of keratinocytes (epidermal cells). In host species with a variable response to infection, the galactose content varies strongly between individuals of the same species. It is currently not known if the glycosylation pattern of the skin is stable over time and if it can be linked with Bsal colonization intensity at individual level (currently only known at species level)

Doelstelling:

Temporal dynamics of the glycosylation pattern of the skin will be studied in newts (*Ichthyosaura alpestris*). In minimal invasive skin biopsies the galactose content will be determined using RCA stainings. Individual glycosylation patterns will be linked with Bsal colonization by exposing the newts at the end of the trial to Bsal following a routine infection protocol (10^3 zoospores per animal and subsequent individual housing).

Locatie:

Onderwerp voorbehouden voor Emma So Jeong Yoon

Deze masterproef werd reeds 1-maal toegekend!

30993: Socio-ecologische karakterisering van LTSER onderzoeksplatformen aan de hand van eLTER standard observations

Promotor(en): Sander Jacobs
Begeleider(s): Nathalie Cools
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Het lange termijn ecologisch onderzoeksnetwerk in België (LTER-Belgium) omvat enkele zo genaamde 'lange-termijn socio-ecologische onderzoeksplatformen (LTSER)' (zie DEIMS.org). In tegenstelling tot de kleinere lange-termijn onderzoekssites, dienen deze platformen ook op socio-ecologische manier gekarakteriseerd te worden. Dit wordt jouw uitdaging!

Doelstelling:

Hiervoor zal je de toepasbaarheid van de lijst van de eLTER Standard Observations van de Europese eLTER onderzoeksinfrastructuur (<https://www.elter-ri.eu/>) op de Vlaamse LTSER platformen evalueren.

Locatie:

VAC Herman Teirlinck, Brussel

30973: Spatial ecology of strandline species on the Belgian coast: population dynamics and habitat characteristics

Promotor(en): Dries Bonte
Begeleider(s): Charlotte Taelman
Contactpersoon: Charlotte Taelman
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Strandline species (in Dutch "vloedmerksoorten") form communities of plants right above the shoreline on the beach. They are capable of forming small dunes - often referred to as embryo dunes or shadow dunes - in front of the larger foredunes that consist mainly of marram grass (*C. arenaria*). These

communities consist of a handful of species that are highly adapted to the exposed and harsh conditions on the forebeach.



In contrast to the heavily studied species marram grass, the ecology of strandline species is not very well known. The preferences of these species for soil characteristics, the potential for dune development, their habitat conditions, and their spatiotemporal dynamics remain to a large extent unknown.

Doelstelling:

The student will gather data on these strandline species through fieldwork in the summer months. These data will be used to study the presence and dynamics of the species in time and space, and infer their relation to the habitat characteristics (soil, urbanisation, beach morphology ...). A part of the data analysis will involve learning how to use GIS software (QGIS). This is a powerful tool for ecologists to handle geographic data and perform spatial analyses and is demanded as a skill in most jobs in Biology.

The purpose of the thesis is to understand where these species are present the most, how we can predict their presence based on the environmental characteristics, and translate this into management measures to ensure the existence of suitable spaces for these dune pioneer species.

Locatie:

campus Ledeganck, Belgian coast

31041: Stem cell maintenance versus cell differentiation in the maize shoot apex

Promotor(en): Hilde Nelissen
Begeleider(s):
Contactpersoon: Timothy Villers
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Plant morphogenesis determines the plant's shape and structure by controlling tissue growth, patterning and cell differentiation. During these overlapping developmental processes, meristematic cells differentiate into specific cell types, that subsequently grow to make up tissues and organs. In plant meristems such as the shoot apical meristem (SAM) and floral meristems of maize, the expression of *KNOTTED1* (*KN1*), is restricted to the meristematic cells in apical meristems and absent from lateral organs. This sharp delineation of the *KN1* expression impedes the understanding of its function as switch between indeterminate to determinate cell fates which is thought to be spatiotemporally regulated. Recently, our team showed that gradients of *KN1*, *PLASTOCHRON1* (*PLA1*) and *GROWTH- REGULATING FACTOR* (*GRF*) *INTERACTING FACTOR1* (*GIF1*) expression define the developmental trajectory from meristematic to (early) differentiating cells using the targeted spatial transcriptomics approach called Molecular Cartography. Using double mutant analysis and spatial transcriptomics on mutants, we show that bidirectional signaling between *PLA1* and *GIF1* in developing primordia and meristematic cells, pointing towards the existence of a signaling center that maintains the balance between meristems size and lateral organ outgrowth.

Doelstelling:

During the project, we will further study this newly identified "signaling center" through the following approaches:

- Analysis of the canonical "organizing center" consisting of *CLAVATA* and *WUSCHEL* in *Arabidopsis*. 1. In situ hybridizations with probes for the

- orthologous genes in the maize mutants, 2. Spatial transcriptomics with a probeset containing PLA1, GIF1, KN1, CLAVATA and WUSHEL homologs.
- Analysis of the highly specific expression of PLA1. Maize lines were generated in which the regulatory sequences of PLA1 were perturbed using multiplex CRISPR/Cas9. Several of these lines show pla1 mutant or PLA1 overexpression phenotypes, meaning that regulatory sequences were disturbed. 1. Genotyping and phenotyping the lines, 2. Validating the regulatory sequence with genome editing (not multiplex), 3. Determine the transcription factor binding to the regulatory element.
 - Hormonal influence. Empirical data suggest the involvement of phytohormones into the regulation of organ differentiation. 1. Cross hormone markers into the pla1 and gif1 mutants, genotype and compare to wildtype, 2. Analyze (spatial) transcriptome datasets that our team acquired: hormonal genes in the SAM (spatial) and transcriptome shortly after transcriptional activation of PLA1 (bulk RNAseq).

Techniques: genetics, genotyping, data analysis, phenotyping experiment, in situ hybridizations

Locatie:

Onderwerp voorbehouden voor Samantha De Gottal

Deze masterproef werd reeds 1-maal toegekend!

31017: Substrate-mediated interactions between diatom and bacteria in intertidal marine biofilms

Promotor(en): Koen Sabbe, Wim Vyverman
Begeleider(s): Yeseren Kayacan
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The surface layers of intertidal marine sediments are inhabited by highly productive biofilms. These consist of complex consortia of microalgae, bacteria, protozoa and microbial invertebrates, embedded in a matrix of extracellular polymeric substances (EPS) which are mainly secreted by the microalgae. While in the past, it was usually assumed that the diversity and community structure of these biofilms was mainly driven by the abiotic environment (e.g. nutrients, salinity, hydrodynamics), it is now becoming increasingly clear that interactions between the biofilm inhabitants also have a major impact on community assembly and functioning. In this thesis, we will focus on interactions between microalgae (diatoms) and bacteria. More specifically, we will investigate to what degree EPS secreted by the diatoms affects the structuring and functioning of the biofilm through such interactions. We hypothesize that specialized and species-specific production and consumption of EPS will facilitate complementarity and hence the high diversity and functional performance of the diatom-bacteria biofilms.

Doelstelling:

Ecophysiological experiments will be set up using different diatom and bacterial isolates and/or natural communities to assess (1) to what degree differences in EPS production between diatoms affect bacterial growth and composition, (2) whether different bacterial species consume different fractions of the EPS matrix, and/or (3) how the presence of different bacteria affects diatom fitness. Additionally, the effect of nutrient limitation, specifically phosphate starvation, on diatom growth and EPS production will be determined, and how this affects diatom-bacteria interactions. Several species and/or strains will be cultivated axenically under varying phosphate levels, and growth of diatom cultures and EPS production will be determined. The student will be trained in designing and executing experiments with algal cultures, the use of Pulse Amplitude Modulated (PAM) fluorometry, microplate reader, and EPS analysis.

Locatie:

Sterre S8

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English.

31035: Taxonomy, phylogenetics and floral scent analysis in East African species of Ipomoea

Promotor(en): Lars Chatrou, Ana Rita Giraldes Simoes
Begeleider(s): Samuel Paul Kagame

Contactpersoon:

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Convolvulaceae, a family of ca. 2000 species in 60 genera, is distributed across tropical and temperate regions. *Ipomoea* L. stands as the largest genus of Convolvulaceae, comprising a third of the total Convolvulaceae species (659 species). Phylogenetic analyses based on morphology and plastid sequence data showed that *Ipomoea* is polyphyletic, with ten other genera nested within it.

A paper in 2019 published the most comprehensively sampled phylogenetic analysis of tribe Ipomoeae so far, with over 1200 accessions for which the internal described spacer (ITS), a small part of the nuclear rDNA, was sequenced. Facing the paraphyletic nature of the genus *Ipomoea*, the authors synonymized all other genera in the tribe into *Ipomoea*, thus creating an even larger genus of ca 900 species. As a result, the remaining nine genera disappeared, which has caused concern amongst many botanists, especially as many of these nine genera have distinctive fruit morphologies.

Rather than creating a very large genus with ca 900 species, an alternative solution would be to recognize a more limited *Ipomoea*, and continue to recognize the remaining nine genera. Having said that, this is a daunting task because of the number of species. Advancing phylogenetic resolution and taxonomic decision-making in tribe Ipomoeae can be done in a piecemeal fashion, subsequently solving part of the phylogenetic relationships within the tribe and gradually improve its classification. This can be done using the ITS tree as a framework, and study selected clades in detail.

One such clade is the subject of the MSc project, and contains just over ten African species of *Ipomoea*, including *I. longituba*. Many, and perhaps all, of the species in this clade differ from most other species of *Ipomoea* in their flower morphology. The white corolla has a long tube, and at anthesis the flowers produce a sweet-spicy odour. Flowering starts at dusk, and hawkmoths are attracted by the floral scent.

In this project you will dive into the systematics of this group, revise species boundaries and analyse the floral scent of some Kenyan species.

Doelstelling:

- Study herbarium specimens of the species in the *Ipomoea longituba* clade and revise the taxonomy of the species.
- Study the Kenyan species in the field in support of the taxonomic revision.
- Collect leaf material for DNA extraction and sequencing of ITS, to be added to the existing ITS database. Perform phylogenetic analyses using this database to infer relationships among the species.
- Collect scent samples of *Ipomoea longituba* and if possible of other species of *Ipomoea* too.
- Analyse the organic compounds that make up the floral bouquet using GC-MS.

This project will suit a student with a strong interest in the natural history of plants and taxonomy. The student will do field work, and learn how to use a variety of lab techniques and software packages. The output will be written in the form of a scientific article aiming to submit it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck, campus Sterre

Onderwerp voorbehouden voor Marie Declercq

Deze masterproef werd reeds 1-maal toegekend!

30943: The demographic causes underlying toad population decline

Promotor(en): Dries Bonte

Begeleider(s):

Contactpersoon: Dries Bonte

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Amphibian declines are emblematic for the sixth mass extinction. The European common toad (*Bufo bufo*) is the archetypal toad in European culture. The species has a very wide range and is present in a variety of habitats, including those from agricultural landscapes. While its situation was still assessed as stable in 2009 by IUCN, the species has undergone recent, widespread declines. These declines have gained relatively little attention. Toad migration data of Natuurpunt show a decrease of migrating toads of at least 25% compared to the populations' long term (at least 10 years) averages.

Understanding the causes of toad decline is key in designing measures to avert further biodiversity loss. Any factor negatively affecting the performance and fitness of any of the toad life stages (aquatic tadpole, metamorphosis and juveniles, adults) and resulting in reduced recruitment and survival may be relevant. Which life stage(s) and/or life trait(s) are affected, is not known.

Doelstelling:

The MSc-student will compare demographic and movement parameter among populations that show different rates of decline. The research may involve field, lab work as well as demographic modeling.

Locatie:

Onderwerp voorbehouden voor Henri Rommel

Deze masterproef werd reeds 1-maal toegekend!

30972: The devil is in the details: can leaf micromorphology help to resolve the taxonomy and evolution of Amazonian rubber trees?

Promotor(en): Lars Chatrou
Begeleider(s): Federico Fabriani
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The genus *Hevea* contains ten species of trees native to the Amazon basin, including the (in-)famous *Hevea brasiliensis*, the world's main source of natural rubber which has been described as "the tree that changed the world in one century". Thousands of people in tropical countries around the world base their livelihood on rubber plantations. Also, rubber constitutes a valuable non-timber forest product (NTFP) that can empower people to protect the Amazon rainforest. Besides its economic, historical and social importance, the genus *Hevea* has a considerable ecological value since its species are among the top 10 most common tree species in the Amazon basin and can be found in all the main vegetation types present in this biome, ranging from terra firme rainforests to savanna and inundated river banks. For this reason, *Hevea* is a good model to study how Amazonia, the most species diverse biome on the planet, has evolved through time and how it reached its current high levels of diversity.

The current taxonomic system of the genus is exclusively based on floral characters resulting in hundreds of plant collections that cannot be reliably identified to species. This severely endangers our ability to identify new varieties and species that could potentially have economic importance in a world of a changing climate. A better identification system based on leaf micromorphological characters would facilitate the study of the evolution of Amazonian plants, could give us important insights on how this biome may react to naturally occurring and man-induced climate change.

Doelstelling:

During a recent taxonomic revision of the genus, occasional observations pointed to leaf micromorphology as a source of potentially informative characters for species delimitation within the genus *Hevea*. A preliminary survey seemed to confirm this intuition, but further data are required to validate this hypothesis. Those morphological data will also be paired with ecological data and unpublished genomic data in a phylogenetic framework to infer the ecological evolution of the genus *Hevea* within the Amazon basin.

- Survey micromorphological characters using microscopy techniques on (already available) representative leaf material of *Hevea*
- Describe the surveyed diversity by defining discrete and continuous micromorphological characters and enter character states in a matrix
- Reconstruct phylogenetic relationships of *Hevea* species using (already available and unpublished) genomic data
- Test phylogenetic signal of leaf micromorphology
- Produce identification tools of *Hevea* species from vegetative characters
- Gather information about species' ecological preferences
- Link single or a combination of characters to species' ecology
- Reconstruct character evolution and/or niche evolution of the genus *Hevea*

This project will suit a student with a strong interest in evolution, phylogenetics and bioinformatics. The student will use a variety of techniques from microscopy to data-mining to bioinformatics. The student is expected to be passionate about the project, to have a proactive mindset, and to be able to work independently. The supervisors will provide all necessary guidance and training needed. The output will be written in the form of a scientific article in the

aim of submitting it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck

30939: The effectiveness of Natura 2000 networks for the conservation of insects under climate change

Promotor(en): Dries Bonte, Dirk Maes
Begeleider(s): Garben Logghe
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

To survive under climate change, species will need to adapt or accommodate to the new environmental conditions, or track their niche along the moving climate window. Local and regional conservation strategies are being developed at the European level in the Natura 2000 network to improve local habitat quality via nature management and the restoration of connectivity among these critical habitats along the principal climate change gradients. Given the documented dramatic insect decline in Europe, an arthropod-centered view on such connectivity conservation and restoration is highly needed.

Doelstelling:

The student will connect life history traits of a (to be specified) group of grassland arthropods by means of extensive field work and the compilation of existing data. Based on these data, connectivity models will be developed to test to which degree the changes in species assemblages are expected in habitats that are organised in the European Natura 2000 network. The project will specifically aim to quantify how connectivity can be optimised for insects of conservation concern

Locatie:

campus Ledeganck; veldwerk

Website:

Meer informatie op: www.ecology.ugent.be/terec/people/garben-logghe/

Onderwerp voorbehouden voor Zaya Lips

Deze masterproef werd reeds 1-maal toegekend!

30988: The evolution of floral scent in tropical rain forest trees

Promotor(en): Lars Chatrou, Kate Goodrich
Begeleider(s): Luiz Fonseca
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Flowering plants dominate tropical ecosystems, and in many cases these plants require their pollen to be moved via a pollinator such as a bee, beetle, or butterfly, to the flowers of another individual plant of the same species in order to successfully reproduce. This is no small feat in a tropical rain forest. Plants are densely packed together, yet due to the incredible biodiversity and heterogeneity of plant communities of tropical forests, individuals of the same species may be separated by many meters and other plant species. Flowers use combinations of visual and olfactory cues to attract and manipulate insects as pollinators. In the low and variable light within and below the canopy of the rain forest, olfactory chemical cues (floral odour) play a particularly important role in attracting appropriate pollinators. Very little is known about the chemical composition of floral odours for species of Annonaceae, a family of tropical rain forest trees and lianas. The majority of the species which have had their floral scent described by human perception in the literature are

described as sweetly fruity or as ripe, rotten, or fermented fruit. The fruity odour of a number of species has been linked to attraction of beetle pollinators, with the general assumption being that these fruity, fermented odours mimic actual rotting fruits, duping the beetle pollinators into visiting the flowers while in search of brood sites. A line of research has started recently in the Systematic and Evolutionary Botany lab, and you can be part of that. This project offers the possibility to do fieldwork on Madagascar, and sample the floral scent of several species Annonaceae. At Ghent University, these scent samples will be analysed and interpreted.

Doelstelling:

The goal is to learn several techniques for sampling and analysing the volatile organic compounds that make up floral scents. Also, you will acquire experience with analytical tools to analyse the data in a phylogenetic context. These techniques involve:

- Headspace sampling of floral scent
- Gas chromatography–mass spectrometry (GC-MS)
- Transformation of volatile organic compounds into characters for evolutionary analysis.
- Phylogenetic methods

This project will suit a student with an analytical mindset and a strong interest in evolution and flower ecology. The student will learn how to use a variety of lab techniques, analytical tools and concepts. The output will be written in the form of a scientific article aiming to submit it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck, campus Sterre

Onderwerp voorbehouden voor Lies Desmet

Deze masterproef werd reeds 1-maal toegekend!

31012: The functional potential and redundancy of microbial communities in Arctic tundra soils

Promotor(en): Elie Verleyen, Wim Vyverman
Begeleider(s): Bjorn Tytgat, Jill De Visscher
Contactpersoon: Elie Verleyen
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Polar tundra systems and their permafrost soils store vast amounts of organic matter and therefore act as globally important carbon and nitrogen sinks. However, global warming heavily affects the functioning of these systems by increasing the length of the growing season and the depth of the active layer in the permafrost. The latter results in increased microbial activity which potentially results in increased emissions of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Increased releases of these greenhouse gasses to the atmosphere will exert a positive feedback effect on global warming. Increased microbial activity might also lead to the release of more nutrients, which can promote plant growth. In combination with higher temperatures and a longer growing season, this already resulted in the northward shift of tundra vegetation and increased plant cover; a phenomenon known as the 'Greening of the Arctic'. To better predict the effects of global warming on tundra ecosystems, a detailed understanding of the taxonomic and functional potential of their microbiomes in response to environmental variability is urgently needed.

Doelstelling:

In the summer of 2017, samples were collected along a gradient from low elevation wet tundra to dry upland tundra in two regions in Svalbard. Samples were taken at two depths to target both the (i) topsoil with biological soil crusts, consisting of i.a. cyanobacteria, green algae, fungi and mosses which are exposed to inclement weather conditions, and (ii) the more sheltered subsoils harbouring completely different communities. We sequenced 72 samples using the latest Illumina NovaSeq platform, giving an unprecedented opportunity to cast a deep look into the microbial communities in these ecosystems. In this MSC project, the student will contribute to the analysis of these shotgun metagenome data using standardized pipelines and downstream analyses. After a first explorative analysis, selected pathways or functions, such as those involved in carbon and nitrogen cycling, will be studied in more detail. This will reveal potential differences in the genomic potential between wet and dry tundra microbiomes, and surface versus subsoil communities, and their potential response to predicted climate change scenarios.

Locatie:

Sterre S8

Opmerkingen:

R skills will be heavily relied upon, but you will be well supported. Scripting (Python, bash) abilities are a plus. The willingness to learn to work in a Linux based environment and interest in bioinformatics are a necessity.

30985: The genus *Russula* in Belgium and neighbouring countries: towards species delimitation and identification tools.

Promotor(en): Annemieke Verbeken
Begeleider(s): Ruben De Lange
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Russula is an iconic genus of Agaricomycetes because of the often brightly coloured caps contrasting with the paler stipe and gills, the very brittle context, the variation in smells and a taste that ranges from mild and agreeable to burning acrid. There are about 150 species in our region and as ectomycorrhizal fungi they are one of the most important and dominant genera in our temperate forests. Notwithstanding their multitude of characters, in the field as well as under the microscope, species delimitation is often problematic in this group. Available identification tools are monographs from France (useful but outdated), from Italy and the Nordic countries, not very user friendly to identify the *Russula*'s you encounter on every excursion. Although characters as ecology, habitus, macrochemical reactions, taste, smell, spore print colour, colour of the cap etc. help to key out many *Russula* species, some keys rely on microscopical characters in a very early stage.

Doelstelling:

This master dissertation wants

1. To make an identification tool for *Russula* in Belgium and the neighbouring countries based mainly on macroscopical, ecological and macrochemical characters. This will not allow to key out all taxa on species level, but at least to groups where microscopy then will be the further step. Fieldwork in- and outside Belgium is needed to get familiar with the *Russula* fungi and to test some macrochemical features in a very standardized way.
2. In a selected group (based on what is collected during the fieldwork) try out species delimitation according to up-to-date taxonomy, including microscopical and molecular work.

Locatie:

Onderwerp voorbehouden voor Joeri Moens

Deze masterproef werd reeds 1-maal toegekend!

30942: The interactions between invasive ants and symbiotic partners

Promotor(en): Thomas Parmentier, Wouter Dekoninck
Begeleider(s):
Contactpersoon: Thomas Parmentier
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

A surprisingly high number of ants are listed among the 100 of the world's worst invasive species. These ants can have a dramatic effect on local fauna and flora. Most native ants engage in a wide of symbiotic interactions, but it is poorly known which symbionts interact with invasive ants. The mutualistic association between invasive ants and aphids could accelerate the spread of invasive ants, whereas parasites could control the growth of these ants.

Doelstelling:

The aim of this thesis is to survey in detail the symbiotic (mutualists, commensal, parasites) interactions of invasive/exotic ants. Therefore, the student will sample the symbionts of different populations of invasive ant species (*Lasius neglectus*, *Tapinoma nigerrimum* ...) across Belgium and compare the diversity of symbionts with these of symbionts associated with neighbouring native ant species. The student will also conduct behavioral tests in the lab to explore whether the behavior of the exotic ants towards these symbionts is different from the behavior of native ants.

This thesis involves field work during the summer, identification of arthropods and behavioral tests

papers see:

https://www.eje.cz/artkey/eje-200701-0023_acceptance_of_two_native_myrmecophilous_species_platyarthrus_hoffmannseggii_isopoda_oniscidea_and_cyphoderu.php

https://www.researchgate.net/publication/337050289_Guests_of_social_insects

<https://link.springer.com/article/10.1023/B:BINV.0000041556.88920.dd>

Locatie:

Ledeganck Terec

Website:

Meer informatie op: www.researchgate.net/profile/Thomas-Parmentier

Deze masterproef werd reeds 1-maal toegekend!

3101: The response of micro-eukaryotic and bacterial communities to increased temperature and moisture availability in High Arctic field experiments

Promotor(en): Elie Verleyen, Bjorn Tytgat
Begeleider(s): Jill De Visscher
Contactpersoon: Elie Verleyen
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1 of 2
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

The Arctic is experiencing rapid climate change as a result of the polar amplification of global warming. While the Earth has warmed by c. 0.8 °C since the late 19th century, the Arctic has warmed by 2 to 3 °C during the same period and over the past decade alone, it has warmed by 0.75 °C relative to the mean for 1951–1980. Climate models further predict that as the Earth approaches a 2 °C warming in the future, which is 0.5 °C above the Paris Agreement, the Arctic may reach 4 °C mean annual warming. In addition, it is predicted that during the 21st century, precipitation in the Arctic will increase with 50-70%. These climate changes are expected to have an impact on Arctic terrestrial biomes, which are dominated by microbial organisms that provide critical ecosystem functions such as primary production and nutrient cycling. More in particular, climate change is expected to accelerate the microbial breakdown of the organic carbon stored in tundra and their permafrost soils, which will promote the release of the greenhouse gasses carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) to the atmosphere. These soils and sediments may thus cross a critical threshold, leading to an offset in their carbon balance and become sources of CO₂ and CH₄ instead of being carbon sinks.

Long-term field experiments (> 5 years or longer) using open-top chambers (OTCs) were initiated in the framework of several international initiatives aimed at studying the effect of climate change on terrestrial ecosystems. OTCs act as small greenhouses and increase air temperatures with on average 2.1 °C compared to the outside environment. The application of OTCs has provided critical insights into the effects of climate change on polar communities and ecosystem processes. However, these studies largely focused on plant communities or physical and geochemical processes, yet until recently, relatively few studies have used DNA based approaches or focused on microbial communities.

Doelstelling:

In the summer of 2014, a long-term field experiment was initiated in Kongsfjord in Spitsbergen, Svalbard. In total, 48 plots were subjected to one of the following four different treatments: 1) warming using OTCs, 2) 1 L of water addition twice a year thereby increasing the moisture availability), 3) a

combination of both warming (1) and watering (2); and (4) untreated control plots. Samples were collected during several years to track long-term changes in the soil microbial community structure and diversity resulting from these treatments. In this MSc project the student will analyse changes in the diversity and structure of different taxonomic groups using high-throughput sequencing of different marker genes, such as 16S rRNA for bacteria, 18S rRNA for micro-eukaryotes s.l. and ITS2 for Fungi. The student(s) will be involved in the DNA extraction and library preparation for sequencing. Data analyses will be performed using a standardized pipeline and packages available in R.

Locatie:

Sterre (S8) and K.L. Ledeganckstraat

Opmerkingen:

R skills will be heavily relied upon, but you will be well supported. Scripting (Python, bash) abilities are a plus.

31020: The role of microorganisms in the flocculation of sediments in the Belgian Part of The North Sea

Promotor(en): Koen Sabbe, Wim Vyverman
Begeleider(s): Auria Kallend, Luz Amadei Martinez
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Suspended Particulate Matter (SPM) is a key determinant of biological processes, ecosystem functioning and biogeochemical fluxes in coastal ecosystems. SPM causes turbidity which limits light availability for phytoplankton, increases fluxes of carbon to the sea floor through enhanced settling of larger particles, but also forms an ideal substrate for microbial activity (mineralisation). While SPM dynamics were traditionally thought to be mainly controlled by hydrodynamic processes (currents, tides, weather) and the physical and chemical properties of the particles, it is becoming increasingly clear that biological activity as well affects the size and settling of particle aggregates. The release of exopolymeric substances (EPS) and the formation of sticky marine gels by phytoplankton can stimulate the formation of flocs, while bacterial mineralisation and zooplankton grazing can break down the flocs. To date, however, the impact of biological processes on SPM dynamics in coastal ecosystems is insufficiently understood: while biology is affected by the variation in SPM concentration and composition, biological processes themselves can in turn impact SPM dynamics. This would result in complex feedback loops affecting the functioning, services and habitability of the whole coastal ecosystem.

Doelstelling:

In this thesis, we aim to study the interactions between phytoplankton and SPM in Belgian coastal waters. More specifically, we will investigate (1) which phytoplankton species produce sticky marine gels and under which conditions; and (2) test the flocculation potential of phytoplankton/marine gels under different turbulences. The student will have to perform experiments with phytoplankton cultures and perform experiments with a flocculator chamber with a camera system that records particles and flocs. The images will be analyzed using image analysis techniques. Different techniques will be used, ranging from microscopy and flow cytometry over EPS and marine gel analyses (spectrophotometry), pigment analysis and Pulse Amplitude Modulated fluorometry.

The thesis will contribute to the BG-PART project, which is coordinated by the Royal Belgian Institute of Natural Sciences (RBINS), Operational Directorate 'Natural Environment' (OD Nature), with Ghent University (UGent, Protistology & Aquatic Ecology Lab) and the Flanders Marine Institute (VLIZ) as partners.

Locatie:

Sterre S8

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English.

31031: Thermal adaptation in the *Cylindrotheca closterium* diatom species complex: an ecophysiological and molecular approach

Promotor(en): Koen Sabbe, Klaas Vandepoele
Begeleider(s): Guillaume Marec
Contactpersoon: Koen Sabbe
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Diatoms belonging to the *Cylindrotheca closterium* species complex are widely distributed in benthic marine environments worldwide, from the poles to the tropics. Recent studies in the Protistology & Aquatic Ecology lab (e.g. Stock et al. 2019, <https://doi.org/10.3389/fmicb.2019.01395>) have demonstrated a high degree of thermal niche differentiation in this complex, with clades showing pronounced differences in optimal growth temperature and thermal niche width. This strongly suggests that certain clades have evolved specific (molecular) adaptations to low or high temperatures. Understanding these molecular adaptation mechanisms would increase our understanding of how diatoms could respond to a globally warming climate, but could be of interest from a biotechnological point of view, for example for the search for new enzymes that can be used at low or high temperatures.

Doelstelling:

The aim of this project is to assess how global isolates from the *Cylindrotheca closterium* species complex differ in their thermal niche characteristics, and what underlying genomic features may be involved in this adaptation. To this end, the student will perform (1) ecophysiological growth experiments to investigate growth of the different isolates across a wide range of temperatures and temperature variability, and (2) perform gene expression studies of selected isolates at different temperatures. The whole genome of a *Cylindrotheca closterium* strain has recently been sequenced in the labs of the promotor. However, the function of many genes is as yet unknown. By studying gene expression patterns across a range of temperatures and between different strains, it could be possible to identify specific genes that are expressed at low or high temperatures.

Locatie:

Sterre S8; Vlaams Instituut voor Biotechnologie (VIB)

Opmerkingen:

As this topic is under the supervision of someone who is not Dutch speaking, the supervision and writing of the thesis will be done in English. A keen interest in accurate experimental work and bioinformatics is a necessity.

30965: Thermoregulation in the cold: flexibility in metabolic rates versus changes in core body temperature as mechanisms underlying the invasion success of common waxbill (*Estrilda astrild*).

Promotor(en): Diederik Strubbe

Begeleider(s): Marina Sentis Vila

Contactpersoon:

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

How invasive species adapt to the often novel environmental conditions they experience in their new range is the topic of much debate. While many invasive species largely conserve their native range climate niche, a subset of species is able to expand their niche and invade in areas that strongly differ from their native range. Such 'niche shifts' can occur either because of changes in species' fundamental (i.e. because of adaptive changes in physiology) or realized niches (i.e. because dispersal limitations and biotic interactions prevent species from occupying all suitable areas available to them). Yet, most studies to date exclusively rely on contemporary species occurrence data to characterize environmental niches, and hence can only measure a species' realized niche. Methods to approximate species' fundamental niches based on ecophysiological first-principles exist, but are seldom used because experiments are needed to obtain crucial functional traits (such as metabolic rates and core body temperatures). Current invasive species risk assessment models are built on the assumption that species' niches do not change during the invasion process, and hence assume that climates occupied by species in the native range are predictive of where they are likely to be successful invaders. Elucidating the factors linked to 'niche shifts' is therefore crucial for understanding when invasive species range expansion forecasts are reliable, and under which conditions they are not.

Doelstelling:

The common waxbill (*Estrilda astrild*) is an Afrotropical passerine native to most of sub-Saharan Africa. Because of its popularity as a pet aviary bird, invasive populations have established worldwide, including in areas colder than their native range, such as parts of Portugal, Spain and Italy. Recently, several studies (TEREC PhD projects) studied both captive, invasive (Portugal) and native (South-Africa) waxbills to test the hypothesis that when exposed to colder conditions (wild: South-Africa versus Spain; captive: summer vs autumn), these birds would upregulate their metabolic rates and body masses in

order to better tolerate cold. However, preliminary results suggest the opposite is true. This suggests that rather than increasing their capacity for heat generation (metabolic rate) and retention (body mass), that waxbills follow an energy-saving strategy reducing their energetic needs under colder conditions. Such a strategy implies that waxbills would be capable of adjusting (lowering) their body temperature, however very few data exist on flexibility in waxbill core body temperature. This thesis will therefore test the hypothesis that when exposed to colder temperatures, waxbills will decrease their core body temperature. The thesis will study a small group (max. 10) of common waxbills through the use of open-flow respirometry for measuring metabolic rates and thermocouples for skin and core body temperature.

Locatie:

Ledeganck

Onderwerp voorbehouden voor Hanne Danneels

Deze masterproef werd reeds 1-maal toegekend!

30967: Touch- and sound sensing in plants: the role of mechanosensitive ion channels

Promotor(en): Dominique Van Der Straeten, Ratnesh Mishra
Begeleider(s): Marie Demey
Contactpersoon: Dominique Van Der Straeten
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Mechanosensitive (MS) ion channels are transmembrane proteins that facilitate ion fluxes upon mechanical stimulation (Hamilton et al., 2015). There are multiple membrane-localized MS ion channels families present in plants: (1) MscS-like (MSL) channels, (2) Mid1-Complementing Activity (MCA) channels, (3) piezo channels and (4) the hyperosmolality-induced calcium increase (OSCA) channels. Some of them have a known function in mechanosensing, e.g. *mca1*-null mutants were not able to penetrate a harder agar layer, others have been suggested but evidence is lacking. As sound vibration is also a mechanical stimulus, it is highly possible some MS ion channels are involved in sound sensing as well (Ghosh et al., 2017; Mishra et al., 2016).

References

- Hamilton, E., Schlegel, A. & Haswell, E. (2015). United in diversity: Mechanosensitive ion channels in plants. *Annual Reviews of Plant Biology* (66): 113–37
- Mishra, R., Ghosh, R. & Bae, H. (2016). Plant acoustics: in the search of a sound mechanism for sound signaling in plants. *Journal of experimental botany* (67): 4483-4494
- Ghosh, R., Gururani, M., Ponpandian, L., Mishra, R., Park, S., Jeong, M. & Bae, H. (2017). Expression analysis of sound vibration-regulated genes by touch treatment in *Arabidopsis*. *Frontiers in plant science* (8): 10.3389/fpls.2017.00100

Doelstelling:

Three different functional screens with MS ion channel mutants will be performed to discover which of them have a role in mechanosensing. The first screen is based on seedling protrusion. When a seed germinates under the surface, the seedling has to sense the overlaying layer and give a downstream signal to form an apical hook, which will protect the shoot meristem from mechanical damage. The hypothesis is then that (a) MS ion channel(s) is/are responsible for sensing the soil layer. The second screen focuses on the involvement of the MS ion channels in eliciting the thigmomorphogenic response upon touch. The touch treatment is given through a one-dimensional robot that goes over the plants multiple times a day. Finally, a sound screen based on phonotropic root growth will reveal whether MS ion channel proteins also have a function in sensing sound vibrations. Seedlings are grown under unidirectional continuous sound. In those conditions, roots grow towards the sound source.

Locatie:

Campus Ledeganck, 6th floor

Deze masterproef werd reeds 1-maal toegekend!

30980: Tracking the effects of Late Ordovician global climate change through the palaeotropics in the USA and Canada

Promotor(en): Thijs Vandenbroucke, Poul Emsbo
Begeleider(s): Patrick McLaughlin

Contactpersoon:

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Historically, the Ordovician-Silurian was considered a time of stable greenhouse conditions, only interrupted by a very short-lived end-Ordovician 'Hirnantian' glaciation. The Hirnantian is characterised by extensive glacial deposits that represent one of the most dramatic periods of Phanerozoic glaciation. These deposits are associated with the HICE carbon isotope excursion, exceeding +5‰ and featuring amongst the most extreme values of the Phanerozoic. Over the past decade, however, it has been suggested that prolonged CO₂ draw down may have created a much longer-lived 'Early Palaeozoic Icehouse' (EPI) background condition that was accentuated by multiple and abrupt periods of glacial maxima. High-resolution carbon isotope stratigraphy has shown that there are multiple global positive excursions, which now are increasingly interpreted as additional glacial maxima. These changing Late Ordovician environments also had a major influence on Earth's biosphere. They introduced extinctions events including the very prominent Hirnantian Event that eradicated more than 85% of marine species and is classified as one of the 'big five' mass extinctions. The revision of the duration and timing of the glacial interval opens a series of questions and insights with regards to the cause and effect relationships between mass extinction and climate change, which this project will contribute to.

Doelstelling:

Approach: Patrick McLaughlin (Indiana Geological and Water Survey) and his group are developing a fully revised chronostratigraphic framework in the Eastern USA, based on extensive carbon isotope, sedimentological and sequence stratigraphic data from a suite of outcrops and cores. This framework includes several onshore-offshore transects, which constitute key localities to study the Upper Ordovician event stratigraphy in high-tropical palaeolatitudes. These emergent data, for instance, identify multiple high-order glacio-eustatic cycles in the Hirnantian of the Eastern USA. Given that chemo- and sequence-stratigraphic data are non-unique signals, it is key to also include biostratigraphic data if we want to correlate these events over a long distance, and to understand them. Conodont analyses are run at the Indiana Survey, but in order also to obtain biostratigraphic data from shales, the UGent contributes to this framework with microfossil (chitinozoan) analyses. As the MSc student on the project, you will help driving this effort. This work builds on five recent pilot MSc projects that already produced wonderfully preserved palynomorphs from some of the cores. You will work on parallel sections. Method: This MSc project will consolidate the collaboration between the groups at the UGent and the Indiana Geological and Water Survey (IGWS). We will focus on answering a series of existing and key correlation questions. The available samples are from sections spanning from the Katian Gutenberg Carbon Isotope Excursion (GICE, c. 455 Ma) to the Hirnantian Carbon Isotope Excursion (HICE, c. 444 Ma), including the Maquoketa and Sylvan shales. As the MSc student on this project, you will use samples collected in the Eastern USA, during sampling trips in 2017 and 2020; in case this is deemed useful and in discussion with Patrick McLaughlin (IGWS), further samples may be collected on site in the core facilities of the IGWS. Meanwhile, this research is expanding, upwards into the Silurian and to the North with research sites on Anticosti Island and elsewhere in Canada (collaboration with A. Desroches, UOttawa), opening new opportunities for MSc projects. The lab work consists of micropalaeontological/palynological analyses (acid digestions, microscopy and SEM work). Outcomes of this work will be publishable, and as a student, you will be trained how to best present your data in the form of a scientific paper or a presentation at an international meeting.

Locatie:

Campus terre: Research Group Palaeontology and Palaeo-environments (Dept. of Geology, UGent)

30947: Understanding the effect of life cycle variability and population size on climate resilience of brown seaweeds

Promotor(en): Olivier De Clerck, Sofie Vranken

Begeleider(s):

Contactpersoon: Olivier De Clerck

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Climate change is significantly impacting global species diversity and ecosystem services. Understanding the capacity of species to adapt to changes is thus crucial to fully comprehend the impact of climate change. Theory predicts that population size and life cycle mode (asexual versus sexual) significantly influence resilience towards stressors and climate change. Bigger or sexual reproducing populations are expected to be more resilient to environmental changes than small or asexual populations, because they generally contain more genetic variation, are less vulnerable to genetic drift and experience higher selection efficacy.

Doelstelling:

Dictyota dichotoma is a brown seaweed that mainly reproduces sexually, yet recent analysis indicated that asexual reproduction is also possible. This master thesis aims to elucidate the effect of the mode of reproduction and the effective population size on the adaptive potential *Dictyota dichotoma*. Populations from various European locations will be compared, and a combination of whole genome resequencing and RNA sequencing will be used. The student conducting this research is expected to work in the molecular lab and perform genomic data analysis. In case the timing is right, the option to join fieldwork can be discussed.

Locatie:

Sterre S8, Ledeganck

Website:

Meer informatie op: phycology.ugent.be

Opmerkingen:

In collaboration with University of the Mediterranean (Marseille)

30987: Unravelling species complexes and cryptic species in the Amazon, using genomic data

Promotor(en): Lars Chatrou
Begeleider(s): Luiz Fonseca, Federico Fabriani
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

Amazonian forests are the largest and most diverse forests in the tropics. Interestingly, Amazonian tree species abundance is not evenly distributed, and most areas are inhabited by a few, highly abundant species, termed oligarchic or hyperdominant. It is hypothesized that in some species, hyperdominance can be a result of species complexes and poorly defined species.

The determination of hyperdominant species status relies on correct botanical identification of tree species in Amazonian forests. While defining a species is potentially one of the most difficult tasks in biology and highly dependent on the species concept applied, it is a fundamental unit of biological science. In the Amazon, the species concept applied in almost all cases is the morphological species concept, as other species concepts effectively cannot be applied due to logistic difficulties. Increasingly, we find that widespread species are harbouring multiple species, which may only be discernible using genetic techniques as the morphology of the genetic clusters is similar.

In this project, you will be looking at some widespread species of Annonaceae in the Amazon, and see if they contain distinct genetic clusters. The Annonaceae are a pantropical family of rain forest trees and lianas. The ca 1000 Neotropical species are trees, and belong to genera that have all been revised by taxonomist in the past 30 years. In other words, the morphological species concept has been applied and can be taken as a hypothesis for species circumscription. Some of the species are widespread, ranging from the Guianas in the north to Amazonian Bolivia in the south. Genera such as *Guatteria*, *Duguetia*, and *Fusaea* are amongst those that include widespread species.

The resources to be used in this project are within reach: the herbarium at Naturalis Biodiversity Center (Leiden, the Netherlands) contains the largest collection worldwide of Neotropical Annonaceae. A number of specimens of widespread species will be sampled from across the distribution area, for which a number of genetic markers will be sequenced. Geographic patterns of genetic variation will be inferred, testing the hypothesis of the presence of cryptic species in widespread Amazonian species of Annonaceae.

Doelstelling:

In this project, you will test the hypotheses of the presence of cryptic species in widespread Amazonian species of Annonaceae. These species will be identified based on taxonomic monographs and revisions that have been published in the past ca 30 years. The markers that will be sequenced for each individual in a species complex will have to be decided, evaluating cost-effectiveness and resolution.

Specifically, we will test the following hypotheses:

- Widespread species of Annonaceae in the Amazon harbour cryptic species.

- Cryptic species in Amazonian Annonaceae follow well-established biogeographic boundaries in South America.

This project will suite a student with an analytical mindset and a strong interest in evolution, ecology and taxonomy. The student will learn how to use a variety of lab techniques and analytical tools and concepts. The output will be written in the form of a scientific article aiming to submit it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck

Onderwerp voorbehouden voor Rik Van den Heede

Deze masterproef werd reeds 1-maal toegekend!

30986: Unravelling the geographical diversification of a hyperdiverse plant clade using comparative methods

Promotor(en): Lars Chatrou
 Begeleider(s): Luiz Fonseca
 Contactpersoon:
 Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
 Niet behouden voor:
 Nog onbeslist voor:
 Aantal studenten: 1
 Aantal masterproeven: 1
 Motivering voor deze opleiding:

Probleemstelling:

Lamiales is one of the most intractable orders of the flowering plants, and has seen many major changes in composition and family circumscription as a result of molecular phylogenetic studies. The order is composed of approximately 23,000 species, distributed across 26 families. The species diversity is highly unbalanced at family-level, ranging from the Plocospermataceae with a single species only to Lamiaceae, with more than 7,800 species. The order has a worldwide distribution, occurring in many different biomes. Species are found from rainforests to frozen habitats, with a remarkable balance between tropical and extratropical numbers of species.

The most comprehensive phylogenetic study of Lamiales sampled a single nuclear and nine plastid regions. The phylogenetic tree inferred included 6,910 species (or 29.5% of all known species) from all 26 families. This study also made available well-curated data on geographic distribution for 4,190 species. In and out of the tropics historical biogeographic patterns were already studied, with recurrent transitions into and out of tropical regions through time. Here we aim to combine the available phylogenetic and distribution data to infer the biogeographic history of the Lamiales and evaluate the role of area transitions for the diversification of the order.

Doelstelling:

More specifically, we would like to infer

- (1) the ancestral movements between continents and biogeographic areas, and
- (2) how transitions in area and habitat could be responsible in shifts of speciation and extinction rates within Lamiales.

To accomplish these goals, we will use cutting-edge comparative methods. Through the development of this project, the student will learn how to handle, and analyze phylogenetic and geographic data and combine these resources with recent developed methods to answer evolutionary questions.

This project will suit a student with an analytical mindset and a strong interest in evolution, and phylogenetics. The output will be written in the form of a scientific article aiming to submit it to a peer-reviewed journal for publishing.

Locatie:

Campus Ledeganck

31007: Using sex marker genes to detect sexual reproduction events in natural diatom populations

Promotor(en): Wim Vyverman, Gust Bilcke
 Begeleider(s): Nadine Rijdsdijk
 Contactpersoon: Wim Vyverman
 Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
 Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Diatoms are an evolutionary very successful group of microalgae that have a unique life cycle. During vegetative growth, their cell size gradually diminishes by consecutive cell divisions. When diatoms reach a minimal size-threshold, they are able to sexually reproduce and restore their original cell size through the expansion of a unique cell stage called the auxospore.

Even though sexual reproduction is a very important process in the life cycle of most diatom species, it has rarely been observed in nature. Recent work has identified key genes that are involved in diatom sexual reproduction (Audoor et al., unpublished; Bilcke et al., unpublished). By using these sex marker genes (conserved genes that are only upregulated during sexual reproduction) in reverse transcription quantitative real-time PCR (RT-qPCR) assays of natural diatom samples, sexual reproduction events can be detected in nature. RT-qPCR is a technique based on the transcription of mRNA into cDNA, which can then be used as a template for the qPCR reaction. RT-qPCR allows for the quantitation of the PCR product and can thus be used to quantify expression of the sex marker genes. Applying this technique on natural samples will give novel insights into the frequency and timing of sexual reproduction events in diatom populations.

Doelstelling:

The main objective of this MSc thesis is to detect sexual reproduction events in natural diatom populations. First, the student will optimize and validate the RT-qPCR method for field samples by mixing them with sexual laboratory cultures of different cell densities to determine the detection limit of the qPCR. In parallel, light microscopy will be used to screen phytoplankton/microphytobenthos samples from the Belgian coastal region for the presence of sexual cell stages, which will aid as a guide for the selection of samples on which subsequent RNA extractions and RT-qPCR assays will be conducted. By analysing samples taken over longer time periods and linking the presence of sexual reproduction with cell size distribution and environmental parameters, we can get an idea about the timing of sexual reproduction events and the environmental conditions that might trigger them.

Locatie:

Sterre S8, Ledeganck, VIB

31026: Vegetation heterogeneity and structure and its relationship with spider diversity and abundance

Promotor(en): Jan Van Uytvanck, Dries Bonte

Begeleider(s):

Contactpersoon: Jan Van Uytvanck

Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie

Niet behouden voor:

Nog onbeslist voor:

Aantal studenten: 1

Aantal masterproeven: 1

Motivering voor deze opleiding:

Probleemstelling:

Vegetation structure plays an important role in diverse ecosystems such as heathlands, dunes and floodplains. On former agricultural land it may be a crucial factor for biodiversity, due to the restraints of high nutrient richness in these systems. Moreover, former agricultural land has to be recolonised by plants and animals and this process is known to be difficult and slow. Developing vegetation heterogeneity may help the establishment of arthropod species but little is known to what extent, especially for arthropods that live in strong relationship with plants. In this research we'll focus on spiders living in a vegetation structure gradient, containing short grassland, tall herbs and scrub in three sites in East-Flanders that have a development under low-intensity grazing management, exceeding 20 years. We rely on ongoing field campaigns organised by INBO aiming at mapping vegetation structure in a representative selection of ecosystems in Flanders. Arthropod (and spider) sampling is done by a garden tool to blow or suck up leaves.

Besides testing the direct relationship between vegetation structure and spider biodiversity and abundance, we aim to understand the long term impact of nature management measures such as low-intensity grazing (and mowing on reference plots) in nutrient rich conditions (here on floodplain, small valley and dry valley slope sites).

Doelstelling:

We aim to establish general insights on how spatial vegetation structure affects and relates to spider biodiversity on former agricultural land. Data have been collected during past years and will be further collected in the following years. If possible, the students will (may) assist in further data collection in summer 2023 or spring 2024.

Locatie:

campus Ledeganck

Opmerkingen:

Study sites: - Bos t 'Ename (Oudenaarde, valley slope) - Boelaremeersen (Geraardsbergen, floodplain) - Moenebroek (Geraardsbergen, small valley)

Deze masterproef werd reeds 1-maal toegekend!

30963: Voorkomen, gedrag en abundantie van Chinese muntjak in Vlaanderen

Promotor(en): Dries Bonte
Begeleider(s): Bram DHondt
Contactpersoon:
Goedgekeurd voor: Master of Science Biology, incl. Educatieve Master Biologie
Niet behouden voor:
Nog onbeslist voor:
Aantal studenten: 1
Aantal masterproeven: 1
Motivering voor deze opleiding:

Probleemstelling:

De Chinese muntjak (*Muntiacus reevesi*) is een klein, exotisch hertje dat door de mens in Europa is geïntroduceerd. In Groot-Brittannië is de soort uitgegroeid tot één van de meest algemene hertachtigen. Om een gelijkaardige invasie op het Europese vasteland te vermijden, zijn lidstaten verplicht om muntjak te monitoren. Deze monitoring gebeurt in Vlaanderen onder de coördinatie van het Instituut voor Natuur- en Bosonderzoek (INBO).

Doelstelling:

Deze masterproef draagt op diverse wijzen bij aan de surveillance. Ten eerste wordt een netwerk aan cameravallen opgevolgd te Park Vordenstein (Schoten; doorlopend van ± november tot mei). Op deze locatie is een gekende populatie aanwezig, die ook beheerd wordt. De opvolging vormt het sluitstuk van een vier jaar durende monitoring, die dus een belangrijk inzicht in het gedrag en de aantallen geeft. Ten tweede gaat de student zelfstandig aan de slag met een kleinere, mobiele set cameravallen om de aanwezigheid op andere locaties in Vlaanderen na te gaan. Daarvoor worden de evoluties inzake verspreiding nauw opgevolgd. Ten derde experimenteert de student met akoestische detectie, waarbij het geblaf van de dieren met behulp van veldmicrofonen als surrogaatmethode voor detectie wordt getest. (Naargelang lopende ontwikkelingen kan dit luik een groter of kleiner belang in het proefwerk krijgen.)

Cameravalbeelden worden verwerkt via het platform <https://www.agouti.eu/>. De student verricht dataverwerking, modelmatige abundantieschattingen en andere statistische analyses met behulp van R. Er is een redelijk aandeel veldwerk. Een rijbewijs is sterk aangeraden. Bureauwerk vindt plaats op het INBO (Brussel, Geraardsbergen) en, op zelfstandige basis, aan de UGent of thuis.

Locatie:

campus Ledeganck, INBO, thuis

Deze masterproef werd reeds 1-maal toegekend!