Rules of the microbiome

Ecological communities vary widely across space and time, as a result of a combination of stochastic and deterministic processes. Macroecology focuses on finding universal statistical patterns that describe variation in community composition and diversity. In this project, we will use methods from macroecology to search for universal rules in communities of microorganisms living inside animals (so-called microbiomes) from the same host population. The student will model microbial time-series from many hosts to quantify the stability of hosts’ microbiome (how much does the composition change over long timescales?) and its reproducibility (how much composition differs across hosts?). Specifically, the student will use the stochastic logistic model to test whether community dynamics are host-specific such that each host’s microbiomes follow its own rules (i.e. estimated model parameters are unique to each host) or whether dynamics is universal across the host population (i.e. estimated model parameters are consistent across hosts).

The master student will be supervised by physicist Dr. Jacopo Girilli (ICTP, Italy) and computational ecologist Dr. Johannes Björk (UMCG), together with Professor Rampal Etienne from RUG-GELIFES.

Depending on current COVID19 regulations, the student can work at RUG, UMCG or at home. The student will meet regularly with the supervisors (in person and/or online).

Methods: The project combines a theoretical component with data analysis. We are seeking a master student with a keen interest in theoretical ecology/macroecology with good knowledge of Matlab and/or R.

Staff member: Rampal Etienne
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Expertise group: Theoretical Research in Evolutionary Life Sciences

Type of project: ☒ Bioinformatics ☒ Fieldwork ☒ Laboratory ☒ Theoretical ☒ Data analysis

MSc program: ☒ Biology ☒ Ecology and Evolution ☒ Marine Biology

Biomedical Sciences ☒ Behavioural and Cognitive Neurosciences

ECTS: ☒ 30 ☒ 40

Language: ☒ Dutch ☒ English

Start date: Flexible
Location: GELIFES / UMCG / Home

2021-2022