UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

11 March 2021

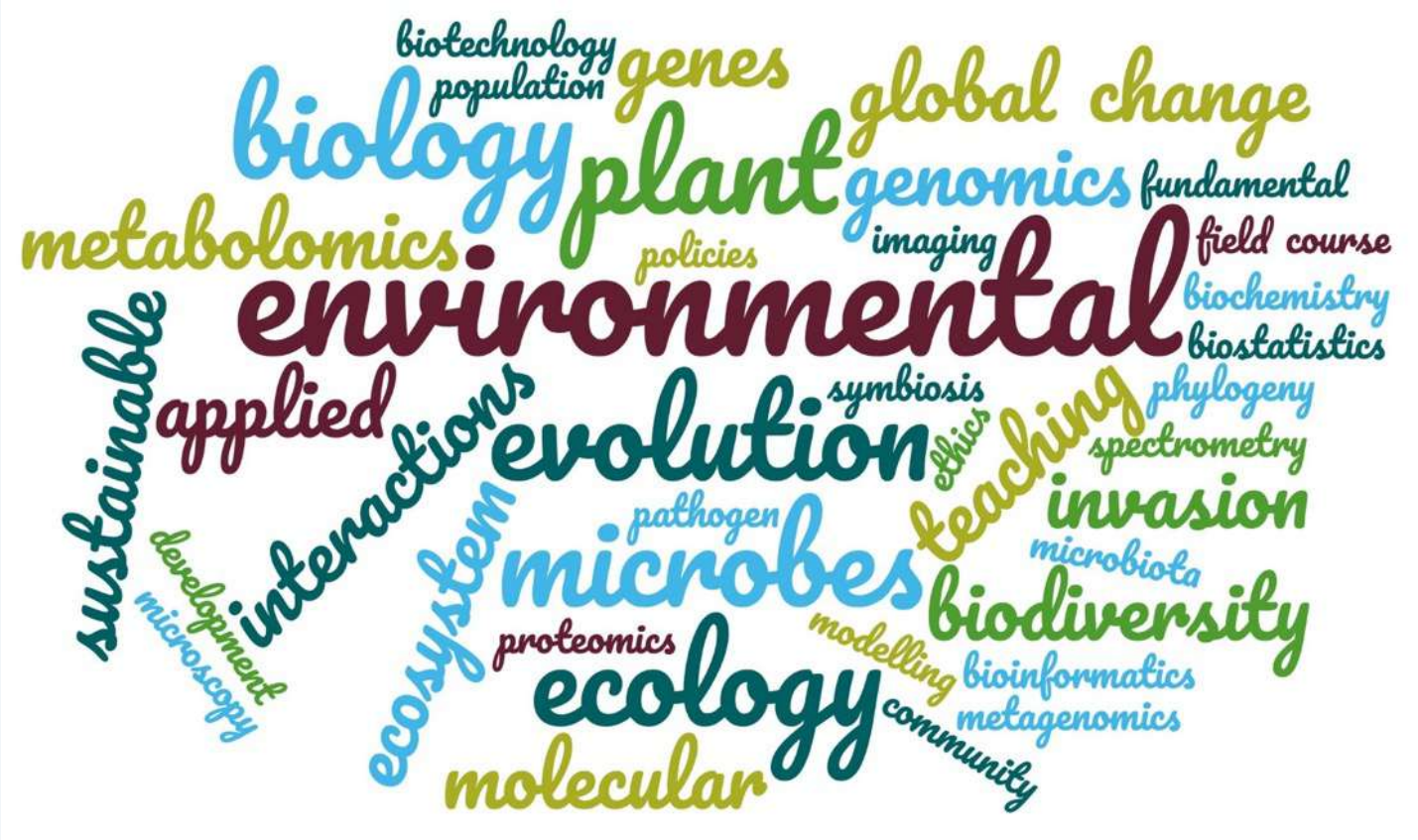
MASTER IN ENVIRONMENTAL BIOLOGY

Master Week

Laure Weisskopf
Rudolf Rohr
Thomas Flatt

MASTER IN ENVIRONMENTAL BIOLOGY

” From genes to ecosystems “



MASTER IN ENVIRONMENTAL BIOLOGY

We offer 4 options

Ecology & Evolution

120 ECTS

Master Thesis
60 ECTS
Courses
50 ECTS
Seminars
10 ECTS

Plant & Microbial Sciences

120 ECTS

Master Thesis
60 ECTS
Courses
50 ECTS
Seminars
10 ECTS

Applied Environmental Biology

120 ECTS

Master Thesis
60 ECTS
Courses
50 ECTS
Seminars
10 ECTS

Teaching

90 ECTS

Master Thesis
45 ECTS
Courses
37.5 ECTS
Seminars
7.5 ECTS

MASTER IN ENVIRONMENTAL BIOLOGY

Ecology & Evolution

- Community ecology
- Population and evolutionary dynamics
- Evolutionary and ecological genomics
- Ecological field course
- Biostatistics
- Modelling

- Bioinformatics (in collaboration with the MSc in Bioinformatics & Computational Biology)

MASTER IN ENVIRONMENTAL BIOLOGY

Plant & Microbial Sciences

- Plant biotechnology
- Symbiosis: how plants and microbes communicate
- Methods in plant pathogen interactions
- Structure and functions of host-associated microbiota
- Microbial metabolism and genetics

- Proteomics, metabolomics, microscopy (in collaboration with the MSc in Molecular Life & Health Sciences)

MASTER IN ENVIRONMENTAL BIOLOGY

Applied Environmental Biology

- Global change
- Invasion biology
- Ecological field course
- Biostatistics

- Principal of environmental ethics & Issues of sustainable development (in collaboration with the MSc Environmental Sciences & Humanities)

MASTER IN ENVIRONMENTAL BIOLOGY

Teaching

- Core courses from the 3 research options
- Appropriate for students who are interested in **becoming teachers** at the secondary level II
- The students taking this option will need to complement the 90 ECTS with 30 ECTS from other programs

MASTER IN ENVIRONMENTAL BIOLOGY

We are 14 research groups


Pierre-Marie Allard


Sven Bacher


Louis-Félix Bersier


Thomas Flatt


Markus Geisler


Ora Hazak


Gregor Kozlowski


Adria LeBoeuf


Christian Parisod


Stefanie Ranf


Didier Reinhardt


Rudolf Rohr

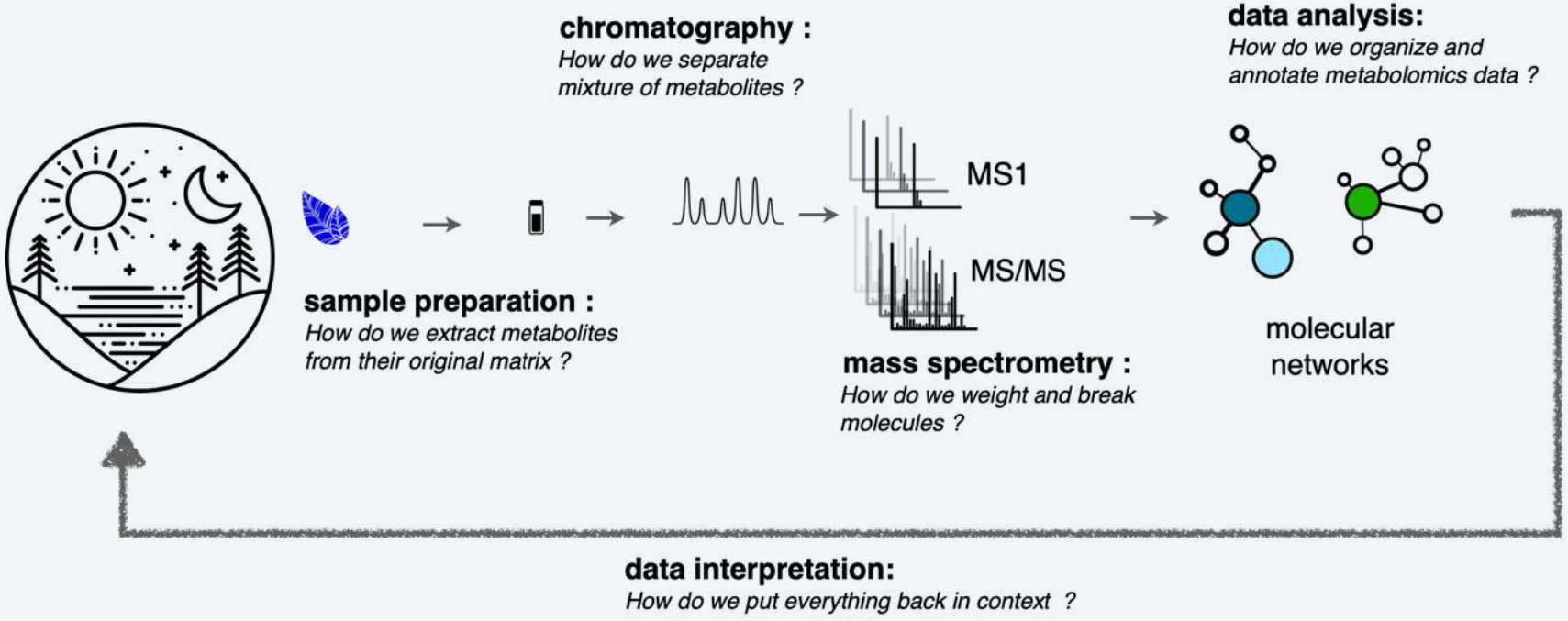

Daniele Silvestro


Laure Weisskopf

How do we characterize metabolomes ?

- What is a metabolite ? What is a metabolome ? What is metabolomics ?
- Practically, how do we acquire, process and interpret metabolomics data ?

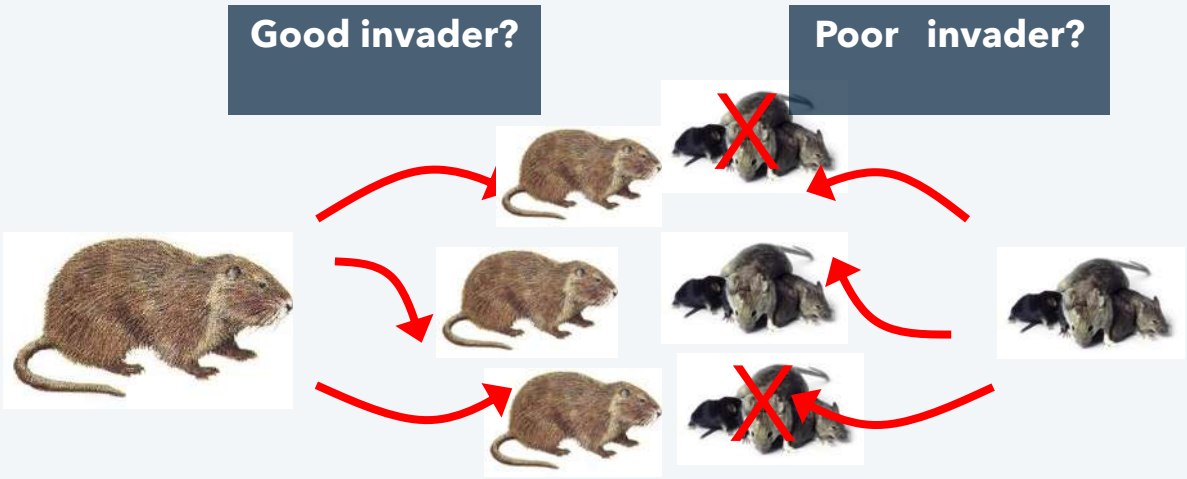
Pierre-Marie Allard



Fundamental questions about biodiversity


Sven Bacher

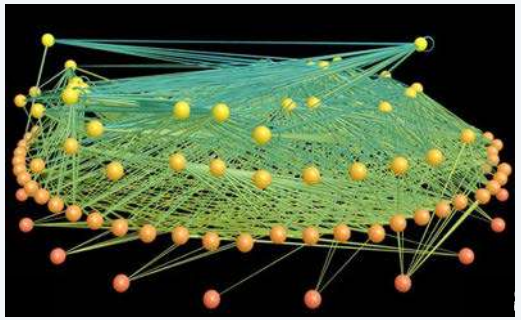
- How many species are there?
- Which species are becoming extinct?
- Which species become invasive?
- Which species become pests?



How do ecological networks work?

Plant-pollinator interactions

Predator-prey interactions

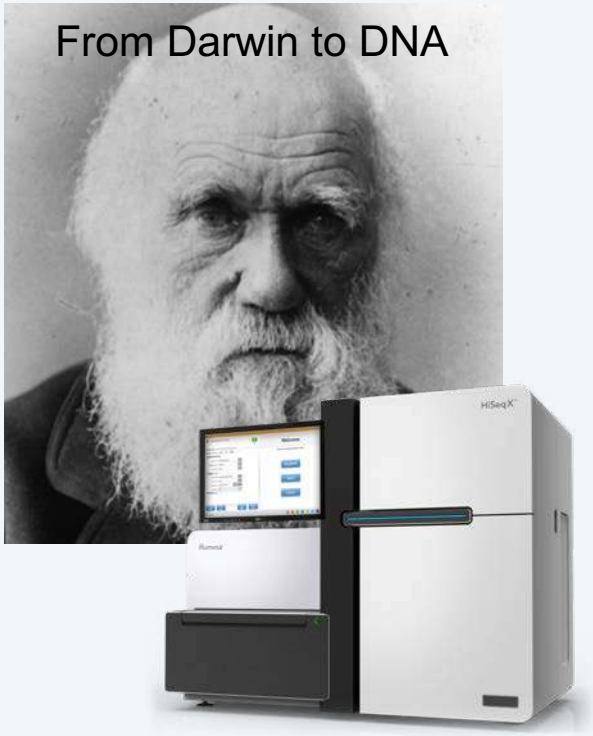


Louis-Félix Bersier

How do species adapt to their environment?

Thomas Flatt

From Darwin to DNA

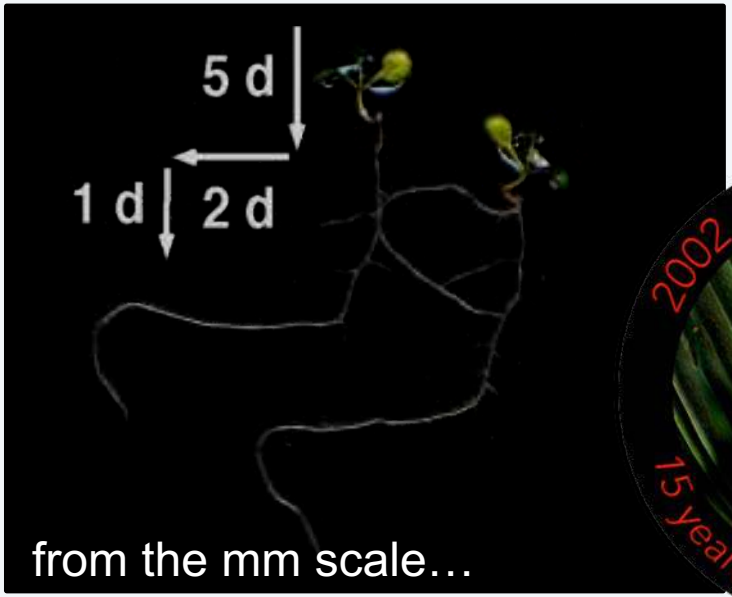


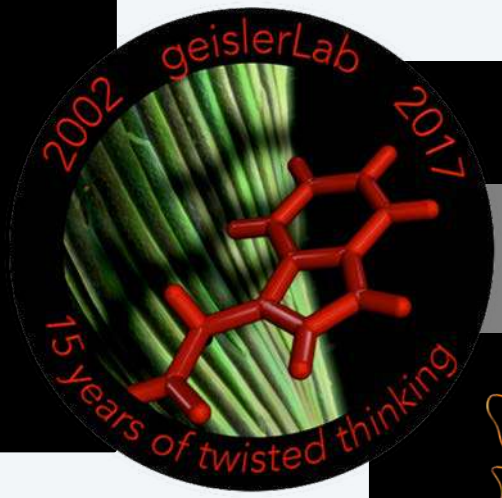
Experimental evolution in the laboratory

- What molecular changes happen during evolution?
- How do characteristics of organisms change when they adapt?

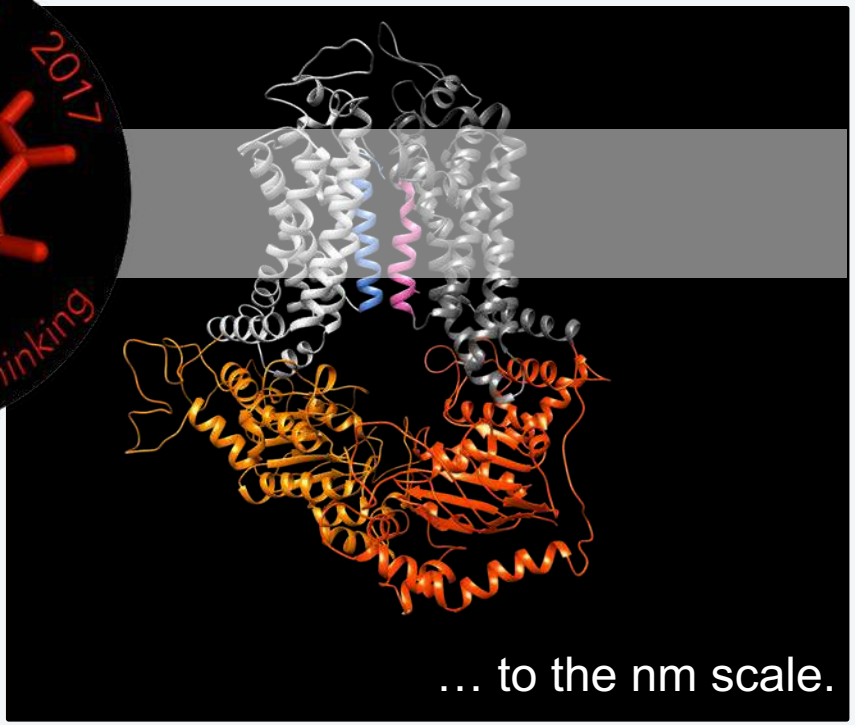
How is plant development regulated on a molecular level ?

Markus Geisler





- How do plant hormone transporters work?
- How are they regulated?
- Are they different to mammalian ones?



Fundamental questions of conservation biology

Gregor Kozlowski

- How to stop or slow down the extinction crisis?
- What is the value and importance of biodiversity?
- What are species responses to manmade global changes?
- How to determine conservation priorities?

Arctic and alpine plants and global warming

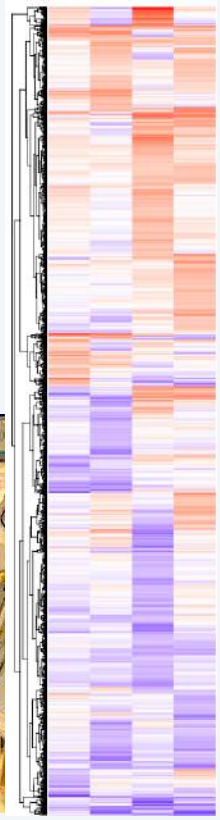
Mediterranean ecosystems and overbrowsing

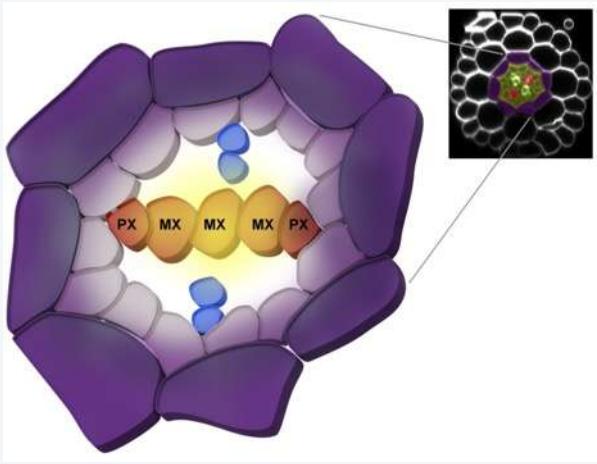
Relict trees and conservation priorities

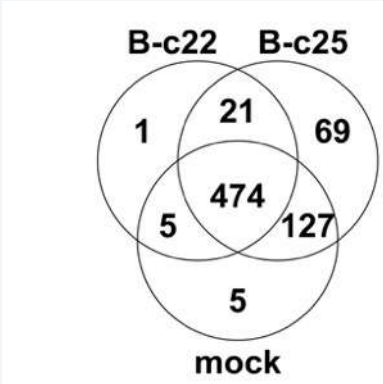
How do small signaling peptides shape a plant?

Ora Hazak

- Which plant cells produce active peptides?
- Which receptors bind specific peptide ligands?
- How does a peptide activate downstream signaling?
- Which plant adaptations are mediated by peptides?



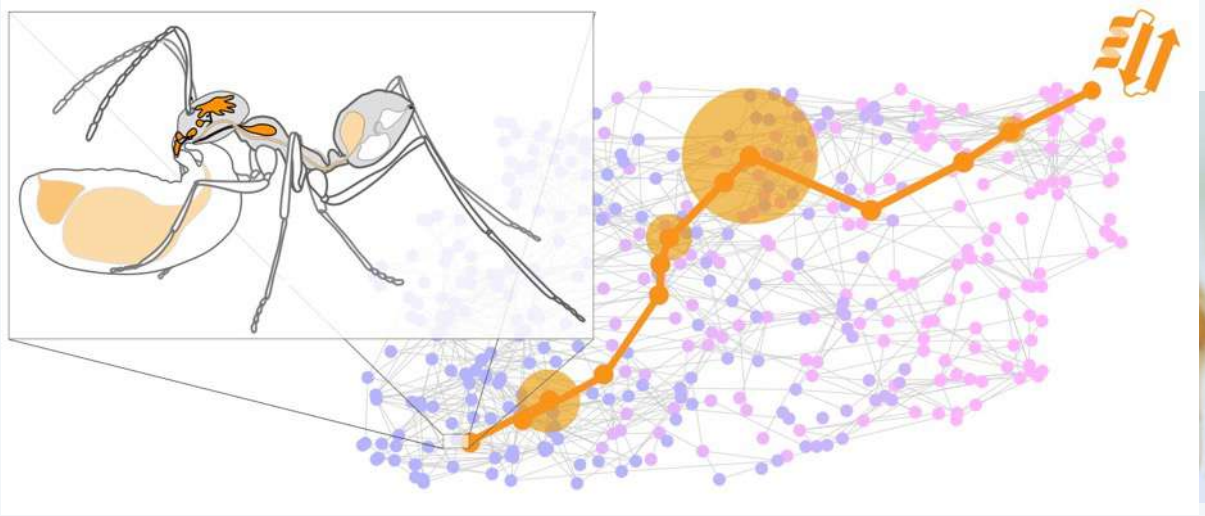




How does social life evolve and function?

Adria LeBoeuf

- How do behaviors evolve?
- How can genes regulate social collectives?
- How do socially exchanged fluids manipulate receivers?
- How do complex collective behaviors function?

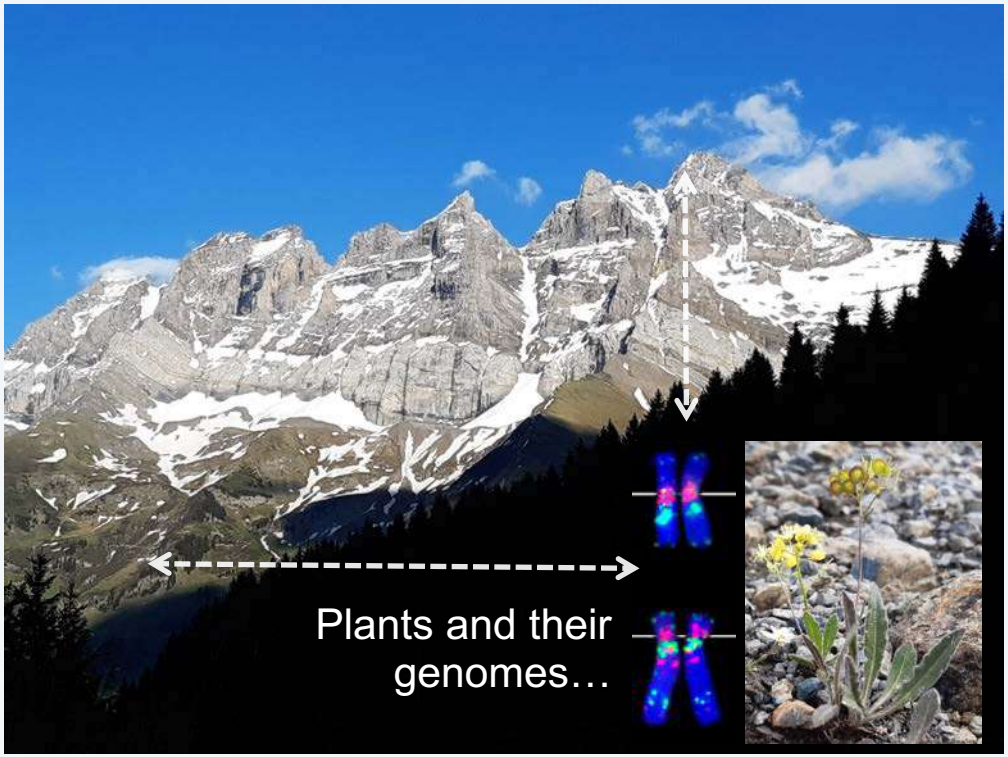


From molecules to social networks

How do new plant species evolve ?

- What is the impact of genome changes on adaptation and speciation ?
- How do sessile plants respond to environmental changes ?

Christian Parisod

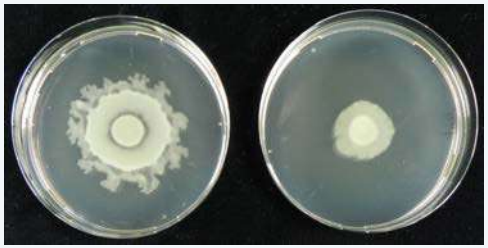


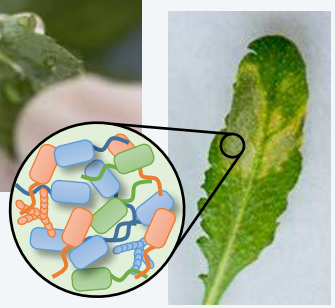
…in natural and experimental populations

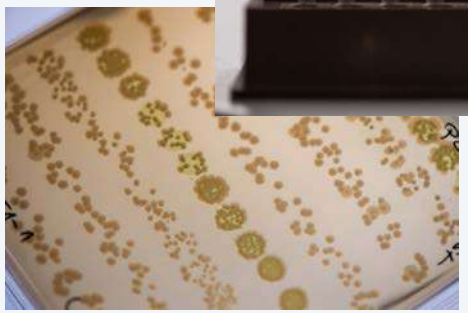
Molecular plant-microbe interactions


Stefanie Ranf

- How does the plant immune system control microbial colonisation?
- How do microbes deal with plant immune responses?
- How can we exploit plant immunity for sustainable plant protection?

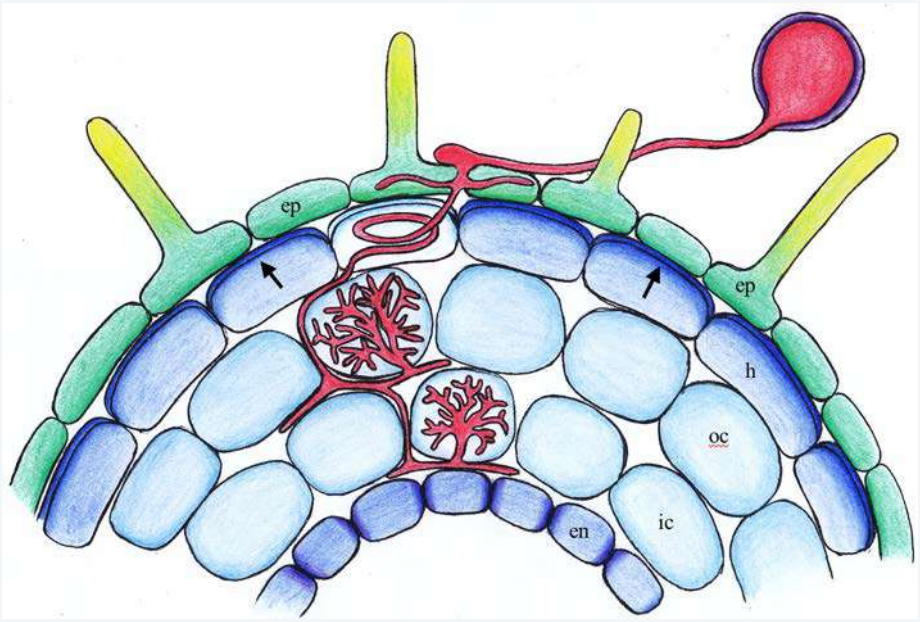



How do plants and their microbial symbionts get along with each other?

Didier Reinhardt

The fungus



The symbiosis

The host plant

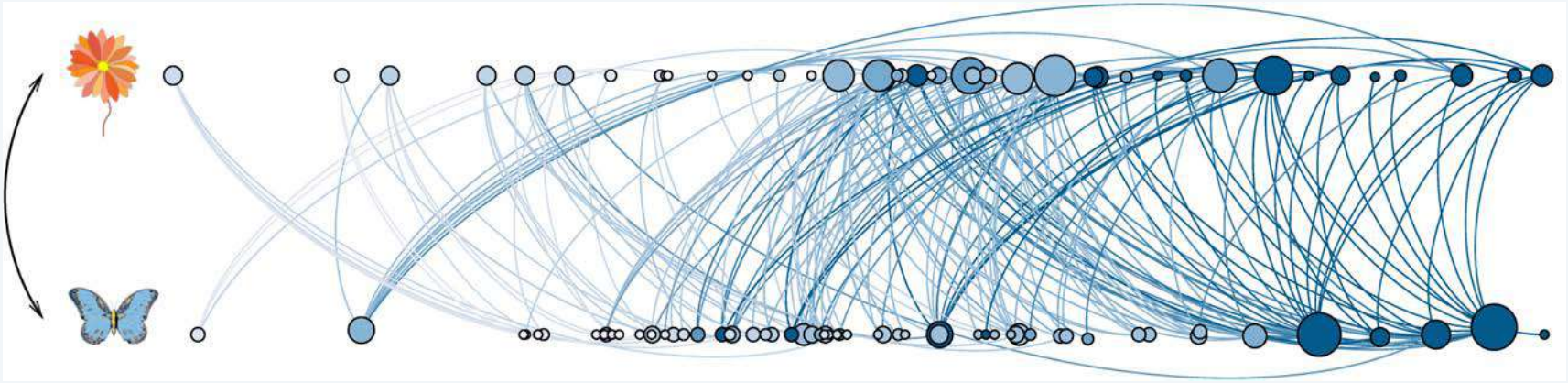
- How do bacterial and fungal symbionts enter and colonize the roots?
- How is symbiosis established without triggering an immune reaction in the plant?

How do species co-evolve?

- How do interactions between species influence ecological networks?
- How does coevolution influence biodiversity?

Co-evolution between pollinators and plants

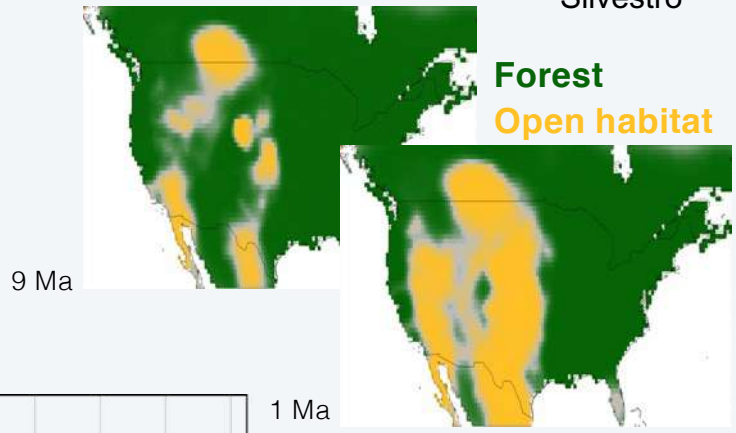
Rudolf Rohr

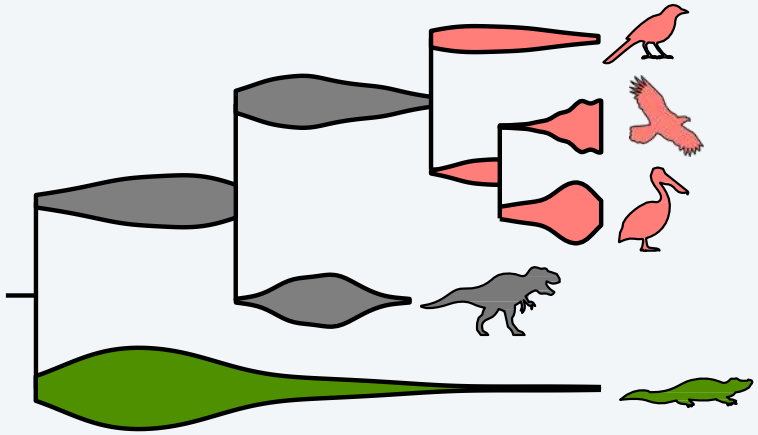


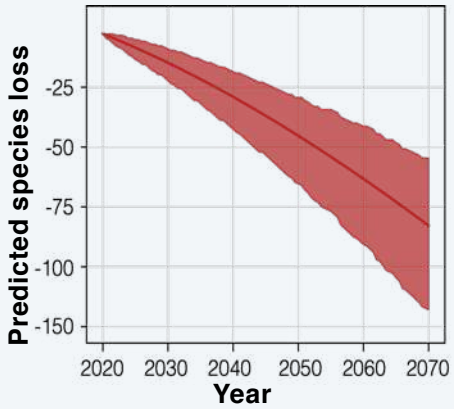
How does biodiversity change over time?

- How do new species arise? Why do they become extinct?
- Why are certain groups of organisms more species-rich than others?

Daniele Silvestro



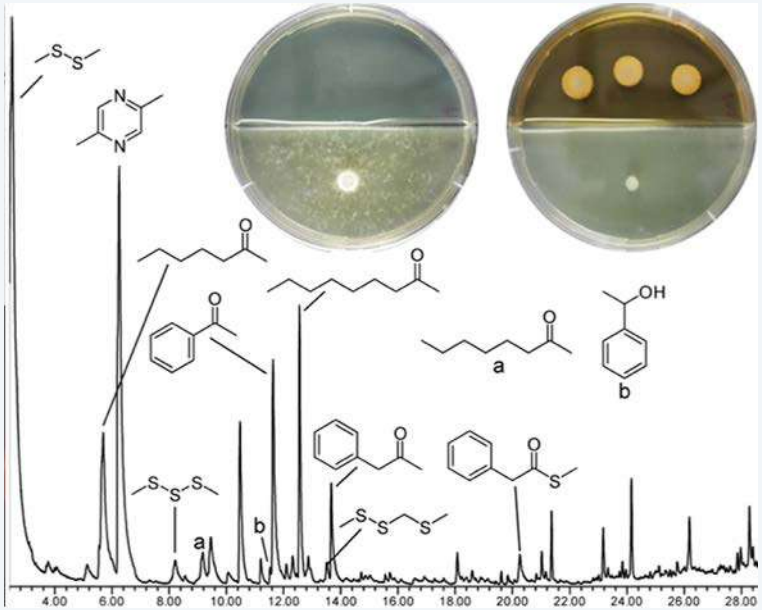




What are plant-associated microbes doing?

Laure
Weisskopf

- How do microbes communicate ?
- How do beneficial bacteria protect plant health ?
- Can we use these beneficial microbes as alternative to pesticides ?



What can you do with this master degree?

- go into **academic research** in life and environmental sciences (PhD studies)
- become a **teacher** with broad knowledge and skills
- work in **industry** (agronomy, microbiology, biotechnology, …)
- work for **nature preservation** offices, NGOs or private foundations
- work at **federal research institutes** and offices (Agroscope, FiBL, WSL, HAFL, HEPIA, BAFU, BLW, etc…)
- start your own **business**
- …

Course visit on Friday morning

- 8h15 to 10h: **Microbiomes: from plants to humans** (SBL.00424) with Laure Weisskopf
- 8h15 to 10h: **Ecological networks** (SBL.00213) with Louis-Félix Bersier
- 10h10 to 12h: **Classical models in biology** (SBL.06002) with Rudolf Rohr & Louis-Félix Bersier

Links to visit the lectures can be found on the master week webpage:
https://events.unifr.ch/masterweek/fr/masterweek2021/scimed.html

MASTER IN ENVIRONMENTAL BIOLOGY

Questions ?

Visit our webpage:

https://www.unifr.ch/bio/en/studies/master/

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