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Info on MSc in Botany

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Attention South Tyrolean students:

Contrary to a rumour currently circulating, studying botany at the LFU Innsbruck is still recognized in Italy and employment in the public sector is possible! A change is currently neither in progress nor planned!!

For more information see:
https://https://www.biologen.bz.it/de/studenteninfo

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Content

1) Overview of modules, lectures and practicals

2) Research areas for the MSc thesis

3) Career opportunities

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MSc Botany

Department of Botany, Faculty of Biology,
University of Innsbruck

scope and duration:

120 ECTS-points

- corresponds to 4 Semesters

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Compulsory modules

x 3, (two in connection with the MSc thesis)

- **Guide to scientific work (15 ECTS)**

Formulating the scientific question of the master's thesis, developing hypotheses, testing these hypotheses with suitable methods

- **Selected topics in plant science (Botanical Seminar: 1,5 ECTS; Botanical Colloquium: 1 ECTS)**

presentation of own research results; structuring and design of publications

- **Defense of the MSc thesis (2.5 ECTS)**

Oral defense of the master's thesis in front of an examination board

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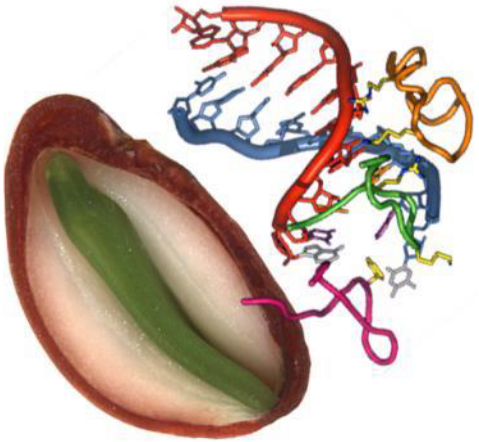
Optional modules

Various optional modules make up **100 ECTS**



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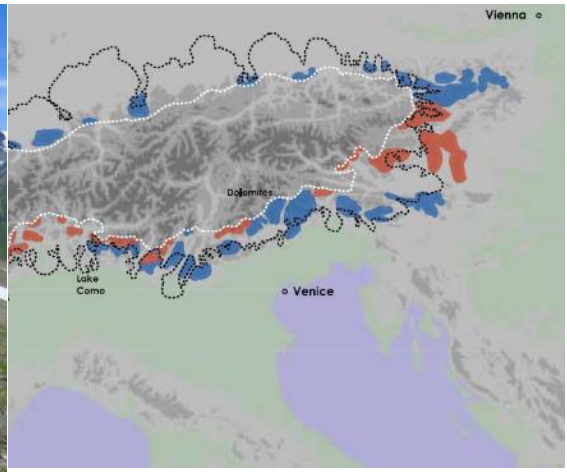
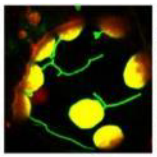
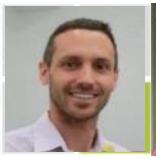
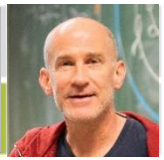
- **Plant diversity of selected native habitats**
- **Plant diversity and systematics**
- **Biogeography**





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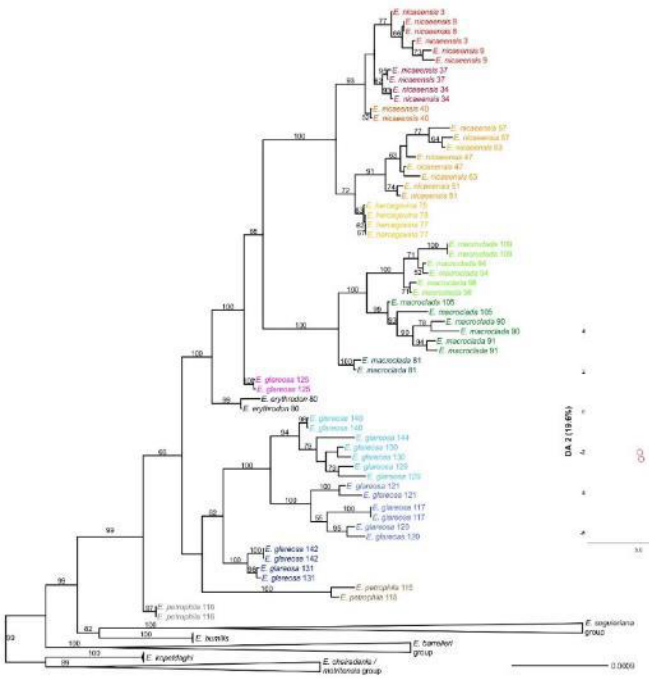
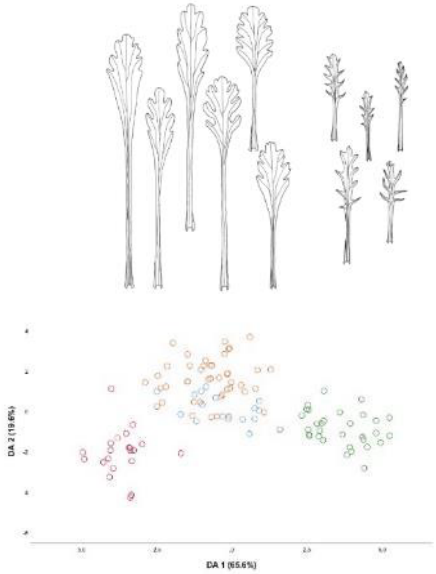
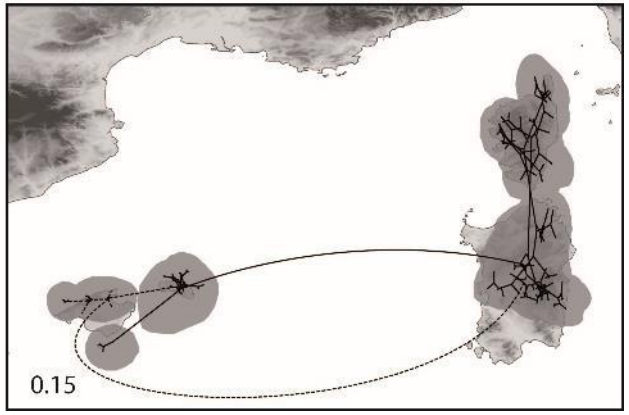
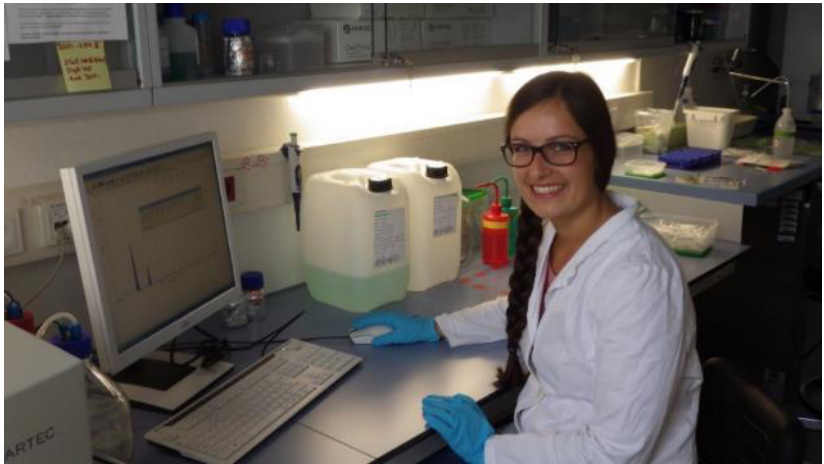
- **Methods of evolutionary research, plant systematics and biogeography**









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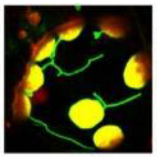
- **Biodiversity in transition**

Anthropogenic flora and vegetation

Management

Man and environment

Neobiota

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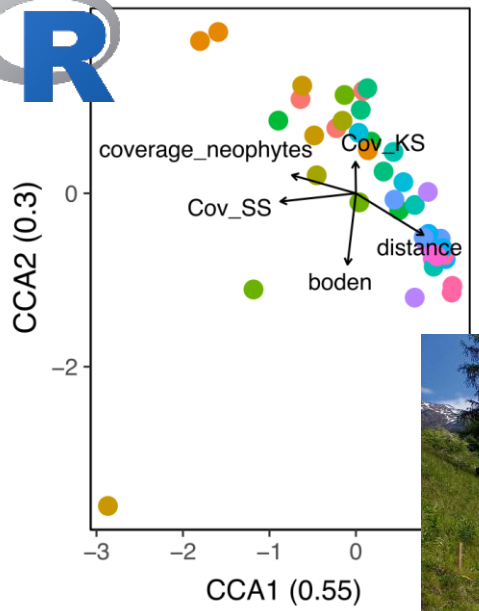
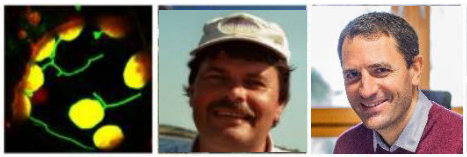
- **Vegetation analysis I**
- **Vegetation analysis II**









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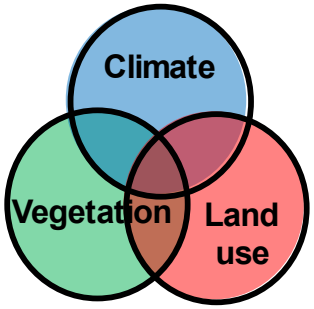
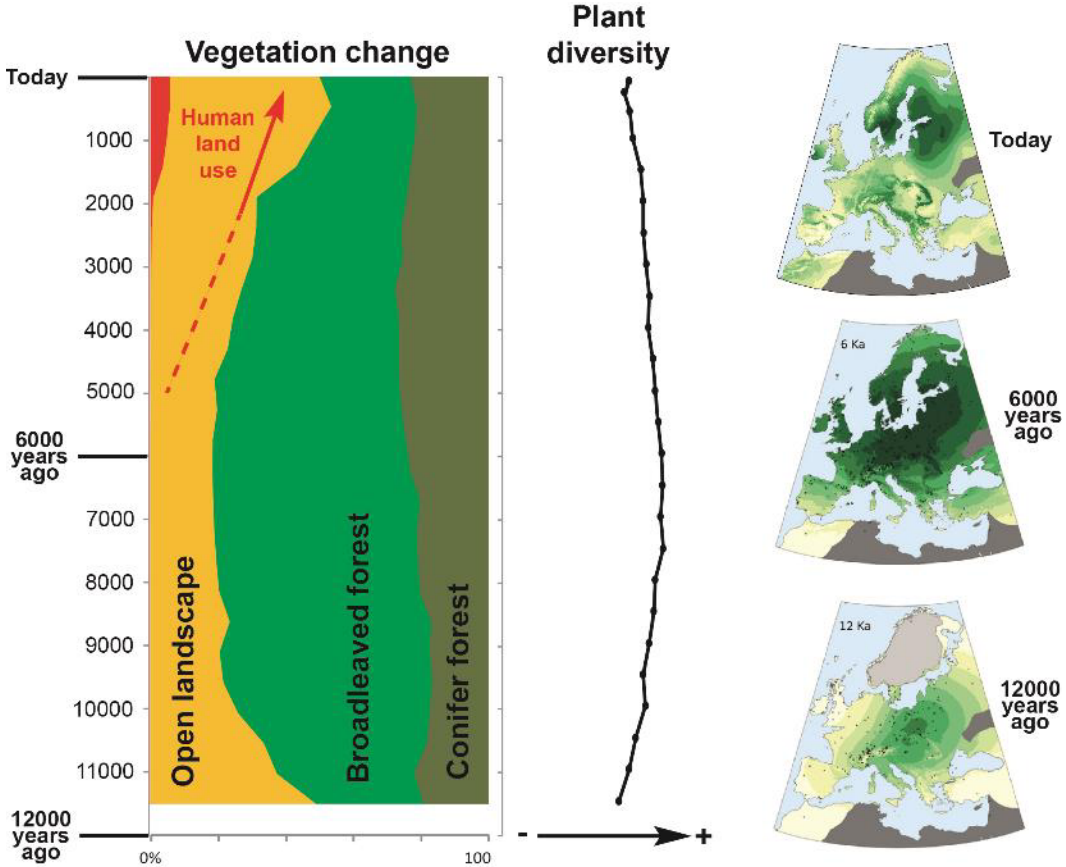
- **Vegetation in transition I**

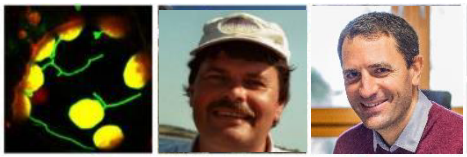
Palaeoecological concepts and methods

Vegetation und climate change in the quarternary / Paleoecology



Sediment cores





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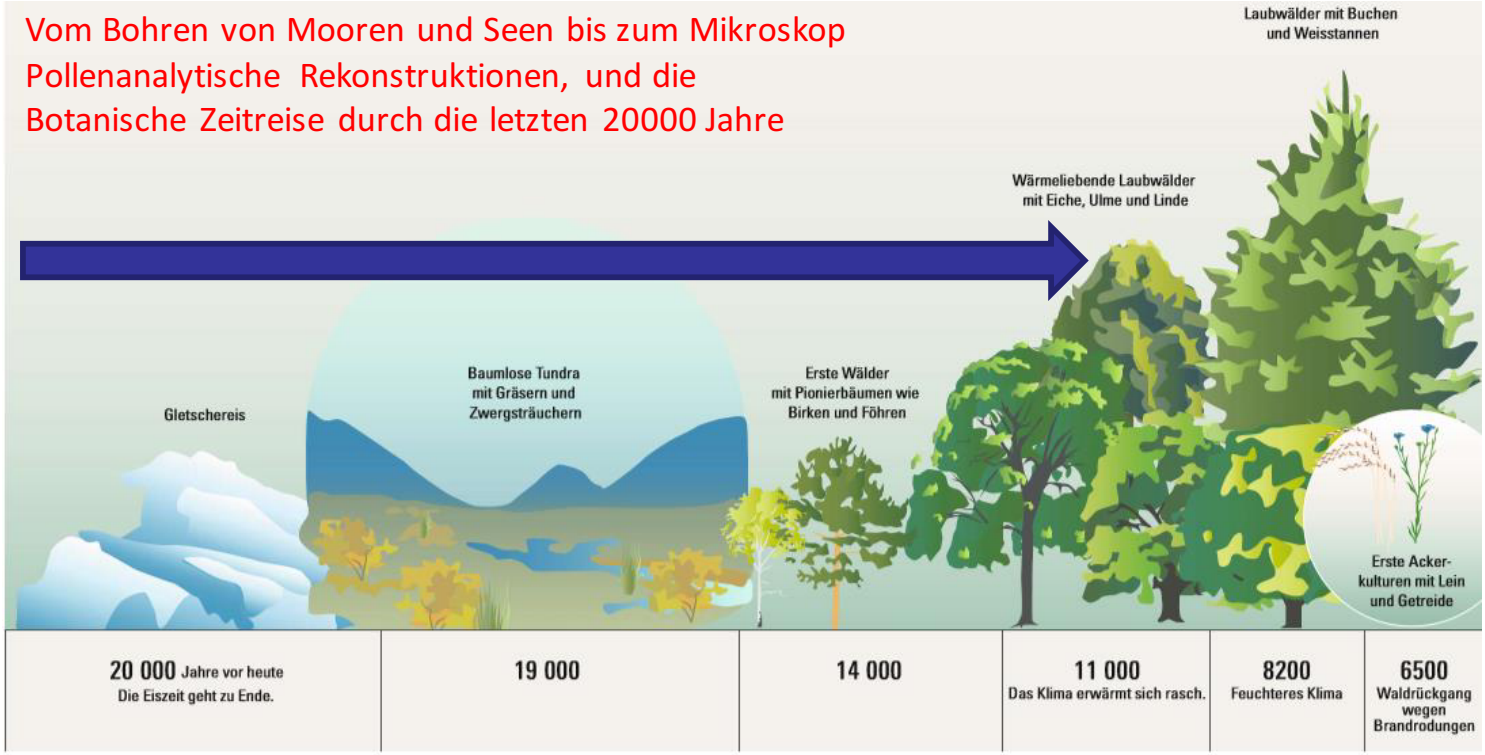
- **Vegetation im transition II**

Palynology and Archaeobotany: The Human Factor
Holocene vegetation development in Central Europe
Paleoecology

→ Vom Bohren von Mooren und Seen bis zum Mikroskop
→ Pollenanalytische Rekonstruktionen, und die
→ Botanische Zeitreise durch die letzten 20000 Jahre



QUELLE: VEGETATION HISTORY AND ARCHAEOBOTANY 26, 571–586 (2017)

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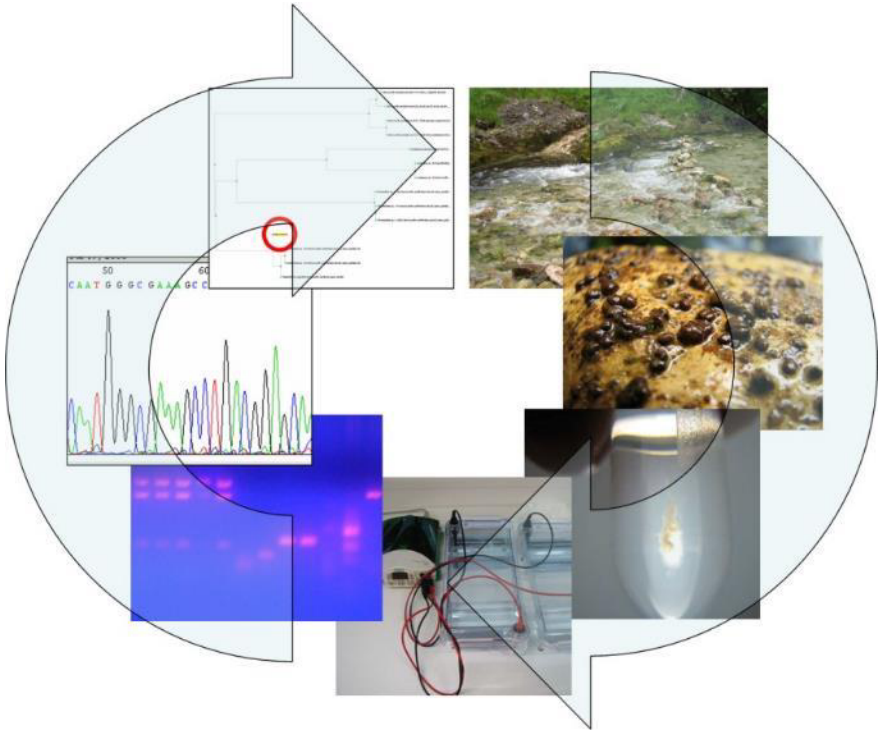
- **Hydrobotany**

Molecular Taxonomy & Ecophysiology of algae



Combination of traditional taxonomic and molecular taxonomic investigations for the functional and ecological evaluation of running waters

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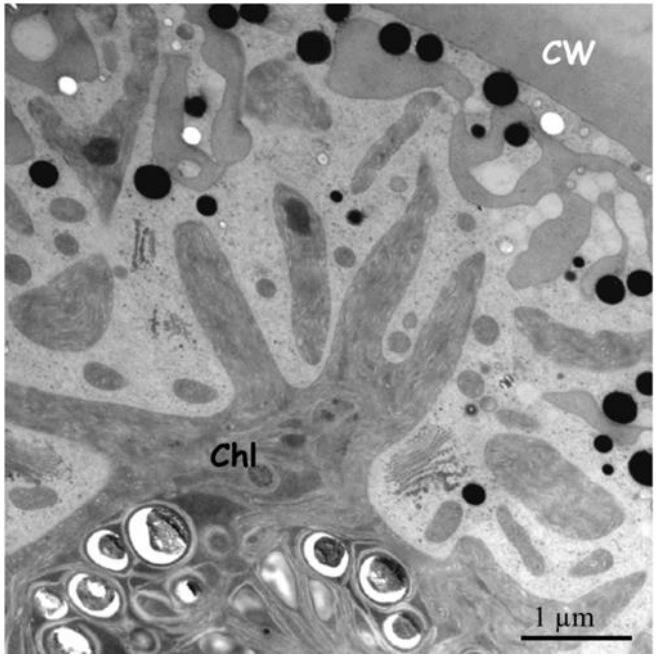
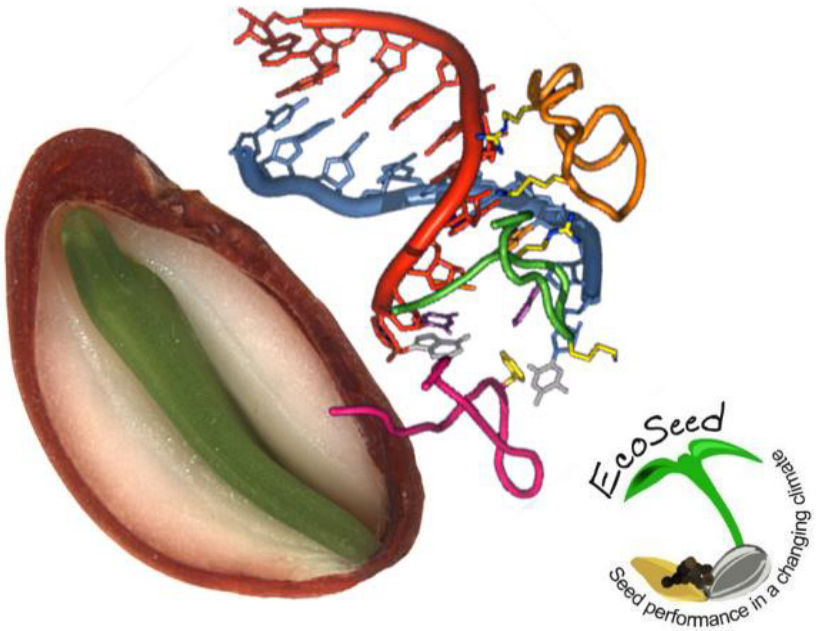
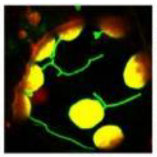
- **Cell biology**
- **Physiology I: metabolism and biochemistry**



Green algal cell in the transmission electron microscope



Impact of climate change on seed quality



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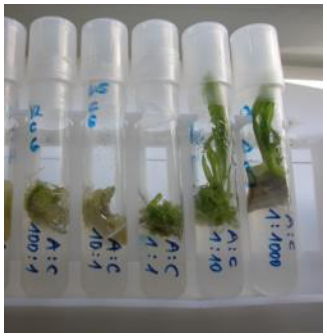
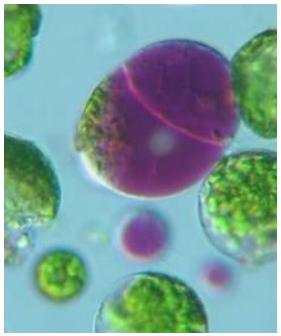
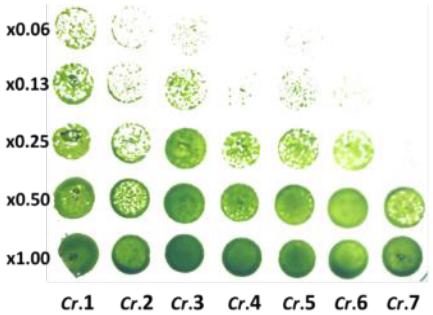
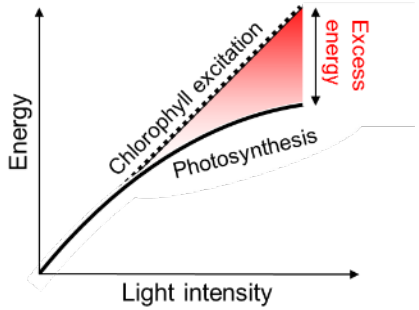
- **Physiology II: Development**
- **Physiology III: Stress**



Tissue culture, phytohormone analyses, field work in the Alpine Garden, Patscherkofel

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- **Ecophysiology I: Plants and environment**
- **Ecophysiology II: Alpine plants**

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- **Ecophysiology III: Forestry and Agriculture**

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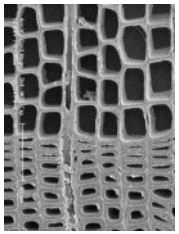
- **Ecophysiology IV: Tree growth**

Climate and environmental factors on growth processes

Tree ring analysis - wood formation - growth physiology



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Optional modules

In addition to the optional modules offered by the Dept. of Botany, the following can also be chosen:

- **Scientific theory and gender studies (7,5 ECTS)**
- **Selected Chapters of Botany I (2,5 ECTS)**
- **Selected Chapters of Botany II (5 ECTS)**
- **Module from another MSc program at the Faculty of Biology (5 ECTS)**
- **Interdisciplinary competencies (7,5 ECTS)**

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Which courses are taught in English?

MODUL	English	
Pflichtmodul 2: Botanisches Seminar / Botanisches Kolloquium	1	
Wahlmoldul 3: Pflanzensystematik und Biogeographie	1	3
Wahlmoldul 4: Biogeographie	1	
Wahlmodul 14: Physiologie II: Entwicklung	1	
Wahlmodul 15: Physiologie III: Stress	1	2
Wahlmodul 13: Physiologie I: Stoffwechsel und Biochemie	2	1
Wahlmodul 6: Vegetations- und Populationsökologie	2	
Wahlmodul 7: Vegetationsanalyse I	2	
Wahlmodul 8: Vegetationsanalyse II	2	
Wahlmodul 11: Hydrobotanik	2	
Wahlmodul 12: Zellbiologie	2	
Wahlmodul 17: Ökophysiologie II: Alpine Pflanzen	2	
Wahlmodul 9: Vegetation im Wandel I	2	3
Wahlmodul 10: Vegetation im Wandel II	2	3
Wahlmodul 1: Pflanzendiversität einheimischer Lebensräume	3	
Wahlmodul 2: Pflanzendiversität und -systematik	3	
Wahlmodul 5: Biodiversität im Wandel	3	
Wahlmodul 16: Ökophysiologie I: Pflanze und Umwelt	3	
Wahlmodul 18: Ökophysiologie III: Land- und Forstwirtschaft	3	
Wahlmodul 19: Ökophysiologie IV: Baumwachstum	3	

(1) Taught in English
(2) can be if required
(3) Taught in German, but help for those that don't speak it

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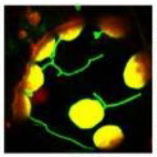
Content

1) How is the MSc constructed?

2) Research projects as part of the MSc Botanik

3) Career opportunities

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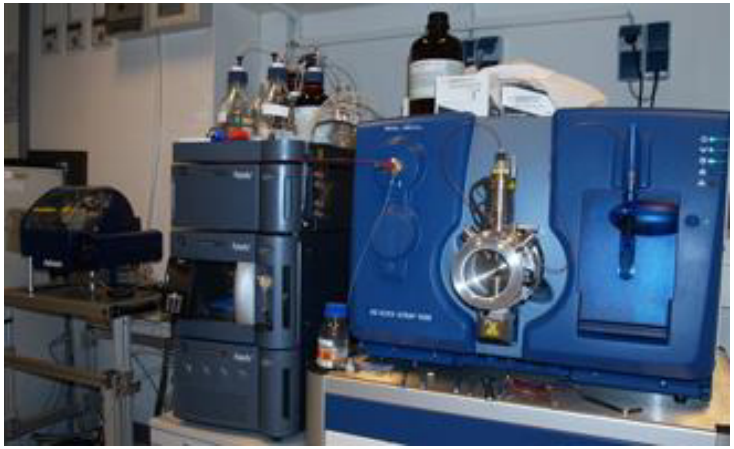
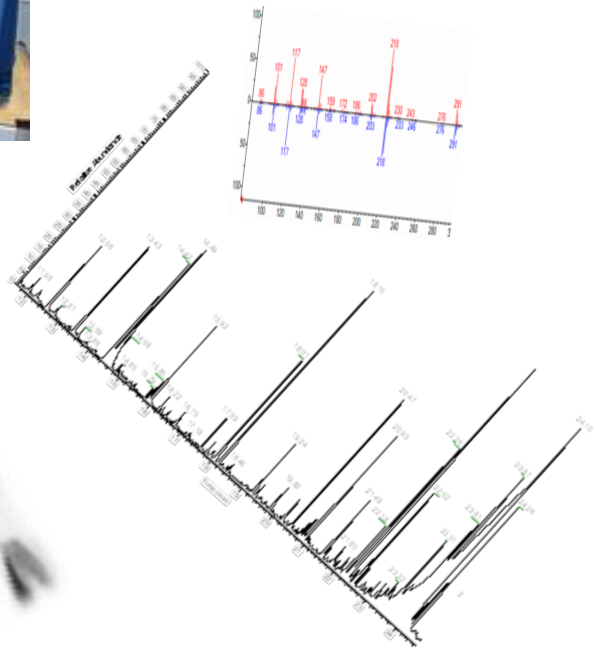
Research group: Stress metabolism



Mass spectrometry

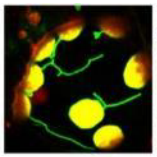


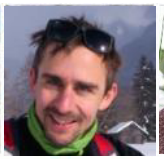
Aminosäuren?

Zitronensäurezyklus?

Phosphorylierte Zucker?

EcoSeed – Seed performance in a changing climate



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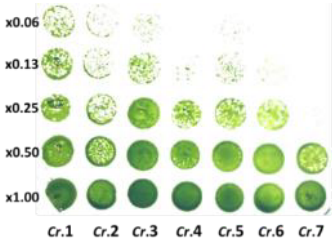
Research group: Stress metabolism

Photosynthesis

Western blotting



Antioxidants

HPLC

ROS

Mass spectrometry

Seed micorbiota

desiccation tolerance

Contents lists available at ScienceDirect

Free Radical Biology and Medicine

journal homepage: www.elsevier.com/locate/freeradbiomed

ELSEVIER

Beste pflanzwissenschaftliche Master-Arbeit
Uni Innsbruck 2021

DBG Deutsche Botanische Gesellschaft

Distress and eustress of reactive electrophiles and relevance to light stress acclimation via stimulation of thiol/disulphide-based redox defences

Thomas Roach*, Wolfgang Stöggl, Theresa Baur, Ilse Kranner

Department of Botany and Centre of Molecular Biosciences, Leopold-Franzens-Universität-Innsbruck, Sternwartestrasse 15, 6020 Innsbruck, Austria

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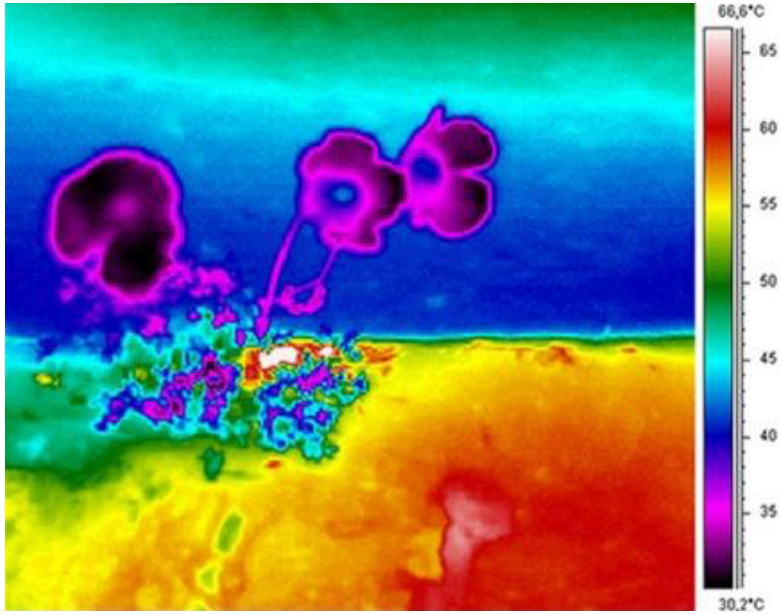
Research group: Stress physiology

Plants and temperature

Ice management and **Supercooling (FWF 34844-B)**

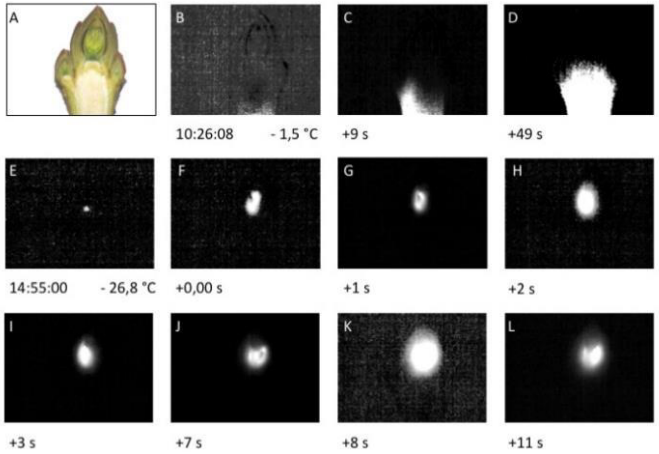
water use in heat waves (FWF 34717-B)

Alpine poppies - does the cuticle melt in the heat?



Infra-red image

Norway maple buds supercool down to -26.8°C

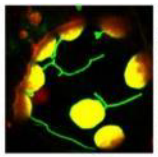


ORIGINAL ARTICLE

WILEY

Deep supercooling enabled by surface impregnation with lipophilic substances explains the survival of overwintering buds at extreme freezing

Gilbert Neuner | Benjamin Kreische | Dominik Kaplenig | Kristina Monitzer | Ramona Miller



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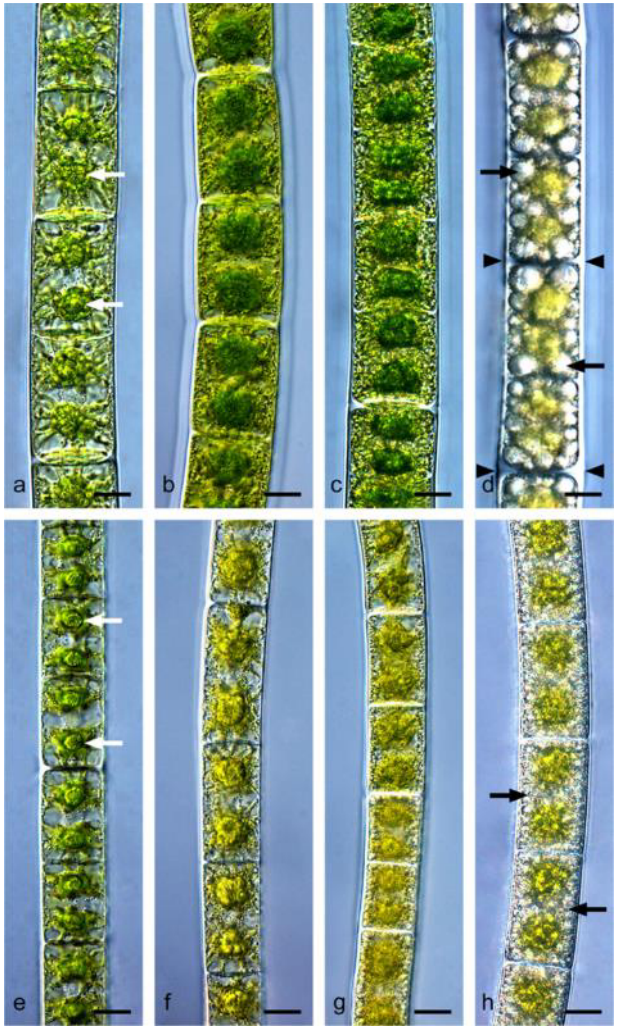
Research group: Cell biology

Cell biological basis for stress tolerance (desiccation, UV) in green algae & various alpine plants

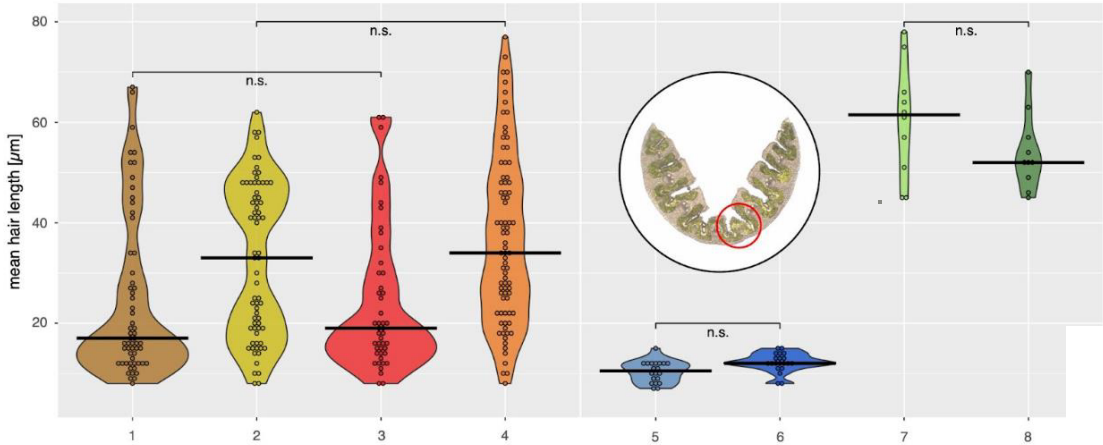
12 wissenswert Dienstag, 11. April 2017

Urahnen der Landpflanzen

Grünalgen zählen zu den ersten Pflanzen, die die Erde besiedelt haben. Die Strategien, die ihnen bei ihrem Landgang vor circa 450 Millionen Jahren dabei geholfen haben, machen sie auch heute noch extrem widerstandsfähig.



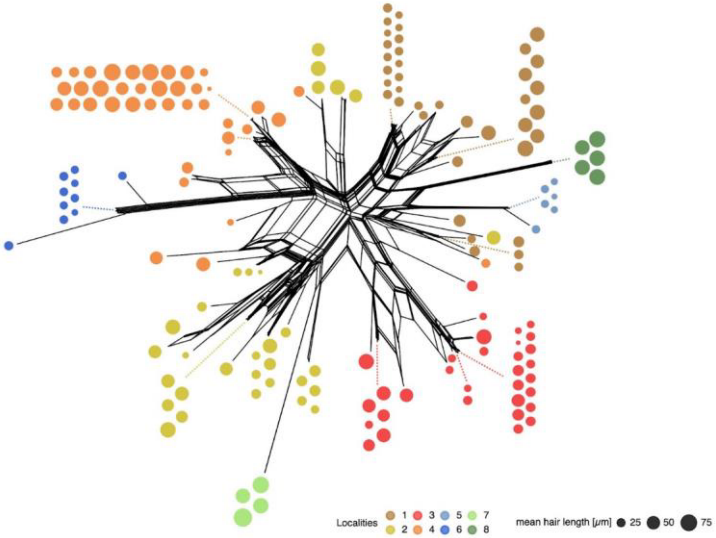
Research group: Biodiversity

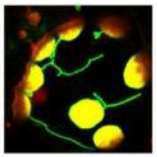


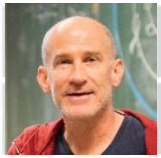
Population 1
mean hair length: 37 μm

Population 6
mean hair length: 8 μm

Population 7
mean hair length: 68 μm





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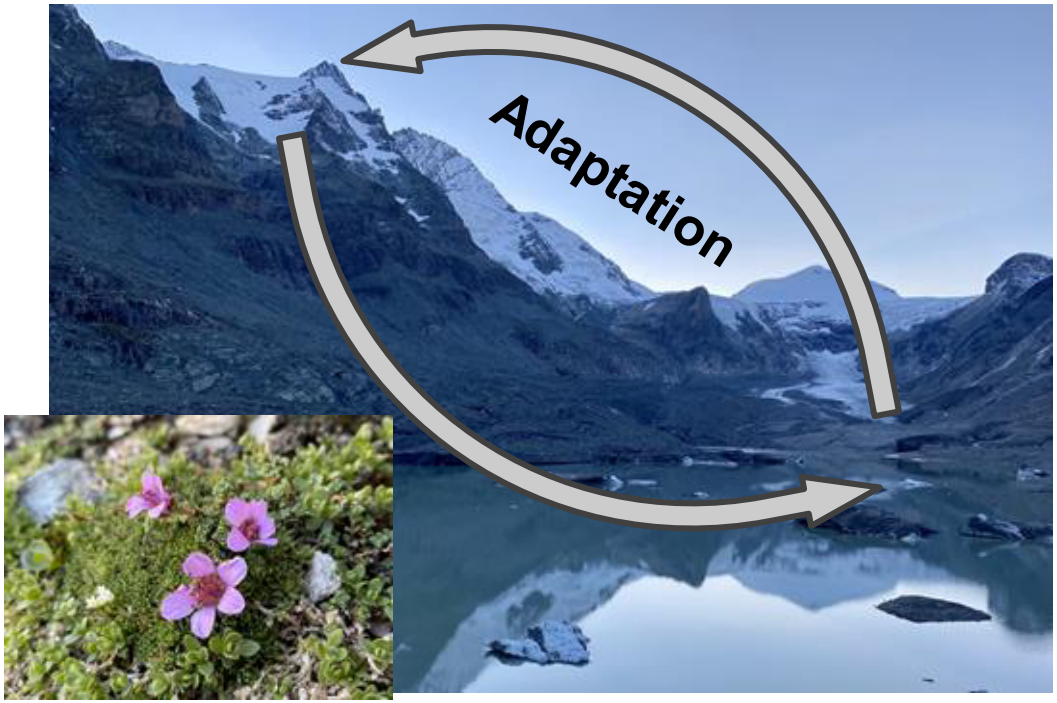
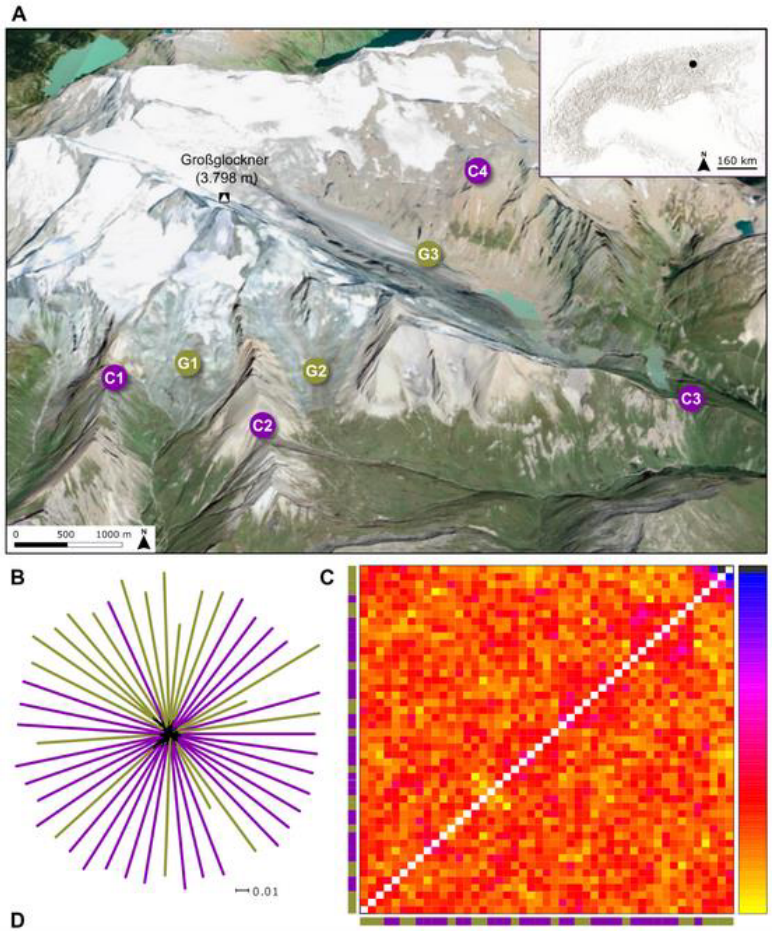
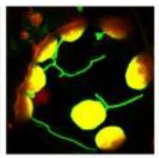
Research group: Biodiversity





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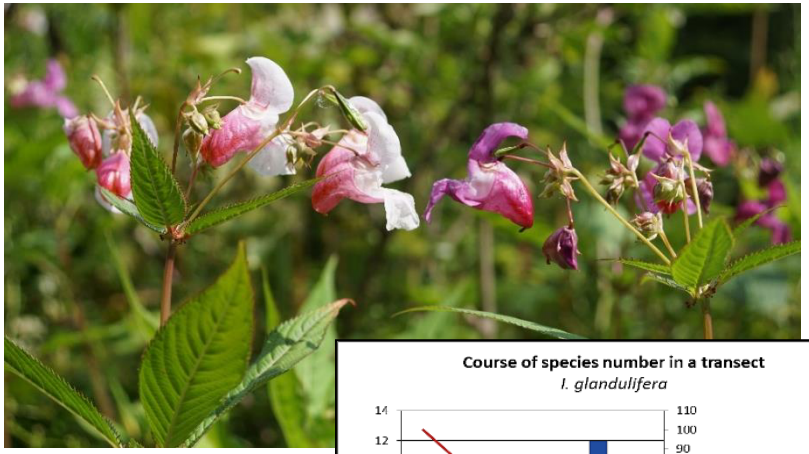
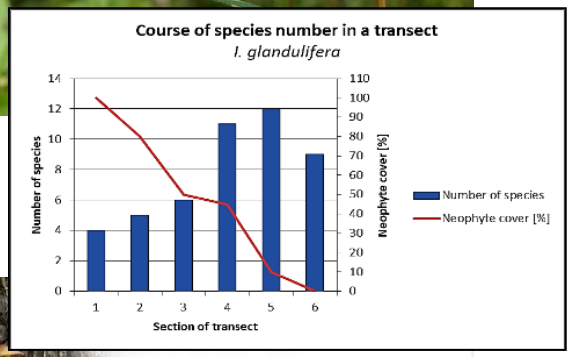
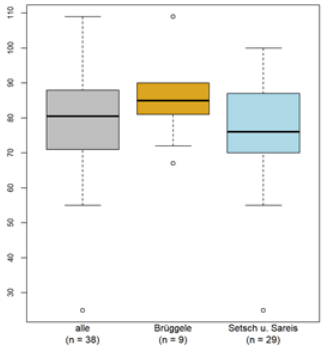
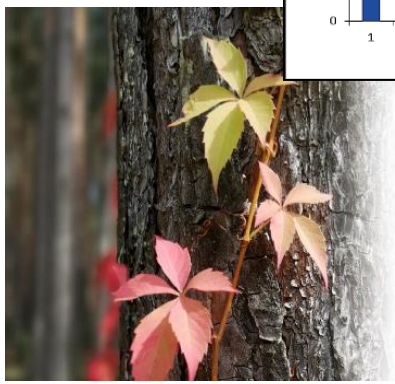
Research group: Biodiversity

Naturpark Karwendel









Risikoabschätzung & Managementstrategie für Neophyten in Südtirol

Eine Erhebung zum Gefahrenpotential von invasiven Arten in Südtirol

inatura

Natur, Mensch und Technik erleben

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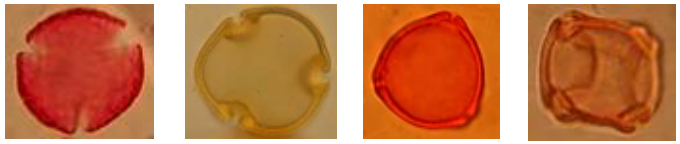
Research group: Vegetation Modelling

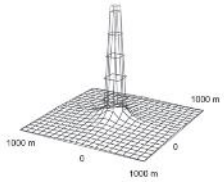
Pollen-based land cover modelling to reconstruct past vegetation and plant diversity

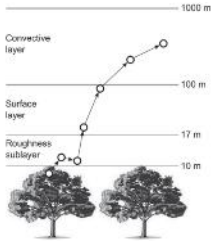
Fossil pollen



Theory of pollen analysis

Production





Dispersion

Deposition

$$\hat{V}_i = \frac{n_{i,k} \Big/ \hat{\alpha}_i \int_R^{Z\max} g_i(z)dz}{\sum_{j=1}^{m} \left(n_{j,k} \Big/ \hat{\alpha}_j \int_R^{Z\max} g_j(z)dz \right)}$$

Pollen-based modelling

Today landscape

1000 years ago Medieval period

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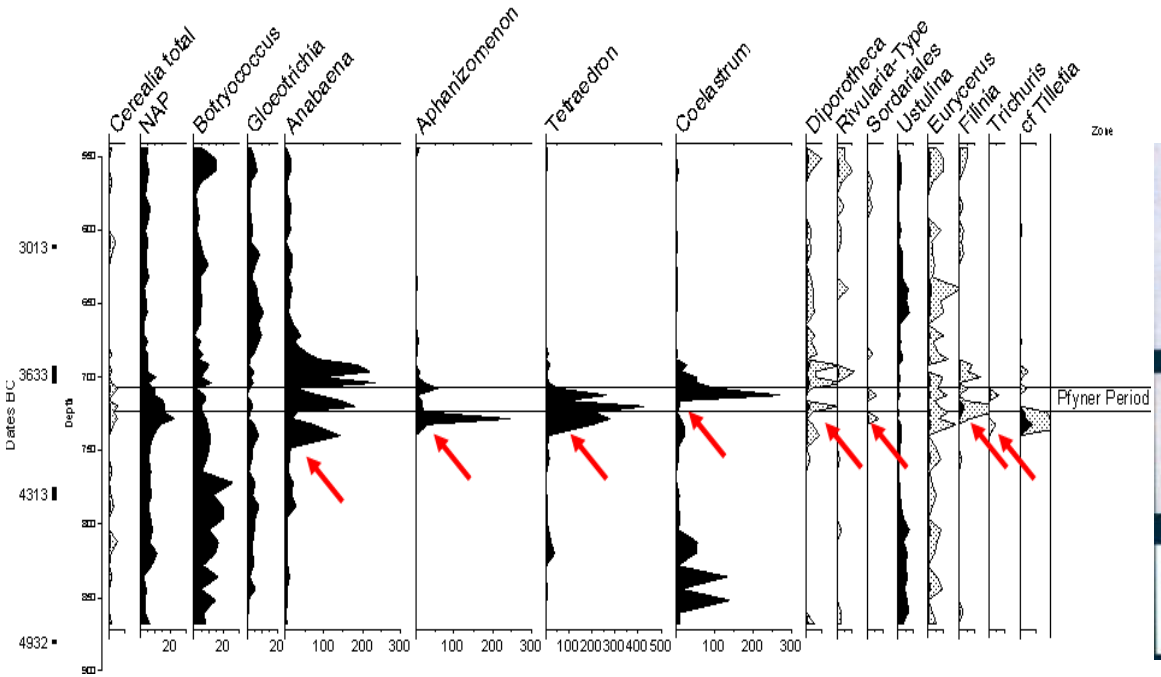
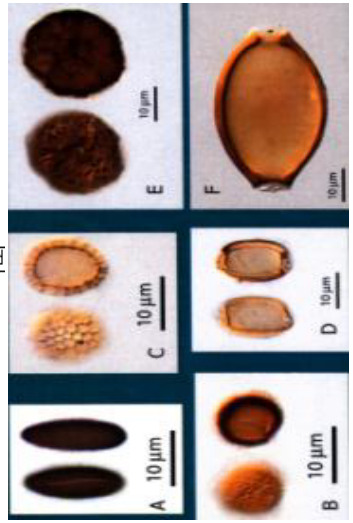
Research group: Paleontology und Archaeobotany

Quaternary phytodiversity change due to climatic and anthropogenic factors





Nussbaumersee (CH): Rapid eutrophication 5700 years ago, and rapid lake recovery after abandonment of the pile dwelling settlements!

Haas & Hadorn 1998, Magny et al. 2007, 2009,
Haas & Wahlmüller 2010, Hillbrand et al. 2012, 2014

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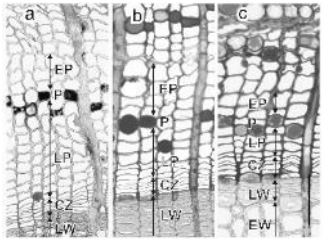
Research group: Dendroecology und Tree physiology

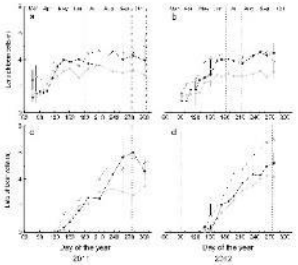
Research focus:

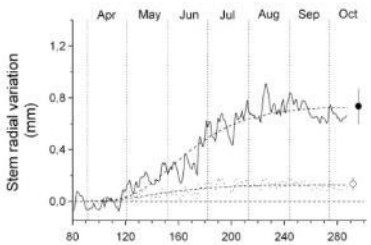
Influence of environmental factors on tree growth in extreme locations

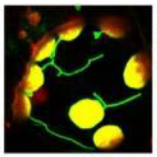
Analyses

- Growth trend and response to climate extremes
- Cambium activity and cell differentiation
- Stem water balance and growth processes











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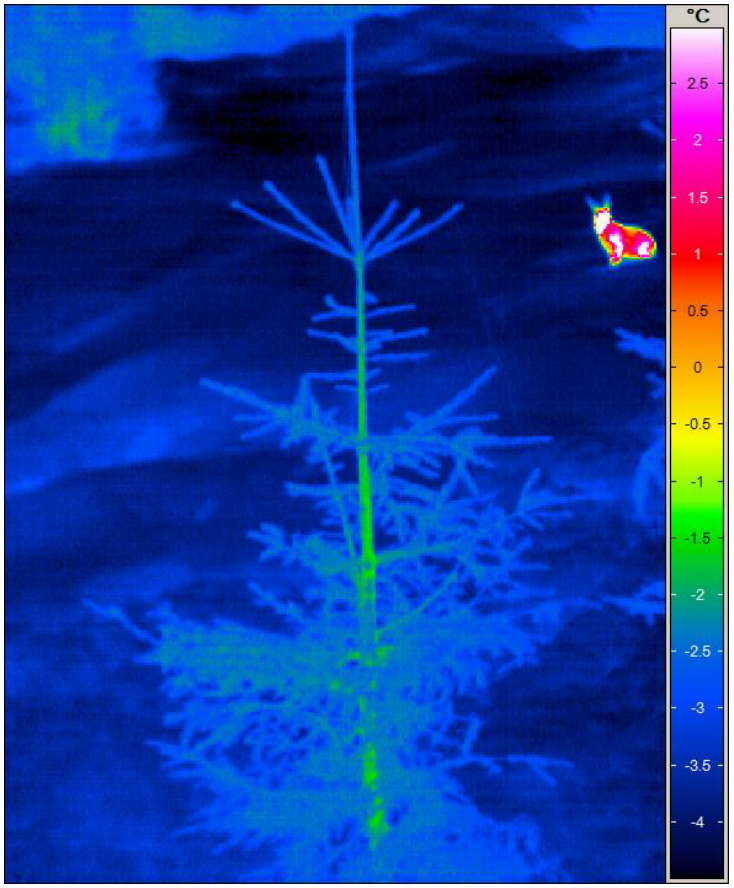
Research group Ecophysiology



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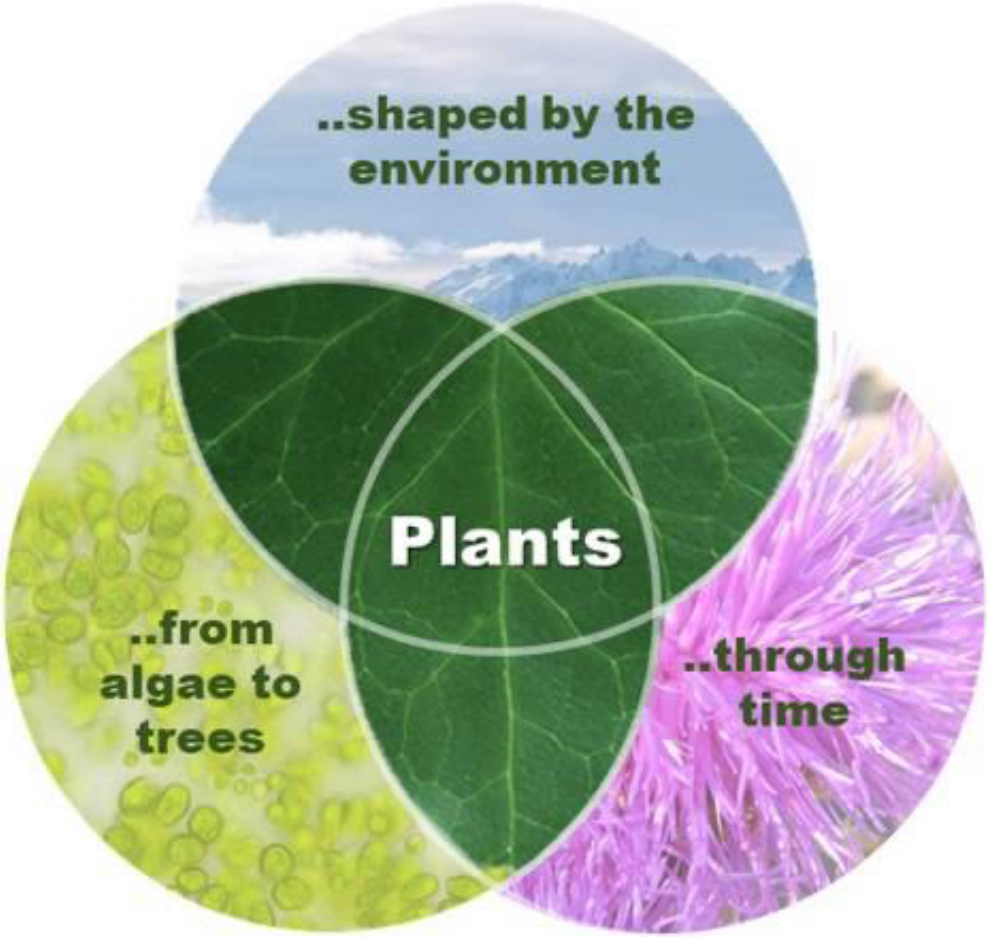

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Content

1) How is the MSc constructed?

2) Research projects as part of the MSc Botanik

3) Career opportunities

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3) Karrieremöglichkeiten

1. **Research:** university and non-university (museums, EURAC, agricultural research institutes; national park/nature park management; other areas of life sciences, e.g. pharmacy, forestry and agriculture)

2. **Nature-** und **Environmental protection**

3. **Technical office work** und **engineering** (self-employed / company)

4. **Other lab opportunities** (e.g. Environmental analysis, limnology, seed industry, molecular biological laboratories)

5. **Transdisciplinary**: adult education; science journalism

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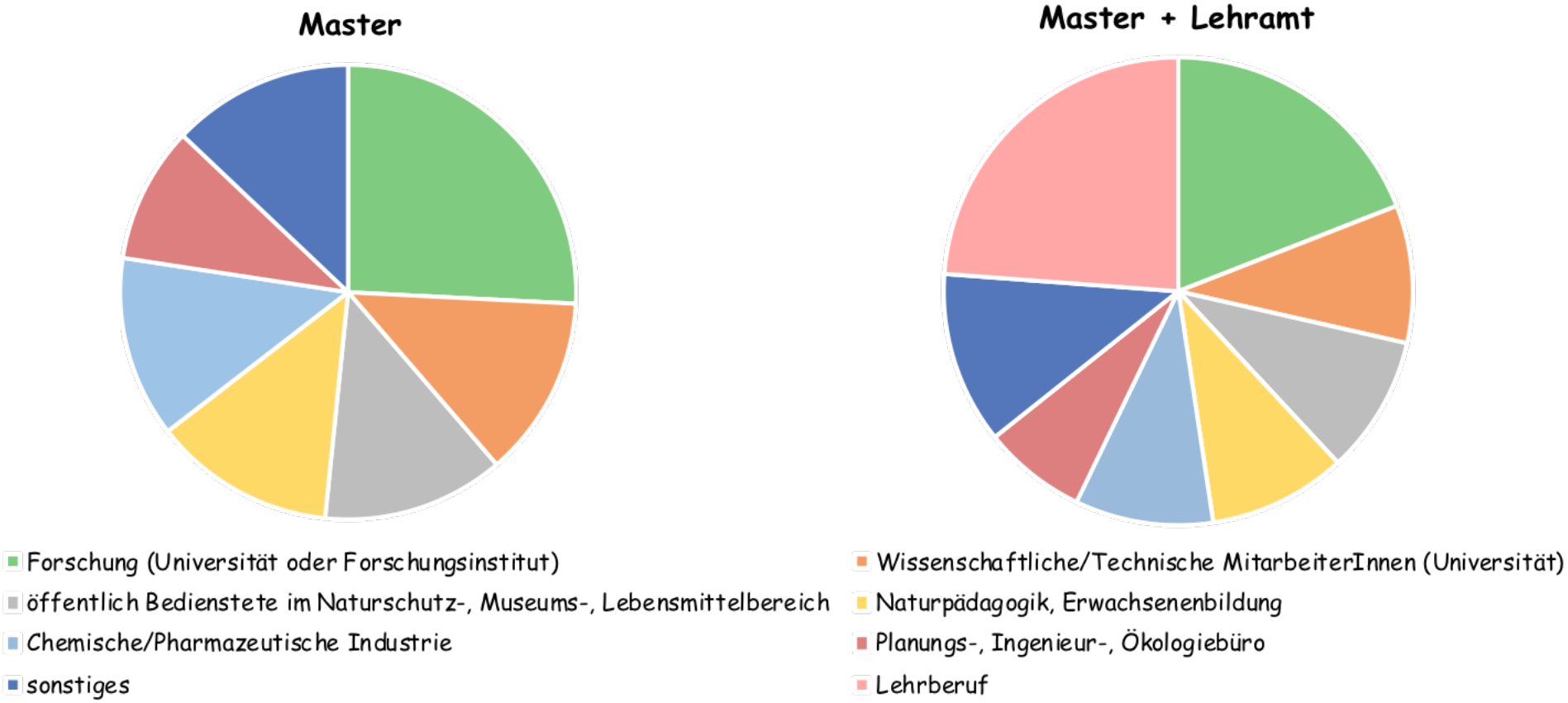
3) Career opportunities - graduate survey



Where do our graduates work now?

n=38 Students (MSc Botanik, Lehramt-MSc with Botany, Diplomarbeit at the Dept. for Botany)

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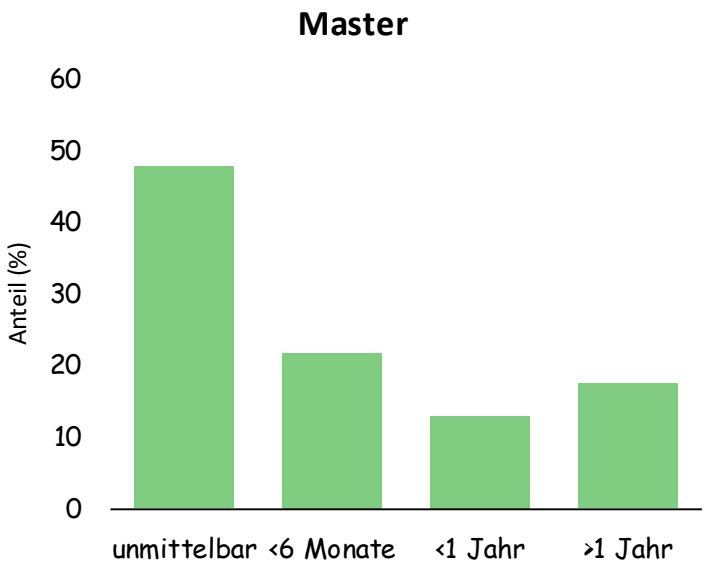
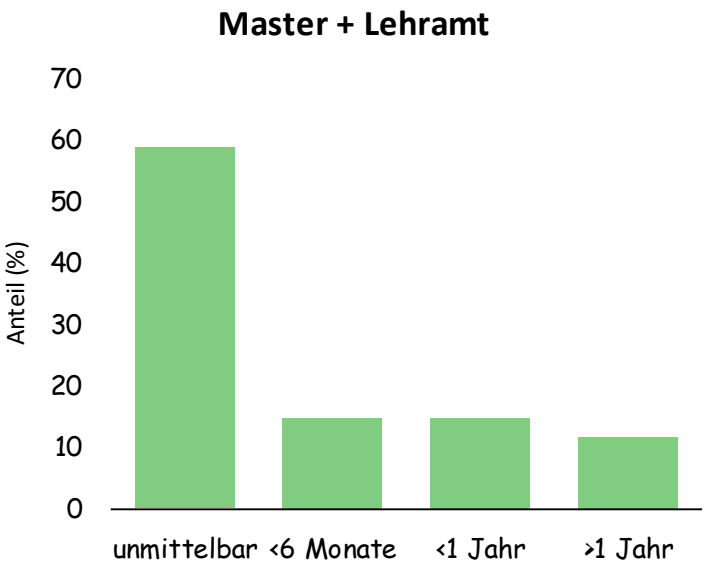
3) Career opportunities - graduate survey





How long did the job search take?

n=38 Students (MSc Botanik, Lehramt-MSc with Botany, Diplomarbeit at the Dept. for Botany)

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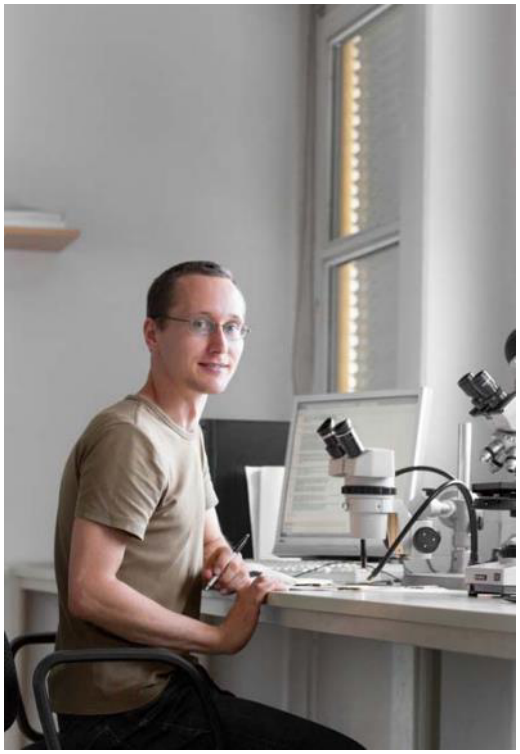
3) Career opportunities – selected examples

Adriano Losso
Research Fellow at Western Sydney University



Michael Thalinger
Curator, Tiroler Landesmuseen

Research: universities, museums, pharmacy, forestry and agriculture

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3) Career opportunities – selected examples

Bayerische Akademie für Naturschutz und Landschaftspflege

Lisa Silbernagl
Stellvertretende Fachbereichsleiterin
Bayerische Akademie für Naturschutz und Landschaftspflege

NATURPARK TIROLER LECH

Lena Nicklas
Geschäftsführung
Naturpark Tiroler Lech

Elisabeth Falkeis
Naturschutz und Projekte
Naturpark Kaunergrat

Nature and environmental protection

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3) Career opportunities – selected examples

Agnes Erler
Bundesministerium für Klimaschutz, Umwelt, …

Nature and environmental protection

1. **Environmental departments/nature conservation departments of the federal states, Federal Environment Agency**
2. **Protected area management, protected area supervisor (country)**
3. **district authorities, municipalities**
4. **Agricultural and forest departments, waste and landfill management**
5. **Water management (water ecology, water quality)**
6. **NGOs: WWF, Greenpeace, Natopia, ÖAV, etc.**

nature and environmental protection

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3) Career opportunities – selected examples

http://www.oekoteam.at

Iris Trenkwalder
Atelier Gstrein

Technical and engineering positions

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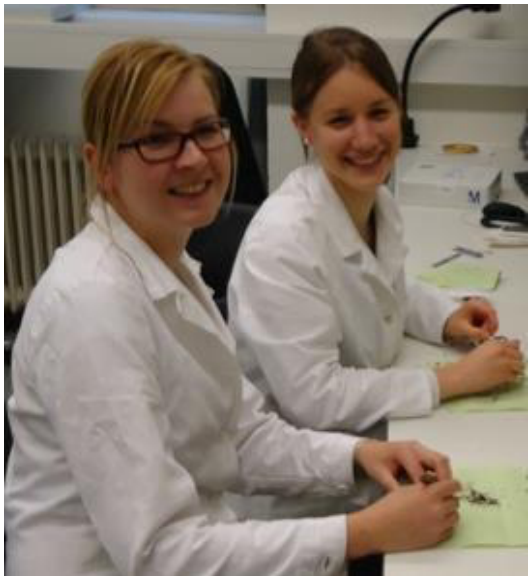
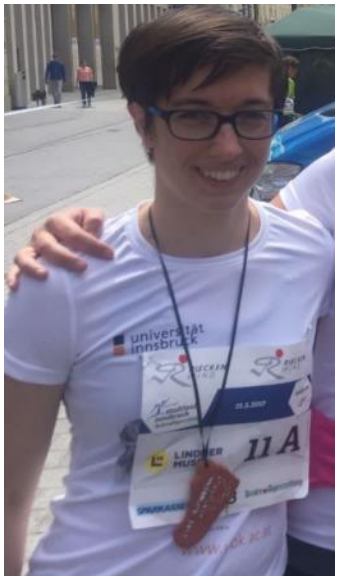
3) Career opportunities – selected examples





Christina Schausberger, Quality control, Richter Pharma
Fabiola Morscher, Pharmacist
Theresa Baur, QS officer, Kalb Analytik
David Clara, Eurofins Genomics

Divisions with laboratory requirements
(environmental analysis, seed industry, molecular biological laboratories, scientific services)

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3) Career opportunities – selected examples

Karin Kompatscher
Curator und garden teacher
Schloss Trautmannsdorf

Ramona Roach
Nature teacher
Grüne Schule, Uni Innsbruck

Bildung

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Summary: Why study MSc Botanik?

Broad range of study opportunities

Excellent supervisory relationship

Cooperation with non-university organizations

Good chances with finding a job

Strong involvement in research projects and networks

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MSc Botanik

... and we look forward to interested students!