
TOBIAS HOFMANN

Last Updated: June 16th, 2016

Department of Biological and Environmental Sciences
Carl Skottsbergs gata 22B
41319, Göteborg, SWEDEN

Mobile: +46 (0) 76 090 1106

E-mail: tobias.hofmann@bioenv.gu.se

GitHub: <https://github.com/tobiashofmann88>

Born 22.11.1988 in Munich, Germany

Currently resident in Sweden

Married since 2013



KEYWORDS EXPERTISE

- Advanced Phylogenetics
- Next Generation Sequencing
- Bioinformatics
- Evolutionary Biology
- Macroevolution

EDUCATION

- Master of Science, Systematics and Biodiversity (Nordic Academy of Biodiversity and Systematics (NABiS)), Gothenburg University, graduated June 5th, 2015
- Bachelor of Science, Biosciences, University of Münster (WWU), Germany, graduated August 15th, 2012

LANGUAGES

- English, German: Fluent
- Swedish: Basic

CURRENT POSITION

PhD student at Gothenburg University (February 2016 - today):

Within my PhD project “The Rise and Fall of Species” I am investigating the dynamics of speciation, extinction and species turn-over on broad taxonomic, geographic and temporal scales. I am particularly interested in understanding which biotic and abiotic factors majorly shaped the evolution of life on earth in the past. I therefore am applying genetic data of the present biodiversity and fossil occurrences of the past, using and developing new bioinformatic approaches that are capable of handling big data.

PREVIOUS POSITIONS

Research Assistant at Gothenburg Botanical Garden (July 2015 - December 2015):

Located at the Department of Biological and Environmental Sciences at Gothenburg University, I worked as the main author on the completion of several research projects aimed for publication. Further I programmed a largely automated workflow for the processing and analysis of NGS data (https://github.com/AntonelliLab/seqcap_processor). Additionally I assisted in processing and analysis of Sequence-Capture datasets.

THESES/DISSERTATIONS

Master thesis:

Misled by the mitochondrial genome - A phylogenetic study in Topaza hummingbirds

Within this project I investigated the population structure of *Topaza* hummingbirds in relation to the Amazon River as a natural landmark and possible barrier. Using a multilocus NGS dataset, I found considerable genetic structure within one of the two recognized species of this genus, leading to the definition of two distinct subspecies, which are divided by the river. Further, I found a strong discrepancy of the mitochondrial tree with the multilocus nuclear species tree; within my thesis I discuss possible reasons for this discrepancy and the general suitability of mitochondrial sequences as phylogenetic markers.

Supervisors: Alexandre Antonelli (Professor) & Urban Olsson (Professor)

Gothenburg University, Department of Biological and Environmental Sciences

Completion: June 5th, 2015

Bachelor thesis:

Evolutionary ecology of immune priming – A bacteria liquid growth inhibition assay for Tribolium castaneum

This project was aimed towards developing a new method to quantitatively measure the humoral (non-cellular) immune response of the red flour beetle (*T. castaneum*) as an invertebrate model organism in response to infections with different strains of bacteria. It could be shown that in individual cases the hemolymph of bacteria primed individuals had a stronger

inhibitory effect on the growth of liquid bacteria cell cultures than the hemolymph of the untreated control group.

Supervisors: Joachim Kurtz (Professor) & Sophie Armitage (Postdoc)

University of Münster (WWU), Institute for Evolution and Biodiversity

Completion: August 15th, 2012

EXPERIENCE

RESEARCH EXPERIENCE

Master project (2013-2015)

Gothenburg University

- Advanced labwork experience of library preparation and sequence capture as preparation for Illumina sequencing, including also DNA-extraction & purification, Nanodrop, Tapestation, Gel-electrophoresis and PCR amplification
- Programming and scripting experience (Python and Bash) concerning the processing and analysis of Illumina NGS data
- Expertise in a broad range of advanced phylogenetic and population genetic programs and methods (see list below)
- Basic knowledge of data visualization and plotting in R

Tropical Biology Course, Madagascar (November-December 2014)

Tropical Biology Association, Cambridge, UK

- Gained experience to discuss and collaborate in a very diversely international group of researchers
- Application of a variety of biological fieldwork techniques
- Learned a substantial amount about the Malagasy fauna and flora, evolutionary history and the interesting story of its relatively recent human occupation and the unique genetic setup of Malagasy people
- Designed and carried out an individual research project on pollination ecology of a vine species (*Adenia firingalavensis*) in the deciduous dry Kirindy forest in Western Madagascar

Erasmus Exchange Semester (2011-2012)

Midsweden University (MIUN), Sundsvall, Sweden

- Increased experience in an international learning environment
- Built up my experience in academic writing and accessing and reviewing scientific literature
- Carried out an individual research project about the ecology and distribution of the freshwater crayfish *Astacus astacus* in central (geographically) Sweden, thereby gaining experience in field methods and data analyses (including statistical tests, plotting, etc.)

Bachelor project (2012)

University of Münster (WWU), Germany

- Planned and carried out a complex laboratory study in order to develop a new laboratory technique to measure the immune response of invertebrates (see description above), thereby gaining experience in project design and various basic laboratory techniques (pipetting, setting up liquid bacteria cultures, fine-scale measuring, centrifuging, general lab rules) and in writing a scientific report/publication

COMPUTATIONAL SKILLS

Developer - List of programs which I developed/ participated in development:

- **SeqCap-Processor**: Pipeline for processing Sequence-Capture Datasets (NGS)
- **IUCN-simulator**: Simulator to estimate future extinctions based on IUCN categories

User - This section contains a list of programs that I am familiar with:

- **Estimating extinction rates**: PyRate
- **NGS data processing**: Phyluce, Trimmomatic, Samtools, CLC-Workbench, Tablet
- **Alignment/Sequence visualization**: Geneious, Mafft, Bioedit
- **Organelle-assembly and -annotation**: DOGMA, ngKlast
- **Tree inference**: BEAST, *BEAST, BEAST2, DISSECT, SNAPP, MPEST, RaxML, MrBayes, Astral, MulRF, STELLS
- **Tree visualization and log-file assessment**: Tracer, FigTree, DensiTree, TreeAnnotator
- **Others**: MySQL, STRUCTURE, jModeltest, PartitionFinder, Mesquite, MCcoal

SUPERVISION

Supervision of Adrian Gimdal, Bachelor project in Macroevolution (15 credits), April-June 2016

Curtains down for man's best friends? A macroevolutionary study on the past, present and future of canids and equids

TEACHING EXPERIENCE

BIO508 "Phylogeny for Evolutionary Biologists" (2016)

Gothenburg University (GU)

- Theory and inference of gene trees and species trees
- Macroevolutionary and biogeographic analyses

ForBio course "Target capture for NGS sequencing" (2016)

Gothenburg University (GU)

- Post-sequencing data processing
- Introduction and practical to bioinformatic tools for Sequence-Capture data

BIO502 "Ornithological identification methodology" (2016)

Gothenburg University (GU)

- Identification skills of Swedish bird fauna in the field
- Handling of live birds for capture, ringing and sampling

NGS-workshop (2015)

Gothenburg University (GU)

- One-day workshop, introducing PhD-students to NGS processing pipeline SeqCap-Processor (developer)
- Covering trimming, filtering and assembly of NGS data

Tutor of Bachelor course in Physics (2011)

University of Münster (WWU)

- Practiced lecture design, using different interactive teaching methods
- Interacted with examining Professor about course contents and correction of exams
- Transferred knowledge in Physics for Natural Scientists

WORK EXPERIENCE**Surveying Assistant (January-August 2014)**

Surveying-Office Hofmann, 35066 Frankenberg, Germany

- Practical training in surveying landscapes, infrastructure projects (bridges, roads, etc.) and buildings
- Experience with advanced applications as e.g. the digital modeling of 3-dimensional objects (landscapes, etc.)

Military Service (2008-2009)

Electronic Warfare Battalion 932, 35066 Frankenberg, Germany

- Extensive training in functioning as part of a specialized group
- Learned advanced navigation and orientation skills
- Received special training as a radio operator
- Worked in an administrative office job, managing personal, schedules and field trainings

VOLUNTARY WORK EXPERIENCE**Voluntary Work at Nature Camp (July-September 2009)**

Guelph Nature Center, Guelph, Canada

- Educated school children in biology
- Worked in a reforestation program

Voluntary Fireman (2005-2012)

Fire Department in 34477 Berndorf, Germany

- Enhanced capabilities of efficient teamwork in stressful situations
- Completed various special trainings (radio-operator, respiratory equipment)

PRESENTATIONS

- April 2016:** "A novel approach for using Ultraconserved Elements at shallow taxonomic scales"
ForBio annual meeting, NTNU, Trondheim, Norway
- March 2016:** **Invited Talk:** "Applying NGS to Phylogenetics and Biogeography"
SciLifeLab Conference at Chalmers University, Gothenburg, Sweden
- January 2016:** **Invited Talk:** "Phylogenetic Analyses with Ultraconserved Elements - a case study in Topaza hummingbirds"
UMSL, University of Missouri, St Louis, USA
- September 2015:** "How to deal with conservative genes"
Swedish Bioinformatics Workshop (SBW) 2015, Karolinska Institute, Stockholm, Sweden
- July 2015:** "Historical biogeography of the hummingbird genus Topaza" (*)
10th Neotropical Ornithological Congress, Manaus, Brazil
- (*) This presentation, representing my Master's project, was given by Romina Batista. I participated as the main correspondent in the proposal, the content and the structure of the presentation.
- June 2015:** "Misled by the mitochondrial genome - A phylogenetic study in Topaza hummingbirds"
Department of Biological and Environmental Sciences, Gothenburg
Master's thesis defense

ATTENDED COURSES

Phylogenetics:Advanced Phylogenetics (BIO404), 10 credits:

- Proper usage of advanced methods for gene- and species-tree inference, in particular Bayesian methods
- Coalescent theory and related issues, such as incomplete lineage sorting, recombination and hybridization.

Fundamental and molecular systematics (Uppsala), 10 credits:

- Central concepts and principles of phylogenetic analyses and overview of tree inference methods
- Generating, processing and analyzing of molecular data (Sanger sequencing)

Systematic theory:Alphataxonomical principles (BIO401), 5 credits:

- Basics of systematic theory
- Species concepts, naming conventions for animals and plants, importance of reference specimen and correct taxonomic labeling

Ornithological identification methodology (BIO502), 5 credits:

- Identification skills of Swedish bird fauna in the field
- Handling of live birds for capture, sampling and measuring

Historical Biogeography:Diversification in Time and Space (Trondheim), 10 credits:

- Using geographic information in phylogenetic inference (biogeography)
- Introduction to population genetics (Hardy Weinberg frequencies, genetic drift, migration, linkage disequilibrium)

Bioinformatics:Informatics Toolbox for Systematics (Uppsala), 5 credits:

- Useful bioinformatic tools and introduction to programming languages (Perl and R)
- Database operations with MySQL

Others:Applied Project in Biology (BIO331):

- *The ecology of Adenia firingalavensis (Passifloraceae) in Kirindy Forest, western Madagascar:*

This project constituted a field study, carried out in the dry deciduous Kirindy forest in Madagascar, within which we researched particularly the pollination ecology of an unstudied species of vine from the Passifloraceae family. We discovered a complex network of pollinators and seed dispersers, revealing only a small part of the complex ecological interactions in this understudied and extremely drought adapted, unique ecosystem.

- *The effect of admixture on species delimitation with DISSECT:*

Within this additional project I explored and discussed the effect of individuals of admixed (hybrid) origin, on coalescent species delimitation programs, exemplarily portrayed in DISSECT.

International biodiversity resource management (BIO468):

- Political and strategic dimensions of biodiversity resources, covering international conventions and local trade and export restrictions
- Overview of required permits for different part of the world in order to collect biological material

GRANTS RECEIVED

- British Ecological Society (BES) scholarship (May 2014)
- Erasmus+ Study Scholarship for studies abroad (September 2011 – January 2012)

REFERENCES

Dr. Alexandre Antonelli, Professor

PhD supervisor

University of Gothenburg

Department of Biological and Environmental Sciences

Mobile: 070 398 9570

E-mail: alexandre.antonelli@bioenv.gu.se

Dr. Daniele Silvestro, Postdoctoral research fellow

PhD supervisor

University of Gothenburg

Department of Biological and Environmental Sciences

E-mail: daniele.silvestro@bioenv.gu.se