Dr Norman Warthmann
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EMPLOYMENT

2012 – present	Research Fellow (Lecturer, B) in the Borevitz Group at the *Research School of Biology*, Division of Plant Science, ***The Australian National University***, Canberra, Australia
2014	Consultant for the *International Treaty on Plant Genetic Resources for Food and Agriculture* (ITPGRFA) at the **FAO**, Rome, Italy. (Part time)
2012 (Jul-Oct)	Guest Researcher at ***Bioversity International (CGIAR)***, Rome, Italy.
2002 – 2012:	Research Scientist at the ***Max Planck Institute for Developmental Biology*** in Tübingen, Germany, Department of Molecular Biology.
2010 – 2011	Research (IGB) Fellow at the ***Leibniz Institute for Freshwater Ecology and Inland Fisheries*** *(IGB)*, Berlin, Germany. (Part time)
2001 – 2002	Student Research Fellow at the **Salk Institute for Biological Studies**, La Jolla, CA, USA.
1994 – 1996	Military Service Mountain Rangers, Z2 ROA, Gebirgsjägerbataillon 233, Mittenwald, Germany

EDUCATION

2012 (Nov)	PhD, Max Planck Institute for Developmental Biology and *Eberhard-Karls Universität*, Tübingen, Germany
2002	Diplom in Biologie (Plant Physiology, Genetics, and Biochemistry), *Eberhard-Karls-Universität*, Tübingen, Germany.
2002	Summer Institute in Statistical Genetics, *North Carolina State University,* Raleigh, NC, USA
2001- 2002	Diplomarbeit (Masters Thesis) at the Salk Institute for Biological Studies, La Jolla, CA, USA
1996 - 2002	Diplom in Biologie at *Eberhard-Karls-Universität*, Tübingen, Germany
1994	Abitur, mit Latinum and Graecum (Latin and Greek), *Karlsgymnasium* Bad Reichenhall

SCIENTIFIC WORK

Past

From 2001 until 2012 I have been a research scientist in the lab of Detlef Weigel, first at the Plant Molecular Biology Laboratory at the *Salk Institute for Biological Studies* in La Jolla, USA, and from 2002 until April 2012 in the "Department of Molecular Biology", at the *Max Planck Institute for Developmental Biology*, Tübingen, Germany.

During 2010 and 2011 I was also a *Fellow in Freshwater Sciences* at the *Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)* in Berlin. I worked with the groups of Michael Monaghan and Hans-Peter Grossart towards a species inventory of fungi in freshwater lakes using 454 DNA sequencing technology.

The summer of 2012 I spent in Rome as guest researcher with *Bioversity International*, an institute of the CGIAR, preparing review studies; i.e., I summarized current approaches and ideas towards a „red list" concept for agricultural biodiversity and summarised the current status and trends of research on neglected underutilized species, aka orphan/minor crops.

Since November 2012 I am a post-doctoral research fellow (lecturer, level B) in the lab of Justin Borevitz in the Research School of Biology at the Australian National University in Canberra, Australia.

I started working with 2nd generation sequencing technologies in 2007, before standards for experimental design, data analysis, and interpretation of 2nd generation sequencing data had been established; read mapping software and SNP callers didn't exist. I have developed new molecular biology methods for library production and multiplexing, and participated in and lead software development for data analysis, mainly for the Illumina sequencing platform. This development culminated, when, in 2009, we were the first to put forward the idea storing the pan genome of a species in a reference graph (*Schneeberger et al, 2009*).

Present

The cost of DNA sequencing has dropped to a point where we can conduct landscape genomics on a continental scale. My current projects revolve around harnessing modern genomics to characterise ecosystems and germplasm to educate conservation and breeding efforts including domestication of neglected and underutilized crops. I have optimised and automated sequencing library preparation for cost-efficient whole-genome sequencing and developed novel computational approaches to compare whole-genome sequencing data to uncover population structure. Currently, my focus is on African rice and potato, where I characterise populations for Genome Wide Association Studies (GWAS).

LIST OF PAST AND CURRENT PROJECTS

- Software development for detecting sample relatedness and population structure from raw sequencing data, reference- and alignment-free (kWIP, *manuscript in review (senior author) and available here: http://www.biorxiv.org/content/early/2016/10/04/075481*)
- Developed protocols and analysis pipeline for metagenomic data where conserved primers cannot be used within the read length of the technology (454). (*Wurzbacher et al., 2016*)
- Development of a robust statistical method for genetic mapping by 2nd generation sequencing without parental sequencing information. ('*Reference-based Cloning*', *manuscript in preparation as first author*)
- Developing Artificial microRNA's (amiRNAs) as a reverse genetics tool for gene silencing in *Arabidopsis thaliana* and rice (*Schwab, 2007, and Warthmann, 2008*)
- Evolution and Regulation of endogenous miRNAs. (Warthmann, 2008)
- Developing a novel technique for genome complexity reduction prior to 2nd generation sequencing (patent granted)
- Software development for SNP discovery and SNP-assay-development (MSQT). (*Warthmann, 2007*)
- Constructing a genetic map by explorative shotgun and RAD marker sequencing in non-model species (*Arabis alpina, Capsella ssp.*). (*Willing, 2015*)
- QTL-mapping of various traits in model and non-model species. (Schwartz, 2009, Balasubramanian, 2009, etc)
- Re-sequencing of *Arabidopsis thaliana* accessions by various means (Clark, 2007, Ossowski 2008 , etc.)
- Pioneered the idea of a pan-genome reference graph (software: genomemapper, *Schneeberger, 2009*)
- Flowering time: First positive evidence that the gene Flowering Locus T is the long sought florigen (or a major part thereof). (*Mathieu, et al 2007*)

ADDITIONAL (RELEVANT) SKILLS

Computer use, programming, and software development:
I make extensive use of all kinds of generic and specialised software on different platforms, mainly MacOS, Linux, Unix, and Windows. Much of my work consists of scripting and programming, and I can confidently use the UNIX shell, Python, Perl, R, and SQL; on a local machine as well as on a remote compute cluster such as a Sun Grid Engine or PBS. I have developed software and published in Bioinformatics type journals, including as first and senior author (e.g. *Warthmann et al., 2008, Murray et al 2016*).

Molecular Biology protocol development, and high-throughput sample processing
For molecular biology with large sample sizes I program, customize and use liquid handling robots (Perkin Elmer 'Ianus', 'NGS Express', and Beckman Coulter 'Biomek'). I confidently use auxiliary instruments for DNA quantification and purification (Agilent Bioanalyzer, Perkin Elmer Labchip GX and XT, etc). I have run gel-based DNA sequencers (Sanger) myself in the past, and I have loaded Illumina 2nd generation sequencing instruments.
Much of my work consists of not only following, but also developing molecular biology protocols; from Artificial miRNAs for gene silencing in Arabidopsis and Rice (*Schwab et al., 2006*, *Warthmann et al., 2008*) to a novel method for reduced representation sequencing on 2nd generation sequencing instruments (US and European patent).

Military career
Prior to attending university I served for 2 years in the German Army, the Mountain Rangers Special Forces (*2ndcompany/Gebirgsjägerbataillon 233 in Mittenwald*). I was selected for the officer's track and served as sniper, squad leader of sniper detail and platoon leader. I picked up a broad range of skills that alleviate the challenges of fieldwork in remote areas, challenging terrain in all four seasons, and in bad weather.

Pilot license
I hold an FAA pilot certificate '*Private Pilot Single Engine Land Instrument Airplane*' (#2546772, PPL and IFR) including a tail-wheel rating, issued by the FAA, USA. I also hold an Australian '*Flight Crew License'* (Private Pilot, #820981), issued by CASA, and a License for Light Sport Aircraft, issued by RA-Aus. I own an aeroplane, a Skyfox CA22. A Private Pilot license allows for conducting flights connected to one's job.

Miscellaneous
I have a German wildlife preservation and hunting license, which includes a license to possess a gun. I am holding licenses for operating motorboats in lakes and the ocean, a 2-star scuba diving license, and driving licenses for motorcycles, cars, and trucks (up to 40 tons). I am a qualified ski instructor and have conducted alpine tours to high altitudes.

ADDITIONAL (RELEVANT) EXPERIENCE AND COMMUNITY SERVICE

Policy
I am passionate about protecting the public good and the sustainable use and sharing of resources.

In 2014 I worked as **consultant for the UN**; for the '*International Treaty on Plant Genetic Resources for Food and Agriculture'* at the *Food and Agricultural Organization*, ***FAO***. I contributed expertise in genomics to a process that aims at designing and implementing a '*Global Information System on Plant Genetic Resources for Food and Agriculture*'. When in place, this information system will hopefully

transform plant breeding from local projects into a globally interoperable effort. In this role I wrote a 70-page policy document entitled: *Plant Genetic Resources and Genomics: Mainstreaming Agricultural Research through Genomics.*

In 2015, together with Claudio Chiarolla (currently at WIPO), I submitted a policy document entitled "**Thinking a Global Open Genome Sequence Data Framework for Sustainable Development**" to '*Crowdsourced Science Briefs on Sustainable Development*', which are part of the efforts to improve the science-policy interface in the intergovernmental processes on Sustainable Development at the United Nations.

Community Service

I served as **session chair** at the 24th International Conference on Arabidopsis Research (ICAR 2013) for the session *'Natural Variation, Evolution and Phenomics'*.
In 2014 and 2015, I ran the weekly *Plant Science Seminar Series* and attracted a broad range of national and international speakers to the Research School of Biology at the ANU.
I am currently supervising a (computational) PhD student, serve on various thesis committees, and I am "Affiliated Expert" with the '*ANU Bioinformatics Consultancy* (ABC)' at the John Curtin School for Medical Research at the ANU.
I have peer-reviewed manuscripts for (in alphabetical order): *Bioinformatics, BMC Bioinformatics, elife, Journal of Biotechnology, Molecular Biology Reports, Nucleic Acids Research, Plant Biology, and* various *PLoS* Journals.

(Relevant) Volunteer work

During the summer of 2011, I volunteered with the Johann Heinrich von Thünen Institute of Sea Fisheries in Hamburg, Germany to serve as scientist on research cruise number 344 on biggest of Germany's fishery research vessel, '*Walther Herwig III*'. We cruised the North Atlantic for four weeks and assessed stocks of Sebastes spec. in the Irminger Sea for reporting to the European Union.