

# Tahir Ali, PhD

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## Research Interests

- I am interested in a diverse set of evolutionary and ecological phenomena, but I'm particularly excited to investigate the role of landscape heterogeneity and contemporary/historical environment in deriving population genetic processes and local adaptation.
- Besides, keen on integrating correlative and mechanistic approaches into a single modelling framework to understand species-environment interactions and improve predictions of species range dynamics under climate change scenarios.

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## Education and Qualifications

**Doctor of Philosophy (2018)** [Goethe University & Senckenberg Biodiversity and Climate Research Center (SBIK-F), Frankfurt am Main]

During my PhD I have been working on a project titled: "Morphology, systematics and phylogeography of *Microthlaspi* (Brassicaceae, Coluteocarpeae)".

**Master by Research (2010)** [University of Dundee, College of Life Sciences & Scottish Crop Research Institute, UK]

This course focused on the application of basic research to crop improvement in the 21st century. Individual modules covered basic plant biology including gene expression and regulation, molecular genetics and pathology, genetic manipulation as well as environment-plant interactions.

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## Awards

- The University of Dundee Global Excellence Postgraduate Scholarship.
- GRADE Goethe Graduate Academy Doctoral Fellowship.
- Erich Oberdorfer Foundation Research Award.

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## Work Experience

**2018 – till present** Postdoctoral researcher [Senckenberg/LOEWE Translational Biodiversity Genomics (TBG), Frankfurt am Main].

- Using population genomics and whole genome Sequencing, I aim to investigate effects of landscape heterogeneity and environmental variation on population genetic processes (such as genetic drift, gene flow and selection), and detect signatures of local adaptation in *Microthlaspi*.
- Genome-wide association studies on the phyllosphere microbiome in *Microthlaspi*.

**2011 – 2018** PhD Research Associate [Goethe University/Senckenberg Biodiversity and Climate Research Centre (SBIK-F), Frankfurt am Main].

PhD-Project: Morphology, systematics and phylogeography of *Microthlaspi* (Brassicaceae, Coluteocarpeae).

During my PhD research, I have conducted an in-depth investigation of the evolutionary and phylogeographic history of the genus *Microthlaspi*, which can stand as an exemplar for other Palaearctic genera.

*Systematics*: A re-appraisal of the genus *Microthlaspi*, and described two new genera and three new species

- *Ihsanalshehbazia* Tahir Ali & Thines, gen. nov., *Friedrichkarmeyeria* Tahir Ali & Thines, gen. nov.
- *Microthlaspi mediterraneo-orientale* Tahir Ali & Thines, sp. nov., *Microthlaspi sylvarum-cedri* Tahir Ali & Thines, sp. nov., and *Microthlaspi erraticum* (Jord.) Tahir Ali & Thines, comb. nov.

*Geographical distribution*: A re-description of geographic distributions of

- *Microthlaspi perfoliatum* and *M. erraticum* based on morphological investigations, ploidy estimation and phylogenetic reconstructions.

*Phylogeography and demographic history*: The investigation of spatial patterns of genetic diversity and genetic structure to resolve

- Whether observed spatial patterns of genetic diversity are caused by Pleistocene climatic changes.
- Colonisation routes and demographic history of species.

*Field Work*

- I have conducted fieldwork in Turkey, Algeria, Pakistan, and many European countries: including France, Germany, Czech Republic, Austria, Slovenia, Croatia and Bulgaria.

**2009 – 2010**

MRes Project: The Role of Alternative Splicing in Barley in Response to Cold/Drought Stress. [Gene Expression Group at the Scottish Crop Research Institute, Dundee]

My research project Confirmed alternative splicing of Rbu-P2 Carboxylase activase {Rca} in barley in response to cold/drought stress.

## Research Skills

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### Wet-lab Skills

- Skilled in general laboratory techniques including; high-throughput extraction and manipulation of DNA and RNA, PCR, qPCR, preparation of Illumina and Oxford Nanopore sequencing libraries, generation of AFLP profiles, RADseq library preparation, cloning and microbiology.

### Computational skills

- Skilled in using both Linux and Windows operating systems.
- Experienced in using reference-based/guided genome assembly & comparative genomics pipelines.
- Can run and interpret results of a broad-range of phylogenetics, population genetic and genomics analysis programmes, including Geneious, MEGA, DNAsp, MrBayes, RAxML, siMba, SplitsTree, TCS, PopArt, GeneMarker, GeneMapper, Peak Scanner, Structure, Geneland, BAPS, TESS, Barrier, Arlequin, GenALEX, PopGen, F-stat, GESTE, Colony, BEAST, IMA2, DIYABC, Migrate-N, Mecheza, ArcGIS and MaxEnt.
- Skilled in R – programming language.

### Statistical analysis

- Statistical and quantitative skills are essential to population genetics and ecology, and are therefore an aspect I specially focussed on during my PhD research work. I'm experienced in applying computation approaches, including multivariate statistics, regression models (GLM and GAM), Bayesian modelling using R.

### GIS-based skills

- Manipulation and visualization of genetic and ecological data, Genetic landscape GIS tool, spatial analysis and modeling spatial patterns.
- Species distribution modelling using various modelling algorithms including SVM, GLM, GAM, BRT, RF, and MaxEnt.

### Academic writing

- Correct academic writing style is an essential skill, and one I developed through writing a range of reports, peer-reviewed manuscripts and dissertation. I continue to develop these skills by taking postgraduate skills courses in academic writing and writing literature reviews.

### Presentation skills

- The ability to present one's research is a fundamental skill. I have developed this skill through presentations during internal lab-meetings, SBIK-F symposia as well as various international conferences and workshops.

### Teamwork

- My collaboration and communication with various researchers across Eurasia during my PhD research, as well as my work as a Young Scientists speaker at Senckenberg have developed my ability to work as a member of the team during my degree.

### Teaching Skills

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- Fluent in English, good interpersonal skills, self-confident and motivating personality.
- B1-level of German language.
- Excellent at micro and macro lesson planning.
- Good exposure to all latest teaching methodologies like: demonstrative, discussion-oriented, presentation style, activity based as well as situation based.

### Conferences and Workshops

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- Diversity of *Arabidopsis thaliana* in Italy as inferred from next-generation genotyping in relation to biotic and abiotic factors (Conference Proceedings) Wild Plant Pathosystems (2013) Olomouc, Czech Republic.
- Influence of climate and geography on occurrence of infection in *Microthlaspi perfoliatum*, German Mycological Society (DGfM) Congress (2014) Mettlach-Orscholz, Germany.
- Determination of genetic diversity of *Arabidopsis thaliana* in the Italian peninsula in relation to biotic and abiotic factors using next-generation genotyping (RAD-Seq) (workshop delivered) Botanikertag (2015) Munich, Germany.
- Genomics and climate adaptation (2018), Senckenberg Translational Biodiversity Genomics, Frankfurt am Main, Germany.
- Modelling of range-wide pathogen pressure in an annual member of the Brassicaceae (Conference Proceedings) Wild Plant Pathosystems (2019), Frankfurt am Main, Germany.

### Invited Talks and Lectures

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- An evolutionary framework for biodiversity science (2013), Pamukkale University, Denizli, Turkey.
- Introduction to molecular phylogeny & systematics (2013), Badji Mokhtar University, Annaba, Algeria.
- Climate change, biodiversity and sustainable development (2019), Build Pakistan Summit, Frankfurt.
- Pleistocene glaciation and Palearctic phylogeography: inferring species glacial refugia and re-colonisation routes (2019), MONREPOS Archaeological Research Center, Neuwied, Germany.

### Selected Publications

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- **Ali, T.**, Peterson, A.T., A conceptual framework and toolkit for phylogeography and landscape genomics (submitted in Critical Reviews in Plant Sciences).
- Mishra, B., **Ali, T.**, Ploch, S., Schmuker, A., Gupta, D.K., Runge, F., Sharma, R., Xia, X., Thines M., (Under review in Frontiers). The genome of *Microthlaspi erraticum* (Brassicaceae) provides insights into the adaptation to highly calcareous soils.

- **Ali, T.**, Muñoz-Fuentes, V., Çelik, A., Schmuker, A., Buch, A., Dutbayev, A., Runge, F., Khaliq, I., Solovyeva, I., Gabrielyan, I., Maciá-Vicente, J.G., Glynou, K., Nigrelli, L., Vakhrusheva, L., Kitner, M., Ploch, S., Xia, X., Nowak, C., Thines, M., (2019). Out of Transcaucasia: Origin of Western and Central Palearctic populations of *Microthlaspi perfoliatum*. *Flora* 253, 127-141.
- Brandrud, T.E., Schmidt-Stohn, G., Liimatainen, K., Niskanen, T., Frøslev, T.G., Soop, K., Bojantchev, D., Kytövuori, I., Jeppesen, T.S., Bellù, F., Saar, G., Oertel, B., **Ali, T.**, Thines, M., Dima, B., (2018) *Cortinarius* sect. *Riederi*: taxonomy and phylogeny of the new section with European and North American distribution. *17*, 1323-1354.
- Bandini, D., Oertel, B., Ploch, S., **Ali, T.**, Vauras, J., Schneider, A., Scholler, M., Eberhardt, U., Thines, M., (2018) Revision of some central European species of *Inocybe* (Fr.: Fr.) Fr. subgenus *Inocybe*, with the description of five new species. *Mycological Progress*, 1-48.
- **Ali, T.**, Muñoz-Fuentes, V., Çelik, A., Schmuker, A., Buch, A., Dutbayev, A., Runge, F., Khaliq, I., Solovyeva, I., Gabrielyan, I., Maciá-Vicente, J.G., Glynou, K., Nigrelli, L., Vakhrusheva, L., Kitner, M., Ploch, S., Xia, X., Nowak, C., Thines, M., (2017). Genetic patterns reflecting Pleistocene range dynamics in the annual calcicole plant *Microthlaspi erraticum* across its Eurasian range. *Flora*, 236-237, 132-142.
- Glynou, K., **Ali, T.**, Haghi Kia S., Thines, M., Maciá-Vicente, J.G., (2017). Intraspecific genetic diversity in root-endophytic fungi reflects efficient dispersal and environmental adaptation. *Molecular Ecology*. 10.1111/mec.14231.
- **Ali, T.**, Runge, F., Ayan D., Schmuker, A., Solovyeva, I., Nigrelli, L., Buch, A., Xia, X., Ploch, S., Orren, O., Kummer, V., Çelik, A., Vakhrusheva, L., Gabrielyan, I., Thines, M., (2016b). Range-wide complete taxon sampling of *Microthlaspi* reveals that *Microthlaspi erraticum* is widespread and ranges from the Alps to the Tien Shan. *Flora*, 225, 76-81.
- **Ali, T.**, Schmuker, A., Runge, F., Solovyeva, I., Nigrelli, L., J, P., Buch, A., Xia, X., Ploch, S., Orren, O., Kummer, V., Linde-Laursen, I., Ørgaard, M., Hauser, T.P., Çelik, A., Thines, M., (2016a). Morphology, phylogeny, and taxonomy of *Microthlaspi* (Brassicaceae, Coluteocarpeae) and related genera. *Taxon* 65(1):79-98.
- Glynou K., **Ali T.**, Buch A., Haghi Kia S., Ploch S., Xia X., Çelik A., Thines M., Maciá-Vicente J.G., (2016) The local environment determines the assembly of root endophytic fungi at a continental scale. *Environmental Microbiology* doi:10.1111/1462-2920.13112.
- Cheikh-Ali Z., Glynou K., **Ali T.**, Ploch S., Kaiser M., Thines M., Bode H.B., Maciá-Vicente J.G., (2015) Diversity of exophillic acid derivatives in strains of an endophytic *Exophiala* sp. *Phytochemistry* 118:83–93.
- Kitner, M., Lebeda, A., Sharma, R., Runge, F., Dvorák, P., **Ali, T.**, Choi, Y.-J., Sedláková, B., Thines, M., (2015) Coincidence of virulence shifts and population genetic changes of *Pseudoperonospora cubensis* in the Czech Republic. *Plant Pathology* 64, 1461–1470.
- Schneider, J.V., Bissiengou, P., Amaral Mdo, C., **Ali, T.**, Fay, M.F., Thines, M., Sosef, M.S., Zizka, G., Chatrou, L.W., (2014) Phylogenetics, ancestral state reconstruction, and a new infrafamilial classification of the pantropical Ochnaceae (Medusagynaceae, Ochnaceae s.str., Quinaceae) based on five DNA regions. *Molecular Phylogenetics and Evolution* 78:199–214.

## Academic Advisors

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- Prof. Dr. Marco Thines, Department of Biology, Institute of Ecology, Evolution and Diversity, Goethe University, Frankfurt am Main, Germany. [marco.thines@senckenberg.de]
- Professor Dr. Paul Birch, Head of Division of Plant Sciences, University of Dundee at James Hutton Institute, Invergowrie, Dundee, Scotland. [paul.birch@hutton.ac.uk]