To Whom It May Concern,

I am writing to apply for the position "Technical Assistant in Ecological Statistics and Data Science" (ID no. 91/2023) at the University of Potsdam. My quantitative background, programming skills, and research interests are completely aligned with the requirements and objectives of the position. Therefore, this opportunity excites me and it would be a great pleasure to join the environment of the Ecology and Macroecology group.

My main areas of expertise are macroecology and biogeography, particularly using mathematical models and GIS tools to understand the effects of human pressure and climate change on biodiversity. I routinely synthesize information from several sources and databases, for which I helped develop a taxonomic harmonization standard. I have also advanced the field of movement ecology and produced novel tools to understand how behavioural preferences influence animal movement (e.g., the R package enerscape, also applied here). I have outstanding programming skills, especially in R, python, bash, and C, with all my code being version-controlled using git. Additionally, I have high standards and competence for reproducibility, testing, automation, and continuous integration (e.g., using GitHub actions). I authored the R package enerscape and co-developed ATNr, both currently on CRAN. For larger and more complex projects, I package the code to assure optimal performance and reproducibility (e.g., the assembly and the squirrygis packages).

I have authored several R Shiny apps, including: bifurcation plot, data inspection as supplement for a publication, and vegetation classification for an ongoing study. I also have experience developing Google Earth Engine apps (e.g., landscape connectivity of tigers in Nepal), which are easy to scale and maintain. For the last three years, I have been in charge of managing the food web database GATEWAy. I am leading the development of a new version of the database and built an automated pipeline for its release, to be operative as a SQL (PostGres) database by the end of 2023 on a new website. I am confident with basic concepts of website development (e.g. POST/GET requests) and html (see my personal website) and I am eager to learn more. I am familiar with some of the largest and most used databases in ecology, such as: CHELSA, WorldClim, BioTime, TetraDENSITY, EltonTraits. I have over ten years of experience with Linux and more than 3 years with high computing clusters. I employ software orchestrating tools (e.g., snakemake) and develop scalable, automated pipelines in bash (e.g., processing CHELSA climate) in order to maximize research output.

I have several years of experience in data analysis, machine learning, database management, GIS, app development, and species distribution modeling. I used both frequentists and bayesian statistics as well as machine learning methods (e.g. random forest, gradient boosting, GAMs, and Maxent) to conduct my research and support other projects. I have also applied these tools to species distribution models. Additionally, I am developing a novel SDM framework that uses stochastic demography to quantify the effects of climate variability on species' distribution. Due to my quantitative skills in theoretical ecology and data analysis, I have experience in a supporting role for research. During the last six years, I have had the chance to support and guide PhD students and PostDocs with statistical, mathematical, and methodological advice, including machine learning and

species distribution models. For instance, I helped various students develop a novel mathematical model for the traveling speed of animals, analyze the drivers of pollutants concentration globally, and model landscape connectivity of tigers in Nepal.

I am a very friendly person and open to other cultures and opinions, which helped me establish an international network of collaborators, with whom I share mutual respect and support. I strive to make the working environment a better place, where everybody can feel heard and accepted. Additionally to scientific advice, it is very important for me to help others in their professional and personal growth. For instance, I help students to acquire a set of transferable skills for alternative career paths.

I moved to Leipzig three years ago after completing my PhD. I have visited many places and greatly enjoyed my time in Germany, where I would like to settle down. I have studied German occasionally for the last three years (A2), however I prioritized my academic development whilst waiting for a permanent positions in Germany to learn more advanced German. Given the opportunity, I want to achieve a high proficiency in German and integrate into German society. Further, I have a driving license (AM B) and I am a skilled driver.

In summary, I feel confident that my quantitative background, statistical and programming skills, and mindset strongly align with this position. For me it would be a great pleasure to join the exciting research environment at the University of Potsdam.

Sincerely,

Dr. Emilio Berti

Theory in Biodiversity Science
German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
Leipzig, Germany

EMILIO BERTI

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SUMMARY

I am a theoretical ecologist with a passion for math and computing. I have a strong quantitative background, with expertise in mathematical and statistical modelling of complex systems using big databases at large spatio-temporal scales. I have worked in many different fields of biology, from molecular muscle physiology to macroecology and biogeography. I am very open minded to other cultures and societies: I am Italian, my wife is Bulgarian, we met in Denmark, and we live in Germany. I am an avid reader of ancient history and I love sumo.

PROFESSIONAL EXPERIENCE

PostDoctoral researcher *01/10/2020 – Present*
Theory in Biodiversity Science
German Centre for Integrative Biodiversity Research (iDiv)
Leipzig, Germany

In my current PostDoc position, I focus on theoretical ecology, community assembly, animal movement, and species' distribution models.

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Scientific consultant *01/05/2020 – 31/07/2020*
Department of Bioscience
Aarhus University
Aarhus, Denmark

During these three months, I started developing a mechanistic model to assess areas of conservation priorities in Denmark using the national biodiversity database.

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Teaching assistant *01/02/2017 – 30/04/2020*
Department of Biology
Aarhus University
Aarhus, Denmark

I taught one course every semester to fulfill the requirements of my PhD program. Teaching varied from lab support to lectures preparation and presentation.

EDUCATION

PhD *01/02/2017 – 29/06/2020*
Section of Ecoinformatics and Biodiversity
Department of Biology
Aarhus University
Aarhus, Denmark
Title of dissertation: *Megafauna extinctions, allometric scaling and biotic interactions: ecological effects and restoration opportunities through rewilding.*

Visiting PhD student *15/09/2018 – 12/12/2018*
Department of Ecology and Evolution
University of Chicago
Chicago, IL

MSc in Biology *01/09/2013 – 31/04/2016*
Department of Ecology and Evolution
University of Florence
Florence, Italy
Title of dissertation: *Analysis of the movement and aggressive interactions between two species of ants of the Genus Lasius (Hymenoptera: Formicidae) through mathematical models.*

BSc in Biology *01/09/2009 – 31/09/2012*
Department of Physiology
University of Florence
Florence, Italy
Title of dissertation: *The effects of myopalladin on the contraction mechanics of muscle fibers.*

SKILLS

I have acquired a very complementary set of skills through my career. I have developed outstanding mathematical and theoretical skills through personal training and successfully applied them to investigate macroecological and biogeographical drivers of biodiversity. I try to get the best from each experience; I have failed many times and will fail again, but this is also an opportunity to learn new things and incorporate them into my personal and professional growth.

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Languages
Italian (native), English (fluent), Danish (beginner), German (beginner)
Programming
R (expert), python (expert), bash (expert), C/C++ (advanced), javascript (mostly for Google Earth Engine, proficient), SQL (postgres flavor; advanced), GIS (expert), High Performance Cluster (HPC, SLURM flavor; expert)
Software
Linux/GNU, QGIS, Anaconda, RShiny, Jupyter Notebooks, LaTeX, Git, GitHub
Methods
Network analysis, mathematical modeling, geographic information systems (GIS), geoinformatics, data science, statistics, ordination and classification, optimization, machine learning, species distribution

models (SDMs), climate analyses, environmental niche modeling, high performance clusters, automation.

SCIENTIFIC PUBLICATIONS

First authorship

Berti, E., Rosenbaum, B., Brose, U., & Vollrath, F. (2023). Energy landscapes direct the movement preferences of elephants. (Authorea; under review in Journal of Animal Ecology). DOI: `https://doi.org/10.22541/au.168373276.62196439/v1`.

Bauer, B., **Berti, E.**, ... & Brose, U. (2022). Biotic filtering by species' interactions constrains food-web variability across spatial and abiotic gradients. *Ecology letters*. DOI: 10.1111/ele.13995. (`Shared first authorship`).

Berti, E., Davoli, M., ... & Vollrath, F. (2021). The r package enerscape: A general energy landscape framework for terrestrial movement ecology. *Methods in Ecology and Evolution*. DOI: 10.1111/2041-210X.13734.

Berti, E., Monsarrat, S., Munk, M., Jarvie, S. & Svenning, J.C. (2020). Body size is a good proxy for vertebrate charisma. *Biological Conservation*. DOI: 10.1016/j.biocon.2020.108790.

Berti, E. & Svenning, J.C. (2020). Megafauna extinctions have reduced biotic connectivity worldwide. *Global Ecology and Biogeography*. DOI: 10.1111/geb.13182.

Last authorship

Gauzens, B., Brose, U., Delmas, E., & **Berti, E**. (2023). ATNr: Allometric Trophic Network models in R. Methods in Ecology and Evolution.

Co-authorship with supporting role

Wei, S., **Berti, E.**, ... & Yue, K. (2023). Global patterns and drivers of lead concentration in inland waters. Journal of Hazardous Materials, 132455.
I performed the analyses to investigate the drivers of lead concentration.

Amyntas, A., **Berti, E.**, Gauzens, B., Albert, G., Yu, W., Werner, A. S., ... & Brose, U. (2023). Niche complementarity among plants and animals can alter the biodiversity–ecosystem functioning relationship. Functional Ecology.
I advice on the assembly model and wrote the R package used to generate community data.

Dyer, A., Brose, U., **Berti, E.**, Rosenbaum, B., & Hirt, M. R. (2023). The travel speeds of large animals are limited by their heat-dissipation capacities. Plos Biology, 21(4), e3001820.
I helped developing the theoretical mathematical model for the optimal travel speed of animals.

Vogel, S. M., Vasudev, D., Ogutu, J. O., Taek, P., **Berti, E.**, Goswami, V. R., ... & Svenning, J. C. (2023). Identifying sustainable coexistence potential by integrating willingness-to-coexist with habitat suitability assessments. Biological Conservation, 279, 109935.
I advised on the analyses and ran preliminary species occupancy models.

Terlau, J., Brose, U., Antunes, A. C., **Berti, E.**, Boy, T., Gauzens, B., ... & Hirt, M. R. (2022). Integrating trait-based movement into mechanistic predictions of thermal performance.
I performed the analysis to reconstruct the climatic niche of the species.

Grenié, M, **Berti, E.**, ... & Marten, W. (2022). Harmonizing taxon names in biodiversity data: a review of tools, databases, and best practices. *Methods in Ecology and Evolution.* DOI: 10.1111/2041-210X.13802.

I developed the pipeline to harmonize taxonomic information used as case study and contributed substantially to the conceptual and practical recommendation for taxonomic harmonization.

PEER REVIEW

As of July 2022, I have reviewed 6 papers for: Ecography (2), Ecology Letters (2), GigaScience (1), and Scientia Agricola (1). You can find more at my WoS profile.

CONFERENCE TALKS

Invited talk: Bauer, B., **Berti, E.**, ..., & Brose, U. (2022). From regional to local scale: biotic interactions shape multilayer food-webs. *SFE-GFO-EEF biannual meeting, Metz, France.*

Berti, E., & Svenning, J.C. (2022). State-space models show that functional replacements of extinct megafauna have distinct habitat preference in a European rewilding area. *SFE-GFO-EEF biannual meeting, Metz, France*

Grenié, M., **Berti, E.**, Carvajal-Quintero, J., Winter, M., & Sagouis (2021). Matching Species Names Across Biodiversity Databases: Sources, tools, pitfalls and best practices for taxonomic harmonization. *TDWG annual meeting, online*

Berti, E. & Svenning, J.C. (2019). Megalinkers extinction and the decrease of ecosystem connectivity. *ESA annual meeting, Louisville, KY*

Berti, E., Jarvie, S. W., & Svenning, J.C. (2018). Rewiring food webs via trophic rewilding. *BES annual meeting, Belfast, UK*

SUPERVISION AND MENTORING

I am helping and informally mentoring two PhD students at iDiv: Angelos Amyntas, whose work focuses on biodiversity-ecosystem functioning, and Ana Carolina Antunes, whose work focuses on the impacts of humans on α-diversity using camera trap data. I am formally co-supervising the PhD candidate Jingyi Li, who is developing a novel mathematical approach for functional responses based on information theory. In addition to supervision, I also provide theoretical, computational, and statistical advice to several members of the TiBS working group at iDiv as well as individual mentoring for PhD students, advising especially on transferable skills and alternative career paths outside academia.

TEACHING & ORGANIZED WORKSHOPS

During my PhD, I taught one course every semester, as part of my salary was paid by Aarhus University on the basis of teaching. I have thus a relatively long teaching experience for my career stage. I also regularly organize lab workshops to teach reproducible research and open data principles.

Teaching
Introduction to scientific programming and tidyverse (2022) – slides
Introduction to git and GitHub for a fool-proof programming (2022) – course
Teaching Assistant
Theoretical Population Ecology (2023) Meta-analyses for Biodiversity (2021)

Statistical and Geospatial Modelling (2019)
Behavioural Biology (2018, 2019)
Geographic Information System (2017)
Organized Workshops
Cleaning online repository data for use in biogeography and macroecology (2019)
Running a species distribution model in R (2019)
A (very) gentle introduction to Linux (2019)

COLLABORATIONS

I have moved several times to pursue my career dreams and, being a friendly person, I established
personal and professional ties with the people I met. My network of current collaborators include:

- Prof. Jens-Christian Svenning, Aarhus University, Aarhus, Denmark.
- Prof. Ulrich Brose, Jena University, Jena, Germany.
- Prof. Daniel Reuman, Kansas University, Lawrence, KS, USA.
- Prof. Giacomo Santini, Università degli Studi di Firenze, Florence, Italy.
- Prof. Kai Yue, Fujian Normal University, Fuzhou, China.
- Prof. Neil Carter, University of Michigan, Ann Arbor, MI, USA.
- Ass. Prof. Susanne Vogel, Open University of the Netherlands, Heerlen, Netherlands.
- Prof. Fritz Vollrath, University of Oxford, Oxford, UK.

I also collaborate with Dr. Sophie Monsarrat, rewilding manager at the NGO Rewilding Europe
(Nijmegen, Netherlands), and veterinary doctor Agnese Santi (Prato, Italy), with whom I am developing
a new concept of "wildness" that can be applied to feral and semi-domesticated horses in Europe.

EXTERNAL LINKS

- Google Scholar profile
- Personal website
- ORCiD
- LinkedIn
- GitHub
- Publons

References

Prof. Jens-Christian Svenning
Section for Ecoinformatics and Biodiversity
Aarhus University
Aarhus, Denmark.

email: svenning@bio.au.dk

phone: +45 289 92 304

Prof. Svenning was my PhD supervisor and has always supported my personal
and professional growth. We have worked together on several publications and
still maintain active collaborations.

Prof. Ulrich Brose
Theory in Biodiversity Science
German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
Leipzig, Saxony, Germany.

email: ulrich.brose@idiv.de

phone: +49 341 9733205

Prof. Brose is my current PostDoc supervisor and he has actively helped me to
further develop my career goals and objsectives.

Caitlin Wilkinson
Theory in Biodiversity Science
German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
Leipzig, Saxony, Germany.

email: caitlin.wilkinson@idiv.de

phone: +49 341 9739178

Wilkinson is a PhD student who I have been tutoring since approximately one
year. She accepted to be a reference for this application and you are encouraged
to contact her to inquire about my approach and commitment to teaching and
mentoring.