

# CANAN KARAKOÇ

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\*Digital version includes external links.

## EDUCATION

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- Ph.D. in Biology, *magna cum laude*** 2013 – 2019  
University of Leipzig🔗 , HIGRADE Graduate School🔗 Leipzig, Germany  
Primary advisers: Hauke Harms🔗 and Antonis Chatzinotas🔗  
Other advisers: Adam T. Clark, Viktoriia Radchuk, Alexander Singer, Karin Johst  
Project title: "Context Dependency of Community Dynamics: Predator-Prey Interactions Under Ecological Disturbances"
- M.Sc. in Global Change Ecology** 2009 – 2012  
University of Bayreuth🔗 , Elite Network Bavaria (ENB)🔗 Bayreuth, Germany  
Advisers: Björn Reineking, Steffen Kolb, George Wang, Detlef Weigel
- M.Sc in Biology** 2005 – 2008  
Cumhuriyet University🔗 Sivas, Turkey
- B.Sc in Biology (Minor: Molecular Biology)** 2000 – 2004  
Akdeniz University🔗 Antalya, Turkey

## PROFESSIONAL EXPERIENCE

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- Brown Lab🔗 Biological Sciences, Georgia Institute of Technology** 2024 - Ongoing  
*Postdoctoral researcher* Atlanta, GA, US  
· Microbial dynamics and infection. Adviser: Sam Brown
- Lennon Lab🔗 Department of Biology, Indiana University** 2021 - 2024  
*Postdoctoral researcher* Bloomington, IN, US  
· Microbial ecology and evolution. Adviser: Jay T. Lennon
- Helmholtz Centre for Environmental Research–UFZ**  
**German Centre for Integrative Biodiversity Research (iDiv)🔗** 2019 - 2021  
*Research associate* Leipzig, Germany  
· Evolutionary ecology. Advisers: Antonis Chatzinotas and Stan Harpole🔗
- UFZ** 2013 - 2018  
*Research assistant* Leipzig, Germany  
· Experimental community ecology. WG Microbial Interactions Ecology🔗
- iDiv** 2015 - 2016  
*Guest research assistant* Leipzig, Germany  
· Experimental community ecology. WG Experimental Interactions Ecology🔗
- University of Thessaly** 2016 & 2014  
*Guest research assistant, DAAD Scholarship* Larissa, Greece

- Applied microbial ecology. Department of Biochemistry and Biotechnology

**Max Planck Institute for Developmental Biology**

2011

*Intern, ENB travel grant*

Tübingen, Germany

- Evolutionary ecology. Department of Molecular Biology

**Technical University of Munich**

2010

*Intern, ENB travel grant*

Munich, Germany

- Microbial ecology. Technical University of Munich, Department of Soil Ecology

**University of Bayreuth**

2010 – 2012

*Technical assistant*

Bayreuth, Germany

- Field/lab work. University of Bayreuth, Department of Soil Physics; Department of Biogeography (EVENT); Department of Plant Physiology (TERRECO) and Agroecosystem Research.

**Cumhuriyet University**

2005 – 2008

*Research & teaching assistant*

Sivas, Turkey

- Applied microbial ecology. Department of Molecular Biology and Genetics.

**Antalya State Hospital**

2003

*Intern*

Antalya, Turkey

- Laboratories of Microbiology, Immunology & Biochemistry.

## PUBLICATIONS

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### Published

- Glidden, C. K., **Karakoç, Canan**, Duan, C., Jiang, Y., Beechler, B., Jabbar, A., and Jolles, A. E. (2023). Distinct life history strategies underpin clear patterns of succession in microparasite communities infecting a wild mammalian host. *Molecular Ecology*, 32(13):3733–3746. doi.org/10.1111/mec.16949
- Zhao, Q., Van den Brink, P. J., Xu, C., Wang, S., Clark, A. T., **Karakoç, C.**, Sugihara, G., Widdicombe, C. E., Atkinson, A., Matsuzaki, S., Shinohara, R., He, S., Wang, Y. X. G., and De Laender, F. (2023). Relationships of temperature and biodiversity with stability of natural aquatic food webs. *Nature Communication*, 14(3507). doi-org.proxyiub.uits.iu.edu/10.1038/s41467-023-38977-6
- Jurburg, S. D., Buscot, F., Chatzinotas, A., Chaudhari, N. M., Clark, A. T., Garbowski, M., Grenié, M., Hom, E. F. Y., **Karakoç, C.**, Marr, S., Neumann, S., Tarkka, M., van Dam, N. M., Weinhold, A., and Heintz-Buschart, A. (2022). The community ecology perspective of omics data. *Microbiome*, 10(225). doi.org/10.1186/s40168-022-01423-8
- Clark, A., Mühlbauer, K., L., Hillebrand, H., and **Karakoç, C.** (2022). Measuring stability in ecological systems without static equilibria. *Ecosphere*, 13(12):e4328. doi.org/10.1002/ecs2.4328
- Clark, A., Arnoldi, J.-F., Zelnik, Y., Barabas, G., Hodapp, D., **Karakoç, C.**, König, S., Radchuk, V., Donohue, I., Huth, A., Jacquet, C., de Mazancourt, C., Mentges, A., Nothaaß, D., Shoemaker, L., Taubert, F., Wiegand, T., Wang, S., Chase, J., Loreau, M., and Harpole, S. (2021). General

statistical scaling laws for stability in ecological systems. *Ecology Letters*, 24(7):1474–1486. doi/10.1111/ele.13760

- Saraiva, J. P., Worrlich, A., **Karakoç, C.**, Kallies, R., Chatzinotas, A., Centler, F., and Nunes da Rocha, U. (2021). Mining synergistic microbial interactions: A roadmap on how to integrate multi-omics data. *Microorganisms*, 9(4). doi.org/10.3390/microorganisms9040840
- **Karakoç, C.**, Clark, A. T., and Chatzinotas, A. (2020). Diversity and coexistence are influenced by time-dependent species interactions in a predator–prey system. *Ecology Letters*, 23(6). doi/pdf/10.1111/ele.13500
- **Karakoç, C.** (2019). Context dependency of community dynamics: Predator-prey interactions under ecological disturbances. *Ph.D. Thesis*, Leipzig University. <https://nbn-resolving.org/urn:nbn:de:bsz:15-qucosa2-341500>
- Sendek, A.\*, **Karakoç, C.\***, Wagg, C., Domínguez-Begines, J., Couto, Martucci de Couto, G., Van der Heijden, M. G., Naz, A. A., Lochner, A., Chatzinotas, A., Klotz, S., Gómez-Aparicio, L., and Eisenhauer, N. (2019). Drought modulates interactions between arbuscular mycorrhizal fungal diversity and barley genotype diversity. \*Equal contribution. *Scientific Reports*, 9(1):1–15. doi.org/10.1038/s41598-019-45702-1
- **Karakoç, C.**, Radchuk, V., Harms, H., and Chatzinotas, A. (2018). Interactions between predation and disturbances shape prey communities. *Scientific Reports*, 8:2968. doi.org/10.1038/s41598-018-21219-x
- Ozbayram, E. G., Akyol, c., Ince, B., **Karakoç C.**, and Ince, O. (2018). Rumen bacteria at work: bioaugmentation strategies to enhance biogas production from cow manure. *Journal of Applied Microbiology*, 124(2):491–502. doi/full/10.1111/jam.13668
- **Karakoç, C.**, Singer, A., Johst, K., Harms, H., and Chatzinotas, A. (2017). Transient recovery dynamics of a predator–prey system under press and pulse disturbances. *BMC Ecology*, 17:13. <https://bmcecol.biomedcentral.com/articles/10.1186/s12898-017-0123-2>
- **Karakoç, C.** (2012). Population response to fluctuating temperature regimes – an analysis with a model microorganism. *M.Sc. Thesis*, University of Bayreuth. Can be downloaded at <https://drive.google.com/open?id=1G1qFInk2tTqpVSJmXC6x6KkmmvJ8uILH>

#### First author works close to submission

- **Karakoç C.**, Shoemaker W.R. and Lennon J.T. **A full cost bioenergetic accounting of sporulation.** We estimated bioenergetic costs of sporulation using multiomics data by accounting the energy required for expression of genes during this developmental program. We then estimated the efficiency and maintenance of this complex trait at evolutionary time scales informed by bioenergetics.
- **Karakoç C.**, Behringer M. and Schoolmaster Jr. D.R. and Lennon J. T. **Mutation accumulation under extreme energy limitation.** We explored adaptive mutations occurred in *Bacillus subtilis* that engages dormancy after 5 years starvation.
- **Karakoç C.** and Clark, A.T., Hines J., Harpole S.W., Hilltunnen T. and Chatzinotas A. **Competitor constraints in antibiotic resistance.** We used a bacteria-phage system to explore antibiotic resistance challenged by a competitor with various life history and functional traits.

- **Karakoç C.** and Clark, A.T., Hines J., Harpole S.W., Hilltunen T. and Chatzinotas A. **Antibiotic resistance under random and correlated environments in a predator-prey metacommunity.** We constructed a bacteria-phage metacommunity system to explore antibiotic and phage resistance trade-off under temporally random and autocorrelated antibiotic regimes.

## PRESENTATIONS

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### Talks

- Contributed talk (2023). Evolution of complex traits through the lens of bioenergetics. ESA Annual Meeting, Portland, OR.
- Contributed talk (2020). Diversity and coexistence are influenced by time-dependent species interactions in a predator-prey system. ESA Annual Meeting, virtual.
- Contributed talk (2019). Diversity and stability are directly linked to fluctuating species interactions in a predator-prey system. GfÖ, Münster, Germany.
- Contributed talk (2015). Understanding community assembly mechanisms through integrative approaches, EEF-SiTE - Ecology at the Interface, 2015, Rome, Italy.
- Contributed talk (2014). Understanding the role of species interactions under environmental change: Microbial model systems as tools in ecological theory. YoMo Workshop - Ecological modeling across disciplines, Hann. Münden, Germany
- Invited talk (2014/2016). Patterns and processes under environmental fluctuations: Experiments with microbial model systems. University of Thessaly, Department of Biochemistry and Biotechnology, Larissa, Greece.

### Posters

- Poster (2023). Evolution of survival through the lens of bioenergetics. AbGradCon, San Diego, CA.
- Poster (2021). Community constrains in adaptation to stressors. ESA Annual Meeting, virtual.
- Posters (2018). (a) Resolving Complex Microbial Community Dynamics: A causality analysis with microbial model systems. (b) Impact of Nutrient Levels and Stoichiometry on Microbial Freshwater Community and Functioning in Microcosm Experiments. ISME17, Leipzig, Germany.
- Poster (2014). Transient dynamics of trophically interacting species after disturbance. HETEROCLIM: The response of organisms to climate change in heterogeneous environments, Loches, France.

## PROFESSIONAL SKILLS

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### Computer programs

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<b>Proficient</b>	R programming language, tidyverse, $\LaTeX$
<b>Familiar with</b>	Python, Mathematica, Bash, NetLogo, QGIS/ArcGIS, ImageJ

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### Wet lab/field

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<b>Proficient</b>	Microcosms consisting of viruses, bacteria, protozoa
<b>Familiar with</b>	Nematode experiments, grassland & green house experiments

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### Illustration/Science communication

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Pen & paper, InkScape, Adobe Illustrator/InDesign  
Procreate, Affinity Designer

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### Languages

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<b>English</b>	Fluent speaking & writing
<b>German</b>	Fluent speaking & writing
<b>Turkish</b>	Native

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## ACADEMIC MENTORING & TEACHING

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### Primary supervision

- Research project (Summer 2023), Microbial division of labor under ecological disturbances. Michalle M., Indiana University Summer STEM Research Program.
- B.Sc Research experience (Spring 2023 – present), Microcosms, experimental evolution. Emily C., Indiana University.
- Summer internship (2022). Stability of metabolic exchange and dormancy, Melih Ç., Middle East Technical University.
- B.Sc. project (2020 – 2021). Effect of environmental noise on antibiotic and bacteriophage resistance evolution, Klara-Isabell G., Leipzig University.
- B.Sc. project (2020 – 2021). Fitness costs of antibiotic resistance in various environments, Joanna S., Leipzig University.
- Internship (2018 – 2019) and Master Thesis (2019–2020). Evolutionary rescue in complex communities, Alla K., Leipzig University.
- Internship (2014). Predator–prey interactions under disturbances, Jana H., University of Kassel.

### Mentoring

- B.Sc. reserch experience (2024 – ongoing). Measuring infection dynamics using *C.elegans* model system. Charlotte W., Georgia Institute of Technology.
- High school project (2021 – 2022). Complexity Effects Structural Stability: Using Protist Microcosms and Mathematical Modeling to Navigate Realism in Theoretical Ecology, Sylvia, G., OPRFHS IRDI, Chicago,IL.
- B.Sc. project (2021). Effect of environmental noise on microbial evolution, Philipp K., Leipzig University.

- PhD chapter (2019 – 2020). Mechanisms promoting co-existence of blood born parasites in African buffalo, Caroline G., Oregon State University.
- PhD project (2018 – 2020). Microbial communities of amphibian skin microbiomes, spread of pathogenic chytrid fungus, Adriana C., University of Toulouse.
- PhD project (2018 – 2021). Microbial communities and their interactions across trophic levels in mountain lakes, Judit L., Leipzig University.

### Teaching

- Graduate course (2021 – 2023). Quantitative Biodiversity. Indiana University.
- Practical research training (2022 – present). Microbiology graduate program rotation students, Biology undergraduates, Indiana University.
- Literature seminar (2020 – 2021). Microbial Ecology, Leipzig University.
- Practical training (2018 – 2021). Measuring microbial diversity, experimental evolution, R for data science, Leipzig University.
- Practical courses (2005 – 2008). General biology, Genetics, Molecular Genetics, Biochemistry, Animal Physiology, Microbiology, Introduction to Molecular Biology, Molecular Cell Biology, Cumhuriyet University.

## RELEVANT ACTIVITIES

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**Symposium: Incorporating Dormancy and Rarity to Predict Community Dynamics and Stability Under Environmental Change** 2023

Organizer *ESA Annual Meeting 2023, Portland, OR*

**Course: Origin of Life** 2022

Participant *Complexity Explorer, Santa Fe Institute*

**Workshop: GEMS Biology Integration Institute Bioinformatics** 2022

Participant *Urbana–Champaign, IL*

**Workshop: Trait-Based Eco-Evolutionary Modeling** 2019

Participant, led by Prof. Klausmeier *Leipzig, Germany*

**Workshop: Filling in gaps in global understanding of ecological stability and coexistence** 2019

Invited participation *Leipzig, Germany*

**Workshop: an introduction to Bayesian statistics** 2019

Participant, FlexPool travel grant *Münster, Germany*

**Course: Introduction to regression models with spatial and temporal correlation R-INLA** 2018

Participant, Highland Statistics Ltd., UFZ DEVELOP training grant *Leipzig, Germany*

**Workshop: Eco-evolutionary dynamics in experimental microbial communities** 2018

UFZ Controlling Chemicals' Fate invited speaker (Prof. Teppo Hiltunen) grant *Leipzig, Germany*

**Minisymposium: Experimental evolution & community dynamics** 2018

Participant, FlexPool travel grant *Tvärminne, Finland*

**Winter school: Marine evolution – patterns and processes, Centre for Marine Evol. Bio.** 2011

Participant, Swedish Royal Academy of Sciences travel award *Tjärnö, Sweden*

**Modelling the fate of microbes in aquatic habitats and assessment of their associated risks** 2010

Participant, ENB travel grant

*Vienna, Austria*

**Other graduate school activities** 2013-2018

Courses, soft skill trainings [Link to file](#)

*Leipzig, Germany*

**Other graduate school activities** 2009-2012

Courses, soft skill trainings [Link to file](#)

*Bayreuth, Germany*

## OUTREACH/SERVICE

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### **Mentorship**

- STEM Professional (2023–present). Letters to a Pre-Scientist, [prescientist.org](http://prescientist.org)
- Science Olympiad Mentor (2022–2023). Bloomington South High School, Bloomington, IN

### **Administrative**

- Leadership (2022–2024). IU Postdoc association Career Development Board.

### **Media interviews**

- Interview (2018). Ökosystemforschung im Labor. Norddeutscher Rundfunk NDR.

### **Voluntary work**

- Event organization (2022). Future faculty preparation conference, Indiana University.
- Session organization (2022). "Life of a postdoc", Graduate conference, Indiana University.
- Community outreach (2021, 2022). Bacterial viruses, Science Fest, Indiana University.
- Social development (2020). Diversity, inclusion and equity working group, UFZ.
- Nature conservation activities (2000-2005) Biodiversity monitoring, Doga (BirdLife International partner), Turkey.
- Voluntary teaching (2004-2005). English, arts. Educational volunteers foundation of Turkey.
- Science philosophy and ethics (2004). Workshop, panel and public survey. Akdeniz University.
- Astronomy seminar series for non-astronomers (2000-2003) Physics department, Akdeniz University.

### **Memberships**

- Ecological Society of America.

### **Editorial**

- Review Editor in *Frontiers in Ecology and Evolution*. Speciality section Population, Community, and Ecosystem Dynamics.

### **Peer reviews for Journals (appx. 10/year)**

- Nature Communication, American Naturalist, Applied and Environmental Microbiology, Biology Letters, Biology Communications, Communications Biology, Ecology, Ecology Letters, eLife, Frontiers in Microbiology, PLoS Biology, Scientific Reports.

### **Peer reviews for Grant Proposals**

- National Science Foundation, Division of Environmental Biology (2023)