Assistant Professor

Evolutionary Ecology, Fish Biology, Speciation, Extreme Environments, Cave biology.

Ph.D., 2008, University of Zurich

Phone: 405-744-6815

Email: michi.tobler@okstate.edu

Lab website

Specific Interests

Our lab focuses on the ecological and evolutionary effects of environmental variation on populations. Specifically, we are interested in understanding how ecological and evolutionary processes in complex environments drive adaptation and speciation. Our approach to these problems is necessarily integrative and collaborative. We combine concepts and methods from various biological disciplines ranging from ecology, evolution, and animal behavior to physiology, genetics, and genomics. All of our projects supplement field-based studies with analytical and experimental approaches in the laboratory.

Two key questions dominate our research program: (1) How and why do organisms diversify phenotypically and (2) how and why do reproductive barriers evolve between populations, and under what circumstances can we observe speciation? We address these questions by focusing on species that inhabit a variety of habitats and by quantifying diverging phenotypic traits along environmental gradients. We are elucidating the causes of phenotypic variation, i.e., whether differences among individuals and populations are caused by phenotypic plasticity or genetic differentiation, as well as in its functional significance and how variation in traits translates to variation in fitness under different environmental conditions. Finally, we are trying to understand the proximate mechanisms of ecological speciation: how does adaptive trait divergence translate into reproductive isolation and a split into distinct species. We use different systems of small-bodied fish to address these questions, including livebearing fish inhabiting toxic sulfur springs, as well as pupfish and splitfins from desert habitats.

For more information about our research, fieldwork, and publications, please consult the lab website.

Selected Publications

- Tobler, M. & E. W. Carson (2010): Environmental variation, hybridization, and phenotypic diversification in Cuatro Ciénegas pupfishes. Journal of Evolutionary Biology 23 (7): 1475-1489.

- Tobler, M., S. W. Coleman, B. D. Perkins & G. G. Rosenthal (2010): Reduced opsin gene expression in a cave-dwelling fish. Biology Letters 6 (1): 98-101.

- Tobler, M., R. Riesch, C. M. Tobler, T. Schulz-Mirbach & M. Plath (2009): Natural and sexual selection against immigrants maintains differentiation among micro-allopatric populations. Journal of Evolutionary Biology 22 (11): 2298-2304.
- Tobler, M. (2009): Does a predatory insect contribute to the divergence between cave- and surface-adapted fish populations? Biology Letters 5 (4): 506-509.
- Tobler, M. (2008): Divergence in trophic ecology characterizes colonization of extreme habitats. Biological Journal of the Linnean Society 95 (3): 517-528.
- Tobler, M., T. J. DeWitt, I. Schlupp, F. J. García de León, R. Herrmann, P. G. D. Feulner, R. Tiedemann & M. Plath (2008): Toxic hydrogen sulfide and dark caves: Phenotypic and genetic divergence across two environmental gradients in Poecilia mexicana. Evolution 62 (10): 2643-2649.