György Barabás

Academic Appointments

2018– **Linköping University**, *Division of Theoretical Biology, Dept. IFM*, Assistant professor.

2018– **MTA-ELTE Theoretical Biology and Evolutionary Ecology Research Group**, *Eötvös University, Pázmány 1A, H-1117 Budapest, Hungary*, Assistant professor.

2016–2018 **Linköping University**, *Division of Theoretical Biology, Dept. IFM*, Postdoctoral researcher.

2014–2016 **University of Chicago**, *Dept. Ecology & Evolution*, Postdoctoral researcher.

Education

2008–2013 **University of Michigan, Ann Arbor, MI, USA**, *PhD*, Ecology and Evolutionary Biology. Advisor: Dr. Annette Ostling.

2003–2008 **Eötvös University, Budapest, Hungary**, *BSc and MSc*, Physics. Advisor: Dr. Géza Meszéna.

Publications

†: joint first author

[1] C Carpentier, **G Barabás**, JW Spaak, F de Laender (2021). Reinterpreting the relationship between number of species and number of links connects community structure and stability. *Nature Ecology & Evolution*, doi: https://doi.org/10.1038/s41559-021-01468-2

[2] A Clark, J-F Arnoldi, Y Zelnik, **G Barabás**, D Hodapp, C Karakoç, S König, V Radchuk, I Donohue, A Huth, C Jacquet, C de Mazancourt, A Mentges, D Nothaaß, L Shoemaker, F Taubert, T Wiegand, S Wang, J Chase, M Loreau, S Harpole (2021). General statistical scaling laws for stability in ecological systems. *Ecology Letters*, doi: https://doi.org/10.1111/ele.13760

[3] AI Pastore, **G Barabás**†, MD Bimler, MM Mayfield, TE Miller (2021). The evolution of niche overlap and competitive differences. *Nature Ecology & Evolution* 5: 330–337

[4] **G Barabás**, R D'Andrea (2020). Chesson's coexistence theory: reply. *Ecology* 101(11):e03140

[5] H Zhang, D Bearup, I Nijs, Shaopeng Wang, **G Barabás**, Y Tao, J Liao (2020). Dispersal network heterogeneity promotes species coexistence in hierarchical competitive communities. *Ecology Letters* 24: 50–59

[6] J Häussler, **G Barabás**†, A Eklöf (2020). A Bayesian network approach to trophic metacommunities shows that habitat loss accelerates top species extinctions. *Ecology Letters* 23: 1849–1861

[7] V Kozlov, S Vakulenko, **G Barabás**, U Wennergren (2020). Biomass and biodiversity in species-rich tritrophic communities. *Ecological Complexity* 43: 100854

[8] L Pásztor, **G Barabás**, G Meszéna (2020). Competitive exclusion and evolution: convergence almost never produces ecologically equivalent species. *American Naturalist* 195: E112–E117

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[9] C Song, **G Barabás**†, S Saavedra (2019). On the consequences of the interdependence of stabilizing and equalizing mechanisms. *American Naturalist* 194: 627–639

[10] AG Rossberg, **G Barabás** (2019). How carefully executed network theory informs invasion ecology. *Trends in Ecology & Evolution* 34: 385–386

[11] **G Barabás**, R D'Andrea, S Maccracken Stump (2018). Chesson's coexistence theory. *Ecological Monographs* 88: 277–303, doi: 10.1002/ecm.1302

[12] R Rael, R D'Andrea, **G Barabás**, A Ostling (2018). Emergent niche structuring leads to increased differences from neutrality in species abundance distributions. *Ecology* 99: 1633–1643, doi: 10.1002/ecy.2238

[13] **G Barabás**, MJ Michalska-Smith, S Allesina (2017). Self-regulation and the stability of large ecological networks. *Nature Ecology & Evolution* 1: 1870–1875, doi: 10.1038/s41559-017-0357-6

[14] J Grilli, **G Barabás**, MJ Michalska-Smith, S Allesina (2017). Higher-order interactions stabilize dynamics in competitive network models. *Nature* 548: 210–213

[15] J Grilli, M Adorioso, S Suweis, **G Barabás**, JR Banavar, S Allesina, A Maritan (2017). Feasibility and coexistence of large ecological communities. *Nature Communications* 8: 14389, doi: 10.1038/ncomms14389

[16] **G Barabás**, R D'Andrea (2016). The effect of intraspecific variation and heritability on community pattern and robustness. *Ecology Letters* 19: 977–986

[17] **G Barabás**, MJ Michalska-Smith, S Allesina (2016). The effect of intra- and interspecific competition on coexistence in multispecies communities. *American Naturalist* 188(1): E1–E12

[18] **G Barabás**, S Allesina (2015). Predicting global community properties from uncertain estimates of interaction strengths. *Journal of the Royal Society Interface* 12: 20150218, doi: 10.1098/rsif.2015.0218

[19] S Allesina, J Grilli, **G Barabás**, S Tang, J Aljadeff, A Maritan (2015). Predicting the stability of large structured food webs. *Nature Communications* 6: 7842, doi: 10.1038/ncomms8842

[20] J Grilli, **G Barabás**, S Allesina (2015). Metapopulation persistence in random fragmented landscapes. *PLoS Computational Biology* 11(5): e1004251, doi: 10.1371/journal.pcbi.1004251

[21] MJ Smith, E Sander, **G Barabás**, S Allesina (2015). Stability and feedback levels in food web models. *Ecology Letters* 18: 593–595

[22] **G Barabás**, L Pásztor, G Meszéna, A Ostling (2014). Sensitivity analysis of coexistence in ecological communities: theory and application. *Ecology Letters* 17: 1479–1494

[23] **G Barabás**, G Meszéna, A Ostling (2014). Fixed point sensitivity analysis of interacting structured populations. *Theoretical Population Biology* 92: 97–106

[24] **G Barabás**, R D'Andrea, R Rael, G Meszéna, A Ostling (2013). Emergent neutrality or hidden niches? *Oikos* 122: 1565–1572

[25] **G Barabás**, A Ostling (2013). Community robustness in discrete-time periodic environments. *Ecological Complexity* 15: 122–130

[26] **G Barabás**, R D'Andrea, A Ostling (2013). Species packing in nonsmooth competition models. *Theoretical Ecology* 6: 1–19

[27] R D'Andrea, **G Barabás**†, A Ostling (2013). Revising the tolerance-fecundity trade-off; or, on the consequences of discontinuous resource use for limiting similarity, species diversity, and trait dispersion. *American Naturalist* 181: E91–101

[28] **G Barabás** S Pigolotti, M Gyllenberg, U Dieckmann, G Meszéna (2012). Continuous coexistence or discrete species? A new review of an old question. *Evolutionary Ecology Research* 14: 523–554

[29] **G Barabás**, G Meszéna, A Ostling (2012). Community robustness and limiting similarity in periodic environments. *Theoretical Ecology* 5: 265–282

[30] **G Barabás**, G Meszéna (2009). When the exception becomes the rule: the disappearance of limiting similarity in the Lotka–Volterra model. *Journal of Theoretical Biology* 258: 89–94

Reviews and opinion pieces

[31] **G Barabás** (2021). Biodiversity and community structure. Commentary, *Proceedings of the National Academy of Sciences USA* 118(11): e2101176118

[32] AG Rossberg, **G Barabás**, HP Possingham, M Pascual, PA Marquet, C Hui, MR Evans, G Meszéna (2019). Let's train more theoretical ecologists – here is why. *Trends in Ecology & Evolution* 34: 759–762, doi: 10.1016/j.tree.2019.06.004

[33] **G Barabás** (2017). The coexistence problem revisited. News & Views, *Nature Ecology & Evolution* 1: 1425–1426, doi: 10.1038/s41559-017-0335-z

[34] **G Barabás** (2017). *Theory-Based Ecology: A Darwinian Approach* by Liz Pásztor, Zoltán Botta-Dukát, Gabriella Magyar, Tamás Czárán, and Géza Meszéna. *The Quarterly Review of Biology* 92: 180–181

Unpublished manuscripts

[35] A Åkesson, A Curtsdotter, A Eklöf, B Ebenman, J Norberg, **G Barabás** (in review). The importance of species interactions in spatially explicit eco-evolutionary community dynamics under climate change. *Nature Communications*

[36] J-F Arnoldi, M Barbier, R Kelly, **G Barabás**, Andrew L. Jackson (in review). Fitness and community feedbacks: the two axes that drive long-term invasion impacts.

[37] **G Barabás**, A Szigeti (in review). Intragroup dynamics and the moral significance of group membership. *Journal of Ethics and Social Philosophy*

[38] AR Cirtwill, U Jacob, **G Barabás**, A Eklöf (in revision). Salinity, nutrient concentrations, and other environmental properties shape food-web size and structure in the Baltic Sea.

[39] JT Wootton, EL Sander, AK Henry, **G Barabás** (in revision). Temporal variability predicts species importance in an ecological interaction network.

Teaching

2019-2020 **Lecturer**, Analysis of biological data, Linköping University, Linköping, Sweden.

2019-2020 **Lecturer**, Methods in ecology, Linköping University, Linköping, Sweden.

2019-2020 **Lecturer**, Modeling of biological systems, Linköping University, Linköping, Sweden.

2018-2017 **Guest lecturer**, Modeling of biological systems, Linköping University, Linköping, Sweden.

2014 **Guest lecturer**, Population and community ecology, University of Michigan, Ann Arbor, MI, USA.

2012–2013 **Co-teacher & course co-designer (2 semesters, with Professor Annette Ostling)**, Modeling for ecology and evolutionary biology, University of Michigan, Ann Arbor, MI, USA.

2009–2013 **Teaching assistant (3 semesters)**, Population and community ecology, University of Michigan, Ann Arbor, MI, USA.

2011–2012 **Instructor (2 years)**, Summer session for WISE GISE program (Women in Science and Engineering: Girls in Science and Engineering), University of Michigan, Ann Arbor, MI, USA.

2008–2010 **Teaching assistant (3 semesters)**, Introduction to ecology, genetics, and evolution, University of Michigan, Ann Arbor, MI, USA.

2012–2016 **Workshop leader (5 years)**, St. Cecilia at the Tower Early Music Workshop, Ann Arbor & Saline, MI, USA.

2005– **Instructor (13 years)**, Ósükösd summer camp, at Eötvös University's Radnóti Miklós High School, Ósükösd, Hungary.

Mentoring

2020– **Graduate student**, *(Masters project supervisor)*, Evolution of byproduct cross-feeding in digital organisms, Linköping University, Linköping, Sweden.

2018– **Graduate student**, *(PhD co-supervisor)*, Ecological networks, network structure, and diversity gradients, Linköping University, Linköping, Sweden.

2018– **Graduate student**, *(PhD co-supervisor)*, Eco-evolutionary dynamics and Bayesian networks, Linköping University, Linköping, Sweden.

2017–2018 **Graduate student**, Predicting the effects of newly invading shark and crab species on the Weddell Sea food web, Linköping University, Linköping, Sweden.

2016 **Undergraduate student**, Modeling the stability of large ecological networks, University of Chicago, Chicago, IL, USA.

2015 **Undergraduate student**, Cancer modeling, University of Chicago, Chicago, IL, USA.

2010-2011 **Graduate student**, Species coexistence modeling, University of Michigan, Ann Arbor, MI, USA.

Professional Service

2010– **Reviewer**, for more than 30 journals and funding agencies, including: American Naturalist, Axios Review, Biological Journal of the Linnean Society, Bioscience Horizons, Bulletin of Mathematical Biology, Computers in Biology and Medicine, Ecological Complexity, Ecological Monographs, Ecology, Ecology Letters, eLife, Environment International, Evolution, Functional Ecology, Journal of Animal Ecology, Journal of Biogeography, Journal of Ecology, Journal of Mathematical Biology, Journal of Theoretical Biology, Journal of Vegetation Science, Mathematical Modelling of Natural Phenomena, National Science Centre Poland, National Science Foundation, Nature Ecology & Evolution, Oikos, PeerJ, PLoS One, PLoS Computational Biology, Population Ecology, Proceedings of the National Academy of Sciences USA, Science, Scientific Reports, Theoretical Ecology, Theoretical Population Biology, Trends in Ecology & Evolution.

2020– **Associate editor**, *Frontiers in Ecology and Evolution / Models in Ecology and Evolution*, Lausanne, Switzerland.

2020 **Grant review panel external member**, *for the Swedish Research Council (Vetenskapsrådet)*, Sweden.

2019– **Board member**, *International Initiative for Theoretical Ecology*, https://iite.info/.

2015 **Organizer**, *Expanding Your Horizons Network*, Chicago, IL, USA.

2011-2012 **Organizer**, *WISE GISE program (Women in Science and Engineering: Girls in Science and Engineering)*, University of Michigan, Ann Arbor, MI, USA.

Skills

Languages: Hungarian (native), English, German, Swedish
Software: C, LaTeX, Markdown, Mathematica, Matlab, MS Office, Python, R, SQL

Awards

2016 **Outstanding ecological theory paper award**, *ESA Theoretical Ecology Section.*
Awarded paper: Barabás et al. (2014) *Ecology Letters* 17:1479-1494

2012 **Edwin H. Edwards Scholarship**, *University of Michigan, Ann Arbor, MI, USA.*
One semester of fellowship funding including stipend, tuition, and health benefits for the 2012-2013 academic year

2010 **Vito Volterra prize for best student presentation**, *95th annual ESA meeting, Pittsburgh, PA, USA.*

Grant and funding information

2019 **Swedish Environmental Protection Agency (Viltvårdsfonden)**, *Current and future ungulate populations: ecoinformatics for community management*, co-PI. Total: 2,710,000 SEK (≈ $301,000).

2017 **Swedish Research Council (Vetenskapsrådet) Starting Grant**, *Community-wide sensitivity analysis and the eco-evolutionary response of communities in a changing world*, PI. Grant no.: VR 2017-05245. Classification code: 10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation. Total: 4,200,000 SEK (≈ $503,000).

2012 **Edwin H. Edwards Scholarship**, *University of Michigan, Ann Arbor, MI, USA*, Provided one semester of fellowship funding for stipend, tuition, and health benefits for the 2012-2013 academic year. Total: $15,173.

Invited talks

2021 **Coexistence and parameter sensitivity in stationary aperiodic environments**, Online seminar series of the International Initiative for Theoretical Ecology (IITE).

2020 **The evolution of trait variance creates a tension between species diversity and functional diversity**, CNRS SETE, Moulis, France.

2019 **Collectivizing justice: a novel argument for quota-based affirmative action**, Lund University, Lund, Sweden.

2019 **The evolution of trait variance creates a tension between species and functional diversity**, University of Namur, Namur, Belgium.

2019 **The evolution of trait variance creates a tension between species and functional diversity**, University of Amsterdam, Amsterdam, Netherlands.

2018 **Chesson's coexistence theory**, Plenary talk at the 2018 conference of the Hungarian Ecological Society, University of Nyíregyháza, Nyíregyháza, Hungary.

2018 **Self-regulation and the stability of large ecological networks**, Colorado State University, Fort Collins, CO, USA.

2018 **Self-regulation and the stability of large ecological networks**, Oklahoma State University, Stillwater, OK, USA.

2018 **Self-regulation and the stability of large ecological networks**, Eötvös University, Budapest, Hungary.

2017 **Self-regulation and the stability of large ecological networks**, University of Toronto, Toronto, Canada.

2017 **The effect of intra- and interspecific competition on coexistence in multispecies communities**, Uppsala University, Uppsala, Sweden.

2017 **Self-regulation and the stability of large ecological networks**, Umeå University, Umeå, Sweden.

2017 **Self-regulation and the stability of large ecological networks**, University of South Florida, Tampa, FL, USA.

2016 **Competitive coexistence and populaton regulation in the context of multispecies communities**, University of California, Davis, CA, USA.

2016 **Self-regulation and the stability of large biological networks**, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.

2015 **Ecology for an uncertain world**, University of California, Santa Barbara, CA, USA.

2014 **Matrix binning: how lazy should we ecologists be?**, University of Michigan, Ann Arbor, MI, USA.

2014 **Community-wide sensitivity analysis: theory and application**, Kellogg Biological Station, Michigan State University, MI, USA.

Contributed talks

2021 **Modeling trophic metacommunities using Bayesian networks**, Online seminar of the Modeling in Ecology and Evolution Meeting (MEEM), Lausanne, Switzerland.

2020 **The evolution of trait variance creates a tension between species diversity and functional diversity**, 105th ESA Conference (virtual meeting).

2019 **The evolution of trait variance creates a tension between species and functional diversity**, Mathematical Models in Ecology and Evolution, Lyon, France.

2019 **Collectivizing justice: a novel argument for quota-based affirmative action**, 6th Formal Ethics conference, Ghent University, Ghent, Belgium.

2019 **The evolution of trait variance creates a tension between species and functional diversity**, Swedish Oikos Conference, Uppsala, Sweden.

2019 **The evolution of trait variance creates a tension between species and functional diversity**, Workshop on Mathematical Biology, Linköping University, Linköping, Sweden.

2017 **Self-regulation and the stability of large ecological networks**, 102nd ESA Conference, Portland, OR, USA.

2017 **The influence of nonsmooth competition on species packing**, Mathematics in Biology and Medicine Workshop, Linköping University, Linköping, Sweden.

2017 **The effect of intraspecific variation and heritability on community pattern and robustness**, Linköping University, Linköping, Sweden.

2017 **Self-regulation and the stability of large ecological networks**, Swedish Oikos Conference, Lund, Sweden.

2016 **The effect of intra- and interspecific competition on coexistence in multispecies communities**, 101st ESA Conference, Ft Lauderdale, FL, USA.

2016 **The effect of intra- and interspecific competition on coexistence in multispecies communities**, University of Chicago Natural History Seminar, Chicago, IL, USA.

2015 **Predicting global community properties from uncertain estimates of interaction strengths**, 100th ESA Conference, Baltimore, MD, USA.

2014 **Metapopulation structure and persistence in random fragmented landscapes**, 99th ESA Conference, Sacramento, CA, USA.

2014 **Community-wide sensitivity analysis: theory and application**, Midwest Mathematical Biology Conference, La Crosse, WI, USA.

2013 **Applications of community-wide sensitivity calculations to ecological theory, model analysis, and assessment of extinction risk**, 98th ESA Conference, Minneapolis, MN, USA.

2013 **Applications of community-wide sensitivity calculations to ecological theory, model analysis, and assessment of extinction risk**, Biodiversity in a Changing World Workshop, Montreal, Canada.

2012 **Robustness analysis of communities of structured populations**, 97th ESA Conference, Portland, OR, USA.

2011 **Coexistence by virtue of similarity versus dissimilarity: the implications of nonsmooth competition kernels**, 96th ESA Conference, Austin, TX, USA.

2011 **The influence of nonsmooth competition on species packing**, Niche Theory and Speciation Workshop, Keszthely, Hungary.

2010 **How should temporal niche segregation be defined?**, 95th ESA Conference, Pittsburgh, PA, USA.

Workshops

2021 **Temporal stability and species persistence in multivariate environments**, University of Namur, Namur, Belgium.

2019 **sToration: Applying coexistence theory to restoration ecology and adaptive management**, Synthesis Centre for Biodiversity Sciences (sDiv), Leipzig, Germany.

2019 **UFZ Synthesis workshop: Filling in gaps in global understanding of ecological stability and coexistence**, Helmholtz-Zentrum für Umweltforschung (UFZ), Leipzig, Germany.

2017 **London StructInst Workshop @ QMUL, on structural instability in ecology**, Queen Mary University of London, London, UK.

2017 **Mathematical Models in Ecology and Evolution**, City University of London, London, UK.

2017 **Mathematics in Biology and Medicine**, Linköping University, Linköping, Sweden.

2015 **CTW—Uncertainty, sensitivity and predictability in ecology: mathematical challenges and ecological applications**, Mathematical Biosciences Institute, Columbus, OH, USA.

2015 **myCHOICE Scientific Teaching Workshop**, University of Chicago, Chicago, IL, USA.

2014 **Midwest Mathematical Biology Conference**, La Crosse, WI, USA.

2013 **Biodiversity in a Changing World**, Montreal, Canada.

2011 **Niche theory and speciation**, Keszthely, Hungary.

2010 **2nd Helsinki summer school on mathematical ecology and evolution**, Turku, Finland.

2008 **1st Helsinki summer school on mathematical ecology and evolution**, Turku, Finland.