

CURRICULUM VITAE

ANDRÁS SZILÁGYI

M.Sc. in physics, Ph.D. in biological physics, presently employed as research assistant professor at MTA-ELTE Theoretical Biology and Evolutionary Ecology Research Group at Eötvös Loránd University (ELTE, Budapest, Hungary).

CONTACT INFORMATION

Institute address: Eötvös Loránd University (ELTE), **Department of Plant Systematics, Ecology and Theoretical Biology**, Pázmány Péter sétány 1/C, Budapest H1117, Hungary

Institute phone: +36 1 / 209 0555 / 1707

Institute fax: +36 1 / 381 2188

Institute website: <http://plantsys.elte.hu/drupal/en>

Personal website: <http://evol.elte.hu/~szilagyi>

e-mail: and.szilagyi@gmail.com

PERSONAL INFORMATION

Name: András György Szilágyi

Nationality: Hungarian

Place and date of birth: Budapest, Hungary, 8th December 1979

Marital status: married, two children

Private address: Mátyás király út 41/A., Budapest 1121, Hungary

Private phone: (+36)30 -239-8415

STATUS

Highest degree: Ph.D., Eötvös Loránd University (ELTE), Budapest (Hungary), 2011

Current appointment: Research assistant professor at the Hungarian Academy of Science (HAS) Theoretical Biology and Evolutionary Ecology Research Group at Eötvös Loránd University, Department of Plant Systematics, Ecology and Theoretical Biology.

EDUCATION

2004–2007: Ph.D. in Biological physics at Eötvös Loránd University (Budapest), Physics Ph.D. School (summa cum laude).

1998–2003: M.Sc. in Physics at Budapest University of Technology and Economics (excellent).

1994–1998: Baár–Madas Calvinist Secondary School, specialized in mathematics

RESEARCH EXPERIENCES

2012–present: **Research assistant professor** at the Hungarian Academy of Science (HAS) Theoretical Biology and Evolutionary Ecology Research Group at Eötvös Loránd University.

2012–2015: **Member of the Parmenides team** in the FP7 ERC advanced grant project EVOEVO (*Evolution of Evolvable Systems*; PI: Eörs Szathmáry; 2012-2017; project #294332; total funding 2 616 700 €).

2012–2015: **Postdoctoral research fellow** at the Parmenides Centre for the Conceptual Foundation of Science, Pullach, Germany.

2009–2011: **Research assistant** at the Hungarian Academy of Science (HAS) Theoretical Biology and Evolutionary Ecology Research Group at Eötvös Loránd University.

2010–2011: Worked in the FP7 EU project e-Flux (*Evolutionary microfluidics*; PI: Eörs Szathmáry; 2009–2011; project #225167; total funding: 2 300 000 €).

2007–2010: **Research assistant** (scientific coworker) at Department of Organic Chemistry, Faculty of Pharmacy at Semmelweis Medical University.

2004–2007: Ph.D. thesis work at Eötvös Loránd University, Department of Biological Physics: "*Extension of a niche concept to spatially heterogeneous and time fluctuating environment*". Supervisor: Dr Géza Meszéna.

2003–2004: researcher as a university student at Hungarian Meteorological Service.

AWARDS

2003: 1st prize at scientific competition of university students (TDK) mathematics—theoretical physics section

2003: TDK Special Award of the Pro Progressio Foundation

LANGUAGES AND LEVELS

Hungarian: mother tongue.

English: intermediate level (C) state language exam.

Latin: intermediate level (C) state language exam.

PROFESSIONAL ACTIVITIES

My scientific interest has a focus on theoretical evolutionary biology and theoretical ecology. My researches cover different topics in this field: origin of life, major evolutionary transitions, diversity maintaining mechanisms and stability of ecosystems, evolutionary dynamics at various levels, from chemistry to biology, and modeling neural networks.

In my research, I extensively use my physics background in building and evaluating models and analyzing results. I also rely heavily on my experience in computational chemistry to design more realistic model systems and on my programming knowledge to make my own code to investigate the models.

In the past years me (in collaboration with my colleagues) achieved the following results:

- formalized a mathematically rigorous concept of ecological “niche” for structured population;
- using the previously formalized niche concept, we analyzed the diversity maintaining ability of fluctuating environment in ecosystems;
- by computer simulation in a simplified model system we showed that efficient enzymes potentially emerged after the invention of chromosomes;
- *in-silico* analyzed the effect of taking the secondary structure of RNAs into account on the amount of sustainable information in prebiotics (the so called phenotypic error threshold);
- analyzed the stability and evolvability of an extended model of metabolically coupled surface bound replicator system as an important question in a possible scenario of the origin of life;
- presented an evolutionary scenario (in line with experimental data) of the emergence of mutualism in ant-plant symbiosis;

- by computer simulations we have proved the possibility of the evolutionary emergence of a primordial transcription-like system in model protocells;
- in a neuronal toy model we have demonstrated the possibility of real Darwinian dynamics on neural networks, as a proof-of-principle.

TEACHING EXPERIENCE

Modern physics practice and laboratory for physicists and teachers in physics (Eötvös University)

Introductory modern physics for info-bionics students (Pázmány Péter Catholic University)

Molecular modeling for senior pharmaceutical students (Semmelweis Medical University)

Minor classes on theoretical evolutionary biology for biologists (Eötvös University)

Preparing students for competitions in physics at secondary school level (Baár–Madas Calvinist Secondary School)

CURRENT RESEARCH

Presently I am working on the following topics:

- modeling Darwinian dynamics on in-silico neural network populations, analyzing the problem solving capacity of this kind of systems on different deceptive landscapes (further details in my proposal)
- investigation the analogy between the dynamics of recurrent neural networks and complex developmental systems (e.g. gene regulation networks), analyzing the equivalence between the action of natural selection on phenotypic correlation (in developmental systems) and associative learning (in neural networks)
- investigation of ecological and evolutionary stability in models of antibiotic degrading microbial communities

SCHOLARSHIPS AND GRANTS

2012-2015: **Postdoctoral scholarship** at the Parmenides Foundation, Munich (Germany): FP7 ERC advanced grant project EVEEVO (*Evolution of Evolvable Systems*; PI: Eörs Szathmáry; 2012-2017; no. #294332)

2015.9.1–2016.12.31: Postdoctoral research assistant in the OTKA project #100806: “Simulation studies in prebiotic evolution: Infrabiological differentiation in the Metabolic Replicator System” (4 years, total funding: 25.1 MHUF (~81 000 €)).

2009.3.1–2011.12.31: Postdoctoral research assistant in the OTKA project #73047: “*Computational study of evolution in early life and extant model organisms*” (4 years, total funding: 56 MHUF (~181 000 €)).

2005.1.1–2007.8.30: Research assistant in the OTKA project #49689: “*Adaptive ecology in variable environment*” (4 years, total funding: 7.8 MHUF (~25 000 €)).

2004.1.1–2004.12.31: Research assistant in the OTKA project #47035: “*Problems of inverse scattering theory*” (5 years, total funding: 4.2 MHUF (~13 600 €)).

PUBLICATIONS IN PEER REVIEWED JOURNALS

Publications:

number of publications in peer-reviewed journals: 13 (cumulative IF: 50.06)

popular science articles (in Hungarian): 2

conference proceedings: 3

book co-edited (in Hungarian): 1

lecture notes in physics for biologist (in Hungarian): 1

introductory modern physics lecture notes for biologists (in Hungarian): 1

Szilágyi, A., Meszéna, G.: *Two patch model of spatial niche segregation* *Evolutionary Ecology* **23**: 187-205 (2009) IF: 3,193

Szilágyi, A., Meszéna, G.: *Limiting similarity and niche theory for structured populations* *Journal of Theoretical Biology* **258**: 23-27 (2009) IF: 2,574

Balogh, B., **Szilágyi, A.**, Gyires, K., Bylund, D.B., Mátyus, P.: *Molecular modelling of alpha2A-C adrenoceptors: A comparative study* *Neurochemistry International* **55**: 355-361 (2009) IF: 3,541

Szilágyi, A., Scheuring, I., Edwards, D., Orivel, J., Yu, D.: *The evolution of intermediate castration virulence and ant coexistence in a spatially structured environment* *Ecology Letters* **12**: 1306-1316 (2009) IF: 10,318

Móréh Á., Jordán, F., **Szilágyi, A.**, Scheuring, I.: *Overfishing and regime shifts in minimal food web models* *Community Ecology* **10**(2): 236-243 (2009) IF: 0,792

Szilágyi, A., Meszéna, G.: *Coexistence in a fluctuating environment by the effect of relative nonlinearity: a minimal model* *Journal of Theoretical Biology* **267**: 502-521 (2010) IF: 2,371

Szilágyi, A., Kun, Á., Szathmáry, E.: *Early evolution of efficient enzymes and genome organization* *Biology Direct* **7**(38): 1-10 (2012) IF: 2,72

Szilágyi, A., Zachar, I., Szathmáry, E.: *Gause's principle and the effect of resource partitioning on the dynamical coexistence of replicating templates* *PLoS Computational Biology* **9**: e1-11 (2013) IF: 5,215

Szilágyi, A., Kun, Á., Szathmáry, E.: *Local neutral network help maintain inaccurately replicating ribozymes* *PLoS ONE* **9**(10): e109987 (2014) IF: 3,234

Boza, G., **Szilágyi, A.**, Kun, Á., Santos, M., Szathmáry, E.: *Evolution of division of labor between genes and enzymes in the RNA world* *PLoS Computational Biology* **10**: e1003936 (2014) IF: 4,62

Kun, Á., **Szilágyi, A.**, Könnnyü, B., Boza, G., Zachar, I., Szathmáry E.: *The dynamics of RNA world: insights and challenges* *Annals of the New York Academy of Sciences* **1341**: 75-95 (2015) IF: 4,383

Vasas, V., Fernando, C., **Szilágyi, A.**, Zachar, I., Santos, M., Szathmáry, E.: *Primordial evolvability: impasses and challenges* *Journal of Theoretical Biology* **381**: 29-38 (2015) IF: 2,116

Könnnyü, B., **Szilágyi, A.**, Czárán, T.: *In silico ribozyme evolution in a metabolically coupled RNA population* *Biology Direct* **10**(30): 1-17 (2015) IF: 4,685

Szilágyi, A., Podani, J.: *Bad math in Linné's *Philosophia botanica** *History and Philosophy of the Life Sciences (in press)* IF: 0.349

Matsumura, S., Kun, Á., Ryckelynck, M., Coldren, F., **Szilágyi**, A., Jossinet, F., Rick, C., Nghe, P., Szathmáry, E., Griffiths, A.D.: *Transient compartmentalization of RNA replicators prevents functional collapse due to parasites* (submitted to Science)

Szilágyi, A., Boza, G., Scheuring, I.: *Analysis of stability to cheaters in models of antibiotic degrading microbial communities* (under review in *Journal of Theoretical Biology*)

Google Scholar: [Szilágyi András@Google Scholar](#)

ResearchGate: https://www.researchgate.net/profile/Andras_Szilagyi

BOOK EDITING

Koch Sándor: Pillanat—ember—végtelenség, a 80 esztendő Koch Sándor köszöntése (in Hungarian) (Eds.: Prof. S. Juhász-Nagy, **A. Szilágyi**)

COMPUTER SKILLS

Operating systems: OSX, Linux, Windows;

Programming and scripting languages:

proficient in: C, Fortran

competent in: Bash, Maple, Pascal, Matlab, HTML, etc.

Other software: Office suite, LaTeX, EndNote, JabRef, etc.

2016 July, Budapest

András Szilágyi