Nobuto Takeuchi

Department of Basic Science,
Graduate School of Arts and Sciences,
the University of Tokyo,
Komaba 3-8-1, Meguro-ku,
Tokyo 153-8902, Japan.
phone: +81)-3-545-46732
e-mail: takeuchi.nobuto@gmail.com

Education

2005 – 2010 PhD, *cum laude*; Theoretical Biology and Bioinformatics Group, Utrecht University, The Netherlands; Paulien Hogeweg, Adviser

2003 – 2005 MSc, *cum laude*; Theoretical Biology and Bioinformatics Group, Utrecht University, The Netherlands; Paulien Hogeweg, Adviser

1999 – 2003 BSc; Biological Institute, Tohoku University, Japan

Research Experience

2013 – now Postdoctoral Fellow, Department of Basic Science, University of Tokyo, Japan; Kunihiko Kaneko, Adviser

2010 – 2013 Postdoctoral Fellow, National Center for Biotechnology Information, National Library of Medicine, National Institutes of Health, USA; Eugene V. Koonin, Adviser

Awards

2013 – now Japan Society for the Promotion of Science Research Fellowship for Young Scientist

2012 – 2013 Japan Society for the Promotion of Science Research Fellowship for Japanese Biomedical and Behavioral Researchers at the NIH

2003 – 2005 Utrecht Excellence Scholarship, Utrecht University

Teaching Experience

2008 Supervised a MSc research project of L. Salazar, Facutly of Biology, Utrecht University

2008, 2007 Guest lecturer, Bioinformatic Processes, Faculty of Biology, Utrecht University

2007 Teaching assistant, Theoretical Biology, Faculty of Biology, Utrecht University

2007 Teaching assistant, Mathematics, Faculty of Biology Utrecht University

2006, 2005 Teaching assistant, Bioinformatic Processes, Faculty of Biology, Utrecht University

2004 Teaching assistant, Nonlinear Dynamical Systems, Faculty of Biology, Utrecht University

Academic service

- Reviewer of the following journals: Biology Direct, BioSystems, BMC Evolutionary Biology, Evolution, Journal of Theoretical Biology, Origins of Life and Evolution of Biospheres, PLoS ONE, PLoS Computational Science
- A session chair in the 15th Annual Meeting of Society of Evolutionary Studies, Japan, 2013.

Oral presentations

Invited talks

December 2015 Mathematics of Dynamic Living State and Its Appication, Coop with Math Program, Graduate School of Mathematical Science, the University of Tokyo, Tokyo, Japan. Talk title: "Origin of genes through spontaneous symmetry breaking."

November 2015 Computational Biology Branch Seminar, National Center for Biotechnology Information, National Library of Medicine, National Institutes of Health, Bethesda, Maryland, USA. Talk title: "Origin of genes by spontaneous symmetry breaking."

November 2015 Re-conceptualizing the Origin of Life, Carnegie Institute for Science, Washington DC, USA. Talk title: "Origin of genes by spontaneous symmetry breaking."

April 2015 Molecular Evolution and Fitness Landscapes Minisymposium within Modelling Biological Evolution Conference, Leicester, UK. Talk title: "Spontaneous symmetry breaking in complementary replication as a consequence of multilevel selection in a minimal model of protocells."

May 2014 Arne Traulsen's group, Max Planck Institute for Evolutionary Biology, Germany. Talk title: "Horizontal gene transfer can rescue prokaryotes from Muller's ratchet."

March 2014 Origin of Life Chemistry Workshop, Earth-Life Science Institute, Tokyo Institute of Technology, Japan. Talk title: "On the roles of parasites in an RNA world: Evolution of complexity in model replicator systems."

May 2012 Origins of Information Processing: Evolution at Multiple Levels, Symposium on the Occasion of the PhD Defense of Folkert K. de Boer, Utrecht, the Netherlands. Talk title: "Evolution of RNA-like replicators: Roles of parasites."

Aug. 2011 Kunihiko Kaneko's group, University of Tokyo, Japan. Talk title: "On the origin of DNA genome in RNA world."

Sept. 2009 European Conference on Artificial Life, Levels of Selection Workshop, Budapest, Hungary. "On the degree of freedom in multilevel evolutionary models."

June 2008 Günter von Kiedrowski's group, Ruhr University Bochum, Germany. Talk title: "Evolution & Pattern Formation in Replicator Systems."

June 2004 Marinus J. A. Werger's group, Utrecht University, the Netherlands. Talk title: "Phenotypic error threshold; additivity and epistasis in RNA folding."

Peer-reviewed conference talks

May 2014 Society for Molecular Biology and Evolution Satellite Meeting on Reticulated Microbial Evolution, Kiel, Germany. Talk title: "Horizontal gene transfer can rescue prokaryotes from Muller's ratchet."

April 2014 Society for General Microbiology Annual Conference, Liverpool, UK. Talk title: "Horizontal gene transfer can rescue prokaryotes from Muller's ratchet."

July 2011 Society for Molecular Biology and Evolution Annual Meeting, Kyoto, Japan. Talk title: "On the origin of DNA genome in RNA world."

Aug. 2008 Artificial Life XI, University of Southampton, UK. Talk title: "Evolution of complexity in RNA-like replicator systems."

Oct. 2007 European Conference on Complex Systems, Dresden, Germany. Talk title: "Evolution of complexity in RNA-like replicators."

Publications

1 **Takeuchi, N.**, Cordero, O. X., Koonin, E. V., and Kaneko, K. (2015) Gene-specific selective sweeps in bacteria and archaea caused by negative frequency-dependent selection **BMC Biology**,

13:20
→*Included in an article collection, "Beyond Mendel: modeling in biology".*

2 **Takeuchi, N.**, Kaneko, K. and Koonin, E. V. (2014) Horizontal gene transfer can rescue prokaryotes from Muller's ratchet: Benefit of DNA from dead cells and population subdivision **G3: Genes, Genomes, Genetics**, 4:325-339

3 **Takeuchi, N.** and Hogeweg, P. (2012) Evolutionary dynamics of RNA-like replicator systems: a bioinformatic approach to the origin of life. **Physics of Life Reviews**, 9:219-268

– **Takeuchi, N.** and Hogeweg, P. (2012) Reply to the commentaries to "Evolutionary dynamics of RNA-like replicator systems: a bioinformatic approach to the origin of life". **Physics of Life Reviews**, 9:279-284

4 **Takeuchi, N.**, Wolf, Y. I., Makarova K. S. and Koonin, E. V. (2012). Nature and intensity of selection pressure on CRISPR-associated genes. **Journal of Bacteriology**, 194:1216-1225.
→*Highlighted in Microbe Magazine (March 2012), the news magazine of American Society for Microbiology.*

5 **Takeuchi, N.**, Hogeweg, P. and Koonin, E. V. (2011). On the origin of DNA genomes: Evolution of the division of labor between template and catalyst in model replicator systems. **PLoS Computational Biology**, 7:e1002024.

6 **Takeuchi, N.** and Hogeweg, P. (2009). Multilevel selection in models of prebiotic evolution II: A direct comparison of compartmentalization and spatial self-organization. **PLoS Computational Biology**, 5:e1000542.

7 **Takeuchi, N.**, Salazar, L., Poole, A. M. and Hogeweg, P. (2008). The evolution of strand preference in simulated RNA replicators with strand displacement: Implications for the origin of transcription. **Biology Direct**, 3:33.

8 **Takeuchi, N.** and Hogeweg, P. (2008). Evolution of complexity in RNA-like replicator systems. **Biology Direct**, 3:11.

9 **Takeuchi, N.** and Hogeweg, P. (2007). The role of complex formation and deleterious mutations for the stability of RNA-like replicator systems. **Journal of Molecular Evolution**, 65:668–686.

10 **Takeuchi, N.** and Hogeweg, P. (2007). Error-threshold exists in fitness landscapes with lethal mutants. **BMC Evolutionary Biology**, 7:15.

11 **Takeuchi, N.**, Poorthuis, P. H. and Hogeweg, P. (2005). Phenotypic error threshold; additivity and epistasis in RNA evolution. **BMC Evolutionary Biology**, 5:9.

12 Hogeweg, P. and **Takeuchi, N.** (2003). Multilevel selection in models of prebiotic evolution: Compartments and spatial self-organization. **Origins of Life and Evolution of Biospheres**, 33:375–403.

(For an online list, please see: `http://scholar.google.com/citations?user=M7Cwt7MAAAAJ`)

Last updated: December 25, 2015