FY 2025 Annual Report

Unit Name

Model-Based Evolutionary Genomics Unit
Associate Professor Gergely J Szöllősi

Collaborations

Frank O Aylward, Virginia Tech, USA, Viral contributions to Eukaryotic evolution

Bastien Boussau , CNRS UMR 5558, Lyon, France, Using machine learning to model coevolution

Zachar István, Institute of Evolution, HUN-REN, Hungary, Theoretical models of Eukaryogenesis

Imre Derényi, Eötvös University, Hungary, Somatic Evolution

Tom Williams, University of Bristol, United Kingdom, Reconstructing the Tree of Life

Phil Hugenholtz, University of Queensland, Australia, Prokaryotic evolution

Ben Woodcroft, Queensland University of Technology, Australia, Machine learning in genomics

Eduard Ocaña-Pallarès, The Institute of Evolutionary Biology (IBE), Spain, Gene transfer in eukaryotes

Davide Pisani, University of Bristol, UK, Early Animal phylogeny and SOTA phylogenomics models

Mathieu Groussin, University of Kiel, Germany, Evolution of the Human microbiome

Anja Spang, University of Amsterdam, The Netherlands, Eukaryogenesis and evolutionary genomics of Archaea

Philip C. J. Donoghue, University of Bristol, UK, Dating the Tree of Life

Research Personnel

Larisa Kiseleva, Staff Scientist

Joao Henrique Diniz Brandao Gervasio, Postdoctoral Scholar

Anzhelika Koldaeva, Postdoctoral Scholar

Lenard Szantho, Research Unit Technician

Oliver Schick, Research Unit Technician

Fatima Li-Hau, Postdoctoral Scholar

Bruna Fernanda Fistarol, PhD Student

Olga Evgenyevna Bagrova, Research Intern

Wencong Huang, Visiting Research Student

Scholarly Contributions and Creative Productions (by Faculty)

Journal Article

1. Kay, C. J.; Spang, A.; Szöllősi, G. J.; Pisani, D.; Williams, T. A.; Donoghue, P. C. J. Dated Gene Duplications Elucidate the Evolutionary Assembly of Eukaryotes. Nature 2026, 650, 129–140.
2. Malte, R.; Szantho, L. L.; Waschina, S.; Moitinho-Silva, L.; Mews, L. K.; Camarena, J. F.; Jebens, H.; Costa, J.; Juimo, V.; Fezeu, A.; Agyei, A.; Afihene, M. Y.; Asibey, S. O.; Awuku, Y. A.; Duah, A.; Nartey, Y.

A.; Ibrahim, F.; Lim, Y.; Pin, T. M.; Onyekwere, C.; Rusine, J.; Mwikarago, I. E.; Baines, J.; Franke, A.; Szollosi, G. J.; Xavier, R.; Alm, E. J.; Groussin, M.; Poyet, M.

Convergent Genomic Responses of Human Gut Bacteria to Variations in Industrialization. bioRxiv 2025, 2025.10.20.683395.

3. Huang, W.-C. C.; Probst, M.; Hua, Z.-S. S.; Szánthó, L. L.; Szöllősi, G. J.; Ettema, T. J. G.; Rinke, C.; Williams, T. A.; Spang, A.

   Phylogenomic Analyses Reveal That Panguiarchaeum Is a Clade of Genome-Reduced Asgard Archaea Within the Njordarchaeia. Molecular biology and evolution 2025, 42.

4. Fistarol, B. F.; Gervasio, J. D.; Szöllősi, G. J.

   Gene Copy-Number Features Generalize Better than SNPs for Antimicrobial Resistance Prediction in Staphylococcus Aureus. npj antimicrobials and resistance 2025, 3, 100.

5. Szánthó, L. L.; Merényi, Z.; Donoghue, P.; Gabaldón, T.; Nagy, L. G.; Szöllősi, G. J.; Ocaña-Pallarès, E.

   A Timetree of Fungi Dated with Fossils and Horizontal Gene Transfers. Nature ecology & evolution 2025, 9, 1989–2001.

6. Huang, W.-C.; Probst, M.; Hua, Z.-S.; Sz??nth??, L. L.; Sz??ll??si, G. J.; Ettema, T.; Rinke, C.; Williams, T. A.; Spang, A.

   Phylogenomic Analyses Reveal That Panguiarchaeum Is a Clade of Genome-Reduced Asgard Archaea Within the Njordarchaeia. Molecular Biology and Evolution 2026, 42, msaf201.

7. Moody, E. R. R.; Williams, T. A.; Álvarez-Carretero, S.; Szöllősi, G. J.; Pisani, D.; Lenton, T. M.; Donoghue, P. C. J.

   The Emergence of Metabolisms through Earth History and Implications for Biospheric Evolution. Philosophical transactions of the Royal Society of London. Series B, Biological sciences 2025, 380, 20240097.

8. Davín, A. A.; Woodcroft, B. J.; Soo, R. M.; Morel, B.; Murali, R.; Schrempf, D.; Clark, J. W.; Álvarez-Carretero, S.; Boussau, B.; Moody, E. R. R.; Szánthó, L. L.; Richy, E.; Pisani, D.; Hemp, J.; Fischer, W. W.; Donoghue, P. C. J.; Spang, A.; Hugenholtz, P.; Williams, T. A.; Szöllősi, G. J.

   A Geological Timescale for Bacterial Evolution and Oxygen Adaptation. Science (New York, N.Y.) 2025, 388, eadp1853.

Scholarly Contributions (by Unit Members)

Name of Unit Member	Type	Title	Outlet	Year Pub
Joao Gervazio	Journal Article	Immunosenescence Profile Is Associated With Increased Susceptibility to Severe COVID-19	Aging Cell	2025
Joao Gervasio	Journal Article	Pseudogenes podem ser peças-chave na diversidade de anticorpos de cavalos	Revista Bioinfo	2025
Joao Gervasio	Journal Article	Pre-print 'Profile of the B cell receptor repertoire and antibody responses upon 17DD-YF vaccine boosting'		
Joao Gervasio	Journal Article	HeavyBuilder: Analysis of High-Throughput of Antibody Heavy Chain Repertoires in the Structural Space	Journal of Molecular Biology	
Joao Gervasio	Journal Article	The Therapeutic Nanobody Profiler: characterising and predicting nanobody developability to improve therapeutic design	BioRxiv	2025
Joao Gervasio	Poster Presentation at Conference	Antibiotic Resistance Prediction in Staphylococcus aureus Using Gene	ESEB2025	

Name of Unit Member	Type	Title	Outlet	Year Pub
		Content Outperforms SNV-Based Approaches'		
Anzhelika Koldaeva	Poster Presentation at Conference	A Deep Learning Framework for Ancestral Gene Content Denoising	TSVP Symposium: Computational and Physical Understanding of Biological Information Processing	
Joao Gervasio	Poster Presentation at Conference	'Giant Virus Heredity is Surprisingly Vertical: Reconciliation of Nucleocytoviricota Phylogeny'	ESEB2025	2025
Olga Bagrova	Poster Presentation at Conference	Analysis of Secondary Structure Distribution Across Functional and Homologous Groups of Proteins	Computational & Physical Understanding of Biological Information Processing	
Joao Gervasio	Presentation at Conference	Presentation 'YPub:Scalable Discovery of Public Clonotypes' at Antibody Engineering & Therapeutics Europe 2025	Antibody Engineering & Therapeutics Europe 2025	
Joao Henrique Diniz Brandao Gervasio	Seminars	Phylogeny Reconciliation of Giant Virus	Evolution Seminar	
Anzhelika Koldaeva	Seminars	Learning gene context with Transformer-based models	The Translational Research Institute (TRI), Brisbane, Australia	

Honors, Awards & Fellowships

Term 3 2024 - Ongoing	Physics Prize of the Hungarian Academy of Sciences, ハンガリー科学アカデミー物理学賞, 2024, Hungarian Academy of Sciences [Fiscal Year: 2024]
Term 3 2024 - Ongoing	Pierre-Gilles de Gennes Prize, ピエール＝ジル・ド・ジェンヌ賞, 2024, Organising Committee of Solid State to Biophysics XI [Fiscal Year: 2024]
Term 2 2021 - Ongoing	Hungarian Academy of Sciences Advanced Momentum Grant, 2021 [Fiscal Year: 2021-04-01]
Term 2 2017 - Ongoing	ERC Starting Grant, 2017 [Fiscal Year: 2017-04-01]
Term 2 2016 - Ongoing	Hungarian Academy of Sciences Starting Momentum Grant, 2016 [Fiscal Year: 2016-04-01]
Term 2 2011 - Ongoing	Marie Curie Individual Fellowship, LBBE, Lyon, 2011 [Fiscal Year: 2011-04-01]

Honors, Awards & Fellowships [By Unit Members Only]

Term 1 2025 - Term 1 2025	Joao Gervasio, Best oral presentation, 最優秀口頭発表賞, 2025, Bioinformatica 2035, Bioinformática 2035: Desafios e Formação de Talentos para a Próxima Década [Fiscal Year: 2025]

External Service

Term 3 2025 - Term 3 2025	Faculty at Uzhorod Bioinformatics Summer School 2025, Uzhorod Bioinformatics Summer School [Fiscal Year: 2025]
Term 1 2024 - Ongoing	Brett Babec's thesis committee , Queensland University of Technology, I am part of Brett Babec's thesis committee [Fiscal Year: 2024]

Other Institutional Service

Term 2 2025 - Ongoing	Living on Mars, (University) [Fiscal Year: 2024]

Outreach Activities [For Unit Members Only]

Term 2 2025	Lenard Szantho, OIST Science Festival [Fiscal Year: 2024]
Term 2 2025	Olga Bagrova, OIST Science Festival [Fiscal Year: 2024]
Term 2 2025	Lenard Szantho, Motobu Science Festival [Fiscal Year: 2024]
Term 2 2025	Lenard Szantho, Score! [Fiscal Year: 2024]
Term 2 2025	Oliver Schick, OIST Science Festival [Fiscal Year: 2024]
Term 2 2025	Oliver Schick, Motobu Science Festival [Fiscal Year: 2024]
Term 2 2025	Oliver Schick, Score! [Fiscal Year: 2024]
Term 2 2025	Oliver Schick, Campus tour for high school students [Fiscal Year: 2024]