

Akos J. Nyerges, PhD

website: engineeringbio.science | Google Scholar

EDUCATION

Ph.D.	Biological Research Centre, Hungarian Academy of Sciences, Szeged (Hungary) Ph.D. in Biology, Molecular Biology Programme of the University of Szeged <i>Boehringer Ingelheim Fonds PhD Fellowship</i> Summa cum laude Thesis advisor: Csaba Pal, Ph.D.	2015-2019
M.S.	University of Szeged, Faculty of Science and Informatics, Szeged (Hungary) Master of Science in Biology, Minor: molecular-, immune-, and microbiology Research advisor: Csaba Pal, Ph.D.	2012-2015
B.S.	University of Szeged, Faculty of Science and Informatics, Szeged (Hungary) Bachelor of Science in Biology, Minor: cell and molecular biology Research advisor: György Pósfai, Ph.D. and Csaba Pal, Ph.D.	2009-2012

RESEARCH

Harvard Medical School		2019-Present
<i>Research Fellow in Genetics</i> (2019-2024), <i>Research Associate in Genetics</i> (2024-)		
Advisor: Prof. George M. Church, Department of Genetics & Wyss Institute for Biologically Inspired Engineering		
Biological Research Centre, Hungarian Academy of Sciences		2016-2019
<i>Research Unit Leader of the Evolutionary Genome Engineering Research Unit</i>		
Advisor: Csaba Pal, Ph.D., Biological Research Centre, Hungarian Academy of Science		
ETH Zürich, Switzerland		2016
<i>Visiting researcher, EMBO Short-term Fellow</i>		
Advisor: Prof. Sven Panke, Department of Biosystems Science and Engineering		
Biological Research Centre, Hungarian Academy of Sciences		2010-2016
<i>Undergraduate Research Assistant</i> (2010-2015); <i>Graduate Researcher</i> (2015-2019)		
Advisors: György Pósfai, Ph.D. (2010-2015) and Csaba Pal, Ph.D. (2012-2019)		
Fejerviz Ltd		2006-2010
<i>High school and undergraduate researcher</i>		
Mentor: Laszlo Repas		

AWARDS and HONORS (selected)

• Distinguished Young Scholar (DYSS), University of Washington	2024
• Next Generation in Biomedicine, The Broad Institute of MIT & Harvard	2022
• Junior Prima Prize, <i>the highest academic award for Early Career Researchers in Hungary</i>	2019
• European Molecular Biology Organization Long Term Fellowship to Harvard	2019
• Rosztoczy Foundation Scholarship, US	2019
• Leader of Tomorrow at GapSummit (Broad Institute of MIT & Harvard)	2019
• Qualitas Biologica Prize of the Hungarian Academy of Sciences	2019
• Young Researcher Prize of the Hungarian Academy of Sciences	2019
• Young Investigator Research Fellowship of the Hungarian Academy of Sciences	2018
• Boehringer Ingelheim Fonds PhD Fellowship	2015

- European Molecular Biology Organization Short Term Fellowship to ETH Zürich 2015
- Sófi Research Scholarship for Outstanding Biologists 2014
- Sófi Scholarship for Excellent Graduate Students 2014
- Stephen W. Kuffler Research Scholarship 2014
- SZFA Research Scholarship 2014
- Eötvös Research Scholarship 2013
- Terézia Tóth Scholarship 2012, 2013, 2014
- Academic Scholarship of the Hungarian Republic 2012, 2014
- Pro Renovanda Cultura Hungariae Research Scholarship 2011

TEACHING EXPERIENCE

- Instructor:** European Molecular Biology Organization (EMBO) Synthetic Biology Practical Course 2019
Designed hands-on curriculum and taught a diverse group of undergraduate and PhD students learning genome editing and the use of the **pORTMAGE** & **DiVERGE** genome engineering methods.
- Instructor:** European Molecular Biology Organization (EMBO) Synthetic Biology Practical Course 2017
Designed hands-on curriculum and taught a diverse group of undergraduate and PhD students learning genome editing and the use of the **pORTMAGE** genome engineering method.
- Student Instructor:** University of Szeged, Systems Biology course for BSc, MSc, and PhD students 2014
Taught the fundamentals of genome engineering and synthetic biology for 30+ students.
- International Genetically Engineered Machine (iGEM) team Mentor & academic project lead** 2014
HUNGENIOUS iGEM Team, won “Best experimental setup” prize, MIT, Cambridge, MA

FIRST or LAST AUTHOR PUBLICATIONS

NCBI My Bibliography: <https://www.ncbi.nlm.nih.gov/myncbi/akos.nyerges.1/bibliography/public/>

Total citations: 2096; H-index: 22 | * indicates corresponding authors

1. **Nyerges A***, Chiappino-Pepe A, Budnik B, Baas-Thomas M, Flynn R, Yan S, Ostrov N, Liu M, Wang M, Zheng Q, Hu F, Chen K, Rudolph A, Chen D, Ahn J, Spencer O, Ayalavarapu V, Tarver A, Harmon-Smith M, Hamilton M, Blaby I, Yoshikuni Y, Hajian B, Jin A, Kintses B, Szamel M, Seregi V, Shen Y, Li Z, Church GM*, Synthetic genomes unveil the effects of synonymous recoding, (2024) *bioRxiv* (PMCID: PMC11195188)
2. **Nyerges A***, Vinke S, Flynn R, Owen V S, Rand E, Keen E, Budnik B, Narasimhan K, Marchand A J, Baas-Thomas M, Liu M, Chen K, Chiappino-Pepe A, Hu F, Baym M, Church GM*, (2022 July) *bioRxiv*, Published as A swapped genetic code prevents viral infections and gene transfer, (2023) *Nature*
Highlighted in Science; NewScientist; Synthetic Biology; Nature Biotechnology; DOE; Nature News and Views Interviews in Nature Podcast; Drug Discovery News; TheScientist; Harvard (highlight of the year by Harvard)
3. **Nyerges A**, Tomašič T, Durcik M, Revesz T, Szili P, Draskovits G, Bogar F, Skok Ž, Zidar N, Ilaš J, Zega A, Kikelj D, Daruka L, Kintses B, Vasarhelyi B, Foldesi I, Kata D, Welin M, Kimbung R, Focht D, Mašič LP*, Pal C* (2020) Rational design of balanced dual-targeting antibiotics with limited resistance. *PLOS Biology*
4. **Nyerges A**, Bálint B, Cseklye J, Nagy I, Pál C, Fehér T*, CRISPR-interference-based modulation of mobile genetic elements in bacteria, (2019) *Synthetic Biology*
5. Szili P, Draskovits G, Révész T, Bogar F, Balogh D, Martinek T, Daruka L, Spohn R, Vásárhelyi BM, Czikkely M, Kintses B, Grézal G, Ferenc G, Pál C*, **Nyerges A*** (2019) Rapid evolution of reduced susceptibility against a balanced dual-targeting antibiotic through stepping-stone mutations. *Antimicrobial Agents and Chemotherapy*
6. **Nyerges A***, Csörgő B, Draskovits G, Kintses B, Szili P, Ferenc G, Révész T, Ari E, Nagy I, Bálint B, Vásárhelyi BM, Bihari P, Számel M, Balogh D, Papp H, Kalapis D, Papp B, Pál C* (2018) Directed evolution of multiple genomic loci allows the prediction of antibiotic resistance. *Proceedings of the National Academy of Sciences*
Highlighted in PNAS' In This Issue, 115(25):6315–6317.
Highlighted in “Breakthrough method predicts resistance to antibiotics under development”

7. **Nyerges A**, Csörgő B*, Nagy I, Bálint B, Bihari P, Lázár V, Apjok G, Umenhoffer K, Bogos B, Pósfai G, Pál C* (2016) A highly precise and portable genome engineering method allows comparison of mutational effects across bacterial species. *Proceedings of the National Academy of Sciences*
8. **Nyerges A**, Csörgő B, Nagy I, Latinovics D, Szamecz B, Pósfai G, Pál C* (2014) Conditional DNA repair mutants enable highly precise genome engineering. *Nucleic Acids Research*

CONTRIBUTING AUTHOR PUBLICATIONS

9. Rudolph A, **Nyerges A**, Chiappino-Pepe A, Landon M, Baas-Thomas M, Church G (2023) Strategies to identify and edit improvements in synthetic genome segments episomally. *Nucleic Acids Research*
10. Apjok, G, Számel M, Christodoulou C, Seregi V, Vásárhelyi B, Stirling T, Eszenyi B, Sári T, Vidovics F, Nagrand E, Kovács D, Szili P, Lantos I, Méhi O, Jangir P, Herczeg R, Galik B, Urbán P, Gyenesei A, Draskovits G, **Nyerges A**, Fekete G, Bodai L, Zsindely N, Denes B, Yosef I, Qimron U, Papp B, Pal C (2023), Characterization of antibiotic resistomes by reprogrammed bacteriophage-enabled functional metagenomics in clinical strains, *Nature Microbiology*
11. Yilmaz S, **Nyerges A**, Oost J van der, Church GM, Claassens NJ (2022) Towards next-generation cell factories by rational genome-scale engineering. *Nature Catalysis*
12. Wannier TM, Ciaccia PN, Ellington AD, Filsinger GT, Isaacs FJ, Javanmardi K, Jones MA, Kunjapur AM, **Nyerges A**, Pal C, Schubert MG, Church GM (2021) Recombineering and MAGE. *Nature Reviews Methods Primers*
13. Shukla RD, Zvara Á, Avramucz Á, Biketova AY, **Nyerges A**, Puskás LG, Fehér T (2021) inPOSE: a flexible toolbox for chromosomal cloning and amplification of bacterial transgenes. *Microorganisms*
14. Durcik M, Skok Ž, Ilaš J, Zidar N, Zega A, Szili PÉ, Draskovits G, Révész T, Kikelj D, **Nyerges A**, Pál C, Mašič LP, Tomašič T (2021) Hybrid Inhibitors of DNA Gyrase A and B: Design, Synthesis and Evaluation. *Pharmaceutics*
15. Durcik M, **Nyerges Á**, Skok Ž, Skledar DG, Trontelj J, Zidar N, Ilaš J, Zega A, Cruz CD, Tammela P, Welin M, Kimbung YR, Focht D, Benek O, Révész T, Draskovits G, Szili PÉ, Daruka L, Pál C, Kikelj D, Mašič LP, Tomašič T (2021) New dual ATP-competitive inhibitors of bacterial DNA gyrase and topoisomerase IV active against ESKAPE pathogens. *European Journal of Medicinal Chemistry*
16. Al-ramahi Y, **Nyerges A**, Margolles Y, Cerdán L, Ferenc G, Pál C, Fernández LÁ, Lorenzo V de (2021) ssDNA recombineering boosts in vivo evolution of nanobodies displayed on bacterial surfaces. *Communications Biology*
17. Wannier TM, **Nyerges A**, Kuchwara HM, Czikkely M, Balogh D, Filsinger GT, Borders NC, Gregg CJ, Lajoie MJ, Rios X, Pál C, Church GM (2020) Improved bacterial recombineering by parallelized protein discovery. *Proceedings of the National Academy of Sciences*
Highlighted in [Genetic Engineering and Biotechnology News](#)
18. Ostrov N, **Nyerges A**, Chiappino-Pepe A, Rudolph A, Baas-Thomas M, Church GM (2020) Synthetic genomes with altered genetic codes. *Current Opinion in Systems Biology*
19. Lamut A, Skok Ž, Barančoková M, Gutierrez LJ, Cruz CD, Tammela P, Draskovits G, Szili PÉ, **Nyerges Á**, Pál C, Molek P, Bratkovič T, Ilaš J, Zidar N, Zega A, Enriz RD, Kikelj D, Tomašič T (2020) Second-generation 4,5,6,7-tetrahydrobenzo[d]thiazoles as novel DNA gyrase inhibitors. *Future Medicinal Chemistry*
20. Hueso-Gil A, **Nyerges Á**, Pál C, Calles B, Lorenzo V de (2020) Multiple-Site Diversification of Regulatory Sequences Enables Interspecies Operability of Genetic Devices. *ACS Synthetic Biology*
21. Fois B, Skok Ž, Tomašič T, Ilaš J, Zidar N, Zega A, Peterlin Mašič L, Szili P, Draskovits G, **Nyerges Á**, Pál C, Kikelj D (2020) Dual Escherichia coli DNA Gyrase A and B Inhibitors with Antibacterial Activity. *ChemMedChem*
22. Csörgő B, **Nyerges A**, Pál C (2020) Targeted mutagenesis of multiple chromosomal regions in microbes. *Current Opinion in Microbiology*
23. Aparicio T, **Nyerges A**, Martínez-García E, Lorenzo V de (2020) High-efficiency multi-site genomic editing (HEMSE) of Pseudomonas putida through thermoinducible ssDNA recombineering. *iScience*
24. Tiz DB, Skok Ž, Durcik M, Tomašič T, Mašič LP, Ilaš J, Zega A, Draskovits G, Révész T, **Nyerges Á**, Pál C, Cruz CD, Tammela P, Žigon D, Kikelj D, Zidar N (2019) An optimised series of substituted N-phenylpyrrolamides as DNA gyrase B inhibitors. *European Journal of Medicinal Chemistry*
25. Kintsés B, Méhi O, Ari E, Számel M, Györkei Á, Jangir PK, Nagy I, Pál F, Fekete G, Tengölics R, **Nyerges Á**, Likó I, Bálint A, Molnár T, Bálint B, Vásárhelyi BM, Bustamante M, Papp B, Pál C (2018) Phylogenetic barriers to horizontal transfer of antimicrobial peptide resistance genes in the human gut microbiota. *Nature Microbiology*

26. Guzmán GI, Sandberg TE, LaCroix RA, **Nyerges Á**, Papp H, Raad M de, King ZA, Hefner Y, Northen TR, Notebaart RA, Pál C, Palsson BO, Papp B, Feist AM (2019) Enzyme promiscuity shapes adaptation to novel growth substrates. *Molecular Systems Biology*
27. Aparicio T, **Nyerges A**, Nagy I, Pal C, Martínez-García E, Lorenzo V (2019) Mismatch repair hierarchy of *Pseudomonas putida* revealed by mutagenic ssDNA recombineering of the *pyrF* gene. *Environmental Microbiology*
28. Apjok G, Boross G, Nyerges A, Fekete G, Lázár V, Papp B, Pál C, Csörgő B (2019) Limited Evolutionary Conservation of the Phenotypic Effects of Antibiotic Resistance Mutations. *Molecular Biology and Evolution*
29. Ricaurte DE, Martínez-García E, **Nyerges Á**, Pál C, Lorenzo V de, Aparicio T (2018) A standardized workflow for surveying recombinases expands bacterial genome-editing capabilities. *Microbial Biotechnology*
30. Lázár V, Martins A, Spohn R, Daruka L, Grézal G, Fekete G, Számel M, Jangir PK, Kintses B, Csörgő B, **Nyerges Á**, Györkei Á, Kincses A, Dér A, Walter FR, Deli MA, Urbán E, Hegedűs Z, Olajos G, Méhi O, Bálint B, Nagy I, Martinek TA, Papp B, Pál C (2018) Antibiotic-resistant bacteria show widespread collateral sensitivity to antimicrobial peptides. *Nature Microbiology*
31. Durcik M, Lovison D, Skok Ž, Durante Cruz C, Tammela P, Tomašič T, Benedetto Tiz D, Draskovits G, **Nyerges Á**, Pál C, Ilaš J, Peterlin Mašič L, Kikelj D, Zidar N (2018) New N-phenylpyrrolamide DNA gyrase B inhibitors: Optimization of efficacy and antibacterial activity. *European Journal of Medicinal Chemistry*
32. Umenhoffer K, Draskovits G, **Nyerges Á**, Karcagi I, Bogos B, Tímár E, Csörgő B, Herczeg R, Nagy I, Fehér T, Pál C, Pósfai G (2017) Genome-Wide Abolishment of Mobile Genetic Elements Using Genome Shuffling and CRISPR/Cas-Assisted MAGE Allows the Efficient Stabilization of a Bacterial Chassis. *ACS Synthetic Biology*
33. Bódi Z, Farkas Z, Nevozhay D, Kalapis D, Lázár V, Csörgő B, **Nyerges Á**, Szamecz B, Fekete G, Papp B, Araújo H, Oliveira JL, Moura G, Santos MAS, Jr TS, Balázsi G, Pál C (2017) Phenotypic heterogeneity promotes adaptive evolution. *PLOS Biology*
34. Csörgő B, **Nyerges Á**, Pósfai G, Fehér T (2016) System-level genome editing in microbes. *Current Opinion in Microbiology*
35. Méhi O, Bogos B, Csörgő B, Pál F, **Nyerges Á**, Papp B, Pál C (2014) Perturbation of Iron Homeostasis Promotes the Evolution of Antibiotic Resistance. *Molecular Biology and Evolution*
36. Lázár V, Nagy I, Spohn R, Csörgő B, Györkei Á, **Nyerges Á**, Horváth B, Vörös A, Busa-Fekete R, Hrtyan M, Bogos B, Méhi O, Fekete G, Szappanos B, Kégl B, Papp B, Pál C (2014) Genome-wide analysis captures the determinants of the antibiotic cross-resistance interaction network. *Nature Communications*

PATENTS

1. **Nyerges AJ**, Church G. M, (2024) Synthetic 57-Codon Genome and Methods for Multi-Omics-Based Genome Synthesis, US provisional application 63/560,144
2. **Nyerges AJ**, Church G. M, (2022) Genetic firewall based on an amino-acid-swapped genetic code, PCT/US2023/069468
3. Nyerges AJ, Church G. M, (2021) METHODS FOR MAKING AND USING GENOMICALLY RECODED CELLS, PCT/US21/62177
4. **Nyerges AJ**, Pal C, Csorgo B, Kintses B (2018) Mutagenizing Intracellular Nucleic Acids, PCT/EP2017/082574, US10669537B2 **Outlicensed.**
5. Tomašič T, Zidar N, Durcik M, Ilaš J, Zega A, Durante Cruz C, Tammela P, Pál C, **Nyerges AJ**, Kikelj D, Mašič LP (2020) New Class of DNA Gyrase and/or Topoisomerase IV Inhibitors with Activity Against Gram-Positive and Gram-Negative Bacteria, PCT/EP2019/073412, US20210323957A1

PROFESSIONAL SERVICE

- Manuscript reviewer for Nucleic Acids Research, Nature Communications, Clinical Microbiology Reviews, PLOS One, Microbial Biotechnology, mSystems, GEN Biotechnology, Cell Press, Cell Chemical Biology, Cell Reports.
- Grant application reviewer for ETH Zürich (Switzerland) and Align to Innovate (US).

ORAL PRESENTATIONS (selected)

- Genetic Code Expansion Conference, Oregon State University, 2024
- Discovery on Target, 2023 (*invited*); Session Chair of Synthetic Biology for Drug Discovery, Boston, 2024 (*invited*)
- Synthetic Biology Gordon Research Conference, Newry, 2023 (*invited*)
- Young Investigator Symposium, Vienna, Austria, 2023 (*invited*)
- Northeast Regional Meeting of the American Chemical Society, Boston, 2023 (*invited*)
- 5th International Conference on Microbiome Engineering, Boston, 2022
- Biosciences & Biotechnology Division Seminar, Lawrence Livermore National Laboratory, 2022 (*invited*)
- Molecular and Cellular Integrative Biology Seminar, Queen's University, Kingston, Canada (*invited*)
- SynBioBeta Conference, San Francisco, 2019 (*invited*)
- Keystone Symposia on Precision Genome Engineering, Victoria, Canada, 2019
- Gordon Research Conference on Drug Resistance, 2018
- Spiez CONVERGENCE, Switzerland, 2018 – *Speaker and Advisor regarding Synthetic Biology forward engineering and the potential dual-use of genome engineering (invited)*
- Institutional seminar at the El Centro Nacional de Biotecnología (CNB), Madrid, Spain, 2018 (*invited*)
- Imperial College London, Synthetic Biology Seminar Series, London, UK, 2017 (*invited*)
- Cold Spring Harbor Asia Conference on Synthetic Biology, Suzhou, China, 2014