Vasili Hauryliuk
Molecular Enzymology
LU Profile Area: Proactive Ageing
eSSENCE: The e-Science Collaboration
NanoLund: Centre for Nanoscience
LTH Profile Area: Nanoscience and Semiconductor Technology
Infect@LU

Type of address: Visiting address.
Sölvegatan 19
221 84
Lund
Sweden
Type of address: Postal address.
Box 118
221 00
Lund
Sweden
Type of address: Postal address.
Box 117
22100
Lund
Sweden
Type of address: Visiting address.
Professorsgatan 1
Lund
Sweden
Type of address: Postal address.
Box 118
221 00
Lund
Sweden
Type of address: Visiting address.
Sölvegatan 19
223 62
Lund
Sweden
Email: vasili.hauryliuk@med.lu.se
Mobile: +460706090493

Research

My lab is using a combination of microbiological, biochemical, next-generation sequencing and structural (cryo-EM) approaches to tackle two research directions:

- Molecular mechanisms of bacterial defence against phages
- Protein synthesis on the ribosome: antibiotics, antibiotic resistance, stress sensing and signalling, protein quality control

Qualifications

Molecular biology, PhD
2002 → 2008

Chemistry, MSci
1997 → 2002

… → 2015 Docent in Microbiology

Employment

Research team manager, Senior lecturer
Molecular Enzymology
Lund University
Lund, Sweden
2021 May 10 → present

Profile area member
LU Profile Area: Proactive Ageing
Lund University
Sweden
2023 Jan 1 → present

Member of Strategic Research Area
eSSENCE: The e-Science Collaboration
Lund University
Lund, Sweden
2024 Jan 1 → present

Member of Strategic Research Area
NanoLund: Centre for Nanoscience
Lund University
Lund, Sweden
2024 Dec 10 → present

Profile area member
LTH Profile Area: Nanoscience and Semiconductor Technology
Lund University
Sweden
2024 Dec 10 → present

Affiliated researcher
Infect@LU
Lund University
Lund, Sweden
2025 Jun 30 → present

group leader at the Laboratory for Molecular Infection Medicine Sweden (MIMS)
Umeå University
Umeå, Sweden
2013 Jan 1 → 2021 Jan 1

Researcher
University of Tartu
Tartu, Estonia
2008 Jan 1 → 2010 Jan 1

Research outputs

The Viral AlphaFold Database of monomers and homodimers reveals conserved protein folds in viruses of bacteria, archaea, and eukaryotes
Odai, R., Leemann, M., Al-Murad, T., Abdullah, M., Shyrokova, L., Tenson, T., Hauryliuk, V., Durairaj, J., Pereira, J. & Atkinson, G. C., 2025 Oct 3, In: Science Advances. 11, 40, p. 1-14 eadz8560.

Antibacterial compounds against non-growing and intracellular bacteria
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Characterization of five environmental phages infecting *Escherichia coli* K-12 isolated during a phage biology training course.
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Cyanobacterial Argonautes and Cas4 family nucleases cooperate to interfere with invading DNA
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Mechanisms of neutralization of toxSAS from toxin-antitoxin modules
Dominguez-Molina, L., Kurata, T., Cepauskas, A., Echemendia-Blanco, D., Zedek, S., Talavera-Perez, A., Atkinson, G. C. , Hauryliuk, V. & Garcia-Pino, A., 2025, In: Nature Chemical Biology. 21, p. 182-192

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Kurata, T., Takegawa, M., Ohira, T., Syroegin, E. A., Atkinson, G. C., Johansson, M. J. O., Polikanov, Y. S., Garcia-Pino, A., Suzuki, T. & Hauryliuk, V., 2024 Nov 15, In: Science Advances. 10, 46, eadr9624.

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Minoia, M., Quintana-Cordero, J., Jetzinger, K., Kotan, I. E., Turnbull, K. J., Ciccarelli, M., Masser, A. E., Liebers, D., Gouarin, E., Czech, M., Hauryliuk, V., Bukau, B., Kramer, G. & Andréasson, C., 2024 Feb 15, In: Nature Communications. 15, 1, 1382.

A role for the S4-domain containing protein YlmH in ribosome-associated quality control in Bacillus subtilis
Takada, H., Paternoga, H., Fujiwara, K., Nakamoto, J. A., Park, E. N., Dimitrova-Paternoga, L., Beckert, B., Saarma, M., Tenson, T., Buskirk, A. R., Atkinson, G. C., Chiba, S., Wilson, D. N. & Hauryliuk, V., 2024, In: Nucleic Acids Research. 52, 14, gkae399.

A virally-encoded tRNA neutralizes the PARIS antiviral defence system
Burman, N., Belukhina, S., Depardieu, F., Wilkinson, R. A., Skutel, M., Santiago-Frangos, A., Graham, A. B., Livenskyi, A., Chechenina, A., Morozova, N., Zahl, T., Henriques, W. S., Buyukyoruk, M., Rouillon, C., Saudemont, B., Shyrokova, L., Kurata, T., Hauryliuk, V., Severinov, K. & Groseille, J. & 7 others, Thierry, A., Koszul, R., Tesson, F., Bernheim, A., Bikard, D., Wiedenheft, B. & Isaev, A., 2024, In: Nature. 634, 8033, p. 424-431 8 p.

Mechanism of phage sensing and restriction by toxin-antitoxin-chaperone systems
Mets, T., Kurata, T., Ernits, K., Johansson, M. J. O., Craig, S. Z., Evora, G. M., Buttress, J. A., Odai, R., Wallant, K. C., Nakamoto, J. A., Shyrokova, L., Egorov, A. A., Doering, C. R., Brodiazhenko, T., Laub, M. T., Tenson, T., Strahl, H., Martens, C., Harms, A. & Garcia-Pino, A. & 2 others, Atkinson, G. C. & Hauryliuk, V., 2024, In: Cell Host and Microbe. 32, 7, p. 1059-1073.e8

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The structural basis of hyperpromiscuity in a core combinatorial network of type II toxin-antitoxin and related phage defense systems
Ernits, K., Saha, C. K., Brodiazhenko, T., Chouhan, B., Shenoy, A., Buttress, J. A., Duque-Pedraza, J. J., Bojar, V., Nakamoto, J. A., Kurata, T., Egorov, A. A., Shyrokova, L., Johansson, M. J. O., Mets, T., Rustamova, A., Džigurski, J., Tenson, T., Garcia-Pino, A., Strahl, H. & Elofsson, A. & 2 others, Hauryliuk, V. & Atkinson, G. C., 2023 Aug 15, In: Proceedings of the National Academy of Sciences of the United States of America. 120, 33, p. 1-12 e2305393120.

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Biochemical and X-ray analyses of the players involved in the faRel2/aTfaRel2 toxin-antitoxin operon
Dominguez-Molina, L., Talavera, A., Cepauskas, A., Kurata, T., Echemendia-Blanco, D., Hauryliuk, V. & Garcia-Pino, A., 2023, In: Acta crystallographica. Section F, Structural biology communications. 79, 10

Escherichia coli CspA stimulates translation in the cold of its own mRNA by promoting ribosome progression
Giuliodori, A. M., Belardinelli, R., Duval, M., Garofalo, R., Schenckbecher, E., Hauryliuk, V., Ennifar, E. & Marzi, S., 2023, In: Frontiers in Microbiology. 14, p. 1-16 1118329.

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Tamman, H., Ernits, K., Roghanian, M., Ainelo, A., Julius, C., Perrier, A., Talavera, A., Ainelo, H., Dugauquier, R., Zedek, S., Thureau, A., Pérez, J., Lima-Mendez, G., Hallez, R., Atkinson, G. C., Hauryliuk, V. & Garcia-Pino, A., 2023, In: Nature Chemical Biology. 19, 3, p. 334-345

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Kurata, T., Saha, C. K., Buttress, J. A., Mets, T., Brodiazhenko, T., Turnbull, K. J., Awoyomi, O. F., Oliveira, S. R. A., Jimmy, S., Ernits, K., Delannoy, M., Persson, K., Tenson, T., Strahl, H., Hauryliuk, V. & Atkinson, G. C., 2022, In: Proceedings of the National Academy of Sciences of the United States of America. 119, 6, p. 1-12 e2102212119.

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Kumar, P., Schexnaydre, E., Rafie, K., Kurata, T., Terenin, I., Hauryliuk, V. & Carlson, L.-A., 2022, In: FEBS Letters. 596, 9, p. 1203-1213

Expression of Bacillus subtilis ABCF antibiotic resistance factor VmlR is regulated by RNA polymerase pausing, transcription attenuation, translation attenuation and (p)ppGpp
Hiraku, T., Mandell, Z. F., Yakhnin, H., Glazyrina, A., Chiba, S., Kurata, T., Wu, K. J. Y., Tresco, B. I. C., Myers, A. G., Atkinson, G., Babitzke, P. & Hauryliuk, V., 2022, In: Nucleic Acids Research. 50, 11, p. 6174-6189 gkac497.

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Crowe-McAuliffe, C., Murina, V., Turnbull, K. J., Kasari, M., Mohamad, M., Polte, C., Takada, H., Vaitkevicius, K., Johansson, J., Ignatova, Z., Atkinson, G. C., O'Neill, A. J., Hauryliuk, V. & Wilson, D. N., 2021 Dec, In: Nature Communications. 12, 1, 3577.

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Mojr, V., Roghanian, M., Tamman, H., Do Pham, D. D., Petrová, M., Pohl, R., Takada, H., Van Nerom, K., Ainelo, H., Caballero-Montes, J., Jimmy, S., Garcia-Pino, A., Hauryliuk, V. & Rejman, D., 2021, In: ACS Chemical Biology. 16, 9, p. 1680-1691

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(p)ppGpp controls stringent factors by exploiting antagonistic allosteric coupling between catalytic domains
Roghanian, M., Van Nerom, K., Takada, H., Caballero-Montes, J., Tamman, H., Kudrin, P., Talavera, A., Dzhygyr, I., Ekström, S., Atkinson, G. C., Garcia-Pino, A. & Hauryliuk, V., 2021, In: Molecular Cell. 81, 16, p. 3310-3322.e6

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Takada, H., Roghanian, M., Caballero-Montes, J., Van Nerom, K., Jimmy, S., Kudrin, P., Trebini, F., Murayama, R., Akanuma, G., Garcia-Pino, A. & Hauryliuk, V., 2021, In: Nucleic Acids Research. 49, 1, p. 444-457

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Structural Basis for Bacterial Ribosome-Associated Quality Control by RqcH and RqcP
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Prizes and Distinctions

Göran Gustafssonprisen i molekylär biologi / Göran Gustafsson prize in molecular biology
Hauryliuk, V. (Recipient), 2024 Mar 1

Ragnar Söderberg Fellow in Medicine
Hauryliuk, V. (Recipient), 2014

Science Award of the Estonian Republic
Hauryliuk, V. (Recipient), 2018

The Swedish Fernström Prize
Hauryliuk, V. (Recipient), 2019

Awards

Synthetic DNA fragments
Hauryliuk, V. (PI)
Pia Ståhls Stiftelse: SEK38,400.00
2025/11/11 → 2026/03/11

Projects

A double tap: ribosomal protection though rRNA methylation and antibiotic displacement
Hauryliuk, V. (PI)
Swedish Research Council
2024/12/01 → 2028/12/31

Bacteriophage-based anti-caries ATMP for selective eradication of Streptococcus mutans from the oral microbiome
Hauryliuk, V. (PI)
Swedish Research Council, National ATMP Research School
2025/06/01 → 2029/12/31

Bacteriophage-based anti-caries ATMP for selective eradication of Streptococcus mutans from the oral microbiome
Selkova, P. (Researcher) & Hauryliuk, V. (PI)
2025/11/01 → …

Decoding bacterial toxin-antitoxin systems: from high-throughput discovery to molecular mechanism and biotechnology
Atkinson, G. (PI), Hauryliuk, V. (Researcher) & Schüler, H. (Researcher)
Knut and Alice Wallenberg Foundation
2021/07/01 → 2026/06/30

eSSENCE@LU 10:2 - "New sequence- and structure-based computational methods to find functional domains of proteins
Atkinson, G. (PI), Egorov, A. (Research student), Hauryliuk, V. (Researcher), Bernheim, A. (Researcher), Schwede, T. (Researcher) & Pereira, J. (Researcher)
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Experimental exploration of bacterial toxin-antitoxin systems
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2022/06/01 → …

För banbrytande studier av hur proteinsyntes regleras i bakterier
Hauryliuk, V. (PI)
Göran Gustafssons stiftelse för naturvetenskaplig och medicinsk forskning
2024/04/01 → 2028/12/31

Growth rate control in methanotrophs: engineering a biological sink for atmospheric methane
Hauryliuk, V. (PI)
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2025/11/01 → 2028/12/31