

July, 2024

CURRICULUM VITAE MARIA P. LYLYK

Head of the research laboratory, Department of Biochemistry and Biotechnology, Vasyl Stefanyk Precarpathian National University (PNU)

Research profiles SCOPUS <https://www.scopus.com/authid/detail.uri?authorId=56781567200>, h-8
ORCID <https://orcid.org/0000-0002-2318-6421>
ResearchGate <https://www.researchgate.net/profile/Maria-Lylyk>
Goggle Scholar
https://scholar.google.com/citations?hl=uk&user=Gx_bNJUAAAAAJ&view_op=list_works&gghn_2aGqKY5n_yz1Oy3vIIJyrc96HxLa8Stn1U-Eh4UIweIYJAFzpyQegMsRKW-8KkDjEGFnBAYMaXQFmeKifXFJIpzXg

I. PERSONAL/CONTACT DETAILS

Ukrainian

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Languages: Ukrainian, English

Hobbies: yoga, reading, travelling, reuse/recycling

II. EDUCATION

2015-2018 PhD student, Department of Biochemistry and Biotechnology, PNU. **PhD thesis in Biochemistry:** "Protective effect of alpha-ketoglutarate in fruit flies *Drosophila melanogaster* under the influence of xenobiotics", defended at Ivan Gorbachevsky Ternopil National Medical University, Ukraine (November, 2022). Supervisor: Prof. Maria Bayliak, Head of Department of Biochemistry and Biotechnology, PNU.

2014–2015 Master's Diploma in Biochemistry. **M.Sc. Thesis (in Biochemistry):** Resistance to oxidative stress and indices of antioxidant protection in *Drosophila melanogaster* Canton S grown on medium with alpha-ketoglutarate. Supervisor: Dr. Maria Bayliak of Department of Biochemistry and Biotechnology, PNU.

2010–2014 – Bachelor Diploma in Biology (Department of Biochemistry and Biotechnology, Faculty of Natural Sciences, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine).

III. TEACHING EXPERIENCE

September 2019-June 2021, 2024 – Assistant (part time), Biochemistry and Biotechnology Dept., PNU. **Practical courses:** "Large workshop on laboratory diagnostics", "Biologically active natural compounds", "Basis of Biochemistry", "Microbiology", "Virology", "Molecular Biology" "Physiology and biochemistry of plants", "Biochemistry with the basics of microbiology and virology", "Basis of clinical biochemistry".

IV. PROFESSIONAL EXPERIENCE / TRAINING / SCHOLARSHIP:

- 01/2023 – present Senior researcher in the project funded by Ministry of Education and Science of Ukraine: “Searching for markers of post-traumatic stress disorder based on oxidative stress and inflammation (#0123U101790)”. Project leader – Prof. M. Bayliak
- 01/2022 – 01/2024 Researcher in the project funded by Ministry of Education and Science of Ukraine: “Correction of metabolic syndrome with sulforaphane-enriched preparations from broccoli sprouts”. Project leader – Prof. V. Lushchak.
- February 2021 – present Head of the Research laboratory, Department of Biochemistry and Biotechnology, PNU.
- 12/2020 – 12/2023 Researcher in the project of National Research Foundation of Ukraine “Phenylpropanoid pathway intermediates as substances to prolong the duration and quality of life” (#2020.02/0118). Project leader – Prof. M. Bayliak.
- 12/2019-12/2020 Researcher in the project funded by Ministry of Education and Science of Ukraine: “Development of new non-medicinal methods for correction of metabolic syndrome: normalization of physiological and biochemical indices in animals” (#0118U003477). Project leader – Prof. V. Lushchak.
- June 6-30 2019 Attendance at DAAD Summer School “Perspectives in Biomedicine with a Focus on Cancer Immunotherapy”, PNU, Ivano-Frankivsk, Ukraine.
- 11/2018 – 2/2021 Researcher of the research laboratory, Department of Biochemistry and Biotechnology, PNU.
- 12/2017-01/2018 Researcher in the project “Study of novel milk formulas and devices on a premature pig model ensuring proper PUFA absorption and brain development in preterm infants” at the Kielanowski Institute of Animal Physiology and Nutrition (Jablonna, Poland). Project leader – Prof. Stefan Pierzynowski
- 12/2016-01/2017 Researcher in the scientific project at the Kielanowski Institute of Animal Physiology and Nutrition (Jablonna, Poland). Project leader – Prof. Stefan Pierzynowski.
- July 4-8, 2016 Training at PoLASA courses on breeding, maintenance, welfare and use of laboratory animals (Polish Laboratory Animals Science Association, Warsaw, Poland)

V. LABORATORY METHODS (PROFICIENCY):

Microbiological methods: preparation of microscope slides of bacteria, light microscopy, cultivation of microorganisms, isolation of microbial cultures.

*Physiological methods (on fruit fly *D. melanogaster*):* maintaining of fly culture; lifespan assay; assays of age-related functional declines (climbing activity, resistance to stresses, fecundity, etc.).

Biochemical methods: measurement of contents of main metabolites (glucose, glycogen, triacylglycerides, protein); enzyme activities assays (superoxide dismutase, catalase, glutamate dehydrogenase, glucose-6-phosphate dehydrogenase, alcohol dehydrogenase, aspartate aminotransferase, alanine aminotransferase, hexokinase, aconitase); protein electrophoresis; western blot; urine analysis; water analysis; ELISA assay; spectrophotometric determination of major markers of oxidative stress.

Lab management

VI. SCIENTIFIC INTERESTS AND CURRENT RESEARCH WORK

- Oxidative stress and antioxidant defense in living organisms
- Mechanisms of adaptation of living organisms to different stresses, in particular to oxidative stress
- Free radicals, antioxidants, adaptogens, geroprotectors, detoxifying natural compounds (alpha-ketoglutarate, arginine, etc.) and their influence on fruit fly *Drosophila melanogaster*

- Obesity as a result of high fat diet and obesity prevention strategies (on fruit fly and mouse models)
- Aging and anti-aging treatments
- Post-traumatic stress disorder in the mouse model

VII. AWARDS

Winner of the IV International conference «*Drosophila* in experimental genetics and biology» (best oral presentation). Lviv, 2015 year.

Diploma of the III degree of the Ukrainian competition of student's scientific works on biological sciences. Chernivtsi, 2015 year.

VIII. OTHER ACTIVITIES

Participation in the competition of start-up projects Eco-Friendly from the regional accelerator GCIP for innovations, technologies and startups in Ivano-Frankivsk region, which was established on the basis of Vasyl Stefanyk Precarpathian National University with the support of the United Nations Industrial Development Organization (UNIDO).

Participation in the project "EcoREactive 2.0" for the collection of sorted plastic in the communities of the Carpathian region, organized by the "Mountain Rescue Center" in conjunction with the "Dniester Regional Landscape Park. Serhiy Didych" within the framework of the Direct Aid Program of the Government of Australia.

Membership in Ukrainian Biochemical Society

Member of Organizing Committee at Carpathian Summer School in Biochemistry held annually at Department of Biochemistry and Biotechnology, PNU

Member of Organizing Committee at Autumn School for Young Biochemists held annually at Department of Biochemistry and Biotechnology, PNU

IX. Publications

Papers: articles – 16. Abstracts – 13. h-index in the SCOPUS database - 8. Articles in journals Q1 and Q2 – 9 for the last 10 years (9 in total).

LIST OF PUBLICATIONS

Experimental articles in Q1 and Q2 journals

1. Demianchuk O., **Lylyk M.**, Balatskiy V., Gospodaryov D., Bayliak, M. Alpha-ketoglutarate supplementation in long-lived *Drosophila melanogaster*: Impact on lifespan and metabolic responses. *Archives of Insect Biochemistry and Physiology*. 2024, 116(1), e22116
<https://doi.org/10.1002/arch.22116>. Q2 Insect Science
Link to scimagojr.com:
<https://www.scimagojr.com/journalsearch.php?q=19155&tip=sid&clean=0>
Keywords: *Drosophila*; antioxidant enzymes; energy metabolism; lifespan; α -ketoglutarate.
2. Bayliak M.M., Demianchuk O. I., Gospodaryov D.V., Abrat O.B., **Lylyk M.P.**, Storey K.B., Lushchak V.I. Mutations in genes *cnc* or *dKeap1* modulate stress resistance and metabolic processes in *Drosophila melanogaster* // *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. 2020. Vol. 248.
<https://doi.org/10.1016/j.cbpa.2020.110746> Q1 Animal science and Zoology
Link to scimagojr.com:
<https://www.scimagojr.com/journalsearch.php?q=3500148021&tip=sid&clean=0>
Keywords: Antioxidant system, mitochondrial respiration, oxidative stress, Nrf2, triacylglycerides
3. Bayliak M.M., **Lylyk M.P.**, Gospodaryov D.V., Kotsyubynsky V.O., Butenko N.V., Storey

K.B., Lushchak V.I. Protective effects of alpha-ketoglutarate against aluminum toxicity in *Drosophila melanogaster*. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology*. 2019. 217, 41-53. <https://doi.org/10.1016/j.cbpc.2018.11.020> Q2 Biochemistry

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=9000153111&tip=sid&clean=0>

Keywords: Antioxidant, mitochondrial dysfunction, oxidative stress, pupation, survival, triacylglycerides

4. Bayliak M.M., **Lylyk M.P.**, Maniukh O.V., Storey J.M., Storey K.B., Lushchak V.I. Dietary L-arginine accelerates pupation and promotes high protein levels but induces oxidative stress and reduces fecundity and lifespan in *Drosophila melanogaster*. *J. Comp. Physiol. B*. 2018. 188(1), 37-55. <https://doi.org/10.1007/s00360-017-1113-6> Q1 (Animal Science and Zoology)/Q2 Biochemistry

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=23457&tip=sid&clean=0>

Keywords: Amino acids, nitric oxide, chill coma, climbing activity, proline, thiols

5. Bayliak M.M., **Lylyk M.P.**, Shmihel H.V., Sorochnyńska O.M., Semchyshyn O.I., Storey J.M., Storey K.B., Lushchak V.I. Dietary alpha-ketoglutarate promotes higher protein and lower triacylglyceride levels and induces oxidative stress in larvae and young adults but not in middle-aged *Drosophila melanogaster*. *Comp. Biochem. Physiol. Part A: Mol. Integr. Physiol.* 2017. 204, 23-33. <https://doi.org/10.1016/j.cbpa.2016.11.005> Q2 Biochemistry

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=3500148021&tip=sid&clean=0>

Keywords: Glucose, fecundity, pupation, stress resistance, TCA cycle

6. Bayliak M.M., Shmihel H.V., **Lylyk M.P.**, Storey K.B., Lushchak V.I., 2016. Alpha-ketoglutarate reduces ethanol toxicity in *Drosophila melanogaster* by enhancing alcohol dehydrogenase activity and antioxidant capacity. *Alcohol*. 55, 23-33. <https://doi.org/10.1016/j.alcohol.2016.07.009> Q1 Toxicology/ Q2 Biochemistry

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=24785&tip=sid&clean=0>

Keywords: Fruit fly, pupation, triacylglycerides, low molecular mass thiols, isozyme

7. Bayliak M.M., **Lylyk M.P.**, Vytvytska O.M., Lushchak V.I., 2016. Assessment of antioxidant properties of alpha-keto acids *in vitro* and *in vivo*. *Eur. Food Res. Technol.* 242 (2), 179-188. <https://doi.org/10.1007/s00217-015-2529-4> Q1 Food science/ Q2 Biochemistry

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=23068&tip=sid&clean=0>

Keywords: Alpha-ketoglutarate, oxaloacetate, pyruvate, H₂O₂ scavenging, *Saccharomyces cerevisiae*, *Drosophila melanogaster*

8. Bayliak M.M., **Lylyk M.P.**, Shmihel H.V., Sorochnyńska O.M., Manyukh O.V., Pierzynowski S. G., Lushchak V.I., 2016. Dietary alpha-ketoglutarate increases cold tolerance in *Drosophila melanogaster* and enhances protein pool and antioxidant defense in sex-specific manner. *J. Therm. Biol.* 60, 1-11. <https://doi.org/10.1016/j.jtherbio.2016.06.001> Q1 Agricultural and Biological Sciences (miscellaneous)

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=14901&tip=sid&clean=0>

Keywords: chill coma, stress recovery, amino acids, proline, thiols

9. Bayliak M.M., Shmihel H.V., **Lylyk M.P.**, Vytvytska O.M., Storey J.M., Storey K.B., Lushchak V.I., 2015. Alpha-ketoglutarate attenuates toxic effects of sodium nitroprusside and hydrogen peroxide in *Drosophila melanogaster*. *Environ. Toxicol. Pharmacol.* 40(2), 650-659. <https://doi.org/10.1016/j.etap.2015.08.016> Q2 Toxicology

Link to scimagojr.com:

<https://www.scimagojr.com/journalsearch.php?q=25095&tip=sid&clean=0>

Keywords: fruit fly, pupation, survival, antioxidant, cyanide, oxidative stress

Other articles

1. **Lylyk M.P.**, Bayliak M.M., Shmihel H.V., Storey J.M., Storey K.B., Lushchak V.I. Effects of alpha-ketoglutarate on lifespan and functional aging of *Drosophila melanogaster* flies. Ukr.Biochem.J. 2018. Vol. 90 (6), 49-61. <https://doi.org/10.15407/ubj90.06.049>
2. Bayliak M.M., **Lylyk M P.**, Soroachynska O.M. Dietary alpha-ketoglutarate partially prevents age-related decline in locomotor activity and cold tolerance in *Drosophila melanogaster*. Biologia. 2017. Vol. 72. N4. P. 458-467. <https://doi.org/10.1515/biolog-2017-0042>
3. **Lylyk M. P.**, Golovchak M. V., Shmihel H. V., Bayliak M. M. 2017. Influence of alpha-ketoglutarate on *Drosophila melanogaster* resistance to different toxicants. Journal of Medicine, Biology and Sports. Vol. 4. N 6. P. 180-185. 10.26693/jmbs02.04.180
4. **Lylyk M.**, Soroachynska O., Maniukh O., Bayliak M. 2017. Age-related physiological and biochemical changes in *Drosophila* grown on alpha-ketoglutarate. Bulletin of Taras Shevchenko National University of Physiological Functions Regulation. 22(1), 25-31.
5. **Lylyk M.**, Soroachynska O., Maniukh O., Bayliak M. 2016. Gender differences of amino acid metabolism in *Drosophila melanogaster* on alpha-ketoglutarate-supplemented food. Bulletin of Taras Shevchenko National University of Physiological Functions Regulation. 21(2), 31-36.
6. **Lylyk M.P.**, Bayliak M.M. 2015. Possible protective mechanisms of alpha-ketoglutarate on fruit fly *Drosophila melanogaster* Canton S under exposure to different stressors. Biological systems. 7(1). 119-123.
7. Shmihel H., **Lylyk M.**, Bayliak M. 2014. Effect of alpha-ketoglutarate on pupation, feeding intensity and levels of some metabolites in larvae of *Drosophila melanogaster*. Visnyk of the Lviv University. Series Biology. 2014. 66, 91–99.

Abstracts

1. Demianchuk O., Gospodaryov D., Vatachchuk M., **Lylyk M.**, Bayliak M. Effect of a diet high in fat and fructose on glycolysis and fructolysis and the corrective effect of alpha-ketoglutarate // Abstracts of the XX All-Ukrainian Scientific and Practical Conference of Young Scientists (May 19, 2022, Lviv).
2. Dmytriv T., Strilets N., **Lylyk M.** The content of phenolic compounds and antioxidant properties of water and ethanol extracts from *Matricaria chamomilla* flowers // XVI International Scientific Conference "Youth and Progress of Biology", Lviv, 2020. P. 34-35.
3. Derkachov V., Berezovskyi V., Dmytriv T., Strilets N., **Lylyk M.** Effects of water extracts from *Matricaria chamomilla* flowers on food intake and climbing activity in *Drosophila melanogaster* // XVI International Scientific Conference "Youth and Progress of Biology", Lviv, 2020. P. 248-249.
4. Strilets N., Dmytriv T., **Lylyk M.**, Bayliak M. Influence of animal and plant fats on storage lipid accumulation in *Drosophila melanogaster* // XVI International Scientific Conference "Youth and Progress of Biology", Lviv, 2020. P. 253-254.
5. Butenko N.V., **Lylyk M.P.**, Gospodaryov D.V., Bayliak M.M. Alpha-ketoglutarate alleviates aluminum toxicity in *Drosophila melanogaster* // Medical and clinical chemistry "Materials of the XII Ukrainian Biochemical Congress, Ternopil, September 30-October 4, 2019". V. 21, N3 (supplement). P. 65.
6. Gospodaryov D., **Lylyk M.**, Demianchuk O., Sitko M., Yurchak T., Bayliak M. Deficiency in Nrf2 and Keap1 delays development and modulates metabolic processes in *Drosophila melanogaster* // 26th European *Drosophila* Research Conference (5th-8th September 2019, EPFL, Switzerland). Program & Abstract Book. P. 196-197.

7. Ivasyshyn V., Butenko N., **Lylyk M.** Combined influence of alpha-ketoglutarate and aluminum ions on resistance of *Drosophila melanogaster* to different stressors // XIII International Scientific Conference "Youth and Progress of Biology", Lviv, April 25-27, 2017. P. 252-253.
8. Semchyshyn O., **Lylyk M.**, Bayliak M. Effect of alpha-ketoglutarate on cold stress resistance of *Drosophila melanogaster* at different ages // XII International Scientific Conference "Youth and Progress of Biology", Lviv, April 19-21, 2016.
9. **Lylyk M.P.**, Bayliak M.M. Influence of alpha-ketoglutarate on the general physiological activity of 24-day-old *Drosophila melanogaster* // V International Scientific Conference "Drosophila in Experimental Genetics and Biology", Kyiv, May 12-14, 2016.
10. **Lylyk M.P.** Mechanisms of protective action of alpha-ketoglutarate on two-day-old individuals of *Drosophila melanogaster* under the influence of cold stress // Ukr. Biochem. J., 2016, Vol. 88, N 4, P 85, ISSN 2409-4943.
11. **Lylyk M.**, Vytvytska O. The effect of alpha-ketoglutarate on the resistance of *Drosophila melanogaster* to cold stress // XI International Scientific Conference "Youth and Progress of Biology", Lviv, April 20-23, 2015.
12. **Lylyk M.**, Shmihel H., Kozachok O., Bayliak M. Alpha-ketoglutarate modifies toxic action of sodium nitroprusside and ethanol on *Drosophila melanogaster* // Ukr. Biochem. J. Vol. 86, N 5, supplement 2 "Materials of XI Ukrainian Biochemical congress, Kyiv, October 6-10, 2014". P 249-250.
13. **Lylyk M.**, Vytvytska O. Influence of alpha-ketoglutarate on indices of physiological activity of *Drosophila melanogaster* // VIII International conference of young scientists "Biology: from molecule to biosphere", Kharkiv, 2013. P 85-86.