

June 6, 2019

CURRICULUM VITAE

MARIA M. BAYLIAK

Associate Professor, Ph.D., Department of Biochemistry and Biotechnology, Vasyl Stefanyk Precarpathian National University (PNU)

I. ADDRESS

Work address: Department of Biochemistry and Biotechnology, Vasyl Stefanyk Precarpathian National University, 57 Shevchenko Str., Ivano-Frankivsk, 76018, Ukraine.

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II. PERSONAL

Ukrainian, single, born February 25, 1981,

Languages: Ukrainian, Russian, English (professional working proficiency), German (reading and translation with dictionary)

Hobbies: embroidering, travelling, reading adventure and detective stories

III. EDUCATION

2003-2006 Postgraduate student, Department of Biochemistry, PNU. **Thesis title:** “Peculiarities of antioxidant defense of the yeast *Saccharomyces cerevisiae* at the different growth phases”, defended at Yuriy Fed’kovich Chernivtsi National University, Ukraine (October, 2007). Supervisor: Prof. Volodymyr Lushchak, Head of Department of Biochemistry, PNU.

1998-2003 Student, Department of Biology, PNU. **M.Sc. Thesis (in Biology):** “Biomorphological peculiarities of *Convallaria majalis* in Precarpathian region”, May 2002 – May 2003. Supervisor: Dr. Nadija V. Shums’ka, Department of Biology, PNU.

IV. TEACHING EXPERIENCE

2008-present Associate Professor, Biochemistry and Biotechnology Dept., PNU. **Theoretical and practical courses:** “Metabolism integration” (lectures & seminars), “Methods of molecular biology” (lectures & practice), “Gene expression” (lectures & practice), “Biologically active natural compounds” (lectures & seminars), “Yeast biochemistry” (lectures & practice), “Biological membranes” (lectures & practice), “Practicum on Biochemistry” (practice), “Microbiology” (lectures & practice), “Virology” (lectures & seminars), “Molecular Biology” (practice).

2006-2008 Assistant of Professor, Biochemistry Dept., PNU. **Theoretical and practical courses:** “Biochemistry” (practice), “Microbiology” (practice), “Virology” ((seminars), “Molecular Biology” (practice), “Hydrobiology” (lectures & practice), “Ichthyology” (lectures & practice).

V. PROFESSIONAL EXPERIENCE / TRAINING / SCHOLARSHIP:

1. Attendance at IV Summer School “Molecular microbiology and biotechnology”, Odesa I.I. Mechnykov National University, Odesa, Ukraine, May 25 – June 4, 2011.
2. Scholarship from Queen Jadwiga Fund was received for the realization of research project “Budding yeast *Saccharomyces cerevisiae* as a model to study role of oxidative stress in ageing”. The experimental work was done at the Faculty of Biochemistry, Biophysics and Biotechnology of Jagiellonian University (Krakow, Poland) for the period of June 1-30, 2009.
3. Laureate of L'Oréal-UNESCO program “For women in science 2018” (Ukraine)

VI. LABORATORY METHODS (PROFICIENCY):

Microbiological methods: light microscopy, cultivation of microorganisms, isolation of microbial cultures, study of physiological and biochemical properties of microorganisms, determination of life span of yeast cells.

Physiological methods: fruit fly *D. melanogaster* maintaining and lifespan assay; fruit fly age-related functional declines (fecundity, mobility, sensitivity to stresses, etc.)

Biochemical methods: preparation of tissue and cell extracts, enzyme activities assays, determination of kinetic characteristic of enzymes; measurement of contents of proteins, carbohydrates and lipids; protein and DNA electrophoresis; blood chemistry and blood enzymes' tests; urine analysis; enzyme-linked immunosorbent assay (ELISA); spectrophotometric determination of antioxidant properties of plant compounds and major marker of oxidative stress (protein carbonyls, products of lipid oxidation, glutathione level), and fluorimetric assay of reactive oxygen species production.

VII. SCIENTIFIC INTERESTS AND CURRENT RESEARCH WORK

- Biochemical and molecular aspects of adaptation of microorganisms to environmental conditions, in particular to oxidative stress
- Aging and anti-aging approaches
- Oxidative stress and antioxidants
- Antioxidant, adaptogenic, antiglycemic, stress-protective, neuroprotective, and geroprotective effects and detoxifying properties of natural products (alpha-ketoglutarate, arginine, quercetin, plant extracts, kombucha tea, etc.) (on models yeast *Saccharomyces cerevisiae* and fruit fly *Drosophila melanogaster*)
- Hormetic effects of low doses of stresses and xenobiotics
- Metabolic syndrome and obesity prevention and treatment (on fruit fly and mice)
- Brain aging

VIII. MEMBERSHIP IN PROFESSIONAL SOCIETIES:

Ukrainian Society for Cell Biology

Ukrainian Biochemical Society

Society of Microbiologists of Ukraine

IX. Other activities

Jury member of National Biological and Ecological Olympiads

Jury member of Contest of research works of members of Junior Academy of Sciences

Jury member of National Tournament for Young Biologists

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

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

X. Publications

Papers: published – 35. Abstracts: 38.

List of publications

Monograph chapter

1. Semchyshyn H.M., **Bayliak M.M.**, Lushshak V.I., 2011. Starvation in yeast: biochemical aspects. In: Biology of starvation in human and other organisms. Edited by T.C. Merkin. Nova Science Publishers, Inc., Chapter 2,103-150.
2. Stambulska U.Y., **Bayliak M.M.** Legume-Rhizobium Symbiosis: Secondary Metabolites, Free Radical Processes, and Effects of Heavy Metals. In: Merillon J.M., Ramawat K. (eds) Co-Evolution of Secondary Metabolites. Reference Series in Phytochemistry. Springer, Cham, 2019.
https://doi.org/10.1007/978-3-319-76887-8_43-1

Experimental articles published in scientific journals

1. Sorochyńska O.M., **Bayliak M.M.**, Vasylyk Y.V., Kuzniak O.V., Drohomiretska I.Z., Klonovskyi A.Y., Storey J.M., Storey K.B., Lushchak V.I. Intermittent fasting causes metabolic stress and leucopenia in young mice. *Ukr. Biochem. J.* 2019. Vol. 91, N 1. P. 53-64.
2. **Bayliak M.M.**, Abrat O.B., Storey J.M., Storey K.B., Lushchak V.I. Interplay between diet-induced obesity and oxidative stress: Comparison between *Drosophila* and mammals. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*. 2019. Vol. 228. P.18-12

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. Vol. 217. P. 41-53.
4. 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
5. **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. **IF 1.947**
6. **Bayliak M.M.**, Hrynkiw O.V., Knyhynitska R.V., Lushchak V.I. Alpha-ketoglutarate enhances freeze-thaw tolerance and prevents carbohydrate-induced cell death of the yeast *Saccharomyces cerevisiae*. *Arch. Microbiol.* 2018. 200(1), 33-46. **IF 1.6**
7. **Bayliak M.M.**, Burdyliuk N.I., Lushchak V.I. Growth on alpha-ketoglutarate increases oxidative stress resistance in the yeast *Saccharomyces cerevisiae*. *Int. J. Microbiol.* 2017. (2017), Article ID 5792192, 9 pages, doi: 10.1155/2017/5792192
8. **Bayliak M.M.**, Lylyk M.P., Sorochynska O.M. Dietary alpha-ketoglutarate partially prevents age-related decline in locomotor activity and cold tolerance in *Drosophila melanogaster*. *Biologia.* 2017. 72(4), 458-467. **IF 0.759**
9. **Bayliak M.M.**, Lylyk M.P., Shmihel H.V., Sorochynska 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. **IF 1.812**
10. Lylyk M., Sorochynska O., Maniukh O., **Bayliak M.** Age-related physiological and biochemical changes *Drosophila* grown on alpha-ketoglutarate [in Ukrainian]. *Bulletin of Taras Shevchenko National University of Kyiv. Series: Problems of Physiological Functions Regulation.* 2017. 22(1), 25-31
11. **Bayliak M.**, Burdyliuk N. Effects of long-term cultivation on medium with alpha-ketoglutarate supplementation on metabolic processes of *Saccharomyces cerevisiae*. *J. Aging Res.* 2017 (2017) Article ID 8754879, 12 pages, doi: 10.1155/2017/8754879
12. Lylyk M.P., Holovchak M.V., Shmihel H.V., **Bayliak M.M.** Influence of alpha-ketoglutarate on *Drosophila melanogaster* resistance to different toxicants [in Ukrainian]. *Ukrainian journal of medicine, biology and sport.* 4 (6), 180-185.
13. Lylyk M., Sorochynska O.M., Maniukh O.V., **Bayliak M.M.** Gender differences of amino acid metabolism in *Drosophila melanogaster* on alpha-ketoglutarate-supplemented food [in Ukrainian]. *Bulletin of Taras Shevchenko National University of Kyiv. Series: Problems of Physiological Functions Regulation.* 2016. 21(2), 31-36.
14. **Bayliak M.M.**, Burdyliuk N. I., Lushchak V.I., 2016. Effects of pH on antioxidant and prooxidant properties of common medicinal herbs. *Open Life Sci.* 11, 298–307.
15. **Bayliak M.M.**, 2016. Effects of bicarbonate and alpha-ketoglutarate on sensitivity of yeast *Saccharomyces cerevisiae* to hydrogen peroxide and iron ions. *Studia biologica.* 10(2), 53-62.
16. **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.
17. **Bayliak M.M.**, Lylyk M.P., Shmihel H.V., Sorochynska 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.
18. **Bayliak M.M.**, Burdyliuk N. I., Lushchak V.I., 2016. Quercetin increases stress resistance in the yeast *Saccharomyces cerevisiae* not only as an antioxidant. *Ann. Microbiol.* 66(2), 569-576.

19. **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.
20. Lylyk M.P., **Bayliak M.M.**, 2015. Possible protective mechanisms of alpha-ketoglutarate on fruit fly *Drosophila melanogaster* cantons under exposure to different stressors [in Ukrainian]. *Journal "Scientific Herald of Chernivtsy University. Biology (Biological Systems)"*. 7(1), 119-124.
21. **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.
22. **Bayliak M.**, Burdylyuk N., 2015. 2,4-Dichlorophenoxyacetic acid at low concentrations enhances reproductive ability and oxidative stress resistance of yeast *Saccharomyces cerevisiae*. *Journal of Vasyl Stefanyk Precarpathian National University*, 2(1), 93-99.
23. Shmihel H., Lylyk M., **Bayliak M.**, 2014. Effect of alpha-ketoglutarate on pupation, feeding intensity and levels of some metabolites in larvae *Drosophila melanogaster* [in Ukrainian]. *Visnyk of the Lviv University. Series Biology.* 66, 91-99.
24. Struminska O.O., **Baylyak M.M.**, Kurta S.A., 2014. Microbiological properties of natural film-forming materials [in Ukrainian]. *Eastern-European journal of enterprise technologies.* 2(681), 34-40.
25. **Bayliak M.M.**, Burdyliuk N.I., Izers'ka L.I., Lushchak V.I., 2014. Concentration-dependent effects of *Rhodiola rosea* on long-term survival and stress resistance of yeast *Saccharomyces cerevisiae*: the involvement of YAP 1 and MSN2/4 regulatory proteins. *Dose-Response.* 1, 93-109.
26. Semchyshyn H.M., Miedzobrodzki J., **Bayliak M.M.**, Lozinska L.M., Homza B.V., 2014. Fructose compared with glucose is more a potent glycooxidation agent *in vitro*, but not under carbohydrate-induced stress *in vivo*: potential role of antioxidant and antiglycation enzymes. *Carbohydr. Res.* 384, 61-69.
27. Luchkiv N.U., Burdylyuk N.I., Izers'ka L.I., **Bayliak M.M.**, 2013. Evaluation of antioxidant properties of *Rhodiola rosea* L. and *Centaurea carpatica* porc., collected in Ukrainian Carpathians [in Ukrainian]. *Galician Medical Journal.* 20(1), 55-57.
28. **Bayliak M.M.**, Lushchak V.I., 2011. The golden root, *Rhodiola rosea*, prolongs lifespan but decreases oxidative stress resistance in yeast *Saccharomyces cerevisiae*. *Phytomedicine.* 18(14), 1262-1268.
29. Lushchak O.V., **Bayliak M.M.**, Korobova O.V, Levine R.L., Lushchak V.I., 2009. Buffer modulation of menadione-induced oxidative stress in *Saccharomyces cerevisiae*. *Redox rep.* 14(5), 214-220.
30. **Bayliak M.**, Gospodaryov D., Semchyshyn H., Lushchak V., 2008. Inhibition of catalase by aminotriazole *in vivo* results in reduction of glucose-6-phosphate dehydrogenase activity in *Saccharomyces cerevisiae* cells [in Russian and in English]. *Biochemistry (Moscow).* 73(4), 515-523.
31. **Bayliak M.M.**, Semchyshyn H.M., Lushchak V.I., 2007. Possible accumulation of non-active molecules of catalase and superoxide dismutase in *S. cerevisiae* cells under hydrogen peroxide induced stress. *Central European Journal of Biology.* 2(3), 326-336.
32. **Bayliak M.**, Semchyshyn H., Lushchak V., 2006. Effect of hydrogen peroxide on antioxidant enzyme activities in *Saccharomyces cerevisiae* is strain-specific [in Russian and in English]. *Biochemistry (Moscow).* 71(9), 1013-1020.
33. **Baylyak M.M.**, Semchyshyn H.M., Lushchak V.I., 2006. Role of catalase and superoxide dismutase in yeast *Saccharomyces cerevisiae* response to hydrogen peroxide in exponential phase [in Ukrainian]. *Ukr. Biochem. J.* 78(2), 79-85.
34. **Baylyak M.M.**, Abrat O.B., Semchyshyn H.M., Lushchak V.I., 2005. Survival and antioxidant defence of the yeast *Saccharomyces cerevisiae* under starvation and oxidative stress [in Ukrainian]. *Ukr. Biochem. J.* 77(4), 93-98.
35. Gospodaryov D.V., **Bailyak M.M.**, Lushchak V.I., 2005. Free radical inactivation of glucose-6-phosphate dehydrogenase in *Saccharomyces cerevisiae in vitro* [in Ukrainian]. *Ukr. Biochem. J.* 77(1), P. 58-64.

Main conference theses

1. Holovchak M., Shmihel H., **Bayliak M.** Dietary alpha-ketoglutarate alleviates toxic effects of aluminum on fruit fly *Drosophila melanogaster* development // V International Conference «Drosophila in the Experimental Genetics and Biology» (Kyiv, 2016, May 12-14). – P. 13.
2. Lylyk M. Alpha-ketoglutarate modifies toxic action of sodium nitroprusside and ethanol on *Drosophila melanogaster* / M. Lylyk., H. Shmihel, O. Kozachok, **M. Bayliak** // Ukr. Biochem. J. – Vol. 86, N 5, supplement 2 “Materials of XI Ukrainian Biochemical congress (Kyiv, October 6-10, 2014)”. – P. 249-250.
3. **Bayliak M.** Possible mechanisms of concentration-dependent effects of *Rhodiola rosea* on long-term survival and stress resistance of yeast *Saccharomyces cerevisiae* / M. Bayliak, H. Hryshuk, V. Lushchak // Ukr. Biochem. J. – Vol. 86, N 5, supplement 1 “Materials of XI Ukrainian Biochemical congress (Kyiv, October 6-10, 2014)”. – P. 126-127.
4. **Bayliak M.**, Izers’ka L.. Biochemical peculiarities of *Saccharomyces cerevisiae* grown with alpha-ketoglutarate / Abstracts of 13th congress of Society of Microbiologists of Ukraine (Jalta, October, 1-6, 2013). – Jalta, 2013. – P. 64.
5. Hryshuk Kh., Burdyliuk N., Izers’ka L., **Bayliak M.** Low concentrations of *Rhodiola rosea* aqueous extract demonstrate stress-protective and geroprotective effects on yeast *Saccharomyces cerevisiae* // International Young scientists conference [«Biodiversity. Ecology. Adaptation. Evolution»], (Odesa, May 13-17, 2013). – Odesa: Pechatnyi dom, 2013. – P. 250-251.
6. Pavlykivskij I., Burdyliuk N., Izers’ka L., **Bayliak M.** Influence of *Rhodiola rosea* and quercetin on stress resistance of yeast *Saccharomyces cerevisiae* // Materials of V International Young Scientists conference [Biodiversity. Ecology. Adaptation. Evolution.], (Odesa, June 13-17, 2011). – Odesa: Pechatnyi dom, 2011. – P. 227-228.
7. **Bayliak M.M.**, Lushchak V.I. Lifespan and oxidative stress resistance of yeast *Saccharomyces cerevisiae* under treatment with *Rhodiola rosea* extract // Ukr. Biochem. J. – 2010. – Vol. 82, N 4 (special issue “Materials of the 10th Ukrainian Biochemical Congress). – P. 228-229.
8. Semchyshyn H., **Bayliak M.**, Abrat O., Krzeszowiec W., Lushchak V. Baker’s yeast as a model to study molecular mechanisms of cell response to environmental stress / H. Semchyshyn, , // Free radical research: Abstracts of the Society for SFRR – Europe Meeting 2009, (Rome, August 26-29, 2009). – Vol. 43, Supplement 1. – P. S80.
9. Bayliak M., Lushchak V. Extracts of *Rhodiola rosea* decrease oxidative stress resistance but prolong chronological lifespan of the yeast *Saccharomyces cerevisiae* // 3rd Ukrainian-Polish Weigl Conference [“Microbiology on Service for Human”], (Odesa, 14-17 September, 2009): Abstracts. – Odessa: Odessa National I.I. Mechnykov University, 2009. – P. 72-73.
10. **Bayliak M.** Influence of *R. rosea* extracts on lifespan of yeast *Saccharomyces cerevisiae* // XII Congress of Society of Microbiologists of Ukraine (Uzhorod, May 25-30, 2009): Abstracts – Uzhorod: Patent, 2009. – P. 359.
11. Bayliak M.M., Semchyshyn H.M., Lushchak V.I. Relationships between activities of the protective enzymes in *Saccharomyces cerevisiae* cells under hydrogen peroxide induced stress // Taras Shevchenko Kyiv National University, 2nd Ukrainian Congress for Cell Biology. – Kyiv (Ukraine), 2007. – P. 50.
12. **Bayliak M.**, Semchyshyn H., Lushchak V. Possible accumulation of non-active molecules of catalase and superoxide dismutase in *Saccharomyces cerevisiae* under mild oxidative stress // 6th Parnas conf. – Krakow (Poland): Acta Biochim. Polon. – Vol. 54, N2. – 2007. – P. 31.
13. **Bayliak M.M.** The role of catalase in *Saccharomyces cerevisiae* adaptation to hydrogen peroxide in the middle exponential phase of growth // The 9th Ukrainian Biochemical Congress. – Kharkiv (Ukraine), 2006. – P. 98.
14. Abrat O.B., **Bayliak M.M.** The role of antioxidant systems in the adaptation of yeast *Saccharomyces cerevisiae* to stress conditions (in Ukrainian) // The 9th Ukrainian Biochemical Congress. – Kharkiv (Ukraine), 2006. – P. 93.

15. **Bayliak M.M.**, Abrat O.B. The enzyme activities in exponential-phase acatalaseamic *Saccharomyces cerevisiae* cells under H₂O₂-stress // Ivan Franko Lviv National University, First International conference of students and postgraduate students "The Youth and Progress in Biology". – Lviv (Ukraine), 2005. – P. 3.