

## SANJA BABIĆ - CURRICULUM VITAE

Date of birth: October 11<sup>th</sup> 1989

Place of birth: Zagreb, Croatia, Nationality: Croatian

Present position: Research Associate, Laboratory for Biotechnology in Aquaculture, Division of materials, Ruđer Bošković Institute, Zagreb, Croatia

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### EDUCATION

**2017 – 2018 Postdoctoral research** - Biochemistry in Medical science, Faculty of Health Sciences, University of Ljubljana, Slovenia

**2013 – 2016 Ph.D. in Biology**, Faculty of Science, University of Zagreb, Croatia

**2011 – 2013 Master's degree (MSc) in Environmental Sciences**, Faculty of Science, University of Zagreb

**2008 – 2011 Bachelor's degree in Environmental Sciences (BSc)**, Faculty of Science, University of Zagreb

### RESEARCH EXPERIENCE

**2018 – present Research Associate**, Laboratory for Biotechnology in Aquaculture, Division of materials, Ruđer Bošković Institute, Zagreb

**2016 – 2018 Associate** at the "Centre of excellence for marine bioprospecting (BioProCro)", Laboratory for Biotechnology in Aquaculture, Division of materials, Ruđer Bošković Institute, Zagreb

**2015 – 2016 Associate** on the research project "Pannonian Competence Centre for Wood", Laboratory for Biotechnology in Aquaculture, Ruđer Bošković Institute

**2013 – 2014 Vocational training**, Laboratory for Biotechnology in Aquaculture, Division of materials, Ruđer Bošković Institute, Zagreb

### TEACHING EXPERIENCE

**2021** Ecotoxicological assessment of the impact of cardiovascular pharmaceuticals present in aquatic ecosystems on zebrafish embryos *Danio rerio* (Hamilton, 1822) (student Gabrijela Prgić) – **Supervisor of Master thesis** (supervisor 1: prof.dr.sc. Klobučar G., supervisor 2: dr.sc. Babić S.)

**2018** Toxicity assessment of the water from Sava River using algae, plants and fish (student Anja Sima Cota) – **Supervisor of Master thesis** (supervisor 1: prof.dr.sc. Klobučar G., supervisor 2: dr.sc. Babić S.)

**2014 – 2015 Teaching Assistant**, Department of biology, Faculty of Science, Zagreb

### PROJECTS

**2020 – 2023 SUPERFOOD** – Microalgae to Innovative Bakery Products and Pasta of the Operational Programme Competitiveness and Cohesion (€ 1,034,100) – **Team member**

**2020 – 2022 Associate** on the research project "Partnerships between scientists and fishermen" - Measure I.3., EU Operational Programme for Maritime Affairs and Fisheries of the

- Republic of Croatia for the programming period 2014-2020 (€ 395.000) - Partnership between Science and Fisheries (European Maritime and Fisheries Fund, Ministry of Agriculture) – **Team member**
- 2020 – 2023 Biomimetic intelligent composite systems, Croatian Science Foundation (€ 190.000) – **Team member**
- 2017 – 2022 Bioprospecting of the Adriatic Sea (ERDF fond), European Regional Development Fund, ERDF (€ 5,000.000) – **Team member**
- 2018 – 2020 Bilateral Chinese-Croatian scientific project: Development of biological methods for toxicity assessment of nanoparticles in soil – Research Associate
- 2017 – 2020 INAgip: Environment protection measures and environment monitoring program (€ 480.000) – **Team member**
- 2016 – 2017 Assessment and revision of existing water quality standards for specific pollutants, HRVATSKE VODE-legal entity for water management - Research associate
- 2014 – 2016 Panonic Wood Center of Competence, European Regional Development Fund (€ 7,000.000) – **Team member**

### SCIENTIFIC PUBLICATIONS (22)

- 2021 Jerković I, Cikoš AM, Babić S, Čižmek L, Bojanić K, Aladić K, Ul'yanovskii N.V., Kosyakov D.S., Lebedev AT, Čož-Rakovac R, Trebše P, Jokić S. Bioprospecting of less-polar constituents from endemic brown macroalga *Fucus virsoides* J. Agardh from the Adriatic Sea and targeted antioxidant effects *in vitro* and *in vivo* (zebrafish model). *Marine drugs*, 19(5): 235.
- 2021 Topić Popović N, Krbavčić M, Barišić J, Beer Ljubić B, Strunjak-Perović I, Babić S, Lorencin V, Matulić D, Tomljanović T, Čož-Rakovac R. Comparative tissue responses of marine mollusks on seasonal changes in the northern Adriatic Sea. *Applied Sciences*, 11(6): 2874.
- 2021 Babić S, Čižmek L, Maršavelski A, Malev O, Pflieger M, Strunjak-Perović I, Topić Popović N, Čož-Rakovac R, Trebše P. Utilization of the zebrafish model to unravel the harmful effects of biomass burning during Amazonian wildfires. *Scientific Reports*, 11: 2527.
- 2021 Cikoš AM, Flanjak I, Bojanić K, Babić S, Čižmek L, Čož-Rakovac R, Jokić S, Jerković I. Bioprospecting of Coralline Red Alga *Amphiroa rigida* J.V. Lamouroux: Volatiles, Fatty Acids and Pigments. *Molecules* 26(3): 520.
- 2020 Palčić A<sup>1</sup>, Babić S<sup>1</sup>, Maršavelski A, Galić M, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R, Bronić J, Valtchev V. Nanosized zeolite beta - determining the safety of usage by zebrafish *Danio rerio* embryos. *Microporous and Mesoporous Materials* 299, 110103.
- 2020 Topić Popović N, Beer Ljubić B, Strunjak-Perović I, Babić S, Lorencin V, Jadan M, Čižmek L, Matulić D, Bojanić K, Čož-Rakovac R. Seasonal antioxidant and biochemical properties of the Northern Adriatic *Pecten jacobaeus*. *PlosONE* 15(3): e0230539.
- 2019 Pečur Kazazić S, Topić Popović N, Strunjak-Perović I, Babić S, Florio D, Fioravanti M, Bojanić K, Čož-Rakovac R: Matrix-assisted laser desorption/ionization time of flight mass spectrometry identification of *Vibrio (Listonella) anguillarum* isolated from sea bass and sea bream. *PLoS ONE* 14(11), e0225343.
- 2019 Topić Popović N, Kepec S, Pečur Kazazić S, Barišić J, Strunjak-Perović I, Babić S, Čož-Rakovac R: The impact of treated wastewaters on fish bacterial flora: A public health perspective. *Croatian Journal of Fisheries* 77, 132-135.
- 2019 Pečur Kazazić S, Topić Popović N, Strunjak-Perović I, Florio D, Fioravanti M, Babić S, Čož-Rakovac R: Fish photobacteriosis—The importance of rapid and

- accurate identification of *Photobacterium damsela* subsp. *piscicida*. Journal of Fish Diseases. DOI: 10.1111/jfd.13022
- 2019 Babić S, Malev O, Pflieger M, Lebedev A.T., Mazur D.M., Kužić A, Čož-Rakovac R, Trebše P: Toxicity evaluation of olive oil mill wastewater and its polar fraction using multiple whole-organism bioassays. Science of the Total Environment 686, 903-914
- 2019 Topić Popović N, Kazazić S, Barišić J, Strunjak-Perović I, Babić S, Bujak M, Gajdoš Kljusurić J, Čož-Rakovac R: Aquatic bacterial contamination associated with sugarplant sewage outfalls as a microbial hazard for fish. Chemosphere 224, 1-8
- 2018 Babić S, Barišić J, Stipaniev D, Repec S, Lovrić M, Malev O, Martinović-Weigelt, Čož-Rakovac R, Klobučar G: Assessment of river sediment toxicity: Combining empirical zebrafish embryotoxicity testing with *in silico* toxicity characterization. Science of the Total Environment 643, 435-450
- 2017 Bielen A, Šimatović A, Kosić-Vukšić J, Senta I, Ahel M, Babić S, Jurina T, González Plaza JJ, Milaković M, Udiković-Kolić N: Negative environmental impacts of antibiotic-contaminated effluents from pharmaceutical industries. Water Research 126, 79-87
- 2017 Župan I, Tkalčić S, Čož-Rakovac R, Strunjak-Perović I, Topić Popović N, Babić S, Bujak M, Šarić T: Biochemical parameters in the blood of gilthead sea bream (*Sparus aurata* Linnaeus, 1758) supplemented with commercially available  $\beta$ -glucan-based product (IMUNO-2865®). Aquaculture Research 49(2), 786-792.
- 2017 Babić S, Barišić J, Višić H, Sauerborn Klobučar R, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R, Klobučar G: Embryotoxic and genotoxic effects of sewage effluents in zebrafish embryo using multiple endpoint testing. Water Research 115, 9-21.
- 2016 Topić Popović N, Strunjak-Perović I, Barišić J, Kepec S, Jadan M, Beer-Ljubić B, Matijatko V, Palić D, Klobučar G, Babić S, Gajdoš Kljusurić J, Čož-Rakovac R: Native Prussian carp (*Carassius gibelio*) health status, biochemical and histological responses to treated wastewaters. Environmental Pollution 218, 689-701.
- 2016 Barišić J, Čož-Rakovac R, Delaš I, Topić Popović N, Gavrilović A, Jug-Dujaković J, Brajlo M, Sauerborn-Klobučar R, Babić S, Strunjak-Perović I: Predictive modeling of European flat oyster (*Ostrea edulis* L.) fatty acid composition. Aquaculture International 25(2), 805-825.
- 2016 Babić S<sup>1</sup>, Barišić J<sup>1</sup>, Bielen A, Bošnjak I, Sauerborn Klobučar R, Ujević I, Strunjak Perović I, Topić Popović N, Čož-Rakovac R: Multilevel ecotoxicity assessment of environmentally relevant bisphenol A concentrations using the soil invertebrate earthworm *Eisenia fetida*. Journal of Hazardous Materials 318, 477-486.
- 2016 Babić S, Barišić J, Malev O, Klobučar G, Topić Popović N, Strunjak-Perović I, Krasnići N, Čož-Rakovac R, Sauerborn Klobučar R: Sewage sludge toxicity assessment using earthworm *Eisenia fetida*: can biochemical and histopathological analysis provide fast and accurate insight? Environmental Science and Pollution Research 23(12), 12150-12163.
- 2015 Babić S, Dragun Z, Sauerborn Klobučar R, Ivanković D, Bačić N, Fiket Ž, Barišić J, Krasnići N, Strunjak-Perović I, Topić Popović N, Čož-Rakovac R: Indication of metal homeostasis disturbance in earthworm *Eisenia fetida* after exposure to semi-solid depot sludge. Science of the Total Environment 526, 127-135.
- 2015 Topić Popović N, Strunjak-Perović I, Sauerborn Klobučar R, Barišić J, Babić S, Jadan M, Kepec S, Kazazić S, Matijatko V, Beer Ljubić B, Car I, Repec S, Stipančev D, Klobučar G, Čož-Rakovac R: Impact of treated wastewater effluent on fish and toxicity biosensors. Science of the Total Environment 538, 23-37.
- 2014 Bošnjak I, Bielen A, Babić S, Šver L, Topić Popović N., Strunjak-Perović I, Čož-Rakovac R, Saurborn Klobučar R: First evidence of the P-glycoprotein gene

expression (P-gp/Abcb1) and MXR activity modulation in earthworm *Eisenia fetida*, Savigny. Archives of Industrial Hygiene and Toxicology 65(1): 67-74.

### AWARDS AND SCHOLARSHIPS

- 2017** Ruđer Bošković Institute award for the best article of ZKM employee who did not have a doctorate at the time of publication, for scientific work (Journal of Hazardous Materials 318, 477-486)
- 2017** Annual award of the Society of young scientists and artists for the article published in 2016 (Journal of Hazardous Materials 318, 477-486)
- 2016** City of Zagreb Scholarship for Ph.D. students
- 2015** Scholarship given by FEBS and Croatian society for biochemistry and molecular biology for the attendance at the FEBS3+ Meeting – Molecules of life, Slovenia
- 2012** Special Rector's prize for participation at the event "Night of biology", University of Zagreb
- 2011** Rector's prize for student work "Range expansion of invasive amphipods and their impact on benthic communities in the Drava River" during the academic year 2011/2012
- 2010, 2013** Ministry of Science, Education and Sports Scholarship for students, during the 3<sup>rd</sup> year of undergraduate studies and the 5<sup>th</sup> year of graduate studies

### CONFERENCE ABSTRACTS IN JOURNALS

- 2013** Babić S, Bošnjak I, Bielen A, Šver L, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R, Sauerborn Klobučar R: Importance of ABC transporters in earthworm *Eisenia fetida* may be compromised with environmental influences. Archives of Industrial Hygiene and Toxicology 64(2), 341-351.

### ABSTRACTS IN BOOK OF ABSTRACTS

- 2019** Babić S, Trebše P, Galić M, Topić-Popović N, Strunjak-Perović I, Čož-Rakovac R: Zebrafish embryotoxicity of olive oil mill wastewater and consideration of its renewable potential. Book of abstract of Aquaculture Europe 19 Congress. Berlin, Germany
- 2019** Palčić A, Babić S, Fiolić T, Galić M, Bronić J, Čož-Rakovac R, Valtchev V: Zeolite beta toxicity towards *D. rerio* embryos. Solid State Science and Research Meeting Book of Abstracts. Zagreb, Croatia
- 2019** Klobučar G, Babić S, Barišić J, Stipaničev D, Repec S, Lovrić M, Malev O, Martinović-Weigelt D: Predictive ecotoxicology: are we there yet? Case study of river sediment toxicity assessment – combining empirical zebrafish embryotoxicity testing with *in silico* toxicity characterization. Book of abstract of 3<sup>rd</sup> Symposium of Freshwater Biology – SOBS2019. Zagreb, Croatia
- 2019** Čož-Rakovac R, Galić M, Čižmek L, Babić S, Selmani A, Dutour Sikirić M, Vadlja D, Strunjak-Perović I, Topić Popović N: Growth performance and biochemical composition of marine microalgae *Dunaliella tertiolecta* exposed to selenium nanoparticles. BIOPROSP\_19 - Unlocking the potential of biomolecules from marine environments. Tromsø, Norway
- 2019** Lorencin V, Topić Popović N, Matulić D, Strunjak-Perović I, Babić S, Lovrinov M, Čož-Rakovac R: Biochemical properties of *Pecten jacobaeus* (Linnaeus, 1758) tissues over yearly seasons. Book of abstract of 54<sup>th</sup> Croatian and 14<sup>th</sup> International Symposium on Agriculture. Zagreb, Croatia
- 2019** Križanac S, Strunjak-Perović I, Matulić D, Lovrinov D, Barišić J, Babić S, Topić Popović N, Čož-Rakovac R: Biochemical profile of cultured and wild-caught turbot *Scophthalmus maximus* (Linnaeus, 1758) from northern Adriatic Sea. Book of abstract of 54<sup>th</sup> Croatian and 14<sup>th</sup> International Symposium on Agriculture. Zagreb, Croatia

- 2018 Galić M, Babić S, Selmani A, Bojanić K, Dutour Sikirić M, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R: Impact of sodium selenite and selenium nanoparticles on freshwater and marine microalgae based on algal growth rate and chlorophyll A content. Book of Abstracts of the Ph.D. Candidate Symposium. BOKU University of Natural Resources and Life Sciences. Vienna, Austria
- 2018 Galić M, Babić S, Selmani A, Erceg I, Dutour Sikirić M, Vadjlja D, Čižmek L, Topić Popović N, Strunjak-Perović I, Bojanić K, Čož-Rakovac R: Effect of selenium nanoparticles on microalgae *Chlorella vulgaris* and *Dunaliella tertiolecta*. Book of Abstracts of 9<sup>th</sup> International Congress of Food Technologists, Biotechnologists and Nutritionists. Zagreb, Croatia
- 2018 Vadjlja D, Galić M, Čižmek L, Babić S, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R: Fast electrochemical determination of potential antioxidant capacity of marine and freshwater microalgae. Book of Abstracts of 9<sup>th</sup> International Congress of Food Technologists, Biotechnologists and Nutritionists. Zagreb, Croatia
- 2018 Trebše P, Babić S, Pflieger M, Lebedev A, Dimitry M, Košenina S, Malev O: Chemical characterization of olive oil mill waste matrix and subfraction: species specific toxicity study. Book of abstracts of 11<sup>th</sup> International Mass Spectrometry Conference on Petrochemistry, Environmental and Food Chemistry - Petromass 2018. Bled, Slovenia
- 2017 M. Pflieger, Š. Hadžidedić, S. Babić, P. Trebše, T. Griessler Bulc, A. Kroflič: Ecotoxicity of biomass burning pollutants and their nitro derivatives. Book of abstracts of 18<sup>th</sup> European Meeting and Environmental Chemistry – EMEC. Porto, Portugal
- 2017 Pflieger M, Tramte T, Babić S, Cerar A, Žitnik M, Heath E, Griessler Bulc T, Krivograd Klemenčić A: Algae-based water treatment technology: Ecotoxicity and biodegradation of bisphenols by *Chlorella vulgaris*. Book of abstracts of the 12<sup>th</sup> European Meeting and Environmental Chemistry – EMEC. Porto, Portugal
- 2017 Trebše P, Babić S, Pflieger M, Košenina S, Žitnik M, Cerar A: Assessment of toxicity potential of raw olive mill wastewater and polar subfraction using set of bioassays. Book of abstracts of 18<sup>th</sup> European Meeting and Environmental Chemistry – EMEC. Porto, Portugal
- 2017 Višić H, Babić S, Barišić J, Klobučar G: Impact of wastewater effluents and contaminated sediments on zebrafish embryos using multiple endpoint testing. 20<sup>th</sup> Symposium of Biology Students in Europe, Abstract booklet. Lund, Swedish
- 2017 Bielen A, Šimatović A, Kosić-Vukšić J, Senta I, Babić S, González Plaza JJ, Jurina T, Udiković Kolić N: Negative environmental impacts of effluents from pharmaceutical industry. Book of abstracts of the 2<sup>nd</sup> Symposium on Freshwater Biology. Zagreb, Croatia
- 2017 Palčić A, Babić S, Čož-Rakovac R, Bronić J, Valtchev V: Safety of using industrial materials - *in vitro* and *in vivo* tests. 12. znanstveno stručni skup Održivi razvoj regije Gacke. Otočac, Croatia
- 2017 Palčić A, Babić S, Čož-Rakovac R, Bronić J, Valtchev V: Evaluation of the Embryotoxicity of Nanosized Zeolite Beta. Book of abstracts of 7<sup>th</sup> FEZA Post-Conference School. Sofia, Bulgaria
- 2017 Milanković M, Šimatović A, Gonzalez Plaza JJ, Bielen A, Senta I, Jurina T, Babić S, Udiković-Kolić N: Ecotoxicological evaluation and macrolide-resistance diversity of Croatian pharmaceutical effluents. Book of abstracts of FEMS 2017. Valencia, Spain
- 2016 Kepec S, Babić S: Mechanism of multixenobiotic resistance and determining the sensitivity of bacterial isolates to antimicrobial drug sin assessment of wastewater contamination. Book of abstracts of the 5<sup>th</sup> Symposium with international participation: Kopački Rit: Past, present, future. Croatia
- 2015 Babić S, Strecker R, Sauerborn Klobučar R, Čož-Rakovac R: Correlation between MXR inhibitors in wastewater and zebrafish embryotoxicity. Book of abstracts of FEBS3+ Meeting - Molecules of Life. Portorož, Slovenia

- 2015 Babić S, Sauerborn Klobučar R, Barišić J, Klobučar G, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R: Potential biomarkers for sewage sludge pollution monitoring. Book of abstracts of the 12<sup>th</sup> Croatian biological congress with international participation. Sveti Martin na Muri, Croatia
- 2015 Babić S, Sauerborn Klobučar R, Barišić J, Klobučar G, Topić Popović N, Strunjak-Perović I, Čož-Rakovac R: Evaluation of toxic potential of municipal waste waters from wastewater treatment plant by zebrafish embryo toxicity test. Book of abstracts of the 12<sup>th</sup> Croatian biological congress with international participation. Sveti Martin na Muri, Croatia
- 2015 Čož-Rakovac R, Barišić J, Delaš I, Strunjak-Perović I, Topić Popović N, Sauerborn-Klobučar R, Babić S: Mariculture – Source of polyunsaturated fatty acids from shellfish. 7<sup>th</sup> International Conference on Marine Bioprospecting (BIOPROSP\_2015). Tromso, Norway
- 2014 Bošnjak I, Babić D, Šegvić-Bubić T, Babić S, Bielen A: Genes involved in horizontal gene transfer across different environments. Book of abstracts of FEBS EMBO 2014 Conference. Paris, France
- 2012 Dekić S, Babić S, Hudina S, Žganec K: Range expansion of invasive amphipods and their impact on benthic invertebrate communities in the Drava river. Book of abstracts of the 11<sup>th</sup> Croatian biological congress with international participation. Šibenik, Croatia

#### INVITED TALKS

- 2019 Toxicity assessment of Sava River using multiple endpoint testing (invited talk, unpublished, scientific), School of the Environment, Nanjing University, Nanjing, China.
- 2015 Zebrafish *Danio rerio* as a model organism for the study of human disease (invited talk, unpublished, scientific), Institute for Medical Research and Occupational Health, Zagreb (November 26<sup>th</sup>)
- 2015 Zebrafish – alternative model in toxicology (invited talk, unpublished, scientific), at the workshop Application of the 3R approach in working with laboratory animals. Organized by Croatian Society for Laboratory Animal Science and Croatian Brain Research Institute, Zagreb (October 22<sup>nd</sup>-23<sup>rd</sup>)
- 2013 Earthworms as indicator organisms in ecotoxicological research (invited talk, unpublished, scientific). 10<sup>th</sup> Scientific and Professional Conference on Autochthonous Karstic Species, Otočac (June 28th)

#### PARTICIPATION ON WORKSHOPS

- 2015 Application of 3R approach in working with laboratory animals, at Croatian brain research institute, Zagreb (October 22<sup>nd</sup>-23<sup>rd</sup>)
- 2014 Positron emission tomography, at Ruđer Bošković Institute, Zagreb (November 12<sup>th</sup>-14<sup>th</sup>)
- 2014 BD AccuriT C6 flow cytometer, at Faculty of veterinary medicine, Zagreb (September 5<sup>th</sup>)
- 2014 New Molecular Solutions in Research and Development for Innovative Drugs, at Ruđer Bošković Institute, Zagreb (April 7<sup>th</sup>-9<sup>th</sup>)

#### CERTIFICATES

- 2016 Laboratory Animal Science Course (80 h, FELASA equivalent) – number of certificate: 179.3-16, HR 191/02/P
- 2015 Setting up laboratory in compliance with HRN ISO/IEC 17025 (Accreditation in Europe and Croatia; Quality assurance in Laboratories; Technical competence in Laboratories). Croatian Accreditation Agency, Zagreb (September 29<sup>th</sup> – October 1<sup>st</sup>) - number of certificate: LAB3-V3-011015-006

**MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS/SOCIETIES**

2013 – now Croatian Society of Biochemistry and Molecular Biology

**SKILLS AND COMPETENCIES**

- Drivers license (B)
- Excellent computer skills
- Languages: English, Italian