CURRICULUM VITAE

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Education

Far Eastern State University, Vladivostok, Russia	1995 – 2000	MS, Biology

Work Experience

Stazione Zoologica Anton Dohrn, Villa Comunale, 80121 Napoli, Italy	1/12/2024– present	Research Fellow, Arnone lab PhD student, Arnone lab (SZN), Hejnold lab (FSUJENA)
Marine Biological Laboratory Woods Hole, MA, US	17/1/2023 – 18/11/2024	Senior Research Assistant Rosenthal lab

Project 1. Developing several transgenic techniques, such as CRISPR/HDR, *Minos* transposable element, prime-editing, aiming to generate a stable genetically modified lines of the bobtail squid *Euprymna berryi*. The project involved use of bioinformatics, including multiplex MiSeq genotyping analysis, cloning, IVT, microinjection, and *in vivo* imaging.
Project 2. Developing squid *Doryteuthis pealeii ex-vivo* cell culture technique with establishing efficient non-viral transfection tools. In this project, various growth media composition and cell attachment reagents were tested. Reporter mRNA was used for transfection utilizing a set of delivery reagents.
Project 3. Generating *ADAR2* knockout line of *E. berryi* to study the role of RNA editing enzymes in neural plasticity. To overcome the lethal effect of gene knockout, serial dilutions of the editing system were performed. Mutagenesis efficiency was assessed by pcr-based genotyping.

Gene Editing Core facility management.

Carnegie Mellon University Pittsburgh, PA, US	5/5/2018 – 16/1/2023	Research Assistant II Hinman lab *Project 1.* Comparison of sea urchin and sea star endomesoderm GRNs aiming to elucidate evolutionary changes and constraints of developmental GRNs architecture. To establish functionality of regulatory connections between nodes in GRN, gene knockdown technique (MASO) with downstream in situ hybridization and qRT-PCR assays were performed. *Project 2.* Analysis of the sea star *Patiria miniata* larval regeneration of the whole-body and the nervous system. The project involved use of FISH, IHC, BAC recombineering, microinjection, drug treatments with following cell proliferation assays, in vivo confocal imaging, Kaede photoconversion, Tunel assay, serial semithin sectioning. *Project 3*. Developing novel inducible gene editing tools in *P. miniata* to study post-embryonic GRNs during regeneration and metamorphosis. To achieve spatio-temporal control of genome editing, the CRISPR-Cas9 system was coupled with Tet-ON system. *Pm*U6 regulatory elements able to drive expression of guide RNA were discovered. The project involved use of bioinformatics, microinjection, drug titration assays, plasmid-based transgenesis, Gibson cloning, genotyping analysis. *Echinoderm BACs facility management.* *Mentoring undergraduate and graduate students.* *Lab Safety management.* *General Lab practice management.*
University of North Florida Jacksonville, Fl, US	16/6/2016– 3/5/2018	Adjunct Instructor | General Biology I labs Department of Biology *Teaching and grading responsibilities*. Research Associate (Volunteer) Mashanov lab Project. Establishing the brittle star *Ophioderma brevispinum* as a novel experimental system to study regeneration and evolution of the adult nervous system. The project involved use of core immunostaining techniques, confocal imaging, 3D modeling, tissue sectioning, *ex-vivo* organ culture, pharmacological drugs treatment, genomic DNA extractions for downstream genome sequencing, RNA extraction for *de novo* transcriptome assembly, as well as establishing general

		protocols for animals maintenance under the laboratory conditions. *Mentoring undergraduate and post-bac REU students.*
University of Puerto Rico San Juan, PR	8/1/2008 – 12/6/2016	Research Assistant I Garcia-Arraras lab *Project 1*. Molecular and cellular mechanisms of neural regeneration in the adult sea cucumber *Holothuria glaberrima.* The project involved use of core molecular biology tool boxes such as FISH and colorimetric in situ hybridization; IHC; BrdU, EdU, and Tunel assays, RNAi; electroporation, as well as TEM, histology, paraffin and cryo-tissue sectioning, in vivo pharmacological drugs treatment. To characterize novel cell type populations (radial glial cells) monoclonal antibodies were developed. NGS library (454 platform) preparation was performed for *de novo* neural transcriptome assembly. *Project 2*. Molecular and cellular mechanisms of visceral regeneration in the adult sea cucumber *H. glaberrima.* The project involved use of core molecular (in situ hybridization), cell biology (IHC, BrdU, Tunel) techniques and pharmacological drugs treatment.
Ludwig Maximilian University of Munich Munich, Germany	21/10/2006 – 6/1/2008	Research Associate (Volunteer) Heinzeller lab *Project.* Cellular mechanisms of neural regeneration in echinoderms. The project involved use of IHC, SEM, TEM, and 3D modeling based on serial semithin plastic sections.
Institute of Marine Biology Vladivostok, Russia	16/6/2000– 19/10/2006	Senior Research Scientist Dolmatov lab *Project*. Development and regeneration of the nervous system in the sea cucumber *Eupentacta fraudatrix* (Holothuriodea:Dendrochirota). The project involved use of TEM, 3D modeling, and paraffin histology.

Communication and Interpersonal skills

- Good communication skills through teaching various microinjection techniques at Hinman lab (CMU, US) and Rosenthal lab (MBL, US).
- Good contact and mentoring skills through overseeing lab practicals and supervising undergraduate and graduated students projects at Garcia-Arraras lab (UPR, PR) and Hinman lab (CMU, US).

Managerial skills

- Managerial skills developed through managing BAC facility (CMU, US) and Genome Editing Core facility (MBL, US).

Professional skills

- Proficient at designing and carrying out biological experiments, particularly molecular biology and in vivo functional assays.
- Strong lab skills:

Stereomicroscopy, light microscopy, TEM, SEM, LSCM
DNA, RNA and Protein extraction
Mammalian cell culture technique
Primary *ex-vivo* squid cell culture
Non-viral transfection methods for cell culture
Bradford assay, SDS-PAGE, Agarose gel electrophoresis
Western blot analysis
PCR, RT-PCR, qRT-PCR (SYBR-green chemistry)
Purification of nucleic acids
BrdU, EdU, and Tunel assays
Gene cloning (Gibson assembly, restriction-ligation)
BAC recombineering
Targeted genetic cell ablation technique
Tet-ON, Tet-OFF inducible gene expression systems
Primer design
In vitro transcription (labeled antisense RNA probes, mRNA)
In situ hybridization (fluorescent and colorimetric)
Immunohistochemistry
Histology
Echinoderm, cephalopods embryo handling and culture maintenance
Microinjections (sea star, sea urchin, squid)
Preparation of NGS libraries: RNA-seq and multiplex amplicon MiSeq
PCR-genotyping data analysis
Multiplex amplicon NGS data analysis
Transgenesis using reporter genes (plasmid and BAC-based)

Transgenesis using *Minos* transposable element
CRISPR/HDR-based transgenesis
CRISPR-mediated (Cas9, Cas12a) mutagenesis
In-vivo pharmacological assays
Preparation of various laboratory solutions & stains

- Bioinformatic analysis skills
  Linux tools
  Bash scripting
  RStudio
  Python
  JupyterLab
  The benchling platform
  SnapGene
- 3D modeling
  Blender

Digital skills (self-assessment)

- Proficient user: Problems solving / Organizational and planning skills / Decision-making / Motivated / Good listener and communicator / Team-work oriented
- Independent user: Content creation / Safety
- Efficient command of Linux command line tools, both general-use and specialized, such as bedTools or samtools, aligners (Bowtie2), and various data analysis (HOMER2, IGV, BLAST command line)
- command of R programming language scripting using specialized NGS data-analysis tools such as Seurat 5
- Graphic design software: Inkscape, Fiji, Gimp

Honors and Awards

- 2017 FASEB BioArt award to 3D model of the nervous system of *A. kochii*
- 2006–2007 FESU Biology Award to Outstanding Undergraduate Student
- 2000 Diploma with Distinction, Far Eastern State University, Vladivostok, Russia

Professional Training

- 2025 Gene Regulatory Networks for Development, MBL (US)

Conferences and Presentations

- 2025 DBSUMI XXVIII, MBL (US). Poster Presenter: O. Zueva, M.I. Arnone. Decoding neuronal communication: a multi-modal approach to understandinginformation flow in sea urchin larvae.

Peer Review

- 2022–present Invited Reviewer, Frontiers Media

Publications

2023

Zueva O, Hinman VF. (2023) Inducible in vivo genome editing in the sea star *Patiria miniata*. bioRxiv, doi:10.1101/2023.01.09.523328

2020 - 2022

Zheng M, Zueva O, Hinman VF. (2022) Regeneration of the larval sea star nervous system by wounding induced respecification to the *Sox2* lineage. Elife, doi: 10.7554/eLife.72983.

Cary GA, McCauley BS, Zueva O, Pattinato J, Longabaugh W, Hinman VF. (2020) Systematic comparison of sea urchin and sea star developmental gene regulatory networks explains how novelty is incorporated in early development. Nat Commun., doi: 10.1038/s41467-020-20023-4.

Mashanov V, Akiona J, Khoury M, Ferrier J, Reid R, Machado DJ, Zueva O, Janies D. (2020) Active Notch signaling is required for arm regeneration in a brittle star. PLoS One, doi: 0.1371/journal.pone.0232981.

2017 - 2019

Cary GA, Wolff A, Zueva O, Pattinato J, Hinman VF. (2019) Analysis of sea star larval regeneration reveals conserved processes of whole-body regeneration across the metazoa. BMC Biol., doi: 10.1186/s12915-019-0633-9.

Mashanov V, Zueva O. (2019) Radial Glia in Echinoderms. Dev Neurobiol., doi: 10.1002/dneu.22659.

Zueva O, Khoury M, Heinzeller T, Mashanova D, Mashanov V. (2018) The complex simplicity of the brittle star nervous system. Front Zool, doi: 10.1186/s12983-017-0247-4.

Mashanov, V. S., Zueva, O. R., Mashanova D., & García-Arrarás, J. E. (2017). Expression of stem cell factors in the adult sea cucumber digestive tube. Cell Tissue Res, doi: 10.1007/s00441-017-2692-y

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2017). Inhibition of cell proliferation does not slow down echinoderm neural regeneration. Front Zool 14(12), doi:10.1186/s12983-017-0196-y

2014 – 2016

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2015). Expression of pluripotency factors in echinoderm regeneration. Cell Tissue Res, 359(2), 521–536.

doi:10.1007/s00441-014-2040-4

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2015). Heterogeneous generation of new cells in the adult echinoderm nervous system. Front. Neuroanat. (9), 123. doi:10.3389/fnana.2015.00123

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2015). Myc regulates programmed cell death and radial glia dedifferentiation after neural injury in an echinoderm. BMC Dev Biol, 15(1), 24. doi:10.1186/s12861-015-0071-z

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2014). Postembryonic organogenesis of the digestive tube: why does it occur in worms and sea cucumbers but fail in humans? Curr Top Dev Biol, 108, 185–216. doi:10.1016/B978-0-12-391498-9.00006-1

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2014). Transcriptomic changes during regeneration of the central nervous system in an echinoderm. BMC Genomics, 15(1), 357. doi:10.1186/1471-2164-15-357

2011 - 2013

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2013). Radial glial cells play a key role in echinoderm neural regeneration. BMC Biol, 11, 49. doi:10.1186/1741-7007-11-49

Mashanov, V. S., *Zueva, O. R*., & García-Arrarás, J. E. (2012). Expression of Wnt9, TCTP, and Bmp1/Tll in sea cucumber visceral regeneration. Gene Expr Patterns, 12(1-2), 24–35. doi:10.1016/j.gep.2011.10.003

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2012). Posttraumatic regeneration involves differential expression of long terminal repeat (LTR) retrotransposons. Dev Dyn, 241(10), 1625–1636. doi:10.1002/dvdy.23844

Mashanov, V. S., Zueva, O. R., & García-Arrarás, J. E. (2012). Retrotransposons in animal regeneration: overlooked components of the regenerative machinery? Mob Genet Elements, 2(5), 244–247. doi:10.4161/mge.22644

Mashanov, V.S., Zueva, O.R., Garcia-Arraras, J.E. (2011) Spatio-temporal expression Wnt9, TCTP, and Bmp1/Tll in sea cucumber gut regeneration. Gene Expression Patterns. doi:10.1016/j.gep.2011.10.003

Mashanov, V.S., Zueva, O.R., C. Rojas-Cartagena, Garcia-Arraras, J.E. (2010) Visceral regeneration in a sea cucumber involves extensive expression of survivin and mortalin homologs in the mesothelium. BMC Developmental Biology. 10(1): 117. DOI: 10.1186/1471-213X-10-117

2008 - 2010

Mashanov, V.S., Zueva, O.R., Garcia-Arraras, J.E. (2010) Organization of glial cells in the adult sea cucumber central nervous system. Glia. 58:1581-1593. DOI: 10.1002/glia.21031

Mashanov, V.S., Zueva, O.R., Heinzeller, T., Aschauer, B., Naumann, W.W., Grondona, J.M., Cifuentes, M., Garcia-Arraras, J.E. (2009) The central nervous system of sea cucumbers (Echinodermata: Holothuroidea) shows positive immunostaining for a chordate glial secretion. Frontiers in Zoology 6, 11. DOI: 10.1186/1742-9994-6-11

Mashanov, V.S., Zueva, O.R., Heinzeller, T. (2008) Regeneration of the radial nerve cord in a holothurian: A promising new model system for studying post-traumatic recovery in the adult nervous system. Tissue and Cell 40, 351-372. DOI: 10.1016/j.tice.2008.03.004

2005 - 2007

Mashanov, V.S., Zueva, O.R., Heinzeller, T., Aschauer, B, Dolmatov, I.Yu. (2007) Developmental origin of the adult nervous system in a holothurian: an attempt to unravel the enigma of neurogenesis in echinoderms. Evolution & Development 9, 245—257. DOI: 10.1111/j.1525-142X.2007.00157.x

Dolmatov, I.Y., Mashanov, V.S., Zueva, O.R. (2007) Derivation of muscles of the Aristotle's lantern from coelomic epithelia. Cell and Tissue Research. 327, 371-84. DOI: 10.1007/s00441-006-0314-1

Mashanov, V.S., Zueva, O.R., Heinzeller, T., Dolmatov, I.Yu. (2006) Ultrastructure of the circumoral nerve ring and the radial nerve cords in holothurians (Echinodermata). Zoomorphology 125, 27—38.

Books, book chapters and proceedings

Mashanov, V., Zueva, O.R., Rubilar, T., Epherra, L., and Garcia-Arraras, J. E. (2016) Echinodermata Chapter 51 In: Strcture and Evolution of Invertebrate Nervous Systems, Ed Schmidt-Raesa, A., Harszh, S., and Purschke, G. Oxford University Press. doi.org/10.1093/acprof:oso/9780199682201.003.0051

Mashanov, V.S., Zueva., O.R., Heinzeller, T., and Aschauer, B. (2010). Development of the nervous system in the holothurian Eupentacta fraudatrix. In Echinoderms: Durham, L.G. Harris, S.A. Böttger, C.W. Walker, and M.P. Lesser, eds. (London:Taylor & Francis Group), p. 429.

Dolmatov, I.Yu., Mashanov., V.S., and Zueva, O.R. (2010). Muscle development in the echinoid Aristotle's lantern. In Echinoderms: Durham, L.G. Harris, S.A. Böttger, C.W. Walker, and M.P. Lesser, eds. (London:Taylor & Francis Group), p. 503.

Zueva, O.R., Mashanov, V.S., Dolmatov, I.Yu., and Heinzeller, T. (2004). Ultrastructure of the radial nerve cord in the holothurian Eupentacta fraudatrix. In Echinoderms: München, T. Heinzeller and J.H. Nebelsick, eds. (London:Taylor & Francis Group), pp. 387 – 390.