

CURRICULUM VITAE

Fernando Rodriguez, Ph.D.

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Education and Postdoctoral Training

2010 - 2015	Postdoctoral Scientist Advisor: Irina Arkhipova	Marine Biological Laboratory, Woods Hole, MA (USA)
2004 - 2009	Ph.D. Biology, Molecular Biology and Biochemistry Program Advisors: Ana Dominguez Sanjurjo and Trinidad Perez Mendez	Oviedo University (Spain)
2002-2004	M.Sc. in Biology Advisors: Ana Dominguez Sanjurjo and Trinidad Perez Mendez	Oviedo University (Spain)
1998 - 2002	BS, Biology (Molecular Biology and Biotechnology)	Oviedo University (Spain)

Professional Positions

2024 -	Research Scientist	Thomas H. Gosnell School of Life Sciences, Rochester Institute of Technology, NY (USA)
2018 - 2024	Research Scientist	Josephine Bay Paul Center, Marine Biological Laboratory, Woods Hole, MA (USA)
2015 - 2018	Research Associate	Josephine Bay Paul Center, Marine Biological Laboratory, Woods Hole, MA (USA)
2010 - 2015	Postdoctoral Scientist	Josephine Bay Paul Center, Marine Biological Laboratory, Woods Hole, MA (USA)
2004 - 2009	Graduate Research Assistant	Oviedo University (Spain)

Publications (PDF copies available at <https://rodriguezr.org/cv>)

(** indicates publication of special relevance, undergraduate authors are underlined)

In Preparation and Submitted

[23] **Rodriguez F**, Yushenova I, Metzger B, Arkhipova I. *In Preparation*. Domesticated reverse transcriptase-like genes at the intersection of environmental stress responses.

[22] Nowell R, **Rodriguez F**, Hecox-Lea B, Arkhipova I, Mark Welch D, Barraclough T, Wilson C. Bdelloid rotifers deploy biosynthetic genes acquired from bacteria against attack by pathogenic fungi. ***Nature Communications***. *In Revision*.

Original Research in Peer-Reviewed Journals

[21] Arkhipova I, Yushenova I, **Rodriguez F**. 2023. Shaping eukaryotic epigenetic systems by horizontal gene transfer. ***Bioessays*** 45:e2200232. <https://doi.org/10.1002/bies.202200232>

[20] **Rodriguez F**, Arkhipova IR. 2023. An overview of best practices for transposable element identification, classification, and annotation in eukaryotic genomes. In: Branco, M.R., de Mendoza Soler, A. (eds) **Transposable Elements. *Methods in Molecular Biology*** vol 2607. Humana, New York, NY. <https://doi.org/10.1007/978-1-0716->

2883-6 1

[19] Darras H, De Souza Araujo N, Baudry L, Guiglielmoni N, Lorite P, Marbouty M, **Rodriguez F**, Arkhipova I, Koszul R, Flot J-F, Aron S. 2022. Chromosome-level genome assembly and annotation of two lineages of the ant *Cataglyphis hispanica*: stepping stones towards genomic studies of hybridogenesis and thermal adaptation in desert ants. **Peer Community Journal** vol 2. <https://doi.org/10.24072/pcjournal.140>

** [18] **Rodriguez F**, Yushenova IA, DiCorpo D, Arkhipova IR. 2022. Bacterial N4-Methylcytosine as an epigenetic mark in eukaryotic DNA. **Nature Communications** 13, 1072. <https://doi.org/10.1038/s41467-022-28471-w>

Significance: In this paper we report a new DNA modification system, previously unknown in eukaryotes, captured from bacteria. We propose it has a role in transposon domestication. Altimetric 180. Over 20 news outlets reported this research <https://nature.altmetric.com/details/123800850/news>

[17] Kalendar R, Sabot F, **Rodriguez F**, Karlov GI, Natali L, Alix K. 2021. Editorial: mobile elements and plant genome evolution, comparative analyzes and computational tools. **Frontiers of Plant Sciences** 12, 735134. <https://doi.org/10.3389/fpls.2021.735134>

[16] Craig RJ, Yushenova IA, **Rodriguez F**, Arkhipova IR. 2021. An ancient clade of Penelope-like retroelements with permuted domains is present in the green lineage and protists, and dominates many invertebrate genomes. **Molecular Biology and Evolution** 38, 5005–5020. <https://doi.org/10.1093/molbev/msab225>

[15] †Schön I, †**Rodriguez F**, Dunn M, Martens K, Shribak M, Arkhipova IR. 2021. A survey of transposon landscapes in the putative ancient asexual ostracod *darwinula stevensoni*. **Genes** 12, 401. <https://doi.org/10.3390/genes12030401> . †Authors contributed equally to this work.

[14] Nowell RW, Wilson CG, Almeida P, Schiffer PH, Fontaneto D, Becks L, **Rodriguez F**, Arkhipova IR, Barraclough TG, 2021. Evolutionary dynamics of transposable elements in bdelloid rotifers. **eLife** 10, e63194. <https://doi.org/10.7554/eLife.63194>

[13] Vakhrusheva OA, Mnatsakanova EA, Galimov YR, Neretina TV, Gerasimov ES, Naumenko SA, Ozerova SG, Zalevsky AO, Yushenova IA, **Rodriguez F**, Arkhipova IR, Penin AA, Logacheva MD, Bazykin GA, Kondrashov AS. 2020. Genomic signatures of recombination in a natural population of the bdelloid rotifer *Adineta vaga*. **Nature Communications** 11, 6421. <https://doi.org/10.1038/s41467-020-19614-y>

[12] Sharko FS, Nedoluzhko AV, Lê BM, Tsygankova SV, Boulygina ES, Rastorguev SM, Sokolov AS, **Rodriguez F**, Mazur AM, Polilov AA, Benton R, Evgen'ev MB, Arkhipova IR, Prokhortchouk EB, Skryabin KG. 2019. A partial genome assembly of the miniature parasitoid wasp, *Megaphragma amalphantum*. **PLOS ONE** 14, e0226485. <https://doi.org/10.1371/journal.pone.0226485>

[11] **Rodriguez F**, Arkhipova IR. 2018. Transposable elements and polyploid evolution in animals. **Current Opinion in Genetics & Development, Genome Architecture and Expression** 49, 115–123. <https://doi.org/10.1016/j.gde.2018.04.003>

[10] Pérez T, **Rodriguez F**, Fernández M, Albornoz J, Domínguez A. 2017. Ancient mitochondrial pseudogenes reveal hybridization between distant lineages in the evolution of the *Rupicapra* genus. **Gene** 628, 63–71. <https://doi.org/10.1016/j.gene.2017.07.035>

[9] Arkhipova IR, Yushenova IA, **Rodriguez F. 2017 Giant reverse transcriptase-encoding transposable elements at telomeres. **Molecular Biology and Evolution** 34(9):2245-2257. <https://doi.org/10.1093/molbev/msx159>

Significance: We proposed that the newly discovered DNA sequences can protect chromosome ends in rotifers. Findings may have implications for aging research. <https://www.eurekalert.org/news-releases/745538>

[8] **Rodriguez F**, Kenefick AW, Arkhipova IR. 2017. LTR-Retrotransposons from bdelloid rotifers capture additional ORFs shared between highly diverse retroelement types. **Viruses** 11;9(4). <https://doi.org/10.3390/v9040078>

** [7] **Rodriguez F**, Arkhipova IR. 2016. Multitasking of the piRNA silencing machinery: targeting transposable elements and foreign genes in the bdelloid rotifer *Adineta vaga*. **Genetics** 203, 255–268. <https://doi.org/10.1534/genetics.116.186734>

Significance: The genome of the bdelloid rotifer Adineta vaga is characterized by massive horizontal gene transfer, low transposon content, and highly diversified RNA-mediated silencing machinery. Selected article in Genetics Spotlight 2016 of the GSA. <https://genestogenomes.org/2016-genetics-spotlight/>

[6] Arkhipova IR, Yushenova IA, **Rodriguez F**. (2013). Endonuclease-containing Penelope retrotransposons in the bdelloid rotifer *Adineta vaga* exhibit unusual structural features and play a role in expansion of host gene families. **Mobile DNA** 4:19. <https://doi.org/10.1186/1759-8753-4-19>

** [5] Flot J-F, Hespeels B, Li X, Noel B, Arkhipova I, Danchin EGJ, Hejnol A, Henrissat B, Koszul R, Aury J-M, Barbe V, Barthélémy R-M, Bast J, Bazykin GA, Chabrol O, Couloux A, Da Rocha M, Da Silva C, Gladyshev E, Gouret P, Hallatschek O, Hecox-Lea B, Labadie K, Lejeune B, Piskurek O, Poulain J, **Rodriguez F**, Ryan JF, Vakhrusheva OA, Wajnberg E, Wirth B, Yushenova I, Kellis M, Kondrashov AS, Mark Welch DB, Pontarotti P, Weissenbach J, Wincker P, Jaillon O, Van Doninck K, 2013. Genomic evidence for ameiotic evolution in the bdelloid rotifer *Adineta vaga*. **Nature** 500, 453–457. <https://doi.org/10.1038/nature12326>

Significance: The genome analysis of bdelloid rotifers offers key insights of the evolution without sex. Altmetric 151, covered in 11 news outlets. <https://nature.altmetric.com/details/1638293/news>

[4] Arkhipova IR, **Rodriguez F**. 2013. Genetic and epigenetic changes involving (retro)transposons in animal hybrids and polyploids. **Cytogenetic and Genome Research** 140, 295–311. <https://doi.org/10.1159/000352069>

[3] **Rodriguez F**, Pérez T, Hammer SE, Albornoz J, Domínguez A. 2010. Integrating phylogeographic patterns of microsatellite and mtDNA divergence to infer the evolutionary history of chamois (genus *Rupicapra*). **BMC Evolutionary Biology** 10, 222. <https://doi.org/10.1186/1471-2148-10-222>

[2] **Rodriguez F**, Hammer S, Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Martinkova N, Albornoz J, Domínguez A. 2009. Cytochrome b phylogeography of chamois (*Rupicapra* spp.). population contractions, expansions and hybridizations governed the diversification of the genus. **Journal of Heredity** 100, 47–55. <https://doi.org/10.1093/jhered/esn074>

[1] **Rodriguez F**, Albornoz J, Domínguez A. 2007. Cytochrome b pseudogene originated from a highly divergent mitochondrial lineage in genus *Rupicapra*. **Journal of Heredity** 98, 243–249. <https://doi.org/10.1093/jhered/esm013>

Reviews, Articles, Books, Book Chapters

[4] **Rodriguez F**, Arkhipova I. 2016. Multitasking of the piRNA silencing machinery: targeting transposable elements and foreign genes in the bdelloid rotifer *Adineta vaga*. **Genetics Spotlight 2016**. <https://genestogenomes.org/2016-genetics-spotlight/>

[3] Ana Domínguez Sanjurjo , **Fernando Rodriguez Vazquez**, Jesús Albornoz Pons, Trinidad Pérez Méndez. 2009, El rebeco cantábrico, filogeografía e historia evolutiva. In: El Rebeco Cantábrico (*Rupicapra pyrenaica parva*), "Conservación y gestión de sus poblaciones". Edited by Pérez-Barbería, F.J. & Palacios, B. Colección Naturaleza y Parques Nacionales. Serie Técnica.

[2] **Rodriguez F**, Hammer S, Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Martinkova N, Albornoz J, Domínguez A. (2008). Cytochrome b phylogeography of chamois (*Rupicapra* spp.): Population contractions, expansions and hybridizations characterize the diversification of the genus. 82nd Annual Meeting of the German

Society of Mammalogy. Vienna, 14-18 September 2008. *Mammalian Biology*. 73 [Suppl. 1]: 16.

[1] Domínguez A. and **Rodriguez F.** 2004. Beef traceability based on DNA fingerprinting. *Feedinfo News Service*.

TEACHING

Teaching certifications

2004 Master in Education (250h) Pedagogical Training for Secondary and Upper Secondary School Education, Vocational Training And Languages (Certificate of Pedagogical Aptitude).

Undergraduate Research Mentoring (peer-reviewed publications are indicated)

2022 **Daniel Pugatch**, University of Massachusetts. High School student Mentoring. Project: Development of optimal conditions to produce soluble recombinant proteins from aquatic animals for functional assays.

2021 **Ahmad Alkhatin**, Brown University. Project: Identification of rotifer repeat elements in metagenomes.

Anton Tarazi, Brown University. Project: Identification of rotifer genome components in permafrost.

2020 **Bridget Beaudoin**, University of Massachusetts. Project: Identification of rotifer genome components in metagenomes.

Matthew Dunn, University of Massachusetts. Project: Transposon Analysis in *Darwinula stevensoni* (Rodriguez *et al.*, 2021).

2019 **Samuel Maffa**, Brown University. Project: Function of reverse transcriptase-related (*rvt*) genes in metal stress response.

2018 **Bria Metzger**, Brown University. Project: Role of reverse transcriptase-related (*rvt*) genes in metal stress response (Rodriguez *et al.*, In Preparation)

2017 **Jonathan N. Dow**, Brown University. Project: Mini-Mu vector design and in vitro cloning of circular bdelloid rotifer transposition intermediates.

Brandon M. Le, Brown University. Project: Annotation of repeat regions in the miniature parasitoid wasp *Megaphragma amalphantum* (Sharko *et al.*, 2019).

Katherine Dunham, Brown University. Project: Purification of reverse transcriptase-related (*rvt*) gene in *Neurospora crassa*.

Laura Swain, University of Chicago. Project: Identifying extrachromosomal intermediates of transposition in bdelloid rotifers

2016 **Samantha Spear**, Brown University. Project: *Neurospora* mutagenesis and selection of *rvt*-gene related pathways.

Brandon M. Le, Brown University. Project: Genome transposon analysis benchmarking.

Vishok Srikanth, University of Chicago. Project: Domain structure of reverse transcriptase-related proteins.

2015 **Tatsiana Mello**, Wellesley College. Project: *In vitro* activity of reverse transcriptase-related (*rvt*) genes.

2014 **Aubrey W. Kenefick**, Williams College. Project: Analysis of LTR-Retrotransposons in bdelloid rotifers (Rodriguez *et al.*, 2017).

2013 **Daniel DiCorpo**, Brown University. Project: Detection of methylated DNA in bdelloid rotifers (Rodriguez *et al.*, 2022).

Graduate Research Mentoring

2010-2012 **Anupriya Dutta**, Brown University. Project: Purification and analysis of small RNAs in bdelloid rotifers.

Teaching

- 2008 Lecturer (invited speaker) in MSc Courses, Oviedo University (Spain).
2005 Summer Course “Conservation and genetic characterization of plant resources”, Oviedo University (Spain).

Teaching Outreach

- 2020 Science Fair judge: Falmouth Public Schools (Falmouth, Massachusetts).
2019 Invited Poster Reviewer: 10th Annual MBL Undergraduate Research Symposium Program Biological Discovery in Woods Hole REU (Woods Hole, Massachusetts).
2018 Science counselor: Falmouth Public Schools (Falmouth, Massachusetts).

PROFESSIONAL SERVICE

Invited Reviewer for: BMC Biology, BMC Plant Biology journal, PeerJ, Molecular Biology and Evolution, Scientific Reports, Frontiers in Microbiology, Nucleic Acid Research, Mobile DNA, Hydrobiologia.
<http://www.webofscience.com/wos/author/record/E-9392-2013>

Invited Guest Associate Editor for:

- Frontiers in Plant Systems and Synthetic Biology (Research topic: Mobile Elements and Plant Genome Evolution, Comparative Analyses and Computational Tools).
- Genes (Basel).

Memberships:

- The Genetics Society of America. 2010 – present.
- AAAS/Science membership. Full membership in AAAS (the American Association for the Advancement of Science) sponsored by AAAS/Science Program for Excellence in Science (2 years full membership). 2015 – present.
- The Marine Biological Laboratory (MBL) Society. 2018 – present.
- The Global Invertebrate Genomics Alliance (GIGA). 2018 – present.
- The National Shellfisheries Association. 2020 – present.

Meetings and Conferences Presentations as lead author

(** indicates Invited Speaker)

** [25] Overview of transposable element identification, classification, and annotation for a better epigenetic landscape generation in non-model eukaryotic genomes. **Rodriguez F**, Arkhipova I. National Shellfisheries Association 115 Annual Meeting, Baltimore, MD, USA, 2023.

[24] Bacterial N4-methylcytosine as an epigenetic mark in eukaryotic DNA. **Rodriguez F**, Yushenova I, Arkhipova I. Transposable Elements, CSHL, Cold Spring Harbor, NY, USA, 2022.

[23] Non-canonical base modifications of bacterial origin as an epigenetic mark in eukaryotic DNA. **Rodriguez F**, Yushenova I, Arkhipova I. EPIMAR – Epigenetics in Marine Biology Conference, Woods Hole, MA, USA, 2022.

[22] Epigenetic regulation in aquatic micro-invertebrates: a non-canonical system of bacterial origin. **Rodriguez F**,

Yushenova I, Arkhipova I. Aquaculture, San Diego, MA, USA, 2022.

[21] An ancient clade of Penelope-like retroelements with permuted domains is present in many invertebrate genomes with exceptionally high copy numbers. **Rodriguez F**, Craig R, Yushenova I, Arkhipova I. The Mobile DNA Conference (FASEB), virtual, 2021.

** [20] Non-canonical epigenetic system of bacterial origin in aquatic micro-invertebrates. **Rodriguez F**, Yushenova I, Arkhipova I. National Shellfisheries Association 113 Annual Meeting, virtual, 2021.

[19] Transposon Landscapes in the Putative Ancient Asexual Ostracod *Darwinula stevensoni*. **Rodriguez F**, Schön I, Dunn M, Martens K, Shribak M, Arkhipova I. 4th Uppsala Transposon Symposium, virtual, 2020.

[18] Non-canonical epigenetic system of bacterial origin in aquatic micro-invertebrates. **Rodriguez F, Yushenova I, Arkhipova I. National Shellfisheries Association 112 annual Meeting (canceled due to COVID-19), Baltimore, MD, USA, 2020.

[17] Non-canonical base modifications of bacterial origin in a eukaryotic genome. **Rodriguez F**, Yushenova I, Arkhipova I. The Mobile DNA Conference (FASEB), Palm Springs, CA, USA, 2019.

[16] Transposon silencing and non-canonical base modifications of bacterial origin in a eukaryotes. **Rodriguez F**, Yushenova I, Arkhipova I. Mobile Genetic Elements in Woods Hole, MA, USA, 2019.

[15] The epigenetic landscape in the bdelloid rotifer *Adineta*. **Rodriguez F**, Arkhipova I. Transposable Elements, CSHL, Cold Spring Harbor, NY, USA, 2018.

[14] The epigenetic landscape in the bdelloid rotifer *Adineta*. **Rodriguez F**, Arkhipova I. GIGA III, Global Invertebrate Genomics Alliance, Curacao, 2018.

[13] N6-methyladenine and N4-methylcytosine: amino-methylation as an epigenetic mark in rotifers. **Rodriguez F**, Arkhipova I. Mobile Genetic Elements in Woods Hole, MA, USA, 2017.

[12] N6-methyladenine and N4-methylcytosine base modifications are broadly distributed in the bdelloid rotifer *Adineta*. **Rodriguez F**, Arkhipova I. Transposable Elements, CSHL, Cold Spring Harbor, NY, USA, 2016.

[11] Transposable elements in the bdelloid rotifer *Adineta vaga*: how to invite them to a party but not let them spoil it. **Rodriguez F**, Arkhipova I. Mobile Genetic Elements in Woods Hole, MA, USA, 2015.

[10] piRNA-mediated silencing in the bdelloid rotifer *Adineta vaga* targets transposons as well as genes of foreign origin. **Rodriguez F**, Arkhipova I. Regional Meeting on Mobile Genetic Elements, CSHL, Cold Spring Harbor, NY, USA, 2013.

[9] An increase in relative abundance of pi-like RNAs in response to ionizing radiation in the bdelloid rotifer *Adineta vaga*. **Rodriguez F**, Arkhipova I. Genomic Impact of Eukaryotic Transposable Elements, Asilomar, CA, USA, 2012.

[8] Initial characterization of PIWI-interacting RNAs in *Adineta vaga*. **Rodriguez F**, Arkhipova I. North East Mobile Genetic Element Meeting, Woods Hole, MA, USA, 2011.

[7] Microsatellite and mt-DNA phylogenies of the chamois (genus *Rupicapra*) and taxonomic implications. **Rodriguez F**, Pérez T, Hammer S, Albornoz J, Domínguez A. V World Conference on Mountain Ungulates, Granada, Spain, 2009.

[6] Diversification of the chamois (genus *Rupicapra*). Discordance between microsatellite and mt-DNA phylogenies. **Rodriguez F**, Pérez T, Hammer S, Albornoz J, Domínguez A. XII Congress European Society for Evolutionary Biology, Turin, Italy, 2009

- [5] Filogeografía y diversificación del género *Rupicapra*. **Rodriguez F**, Hammer S, Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Martinkova N, Albornoz J, Domínguez A. XVII Seminario de Genética de Poblaciones y Evolución, Ribadesella, Spain, 2008.
- [4] Cytochrome b Phylogeography of Chamois (*Rupicapra* spp.): Population Contractions, Expansions and Hybridizations characterize the Diversification of the Genus. **Rodriguez F**, Hammer S, Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Albornoz J, Domínguez A. 82nd Annual meeting of the German Society of Mammalogy, Vienna, Austria, 2008.
- [3] Filogeografía mitocondrial del rebeco (*Rupicapra* spp.) basada en el citocromo b. **Rodriguez F**, Hammer S, Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Albornoz J, Domínguez A. XXXVI Congreso de la Sociedad Española de genética, León, Spain, 2007.
- [2] Mitochondrial Phylogeography of chamois (*Rupicapra* spp.) based on cytb. **Rodriguez F**, Hammer S Pérez T, Suchentrunk F, Lorenzini R, Michallet J, Albornoz J, Domínguez A. XI Congress European Society for Evolutionary Biology, Uppsala, Sweden, 2007.
- [1] Evolución del gen citocromo b y su correspondiente pseudogen nuclear en el rebeco (*Rupicapra* spp.). **Rodriguez F**, Albornoz J, Domínguez A. XXXV Congreso de la Sociedad Española de genética, Almería, Spain, 2005.

Workshops

- 2019 - Hydra Workshop: Resources and information for using *Hydra* as a model system. Woods Hole, MA, USA.
- 2013 - Writing about Science for the Public: A Hands-On Workshop for Scientists. Woods Hole, MA, USA.
- 2013 - GMOD Summer School. GMOD component installation, configuration, and usage (GBrowse, JBrowse, Galaxy, MAKER, Tripal, WebApollo, and Chado). NESCent. Durham, NC, USA.
- 2013 - Statistical Analysis and Graphics with R. MBL. Woods Hole, MA, USA.
- 2011 - CCV Bioinformatics Workshop. Brown University, RI, USA.
- 2011 - Genome Assembly Special Forces Workshop. Brown University, RI, USA.
- 2010 - Next-Generation Sequencing Data Analysis. Brown University, RI, USA.
- 2010 - Programmatic Access to Biological Databases (Perl). EMBL-EBI. Hinxton, UK.

Selected Press

- Genetics Spotlight 2016: Selected Article "Multitasking of the piRNA silencing machinery: targeting transposable elements and foreign genes in the bdelloid rotifer *Adineta vaga*". Genetics 203, 255–268. <https://genestogenomes.org/2016-genetics-spotlight/>
- EUREKA ALERT: Newly discovered DNA sequences can protect chromosomes in rotifers. <https://www.eurekalert.org/news-releases/745538>
- The Scientist: Bacterial enzyme keeps rotifers' transposable elements in check. <https://www.the-scientist.com/news-opinion/bacterial-enzyme-keeps-rotifers-transposable-elements-in-check-69766>
- EUREKA ALERT: MBL team discovers new DNA modification system in animals, captured from bacteria more than 60 MYA. <https://www.eurekalert.org/news-releases/944730>
- Marine Biological Laboratory: MBL team discovers new DNA modification system in animals, captured from bacteria. <https://www.mbl.edu/news/mbl-team-discovers-new-dna-modification-system-animals-captured-bacteria>