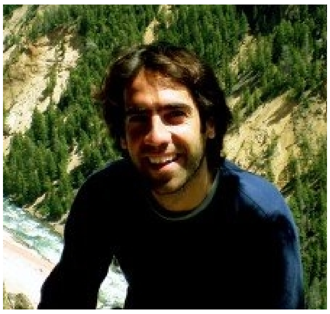
Christoforos Nikolaou

Assistant Professor of Bioinformatics
Department of Biology
University of Crete



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PERSONAL INFORMATION

Date of Birth: February 21st, 1978
Citizenship: Greek
Marital Status: Married with one child
Address: Genimata 34, 71305 Heraklion, Greece

EDUCATION

2005, PhD in Biology
Department of Biology, National and Kapodistrian University of Athens, Athens, Attica, Greece

2000, MSc in Journalism
NY College (Greek Branch), Athens, Greece

1999, BSc in Chemistry
Department of Chemistry, University of Patras, Patras, Achaia, Greece

POSITIONS

February 2014-present
Assistant Professor of Bioinformatics
Department of Biology, University of Crete Department of Biology, Heraklion, Greece

January 2012-January 2014
Post-doctoral Fellow
Biomedical Sciences Research Center "Alexander Fleming", Athens, Greece

January 2010-December 2014
Course Instructor
Department of Biology, University of Crete Department of Biology, Heraklion, Greece

April 2010-December 2011
Post-doctoral Fellow
Institute of Biology, National Centre for Scientific Research "Demokritos", Athens, Greece

May 2007-July 2007
Visiting Fellow
Department of Chemistry, Boston University (BU), Boston, MA, USA

January 2006-April 2009
Post-doctoral Fellow
Bioinformatics and Genomics Group, Centre de Regulació Genòmica (CRG), Barcelona, Catalunya, Spain

October 2010-December 2005
PhD Fellow
Institute of Biology, National Centre for Scientific Research "Demokritos", Athens, Greece

RESEARCH

Originally trained in Biochemistry, I moved to Theoretical Biology during my PhD. My expertise lies in the fields of *Computational Genomics*, *Chromatin Structure* and *Gene Regulation*.
My principal research interests are related to chromatin structure and genome architecture and evolution and how they may shape gene regulation programs. Among my main contributions are:

- The discovery of a link between nucleosome positioning preferences and exon definition, which directly suggested the existence of co-transcriptional splicing.
- A model for statistical nucleosome positioning, according to which only a small subset of a genome's nucleosomes are guided by intricate structural constraints in the underlying DNA sequence.
- Aspects of genome architecture in prokaryotic and eukaryotic (yeast) genomes that point towards underlying principles that link genome evolution, the spacing and orientation of genes with the processes of DNA replication and gene transcription.

My current research activities are focused on the study of genome structure at two levels:
1. The discovery and quantification of structural constraints in the genomic sequence of eukaryotes. By structural constraints we define features of the primary sequence that are conserved through evolution without necessarily being maintained in the nucleotide composition. Such “hidden” structural conservation may form the basis of sequence-dependent properties that link the genetic to the epigenetic level.
2. The evolution of genome architecture in one and three dimensions. In particular, the way the order, orientation and spatial clustering of genes, promoters, enhancers etc is shaped through evolution and how this “segregation” of genomic elements may reflect the organization of the genome in a way that couples homeostasis with the ability to respond to external stimuli. Regarding the latter, we are actively studying changes in the one- and three-dimensional positions of deregulated genes in pathological conditions.

TEACHING

Undergraduate

- Computational Biology: Biology Dept, University of Crete, (https://sites.google.com/site/uoccomputationalbiology/)
- Introduction to Programing: Biology Dept, University of Crete, (https://sites.google.com/site/uocintroprogramming/)
- Biological Databases: Biology Dept, University of Crete, (https://sites.google.com/site/pcuseanddb/)

Graduate

- Algorithms in Bioinformatics: MSc in “Bioinformatics”, University of Crete, (https://sites.google.com/site/uocdataanalysis/lectures/algorithms-in-bioinformatics)
- Introduction to Bioinformatics: MSc in “Molecular Biology and Biomedicine”, University of Crete, (https://sites.google.com/site/uocdataanalysis/lectures/ngs-data-analysis)
- Introduction to Bioinformatics: MSc in “Protein Biotechnology”, University of Crete, (https://sites.google.com/site/uocdataanalysis/lectures/ngs-data-analysis)
- Bioinformatics Analyses in Biomedicine: MSc in “Molecular Biomedicine”, University of Athens (https://sites.google.com/site/uocdataanalysis/lectures/molbiomedclass)
- Data Analysis: MSc in “Management of Environmental Resources”, University of Crete (https://sites.google.com/site/uocdataanalysis/lectures/data-analysis-with-r)
- Systems Biology: MSc in “Systems Biology”, Agricultural University of Athens (https://sites.google.com/site/uocdataanalysis/lectures/genome-structure-and-architecture)

Books/Publications

Υπολογιστική Βιολογία. (2015) Νικολάου Χ, Χουβαρδάς Π., [ηλεκτρ. βιβλ.] Αθήνα:Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. ISBN:978-960-603-124-3. (Greek) http://hdl.handle.net/11419/1577

LANGUAGES

Fluent in Greek (mother tongue), English, Spanish
Very Good French
Basic reading and communications skills in German

MENTORING

Have supervised >10 undergraduate theses
Have supervised 2 post-graduate theses
Currently supervising 4 PhD students:

- Stylianos Mavropoulos
- Dimitrios Konstantopoulos
- Orsalia Hazapis
- Panagiotis Chouvardas (joint supervision with G. Kollias)

http://computational-genomics-uoc.weebly.com/group-members.html

SOCIAL OUTREACH

Website: http://computational-genomics-uoc.weebly.com
Personal Blog: http://computational-genomics-uoc.weebly.com/blog
twitter: https://twitter.com/guilderstern
facebook: https://www.facebook.com/cg2uoc

AWARDS SCHOLARSHIPS

May 2000: Scholarship from the Greek National Institute of Scholarships for an MSc Thesis on "Applied Biochemistry-Biotechnology" (was not used)

September 2000: Student Scholarship from the National Research Center for Physical Sciences "Demokritos" for the preparation of a Doctoral Thesis

October 2002: Assistance Grant from the Greek Society for Biochemistry and Molecular Biology for contributing in the 54th Annual Conference of the Society

February 2004: "Akougiounoglou" Award for exceptional student progress, Institute of Biology, NRCPS "Demokritos"

July 2004: Assistance grant from the Onassis Foundation for attendance of the Onassis Foundation Science Lecture Series 2004 on "Genomics, Bioinformatics and Beyond" FORTH, Heraklion, Greece.

September 2005: Assistance Grant for contributing in the 5th European Conference on Computational Biology

INVITED TALKS

June 2007: “Predicting nucleosome positions from the primary DNA sequence”, Chemistry Department, Boston University, MA, USA (host: Dr Zhiping Weng)

October 2007: “Nucleosome Positioning controls gene expression in eukaryotes”, Laboratoire de Biométrie et Biologie Évolutive, Lyon, France (host: Dr. Jean Lobry)

October 2009: “Spatial and structural properties of nucleosome positions in the genome of *S. cerevisiae*”. 60th Meeting of the Hellenic Society of Biochemistry and Molecular Biology, Athens, Greece

May 2010: “Exon definition through chromatin. A structural code for gene regulation in higher eukaryotes”. BRFAA, Athens, Greece (host: Dr. Dimitris Thanos)

May 2012: “Chromatin-mediated co-transcriptional splicing in the human genome”, TheRALead Meeting, Athens, Greece (host: Dr. George Kollias)

July 2014: “Topological aspects of genome architecture in S. cerevisiae”, IMBB, FORTH Seminar Series (host: Dr. Babis Spilianakis)

PUBLICATIONS

PUBLICATION STATISTICS

Peer-reviewed articles: 23
As first author: 9
As corresponding author: 7
Citations: 541
h-index: 9

Complete Full Papers available here: https://tinyurl.com/m3ydpvg

FULL LIST OF PUBLICATIONS

A1. **Nikolaou C** and Almirantis Y (2002) A study of the middle-scale nucleotide clustering in DNA sequences of various origin and functionality, by means of a method based on a Modified Standard Deviation. Journal of Theoretical Biology, 217, 479-492
http://dx.doi.org/10.1006/jtbi.2002.3045

A2. **Nikolaou C** and Almirantis Y (2003) Mutually symmetric and complementary triplets: Differences in their use distinguish systematically between coding and non-coding genomic sequences. Journal of Theoretical Biology, 223, 477-487
http://dx.doi.org/10.1016/S0022-5193(03)00123-1

A3. **Nikolaou C** and Almirantis Y (2004) Measuring the Coding Potential of Genomic Sequences through a combination of Triplet Occurrence Patterns and RNY Preference. Journal of Molecular Evolution, 59, 309-316
http://dx.doi.org/10.1007/s00239-004-2626-7

A4. Almirantis Y and **Nikolaou C** (2005) Multi-criterial Coding Sequence Prediction. Combination of GeneMark with two novel, coding character-specific quantities. Computers in Biology and Medicine, 35, 627-643
http://dx.doi.org/10.1016/j.compbiomed.2004.04.002

A5. **Nikolaou C** and Almirantis Y (2005) 'Word' preference in the genomic text and genome evolution. Different modes of n-tuplet usage in coding and noncoding sequences. Journal of Molecular Evolution, 61, 23-35
http://dx.doi.org/10.1007/s00239-004-0209-2

A6. **Nikolaou C*** and Almirantis Y (2005) A Study on the correlation of nucleotide skews and the positioning of the Origin of Replication. Different modes of replication in bacterial species. Nucleic Acids Research, 33, 6816-6822
https://doi.org/10.1093/nar/gki988

A7. **Nikolaou C*** and Almirantis Y (2006) Deviations from Chargaff's second parity rule in organellar DNA Insights into the evolution of organellar genomes. Gene , 381:34-41
http://dx.doi.org/10.1016/j.gene.2006.06.010

A8. Tilgner H#, **Nikolaou C#**, Althammer S, Sammeth M, Beato M, Valcárcel J and Guigo R. (2009) Nucleosome positioning as a determinant of exon recognition. Nature Structural & Molecular Biology, 16(9):996-1001.
http://dx.doi.org/10.1038/nsmb.1658

A9. **Nikolaou C***, Althammer S, Beato M and Guigo R. (2010) Structural constraints revealed in consistent nucleosome positions in the genome of S. cerevisiae. Epigenetics and Chromatin 3 (1) 20
http://dx.doi.org/10.1186/1756-8935-3-20

A10. Haupl T, Sorensen T, Smiljanovic B, Bonin M, Grutzkau A, **Nikolaou C**, Pandis I, Kollias G and Rowe A (2013) Comparative Transcriptome Analysis of Human and Mouse Synovial Fibroblast Responses to TNF. Annals of Rheumatic Diseases 72: A50
http://dx.doi.org/10.1136/annrheumdis-2013-203221.6

A11. **Nikolaou C**, Bermudez I, Manichanh C, García-Martinez J, Guigo R, Perez-Ortin JE and Roca J (2013) Topoisomerase II regulates yeast genes with singular chromatin architectures. Nucleic Acids Research 41 (20): 9243-9256
http://dx.doi.org/10.1093/nar/gkt707

A12. Polychronopoulos D, Krithara A, **Nikolaou C**, Paliouras G, Almirantis Y and Giannakopoulos G (2014) Analysis and Classification of Constrained DNA Elements with N-gram Graphs and Genomic Signatures. AlCoB 2014: Algorithms for Computational Biology (220-234). Lecture Notes in Bioinformatics (LNBI)
http://dx.doi.org/10.1007/978-3-319-07953-0_18

A13. Roulis M, **Nikolaou C**, Kotsaki E, Kaffe E, Karagianni N, Koliaraki V, Salpea K, Ragoussis J, Aidinis V, Martini E, Becker C, Herschman HR, Vetrano S, Danese S and Kollias G (2014) Intestinal myofibroblast-specific Tpl2-Cox-2-PGE2 pathway links innate sensing to epithelial homeostasis. Proceedings of the National Academy of Sciences, U.S.A. 111 (43): E4658-E4667
http://dx.doi.org/10.1073/pnas.1415762111

A14. Andreadis C, **Nikolaou C**, Fragiadakis GS, Tsiliki G and

Alexandraki D (2014) Rad9 interacts with Aft1 to facilitate genome surveillance in fragile genomic sites under non-DNA damage-inducing conditions in S. cerevisiae. Nucleic Acids Research42 (20): 12650-12667
https://doi.org/10.1093/nar/gku915

A15. **Nikolaou C***. (2014) Menzerath–Altmann law in mammalian exons reflects the dynamics of gene structure evolution. Computational Biology and Chemistry, 53: 134-143
http://dx.doi.org/10.1016/j.compbiolchem.2014.08.018

A16. Tsiagkas K, **Nikolaou C** and Almirantis Y. (2014) Orphan and gene related CpG Islands follow power-law-like distributions in several genomes: Evidence of function-related and taxonomy-related modes of distribution. Computational Biology and Chemistry, 53: 84-96
http://dx.doi.org/10.1016/j.compbiolchem.2014.08.013

A17. Hadjimichael C, **Nikolaou C**, Papamatheakis J and Kretsovali A. (2016) MicroRNAs for Fine-Tuning of Mouse Embryonic Stem Cell Fate Decision through Regulation of TGF-β Signaling. Stem Cell Reports 6 (3): 292-301
http://dx.doi.org/10.1016/j.stemcr.2016.01.004

A18. Chouvardas P, Kollias G and **Nikolaou C***. (2016) Inferring active regulatory networks from gene expression data using a combination of prior knowledge and enrichment analysis. BMC Bioinformatics 17(5):181
http://dx.doi.org/10.1186/s12859-016-1040-7

A19. Apostolou-Karampelis K, **Nikolaou C** and Almirantis Y. (2016) A novel skew analysis reveals substitution asymmetries linked to genetic code GC-biases and PolIII a-subunit isoforms. DNA Research 23 (4): 353-363
https://doi.org/10.1093/dnares/dsw021

A20. Michopoulos F, Karagianni N, Whalley NM, Firth MA, **Nikolaou C**, Wilson ID, Critchlow SE, Kollias G, Theodoridis GA (2016) Targeted Metabolic Profiling of the Tg197 Mouse Model Reveals Itaconic Acid as a Marker of Rheumatoid Arthritis. Journal of Proteome Research 15 (12): 4579-4590
http://pubs.acs.org/doi/abs/10.1021/acs.jproteome.6b00654

A21. Hadjimichael C, Chanoumidou K, **Nikolaou C**, Klonizakis A, Theodosi GI, Makatounakis T, Papamatheakis J and Kretsovali A. (2017) Promyelocytic Leukemia (PML) protein is an essential regulator of stem cell pluripotency and somatic cell reprogramming. Stem Cell Reports (in press)
https://tinyurl.com/mymzmm4

A22. Tsochatzidou M, Malliarou M, Papanikolaou N, Roca J and **Nikolaou C***. (2017). Genome urbanization: Clusters of topologically co-regulated genes delineate functional

compartments in the genome of *S. cerevisiae*. Nucleic Acids Research (in press)
https://doi.org/10.1101/064667

A23. Ntougkos E, Chouvardas P, Roumelioti F, Ospelt C, Frank-Bertoncelj M, Fihler A, Buckley CD, Gay S, **Nikolaou C**[#] and Kollias G[#] (2017) Genomic responses of mouse synovial fibroblasts during TNF-driven arthritogenesis greatly mimic those of human rheumatoid arthritis. Arthritis and Rheumatology (in press)
https://tinyurl.com/kwqbn9m