Virgile **Andreani**

Postdoc in computational biology

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Research ____

Postdoc in computational biology

Efficient simulations of nested chemical reaction networks

- Image analysis for exotic microfluidic designs
- Statistical analysis of cell lineages in link to population parameters (project)
- Parallel and efficient implementations for nested chemical reaction networks (project)

Postdoc in computational synthetic biology

Elucidating the interactions of stress pathways in cell survival with Bayesian inference 2021 - 2024

- Investigation of the heterogeneity of cell response to antibiotic treatments
- Resolution of an inverse problem in combinatorial protein design
- Solving of an NP-hard promoter design problem
- Investigation of the interactions of stress pathways in cell survival
- Modernization and overhaul of the DeLTA segmentation and tracking software

PhD in computational biology

Gregory Batt's lab, InBio, Inria & Institut Pasteur

Mathematical modeling of the response of bacterial populations to antibiotic treatments 2016 - 2020

- Development of a growth-fragmentation structured population model to describe the response of bacteria to antibiotics
- Reduction of this PDE model to a more manageable ODE model
- Parameter inference for the ODE model
- Bayesian inference of cell numbers from CFUs
- Reverse-engineering of a plate-reader communication protocol to write a Python USB driver

Education _____

PhD in computational biology	Palaiseau, France
École polytechnique	2016 - 2020
Master's degree in theoretical computer science (MPRI)	Paris, France
École normale supérieure	2014 - 2015
Master's degree in quantum physics (ENS-ICFP)	Paris, France
École normale supérieure	2012 - 2014
Bachelor's degree in physics	Paris, France
École normale supérieure	2011 - 2012
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Preprints _____

A quantitative approach to easily characterize and predict cell death and escape to β-lactam treatments https://doi.org/10.1101/2021.07.16.452741 V. ANDREANI*, V. GROSS*, L. YOU, P. GLASER, I. EL MEOUCHE, G. BATT under review in Nature Communications Evaluating the predictive power of combined gene expression dynamics from single cells on antibiotic survival https://doi.org/10.1101/2024.11.23.624989 R. N. ALNAHHAS*, V. ANDREANI*, M. J. DUNLOP under review in mSystems DeLTA 3.0 V. ANDREANI, M. J. DUNLOP V. ANDREANI, M. J. DUNLOP to be submitted

Generating information-dense promoter sequences with optimal string packing

V. ANDREANI^{*}, E. J. SOUTH^{*}, M. J. DUNLOP

https://doi.org/10.1371/journal.pcbi.1012276 PLOS Computational Biology 2024

Comprehensive Screening of a Light-Inducible Split Cre Recombinase with Domain InsertionProfilinghttps://doi.org/10.1021/acssynbio.3c00328

with Jakob Ruess, Lifeware, Inria Saclay 2024 -

Mary Dunlop's lab, BME, Boston University

N. Tague, V. Andreani, Y. Fan, W. Timp, M. J. Dunlop	ACS Synthetic Biology 2023	
	https://doi.org/10.7717/	
PyMC: a modern, and comprehensive probabilistic fram	mework in Python peerj-cs.1516	
O. Abril-Pla, V. Andreani, C. Carroll, L. Dong, C. J. Fonnesbeck, I	M. Kochurov, R. Kumar, J. Lao, C. C. Luhmann, C	
A. Martin, M. Osthege, R. Vieira, T. Wiecki, R. Zinkov	PeerJ Computer Science 2023	
Dynamic gene expression and growth underlie cell-te	o-cell heterogeneity in Escherichia col	
stress response	https://doi.org/10.1073/pnas.2115032119	
N. M. V. Sampaio, C. M. Blassick, V. Andreani, JB. Lugagne, M. J. D	OUNLOP PNAS 2022	
Mapping single-cell responses to population-level dynamics during antibiotic treatment		
	https://doi.org/10.15252/msb.202211475	
K. Kim, T. Wang, H. R. Ma, E. Şimşek, B. Li, V. Andreani , L. You	Molecular Systems Biology 2023	
Optimal control of an artificial microbial differentiation system for protein bioproduction		
	https://doi.org/10.23919/ecc.2019.8795858	
E. WEILL, V. ANDREANI, C. ADITYA, P. MARTINON, J. RUESS, G. BATT, F.	BONNANS ECC 2019	
Applying ecological resistance and resilience to dissect	t bacterial antibiotic responses	
	https://doi.org/10.1126/sciadv.aau18/3	
H. R. MEREDITH, V. ANDREANI, H. R. MA, A. J. LOPATKIN, A. J. LEE, D. J.	. ANDERSON, G. BATT, L. YOU Science Advances 2018	
Software		
PyMC - Bayesian Modeling and Probabilistic Programm	ning in Python O pymc-devs/pymo	
Core Developer	2022 - Presen	
DeLTA - Deep Learning for Time-Lapse Analysis	₩ delta-microscopy/delta	
Maintainer	2021 - Presen	
rebop - A fast simulator for chemical reaction network	s 🖓 Armavica/rebop	
Author	2018 - Present	
Distinctions		
France Cyber Security Challenge	ANSS	
Ranked 31 st /1524	2022	
Bioinformatics Contest	Bioinformatics Institute and ITMO University	
Ranked 12 th /5700	2021	
Bioinformatics Contest	Bioinformatics Institute and ITMO University	
Ranked 9 th /3329	2019	
HashCode optimization contest	Google	
REACHED TOP 3 OF THE EXTENDED ROUNDS	2017-2019	
Southwestern Europe Regional Contest	ACM ICPC	
Silver medal	2011	
Skills		

Author of exemplars (corrigés) for the Grandes Écoles entrance exams	Éditions H&K
Physics, Computer Science, Modelling	2014 - Present
Physics examinations in <i>classes préparatoires</i> Physics, PCSI & PC*	Lycée Fénelon, Paris 2013 - 2015
Science teaching in an elementary school	Écoles des cheminets, Paris
With the association La main à la pâte	2011 - 2012
Student supervision	

Vishal Shah	BME, Boston University
PhD rotation	Winter 2022
James M. Roberts	BME, Boston University
PhD rotation	Fall 2022
Dhimiter Cobani	BME, Boston University
PhD rotation	Summer 2022
Albin Salazar	Institut Pasteur, Paris
M2 research internship	Spring 2019
Shuang Li	Institut Pasteur, Paris
M1 research internship	Spring 2018
Research internships	
Research internship su	upervised by Gregory Batt, Lifeware, Inria Saclay - IdF
A mechanistic model of metabolism and growth at the since	GLE-CELL LEVEL October - August 2016
Research internship	supervised by Marc Pouzet, Parkas, ENS
Distributed simulation of hybrid systems	March - August 2015
Research internship	supervised by Werner Krauth, LPS, ENS
Event-chain algorithm for the hard spheres problem in th	E ISOTHERMAL-ISOBARIC ENSEMBLE February - March 2014
Research internship supervised by Ra	ainer Blatt, Inst. for exp. physics, Innsbruck University
Frequency stabilization of a diode laser for quantum info	RMATION PROCESSING February - July 2013
Research internship supervised by Anne Anth	ore, Lab. de photonique et nanostructures, Marcoussis
Building of a low-noise cryogenic amplifier, in the scope of	F A QUANTUM ELECTRONICS EXPERIMENT June - July 2012
Research internship	supervised by Amel Korichi, CNSM, IN2P3, Orsay
Development of a gamma-ray tracking algorithm for the A	AGATA DETECTOR July 2009