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CHRISTOPHER EDWARD ING

Education

Ph.D., Biochemistry. University of Toronto. 2012 – 2017.

Thesis: Molecular basis of permeation and selectivity in voltage-gated sodium channels using microsecond-scale molecular dynamics (with Dr. Régis Pomès)

M.Sc., Physics. University of Waterloo. 2009 – 2011.

Thesis: Path integral Langevin dynamics of complex molecular systems: from low-temperature quantum clusters to biomolecules (with Dr. Pierre-Nicholas Roy and Dr. Wing-Ki Liu)

Hon.B.Sc., Computational Physics. Co-Op. University of Waterloo. 2004 – 2009.

Thesis: Mathematical Analysis of the Adhesion of Cylindrical Colloids in the Helfrich Model.

Academic

Selected Journal Articles (h-index 16, *equal contributors)

1. **C. Ing***, P.S.W. Yeung*, M. Yamashita, R.Pomès, M. Prakriya, "A sulfur-aromatic gate latch is essential for opening of the Orai1 channel pore". eLife 9, e60751 (2020).
2. S. Heybrock, K Kanerva, Y. Ming, **C. Ing**, …, S. Grinstein, E. Ikonen, P. Saftig, D. Neculai, "Lysosomal integral membrane protein-2 (LIMP-2/SCARB2) is involved in lysosomal cholesterol export", Nature Communications, 10, 3521 (2019)
3. D. Jiang, T.M.G. El-Din, **C. Ing**, P. Lu, R. Pomès, N. Zheng, W.A. Catterall, "Structural basis for gating pore current in periodic paralysis", Nature 557, 7706 (2018)
4. M.J. Lenaeus, T.M.G. El-Din, C. Ing, K. Ramanadane, R. Pomès, N. Zheng, W.A Catterall. "Structures of closed and open states of a voltage-gated sodium channel". Proc. Natl. Acad. Sci., 114, 15 (2017)
5. T.H. Kim, P. Mehrabi, Z. Ren, A. Sljoka, C. Ing, …, R. Pomès, R.S.. Prosser, E. Pai. "The role of dimer asymmetry and protomer dynamics in enzyme catalysis", Science. 355, 6322 (2017).
6. M. Yamashita, P.S.-W. Yeung, C. Ing, B.A. McNally, R. Pomès, M. Prakriya. "STIM1 activates CRAC channels through rotation of the pore helix to open a hydrophobic gate", Nature Communications. 8, 14512 (2017).
7. C. Ing, R. Pomès. "Computational Studies of Ion Permeation and Selectivity in Voltage-Gated Sodium Channels". Current Topics in Membranes. 78, (2016).
8. C. Calmettes, C. Ing, C. M. Buckwalter, M. El Bakkouri, C. Chieh-Lin Lai, A. Pogoutse, S. D. Gray-Owen, R. Pomès, T. F. Moraes. "The molecular mechanism of Zinc acquisition by the neisserial outer-membrane transporter ZnuD", Nature Communications. 6, 7966, (2015).
9. J. Little, G. Li, C. Ing, B. R. DiFrancesco, N. C. Bamford, H. Robinson, M. Nitz, R. Pomès, P. L. Howell, "Modification and periplasmic translocation of the biofilm exopolysaccharide poly-β-1,6-N-acetyl-D-glucosamine" Proc. Natl. Acad. Sci., 111, 30 (2014).
10. N. Chakrabarti, C. Ing, J. Payandeh, N. Zheng, W.A. Catterall, R. Pomès, "Catalysis of Na^+ Permeation in Bacterial Sodium Channel Na_VAb" Proc. Natl. Acad. Sci., 110, 28 (2013).

Academic Supervision

2016 – Special Topics in Computational Medicine, Machine Learning (two graduate students)
Designed a novel approach for the prediction of protein thermostability upon mutation

2015 - Sanofi Biogenius Regional Competitors (two highschool students)
Directed research on the molecular simulation of intrinsically disordered peptides

2015 – Biochemistry Undergraduate Research Project (undergraduate student)

Supervised research on the voltage-sensing domain of voltage-gated sodium channel using MDAnalysis

Work Experience

ProteinQure Inc., Toronto, Canada

2018-Present – Co-Founder and Chief Scientific Officer

Recruitment and management of a team of six PhD-level scientists to support the development and application of novel computational and experimental methods for therapeutic protein design. Acted as team leader on multiple successful hit identification and lead optimization campaigns for internal and external discovery programs through interdisciplinary collaboration with software, machine learning, and business teams at ProteinQure.

Department of Physics and Astronomy, University of Waterloo, Canada

2011 – Teaching Assistant and Laboratory Instructor.

Lead weekly tutorials for first year Calculus students (>50 students). Acted as a lab demonstrator for general physics and teaching assistant for first-year scientific computing.

Synchrotron Soleil, Saint-Aubin, France

2010 – Scientific Programmer. Supervisor: Dr. Konrad Hinsen.

Implemented normal mode path integral molecular dynamics in MMTK, an open-source molecular dynamics package. Benchmark study submitted as a peer-reviewed manuscript. Utilized Cython.

KDE / Google, Online

2009 – Google Summer of Code Developer. Supervisor: Vladimir Kuznetsov.

Implemented a real-time smoothed particle hydrodynamics algorithm in Step, an open-source physics sandbox in the KDE education packages. Written in C++/Qt.

Volunteering

2021 – Invited lecturer at CREATE Apprentice on “De Novo Design of a Protein Design Startup”

2021 – Invited panelist at Virtual Symposium on Theoretical and Comp Chemistry Industry Panel

2020 – Invited expert panelist for Aggregate Intellect’s “AlphaFold2” online seminar (link).

2014-2018 – Action Potential Lab, lecturer, course developer, demonstrator for science-art education

2011/2013/2014 – TEDxWaterloo, TEDxToronto, social media representative and floor volunteer

2012/2013 – PyCon Canada, speaker liaison and session organizer

2009-2016 – Fresh Photons, image blogger (185,000+ followers, http://www.freshphotons.com)