

## Michael C. Puljung, Ph.D.

DEPARTMENT OF CHEMISTRY AND THE NEUROSCIENCE PROGRAM  
CLEMENT CHEMISTRY BUILDING, TRINITY COLLEGE  
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[MICHAEL.PULJUNG@TRINCOLL.EDU](mailto:MICHAEL.PULJUNG@TRINCOLL.EDU)

### EDUCATION

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- 2005 Ph.D. Dept. of Neurobiology, Pharmacology & Physiology, University of Chicago, Chicago, IL  
1998 B.S. Biochemistry, Benedictine University, Lisle, IL

### PROFESSIONAL POSITIONS

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- 2020-present *Assistant Professor*, Department of Chemistry and Neuroscience Program  
Trinity College, Hartford, CT
- 2013-2020 *Departmental Lecturer*, Department of Physiology, Anatomy & Genetics  
University of Oxford, Oxford, UK  
Mentor: Frances Ashcroft, Ph.D., DBE, FRS, FMedSci  
Focus: *Metabolic regulation and dynamics of K<sub>ATP</sub> ion channels*
- 2005-2013 *Research Scientist*, Department of Physiology & Biophysics  
University of Washington, Seattle, WA  
Mentor: William Zagotta, Ph.D.  
Focus: *Novel techniques for structural analysis of HCN channel gating*
- 1998-2005 *Doctoral Student*, Department of Neurobiology, Pharmacology & Physiology  
The University of Chicago, Chicago, IL  
Mentor: Dorothy Hanck, Ph.D.  
Thesis: *An Ionic Block Model of Voltage Gating in Gap Junction Hemichannels*
- 1996-1998 *Research Assistant*, Department of Chemistry  
Benedictine University, Lisle, IL  
Mentor: David Rausch, Ph.D.  
Thesis: *Synthesis of precursor molecules for polymerization catalysts*

### CURRENT RESEARCH FUNDING

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- 2022-present Beckman Scholarship Mentor; \$5,000 (\$21,000 in student support/stipend)  
2020-present Trinity College Startup Funds; \$130,000

### PREVIOUS GRANTS AND RESEARCH SUPPORT

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- 2018-2021 BBSRC (UK) Responsive mode research grant BB/R002517/1—researcher co-investigator; £554,730 (\$677,880 USD)
- 2017 John Fell Fund—Oxford University Press; £7,500 (\$9,165.00 USD)
- 2017 Horne Family Foundation Donation; \$5,000 CAD (\$3,750 USD)
- 2008-2010 National Research Service Award; NEI (F32EY018981); \$104,632
- 2001-2003 National Research Service Award; NINDS (F31NS042972); \$89,346
- 1998-2001 Training grant; NIDA (DA07255)

### HONORS AND AWARDS

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- 2018 *JGP* travel award—Ion Channels Gordon Research Conference
- 2018 Oxford Interdisciplinary Bioscience Impact Award—Science Communication
- 2018 Citation for Distinguished Service—most manuscripts reviewed by a postdoc in 2017, *The Journal of General Physiology*
- 2005 Harry Ginsberg Memorial Prize for Outstanding Performance in the General Field of Physiology (The University of Chicago)
- 2004 Biophysical Society Student Research Achievement Award
- 2003 International Gap Junction Conference Student Travel Award
- 1997 Gregory Snoke Scholarship (Benedictine University)

1994-1998 University Scholar (Benedictine University)

## **TEACHING EXPERIENCE**

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2020-present Supervisor for undergraduate researchers, Trinity College  
2020-present Assistant Professor of Neuroscience and Chemistry, Trinity College

- Courses: Introductory Chemistry, Principles of Neuroscience, Introduction to Neuroscience Methodology, Neurochemistry, Neurochemistry Lab, The Body Electric

2018-2020 *Final Honour School Tutorials*—The Queen's College, University of Oxford  
2018-2020 *Organizer*—Ion channels and Physiology Journal Club, University of Oxford  
2016-2020 *Supervisor for graduate and undergraduate researchers*, University of Oxford  
2011-2012 *Supervisor for undergraduate research*, University of Washington  
2009 *Guest Lectures*, University of Washington, *NBio402 Neuropathophysiology*  
2006-2013 *Guest Lectures*, University of Washington, *PBio519 Membrane and Muscle Biophysics Seminars*  
2000-2003 *Teaching assistant*, The University of Chicago, *Cellular Neurobiology*.  
Laboratory instructor, review sessions, grading.  
2001 *Teaching assistant*, The University of Chicago, *Neuropsychopharmacology*.  
Lectures, review sessions, grading.  
1996-1997 *Teaching assistant*, Benedictine University, *Organic Chemistry Laboratory*,  
*Biochemistry Laboratory*, *Qualitative Organic Analysis*. Lab instructor, grading.

## **PUBLIC LECTURES**

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2022 *Invited Lecture*: Neuroscience Program, DePaul University  
2020 *Invited Lecture*: Department of Physiology and Membrane Biology, University of California, Davis  
2020 *Invited Lecture*: Ligand Recognition and Molecular Gating Gordon Research Conference (canceled due to COVID-19 outbreak)  
2020 *Platform talk*: Biophysical Society Meeting  
2019 *Invited Lecture*: Trinity College, Connecticut. Departments of Neuroscience and Chemistry  
2019 *Invited Lecture*: Integrative Physiology, Cardiovascular & Metabolism Theme Day, University of Oxford  
2018 *Invited Lecture* 29<sup>th</sup> Annual Association Canaux Ioniques meeting  
2018 *Invited Lecture*: 2018 Ion Channels Gordon Research Seminar  
2017 *Invited Lecture*: 15<sup>th</sup> Annual Oxion Symposium, University of Oxford  
2016 *Invited Lecture*: Department of Physiology, University of Maryland  
2015 *Invited Lecture*: Department of Cellular and Molecular Physiology, Loyola University Chicago  
2012 *Invited Lecture*: H.D. Patton Symposium, University of Washington  
2012 *Platform talk*: Biophysical Society Meeting  
2003 *Invited Lecture*: American Society for Cell Biology, Gap Junction Subgroup  
2002 *Invited Lecture*: University of Chicago Neurobiology, Pharmacology & Physiology Retreat

## **PROFESSIONAL TRAININGS AND CERTIFICATIONS**

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2022 Center for Teaching & Learning Fellow—Trinity College  
2021 Equity Certificate Program—Trinity College  
2020 Writing Fellows Program—Trinity College

## SERVICE AT TRINITY COLLEGE

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2022	Member Physical Chemistry Search Committee
2022	Events for admitted students: mock lecture, lunch with admitted students/families, hosted admitted students in class
2022	Second reader: senior thesis for Caitlyn Nguyen
2021-present	Faculty advisor: Nu Rho Psi
2021-22	Faculty reader: Writing Assessment
2020-22	Member Neuroscience Coordinating Committee

## PROFESSIONAL SERVICE/ASSOCIATIONS

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Review Editor	<i>Frontiers in Pharmacology</i> (2022)
Member	Society of General Physiologists (2022-present)wa
Editor	Guest editor for a special topic in <i>Frontiers in Pharmacology</i> (Ion Channels and Transporters in Diabetes and Metabolic Diseases)
Referee	Outside BPhil examiner at University of Pittsburgh
Referee	Agence Nationale de la Recherche (France)
Referee	<i>Biochemistry, British Journal of Pharmacology, eLife, Frontiers in Pharmacology, Frontiers in Oncology, General Physiology and Biophysics, The Journal of General Physiology, Nature Communications, Proceedings of the National Academy of Sciences (USA), Scientific Reports</i>
Service	<i>Journal of General Physiology</i> Diversity and Inclusion Working Group
Service	Postdoctoral representative to <i>The Journal of General Physiology</i> Membrane Protein Structure and Dynamics Focus Group
Outreach	Scientific advice/consultation with Motionhouse Dance Theatre Company on their show "Charge" and associated educational materials <a href="https://charge.motionhouse.co.uk/science/extra-content/">https://charge.motionhouse.co.uk/science/extra-content/</a>
Outreach	<i>Journal of General Physiology</i> Twitter takeover, Biophysical Society 2019
Member	Biophysical Society (2004-present)
Member	Association Canaux Ioniques (2018-2019)

## PUBLICATIONS (ORCID <https://orcid.org/0000-0002-9335-0936>)

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**Puljung MC** (2022) K<sub>ATP</sub> channels and the regulation of insulin secretion. *Handbook of Ion Channels*, 2<sup>nd</sup> Edition. In press.

**Puljung MC**, Haythorne E, Rohm M, Vedovato N (2022) Editorial: Ion channels and transporters in diabetes and metabolic diseases. *Front Pharmacol.* 13:975812. doi: 10.3389/fphar.2022.975812.

<https://www.frontiersin.org/articles/10.3389/fphar.2022.975812/full>

**Puljung MC.** (2021) ANAP: A versatile, fluorescent probe of ion channel gating and regulation. *Methods Enzymol.* 654:49-84. doi: 10.1016/bs.mie.2021.01.048.

<https://www.sciencedirect.com/science/article/abs/pii/S0076687921000707?via%3Dihub>

Usher SG, Ashcroft FM and **Puljung MC.** (2021) Measuring nucleotide binding to intact, functional membrane proteins in real time. *J. Vis. Exp.* doi: 10.3791/61401 (2021)

<https://www.jove.com/t/61401/measuring-nucleotide-binding-to-intact-functional-membrane-proteins>

Usher SG, Ashcroft FM, and **Puljung MC.** (2020) Nucleotide inhibition of the pancreatic ATP-sensitive K<sup>+</sup> channel explored with patch-clamp fluorometry. *eLife.* 9:e52775. doi: 10.7554/eLife.52775. <https://elifesciences.org/articles/52775>

**Puljung M**, Vedovato N, Usher S, and Ashcroft F. (2019) Activation mechanism of ATP-sensitive K<sup>+</sup> channels explored with real-time nucleotide binding. *eLife.* 8. pii: e41103. doi:

10.7554/eLife.41103. <https://elifesciences.org/articles/41103>

**Puljung MC.** (2018) Cryo-electron microscopy structures and progress toward a dynamic understanding of K<sub>ATP</sub> channels. *J Gen Physiol.* 150:653-669. *review*  
<http://jgp.rupress.org/content/150/5/653.long>

Ashcroft FM, **Puljung MC**, and Vedovato N. (2017) Neonatal Diabetes and the K<sub>ATP</sub> Channel: From Mutation to Therapy. *Trends Endocrinol Metab.* 28(5):377-387. *review*  
<https://www.sciencedirect.com/science/article/pii/S104327601730019X?via%3Dihub>

Proks P, **Puljung MC**, Vedovato N, Sachse G, Mulvaney R, Ashcroft FM. (2016) Running out of time: the decline of channel activity and nucleotide activation in adenosine triphosphate-sensitive K-channels. *Philos Trans R Soc London B Biol Sci.* 371(1700). pii: 20150426. *review*  
<http://rstb.royalsocietypublishing.org/content/371/1700/20150426.long>

Vedovato, N, Ashcroft FM, and **Puljung MC.** (2015) The nucleotide-binding sites of SUR1: a mechanistic model. *Biophys J.* 109:2452-60. *review*  
<https://www.sciencedirect.com/science/article/pii/S0006349515011005?via%3Dihub>

**Puljung MC.** (2015) New structural insights into the gating movements of CFTR. *J Gen Physiol.* 145:365-9. *commentary* <http://jgp.rupress.org/content/145/5/365.long>

**Puljung MC.** (2014) Dynamic measurements for funny channels. *Proc Natl Acad Sci USA.* 111:14320-1. *commentary* <http://www.pnas.org/content/111/40/14320.long>

**Puljung MC\***, DeBerg HA\*, Zagotta WN, and Stoll S. (2014) Double electron-electron resonance reveals cAMP-induced conformational change in HCN channels. *Proc Natl Acad Sci USA.* 111:9816-21. \**These authors contributed equally to this work.*  
<http://www.pnas.org/content/111/27/9816.long>

**Puljung MC** and Zagotta WN. (2013) A secondary structural transition in the C helix promotes gating of cyclic nucleotide-regulated ion channels. *J Biol Chem.* 288:1294-56.  
<http://www.jbc.org/content/288/18/12944.long>

**Puljung MC** and Zagotta WN. (2012) Fluorescent labeling of specific cysteine residues using CyMPL. *Curr Protoc Protein Sci.* Nov; Chapter 14:Unit14.14. doi: 10.1002/0471140864.ps1414s70.  
<https://currentprotocols.onlinelibrary.wiley.com/doi/abs/10.1002/0471140864.ps1414s70>

**Puljung MC** and Zagotta WN. (2011) Labeling of specific cysteines in proteins using reversible metal protection. *Biophys J.* 100:2513-2521.  
<https://www.sciencedirect.com/science/article/pii/S0006349511004668?via%3Dihub>

Taraska JW\*, **Puljung MC\***, and Zagotta WN. (2009) Short-distance probes for protein backbone structure based on energy transfer between bimane and transition metal ions. *Proc Natl Acad Sci USA.* 106:16227-32. \**These authors contributed equally to this work.*  
<http://www.pnas.org/content/106/38/16227.long>

Taraska JW, **Puljung MC**, Olivier NB, Flynn GE, and Zagotta WN. (2009) Mapping the structure and conformational movements of proteins with transition metal ion FRET. *Nat Methods.* 6:532-7. <https://www.nature.com/articles/nmeth.1341>

**Puljung MC**, Berthoud VM, Beyer EC, and Hanck DA. (2004) Polyvalent cations constitute the voltage gating particle in human connexin37 hemichannels. *J Gen Physiol.* 124:587-603. <http://jgp.rupress.org/content/124/5/587.long>

McNulty M, **Puljung M**, Jefford G, and Dubreuil RR. (2001) Evidence that a copper-metallothionein complex is responsible for fluorescence in acid-secreting cells of the *Drosophila* stomach. *Cell Tissue Res.* 304:383-389. <https://link.springer.com/article/10.1007/s004410100371>

### RECENT ABSTRACTS

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Alcaro C\*, Rubio P\*, and **Puljung MC**. Fluorescent, non-hydrolyzable nucleotide analogs to probe ATP-activated ion channels. Biophysical Society 67<sup>th</sup> Annual Meeting (2023)

Hawkins A\*, Brado O\*, and **Puljung MC**. Fluorescent probes for real-time binding of serotonin to its receptors. Biophysical Society 67<sup>th</sup> Annual Meeting (2023)

Hawkins A\* and **Puljung MC**. Using electrophysiology and fluorescence microscopy to study binding of serotonin to the 5-HT<sub>3</sub> receptor. Seventeenth Annual Summer Research Symposium—Trinity College Research (2022).

Brado O\* and **Puljung MC**. Studying the binding behavior and physiology of the 5-HT<sub>3</sub> receptor using fluorescence microscopy and electrophysiological measurements. Sixteenth Annual Summer Research Symposium—Trinity College Research (2021).

Katoch A\* and **Puljung MC**. Adding ANAP to P2X<sub>7</sub> receptors to explore ANAP, GFP and TNP-ATP fluorescence. Sixteenth Annual Summer Research Symposium—Trinity College Research (2021).

Rubio P\* and **Puljung MC**. Synthesis and purification of fluorescent, non-hydrolyzable ATP analogs. Sixteenth Annual Summer Research Symposium—Trinity College Research (2021).

Usher S, Ashcroft FM, and **Puljung MC**. Patch-clamp fluorometry defines a role for SUR1 in nucleotide inhibition of K<sub>ATP</sub> channels. Biophysical Society 63<sup>rd</sup> Annual Meeting (2020)

**Puljung MC**, Usher S, Vedovato N, Ashcroft FM. Nucleotide modulation of K<sub>ATP</sub> channels disentangled with FRET. Biophysical Society 63<sup>rd</sup> Annual Meeting (2019)

**Puljung MC**, Usher S, Vedovato N, Ashcroft FM. Using FRET to Disentangle Nucleotide Binding Effects on K<sub>ATP</sub>. Ion Channels Gordon Research Conference (2018)

Usher S, **Puljung MC**, Vedovato N, Ashcroft FM. Visualising adenine nucleotide regulation of the K<sub>ATP</sub> channel. Biophysical Society 62<sup>nd</sup> Annual Meeting (2018)

**Puljung MC**, Vedovato N, Ashcroft FM. A Novel, Spectroscopic Window into Nucleotide Activation of K<sub>ATP</sub> Channels. Biophysical Society 61<sup>st</sup> Annual Meeting (2017)

\*indicates Trinity College student