

# Nathaniel J. Himmel, PhD

Human Frontier Science Program Postdoctoral Fellow

*Curriculum Vitae*

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## EDUCATION

<b>PhD</b>	<b>Neuroscience</b> , Georgia State University, Atlanta, GA, USA	Jan 2022
<b>BS</b>	<b>Biology</b> , University of Florida, Gainesville, FL, USA	April 2013
<b>AA</b>	<b>Biological Sciences</b> , Santa Fe College, Gainesville, FL, USA	July 2011

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## RESEARCH POSITIONS

<b>Postdoctoral Research</b> , University of Lausanne, Lausanne, Switzerland PI: Richard Benton, PhD FRS Visiting Scholar with Nicolas Buchler, PhD (NC State; Nov 2021)	Feb 2022 –
<b>Graduate Research</b> , Georgia State University, Atlanta, GA, USA PI: Daniel Cox, PhD Rotations with Paul Katz, PhD and Gwen Frishkoff, PhD	Aug 2015 – Jan 2022
<b>Research Technician</b> , Emory University, Atlanta, GA, USA PI: Mitsi Blount, PhD	April 2013 – Aug 2015

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## PUBLICATIONS

\* authors contributed equally; † co-corresponding author; § undergraduate mentee

16. **Himmel NJ** and Benton R. Sweet sensors support stressed cell survival. Commentary in *PLoS Biology*. 2022.
15. **Himmel NJ**\*, Sakurai A\*, Donaldson KJ\*, and Cox DN. Methods for measuring cold-evoked neural activity and cold tolerance in *Drosophila* larvae following fictive cold acclimation. *STAR Protocols*. 2022.
14. Patel AA, Sakurai A, **Himmel NJ**, and Cox DN. Modality specific roles for metabotropic GABAergic signaling and calcium induced calcium release mechanisms in regulating cold nociception. *Frontiers in Molecular Neuroscience*. 2022.
13. **Himmel NJ**, Sakurai A, Letcher JM, Patel AA, Bhattacharjee S, Benson MN§, Gray TR§, Cymbalyuk GS, and Cox DN. Chloride-dependent mechanisms of multimodal sensory discrimination and neuropathic sensitization in *Drosophila*. Preprint in *bioRxiv*. 2021.
12. **Himmel NJ**, Letcher JM, Sakurai A, Benson MN§, Gray TR§, Donaldson KJ, and Cox DN. Identification of a neural basis for cold acclimation in *Drosophila* larvae. *iScience*. 2021.
11. **Himmel NJ**, Rogers RT, Redd SK, Wang Y§, and Blount MA. Purinergic signaling is enhanced in the absence of UT-A1 and UT-A3. *Physiological Reports*. 2021.

10. **Himmel NJ**<sup>\*</sup>, Letcher JM<sup>\*</sup>, and Cox DN. Dissecting the molecular and neural circuit bases of behavior as an introduction to discovery-driven research: a report on a Course-Based Undergraduate Research Experience. *Journal of Undergraduate Neuroscience Education*. 2020.
9. **Himmel NJ** and Cox DN. Transient Receptor Potential Channels: Current Perspectives on Evolution, Structure, Function, and Nomenclature. *Proceedings of the Royal Society B*. 2020.
8. **Himmel NJ**<sup>†</sup>, Gray TR<sup>§</sup>, and Cox DN<sup>†</sup>. Phylogenetics identifies two eumetazoan TRPM clades and an eighth TRP family, TRP Soromelastatin (TRPS). *Molecular Biology and Evolution*. 2020.
7. **Himmel NJ**<sup>†</sup>, Letcher JM, Sakurai A, Gray TR<sup>§</sup>, Benson MN<sup>§</sup>, and Cox DN<sup>†</sup>. *Drosophila* menthol sensitivity and the Precambrian origins of TRP-dependent chemosensation. *Philosophical Transactions of the Royal Society B*. 2019.
6. Lopez-Bellido R, **Himmel NJ**, Gutstein HB, Cox DN, and Galko MJ. An assay for chemical nociception in *Drosophila* larvae. *Philosophical Transactions of the Royal Society B*. 2019.
5. **Himmel NJ**, Rodriguez DA<sup>§</sup>, Wang Y<sup>§</sup>, Sun MA<sup>§</sup>, and Blount MA. Chronic lithium treatment induces novel patterns of pendrin localization and expression. *American Journal of Physiology – Renal Physiology*. 2018.
4. **Himmel NJ** and Cox DN. Sensing the Cold: TRP channels in thermal nociception. Commentary in *Channels*. 2017.
3. **Himmel NJ**<sup>\*</sup>, Patel AA<sup>\*</sup>, and Cox DN. Invertebrate Nociception. *The Oxford Research Encyclopedia of Neuroscience*. 2017.
2. Turner HN<sup>\*</sup>, Armengol K<sup>\*</sup>, Patel AA, **Himmel NJ**, Sullivan L, Iyer SC, Battacharya S, Iyer EPR, Landry C, Galko MJ<sup>†</sup>, and Cox DN<sup>†</sup>. The TRP channels Pkd2, NompC, and Trpm mediate unique aversive behaviors to noxious cold in *Drosophila*. *Current Biology*. 2016.
1. Sim JH, **Himmel NJ**, Redd SK, Pulous FE, Rogers RT, Black LN, Hong SM, von Bergen TN, and Blount MA. Absence of PKC- $\alpha$  attenuates lithium-induced nephrogenic diabetes insipidus. *PLoS One*. 2014.

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## FUNDING and AWARDS

### Grants & Funding:

<b>Human Frontier Science Program Long-Term Fellowship (LT-0003/2022-L)</b> <i>International Human Frontier Science Program Organization</i> “Evolutionary, expression, and functional characterization of ancient putative chemosensors”	2022–2025
<b>Ruth L. Kirschstein National Research Service Award (F31NS117087)</b> <i>National Institute of Neurological Disease and Stroke</i> “Functional roles of chloride homeostasis and chloride ion channels in thermosensory nociception”	2020–2022
<b>Kenneth W. and Georganne F. Honeycutt Fellowship</b> <i>Georgia State University, Neuroscience Institute</i>	2017–2020
<b>Brains &amp; Behavior Fellowship</b> <i>Georgia State University, Brains &amp; Behavior Program</i> Honorary Fellow, 2020-2021	2017–2020

### Other Awards:

<b>Writing Across the Curriculum Pedagogy Award</b> , <i>Georgia State University</i>	2021
<b>Neuroscience Institute Outstanding Doctoral Scholar</b> , <i>Georgia State University</i>	2020

<b>Neuroscience Institute Outstanding Graduate Student Mentor</b> , <i>Georgia State University</i>	2019
<b>Meritorious Research Award</b> , <i>American Physiological Society</i>	2016
<b>Meritorious Research Award</b> , <i>American Physiological Society</i>	2015

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## TEACHING EXPERIENCE

### Course design/prep:

#### **PERS2002 – Course-Based Undergraduate Research Experience**

Co-designers: Daniel N. Cox & Jamin M. Letcher

### Teaching assistantships:

#### **PERS2002 - Course-Based Undergraduate Research Experience**

2017

Instructor: Daniel N. Cox

#### **NEUR3010/4000 – Neuroscience Laboratory (x2)**

2016 & 2018

Instructor: Michael P. Black

### Other teaching:

#### **Writing Advisor - Writing Across the Curriculum Program**

2018–2021

GSU, Center for Excellence in Teaching and Learning

### Guest lectures:

GSU's Neuroscience School: *Presenting Data in Different Forms*.

2019

GSU's Neuroscience School: *Neurological Diseases*.

2016

Atlanta Brain Bee Prep Course: *Senses, Perception, and Movement*.

2015

Emory University SUPERR Program: *Techniques in Renal Physiology*.

2015

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## MENTORING, SERVICE, and OUTREACH

### Research trainees:

Maggie N. Benson (2018-2021); Thomas R. Gray (2017-2020); Grace L. Swaim (2014-2015); Matthew R. Borchart (2015); John H. Ward (2014); Michael A. Sun (2014-2015); Daniel A. Rodriguez (2014-2015); Yirong Wang (2014-2015); Nikki A. Mehran (2013-2015)

### Organized research mentorship:

GSU, Initiative for Maximizing Student Development (IMSD)

2017–2020

Emory, Summer Undergrad Program in Emory Renal Research (SUPERR)

2015

Emory/American Physiological Society, Frontiers in Physiology

2014

Emory, Summer Undergraduate Research Experience (SURE)

2013–2015

### Peer review:

Preprint Editorial Team Leader (Physio. & Neuro.), *Proceedings of the Royal Society B*

2019–Present

*Ad hoc* peer review: *The Biological Bulletin* and *Journal of Economic Entomology*

### Media coverage:

Weiner S. "Do insects enjoy sex?" *Gizmodo*. June 2017. Web: <https://gizmodo.com/do-insects-enjoy-sex->

### Professional Memberships:

American Association for the Advancement of Science; American Physiological Society; Genetics Society of America; Society for Neuroscience; Society for the Study of Evolution

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## PRESENTATIONS, POSTERS, and ABSTRACTS

§undergraduate co-author; presenter underlined

### Invited seminars & symposia:

5. Invited speaker, Georgia State University, Neuroscience Institute, Data Analysis Club. July 2022. *Virtual*.
4. Invited speaker, North Carolina State University, College of Veterinary Medicine, Fungal Systems Biology Laboratory. November 2021. *Raleigh, NC*.
3. Invited speaker, Monthly Maggot Meeting. July 2021. *Virtual*.
2. Invited participant, Theo Murphy International Scientific Meeting on the evolution of mechanisms and behaviour important for pain, hosted by The Royal Society. February 2019. *Chicheley, Buckinghamshire, UK*.
1. Invited panelist, NIDDK/KUH Researcher Panel, Summer Student Symposium. July 2015. *Atlanta, GA*.

### Platform talks:

2. Himmel NJ, Letcher JM, Sakurai A, Gray TR<sup>§</sup>, Benson MN<sup>§</sup>, Cox DN. Menthol elicits *Trpm*- and *TrpA1*-dependent rolling in *Drosophila* larvae, suggesting Precambrian origins for TRP-dependent menthol sensing. October 2019. *Platform talk at Neurobiology of Drosophila Meeting, Cold Spring Harbor, NY*.
1. Himmel NJ, Rodriguez DA<sup>§</sup>, Blount MA. Chronic lithium treatment induces  $\beta$ -intercalated cell expression in the renal inner medulla. March 2015. *Platform talk at Experimental Biology, Boston, MA*.

### Posters (first-authored) & published abstracts:

24. Himmel NJ and Benton R. Ancient putative chemosensors in the zoospore fungus *Spizellomyces punctatus*. June 2022. *Annual G enepode Retreat, Les Diablerets, Switzerland*.
23. Himmel NJ and Benton R. Ancient putative chemosensors in the zoospore fungus *Spizellomyces punctatus*. June 2022. *Annual CIG Symposium, Lausanne, Switzerland*.
22. Himmel NJ, Sakurai A, Letcher JM, Patel AA, Benson MN<sup>§</sup>, Bhattacharjee S, Gray TR<sup>§</sup>, Cymbalyuk GS, and Cox DN. Chloride-dependent mechanisms of multimodal sensory discrimination: roles for *subdued*, *koozie*, and excitatory chloride physiology in *Drosophila* cold nociception. October 2021. *Neurobiology of Drosophila Meeting, Cold Spring Harbor Lab, virtual*.
21. Himmel NJ, Letcher JM, Sakurai A, Benson MN<sup>§</sup>, Gray TR<sup>§</sup>, Donaldson KJ, and Cox DN. How The Fly Youth Chill. March 2021. *Annual GSU Brains & Behavior Retreat, virtual*.
20. Himmel NJ, Letcher JM, Sakurai A, Benson MN<sup>§</sup>, Gray TR<sup>§</sup>, Donaldson KJ, and Cox DN. How The Fly Youth Chill: The evolution of cold nociception in drosophilid larvae and identification of a neural basis for

cold acclimation. March 2021. *Animal Behavior Conference, hosted by Indiana University—Bloomington, virtual.*

19. **Himmel NJ**, Sakurai A, Letcher JM, Benson MA, Gray TR, and Cox DN. Excitatory chloride physiology discriminately encodes noxious cold in a multimodal sensory neuron. January 2021. *Annual meeting of the Society for Neuroscience, virtual.*
18. **Maksymchuk N**, Sakurai A, Patel AA, **Himmel NJ**, Cox DN, Cymbalyuk G. Mechanisms of cold temperatures rate coding by *Drosophila* CIII neurons. October 2019. *Annual meeting of the Society for Neuroscience, San Diego, CA.* [Abstract online.](#)
17. **Letcher JM**, **Himmel NJ**, Sakurai A, Holgiun-Lopez M, Cox DN. TrpA1 mediates cold nociception in *Drosophila melanogaster* larvae. October 2019. *Neurobiology of Drosophila Meeting, Cold Spring Harbor Lab, Cold Spring Harbor, NY.*
16. **Maksymchuk N**, Sakurai A, Patel AA, **Himmel NJ**, Cox DN, Cymbalyuk G. Role of TRP channels in temperature rate coding by *Drosophila* noxious cold sensitive neurons. *Conference abstract in BMC Neuroscience*, 20:56, July 2019. doi: [10.1186/s12868-019-0538-0](https://doi.org/10.1186/s12868-019-0538-0)
15. **Himmel NJ**, Letcher JM, Gray TR<sup>§</sup>, Benson MN<sup>§</sup>, Cox DN. TRP-dependent chemical sensing: the Precambrian hypothesis. May 2019. *Annual GSU Brains & Behavior Retreat, Atlanta, GA.*
14. **Himmel NJ**, Letcher JM, Gray TR<sup>§</sup>, Benson MN<sup>§</sup>, Cox DN. Menthol elicits a *Trpm*- and *TrpA1*-dependent nocifensive response in *Drosophila melanogaster* larvae. February 2019. *Theo Murphy International Scientific Meeting on the evolution of mechanisms and behaviour important for pain, hosted by The Royal Society, Chicheley, Buckinghamshire, UK.*
13. Patel AA, **Himmel NJ**, **Cox DN**. Calcium induced calcium release mechanisms in cold nociception. February 2019. *Theo Murphy International Scientific Meeting on the evolution of mechanisms and behaviour important for pain, hosted by The Royal Society, Chicheley, Buckinghamshire, UK.*
12. **Patel AA**, **Himmel NJ**, Yang JJ, Cox DN. Cellular and behavioral requirements for calcium release mechanisms in cold nociception. October 2018. *Annual meeting of the Society for Neuroscience, San Diego, CA.* [Abstract online.](#)
11. **Maksymchuk N**, Patel AA, **Himmel NJ**, Cox DN, Cymbalyuk G. Modeling of TRP channel mediated noxious cold sensation in *Drosophila* sensory neurons. *Conference abstract in BMC Neuroscience*, 19(Suppl 2):64, July 2018. doi: [10.1186/s12868-018-0452-x](https://doi.org/10.1186/s12868-018-0452-x)
10. **Himmel NJ**, Letcher JM, Gray TR<sup>§</sup>, Cox DN. The evolution of cold nociception in drosophilid larvae. May 2018. *Annual GSU Brains & Behavior Retreat.*
9. **Himmel NJ**, Gray TR<sup>§</sup>, Cox DN. Anoctamins are required for cold nociception in *Drosophila*. April 2018. *Annual Georgia Collegiate Neuroscience Symposium, Athens, GA.*
8. **Himmel NJ**, Gray TR<sup>§</sup>, Cox DN. Calcium-activated chloride channels are required for distinguishing between noxious and innocuous stimuli in multimodal sensory neurons. April 2018. *Annual meeting of the Genetics Society of America, Philadelphia, PA.* [Abstract online.](#)
7. **Maksymchuk N**, Patel AA, **Himmel NJ**, Cox DN, Cymbalyuk G. Modeling cellular noxious cold sensation in *Drosophila* sensory neurons. October 2017 *Annual meeting of the Society for Neuroscience, Washington, DC.* [Abstract online.](#)
6. **Kronk TA**, **Himmel NJ**, Mehran NA<sup>§</sup>, Blount MA. Lithium administration can attenuate the progression of polycystic kidney disease. *Conference abstract in The FASEB Journal*, 31(Suppl 1):1032.4, April 2017. doi:

5. Patel AA, Moon D<sup>§</sup>, **Himmel NJ**, Cox DN. Cellular and molecular dissection of noxious cold nociception in *Drosophila*. March 2017. *58<sup>th</sup> Annual Drosophila Research Conference, San Diego, CA*. [Abstract](#).
4. Patel AA, Turner HN, Armengol K, **Himmel NJ**, Galko MJ, Cox DN. Cellular and molecular dissection of noxious cold nociception in *Drosophila*. July 2016. *The Allied Genetics Conference, Orlando, FL*. [Abstract online](#).
3. **Himmel NJ**, Rodriguez DA<sup>§</sup>, Wang Y<sup>§</sup>, Sun MA<sup>§</sup>, Blount MA. Chronic lithium treatment induces novel patterns of pendrin localization and expression in the kidney. *Conference abstract in The FASEB Journal*, 30(Suppl1):968.14, April 2016. doi: [10.1096/fasebj.30.1\\_supplement.968.14](https://doi.org/10.1096/fasebj.30.1_supplement.968.14)
2. **Himmel NJ**, Rogers RT, Redd SK, Blount MA. Purinergic signaling is enhanced in the absence of UT-A1 and UT-A3. October 2014. *Emory Department of Medicine Research Day, Atlanta, GA*.
1. Rogers RT, **Himmel NJ**, Redd SK, Blount MA. Purinergic signaling is enhanced in the absence of UT-A1 and UT-A3. *Conference abstract in The FASEB Journal*, 38(Suppl 1): 969.17, April 2014. doi: [10.1096/fasebj.28.1\\_supplement.1137.10](https://doi.org/10.1096/fasebj.28.1_supplement.1137.10)

**Institutional oral presentations:**

5. **Himmel NJ**, Letcher JM, Sakurai A, Benson MN<sup>§</sup>, Gray TR<sup>§</sup>, Donaldson KJ, and Cox DN. How The Fly Youth Chill: The protective role of cold nociception in *Drosophila* larvae. June 2021. *Neuroscience Institute Breakfast and Lecture Series, Atlanta, GA*.
4. **Himmel NJ**, Gray TR<sup>§</sup>, Cox DN. Insects and vertebrates are the odd ones out: unexpected findings in the evolution of TRP channels. September 2019. *Neuroscience Institute Breakfast and Lecture Series, Atlanta, GA*.
3. **Himmel NJ**, Gray TR<sup>§</sup>, Cox DN. Multimodality in *Drosophila melanogaster* sensory neurons. February 2018. *Neurogenomics Forum, Atlanta, GA*.
2. **Himmel NJ**, Gray TR<sup>§</sup>, Cox DN. Calcium-activated chloride channels play a role in the function of multimodal sensory neurons. August 2017. *Neuroscience Institute Breakfast and Lecture Series, Atlanta, GA*.
1. **Himmel NJ**, Blount MA. Chronic lithium treatment induces renal  $\beta$ -intercalated cell expression in the inner medulla. October 2014. *Emory Transport Signaling Workers Union Seminar, Atlanta, GA*.