Nathaniel J. Himmel, PhD

Human Frontier Science Program Postdoctoral Fellow
Curriculum Vitae

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EDUCATION

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

RESEARCH POSITIONS

Postdoctoral Research, University of Lausanne, Lausanne, Switzerland — Feb 2022 –
PI: Richard Benton, PhD FRS
Visiting Scholar with Nicolas Buchler, PhD (NC State; Nov 2021)

Graduate Research, Georgia State University, Atlanta, GA, USA — Aug 2015 – Jan 2022
PI: Daniel Cox, PhD
Rotations with Paul Katz, PhD and Gwen Frishkoff, PhD

Research Technician, Emory University, Atlanta, GA, USA — April 2013 – Aug 2015
PI: Mitsi Blount, PhD

PUBLICATIONS

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

16. **Himmel NJ** and Benton R. Sweet sensors support stressed cell survival. *PLOS Biology*. 2022 (in press).

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. Preprint in *bioRxiv*. 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**[*], Letcher JM[*], 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**[†], Gray TR[§], and Cox DN[†]. Phylogenetics identifies two eumetazoan TRPM clades and an eighth TRP family, TRP Soromelastatin (TRPS). *Molecular Biology and Evolution*. 2020.

7. **Himmel NJ**[†], Letcher JM, Sakurai A, Gray TR[§], Benson MN[§], and Cox DN[†]. *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[§], Wang Y[§], Sun MA[§], 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. *Channels*. 2017.

3. **Himmel NJ**[*], Patel AA[*], and Cox DN. Invertebrate Nociception. *The Oxford Research Encyclopedia of Neuroscience*. 2017.

2. Turner HN[*], Armengol K[*], Patel AA, **Himmel NJ**, Sullivan L, Iyer SC, Battacharya S, Iyer EPR, Landry C, Galko MJ[†], and Cox DN[†]. 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.

FUNDING and AWARDS

Grants & Funding:

Human Frontier Science Program Long-Term Fellowship (LT-0003/2022-L) 2022–2025
International Human Frontier Science Program Organization
"Evolutionary, expression, and functional characterization of ancient putative chemosensors"

Ruth L. Kirschstein National Research Service Award (F31NS117087) 2020–2022
National Institute of Neurological Disease and Stroke
"Functional roles of chloride homeostasis and chloride ion channels in thermosensory nociception"

Kenneth W. and Georganne F. Honeycutt Fellowship 2017–2020
Georgia State University, Neuroscience Institute

Brains & Behavior Fellowship 2017–2020
Georgia State University, Brains & Behavior Program
Honorary Fellow, 2020-2021

Other Awards:

Writing Across the Curriculum Pedagogy Award, *Georgia State University* 2021
Neuroscience Institute Outstanding Doctoral Scholar, *Georgia State University* 2020
Neuroscience Institute Outstanding Graduate Student Mentor, *Georgia State University* 2019

Meritorious Research Award, *American Physiological Society* 2016
Meritorious Research Award, *American Physiological Society* 2015

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

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/doinsects-enjoy-sex-1796376553.

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 (forthcoming). *Virtual*.

4. Invited speaker, North Carlina 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§, Benson MN§, 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§, Blount MA. Chronic lithium treatment induces β-intercalated cell expression in the renal inner medulla. March 2015. *Platform talk at Experimental Biology, Boston, MA.*

Posters (first-authored) & published abstracts:

23. **Himmel NJ** and Benton R. Ancient putative chemosensors in the zoosporic fungus *Spizellomyces punctatus*. June 2022. *Annual CIG Symposium, Lausanne, Switzerland.*

22. **Himmel NJ,** Sakurai A, Letcher JM, Patel AA, Benson MN§, Bhattacharjee S, Gray TR§, 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§, Gray TR§, 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§, Gray TR§, 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

15. **Himmel NJ**, Letcher JM, Gray TR[§], Benson MN[§], 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[§], Benson MN[§], 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

10. **Himmel NJ**, Letcher JM, Gray TR[§], Cox DN. The evolution of cold nociception in drosophilid larvae. May 2018. *Annual GSU Brains & Behavior Retreat.*

9. **Himmel NJ**, Gray TR[§], Cox DN. Anoctamins are required for cold nociception in *Drosophila.* April 2018. *Annual Georgia Collegiate Neuroscience Symposium*, *Athens, GA.*

8. **Himmel NJ**, Gray TR[§], 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 2017A*annual meeting of the Society for Neuroscience, Washington, DC*. Abstract online.

6. Kronk TA, **Himmel NJ**, Mehran NA[§], 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: 10.1096/fasebj.31.1_supplement.1032.4

5. Patel AA, Moon D[§], **Himmel NJ**, Cox DN. Cellular and molecular dissection of noxious cold nociception in *Drosophila*. March 2017. *58th 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[§], Wang Y[§], Sun MA[§], 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

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

Institutional oral presentations:

5. **Himmel NJ**, Letcher JM, Sakurai A, Benson MN[§], Gray TR[§], 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[§], 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[§], Cox DN. Multimodality in *Drosophila melanogaster* sensory neurons. February 2018. *Neurogenomics Forum, Atlanta, GA.*

2. **Himmel NJ,** Gray TR[§], 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 β-intercalated cell expression in the inner medulla. October 2014. *Emory Transport Signaling Workers Union Seminar, Atlanta, GA.*