Gregory D. Conradi Smith[1]

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RESEARCH INTERESTS

- Mathematical aspects of the life sciences, especially neuroscience and cell physiology.

CURRENT POSITIONS

- Professor, Department of Applied Science, William & Mary, 2013–present.
- Faculty affiliate of two interdisciplinary STEM programs
  - *Neuroscience*, 2001–present.
  - *Computational & Applied Mathematics & Statistics* (CAMS), 2012–present.

EDUCATION

- University of California at Davis. Ph.D. in Biophysics, Dec. 1996.
- Massachusetts Institute of Technology. B.S. as recommended by the Dept. of Biology, Feb. 1986.

PREVIOUS POSITIONS

- Associate Chair, Department of Applied Science, William & Mary, Fall 2023.
- Interim Chair, Department of Applied Science, William & Mary, Jan.–Sept. 2018.
- Director, William & Mary Biomathematics Initiative, 2009–15.
- Associate Professor, Department of Applied Science, William & Mary, 2005–13.
- Visiting Associate Professor, Mathematical Biosciences Institute, The Ohio State University, AY 2007–08.
- Assistant Professor, Department of Applied Science, William & Mary, 2001–05.
- Assistant Professor, Department of Mathematics, Arizona State University, AYs 1999–01.
- National Research Service Award (NEI) Individual Fellowship, Center for Neural Science, New York University, 1998–99. John Rinzel, postdoctoral advisor.
- Intramural Research Training Assistantship, Mathematical Research Branch, NIDDK, NIH, 1997–98. Arthur Sherman & John Rinzel, postdoctoral advisors.
- Research Assistant, The Institute for Theoretical Dynamics & Biophysics Graduate Group, University of California Davis, 1992–96. Joel E. Keizer, graduate advisor.
- Lab Assistant, Dept. of Pediatrics, University of California San Francisco, 1990–92.
- Teacher/Counselor, Learning Experiences, Inc., Coatesville, Pennsylvania, 1987–90.

HONORS, PRIZES, AND AWARDS

- Early faculty development (CAREER) award from the NSF Division of Molecular and Cell Biology.
- Recipient of a 2013 Plumeri Award for Faculty Excellence.
- Recipient of the 2011 Phi Beta Kappa Award for the Advancement of Scholarship.

[1] mini CV, updated July 7, 2026. Formerly Gregory D. Smith: 'Conradi Smith GD' ≅ 'Smith GD' in publications.

COURSES TAUGHT & OTHER EDUCATIONAL ACTIVITIES

- *Cellular Biophysics and Modeling* (APSC 351), Spring '02, Spring '03, Fall '04 & 06, Fall '08, Spring '11 & 13, Fall '14–19, Fall '25 (96 students). This required course in W&M's Neuroscience program typically has 70–100 students. I wrote the textbook published by Cambridge University Press in 2019 (see PUBLICATIONS).
- *Science & Authority* (APSC 453, COLL 400). Fall '22 (14 students). Fall '23 (11 students). Fall '24 (15 students). Spring '26. Science as a legitimate cultural authority and case studies of science gone wrong. https://science-authority.com
- *Computational Neuroscience* (APSC 450, COLL 400). Fall '10 & 12, Spring '18–20, Spring '23 (15 students). Spring '24 (2 students) as an independent study (APSC 404) with weekly meetings. Spring '25 (15 students). https://apsc450computationalneuroscience.wordpress.com/
- Co-organizer of the *Biomath Journal Club & Seminar*, Fall '08–present (w/ Leah Shaw & Helen Murphy).
- Co-organizer of the *Mind/Brain/Wellness Seminar*, Spring '22–present (w/Christopher Del Negro, Patton Burchett, & Mark McLaughlin).
- Lead organizer and instructor of the *Cold Spring Harbor Laboratory Computational Cell Biology International Summer School* (2008–13). A 3-week event w/ ∼25 graduate students and ∼20 lecturers.
- *Mathematical and Computational Methods I & II* (APSC 607/608), Fall '20 & Spring '21. Fall '23 (overload, 10 students). These are 4-credit required courses in the Applied Science graduate program.

PENDING RESEARCH FUNDING

- National Science Foundation, Division of Mathematical Sciences: Emerging Mathematics in Biology, **Mathematics of membraneless organelles: the postsynaptic density.** PIs: Greg Conradi Smith and Jennifer Bestman. $488K, 8/26–7/29. [Pending]

PRIOR RESEARCH FUNDING (SELECTED)

- National Science Foundation, Division of Mathematical Sciences: Mathematical Biology, **Cycle representations of receptor complex signal transduction.** PI: Greg Conradi Smith. NSF DMS #1951646, $451K, 8/20–7/23 → 7/24.
- National Science Foundation, Division of Integrative and Organismal Systems: Evolution of Developmental Mechanisms, **Collaborative Research: Mathematical and empirical investigation of a reaction-diffusion system for spot formation in hybrid Mimulus.** co-equal PIs: Josh Puzey, Greg Conradi Smith, and Arielle Cooley (Whitman College). NSF DEB #2031275 $300K. 3/21–2/24 → 12/25.
- National Institutes of Health R21-NS134005. **Molecular characterization of expiratory breathing-related interneurons in mammals.** PI: Christopher Del Negro. co-PIs: Greg Conradi Smith and Margaret Somosi Saha. Senior personnel: Maria Cristina D. Picardo. $300K. 06/23–05/25.
- Office of Provost, William & Mary. 2023 Faculty Research Seed Grant. **Cellular and molecular characterization of brainstem interneurons that generate expiratory breathing behavior in mammals.** PI: Christopher Del Negro. co-PIs: Greg Conradi Smith and Margaret Somosi Saha. Senior personnel: Maria Cristina D. Picardo. $30K. 06/23–05/25.
- Office of Provost, William & Mary, Interdisciplinary Research Innovation Fund. 2023 Faculty Research Initiation Grant. **Unraveling contemplative practices: A holistic interdisciplinary approach.** co-PIs: Adrian Bravo, Patton Burchett, Christopher Del Negro, Cheryl Dickter, Matthew Haug, Kevin Vose. Key Collaborators: Kelly Crace, Mark McLaughlin, Christy Porter, Greg Conradi Smith. $75K. 06/23–05/25.
- National Center for Complementary & Integrative Health 1R01AT010816, awarded through the joint NSF-NIH program *Collaborative Research in Computational Neuroscience*, **Discovering the neural mechanisms of breathing rhythms - eupnea and sigh.** PIs: Christopher Del Negro and Greg Conradi Smith. 1R01AT010816, $522K, 8/19–7/22 → 1/23.
- NSF Mathematical Biology, **A new class of whole cell models with bidirectional coupling of local (subcellular) and global (cellular) calcium responses.** PI: Smith GD. #1121606. $350K. 10/11–9/14 → 9/16.
- NSF **CSUMS: Theory, techniques, and research in computational mathematics**. PI: C-K Li. co-PIs: A Stathopoulos, J Shi, R Lewis, V Torczon, S Day, D Lutzer, D Phillips, and GD Smith. #DMS-0703532. $884K. 9/07–8/12 → 8/13.

- Joint NSF/NIGMS Initiative in Mathematical Biology, **Ensemble density analysis of stochastic models of cardiac excitation-contraction coupling.** PIs: MS Jafri, GD Smith, and E Sobie. #DMS-0443843. Total $2M. Subcontract for $660k to W&M from George Mason University. 2/05–1/10 → 2/11.
- NSF **CAREER: The dynamics of IP_3-dependent Ca^{2+} release sites.** PI: GD Smith. #MCB-0133132. $500K. 6/02–6/07 → 6/08.
- NSF **The effect of feedback inhibition on sensory relay by visual thalamus.** PI: GD Smith. #IBN-00079931 (ASU) → 0228273 (W&M). $262K. 8/00–8/04.
- Commonwealth Technology Research Fund, **Bringing the future of bioinformatics to Virginia.** PIs: DM Manos, RG Voigt, MS Saha, GD Smith. $3.2M. 11/01–10/04 → 6/06.
- Jeffress Memorial Trust, **The dynamics of IP_3-dependent Ca^{2+} release sites.** PI: GD Smith. #J-640. $27K. 1/02–12/02 → 12/03.

PUBLICATIONS

selected books, manuscripts, and recent refereed articles
over 3900 citations, h-index: 31, i10-index: 58

BOOKS (2)

2. Conradi Smith GD. **Receptor Modeling Jupyter Book**, 2025. https://gregconradismith.github.io/receptor-modeling-jupyter-book/intro.html

1. Conradi Smith GD. **Cellular Biophysics and Modeling: The Computational Biology of Excitable Cells**. Cambridge University Press. March 2019. 394 pages. ISBN-10: 0521183057. ISBN-13: 978-0521183055. [doi:10.1017/9780511793905] [Amazon]

MANUSCRIPTS UNDER REVIEW OR IN PREPARATION (2)

2. Sakly S, Conradi Smith GD. **Phase separation dynamics of SynGAP & PSD-95 in post-synaptic densities.** *In preparation.*

1. Cooley AM, Schlutius C, Matthews M, Simmons E, Zheng X, Thomas D, Edger PP, Platts AE, LaFountain A, George L, Williams A, Hundley D, Conradi Smith GD, Yuan Y-W, Twyford A and Puzey JR. **Genetic architectures of floral pigment and patterning in hybrid monkeyflowers.** Under review at *Genetics*.

SELECTED RECENT REFEREED RESEARCH ARTICLES

10. Kalajian EJ, Stettler MK, Conradi Smith GD, Del Negro CA. **μ-opioid receptor signaling enhances Kir3 currents in glutamatergic preBötzinger complex neurons**. *J. Physiol.* In press. [DOI forthcoming: 10.1113/JP291442]

9. Borrus DS, Stettler MK, Grover CJ, Kalajian EJ, Gu J, Conradi Smith GD*, Del Negro CA*. **Inspiratory and sigh breathing rhythms depend on distinct cellular signaling mechanisms in the preBötzinger complex**. *The Journal of Physiology (London)* 602: 809–834, 2024. [doi:10.1113/JP285582] *Contributed equally.

8. Simmons ESG, Cooley AM, Puzey JR, Conradi Smith GD. **A multigenerational Turing model reproduces transgressive petal spot phenotypes in hybrid *Mimulus***. *Bulletin of Mathematical Biology* 85:120 (2023). [doi:10.1007/s11538-023-01223-7]

7. David CK, Sugimura YK, Kallurkar PS, Picardo MCD, Saha MS, Conradi Smith GD, Del Negro CA. **Single cell transcriptome sequencing of inspiratory neurons of the preBötzinger complex in neonatal mice.** *Scientific Data* 9:457, 2022. [doi:10.1038/s41597-022-01569-y]

6. Smith RD, Puzey JR, Conradi Smith GD. **Population genetics of transposable element load: a mechanistic account of observed overdispersion.** *PLOS ONE* 17(7):e0270839, 2022. [doi:10.1371/journal.pone.0270839]

5. Kallurkar PS, Picardo MCD, Sugimura YK, Saha MS, Conradi Smith GD, Del Negro CA. **Transcriptomes of electrophysiologically recorded Dbx1-derived respiratory neurons of the preBötzinger complex in neonatal mice.** *Scientific Reports* 12:2923, 2022. [doi:10.1038/s41598-022-06834-z]

4. Kinser TJ, Smith RD, Lawrence AH, Cooley AM, Vallejo-Marin M, Conradi Smith GD, and Puzey JR. **Endosperm-based incompatibilities in hybrid monkeyflowers.** *The Plant Cell*, koab117, 2021. [doi:10.1093/plcell/koab117]

3. Zheng X, Om K, Stanton KA, Thomas D, Cheng PA, Eggert A, Simmons ESG, Yuan Y-W, Conradi Smith GD, Puzey JR*, Cooley AM*. **The regulatory network for petal anthocyanin pigmentation is shaped by the MYB5a/NEGAN transcription factor in *Mimulus*.** *Genetics*. 217(2), iyaa036, 2021. [doi:10.1093/genetics/iyaa036]
2. Borrus DS, Conradi Smith GD*, Del Negro CA*. **Role of synaptic inhibition in the coupling of the respiratory rhythms that underlie eupnea and sigh behaviors.** *eNeuro*, 7(3):1-20, 2020. *Contributed equally. [doi:10.1523/ENEURO.0302-19.2020] [PMID:32393585]
1. Conradi Smith GD. **Allostery in oligomeric receptor models.** *Mathematical Medicine and Biology: A Journal of the Institute of Mathematics and its Applications*. 37:313–333, 2020. [doi:10.1093/imammb/dqz016] [PMID:31822901]

SELECTED CONFERENCES AND INVITED SEMINARS

- **2026 Joint Mathematics Meetings session on Stochastic Processes in Biology**, Washington, DC, 4/26. Sakly S, Conradi Smith GD. Phase-field modeling of the biological physics of membraneless organelles (*invited speaker*)
- **Biomath Seminar**, William & Mary, 9/25. Conradi Smith GD. Parking functions. (*speaker*)
- **Biomath Seminar**, William & Mary, 2/25. Conradi Smith GD. Quantifying and maximizing diversity. (*speaker*)
- **SEPEEG 2024 - SouthEastern Population Ecology and Evolutionary Genetics Conference**, Clemson, SC, 10/24. Simmons ESG, Cooley AM, Puzey JR, Conradi Smith GD. Hybridization and phenotypic diversity in *Mimulus* petal patterns. (*speaker*)
- **Biomath Seminar**, William & Mary, 9/24. Conradi Smith GD. Membraneless organelles and the Cahn-Hilliard equation for liquid-liquid phase separation. (*speaker*)
- **Society for Mathematical Biology**, Columbus, OH, 7/23. Minisymposium: Stochastic Cellular Dynamics. Conformational coupling of receptor dimers. (*invited speaker*)
- **CRCNS Principal Investigators Meeting**, Atlanta, GA, 10/22. Borrus DS, Grover CJ, Kam K, Conradi Smith GD, Del Negro CA. Inspiratory and sigh breathing rhythms emerge via distinct mechanisms within a single neuron population. (*poster*)

GRADUATE AND POSTDOCTORAL TRAINING

- **Research associates supported and supervised:** Seth Weinberg, Dan Siegal-Gaskins, Drew LaMar, Marco Huertas, Bori Mazzag, and Yinshui Fan.
- **Graduate students supported and supervised:** Emily S. G. Simmons, Spenser E. Wood, Cameron Grover, Daniel Borrus, Jonathan Newman, Ronald D. Smith, Lauren Shriver, Wenchong He, Daniel Hancock, Futa Ikeda, Xiao Wang, Yan Hao, Ryan Carpenter, Hilary DeRemigio, George Stuart Blair Williams, Jeff Groff, Vivian Zhang, John Hayes, and Chuan Wei.
- Additional Ph.D./M.S. committee service at W&M and external dissertation committee service are listed in the full CV.

UNDERGRADUATE RESEARCH EXPERIENCES

- Co-advisor for W&M iGEM teams in 2016, 2017, and 2025; mentored mathematical modeling for the 2015 W&M iGEM project.
- Recent Computational Biology Laboratory students include Hannah Willett, Izzy Ralph, Sarah Sakly, Yulee Kang, Weifeng Liu, Olivia Webster, Lauren McCluskey, Olabisi Bashorun, Diego Morandi Zerpa, Clara Rinker, Ryno Chen, and Jingzhi Zhao.
- Selected recent outcomes include graduate study in mathematics, cognitive and brain sciences, and applied science programs at University of Pittsburgh, Binghamton University SUNY, University of Utah, and William & Mary.
- Additional undergraduate research students and honors thesis committee service are listed in the full CV.

REPRESENTATIVE PROFESSIONAL SERVICE

- **Reviewer** for the 2nd edition of Paul Bressloff's *Stochastic Processes in Cell Biology*, Springer, 2020.
- **External reviewer** for faculty promotions at Carnegie Doctoral/Research-Extensive Universities, 3× in 2013–2018, 1× in 2023.
- **Editorial board** for *Mathematical Medicine and Biology: Journal of the IMA*. 2010–2014.
- NSF review panels including DMS Mathematical Biology and NIH/NSF CRCNS. 2005, 07, 09, 11, 12, 14, 15, 20, 21, 23, 24, 26.
- Representative W&M service includes School of Computing, Data Sciences & Physics RPT Committee; COLL Curriculum Review Working Group; Applied Science Curriculum Committee chair; Bioengineering ad hoc committee; TTE Faculty Search in Genomic Data Science chair; and W&M Biomath Initiative director.