HENRY L. HALLOCK, PH.D.

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RESEARCH STATEMENT

I am a behavioral neuroscientist interested in how the brain encodes memory, attention, and decision-making. My long-term research goal is to identify circuits (groups of connected neurons) in the brain that regulate these processes, and to understand how these circuits function at the molecular and systems levels. To accomplish this goal, my research uses a variety of techniques, including *in vivo* calcium imaging and electrophysiology, chemogenetic manipulation, *in situ* hybridization and RNA-sequencing, and translational touchscreen-based cognitive testing in rodents. I believe that a fundamental understanding of how memory, attention, and decision-making circuits function will be critical for precision medicine approaches to treating cognitive symptoms in neuropsychiatric disorders, including schizophrenia, post-traumatic stress disorder, major depressive disorder, and attention-deficit hyperactivity disorder.

EDUCATION/TRAINING

2016-Present **Postdoctoral Fellow**
The Lieber Institute for Brain Development, Johns Hopkins School of Medicine, Baltimore, MD
Advisor: Keri Martinowich, Ph.D.

2010-2016 **Graduate Student Researcher**
University of Delaware, Newark, DE
Advisor: Amy L. Griffin, Ph.D.
Dissertation Title: “Prefrontal-thalamo-hippocampal circuit contributions to spatial working memory”
Ph.D. in Psychology, Behavioral Neurosience concentration: 2016

2007-2010 **Undergraduate Researcher**
Millersville University of Pennsylvania, Millersville, PA
Advisors: Shaun P. Cook, Ph.D. & Shawn P. Gallagher, Ph.D.
B.A. in Psychology, Biology minor: 2010
Magna cum laude

FUNDING AS PRINCIPAL INVESTIGATOR

CURRENT

2021-2023 NARSAD Young Investigator Award, Brain and Behavior Research Foundation
‘Neural correlates of sustained attention during touchscreen-based cognitive testing’
Award total: $70,000

2019-2022 NIH Ruth L. Kirschstein National Research Service Award (NRSA) for Individual Postdoctoral Fellows (F32), National Institute of Mental Health
‘Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to-prelimbic projections’
Award total: $206,000

PAST

2018-2019 Mission Forward Award, Lieber Institute for Brain Development
'Molecular signatures of prefrontal-projecting hippocampal neurons'
Award total: $100,000

AWARDS/HONORS

2019 Society for Biological Psychiatry "Rising Star"
2018 Gordon Research Seminar "Amydala" Meeting Poster Prize
2018 Johns Hopkins Postdoctoral Retreat Best Poster ($1,000 Travel Award)
2014 Society for Neuroscience, Delaware Chapter Best Poster (also in 2011)
2013 University of Delaware Graduate Student Travel Award (also in 2012 and 2011)
2013 University of Delaware Graduate Research Fellowship
2012 NSF Graduate Research Fellowship Honorable Mention
2009 Millersville University Intramural Grant for Undergraduate Research
2009 Psi Chi National Honor Society in Psychology

PUBLICATIONS (* DENOTES UNDERGRADUATE/POST-BAC MENTEE)

12. **Hallock, H.L., ***Quillian, H.M., Maynard, K.R., *Mai, Y., Chen, H-Y., Hamersky, G.R., Shin, J.H., Maher, B.J., Jaffe, A.E., & Martinowich, K. (2020). Molecularly-defined hippocampal inputs regulate population dynamics in the prelimbic cortex to suppress context fear memory retrieval. *Biological Psychiatry,* https://doi.org/10.1016/j.biopsych.2020.04.014

11. Maynard, K.R., Kardian, A., Hill, J.L., *Mai, Y., Barry, B., **Hallock, H.L.**, Jaffe, A.E., & Martinowich, K. (2020). TrkB signaling influences gene expression in cortistatin-expressing interneurons. *eNeuro*, **7:** 10.1523/ENEURO.0310-19.2019

10. **Hallock, H.L.**, *Quillian, H.M., *Mai, Y., Maynard, K.R., & Martinowich, K. (2019). Manipulation of a genetically and spatially defined sub-population of BDNF-expressing neurons potentiates learned fear and decreases hippocampal-prefrontal synchrony in mice. *Neuropsychopharmacology,* **44:** 2239-2246

9. Hill, J.L., Jimenez, D.V., *Mai, Y., Maynard, K.R., Hardy, N.F., **Hallock, H.L.**, Ren, M., Chen, H-Y., Yang, F., Maher, B.J., Schloesser, R.J., & Martinowich, K. (2018). Cortistatin interneurons require TrkB signaling to prevent brain hyper-excitability. *Brain Structure and Function,* **224:** 471-483

8. **Hallock, H.L.**, Garman, H.D., Cook, S.P., & Gallagher, S.P. (2017). Recognition without words: Using taste to explore survival processing. *The Journal of Undergraduate Neuroscience,* **15:** A1-A5

7. **Hallock, H.L.,** Wang, A., & Griffin, A.L. (2016). Ventral midline thalamus is critical for hippocampal-prefrontal synchrony and spatial working memory. *The Journal of Neuroscience,* **36:** 8372-8389 -- **featured article*

6. *Layfield, D., *Patel, M.M., **Hallock, H.L.,** & Griffin, A.L. (2015). Inactivation of the nucleus reuniens/rhomboid causes a delay-dependent impairment of spatial working memory. *Neurobiology of Learning and Memory,* **125:** 163-167

5. **Hallock, H.L.,** Wang, A., *Shaw, C.L., & Griffin, A.L. (2013). Transient inactivation of the thalamic reuniens and rhomboid nuclei produces deficits of a working memory-dependent tactile-visual conditional discrimination T-maze task. *Behavioral Neuroscience,* **127:** 860-866

4. **Hallock, H.L.,** *Arreola, A.C., *Shaw, C.L., & Griffin, A.L. (2013). Dissociable roles of the dorsal striatum and dorsal hippocampus in conditional discrimination and spatial alternation T-maze tasks. *Neurobiology of Learning and Memory*, **100:** 108-116

3. *Shaw, C.L., *Watson, G.D.R., **Hallock, H.L.,** Cline, K.M., & Griffin, A.L. (2013). The role of the medial prefrontal cortex in the acquisition, retention, and reversal of a tactile visuospatial conditional discrimination task. *Behavioural Brain Research,* **236:** 94-101

2. **Hallock, H.L.,** & Griffin, A.L. (2013). Dynamic coding of dorsal hippocampal neurons between tasks that differ in structure and memory demand. *Hippocampus,* **23:** 169-186

1. Griffin, A.L., & **Hallock, H.L.** (2013). Hippocampal signatures of episodic memory: Evidence from single-unit recording studies. *Frontiers in Behavioral Neuroscience,* https://doi.org/10.3389/fnbeh.2013.00054

TALKS/SEMINARS

2020 "From circuits to molecules: How the anterior cingulate cortex regulates cognitive domains affected in mental illness", Staying Connected Post-Doc Seminar Series, Virtual (**selected to present**).

2020 "Molecularly-defined hippocampal inputs regulate population dynamics in the prelimbic cortex to suppress context fear memory retrieval", Pavlovian Society meeting, Virtual.

2019 "Molecular targeting in a spatially-localized context fear memory circuit", Inscopix seminar, the National Institutes of Health (NIH), Bethesda, MD (**invited speaker**).

2019 "Molecular targeting in a spatially-localized context fear memory circuit", Baltimore Brain Series, University of Maryland Medical School, Baltimore, MD (**selected to present**).

2019 "Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to-prelimbic projections", Society for Biological Psychiatry (SOBP) Rising Star Symposium, Chicago, IL (**selected to present**).

2017 "The molecular logic of fear extinction circuitry: Implications for psychiatry", PaPC conference, Millersville University, Millersville, PA (**invited speaker; keynote talk**)

2015 "Prefrontal-thalamo-hippocampal circuit contributions to spatial working memory", Harvey lab, Harvard University, Cambridge, MA (**invited speaker**)

2015 "Prefrontal-thalamo-hippocampal circuit contributions to spatial working memory", Gordon lab, Columbia University, New York City, NY (**invited speaker**)

2014 "Prefrontal-thalamo-hippocampal circuit contributions to spatial working memory", Jacobs lab, Drexel University, Philadelphia, PA (**invited speaker**)

2014 "Spatial working memory deficits accompany reductions in hippocampal-prefrontal synchrony following inactivation of the ventral midline thalamic reuniens and rhomboid nuclei", Nanosymposium, Society for Neuroscience, Washington, D.C. (**selected to present**)

2013 "Early life adversity and function of the medial prefrontal cortex throughout the lifespan", Development Seminar Series, University of Delaware, Newark, DE (**invited speaker**)

2012 "Memory demand and task structure differentially modulate spatial representations of hippocampal neurons in dorsal CA1", Data Blitz, Neurobiology of Learning and Memory Conference, Park City, UT

2011 "Charles Bonnet and the clinical significance of insight", History of Psychology Symposium, Eastern Psychological Association, Cambridge, MA

2011 "Attentional set shifting as an interspecies tool for probing prefrontal cortex function", Development Seminar Series, University of Delaware, Newark, DE (**invited speaker**)

TEACHING EXPERIENCE

2020-2021 Johns Hopkins University Teaching Academy, Certificate of Completion

2015 Instructor of Record, "Measurement and Statistics", University of Delaware

2013 Graduate Student, "Teaching Practicum" course – wrote syllabus/lesson plans/activities for "Research Methods" class, University of Delaware

2013 Guest Lecturer, "Introduction to Neuroscience", *Multiple Memory Systems*, University of Delaware

2013 Guest Lecturer, "Spatial Cognition", *Grid Cells in Memory and Navigation*, University of Delaware

2013 Guest Lecturer, "Introduction to Neuroscience", *Structure and Function of the Nervous System*, University of Delaware

2013 Guest Lecturer, "Advanced Neurophysiology", *The Action Potential*, University of Delaware

2011 Guest Lecturer, "Brain and Behavior", *Multiple Memory Systems*, University of Delaware

2011 Guest Lecturer, "Introduction to Psychology", *Reinforcement Learning*, University of Delaware

2010-2013 Graduate Student Teaching Assistant, "Brain and Behavior", University of Delaware (graded exams, prepared lectures, held review sessions, helped students during office hours)

TRAINEE MENTORSHIP

2016-Present 4 post-baccalaureate research assistants, 4 undergraduate research assistants, 3 graduate students, direct supervision of 1 undergraduate grant application/letter of recommendation (Johns Hopkins University)

2010-2016 2 masters students, 7 undergraduate research assistants, direct supervision of 2 undergraduate honors theses, 1 letter of recommendation for undergraduate research scholarship, 3 letters of recommendation for graduate school (University of Delaware)

SERVICE/OUTREACH

Ad hoc reviewer for *Cerebral Cortex, Neuroscience, Developmental Cognitive Neuroscience, Molecular Psychiatry, European Journal of Neuropharmacology, Frontiers in Behavioral Neuroscience, Scientific Reports*

2019 Mentor/letter writer, Letters to a Pre-Scientist
2016 University of Delaware Neuroscience Outreach Program (Project BrainLight)
2016 Organizer, Oscillations journal club, University of Delaware
2013-2016 Big Brother, Big Brothers/Big Sisters, Newark, DE
2011-2015 Graduate recruitment, University of Delaware

PROFESSIONAL MEMBERSHIPS

2010-Present Society for Neuroscience
2010-2013 Eastern Psychological Association
2016-Present Society for Biological Psychiatry

CONFERENCE ABSTRACTS (* DENOTES UNDERGRADUATE/POST-BAC MENTEE)

2020 **Hallock, H.L.,** *Valerino, Jessica, DeBrosse, A.C., Noback, M., *Quillian, H.M., Barrow, J.C. Jaffe, A.E., Carr, G.V., & Martinowich, K. *Molecular and circuit-specific analysis of locus coeruleus-prefrontal networks during a touchscreen rodent continuous performance test.* American College of Neuropsychopharmacology, Virtual.

2020 **Hallock, H.L.,** *Quillian, H.M., Maynard, K.R., *Mai, Y., Chen, H.Y., Hamersky, G.R., Shin, J.H., Maher, B.J., Jaffe. A.E., & Martinowich, K. *Molecularly-defined hippocampal inputs regulate population dynamics in the prelimbic cortex to suppress context fear memory retrieval.* Pavlovian Society, Virtual.

2019 **Hallock, H.L.,** DeBrosse, A.C., Noback, M., *Quillian, H.M., Barrow, J.C., Carr, G.V., & Martinowich, K. *Involvement of a locus coeruleus-to-prefrontal (LC-mPFC) circuit in a touchscreen variant of the continuous performance test (CPT) in mice*. Society for Neuroscience, Chicago, IL.

2019 **Hallock, H.L.,** *Quillian, H.M., *Mai, Y., Chen, H-Y., Hamersky, G.R., Maher, B.J., Jaffe, A.E., & Martinowich, K. *A molecularly and anatomically-defined hippocampal-prelimbic circuit for the regulation of context fear suppression.* GRC Amygdala, Easton, MA.

2019 **Hallock, H.L.,** *Quillian, H.M., *Mai, Y., Chen, H-Y., Hamersky, G.R., Maher, B.J., Jaffe, A.E., & Martinowich, K. *Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to-prelimbic projections.* Society for Biological Psychiatry, Chicago, IL.

2018 **Hallock, H.L.,** *Mai, Y., Hill, J.L., Chen, H-Y., Hamersky, G.R., Maher, B.J., & Martinowich, K. *Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to prelimbic projections.* American College of Neuropsychopharmacology, Hollywood, FL.

2018 *Quillian, H.M., **Hallock, H.L.,** *Mai, Y., Hill, J.L., Maynard, K.R., & Martinowich, K. *Selective manipulation of Bdnf promoter IV-expressing cells in the hippocampus modulates fear expression and hippocampal-prefrontal synchrony in mice.* Society for Neuroscience, San Diego, CA.

2018 **Hallock, H.L.,** *Mai, Y., *Quillian, H.M., Hill, J.L., Chen, H-Y., Hamersky, G.R., Maher, B.J., & Martinowich, K. *Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to prelimbic projections.* Society for Neuroscience, San Diego, CA.

2018 **Hallock, H.L.,** *Mai, Y., Hill, J.L., Chen, H-Y., Hamersky, G.R., Maher, B.J., & Martinowich, K. *Regulation of fear expression by activity-dependent BDNF in direct hippocampal-to prelimbic projections.* Johns Hopkins Postdoctoral Retreat, Baltimore, MD.

2017 **Hallock, H.L.,** *Mai, Y., Hill, J.L., & Martinowich, K. *Fear extinction deficits are associated with altered hippocampal-prefrontal function in mice with impaired activity-dependent BDNF signaling.* American College of Neuropsychopharmacology, Palm Springs, CA.

2015 Maisson, D.J., *Emanuel, B., **Hallock, H.L.,** Gemzik, Z., Donahue, M., & Griffin, A.L. *Distinct contributions of hippocampal and prefrontal afferents to nucleus reuniens during spatial*

working memory. Society for Neuroscience, San Diego, CA.

2014 **Hallock, H.L.,** & Griffin, A.L. *Spatial working memory deficits accompany reductions in hippocampal-prefrontal synchrony following inactivation of the ventral midline thalamic reuniens and rhomboid nuclei.* Society for Neuroscience, Washington, D.C.

2014 **Hallock, H.L.,** & Griffin, A.L. *Spatial working memory deficits accompany reductions in hippocampal-prefrontal synchrony following inactivation of the ventral midline thalamic reuniens and rhomboid nuclei.* Pavlovian Society, Seattle, WA.

2013 *Patel, M.M., **Hallock, H.L.,** Wang, A., *Layfield, D.M., *Shaw, C.L., & Griffin, A.L. *Transient inactivation of the thalamic nucleus reuniens and rhomboid nucleus produces deficits of a working memory-dependent tactile-visual conditional discrimination task.* Society for Neuroscience, San Diego, CA.

2013 **Hallock, H.L.,** & Griffin, A.L. *Different modes of communication in the hippocampal-prefrontal micro-circuit during memory-guided decision making.* Spring Hippocampus Conference, Taormina, Sicily.

2013 **Hallock, H.L.,** & Griffin, A.L. *Working memory modulates hippocampal-prefrontal synchrony across mnemonically distinct T-maze tasks.* Neurobiology of Learning and Memory, Park City, UT.

2012 *Arreola, A.C., **Hallock, H.L.,** *Shaw, C.L., *Patel, M.M., Amos, S.M., Chandrasekhar, V., *Watson, G.D.R., & Griffin, A.L. *Dissociable roles of the dorsal striatum and dorsal hippocampus in the performance of mnemonically distinct T-maze tasks.* Society for Neuroscience, New Orleans, LA.

2012 **Hallock, H.L.,** & Griffin, A.L. *The effect of delay-dependent working memory demand on hippocampal-prefrontal synchrony during awake behavior and sleep.* Society for Neuroscience, New Orleans, LA.

2012 **Hallock, H.L.,** & Griffin, A.L. *Memory demand and task structure differentially modulate spatial representations of hippocampal neurons in dorsal CA1.* Neurobiology of Learning and Memory, Park City, UT.

2011 **Hallock, H.L.,** Cline, K.M., & Griffin, A.L. *Dynamic coding of dorsal hippocampal neurons between tasks that differ in structure and memory demand.* Society for Neuroscience, Washington, D.C.

2011 *Shaw, C.L., *Watson, G.D.R., **Hallock, H.L.,** Cline, K.M., & Griffin, A.L. *Effects of mPFC inactivation on acquisition, performance, and reversal of a tactile visuospatial conditional discrimination task.* Society for Neuroscience, Washington, D.C.

2011 Cook, S.P., Gallagher, S.P., **Hallock, H.L.,** & Garman, H. *Survival processing in flavor memory.* Eastern Psychological Association, Cambridge, MA.