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## **EDUCATION & RESEARCH EXPERIENCE**

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- 2022-                    Indiana University School of Medicine, Indianapolis, Indiana, USA  
Associate Professor of Psychiatry (with tenure)  
Department of Psychiatry; Stark Neuroscience Research Institute
- 2021-2022            Purdue University, West Lafayette, Indiana, USA  
Associate Professor of Neuroscience & Behavior (with tenure)  
Department of Psychological Sciences; Purdue Institute for Integrative Neuroscience
- 2014-2021            Purdue University, West Lafayette, Indiana, USA  
Assistant Professor of Neuroscience & Behavior  
Department of Psychological Sciences; Purdue Institute for Integrative Neuroscience
- 2013                    University of Saskatchewan, Saskatoon, Canada  
Research Scientist, Physiology; *Mentor: Dr. John Howland*
- 2009-2012            Ernest Gallo Clinic & Research Center, University of California at San Francisco  
Postdoctoral Fellow, Neuroscience; *Mentor: Dr. Patricia Janak*
- 2005-2009            Westfälische Wilhelms Universität Münster, Germany (10/2005-04/2009)  
Otto-von-Guericke Universität, Magdeburg, Germany (01/2005-09/2005)  
Postdoctoral Fellow, Neurophysiology; *Mentor: Dr. Hans-Christian Pape*
- 2000-2005            University of Calgary, Canada  
Doctorate, Neuroscience; *Mentor: Dr. Ken Lukowiak*  
Thesis: Consolidation, Reconsolidation, Extinction and Forgetting in *Lymnaea stagnalis*
- 1998-2000            University of British Columbia, Vancouver, Canada  
Laboratory technician, Psychology; *Mentor: Dr. Catharine Rankin*
- 1994-1998            University of British Columbia, Vancouver, Canada  
Bachelor of Science (Behavioural Neuroscience)

## **RESEARCH INTERESTS**

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My research using animal models focuses on the neurobiological mechanisms underlying memory formation, with an emphasis on neural circuits of emotion. This work is both significant and timely to research on sex differences in Post-Traumatic Stress Disorder and drug addictions. The objectives of my research program are to 1) clarify the circuit mediating discrimination among environmental cues signifying safety, fear or reward, and to 2) identify the neuronal correlates of the behavioral sex differences seen in fear and reward responding in our safety-fear-reward discrimination paradigm. This is being accomplished using a combination of techniques which are in place in my current laboratory at Purdue University: behavior, *in vivo* single unit electrophysiology, and chemogenetics.

## **RESEARCH SUPPORT**

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- NIMH R01 Research Grant (R01MH110425)  
Sangha, Susan  
Neural circuitry of safety, fear and reward cue discrimination

04/01/2018-12/31/2022

**Role: PI**

- Feodor Lynen Return Fellowship, Alexander von Humboldt Foundation  
Müller, Iris  
Fear and safety processing in the brain – activation of brain regions and specific neuronal subpopulations  
09/01/2019-08/31/2020                      **Role: Co-Mentor**
- Bilsland Dissertation Fellowship, Purdue University  
Ng, Ka  
Neuronal correlates of safety-cue elicited fear suppression in the prefrontal cortex  
08/12/2019-05/17/2020                      **Role: Mentor**
- Purdue Doctoral Fellowship, Purdue University  
Escobedo, Abraham  
08/14/2017-05/10/2019                      **Role: Mentor**
- Feodor Lynen Research Fellowship, Alexander von Humboldt Foundation  
Müller, Iris  
The impact of stress on different neuronal subpopulations in the basal amygdala  
05/01/2017-04/30/2019                      **Role: Mentor**
- Purdue Research Foundation Research Grant Award, Purdue University  
Sangha, Susan (PI)  
Neuronal encoding of fear, safety, and reward cue discrimination in the prefrontal cortex  
01/01/2018-12/31/2018                      **Role: PI**
- Purdue Institute for Integrative Neuroscience Seed Grant  
A new method for manipulating specific neural pathways during learning  
07/01/2016-06/30/2017                      **Role: PI**

**SALARY FELLOWSHIPS**

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- Human Frontier Science Program Long-term Postdoctoral Fellowship (International), 2005-2008
- Alexander von Humboldt Postdoctoral Fellowship (Germany), 2005
- Natural Sciences and Engineering Research Council of Canada-Postdoctoral Fellowship, 2004
- Canadian Institutes of Health Research's Canadian Graduate Scholarship-Doctoral Award, 2004
- Natural Sciences & Engineering Research Council of Canada-Postgraduate Scholarship B, 2002-04
- University of Calgary's Faculty of Graduate Studies Award (Canada), 2002
- University of Calgary's Graduate Assistantship (Teaching) (Canada), 2002
- Alberta Heritage Masters Scholarship (Canada), 2001
- University of Calgary's Graduate Research Scholarship (Canada), 2001

**AWARDS & HONORS**

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- Purdue University Seed for Success Award for Excellence in Research, 2018
- University of Calgary's Hotchkiss Brain Institute 2018 Alumnus of the Year, 2018
- International Travel Grant, Purdue Research Foundation, 2016
- Invited participation in the 5<sup>th</sup> Bonn Humboldt Award Winners' Forum, 'Frontiers in Neuroscience: Multi-scale Analysis of the Nervous System – From Molecules to Circuits', 2015
- Invited participation in the 57<sup>th</sup> Meeting of Nobel Laureates in Lindau, Germany, 2007
- Canadian Institutes of Health Research's Brain Star Award, 2006
- University of Calgary's Chancellor's Graduate Medal - Doctoral Level, 2005
- Finalist, Lindsley Prize for most outstanding dissertation in Behavioral Neuroscience (international competition), 2005
- Canadian Institutes of Health Research's Brain Star Award, 2004
- University of Calgary's Dean's Research Excellence Award, 2004
- Society for Neuroscience Chapters/Eli Lilly Graduate Student Travel Award, 2003
- University of Calgary's Graduate Travel Award, 2003
- University of Calgary's Dean's Research Excellence Award, 2003

- University of Calgary's Faculty of Graduate Studies Award, 2002
- University of Calgary's Graduate Assistantship (Teaching), 2002
- Company of Biologists' Travel Fellowship (for collaboration between Canada & Japan), 2002
- University of Calgary's Dean's Research Excellence Award, 2002
- Alberta Heritage Masters Scholarship (Canada), 2001
- University of Calgary's Graduate Research Scholarship, 2001
- University of Calgary's Dr. Keith Cooper Award, 2001

## PROFESSIONAL & ACADEMIC SERVICES

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- *Ad hoc reviewer:*

Behavioral Neuroscience	Behavioural Brain Research
Biological Psychiatry	BioMed Central Research Notes
eNeuro	European Journal of Neuroscience
Frontiers Behavioral Neuroscience	Journal of Neuroscience
Journal of Comparative Psychology	Learning & Memory
Molecular Psychiatry	Nature Communications
Neurobiology of Learning & Memory	Neuron
Neuropsychopharmacology	Science Advances
Scientific Reports	
- *Ad hoc grant reviewer:*
  - NIH Study Section Behavioral Neuroscience Fellowship (03/2022, 10/2021, 10/2020, 06/2020)
  - Austrian Science Foundation (2020)
  - NIH Study Section Neurobiology of Learning & Memory (LAM) (10/2019)
  - Human Frontiers Science Program, Career Development Award (2015)
- *Associate Editor/Editorial Board Member:*
  - Frontiers Behavioral Neuroscience: Learning and Memory
  - Frontiers Behavioral Neuroscience: Emotion Regulation and Processing
  - Scientific Reports (2019-2021)
- *International Behavioral Neuroscience Society:*
  - Ethics & Diversity Committee* (2019-2022). Highlighting and encouraging diversity within the society, both in its members and conference locations. Handling reports of incidents violating the IBNS Code of Conduct. *2020-2021 Co-Chair. 2021-2022 Chair.*
  - Education & Training Committee* (2019-2022). Promote participation and achievement of trainees in the behavioral neuroscience field, including selecting travel award winners for the annual conference.
- *Pavlovian Society Executive Committee* (2017-2021). Elected officer of the executive committee responsible for managing the society, including its annual meeting.
- *Greater Indiana Society for Neuroscience Chapter Executive Committee* (2016-2019). Committee organizes yearly chapter meeting representing neuroscience research at Purdue University, Indiana University (Bloomington), Indiana University Purdue University Indianapolis and Indiana University School of Medicine (Indianapolis). Location of meeting rotates among the campuses.
- *News and Views writer* (2004-2007), Journal of Experimental Biology, Neurophysiology/ Neuroethology; Editor: Dr. Kathryn Phillips

## PUBLICATIONS

\*corresponding author

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## • JOURNAL ARTICLES

- Sangha S** (2021). Elevated dopamine in the amygdala disrupts infant's approach to mother: Implications for development of neurotypical social behaviors and networks. Neuron, 109(24): 3900-3902. [Link](#)
- Meyer HC\*, **Sangha S**, Radley JJ, LaLumiere RT, and Baratta MV (2021). Environmental Certainty Influences the Neural Systems Regulating Responses to Threat and Stress. Neurosci Biobeh Rev, 131: 1037-1055. [Link](#)
- Müller I\*, Adams DD, **Sangha S**, Chester JA (2021). Juvenile stress facilitates safety learning in male and female high alcohol preferring mice. Behavioural Brain Research, 400: 113006. [Link](#)
- Krueger JN\*, **Sangha S\*** (2021). On the basis of sex: Differences in safety discrimination vs. conditioned inhibition. Behavioural Brain Research, 400: 113024. [Link](#)
- Woon E, Seibert T, Urbanczyk P, Ng KH, **Sangha S\*** (2020). Differential effects of prior stress on conditioned inhibition of fear and fear extinction. Behavioural Brain Research, 381: 112414. [Link](#)
- Sangha S\***, Diehl M, Bergstrom H, Drew M (2020). Know Safety, No Fear. Neurosci Biobeh Rev, 108: 218-230. [Link](#)
- Greiner EM, Müller I, Norris MR, Ng KH, **Sangha S\*** (2019). Sex differences in fear regulation and reward seeking behaviors in a fear-safety-reward discrimination task. Behavioural Brain Research, 368: 111903. [Link](#)
- Müller I\*, Brinkman AL, Sowinski EM, **Sangha S\*** (2018). Adolescent conditioning affects rate of adult fear, safety and reward learning during discriminative conditioning. Scientific Reports, 8:17315. [Link](#)
- Ng K, Pollock MW, Urbanczyk PJ, **Sangha S\*** (2018). Altering D1 receptor activity in the basolateral amygdala impairs fear suppression during a safety cue. Neurobiol Learn Mem, 147:26. [Link](#)
- Sangha S\*** (2015). Plasticity of fear and safety neurons of the amygdala in response to fear extinction. Front Behav Neurosci, 9:354. [Link](#)
- Sangha S\***, Greba Q, Robinson PD, Ballendine SA, Howland JG\* (2014). Heightened fear in response to a safety cue and extinguished fear cue in a rat model of maternal immune activation. Front Behav Neurosci, 8:168. [Link](#)
- Sangha S\***, Robinson PD, Davies DA, Greba Q, Howland JG\* (2014). Alterations in reward, fear and safety cue discrimination after inactivation of the prelimbic and infralimbic cortices. Neuropsychopharm, 39:2405-2413. [Link](#)
- Sangha S\***, Chadick JZ, Janak PH\* (2013). Safety encoding in the basal amygdala. J Neurosci, 33: 3744-3751. [Link](#) ['Featured Article: Systems/Circuits'](#)
- Christianson JP, Fernando ABP, Kazama AM, Jovanovic T, Ostroff LE, **Sangha S** (2012). Inhibition of fear by learned safety signals: minisymposium review. J Neurosci, 32:14118-14124. [Link](#)
- Sangha S\***, Ilenseer J, Sosulina L, Lesting J, Pape H-C (2012). Differential regulation of glutamic acid decarboxylase gene expression after extinction of a recent memory versus intermediate memory. Learn Mem, 19:194-200. [Link](#)
- Lesting J, Narayanan RT, Seidenbecher T, Kluge C, **Sangha S**, Pape H-C (2011). Patterns of coupled theta activity in amygdala-hippocampal-prefrontal cortical circuits during fear extinction. PLoS One, 6:e21714. [Link](#)
- Sangha S**, Narayanan RT, Bergado-Acosta JR, Stork O, Seidenbecher T, Pape H-C (2009). Deficiency of the 65-kDa isoform of glutamic acid decarboxylase impairs extinction of cued but not contextual fear memory. J Neurosci, 29:15713-15720. [Link](#)
- Jüngling K, Seidenbecher T, Sosulina L, Lesting J, **Sangha S**, Clark SD, Okamura N, Duangdao DM, Xu Y-L, Reinscheid RK, Pape H-C (2008). Neuropeptide S: reduced expression and facilitated extinction of fear through control of intercalated GABAergic neurons in the amygdala. Neuron, 59:298-310. [Link](#)
- Bergado-Acosta JR, **Sangha S**, Narayanan RT, Obata K, Pape H-C, Stork O (2008). Critical role of the 65kD isoform of glutamic acid decarboxylase in consolidation and generalization of Pavlovian fear memory. Learn Mem, 15:163-171. [Link](#)
- Narayanan RT, Seidenbecher T, **Sangha S**, Stork O, Pape H-C (2007). Theta re-synchronization during reconsolidation of remote contextual fear memory. Neuroreport, 18:1107-11. [Link](#)
- Lukowiak K, Martens K, Orr M, Parvez K, Rosenegger D, **Sangha S** (2006). Modulation of aerial respiratory behaviour in a pond snail. Respir Physiol Neurobiol, 154: 61-72. [Link](#)

- Rose JK#, **Sangha S#**, Rai S#, Norman KR, Rankin CH (2005). Decreased sensory stimulation reduces behavioral responding, retards development and alters neuronal connectivity in *Caenorhabditis elegans*. *J Neurosci*, 25:7159-7168. # contributed equally [Link](#)
- Sangha S**, Scheibenstock A, Martens K, Varshney N, Cooke R, Lukowiak K (2005). Impairing forgetting by preventing new learning and memory. *Behav Neurosci*, 119:787-796. [Link](#)
- Parvez K, Stewart O, **Sangha S**, Lukowiak K (2005). Boosting intermediate-term into long-term memory. *J Exp Biol*, 208:1525-1536. [Link](#)
- Sangha S**, Varshney N, Fras M, Smyth K, Rosenegger D, Parvez K, Sadamoto H, Lukowiak K (2004). Memory, reconsolidation and extinction in *Lymnaea* require the soma of RPeD1. *Adv Exp Med Biol*, 551:311-8. [Link](#)
- Sangha S**, Scheibenstock A, Morrow R, Lukowiak K (2003). Extinction requires new RNA and protein synthesis and the soma of the cell RPeD1 in *Lymnaea stagnalis*. *J Neurosci*, 23:9842-9851. [Link](#)
- Sangha S**, Scheibenstock A, Lukowiak K (2003). Reconsolidation of a long-term memory in *Lymnaea* requires new protein and RNA synthesis and the soma of RPeD1. *J Neurosci*, 23:8034-8040. [Link](#)
- Sangha S**, Morrow R, Smyth K, Cooke R, Lukowiak K (2003). Cooling blocks ITM and LTM formation and preserves memory. *Neurobiol Learn Mem* 80:130-139. [Link](#)
- Sangha S#**, McComb C#, Lukowiak K (2003). Forgetting and the extension of memory in *Lymnaea*. *J Exp Biol* 206:71-77. # contributed equally [Link](#)
- Sangha S**, Scheibenstock A, McComb C, Lukowiak K (2003). Intermediate and long-term memories of associative learning are differentially affected by transcription vs. translation blockers in *Lymnaea*. *J Exp Biol* 206:1605-1613. [Link](#)
- Lukowiak K, Haque Z, Spencer G, Varshay N, **Sangha S**, Syed N (2003). Long-term memory survives nerve injury and the subsequent regeneration process. *Learn Mem* 10:44-54. [Link](#)
- Lukowiak K, **Sangha S**, Scheibenstock A, Parvez K, McComb C, Rosenegger D, Varshney N, Sadamoto H (2003). Molluscan model systems: In search for the engram. *J Physiol Paris*, 97:69-76. [Link](#)
- Lukowiak K, **Sangha S**, McComb C, Varshney N, Rosenegger D, Sadamoto H, Scheibenstock A (2003). Associative learning and memory in *Lymnaea stagnalis*: how well do they remember? *J Exp Biol* 206: 2097-2103. [Link](#)
- McComb C#, **Sangha S#**, Quadry S, Yue J, Scheibenstock A, Lukowiak K (2002). Context extinction and concurrent context associative learning in *Lymnaea*. *Neurobiol Learn Mem* 78:23-34. # contributed equally. [Link](#)
- Sangha S#**, McComb C#, Scheibenstock A, Johannes C, Lukowiak K (2002). The effects of continuous vs. partial reinforcement schedules on associative learning, memory and extinction in *Lymnaea*. *J Exp Biol* 205:1171-1178. # contributed equally. [Link](#)
- Smyth K, **Sangha S**, Lukowiak K (2002). Gone but not forgotten: The lingering effects of intermediate term memory on the persistence of LTM. *J Exp Biol* 205:131-140. [Link](#)

- **EDITED BOOK**

- Sangha, S.\***, Foti, D.\* (2018). *Neurobiology of Abnormal Emotion and Motivated Behaviors: Integrating Animal and Human Research*. 1<sup>st</sup> edition. Cambridge, Massachusetts: Academic Press. [Link](#) *Nominated for a Prose Award for Excellence in Reference Works by the Association of American Publishers.*

- **COMMENTARIES**

- Sangha S\*** (2007). Erasing Memories. *J Exp Biol* 210(23): v-a. [Link](#)
- Sangha S\*** (2007). Neurons vie for Recruitment. *J Exp Biol* 210(17): v [Link](#)
- Sangha S\*** (2007). Keeping the Memory Alive. *J Exp Biol* 210(11): vii. [Link](#)
- Sangha S\*** (2007). Unlocking Learning. *J Exp Biol* 210(3): v. [Link](#)
- Sangha S\*** (2006). I Feel Your Pain. *J Exp Biol* 209(21): iv. [Link](#)
- Sangha S\*** (2006). Hopping for Wheaties. *J Exp Biol* 209(15): vi. [Link](#)
- Sangha S\*** (2006). First and only love. *J Exp Biol* 209(9): v-a. [Link](#)
- Sangha S\*** (2006). Less studying, better memory? *J Exp Biol* 209(3): vii. [Link](#)
- Sangha S\*** (2005). Moving without dopamine. *J Exp Biol* 208 (21), v. [Link](#)
- Sangha S\*** (2005). Pass the remote please. *J Exp Biol* 208(15), v. [Link](#)

**Sangha S\*** (2005). The synapse that lost the battle. *J Exp Biol* 208(8), vi. [Link](#)

**Sangha S\*** (2005). Competing memories. *J Exp Biol* 208(3), vi. [Link](#)

## **INVITED TALKS: EDUCATIONAL INSTITUTIONS & CONFERENCES**

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2021

- *Crick Lecture Series*. University of Evansville, Department of Psychology. Evansville IN.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Puerto Vallarta, Mexico (Virtual)

2019

- University of Wisconsin Milwaukee, Department of Psychology. Milwaukee WI.
- Indiana University School of Medicine, Stark Neuroscience Research Institute. Indianapolis IN.
- Boston College, Psychology Department. Boston MA.
- *Annual Fall Symposium of the Center for Research on Brain, Behavior, and NeuroRehabilitation*. West Lafayette IN.
- *Annual Meeting of the Society for Neuroscience*. Chicago IL.
- *Annual Meeting of the Pavlovian Society*. Vancouver Canada.
- *Gordon Research Conference: Amygdala function in emotion, cognition and disease*. Easton, MA.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Cairns Australia.

2018

- *Neuroscience Alumnus of the Year Award Talk*. University of Calgary, Hotchkiss Brain Institute. Calgary Canada.
- University of Saskatchewan, Department of Physiology. Saskatoon Canada.
- Purdue University, Department of Biological Sciences. West Lafayette IN.
- Purdue University, Department of Psychological Sciences, Social Colloquium. West Lafayette IN.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Boca Raton FL.
- *Annual Meeting of the Canadian Association of Neuroscience*. Vancouver Canada.
- *Annual Meeting of the Organization for the Study of Sex Differences*. Atlanta GA.
- *Winter Conference on the Neurobiology of Learning & Memory*. Park City UT.

2017

- Purdue University, Department of Psychological Sciences, Clinical Colloquium. West Lafayette IN.
- Purdue Institute for Integrative Neuroscience, Summer Seminars. West Lafayette IN.
- *Annual Meeting of the Pavlovian Society*. Philadelphia PA.
- *International Conference on Brain Plasticity linking Molecules, Cells & Behavior*. Magdeburg Germany.

2016

- Universität Tübingen, Centrum für Integrative Neurowissenschaften. Tübingen, Germany.
- Deutsches Zentrum für Neurodegenerative Erkrankungen. Bonn, Germany.
- Universität Münster, Institut für Neurophysiologie. Münster, Germany.
- *Annual Meeting of the Federation of the European Neuroscience Society*. Copenhagen Denmark.

2015

- *Annual Meeting of the International Behavioral Neuroscience Society*. Victoria Canada.

2014

- IUPUI, Alcohol Research Group. Indianapolis IN.
- Purdue University, Department of Psychological Sciences, Behavioral Neuroscience Colloquium. West Lafayette IN.
- IUPUI, Department of Psychology. Indianapolis IN.
- *Annual Meeting of the Indianapolis Society for Neuroscience*. Indianapolis IN.