

MARSHA R. PENNER, PHD

Telephone: 919.451-4226

Email: marsha.penner@gmail.com

EDUCATION

Doctor of Philosophy , University of Arizona, Tucson Arizona	2008
Major field of study: Neuroscience	
Dissertation: <i>Subregion specific changes in immediate-early genes in the aged hippocampus</i>	
Faculty Mentor: Carol A. Barnes	
Master of Science , Dalhousie University, Halifax, Nova Scotia	2001
Major field of study: Pharmacology & Neuroscience	
Thesis: <i>Characterization of NGFI-A and the dendritic immediate-early gene Arc in the hippocampus of rapidly kindled rats</i>	
Faculty Mentor: Harold A. Robinson	
Bachelor of Arts Honors , University of Winnipeg, Winnipeg, Manitoba	1998
Major field of study: Psychology	
Thesis: <i>Differences in spatial performance: effects related to the menstrual cycle</i>	
Faculty Mentor: Kathryn J. Schultz	

PROFESSIONAL EXPERIENCE

Visiting Teaching Assistant Professor	Fall 2019
Department of Biology	
University of North Carolina-Chapel Hill	
Teaching Assistant Professor, Associate Director of Neuroscience Curricula	2013-2019
Department of Psychology & Neuroscience	
University of North Carolina-Chapel Hill	
Lecturer & Research Associate	2010-2013
Department of Psychology	
University of Washington	

HONORS and AWARDS

Tanner Award for Excellence in Undergraduate Teaching	2019
<i>Campus-wide award</i>	
Teaching commendation, UNC Department of Psychology and Neuroscience	2018
UNC Office of the Provost Engaged Teaching Award Nominee	2018
Teaching commendation, UNC Department of Psychology and Neuroscience	2017
Carolina Center for Public Service Robert E. Bryan Faculty Public Service Award	2017
<i>Campus-wide award</i>	
Johnston Excellence in Teaching Award	2017
<i>Campus-wide award</i>	
Invited plenary talk at the Faculty for Undergraduate Neuroscience Education meeting	2017
<i>"Inclusive Teaching: Strategies for Improving Equity in the Classroom"</i>	
Teaching commendation, UNC Department of Psychology and Neuroscience	2016

Teaching commendation, UNC Department of Psychology and Neuroscience	2015
Undergraduate Research Mentor Award, University of Washington	2013
<i>A campus-wide student nominated award</i>	
Ellison Foundation Woods Hole Fellowship	2004
Society for Neuroscience Chapters/Eli Lilly Graduate Student Travel Award	2002
Epilepsy Canada Beth Parker Research Fellowship	2000
Presidential Teaching Award nominee, Dalhousie University	2000
Dalhousie Graduate Student Fellowship, Dalhousie University	1999, 2000
NIH travel award	1999
Queen Elizabeth II Summer Student Research Fellowship, QEII HSC, Halifax	1999
Student of Distinction, University of Winnipeg	1997, 1998
Board of Regents Entrance Scholarship, University of Winnipeg	1994

TEACHING ACTIVITIES

University of North Carolina-Chapel Hill (2013-2019)

- Fundamentals of Human Anatomy and Physiology (BIOL 252)
 - Fall 2019
- Methods of Detection (PSYC089/AMST089)
 - Spring 2019
- Biopsychology (PSYC220, 220H, 220W)
 - Summer Session II 2018 (220W) ONLINE
 - Spring 2018 (220)
 - Summer Session II 2017 (220W) ONLINE
 - Fall 2015 (220)
 - Summer Session II 2015 (220)
 - Spring 2015 (220)
 - Fall 2015 (220)
 - Summer Session I 2014 (220)
 - Spring 2014 (220)
 - Spring 2014 (220H)
- Learning (PSYC222, 222H)
 - Spring 2018 (222)
 - Fall 2016 (222)
 - Spring 2016 (222H)
- Introduction to Neuroscience (PSYC390, 315, 175)
 - Fall 2018 (175)
 - Fall 2017 (315)
 - Fall 2016 (315)
 - Fall 2015 (315)
 - Fall 2014 (315)
 - Fall 2013 (390)
- History of Neuroscience (PSYC415, 490)
 - Fall 2018 (415)

- Spring 2017 (415)
- Spring 2015 (490)

- Neural Connections: Hands-on Neuroscience APPLES service-learning (PSYC424)
 - Spring 2019
 - Spring 2018
 - Spring 2017
 - Spring 2016

- Neuroscience, Society, and the Media (PSYC 428)
 - Spring 2019
 - Spring 2017
 - Spring 2016

- Neurobiology of Learning and Memory (PSYC437, 490)
 - Fall 2017 (437)
 - Fall 2016 (437)
 - Fall 2015 (437)
 - Spring 2015 (437)
 - Fall 2014 (437)
 - Spring 2014 (490)
 - Fall 2013 (490): 2 sections

Lecturer – University of Washington (2010-2013)

- Psychobiology of Aging
 - Spring 2013

- Neurobiology of Learning and Memory
 - Spring 2013
 - Fall 2012

Graduate Teaching Assistant – Dalhousie University (2000, 2001)

- Introduction to Biology

Undergraduate Honors Students Mentored, University of North Carolina-Chapel Hill

2018-2019 Haley Kirse, Amanda Kessler, Emily Thompson, Anna Zhao, Gabby Jeifa

- These undergraduate students worked with me as a research consultant team funded via the UNC Quality Enhancement Plan and the Office of Undergraduate Research. We investigated the use of escape rooms to teach scientific literacy skills.

2018-2019 Matthew Mattoni, CSTART Honors student

- Faculty Teaching mentor for the course: *Neuroscience: Methodologies and Implications*

2015-2016 Shannon Powers, CSTART Honors student;

- Faculty Teaching mentor for the course: *Neuroscience in the 21st Century*

Honors Thesis Committees, Department of Psychology & Neuroscience, University of North Carolina-Chapel Hill

2018 Savita Maddan

- Honors Thesis: *The Influence of Motivational Systems and Affectivity in Substance Use Outcomes*

2017 Sarah Jessup

- Honors Thesis: *Anxiety Sensitivity and Posttraumatic Stress Symptoms in Sexual Assault Survivors*

2016 Mary Whatley

- Honors Thesis: *Does Apparent Hand Size Affect Thermal Pain Perception?*

2014 Scott Oppler

- Honors Thesis: *The Role of Ventral Striatal Dopamine in Reward Valuation Sensitivity*

Undergraduate Students Mentored, Department of Psychology, University of Washington (2010-2013)

Jenna Shrewsbury, Undergraduate student, Mary Gates Scholar 2012-2013

Meilin Jai-Richards, Undergraduate student, Mary Gates Scholar 2012-2013

Nile Graddis, Undergraduate Honors student, Mary Gates Scholar 2011-2013

Tom Coleman, Undergraduate Honors student, Mary Gates Scholar 2010-2012

Josh Larkin, Undergraduate student, Mary Gates Scholar 2010-2012

Jack Clearman, Undergraduate summer student, 2012

Lindsey Kishline, Undergraduate summer student 2012

SELECTED TRAINING

Accessibility in the Classroom, NC State University	2019
IMPACTS Science Communication Fellow, Morehead Science Center	2019
HHMI and NSF Summer Institute Science Teaching Mentor, UNC-CH	2018, 2019
Course-based Undergraduate Research Experiences (CURE) Institute, North Carolina Central University	2018
HHMI and NSF Summer Institute Science Teaching Fellow, UNC-CH	2017
Undergraduate Neuroscience Education: Activities, Laboratories and Best Practices for Developing, Assessing and Sustaining Inclusive Curricula, Dominican University	2017
Inclusive Teaching Training, UNC Office of Instructional Development	2017
Safe Zone Certified (LGBTQ awareness training), UNC-CH	2017
Summer School technology training workshops, UNC-CH	2015
Service-learning course development offered through APPLES and the Center for Public Service	2015
Several Faculty Learning Communities offered through the Center for Faculty Excellence, UNC	2015-2019

GRANTS

UNC Quality Enhancement Plan CURE Award (\$5,000)	2019
UNC Quality Enhancement Plan Undergraduate Research Consultant Award (\$5,000)	2018
UNC Quality Enhancement Plan Integrated Curricula Award (w/Michelle Robinson, \$10,000)	2018
UNC Systems Challenge Grant (\$2,000)	2018
APPLES Course Enhancement Grant (\$500)	2018
Summer School Course Development Grant (\$3,000)	2016
UNC Quality Enhancement Plan Makerspace Integration Award (\$5,000)	2017
Center for Faculty Excellence 100+ Large Course Redesign (\$5,000)	2014
APPLES Service-Learning Course Development (\$3,000)	2014

SELECTED SERVICE

Associate Director of Neuroscience Curricula	2018-2019
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Chair, UNC Education Policy Committee	2018-2019
Academic Advisory Council, Ackland Art Museum	2018-2019
Dual Degree and Degree Hierarchy Working Group	2018-2019
Priority Registration Advisory Committee	2018
University Teaching Awards, Chair of the Johnston University Teaching Award Committee	2018
UNC Neuroscience Executive Advisory Committee	2017, 2018
UNC Faculty Governance, Education Policy Committee	2017-2019
Faculty Mentor, Carolina Scholars	2017-2019
Liaison, Office of Undergraduate Research	2017-2018
New Faculty Orientation, facilitator	2017, 2018
University Teaching Awards, Lifetime Mentor Award committee	2017
Faculty Advisor, Neural Connections student group	2016-2019
Liaison, Office of Instructional Innovation	2016-2019
Faculty Advisor, IMPULSE	2015-2019
THRIVE Retention Workgroup	2016
Project Uplift	2016
Director of Undergraduate Research in Psychology and Neuroscience	2015-2018
Triangle Society for Neuroscience, Outreach Committee	2015-2017
Interviewer, Chancellor's Science Scholars	2015, 2016, 2017, 2018, 2019
Faculty Advisor, Carolina Neuroscience Club	2013-2019

BOOKS & CHAPTERS

Penner, M.R. & Barnes, C.A. (2007). Memory Changes with Age: Neurobiological Correlates. In *Learning and Memory: A Biological View* (Martinez J.L. & Kesner K., eds.), pp. 483-517. San Diego: Academic Press.

REFEREED PAPERS/ARTICLES

- Penner, M.R.** (2018). Building an Inclusive Classroom. *J Undergrad Neurosci Educ.* 16: A268-A272.
- Tryon, V.L., **Penner, M.R.**, Heide, S.W., King, H.O., Larkin, J., Mizumori, S.J. (2017) Hippocampal neural activity reflects the economy of choices during goal-directed navigation. *Hippocampus*, 27: 743-758.
- Penner, M.R.**, Parrish, R.R., Hoang, L.T., Roth, T.L., Lubin, F.D., Barnes, C.A. (2016) Age-related changes in Egr1 transcription and DNA methylation within the hippocampus. *Hippocampus*, 26:1008-1020.
- Chawla, M.K., **Penner, M.R.**, Olson, K.M., Sutherland, V.L., Mittelman-Smith, M.A., Barnes, C.A. (2013). Spatial behavior and seizure-induced changes in c-fos mRNA expression in young and old rats. *Neurobiology of Aging*, 34:1184-98.
- Penner, M.R.** & Mizumori, S.J. (2012). Age-associated changes in the hippocampal-ventral striatum-ventral tegmental loop that impact learning, prediction, and context discrimination. *Frontiers in Aging Neuroscience*, 4:2.
- Penner, M.R.** & Mizumori, S.J. (2012). Neural systems analysis of decision making during goal directed navigation. *Progress in Neurobiology*, 96:96-135.
- Penner, M.R.**, Roth, T.L., Chawla, M.K., Hoang, L.T., Roth, E.D., Lubin, F.D., Sweatt, D.J., Worley, P.F. & Barnes, C.A. (2011) Age-related changes in *Arc* transcription and DNA methylation within the hippocampus. *Neurobiology of Aging*, 32, 2198-2210.
- Penner, M.R.**, Roth TL, Barnes CA, Sweatt JD. (2010). An epigenetic hypothesis of aging-related cognitive dysfunction. *Frontiers in Aging Neuroscience*, 2:9.
- McGlone, J., Valdivia, I., **Penner, M.**, Williams, J., Sadler, R.M. & Clarke, D.B. (2008). Quality of life and memory after vagus nerve stimulator implantation for epilepsy. *Canadian Journal of Neurological Sciences*, 35:287-96.

- Burkes, S.N., Chawla, M.K., **Penner, M.R.**, Crowell, B.E., Worley, P.F., McNaughton, B.L. & Barnes, C.A. (2005). Differential encoding of behavior and spatial context in deep and superficial layers of the neocortex. *Neuron*, 45, 667-674.
- Pinaud, R., Tremere, L.A., **Penner, M.R.**, Hess, F., Robertson, H.A. & Currie, R.W. (2002). Plasticity-driven gene expression in the rat retina. *Molecular Brain Research*, 98, 93-101.
- Pinaud, R., Tremere, L.A., **Penner, M.R.**, Robertson, H.A. & Currie, R.W. (2002). Complexity of sensory environment drives the expression of candidate-plasticity gene, nerve growth factor induced-a. *Neuroscience*, 112, 573-582.
- Penner, M.R.**, McFadyen, M.P., Pinaud, R., Carrey, N., Robertson, H.A. & Brown, R.E. (2002). Age-related distribution of C-fos expression in the striatum of CD-1 mice after acute ritalin administration. *Developmental Brain Research*, 135, 71-77.
- Penner, M.R.**, McFadyen, M.P., Carrey, N. & Brown, R.E. (2001). Methylphenidate hydrochloride does not affect ultrasonic vocalizations or neuromotor development of 3-11 day old mouse pups. *Developmental Psychobiology*, 39, 216-228.
- Pinaud, R., **Penner, M.R.**, Robertson, H.A. & Currie, R.W. (2001). Upregulation of the immediate early gene ARC in response to environmental enrichment: Implications for molecular plasticity. *Molecular Brain Research*, 91, 50-56.
- Penner, M.R.**, Pinaud, R. & Robertson, H.A. (2001). Rapid kindling of the dorsal hippocampus provides neuroprotection against damage associated with status epilepticus. *Neuroreport*, 12, 453-457.
- Pinaud, R., Tremere, L.A. & **Penner, M.R.** (2000). Light-induced zif268 expression is dependent on noradrenergic input in rat visual cortex. *Brain Research*, 882, 251-255.

SELECTED REFEREED ABSTRACTS AND PRESENTATIONS

- Penner, M.R.** Inclusive Teaching: Strategies for Improving Equity in the Classroom. Invited plenary talk at the Faculty for Undergraduate Neuroscience meeting, Dominican University, 2017.
- Penner, M.R.**, Lebonville, C.L., Brosso, S.N., Ulrich, E.I., Powers, S. Neural Connections: A Service-Learning Undergraduate Class. Presented at Society for Neuroscience, Washington D.C., Nov 2017.
- Penner, M.R.** & Giovanello, K. Teaching undergraduate students how to "think like a neuroscientist" using a flipped classroom approach. Presented at the *Society for Neuroscience*, Chicago, IL, 2016.
- Penner, M.R.**, Larkin, J., Tryon, V. & Mizumori, S.J.Y. Hippocampal pyramidal cell activity is modulated by changes in reward context on a decision-making maze. Presented at *Society for Neuroscience*, New Orleans, LA, 2012.
- Tryon, V., Brumm, L.L., **Penner, M.R.** & Mizumori, S.J.Y. A role for the periaqueductal gray in reward related processing. Presented at *Society for Neuroscience*, New Orleans, LA, 2012.
- Coleman, T.J., Graddis, N.S.W., **Penner, M.R.** & Mizumori, S.J.Y. Attenuation of phasic firing by dopamine neurons affects decision making on a spatial task. Presented at *Society for Neuroscience*, New Orleans, LA, 2012.
- Penner, M.R.**, Jaramillo, D., Larkin, J., Pettet, M.W. & Mizumori, S.J.Y. A role for the periaqueductal grey in probabilistic reward-related learning. Poster presented at *Society for Neuroscience*, Washington, DC, 2011.
- Penner, M.R.**, Hoang, L.Y., Thome, A., Lister, J.P., Wann, E.G. & Barnes, C.A. Age-related changes in the plasticity of the Arc transcriptional response. Poster presented at the *Society for Neuroscience*, San Diego, CA, 2010.
- Penner, M.R.**, Roth, T.L., Hoang, L.T., Roth, E.D., Sweatt, J.D. & Barnes, C.A. DNA methylation of zif268 is not dynamically regulated within the aged hippocampus following spatial behavior. Poster presented at the *Society for Neuroscience*, Chicago, IL, 2009.
- Buzzetti, R., **Penner, M.R.**, Hoang, L.T., Lister, J.P. & Barnes, C.A. Arc transcriptional responses are modulated by degree of context familiarity. Poster presented at the *Society for Neuroscience*, Chicago, IL, 2009.
- Chawla, M.K., **Penner, M.R.**, Olsen, K. & Barnes, C.A. Maximal electro-convulsive shock induced c-fos mRNA expression is reduced in the hippocampus of aged rats. Poster presented at the *Society for*

Neuroscience, Chicago, IL, 2009.

- Pleil, K.E., **Penner, M.R.**, Glenn, M.J., & Williams, C.L. Expression of the immediate-early genes c-Fos and Arc reveal distinct mechanisms in the hippocampus and striatum of female rats during place and response navigation. Poster presented at the *Society for Neuroscience*, Chicago, IL, 2009.
- Williamson, L.L., **Penner, M.R.**, Glenn, M.J., & Williams, C.L. Age-related changes in hippocampal ensemble activity are attenuated by prenatal choline supplementation in rats. Poster presented at the *Society for Neuroscience*, Chicago, IL, 2009.
- Penner, M.R.**, Hoang, L.T., Roth, T.L., Roth, E.D., Sweatt, J.D. & Barnes, C.A. DNA methylation of Arc in the hippocampus of memory-impaired aged rats. Poster presented at *Society for Neuroscience*, Washington, DC, 2008.
- Buzzetti, R., **Penner, M.R.**, Worley, P.F & Barnes, C.A. Reduced Arc transcription in CA1 pyramidal cells of aged, memory-impaired rats. Poster presented at *Society for Neuroscience*, Washington, DC, 2008.
- Penner, M.R.**, Milliken, H.L., Chawla, M.K., Worley, P.F & Barnes, C.A. Basal levels of several immediate-early genes are lower in the aged rat hippocampus versus the adult rat hippocampus. Poster presented at *Society for Neuroscience*, San Diego, CA, 2007.
- Penner, M.R.**, Milliken, H.L., Chawla, M.K., Worley, P.F & Barnes, C.A. No Evidence for Age-Associated Alterations in *zif268* mRNA Expression in CA1 Pyramidal Neurons. Poster presented at *Society for Neuroscience*, Atlanta, GA, 2006.
- Penner, M.R.**, Milliken, H.L, Chawla, M.K., Worley, P.F. & Barnes, C.A. Arc gene expression in the entorhinal cortex and CA3 field of aged rats versus adult rats following environmental exploration. Poster presented at *Society for Neuroscience*, Washington, DC, 2005.
- Marrone, D.F., Chawla, M.K., **Penner, M.R.**, Schaner, M.J., Lanahan, A., Worley, P.F. & Barnes, C.A. Behaviorally induced expression of neuropeptide γ and *arc* in young and aged rodents. Poster presented at *Society for Neuroscience*, Washington, DC, 2005.
- Penner, M.R.**, Chawla, M.K., Burke, S.N., Milliken, H.L., Schaner, M.J., Xiao, B., Worley, P.F. & Barnes, C.A. Levels of IEGs responsible for receptor trafficking are unchanged in the aged hippocampus. Poster presented at *Society for Neuroscience*, San Diego, CA, 2004.
- Penner, M.R.** & Burkes, S.N. From the metaphor to the model: A brief history of computational neuroscience and the search for the engram. Poster presented at *Society for Neuroscience*, San Diego, CA, 2004.
- Chawla, M.K., **Penner, M.R.**, Sutherland, V.L., Olson, K., Worley, P.F. & Barnes, C.A. Spatial-behavior induced *CFOS* mRNA levels in the hippocampus of young and memory impaired old rats. Poster presented at *Society for Neuroscience*, San Diego, CA, 2004.
- Burke, S.N., Chawla, M.K., **Penner, M.R.**, Schaner, M.J., Worley, P.F., McNaughton, B.L. & Barnes, C.A. Differential distribution of activity-dependent induced Arc RNA in deep and superficial lamina of the posterior parietal cortex. Poster presented at *Society for Neuroscience*, San Diego, CA, 2004.
- Penner, M.R.** & Burkes, S.N. (2004). A brief history of computational neuroscience: still searching for the engram. Poster presented at the *International Society for the History of Neuroscience*, Montreal, QC, June 2004.
- Penner, M.R.**, Chawla, M.K., Burke, S.N., Houston, F.P., Dees, J.A., Bohne, K.M., Meyer, R., Worley, P.F. & Barnes, C.A. ARC expression is more robustly increased in the CA fields of aged rats versus adult rats following environmental exploration. Poster presented at *Society for Neuroscience*, New Orleans, LA, November 2003.
- Burke, S.N., Chawla, M.K., **Penner, M.R.**, McNaughton, B.L. & Barnes, C.A. Distribution of activity-induced ARC RNA confirms place and movement encoding distinction between hippocampus and posterior parietal cortex. Poster presented at *Society for Neuroscience*, New Orleans, LA, November 2003.
- Penner, M.R.**, Chawla, M.K., Lanahan, A., Worley, P.F. & Barnes, C.A. Differences in coordinate expression of immediate-early genes following behavioral stimuli or seizure. Poster presented at *Society for Neuroscience*, Orlando, FL, November 2002.

- Valdivia, I., McGlone, J., Clarke, D., Sadler, M. & **Penner, M.** (2002) Quality of life (QOL), depression and seizure frequency did not change after one year of vagal nerve stimulation. *Canadian Journal of Neurological Sciences*, 29, (Supplement 1) S14.
- Penner, M.R.**, Stanford, M., King, C. Salloum, D. & Schmidt, B. Let's Talk Science Partnership Program. Poster presented at *Society for Neuroscience*, San Diego, CA, November 2001.
- Penner, M.R.**, Pinaud, R., Kutcher, M.R., Currie, R.W. & Robertson, H.A. Rapid Kindling Induces an Upregulation of Arc mRNA in the Rat Dentate Gyrus. Poster presented at *Society for Neuroscience*, San Diego, CA, November 2001.
- Pinaud, R., **Penner, M.R.**, Robertson, H.A. & Currie, R.W. Exposure to an Enriched Environment Upregulates the Expression of the Immediate Early Gene Arc in the Rat Brain. Poster presented at *Society for Neuroscience*, San Diego, CA, November 2001.
- Tremere, L.A., Pinaud, R., **Penner, M.R.**, Hess, F.F., Robertson, H.A. & Currie, R.W. Plasticity-Driven Gene Expression in the Rat Retina. Poster presented at *Society for Neuroscience*, San Diego, CA, November 2001.
- Penner, M.R.**, McFadyen, M.P., Pinaud, R., Robertson, H.A. & Brown, R.E. C-fos Expression After Acute Ritalin Administration Across Different Stages of Development. Paper presented at the *International Society of Developmental Psychobiology*, New Orleans, LA, November 2000 (NIH travel award).
- Penner, M.R.** & Robertson, H.A. Rapid Kindling of the Dorsal Hippocampus is Neuroprotective Against Kainic Acid-Induced Status Epilepticus. Poster presented at *Society for Neuroscience*, New Orleans, LA, November 2000.
- McFadyen, M.P., **Penner, M.R.**, Carrey, N. & Brown, R.E. Early Postnatal Exposure to Methylphenidate Does Not Alter Later Behavior in the Open Field, Elevated Plus Maze, or Water Maze. Presented at the *International Society of Developmental Psychobiology*, New Orleans, LA, November 2000.
- Penner, M.R.**, McFadyen, M.P., Carrey, N. & Brown, R.E. Effects of Chronic Methylphenidate Hydrochloride (Ritalin) Administration in 3-11 Day Old Mouse Pups. Presented at the *Canadian College of Neuropsychopharmacology*, Halifax, NS June 1999.
- Penner, M.R.**, McFadyen, M.P., Carrey, N. & Brown, R.E. Effects of Ritalin Administration on Early Postnatal Development and Ultrasonic Vocalizations in Mice. Presented at the *International Society of Developmental Psychobiology*, Coral Gables, FL, October 1999 (NIH travel award).
- Kelly, M.E., **Penner, M.**, McIntyre, D.C. & Robertson, H.A. Kindling-Induced Neuroprotection is Dependent in Site of Kindling. Presented at the *American Epilepsy Society*, Orlando, FL, December 1999.
- Penner, M.R.** & Schultz, K. Differences in Spatial Performance: Effects Related to the Menstrual Cycle. Presented at the *Prairie Undergraduate Conference*, Winnipeg, MB, May 1998.