**Angela R Freeman**

PhD

Cornell University

231 Uris Hall

Ithaca, NY 14851

Email: arf86@cornell.edu

**Current**

2017 – present Postdoctoral Research Associate, Department of Psychology, Cornell University

PI: A.G. Ophir

**EDUCATION**

2016 **Ph.D.** Biological Sciences - Physiology, Kent State University

Co-supervisors: H.K. Caldwell and J.F. Hare

2012 **M.Sc.** Biological Sciences, University of Manitoba, Canada

Supervisor: J.F. Hare

2008 **B. Environmental Studies**, Environment and Resource Studies, Biology Joint Honours, University of Waterloo, Canada

**AWARDS AND HONORS**

2019 Army Educational Outreach Program Grant $7,500

 (PI: Alexander Ophir, Mentor: **Angela Freeman**)

2017 Smithsonian Tropical Research Institute Short-term Fellowship $2,000

2015 – 2016 Kent State University Fellowship

2015 Kent State Graduate Student Symposium Oral Presentation Award $100

2015 Kent State Graduate Student Senate Research Award $1,600

2012 – 2015 NSERC, NSERC Post Graduate Scholarship D3 $63,000

2011 – 2012 Manitoba Graduate Scholarship $15,000

2011 Sigma XI Grant in Aid of Research $1,000

2011 American Ornithologists’ Union Student Membership Award

2010 – 2011 Roger Evans Memorial Scholarship, University of Manitoba $2,775

2010 – 2011 NSERC, NSERC Canada Graduate Scholarship M $17,500

2004 – 2008 Dean’s List for B. Environmental Studies

2008 “Program of the Term” Award, University of Waterloo Housing Department

2007 NSERC, NSERC Undergraduate Student Research Award $5,400

2007 Jack and Jean Nichol Award, University of Waterloo $1,000

2006 Night Tracking as a Research Tool in Flying Squirrel Studies, Co-operative Work Report Award, University of Waterloo $100

**SCHOLARLY AND CREATIVE WORKS**

**Publications and Manuscripts**

In revision/review

13 **Freeman, A.R**., Hare, J.F., Caldwell, H.K. *In review.* Auditory processing of alarm calls results in call-specific patterns of neural activation in Richardson’s ground squirrels. Submitted to Brain and Behavior.

12 **Freeman, A.R**., Ophir, A.G., Sheehan, M.J. *In review.* The giant pouched rat (*Cricetomys ansorgei*) olfactory receptor repertoire. bioRxiv 742668; doi: https://[doi.org/10.1101/742668](https://doi.org/10.1101/742668) In review at PLOS ONE.

Published/Accepted

11 **Freeman, A.R**., Aulino, E.A., Caldwell, H.K., Ophir, A.G. *In press.* Comparison of the distribution of oxytocin and vasopressin 1a receptors in rodents reveals conserved and derived patterns of nonapeptide evolution. Journal of Neuroendocrinology. doi: 10.1111/jne.12828

10 **Freeman, A.R**., Wood, T.J., Bairos-Novak, K.R., Anderson, W.G., Hare, J.F. (2019). Gone girl: Richardson’s ground squirrel offspring and neighbours are resilient to female removal. Royal Society Open Science, 6(9), 1-15.

9 **Freeman, A.R**., Hare, J.F., Caldwell, H.K. (2019)*.* Central distribution of oxytocin and vasopressin 1a receptors in juvenile Richardson’s ground squirrels. Journal of Neuroscience Research, 97(7), 772-789.

8 **Freeman, A.R**., Sheehan, M.J., Ophir, A.G. (2019). Anogenital distance predicts sexual odor preference in African giant pouched rats. Animal Behaviour, 148, 123-132.

7 **Freeman, A.R**., Ophir, A.G. (2018)*.* Scent marking behavior of the southern giant pouched rat (*Cricetomys ansorgei*). Journal of Mammalogy, 99(6), 1430-1435.

6 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2018). Effects of arginine vasopressin on Richardson’s ground squirrel social and vocal behavior. Behavioral Neuroscience, 132(1), 34-50.

5 Bairos-Novak, K.R., Ryan, C.P., **Freeman, A.R**., Anderson, W.G., Hare, J.F. (2017). Like mother, like daughter: inheritance of Richardson’s ground squirrel (*Urocitellus richardsonii*) cortisol stress response. Current Zoology, 64(2), 153-163.

4 Morales-Medina, J.C., Iannitti, T., **Freeman, A.R.**, Caldwell, H.K. (2017). The olfactory bulbectomized rat as a model of depression: the hippocampal pathway. Behavioral Brain Research, 317, 562-575.

3 Caldwell, H.K., Aulino, E.A**., Freeman, A.R**., Miller, T.V., Witchey, S.K. (2016). Oxytocin and behavior: Lessons from knockout mice. Developmental Neurobiology, 77(2), 190-201.

2 **Freeman, A.R.,** Hare, J.F. (2015). Infrasound in Mating Displays: A Peacock’s Tale. Animal Behaviour, 102, 241-250.

1 **Freeman, A.R.,** Hare, J.F. (2011). Infrasound in the flutter-jump display of Capercaillie (*Tetrao urogallus*): signal or artefact? Journal of Ornithology, 152(3), 815-816.

**Theses/Dissertation**

3 **Freeman, A**. (2016). Vasopressin and Social Behavior in Richardson’s ground squirrels. Kent State University. Prepared as a part of the requirements for the Ph.D.

2 **Freeman, A**. (2012). Infrasonic and Audible Signals in Male Peafowl (Pavo cristatus) Mating Displays. University of Manitoba. Prepared as a part of the requirements for the M.Sc. degree.

1 **Freeman, A**. (2008). The Effect of Coarse Woody Debris on Species Diversity in the Boreal Forest. University of Waterloo. Prepared as a part of the requirements for the B.E.S. degree.

**Reports**

3 **Freeman. A.** (2007). The Effect of Climate Change on the Snow Bunting Population in Fergus, Ontario. University of Waterloo. Prepared as a part of the requirements for the Co-op Education Program.

2 **Freeman, A.** (2006). Night Tracking as a Research Tool in Flying Squirrel Studies. University of Waterloo. Prepared as a part of the requirements for the Co-op Education Program.

1 **Freeman, A**. (2005). Parasitism of Greenhouse Whitefly across Three Experimental Scales. University of Waterloo and Agriculture and Agri-food Canada. Prepared as a part of the requirements for the Co-op Education Program.

**Presentations and Abstracts**

Invited

7 **Freeman, A.R.** (2019). Context and recognition: How do social animals understand each other? Smithsonian Tropical Research Institute, Animal Behavior Talk Series, Panama City, Panama. October 15, 2019.

6 **Freeman, A.R.** (2019). Richardson’s ground squirrel communication: Neural mechanism and function. Asa Gray Lecture Series, Utica College, Utica, NY. September 9, 2019.

5 **Freeman, A.R.** (2019). Weird Science: Accidental discoveries in animal behavior. Science on Tap Lecture Series, Ithaca, NY. June 26, 2019.

4 Hiura, L.C., **Freeman, A.R.** (2018). Getting involved in psychological research. Co-hosted by Pre-Medical Minority Mentorship Program (PreM3) and the Black Bio-medical and Technical Association (BBMTA). Ithaca, NY. November 27, 2018.

3 **Freeman, A.R.,** Sheehan, M.J., Ophir, A.G. (2018). Scent-detection of reproductive availability by African giant pouched rats. 35th Anniversary of the Institute of Biotechnology at Cornell University, Ithaca, NY.

2 **Freeman, A.R.**, Sheehan, M.J., Ophir, A.G. (2017). Smell the love: African giant pouched rats use olfactory cues to evaluate potential mates. STRI Tupper Talk, Panama.

1 **Freeman, A.R.** (2014). Protein synthesis. Invited lecture. Ohio Regional Albumin Conference, Akron, OH.

Presentations

\*\*= Supervised undergraduate students, ●= Supervised high school students

32 Choudhry, A.●, Lo, B.\*\*, **Freeman, A.R**., Ophir, A.G. (2020). Female African giant pouched rats scent mark at similar rates despite reproductive differences. Society for Integrative and Comparative Biology Annual Meeting, Austin, TX. *Published Abstract*

31 **Freeman, A.R**., Ophir, A.G., Sheehan, M.J. (2020). Doing more with less: African giant pouched rats specialize in olfaction with a typical olfactory receptor repertoire. Society for Integrative and Comparative Biology Annual Meeting, Austin, TX. *Published Abstract*

30 Lo, B.\*\*, **Freeman, A.R**., Singh, B., Choudhry, A.●, Place, N., Cheong, S.H., Ophir, A.G. (2019). The effect of estradiol on vaginal patency and scent marking in female African giant pouched rats. Developmental Biology New York 2019 Conference, November 16, 2019, Ithaca, NY.

29 **Freeman, A.R.,** Lee, D.N., Allen, J., Lerer, A., Singh, B., Blank, B., Jeffery, D., Cheong, S.H.,Ophir, A.G. (2019). Open for business: Some female pouched rats lack a vaginal opening; only those with open vaginas are choosy. Animal Behavior Society, Behaviour 2019, Chicago, IL.

28 Zheng, R.\*\*, Prisco, L.\*\*, **Freeman, A.R.,** Ophir, A.G. (2019). Social scent discrimination by African giant pouched rats. Cornell Undergraduate Psychology (CUP) Conference, Cornell University, Ithaca, NY.

27 Lo, B.\*\*, Arenas, S.\*\*, **Freeman, A.R.,** Ophir, A.G. (2019). Central distribution of vasopressin 1a receptor in the African giant pouched rat. Cornell Undergraduate Psychology (CUP) Conference, Cornell University, Ithaca, NY.

26 Arenas, S.\*\*, Lo, B.\*\*, **Freeman, A.R.,** Ophir, A.G. (2019). Central distribution of oxytocin receptor in the African giant pouched rat. Cornell Undergraduate Psychology (CUP) Conference, Cornell University, Ithaca, NY.

25 **Freeman, A.R.,** Ophir, A.G. (2019). The mystery of pouched rat reproduction. Department of Neurobiology and Behavior Lunch Bunch Series, Cornell University, Ithaca, NY.

24 **Freeman, A.R.,** Sheehan, M.J., Ophir, A.G. (2019). Anogenital distance predicts sexual odour preference in African giant pouched rats. Society for Integrative and Comparative Biology Annual Meeting, Tampa, FL.

23 Hare, J.F., Caldwell, H.K., **Freeman, A.R.** (2018). Situationally-specific Richardson’s gound squirrel (*Urocitellus richardsonii*) alarm calls communicate differential response urgency. Manitoba Neuroscience Network, Winnipeg, MB.

22 Kwon, H.\*\*, **Freeman, A.R**., Ophir, A.G. (2018). Female but not male African giant pouched rats exhibit individual recognition. Cornell Undergraduate Psychology (CUP) Conference, Ithaca, NY.

21 **Freeman, A.R.,** Hare, J.F., Caldwell, H.K. (2017). c-Fos expression following alarm call perception by Richardson’s ground squirrel. Society for Neuroscience, Washington, D.C.

20 **Freeman, A.R**., Sheehan, M.J., Ophir, A.G. (2017). Social and non-social odor discrimination by African giant pouched rats. 54th Annual Animal Behavior Society Conference, Scarborough, ON, Canada.

19 Aulino, E.A., **Freeman, A.R.,** Wiggins, R.D.\*\*, Caldwell, H.K. (2017). Maternal investment in vasopressin 1b receptor knockout mice. Kent State University Neuroscience Symposium, Kent, OH.

18 Bairos-Novak, K.R., Anderson, W.G., **Freeman, A.R.,** Ryan, C.P., Hare, J.F. (2016). Like mother, like matriline: quantification and inheritance of Richardson’s ground squirrel (*Urocitellus richardsonii*) stress responses. Prairie University Biology Symposium, Lethbridge, AB, Canada.

17 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2016). Sex-dependent effects of arginine vasopressin on Richardson’s ground squirrel social behavior and communication. Society for Neuroscience, San Diego, CA.

16 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2016). Central vasopressin and sex-dependent changes in Richardson’s ground squirrel social behavior and communication. Annual meeting of the Society for Behavioral Neuroendocrinology, Montreal, QC.

15 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2016). Sex-dependent effects of central vasopressin administration on Richardson’s ground squirrel social behavior. CISAB Conference, Indiana University, Bloomington, IA.

14 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). Arginine vasopressin influences the social behavior of free-living Richardson’s ground squirrels (*Urocitellus richardsonii*). Society for Neuroscience, Chicago, IL.

13 **Freeman, A.R.**, Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). Arginine vasopressin influences the social behavior of free-living Richardson’s ground squirrels (*Urocitellus richardsonii*). Society for Social Neuroscience, Chicago, IL.

12 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). Arginine vasopressin influences the social behavior of free-living Richardson’s ground squirrels (*Urocitellus richardsonii*). NEOSFN Poster Session, NEOMED, Ohio.

11 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). Conspecific‑context cues communication: vasopressin influences social behaviour of Richardson’s ground squirrels. Behaviour 2015: International Ethological Conference, Cairns, Australia.

10 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). I'm a runner, not a fighter: vasopressin influences predator vigilance and social aggression in Richardson's ground squirrels. Graduate Student Symposium, Kent State University, Ohio.

9 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). I’m a runner not a fighter: vasopressin influences vigilance and aggression in Richardson’s ground squirrel. Every Signal Thing: Mechanisms and evolution of animal communication symposium, CISAB Animal Behavior Conference, Bloomington, Indiana.

8 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). Vasopressin and social behaviour of Richardson’s ground squirrels. Biological Sciences departmental seminar, University of Manitoba, Winnipeg, Manitoba.

7 **Freeman, A.R.,** Hare, J.F., Anderson, W.G., Caldwell, H.K. (2015). I’m a runner not a fighter: arginine vasopressin reduces social aggression and increases predator vigilance behaviours in Richardson’s ground squirrel. Prairie University Biology Symposium, Winnipeg, Manitoba.

6 **Freeman, A.R.,** Anderson, W.G., Hare, J.F., Caldwell, H.K. (2014). Vasopressin affects social behavior in Richardson’s ground squirrel. Northeast Ohio Society for Neuroscience Poster Preview Conference, Ohio.

5 Hare, J.F., **Freeman, A.R.** (2013). Peacock train displays: An infrasonic tale. International Bioacoustics Congress. Pirenopolis, Brazil.

4 **Freeman, A.R.,** Hare, J.F. (2012). Acoustic properties and signals of the peacock’s display: How low can he go? 49th Annual Meeting of the Animal Behaviour Society. Albuquerque, New Mexico.

3 **Freeman, A.R.** (2011). Shiver me feathers: Infrasound and Indian Peafowl. Prairie University Biology Symposium. Saskatoon, Saskatchewan.

2 **Freeman, A.R.** (2010). Infrasound as a Signal in Mate Choice by Indian Peafowl. University of Manitoba, Crackerjack Lecture Series.

1 **Freeman, A.R.** (2008). The Effect of Coarse Woody Debris on Species Diversity in the Boreal Forest. University of Waterloo. Environment and Resource Studies Thesis Poster Presentation.

**TEACHING AND MENTORING EXPERIENCE**

**Cornell University**

 **Teaching**

2017 Guest Lecturer, Methods in Animal Behavior (BIONB 3230), Neurobiology and Behavior

**Students Supervised**

2019– Present Jackie Berman (Undergraduate, Biology)

2019– Present Alexandra Chaves (Undergraduate, Biology)

2019 Aumena Choudhry (High School, from Thomas Jefferson High School for Science and Technology)

2018 – Present Beverly Lo (Undergraduate, Biology)

2018 – 2019 Lauren Prisco (Undergraduate, Biology)

2018 – 2019 Rachel Zheng (Undergraduate, Animal Science) Current position: Masters student in Animal Science at Stanford

2018 Montserrat Cubilla (High School, from Paraguay Centro para el desarollo de la inteligencia)

2018 Emily Mao (High School, from Hong Kong International School)

2017 – Present Sam Arenas (Undergraduate, Animal Science)

2017 – 2019 Helen Kwon (Undergraduate, Sociology)

2018 Emily MacArthur (Professional Student, VetMed)

2017 – 2018 Janet Wang (Undergraduate, Psychology)

2017 Deepthi John (Undergraduate, Biology)

2017 Ebony Cadet (Undergraduate, Animal Sciences)

**Kent State University**

 **Teaching**

2015 Teaching Assistant, Lab Experience in Biology (BSCI 10003), Biological Sciences, Faculty of Science

2013 Guest Lecturer, Hormones and Behavior (BSCI 50519), Biological Sciences, Faculty of Science

2012 Guest Lecturer, Animal Behavior (BSCI 40515), Biological Sciences, Faculty of Science

**Students Supervised**

2015 – 2016 Rodrick Wiggins (Undergraduate, Biology (Pre-dental))

**University of Manitoba**

 **Teaching**

2012 Teaching Assistant, Behavioural Ecology & Cognitive Ethology (BIOL 4362), Biological Sciences, Faculty of Science

2011 Demonstrator, SAG-STAG (Special Activity Groups – Science Teacher Activity Group) workshop for high school science teachers, Winnipeg (Organizer: M. Shaw)

2011 Teaching Assistant, Biology of Birds (BIOL 4216), Biological Sciences, Faculty of Science

2010 – 2011 Teaching Assistant, Animal Behaviour (BIOL 3360), Biological Sciences, Faculty of Science

**Students Supervised**

2011 Gabrielle Macklin (Field Assistant, Undergraduate, Biology)

**Other**

2007 – 2008 Residence Don, University of Waterloo Housing Department, Waterloo, Ontario, Canada

**ADDITIONAL FIELD RESEARCH**

2014 Christmas Bird Count, Greater Akron Audubon Society

2011 – 2012 Annual Owl Survey (Manitoba Conservation) near Dugald, Manitoba

2010 Breeding Bird Surveyor near Gimli, Manitoba

2009 Field Assistant, University of Western Ontario (now Western University), Victoria, British Columbia, Canada. Supervisor: L. Zanette

2008 Lead Bird Bander, University of Montana, Arizona, U.S.A. Supervisor: J. Olson

2007 Field Assistant, University of Toronto, Kapuskasing, Ontario, Canada. Supervisor: J. Malcolm

2007 Apprentice bird bander (Master Bander: D. Lamble), Fergus, Ontario

2006 Volunteer, MAPS banding station, New Brunswick, Canada

2006 Volunteer, “Owl Prowl” owl survey outreach with Parks Canada, New Brunswick, Canada

2005 – 2006 Field Assistant, University of New Brunswick, Fundy National Park, New Brunswick, Canada. Supervisor: M. Smith

**COMMUNITY SERVICE AND MEMBERSHIPS**

**Science Outreach and Service**

2020 Session chair, Annual Society for Integrative and Comparative Biology meeting, Austin, TX

2019 Scientist volunteer, Letters to a Pre-Scientist pen pal program

2019 Mouse breeding consultant, Free Science Workshop, Ithaca, NY

2019 Skype a Scientist outreach program volunteer

 Participated with:

 Ethan A Chase Middle School, Menifee, CA

 STEM Middle Academy, Springfield, MA

2019 – 2020 Mentor in Mentor-Mentee program through the Society for Integrative and Comparative Biology

2018 – 2019 ‘Expanding Your Horizons’ program volunteer (Neurobiology workshop for 9th grade girls)

2017 Session moderator, 54th Annual Animal Behavior Society Conference, Scarborough, ON, Canada

**Institutional - Kent State University**

2015 Organizer/Host, Biology Graduate Student External Invited Speaker Seminar (S. Phelps)

2015 – 2016 Treasurer, Biology Graduate Student Association

2013 – 2016 Member, KSU Bird Club

2013 – 2014 Member, Scientista Foundation: KSU Chapter

2012 – 2015 Member, Kent State Freethinkers Club

2012 – 2016 Member, Kent State Neuroscience Journal Club

2012 – 2013 Volunteer, Conversation Partners Program, International Scholars and Student Services

**Institutional – University of Manitoba**

2012 Member, University of Manitoba Sustainability Committee

2011 – 2012 Member, Senate Committee on Admissions

2011 – 2012 Vice President Internal, Graduate Student Association

2011 – 2012 Chair, Graduate Student Association Finance Committee; Bylaws and Policy Committee; Indigenous Committee

2010 – 2011 Graduate Student Association Biological Sciences Representative

2010 – 2011 Chair, Graduate Student Association Internal Development and Review Committee

2010 – 2011 Graduate Student Association Representative, Biological Sciences Graduate Student Society

**Institutional - University of Waterloo**

2005 Member, Board of Governors, St. Paul’s College

2004 – 2007 Society President (final position held), Environmental Student Society

**Scientific Society Affiliations**

Society for Integrative and Comparative Biology

American Society of Mammalogists

Animal Behavior Society

Society for Neuroscience

Sigma XI

**Reviewer for the following journals**

Frontiers in Zoology, Ethology, Royal Society Open Science, Behavioral Ecology and Sociobiology

**Additional Memberships and Service**

2011 – 2012 Member and Volunteer, Club d’escalade St. Boniface (St. Boniface Alpine Club Chapter), Alpine Club of Canada.

2010 – 2012 Volunteer, Winnipeg Humane Society, Winnipeg, Manitoba

2006 – 2008 Board Member, Waterloo Public Interest Research Group, Waterloo, Ontario

2007 – 2008 Member, Waterloo Public Interest Research Group, Hiring Committee, Waterloo, Ontario

2008 Provincial Representative for Ontario Public Interest Research Group, Waterloo Public Interest Research Group, Waterloo, Ontario

**PERSONAL AND PROFESSIONAL DEVELOPMENT**

2019 Participant, NSF Reintegrating Biology Jumpstart

2019 Science Communication Workshop (Comm 5660), Cornell University

2018 Pathways to Success: A Professional Development Symposium for Graduate Students and Postdocs, Sponsored by: Cornell Graduate School, Center for the Integration of Research, Teaching and Learning (CU-CIRTL), and Broadening Experiences in Scientific Training (BEST), Cornell University, Ithaca, NY

2017 Professional development workshop: How to Submit Grants at Cornell - A Primer for Postdocs, Office of Sponsored Programs and Office of Postdoctoral Studies, Cornell University, Ithaca, NY

2017 Small mammal preparation workshop, Cornell University Museum of Vertebrates, Ithaca, NY

2017 Professional development workshop: How to get your NSF proposal funded, Office of Sponsored Programs and Office of Faculty Development and Diversity, Ithaca, NY

2007 Conflict Resolution Workshop, Waterloo Public Interest Research Group, Waterloo, Ontario, Canada.

**CREDENTIALS**

2018 Radiation safety training, Cornell University

2017 Animal Care Training, Cornell University

2016 Animal Care and Use Training, Kent State University

2016 Occupational Health and Safety Training, Kent State University

2014 Radiation Safety Training, Kent State University

2014 Radiation Safety Training, University of Manitoba

2012 Laboratory and Animal Care Use Course, Institutional Animal Care and Use Committee, Kent State University

2010 Animal User Training Course: Wildlife and Behavioural Sciences, Field, Non-Capture, University of Manitoba Central Animal Care

2007 – 2008 Standard First Aid and CPR Certificate, Canadian Red Cross

2003 – 2008 WHMIS trained