

## DR. BEN M. SADD

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### RESEARCH INTERESTS

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Host-parasite evolutionary ecology; host immune defense evolution; host-beneficial microbe interactions; ecological immunology; pollinator health; life-history investment

### CURRENT POSITION

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2023 – present Full Professor, Illinois State University, USA

### PRIOR POSITIONS

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2019 – 2023 Associate Professor, Illinois State University, USA  
2013 – 2019 Assistant Professor, Illinois State University, USA  
2011 – 2013 ETH Zürich (Switzerland) Senior Researcher (Oberassistent)  
2010 – 2011 Junior Fellow at the Wissenschaftskolleg zu Berlin, Germany  
Member of the focus group Limits to Disease Control  
2008 – 2010 ETH Zürich (Switzerland) Postdoctoral Assistant

### EDUCATION

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2004 – 2008 ETH Zürich, PhD, *The ecology of immune priming in a social context*.  
2000 – 2004 University of Sheffield M.Sc. (Hons.) in Zoology. Class I

### AWARDS

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2022 Outstanding College Researcher  
2021 Illinois State University Million Dollar Club  
2020 Promotion of Diversity STAR Award, Student Affairs, Illinois State University  
2018 Research Initiative Award, Illinois State University  
2010 – 2011 Fellowship at the Wissenschaftskolleg zu Berlin (WIKO) awarded by the European Society for Evolutionary Biology  
2009 ETH Medal for an Outstanding PhD Thesis

### PEER REVIEWED PUBLICATIONS

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68. Martinez, A, Calhoun, AC & Sadd, BM (accepted) Investigating the influence of diet diversity on infection outcomes in a bumble bee (*Bombus impatiens*) and microsporidian (*Nosema bombi*) host-pathogen system. *Frontiers in Insect Science*.  
67. \*Li, J, \*Sauers, L, \*Zhuang, D, Ren, H, Guo, J, Wang, L, Zhuang, M, Guo, Y, Zhang, Z, Wu, J, Yao, J, Yang, H, Huang, J, Wang, C, Lin, Q, Zhang, Z & Sadd, BM (2023) Divergence and convergence of gut microbiomes of wild insect pollinators. *mBio*. (\*Joint first authors)  
66. Rubén Martín-Blázquez, R, Calhoun, AC, Sadd, BM, & Cameron, SA (2023) Gene expression in bumble bee larvae differs qualitatively between high and low concentration imidacloprid exposure levels. *Scientific Reports*, 13, 9415.

65. McCormick, EC, Cohen, OR, Dolezal, AG, & **Sadd, BM** (2023) Consequences of microsporidian prior exposure for virus infection outcomes and bumble bee host health. *Oecologia*, 202, 325-335.
64. Rines, IG, Harrod, AE, Hunt, J, **Sadd, BM**, & Sakaluk, SK (2023) Disentangling effects of mating, nuptial gifts, and accessory gland proteins on reproduction in female crickets. *Animal Behaviour*, 196, 1-7.
63. Foquet, B, Rapkin, J, Sharma, M, **Sadd, BM**, Sakaluk, S, & Hunt, J (2023) Transcriptomic responses of females to consumption of nuptial food gifts as a potential mediator of sexual conflict in decorated crickets. *Journal of Evolutionary Biology*, 36, 183-194.
62. Goldberg, DL, **Sadd, BM**, Capparella, AP (2023) A rallid ballad: communal signaling is correlated with annual territoriality in the most duet-rich family of birds (Gruiformes: Rallidae). *Ornithology*, 140, ukac054.
61. Strange, JP, Colla, SR, Adams, LD, Duennes, MA, Evans, EC, Figueroa, LL, Lehmann, DM, Moylett, H, Richardson, L, **Sadd, BM**, Smith, JW, Smith, TA, Tripodi, AD, Spevak, EM & Inouye, DW (2023) An evidence-based rationale for a North American commercial bumble bee clean stock certification program. *Journal of Pollination Ecology*, 32, 1-13.
60. \*Figueroa, LL, \***Sadd, BM**, \*Tripodi, AD, Strange, JP, Colla, SR, Adams, LD, Duennes, MA, Evans, EC, Lehmann, DM, Moylett, H, Richardson, L, Smith, JW, Smith, TA, Spevak, EM & Inouye, DW (2023) Endosymbionts that threaten commercially raised and wild bumble bees (*Bombus* spp.). *Journal of Pollination Ecology*, 32, 14-36. (\*Joint first authors)
59. Evans, EC, Strange, JP, **Sadd, BM**, Tripodi, AD, Figueroa, LL, Adams, LD, Colla, SR, Duennes, MA, Lehmann, DM, Moylett, H, Richardson, L, Smith, JW, Smith, TA, Spevak, EM & Inouye, DW (2023) Ectoparasites, parasitoids, and hive products that are potentially deleterious to commercially raised and wild bumble bees (*Bombus* spp.). *Journal of Pollination Ecology*, 32, 37-53.
58. Duffield KR, Foquet, B, Stasko, JA, Hunt, J, **Sadd, BM**, Sakaluk, SK, & Ramirez, JL (2022) Induction of multiple immune signaling pathways in *Grylodes sigillatus* crickets during active viral infections. *Viruses*, 14, 2712.
57. Strange, JP, Colla, SR, Duennes, M, Evans, E, Figueroa, LL, Inouye, DW, Lehmann, DM, Moylett, H, Richardson, L, **Sadd, BM**, Smith, JW, Tripodi, AD & Adams, LD (2022) Developing a commercial bumble bee clean stock certification program: a white paper of the North American Pollinator Protection Campaign Bombus Task Force. *North American Pollinator Protection Campaign (NAPPC)*. [link](#)
56. Letendre, C, Duffield, KR, **Sadd, BM**, Sakaluk, SK, House, C & Hunt, J (2022) Genetic covariance in immune measures and pathogen resistance in decorated crickets *Grylodes sigillatus*. *Journal of Animal Ecology*, 91, 1471-1488.
55. Fowler, AE, **Sadd, BM**, Bassingthwaite, T, Irwin, RE & Adler, LS (2022) Consuming sunflower pollen reduced pathogen infection but did not alter measures of immunity in bumble bees. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 377, 20210160.
54. Duffield, KR, Hunt, J, **Sadd, BM**, Sakaluk, SK, Oppert, B, Rosario-Cora, K, Behle, R & Ramirez, JL (2021) Active and covert infections of cricket iridovirus and *Acheta domesticus* densovirus in reared *Grylodes sigillatus* crickets. *Frontiers in Microbiology*, 12, 780796.
53. Calhoun, AC, Harrod, AE, Bassingthwaite, TA & **Sadd, BM** (2021) Testing the multiple stressor hypothesis: Chlorothalonil exposure alters transmission potential of a bumblebee pathogen but not individual host health. *Proceedings of the Royal Society B: Biological Sciences*, 288, 20202922.
52. Hampton, KJ, Duffield, KR, Hunt, J, Sakaluk, SK & **Sadd, BM** (2021) Male and female genotype and a genotype-by-genotype interaction mediate the effects of mating on cellular but not humoral immunity in female decorated crickets. *Heredity*, 126, 477-490.
51. Sun, C, Huang, J, Wang, Y, ..., **Sadd, BM**, Hahn, M, Schaack, S, Barribeau, SM, Williams, PH, Waterhouse, RM, Mueller, RL (2021) Genus-wide characterization of bumblebee genomes provides insights into their evolution and variation in ecological and behavioral traits. *Molecular Biology and Evolution*, 38, 486-501.
50. Duffield, KR, Hampton, KJ, Houslay, TM, Rapkin, J, Hunt, J, **Sadd, BM** & Sakaluk, SK (2020)

Macronutrient intake and simulated infection threat independently affect life history traits of male decorated crickets. *Ecology and Evolution*. 10, 11766-11778.

49. Cameron, SA & **Sadd, BM** (2020) Global trends in bumble bee health. *Annual Review of Entomology*, 65, 209-232.

48. Wang, L, Wu, J, Li, K, **Sadd, BM**, Guo, Y, Zhuang, DH, Zhang, Z, Chen, YP, Evans, JD, Guo, J, Zhang, Z & Li, J (2019) Dynamic changes of gut microbial communities of bumble bee queens through important life stages. *mSystems*, 4, e00631-19.

47. Sauers, LA and **Sadd, BM** (2019) An interaction between host and microbe genotypes determines colonization success of a key bumble bee gut microbiota member. *Evolution*, 73, 2333-2342.

46. Ashford, MA, Palackdharry, SA, **Sadd, BM**, Bowden, RM & Vogel, LA (2019) Intestinal B cells in the red-eared slider turtle, *Trachemys scripta*: anatomical distribution and implications for ecological interactions with pathogenic microbes. *Journal of Experimental Zoology A*, 331, 407-415.

45. Sakaluk, SK, Oldziej, J, Hodges, C, Harper, J, Rines, I, Hampton, KJ, Duffield, KR, Hunt, J & **Sadd, BM** (2019) Effects of inbreeding on life history traits and sexual competency in decorated crickets. *Animal Behaviour*, 155, 241-248.

44. Tobin, KB, Calhoun, AC, Hallahan, MF, Martinez, A & **Sadd, BM** (2019) Infection outcomes are robust to thermal variability in a bumble bee host-parasite system. *Integrative and Comparative Biology*, 59, 1103-1113.

43. Duffield, KR, Hampton, KJ, Houslay, TM, Hunt, J, **Sadd, BM** & Sakaluk, SK (2019) Inbreeding alters context-dependent reproductive effort and immunity in male crickets. *Journal of Evolutionary Biology*, 32, 731-741.

42. Sakaluk, SK, Duffield, KR, Rapkin, J, **Sadd, BM** & Hunt, J (2019) The troublesome gift: the spermatophylax as a purveyor of sexual conflict and coercion in crickets. *Advances in the Study of Behavior*, 51, 1-30.

41. Zhao, X, Su, L, Schaack, S, **Sadd, BM** & Sun, C. (2018) Tandem repeats contribute to coding sequence variation in bumblebees (Hymenoptera: Apidae). *Genome Biology and Evolution*, 10, 3176-3187.

40. Roth, O, Beemelmans, A, Barribeau, SM & **Sadd, BM** (2018) Recent advances in vertebrate and invertebrate trans-generational immunity in the light of ecology and evolution. *Heredity*, 121, 225-238.

39. Rothchild, K, Adler, LS, Irwin, RE, **Sadd, BM**, Stevenson, PC, Palmer Young, EC (2018) Effects of short-term exposure to naturally occurring thymol concentrations on transmission of a bumble bee parasite. *Ecological Entomology*, 43, 567-577.

38. Duffield, KR, Hampton, KJ, Houslay, TM, Hunt, J, Rapkin, J, Sakaluk, SK & **Sadd, BM** (2018) Age-dependent variation in the terminal investment threshold in male crickets. *Evolution*, 72, 578-589.

37. Palmer-Young, EC, Calhoun, A, Mirzayeva, A & **Sadd, BM** (2018) Effects of the floral phytochemical eugenol on parasite evolution and bumble bee infection and preference. *Scientific Reports*, 8, 2074.

36. Carter, A, **Sadd, BM**, Tuberville, T, Paitz, R & Bowden, RM (2018) Short heatwaves during fluctuating incubation regimes produce females under temperature-dependent sex determination with implications for sex ratios in nature. *Scientific Reports*, 8, 3.

35. Duffield, KR, Bowers, EK, Sakaluk, SK & **Sadd, BM** (2017) A dynamic threshold model for terminal investment. *Behavioral Ecology and Sociobiology*, 71, 185.

34. Czerwinski, MA & **Sadd, BM** (2017) Detrimental interactions of neonicotinoid pesticide exposure and bumblebee immunity. *Journal of Experimental Zoology A*, 327, 273-283.

33. Fauser, A, Sandrock, C, Neumann, P & **Sadd, BM** (2017) Neonicotinoids override a parasite exposure impact on hibernation success of a key bumblebee pollinator. *Ecological Entomology*, 42, 306-314.

32. Palmer-Young, EC, **Sadd, BM**, Irwin, RE & Adler, LS (2017) Synergistic effects of floral phytochemicals against a bumble bee parasite. *Ecology and Evolution*, 7, 1836-1849.
31. Palackdharry, S, **Sadd, BM**, Vogel, LA & Bowden, RM (2017) The effect of environmental temperature on reptilian peripheral blood B cell functions. *Hormones and Behavior*, 88, 87-94.
30. Palmer-Young, EC, **Sadd, BM** & Adler, LS (2017) Evolution of resistance to single and combined floral phytochemicals by a bumble bee parasite. *Journal of Evolutionary Biology*, 30, 300-312.
29. Palmer-Young, EC, **Sadd, BM**, Stevenson, PC, Irwin, RE & Adler, LS (2016) Bumble bee parasite strains vary in resistance to phytochemicals. *Scientific Reports*, 6, 37087.
28. Barribeau, SM, Schmid-Hempel, P & **Sadd, BM** (2016) Royal decree: gene expression in trans-generationally immune primed bumblebee workers mimics a primary immune response. *PLOS ONE* 11: e0159635.
27. Engel, P, Kwong, W, McFrederick, Q, Anderson, KE, Barribeau, S, Chandler, JA, Cornman, S, Dainat, J, de Miranda, J, Doublet, V, Emery, O, Evans, J, Farinelli, L, Flenniken, M, Granberg, F, Grasis, J, Gauthier, L, Hayer, J, Koch, H, Kocher, S, Martinson, V, Moran, N, Munoz-Torres, M, Newton, I, Paxton, R, Powell, J, **Sadd, BM**, Schmid-Hempel, P, Schmid-Hempel, R, Song, SJ, Schwarz, R, van Engelsdorp, D & Dainat, B (2016) The bee microbiome: impact on bee health and model for evolution and ecology of host-microbe interactions. *mBio*, e02164-15.
26. Duffield, KR, Hunt, J, Rapkin, J, **Sadd, BM** & Sakaluk, SK (2015) Terminal investment in the gustatory appeal of nuptial food gifts in crickets. *Journal of Evolutionary Biology*, 28, 1872-1881.
25. Rahnamaeian, M, Cytrynska, M, Zdybicka-Barabas, A, Dobszlaff, K, Wiesner, J, Twyman, R, Züchner, T, **Sadd, BM**, Regoes, R, Schmid-Hempel, P & Vilcinskas, A (2015) Insect antimicrobial peptides show potentiating functional interactions against Gram-negative bacteria. *Proceedings of the Royal Society B: Biological Sciences*, 282, 201550293.
24. **Sadd, BM** et al. (2015) The genomes of two key bumblebee species with primitive eusocial organization. *Genome Biology*, 16, 76.
23. Barribeau, SM, **Sadd, BM**, du Plessis, L, Brown, MJF, ..., Waterhouse, R, Yu, NA, Zdobnov, EM & Schmid-Hempel, P (2015) A depauperate immune repertoire precedes evolution of sociality in bees. *Genome Biology*, 16, 83.
22. Barribeau, SM, **Sadd, BM**, du Plessis, L & Schmid-Hempel, P (2014) Gene expression differences underlying genotype-by-genotype specificity in a host-parasite system. *Proceedings of the National Academy of Sciences USA*, 111, 3496-3501.
21. \*Fauser-Misslin, A, \***Sadd, BM**, Neumann, P & Sandrock, C (2014) Influence of combined pesticide and parasite exposure on bumblebee colony traits in the laboratory. *Journal of Applied Ecology*, 51, 450-459. (\*Joint first authors)
20. **Sadd BM** & Barribeau SM (2013) Heterogeneity in infection outcome: lessons from a bumblebee-trypanosome system. *Parasite Immunology*, 35, 339-349.
19. Antonovics, J, Boots, M, Ebert, D, Koskella, B, Poss, M & **Sadd, BM** (2013) The origin of specificity by means of natural selection: evolved and non-host resistance in host-pathogen interactions. *Evolution*, 67, 1-9.
18. Li, J, Qin, H, Wu, J, **Sadd, BM**, Wang, X, Evans, JD, Peng, W & Chen, Y (2012) The prevalence of parasites and pathogens in Asian honeybees *Apis cerana* in China. *PLoS ONE*, e47955.
17. Greco, MK & **Sadd, BM** (2012). Using diagnostic radioentomology for non-invasive observations of bumblebee, *Bombus terrestris* colonies. *Journal of Insect Science*, 12, Article 85.
16. Cisarovsky, G, Schmid-Hempel, P & **Sadd, BM** (2012) Robustness of the outcome of adult bumblebee infection with a trypanosome parasite after varied parasite exposures during larval development. *Journal of Evolutionary Biology*, 25, 1053-1059.

15. **Sadd, BM** (2011) Food-environment mediates specific interactions between a bumblebee and its trypanosome parasite. *Evolution*, 65, 2995-3001.
14. Ulrich, Y, **Sadd, BM** & Schmid-Hempel, P (2011) Strain filtering and transmission of a mixed infection in a social insect. *Journal of Evolutionary Biology*, 24, 354-362.
13. **Sadd, BM et al.** (2010) Analysis of a normalised expressed sequence tag (EST) library from a key pollinator, the bumblebee *Bombus terrestris*. *BMC Genomics*, 11, 110.
12. Schluns, H, **Sadd, BM**, Schmid-Hempel, P & Crozier, RH (2010) Infection with the trypanosome *Crithidia bombi* and expression of immune-related genes in the bumblebee *Bombus terrestris*. *Developmental and Comparative Immunology*. 34, 705-709.
11. **Sadd, BM** & Schmid-Hempel, P (2009) *Ecological and evolutionary implications of specific immune responses*. In Rolff, J & Reynolds, S, eds. *Insect infection and immunity: evolution, ecology, and mechanisms*. Oxford University Press.
10. **Sadd, BM** & Schmid-Hempel, P (2009) Principles of Ecological Immunology. *Evolutionary Applications*. 2, 113-121.
9. **Sadd, BM** & Schmid-Hempel, P (2009) A distinct infection cost associated with trans-generational priming of antibacterial immunity in bumblebees. *Biology Letters*. 5, 798-801.
8. Roth, O, **Sadd, BM**, Schmid-Hempel, P & Kurtz, J (2009) Strain-specific priming of resistance in the red flour beetle, *Tribolium castaneum*. *Proceedings of the Royal Society B: Biological Sciences*. 276, 145-151.
7. Little, TJ, Colegrave, N, **Sadd, BM** & Schmid-Hempel, P (2008) Studying immunity at the whole organism level. *BioEssays*, 30, 404-405.
6. Otti, O & **Sadd, BM** (2008) Parental guidance? Trans-generational influences on offspring life-history in mosquitoes. *Trends in Parasitology*, 24, 197-199.
5. **Sadd, BM** & Schmid-Hempel, P (2007) Facultative but persistent trans-generational immunity via the mother's eggs in bumblebees. *Current Biology*, 17, R1046-1047.
4. **Sadd, BM** & Siva-Jothy, MT (2006) Self-harm caused by an insect's innate immunity. *Proceedings of the Royal Society B: Biological Sciences*, 273, 2571-2574.
3. **Sadd, BM** & Schmid-Hempel, P (2006) Insect immunity shows specificity in protection on secondary pathogen exposure. *Current Biology*, 16, 1206-1210.
2. **Sadd, BM et al.** (2006) Modulation of sexual signalling by immune challenged male mealworm beetles (*Tenebrio molitor*, L.): evidence for terminal investment and dishonesty. *Journal of Evolutionary Biology*, 19, 321-325.
1. **Sadd, BM et al.** (2005) Trans-generational immune priming in a social insect. *Biology Letters*, 1, 386-388.

#### NON-PEER REVIEWED PUBLICATIONS

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Smith, TA, Strange, JP, Evans, EC, **Sadd, BM**, Steiner, JC, Mola, JM & Traylor-Holzer, K. Eds. (2020) Rusty Patched Bumble Bee, *Bombus affinis*, Ex Situ Assessment and Planning Workshop: Final Report. IUCN SSC Conservation Planning Specialist Group, Apple Valley, MN, USA.

#### FUNDING

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Howard Hughes Medical Institute. Inclusive Excellence 3 Award. Co-PI (\$782,600, current)

Great Lakes Restoration Initiative. *Comparative investigations to address responses to relevant stressors of the sub-genus Bombus sensu stricto and use of non-destructive sampling to assess bumble bee community health*. PI (\$500,000, current, pending annual approval, disbursement to date \$130,000)

United States Department of Agriculture. *Straining the gut: diversity of and genome-based treatments for trypanosomatid parasites of honey bees*. Co-PI (\$727,000, approved for funding, sub-award to Illinois State University \$64,155)

National Science Foundation. *Collaborative Research: Experimental evolution of insect nuptial food gifts and female responses*. Co-PI (\$668,384, current IOS-1654028, includes *Research Experience for Undergraduates* and *Research Experience for Teachers* supplements)

National Institutes of Health. *Host and microbe factors influencing composition and functioning of an accessible gut microbiota model*. PI (\$362,500, 2018 – 2022, 1R15GM129681-01)

United States Department of Agriculture. *Interactive effects of Nosema infection and the neonicotinoid imidacloprid on bumble bee decline in the U.S.* Co-PI (\$499,976, current 2016-09144, sub-award to Illinois State University \$40,693)

Howard Hughes Medical Institute. Driving Change Seed Grant (\$50,000, current)

Howard Hughes Medical Institute. Inclusive Excellence 3 Seed Grant (\$30,000, current)

United States Fish and Wildlife Service. *Pathogen screening of feces collected from Bombus affinis colonies and foragers*. (\$8,596, current)

National Science Foundation. *MRI: Acquisition of a high speed cell sorter for interdisciplinary student research and training in Biological Sciences*. Co-PI (\$316,778, current 1725199)

National Evolutionary Synthesis Center Catalysis Meeting Grant, 2015. *Forgotten Memories: immune memory beyond the adaptive immune system*. Group leader

Illinois State University Competitive Research Grant, 2018 (\$3,500)

Illinois State University Competitive Research Grant, 2014 (\$3,500)

## INVITED PRESENTATIONS

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Cornell University, USA, 2023, *It's a gut feeling: the evolutionary ecology of host-microbiota interactions*

US Fish and Wildlife Survey, Rusty Patched Bumble Bee Virtual Science Webinar, 2023, *Pathogens of Bombus affinis and understanding threats of multiple stressors using surrogate bumble bee species*

Northern Illinois University, USA, 2023, *Death and taxes: interactions between reproduction and immunity in decorated crickets*

Copenhagen Institute of Design, Costa Rica, 2022, *An evolutionary ecology approach to immunity and health*

Indiana State University, USA, 2021, *What kills the buzz in the meadow? An evolutionary ecology approach to bumble bee health and declines*

Midwest Ecology and Evolution Conference, USA, 2021, *What kills the buzz in the meadow? An evolutionary ecology approach to bumble bee health and declines*

Rusty-Patched Bumble Bee IUCN and SSC Conservation Planning Specialist Group, Minnesota, USA, 2020, *I am sick of this: considering disease in bumble bee captive rearing*

BOMBUSS 2.0, Toronto, Canada, 2019, *Disease and Pathogens*

Society for Integrative and Comparative Biology, Tampa, USA, 2019, *In the heat of the moment: host immunity and parasite resistance in the face of thermal shifts and stress*

University of Missouri St. Louis, USA, 2018, *What kills the buzz in the meadow? An evolutionary ecology approach to bumble bee health and declines*

Illinois State University, USA, 2018, *What kills the buzz in the meadow? An evolutionary ecology approach to bumble bee health and declines*

Murray State University, USA, 2018, *Low on the genes, but big on defense: bumblebee immunity across generations and consequences for associated microbes*

Penn State University, USA, 2017, *Low on the genes, but big on defense: bumblebee immunity across generations and consequences for associated microbes*

Princeton University, USA, 2017, *Ecological costs and the evolution of strategies of immune memory*

Northern Illinois University, USA, 2017, *Low on the genes, but big on defense: bumblebee immunity across generations and consequences for associated microbes*

Southern Illinois University, USA, 2017, *Low on the genes, but big on defense: bumblebee immunity across generations and consequences for associated microbes*

Purdue University West Lafayette, USA, 2017, *Constrained by royal decree: trans-generational immunity in bumblebees and consequences for friend and foe*

International Congress of Entomology, Orlando, USA, 2016, *Taxes of a different state: costs associated with insect immune priming*

Washington University, St. Louis, USA, 2016, *Constrained by royal decree: trans-generational immunity in bumblebees and consequences for friend and foe*

University of Massachusetts Amherst, USA, 2016, *Constrained by royal decree: trans-generational immunity in bumblebees and consequences for friend and foe*

International Symposium on Biomathematics and Ecology Education and Research, Illinois State University, USA, 2015, *Constrained by royal decree: trans-generational immunity in bumblebees and consequences for friend and foe*

Purdue University Calumet, USA, 2014, *Environment induced change to immunity and infection in bumblebees*

University of Bern, Switzerland, 2014, *Environment induced change to immunity and infection in bumblebees*

University of Illinois, USA, 2014, *Environment induced change to immunity and infection in bumblebees*

Illinois State University, USA, 2013, *Synergy to specificity: a multi-level view on the role of contingency in host-parasite evolutionary ecology*

Queen Mary University London, United Kingdom, 2012, *Environmental contingency and the outcome of host- parasite interactions*

GEOMAR Kiel, Germany, 2012, *Environmental contingency and the outcome of host-parasite interactions*

IST, Austria, 2011, *Synergy to specificity: a multi-level view on the role of contingency in host-parasite evolutionary ecology*

Neuchatel University, Switzerland, 2011, *Mothers to microbes: a more complex story of immunity and infection*

Humboldt University, Berlin, Germany, 2010, *Contingency and the outcome of host-parasite interactions*

International Conference of Pollinator Biology, Health and Policy, Pennsylvania State University, USA, 2010, *The influence of the environment on immunity and parasite resistance in bumblebees*

Evolutionary Biology Symposium, ETH Zürich, Switzerland, 2010, *Contingency and the outcome of host-parasite interactions*

University of Münster, Germany, 2008, *Immune priming in a social context*

University of Bern, Switzerland, 2008, *Immune priming in a social context*

Symposium on Social Immunity, Regensburg, Germany, 2007, *Immune priming in a social insect: within and between individuals*

## OTHER SELECT PRESENTATIONS (principal author/presenter only)

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Tobin, K, Hallahan, M, Martinez, A, Mandes, R & **Sadd, BM** (IUSI Congress, Guarujá, Brazil, 2018) *Bumble bee immunity and parasite infection in the face of thermal variability and heatwaves*

Palmer-Young, EC, Adler, LS, Calhoun, A & **Sadd, BM** (CNRS Conference, Roscoff, France, 2017) *We get by with a little help from our friends? Potential for phytochemicals to modify a bumblebee-trypanosome interaction*

**Sadd, BM** & Barribeau, SM (Evolution Ecology Infectious Disease, Athens, USA, 2015) *Constitutive protection, mismatch, and secondary exposure in bumblebee trans-generational immune memory*

**Sadd, BM** (Evolution Ecology Infectious Disease, Fort Collins, USA, 2014) *Expression by Royal Decree: trans-generational immunity in a social insect*

**Sadd, BM** (CNRS Conference, Roscoff, France, 2011) *Working together in the defence community*

**Sadd, BM** (ESEB09, Turin, Italy, 2009) *Mother knows best? Trans-generational priming of antibacterial immunity in bumblebees*

**Sadd, BM** & Schmid-Hempel, P (Ento07, Edinburgh, UK, 2007) *Trans-generational immunity in bees*

**Sadd, BM** & Schmid-Hempel, P (ESF Conference, Obergurgl, Austria 2007) *The birds do it, and so do the bees: trans-generational immunity through eggs*

**Sadd, BM** & Schmid-Hempel, P (Host-Parasite Meeting, Fribourg, Switzerland, and PhD meeting, Bordeaux, France, 2005) *Trans-generational immune priming in a social insect*

**Sadd, BM** & Siva-Jothy, M (Zürich, Switzerland, 2004) *Quantifying autoreactivity in insects*

**Sadd, BM** (ASAB, Sussex, UK, 2004) *Dishonesty in the face of death*

## TEACHING & ADVISING

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### Direct research advisor

#### MS

2022 – current Laura Rengifo Gutierrez (Illinois State University)

2020 – current Jack McKermitt (Illinois State University)

2019 – 2022 Bryan Sierra-Rivera, Elyse McCormick (Illinois State University)

2017 – 2020 Austin Calhoun (Illinois State University)

2017 – 2019 Kylie Hampton (Illinois State University)

2016 – 2019 Kerrigan Tobin (Illinois State University)

2016 – 2018 Logan Sauers (Illinois State University)

#### PhD

2020 – current Austin Calhoun (Illinois State University)

2019 – current Logan Sauers (Illinois State University)

2018 – 2021 Ian Rines (Illinois State University): co-advised with Dr. Scott Sakaluk

2013 – 2018 Kristin Duffield (Illinois State University): co-advised with Dr. Scott Sakaluk

2010 – 2014 Aline Fauser-Misslin (University of Bern): co-advised with Dr. Peter Neumann

#### Postdoctoral

2022 – current Dr. Ashley Tessnow (Illinois State University)

2021 – current Dr. Bert Foquet (Illinois State University)



2018 – 2022 Dr. Ruben Blazquez (University of Illinois / Illinois State University)

2019 – 2020 Dr. Kristin Duffield (Illinois State University)

### ***Undergraduates at Illinois State University***

2014 – present *Total: 27.* Christina Jester, Steffanie Cain, Joseph Oremus, Mitchell Czerwinski (honors thesis student), Marc Ashford, Rachel Mandes, Adam Frank, Michelle Alvarez, Austin Calhoun, Elizabeth Hart, Kylie Hampton, Emily Heflin, Megan Price, Madeline Hallahan (Biology Education Noyce Scholar), Abraham Martinez (honors thesis student), Shannon Barbarek, Earon Grinage, Audrey Harrod (honors thesis student), Diniz Ferreira (visiting student from the Federal University of Pelotas, Brazil), Michael Williams (Biology Education Noyce Scholar), Will Kuna, Toby Bassingthwaite, Liv Cohen, Justin Palmer, Megan Grant, Teni Shosanya, Amilie Mwilambwe

### ***Undergraduate honors theses at Illinois State University***

2020 – 2022 Audrey Harrod. *Investigating pathogen transmission potential upon fungicide co-exposure in bumble bees.*

2018 – 2020 Abraham Martinez. *Diet diversity and infection outcomes in a bumble bee and microsporidian system.*

2015 – 2016 Mitchell Czerwinski. *Interactions of the pesticide imidacloprid and immunity of the bumble bee Bombus impatiens.*

### **Course related teaching**

#### ***Illinois State University***

2021 Biological Diversity (BSC196, 4 credits with lab coordination)

2020 Graduate Seminar in Evolution and Systematics: Evolution in Changing Environments and Science Communication (BSC420.28, 1 credit)

2019 – present Evolution (BSC470, 3 credits graduate)

2019 – present Guest lecturer and FACS demonstration: Medical Laboratory Sciences (HSC 263)

2019 – present Guest lecturer: Global Health (HSC 206)

2015 – present Entomology (BSC301, 4 credits with lab coordination)

2015 – present Rainforest Ecology (BSC311, 3 credits including study abroad component in Costa Rica)

2015 – present Honors Undergraduate Research (BSC299, 1-3 credits)

2014 – present Evolution and Ecology of Infectious Disease (BSC450.48, 3 credits graduate)

2013 – present Undergraduate Research (BSC290, 1-3 credits)

2019 – 2020 Independent Studies in Conservation Biology and Entomology (BSC287, 2-3 credits)

2016 – 2020 Guest lecturer/lab: Immunology (BSC 367)

2014 – 2018 Ecology (BSC201, 4 credits with lab coordination)

2017 Graduate Seminar in Evolution and Systematics: Coevolution (BSC420.28, 1 credit)

#### ***ETH Zürich***

2009 – 2013 Evolutionary Ecology field course in the Swiss Alps

2012 Bachelor project. *Food environment and host-parasite transcriptional responses to discrete parasite strain exposures*

2012 Current topics in Infectious Disease (MSc. / PhD course)

2012 Term paper. *Sociality in a dirty world*

2011 Bachelor project. *Parasite evolution under competition*  
 2011 Term-paper. *Social living and immunity evolution*  
 2008 – 2010 Lectures in Population Biology (5th Semester)  
 2010 Bachelor project. *Synergy between immune components*  
 2009 Evolution and Ecology of Infectious Disease (MSc. / PhD course)  
 2008 Term-paper. *The influence of the environment on immunity*  
 2007 Diploma project. *Infection and immune activation by Crithidia bombi*  
 2005 Co-leader of a one-week field course on Evolutionary Ecology

### **University of Sheffield**

2004 Co-leader of an eight-day field course in Portugal (University of Sheffield)

## **ACADEMIC & OTHER SERVICES**

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### **University, College, and School Service**

College of Arts and Sciences Dean's Council (2022 – ongoing)  
 College of Arts and Sciences Graduate Funding Committee (2022 – ongoing)  
 Assistant Director of Graduate Studies in the School of Biological Sciences (2019 – ongoing)  
 Graduate Studies Committee Chair (2019 – ongoing)  
 Scheduling Committee Member (2019 – ongoing)  
 Behavior, Ecology, Evolution and Systematics Graduate Sequence Coordinator (2019 – ongoing)  
 Illinois State University Invertebrate Collection Curator (2014 – ongoing)  
 School Faculty Status Committee (2017 – 2018, 2019 – 2020)  
 Associate Director of the School of Biological Sciences (2018 – 2019)  
 Scheduling Committee Chair (2018 – 2019)  
 Zoology Undergraduate Sequence Coordinator (2016 – 2019)  
 Member of Undergraduate Studies Committee (2016 – 2019)  
 Chair of faculty search committee for Ecology of Human Impacted Systems position, School of Biological Sciences, Illinois State University (2022 – 2023)  
 Search committee for Research and Sponsored Programs Assistant Director of Award Management (2022 – 2023)  
 Chair of faculty search committee for Evolutionary Biology position, School of Biological Sciences, Illinois State University (2019 – 2020)  
 Faculty search committee for Conservation Biology position, School of Biological Sciences, Illinois State University (2019 – 2020)  
 Faculty search committee for Ecologist position, School of Biological Sciences, Illinois State University (2017 – 2018)  
 Faculty search committee for Virologist position, School of Biological Sciences, Illinois State University (2016 – 2017)  
 Phi Sigma Biological Sciences Student Society: Faculty advisor (2014 – 2016), symposium judge (2014, 2016 – 2019)  
 Rilett Public Seminar Committee (2016, 2018)

Biological Sciences Student Association Undergraduate Research Symposium Judge (2016)

Chair Evaluation and Development Committee, School of Biological Sciences, Illinois State University (2015)

PhD committee member: *Illinois State University* – Amanda Wilson-Carter (2013 – 2017), Peter Brabant (2013 – 2017), Kristina McIntire (2015 – 2020), Daniel Goldberg (2018 – 2021), Anthony Breitenbach (2017 – 2022), Rachael DiSciullo (2017 – current), Rosario Marroquin-Flores (2018 – 2022), Pooja Kadaba Ranganath (2019 – 2022), Jaclyn Everly (2019 – current), Ashley Waring (2019 – current), Kate Evans (2020 – current), Olivia Brooks (2021 – current), Brooke Allen (2021 – current); *ETH Zürich, Switzerland* – Katja Leicht (2010 – 2013); *University of California Riverside* – Lyna Ngor (2020 – current); *Oakland University* – Danielle Dorsen (2022 – current)

MSc committee member: *Illinois State University* - Molly Schumacher (2013 – 2015), Tess Piening Mulrey (2014 – 2015), Sarah Marrochello (2014 – 2016), Aderinsola Odetunde (2015 – 2017), Robert Philipps (2015 – 2018), Joseph Neale (2015 – 2018), Marc Ashford (2016 – 2018), Nicole Campbell (2017 – 2019), Kara Hodges (2017 – 2019), Kate Evans (2017 – 2019), Christopher Lark (2018 – 2020), Aleksandra Majewski (2020 – 2020), Madi Rittinger (2019 – 2021), Tim Martin (2017 – 2021), Jesse Smith (2019 – 2021), Rachel Berg (2021 – current), Emily Harders (2021 – current), Mary Crompton (2021 – current); *Universidad de la República, Uruguay* – Mauro Martínez Villar (2022 – current)

Undergraduate honors thesis committee member, Illinois State University: Darren Will (2016), Konnor Damery (2019)

### **Discipline Service**

Guest co-editor for *Frontiers in Insect Science*, *Multiple stressors and insect health* (2022)

North American Pollinator Protection Campaign (NAPPC) Imperiled Bombus Conservation Taskforce (2021 – ongoing)

Workshop session co-organizer (BOMBUSS 2.0: Building our methods by using sound science: next steps in North American bumble bee monitoring and conservation, Toronto, Canada, 2019) *Disease and Pathogens*.

Symposium co-organizer (IUSSI Congress, Guarujá, Brazil, 2018) *20 years since “Parasites in Social Insects” – where have we travelled and what does the future hold?*

International bumblebee genome annotation consortium co-coordinator (2008-2016)

NESCent Workshop co-organizer (Duke University, Durham, USA, 2015) *Forgotten Memories: immune memory beyond the adaptive immune system*.

Symposium co-organizer (IUSSI Congress, Copenhagen, Denmark, 2010) *Sociogenomics and Immunity*.

Zürich Interaction Seminar Series in Ecology and Evolution chair and organiser (2005-2007)

Joint Host-Parasite Meeting co-chair (Zürich, 2006 and 2011)

**Journal Referee:** *Science*, *Current Biology*, *PNAS*, *Evolution*, *Journal of Evolutionary Biology*, *PLoS Pathogens*, *Behavioural Ecology and Socio-Biology*, *Ecology*, *Biology Letters*, *Ecological Entomology*, *Ecology Letters*, *Proceedings of the Royal Society B*, *Journal of Insect Physiology*, *Behavioral Ecology*, *Microbes and Infection*, *Insect Socials*, *Journal of Animal Ecology*, *Heredity*, *Integrative and Comparative Biology*, *Functional Ecology*, *Molecular Ecology*, *Trends in Parasitology*, *BMC Evolutionary Biology*, *Journal of Insect Science*, *Molecular Biology and Evolution*, *Genome Biology and Evolution*, *Ecology and Evolution*, *Developmental and Comparative Immunology*, *Experimental Gerontology*, *Journal of Apicultural Research*, *Environmental Entomology*, *PLoS ONE*, *The American Naturalist*, *Conservation Physiology*, *Journal of Invertebrate Pathology*, *Insect Science*, *Insects*, *Scientific Reports*, *Animal Behavior*, *Journal of Insect Conservation*, *Royal Society Open Science*, *Ecology and Evolution*, *mbio*, *Biological Invasions*, *BMC Biology*, *Journal of Economic Entomology*, *Elife*, *Physiological Entomology*

**Funding Referee:** European Research Council, National Science Foundation (DEB and IOS), National Environmental Research Council (UK), Swiss National Science Foundation (Switzerland), Cogito

Foundation (Switzerland), US-Israel Binational Science Foundation, ETH Zurich Research Commission, French National Research Agency, US Department of Agriculture, Biotechnology and Biological Sciences Research Council (UK), Society for the Study of Evolution, Israeli Science Foundation, Austrian Science Fund

**Funding Panelist:** USDA AFRI Pollinator Health: Research and Applications

***Diversity, Equity and Inclusion Related Work***

HHMI Inclusive Excellence Learning Community Cluster 1 Steering Team (2022 – ongoing)

STEM Diversity, Equity and Inclusion Taskforce, Illinois State University (2021 – ongoing)

Lead Organizer of Charles Morris STEM Social for Underrepresented Students (2019 – ongoing)

STEM Alliance (previously Louis Stokes Alliance for Minority Participation): Faculty mentor (2014 – ongoing, 6 students), Faculty panelist (2014, 2015, 2016, 2018, 2020, 2021, 2022), Midwest Alliance Conference symposium judge (2018, 2019, 2022), STEM talks presenter (2020, 2021), STEM Alliance faculty facilitator (2022 – ongoing)

Co-organizer of Professional Development Series for Inclusive STEM Teaching Practices with Dr. Bryan Dewsbury (2022 – 2023)

Co-organizer of Charles Morris STEM Social for Underrepresented Students (2017 – 2018)

DEI bilingual contributor: NSF funded discussion about STEM career options in English and Spanish

***Selected Extension and Outreach***

Working Dogs for Conservation and Midwest Conservation Dogs- Forensics and Field Specialists: consultant and supplier of materials

US Fish and Wildlife Service: Rusty patched bumble bee recovery implementation strategy science support team

Children's Discovery Museum, Normal, IL, USA: "Insectopia" video on insect structure and function and related activities

Environmental Educators of Illinois, Sugar Grove Nature Center, IL, USA: bumble bee conservation presentation

Native pollinators at Nature Trails Day, Sugar Grove Nature Center, IL, USA

Chiddix and Parkside Junior High Schools, Normal, IL, USA: presentations on beneficial microbes of bees

Oakland Elementary School Summer Camp, Bloomington, IL, USA: presentations on insect adaptations

Illinois State University Senior Professionals, *What kills the buzz in the meadow? Understanding bee pollinator health and declines*, Global Health and the Environment Lecture Series

ScoutReach, Scout Adventure Camp: educational exhibit and exercises on bees and insects, IL, USA

Parklands Foundation: native bee outreach presentation and exhibit, IL, USA

Founder's Grove Community Association, Normal, IL, USA: bumble bee conservation presentation

Illinois State University Childcare Center, Boys and Girls Club Bloomington, IL, USA: insects in our lives presentation

Ecology Action Center: "Yard Smart" garden walk keynote presentation, Normal, IL, USA

Pro-Natura "Nature Days": consultant and material supply (Zurich, Switzerland, 2008 – 2013)

Darwin's long arm: Evolutionary Theory Today, Outreach Weekend (Zurich, Switzerland, 2009)