

# Helen F. McCreery, Ph.D.

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Total fellowship & grant funding \$ 337,000

## Affiliations and Education

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James S. McDonnell Complex Systems Postdoctoral Fellow	2017 -
Harvard University, Computer Science <i>Advisor: Dr. Radhika Nagpal</i>	2018 -
Michigan State University, Integrative Biology BEACON Center for the Study of Evolution in Action <i>Advisor: Dr. Tom Getty</i>	2017 - 2018
<b>Ph.D</b> University of Colorado, Boulder Ecology and Evolutionary Biology <i>Ph.D Advisor: Dr. Michael Breed</i>	2011 - 2017
<b>M.Eng</b> Massachusetts Institute of Technology Environmental Engineering	2006 - 2007
<b>BS</b> Massachusetts Institute of Technology Environmental Engineering, Theater Arts	2002 - 2006

## Refereed Publications ([google scholar link](#))

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- <sup>U</sup> Indicates undergraduate mentee  
<sup>A</sup> Authors listed alphabetically

*In preparation, submitting October 2020:* **McCreery, H.F.**, Gemayel, G.<sup>U</sup>, Pais, A.<sup>U</sup>, Garnier, S., Nagpal, R. "Hysteresis and collective control of flexible, living ant bridges."

*In review:* Kao, A.B., Hund, A.K., Bhat, D., Young, J.-G., Garland, J., Santos, F.P., Oomen, R.A., **McCreery, H.F.** "Changes in group size during resource shifts reveal drivers of sociality across the tree of life."

***I co-lead this funded working group at the Santa Fe Institute***

13. Ålund, M., Emery, N., Jarrett, B.J.M.<sup>A</sup>, MacLeod, K.J.<sup>A</sup>, **McCreery, H.F.**<sup>A</sup>, Mamoozadeh, N.<sup>A</sup>, Phillips, J.G.<sup>A</sup>, Schossau, J.<sup>A</sup>, Thompson, A.W.<sup>A</sup>, Warwick, A.R.<sup>A</sup>, Yule, K.M.<sup>A</sup>, Zylstra, E.R.<sup>A</sup>, Gering, E. (2020). "To support a sustainable postdoc workforce, academic ecosystems must evolve." *Nature Ecology & Evolution*, 4:777-781.
12. **McCreery, H.F.** (2020). "Cooperative transport in ants." In: Starr C. (ed) *Encyclopedia of Social Insects*. Springer.
11. **McCreery, H.F.**, Bilek, J.N.<sup>U</sup>, Nagpal, R., Breed, M.D. (2019). "Effects of load mass and size on cooperative transport in ants over multiple transport challenges." *Journal of Experimental Biology*, 222. Available online: DOI:10.1242/jeb.206821

10. Sankovitz, M.A.<sup>U</sup>, Breed, M.D., **McCreery, H.F.** (2019) "Effects of *Formica podzolica* ant colonies on soil moisture, nitrogen, and plant communities near nests." *Ecological Entomology*. 44:71-80.
9. Hund, A.K., Churchill, A.C.A, Faist, A.M.A, Havrilla, C.A.A, Love Stowell, S.M.A, **McCreery, H.F.A**, Ng, J.A, Scordato, E.S.C. (2018). "Transforming mentoring in STEM by training graduate students and postdocs." *Ecology and Evolution*. 8(20):9962-9974.  
**One of the journal's most downloaded papers of 2018**
8. Esterly, E.E.<sup>U</sup>, **McCreery, H.F.**, Nagpal, R. (2017). "Models of adaptive navigation, inspired by ant transport in the presence of obstacles." In: *Proceedings of the Artificial Life Conference 2017, IEEE*. DOI: 10.1109/SSCI.2017.8280899.  
**Outstanding paper honorable mention**
7. **McCreery, H.F.** (2017). "A comparative approach to cooperative transport in ants: individual persistence correlates with group coordination." *Insectes Sociaux*. 64:535-547.
6. **McCreery, H.F.**, Dix, Z.<sup>U</sup>, Breed, M.D., Nagpal, R. (2016). "Collective strategy for obstacle navigation during cooperative transport by ants." *Journal of Experimental Biology*. 219: 3366-3375.
5. **McCreery, H.F.**, Correll, N., Breed, M.D., Flaxman, S. (2016). "Consensus or deadlock? Simple behavioral rules and their consequences for coordination in self-organized groups." *PLoS ONE* 11(9): e0162768.
4. Breed, M.D., Cook, C.N., **McCreery, H.**, Rodriguez, M. (2015). "Nestmate recognition in eusocial insects: The honeybee as a model system." In *Social Recognition in Invertebrates*, L. Aquiloni and E. Tricarico, eds, pgs 147-164, Springer.
3. **McCreery, H.F.** and Breed, M.D. (2014). "Cooperative transport in ants: a review of proximate mechanisms." *Insectes Sociaux*. 61: 99-110.  
**One of the journal's most downloaded papers of 2014**
2. Pizzaro, L.C., **McCreery, H.F.**, Lawson, S.P., Winston, M.E., and O'Donnell, S. (2012). "Sodium-specific foraging by leafcutter ant workers (*Atta cephalotes*, Hymenoptera: Formicidae)." *Ecological Entomology*. Vol. 37: 435-348.
1. O'Keefe, K.J., Silander, O.K., **McCreery, H.**, Weinreich, D.M., Wright, K.M., Chao, L., Edwards, S.V., Remold, S.K., and Turner, P.E. (2010). "Geographic differences in sexual reassortment in RNA phage." *Evolution*. Vol. 64: 3010-3023.

## Fellowships

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Year	Name	Amount
2016	James S McDonnell Complex Systems Postdoctoral Fellowship	\$ 200,000
2016	U of Colorado, Graduate School Dissertation Completion Fellowship	\$ 16,000
2015	U of Colorado, Ecology and Evolutionary Biology (EBIO) Semester Fellowship	\$ 16,000
2015	U of Colorado, Graduate School Summer Fellowship	\$ 6,000
2012	National Science Foundation Graduate STEM Fellowship in K-12 Education	\$ 30,000
<b>Total Fellowship Funding</b>		<b>\$ 268,000</b>

## Grants

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Year	Name	Amount
2018	NSF BEACON: "Dynamic spatial allocation in cooperative social groups." Collaboration with F. Dyer (PI), D. Incorvaia, and C. Bohm	\$ 51,997
2015	U of Colorado Dean's Graduate Student Grant	\$ 9,670
2014	U of Colorado, EBIO Department Research Grant	\$ 2,500
2014	U of Colorado Beverly Sears Graduate Student Grant	\$ 1,000
2013	U of Colorado, EBIO Research Grant	\$ 1,200
2013	Sigma Xi Grant-in-aid of research	\$ 600
2013	U of Colorado Beverly Sears Graduate Student Grant	\$ 1,000
2012	U of Colorado, EBIO Research Grant	\$ 1,500
<b>Total Grant Funding</b>		<b>\$ 69,467</b>

## Awards

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Year	Name
2017	U of Colorado Nominee for CGS/ProQuest Distinguished Dissertation Award in Biological Sciences
2017	EBIO Award for outstanding Teaching Assistant
2016	EBIO Award for outstanding Teaching Assistant
2015	EBIO Award for outstanding Teaching Assistant
2012	Award for outstanding oral presentation in social foraging and decision behavior. IUSSI-NAS Breakout Meeting, Greensboro California

## Non-refereed Publications and Press

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Breed, M.D. and **McCreery, H.F.** (2014). "Animal behavior: Social recognition in crickets." *Current Biology*. Vol. 24(23): R1123-R1124.

### Press features and blog posts

**The New York Times:** Gorman, James (2016). "How teamwork brings home the tuna in Lego Land." Research feature in The New York Times series *Science Take*. Available at: <https://www.nytimes.com/2016/11/15/science/longhorn-crazy-ants.html>

**Scientific American:** Harper, Kelso and DeViscio, Jeffery (2019). Research featured in gif column: <https://www.scientificamerican.com/article/cannibalistic-cancer-protection-from-blast-belly-and-chicken-inner-space-science-gifs-to-start-your-week/>

**The POSTDOCKET** (2020). "Preparing a Growing Postdoctoral Workforce for a Diverse Job Market." Publication featured in National Postdoctoral Association press. 18: 6 June. Available at: [https://www.nationalpostdoc.org/page/POSTDOCKET\\_1806](https://www.nationalpostdoc.org/page/POSTDOCKET_1806)

**Scientific American blog:** Muth, Felicity (2013). "How do ants coordinate moving huge objects?" Research feature in the blog *Not Bad Science, Scientific American*. Available at: <http://tinyurl.com/z3hvb3w>

*Small Pond Science*, guest post: **McCreery, H.F.** (2018) “Learning to be a better mentor and leader.” <https://smallpondscience.com/2018/10/15/learning-to-be-a-better-mentor-and-leader/>

*Insectes Sociaux blog*: **McCreery, H.F.** (2017). “Do persistent ants work better together?” Research feature in blog, available at: <http://tinyurl.com/ybjah7zt>

*Inside JEB*: Knight, Kathryn (2016). “Cooperative ants are more than the sum of their parts.” Research feature in *Inside JEB, Journal of Exp. Biology*. 219: 3309-3310

## Presentations

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### Invited Seminars & Symposium Presentations

- 2020** Invited symposium presentation: “Collective behavior in ants and the robotic swarms they inspire”  
Collective Behavior symposium, Institute of Bioinformatics, University of Georgia (March 2020).  
  
Invited seminar: “Collective intelligence in ants: mechanisms, strategy, and flexibility”  
University of Massachusetts, Dartmouth Integrative Biology Seminar Series (February 2020).  
  
Invited seminar: “Mechanisms of collective intelligence in ants”  
Mathematical Biology Seminar Series, Brandeis University (June 2020).
- 2019** Invited symposium presentation: “Enriching undergraduate research experiences by improving mentorship training”  
Symposium on Undergraduate Education at 2019 Entomological Society of America Annual Meeting, St. Louis (November 2019).  
  
Invited symposium presentation: “Fine-scale resilience: Structure and function of flexible army ant bridges”  
Symposium on Social Resilience at 2019 Entomological Society of America Annual Meeting, St. Louis (November 2019).
- 2018** Invited project Leader: MBI Collective Behavior Workshop, Mathematical Biosciences Institute, Ohio State University. “Exploring group strategy and cohesion during obstacle navigation.”  
  
Invited symposium presentation: “A comparative approach to cooperative transport: disregarding potentially distracting information can be good.”  
Symposium on Information Use in Social Insects at the International Union for the Study of Social Insects (IUSSI) 2018 conference.
- 2017** Invited seminar, Physics of Living Systems group at the Massachusetts Institute of Technology.
- 2016** Invited seminar: Jin-Cornell bi-group seminar at JILA (joint physics institute of the University of Colorado and the National Institute of Standards and Technology).
- 2015** Invited symposium talk: “Reaching students through teachers: How to run a science workshop for K-12 teachers.”  
SciComm 2015: A symposium on effective science communication. Lincoln, Nebraska; October 2015.  
  
Invited seminar, Self-Organizing Systems Research Group at Harvard University.
- 2014** Invited seminar, Social Insects Research Group at Arizona State University.

Additional Seminars

- 2017** BEACON Center for the Study of Evolution in Action, Seminar Series. Michigan State University.
- 2016** Smithsonian Tropical Research Institute. Barro Colorado Island, Panama.
- 2014** Multidisciplinary Graduate School STEMinar series, University of Colorado.

Conference Contributions

- 2020** American Society of Naturalists Stand Alone Meeting  
*Planned November 2020: Entomological Society of America National Meeting*
- 2019** Animal Behavior Society Meeting  
Entomological Society of America National Meeting
- 2018** American Society of Naturalists Stand Alone Meeting  
International Union for the Study of Social Insects Meeting  
International Society for Behavioral Ecology Meeting
- 2017** Entomological Society of America National Meeting  
IEEE Annual Symposium on Artificial Life (poster & presentation)
- 2016** American Society of Naturalists Stand Alone Meeting
- 2015** Entomological Society of America National Meeting  
Guild of Rocky Mountain Ecologists and Evolutionary Biologists Meeting
- 2014** Entomological Society of America National Meeting  
Biological Distributed Algorithms Workshop at Distributed Computing (poster)
- 2013** Animal Behavior Society Meeting
- 2012** International Union for the Study of Social Insects – North American Section Breakout Meeting, **won outstanding oral presentation**

Teaching

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**Animal Behavior Course:** Graduate Instructor & Lecturer (2016). 100-student upper division undergraduate course at University of Colorado. Co-taught this course with a professor as well as three graduate and nine undergraduate teaching assistants; responsible for half the lectures and half of the management and administration of this lecture and lab course.

**Leadership and Mentoring in Science:** Graduate Instructor (2017). Seminar for graduate students and postdocs at University of Colorado. Co-taught this course with a postdoctoral associate.

**Ants of the Southwest:** Instructor (2016). Undergraduate and graduate specialty field course at the Southwestern Research Station, Arizona. Co-led this field course as part of a 3-person team.

**Science Writing:** Graduate leader (2015). Graduate seminar at University of Colorado. Co-led seminar as part of a 3-person team.

**Animal Behavior Course:** Teaching assistant on 3 occasions (2013, 2014, and 2015). Upper division undergraduate course at University of Colorado. Taught lab sections, developed new labs, and managed lab administration

**Genetics, Molecular to Population:** Teaching assistant (2015). Lower division undergraduate course at University of Colorado. Taught three recitation sections.

**General Biology I & II:** Teaching assistant on 3 occasions (2011, 2012, and 2014). Lower division undergraduate course at University of Colorado. Taught two to three lab sections.

**Curriculum development:** Developer and Guest Lecturer (2015). Developed and taught a week-long teachable unit on the evolution of social parasitism, including learning goals and assessments, for 32-student upper division course on parasites. Part of a graduate seminar on data-driven education practices.

**Graduate NSF STEM Fellow:** Life Sciences Teaching Assistant (2012-2013) at Centennial Middle School. Developed and led curriculum and activities for 7<sup>th</sup> grade, led “Science Club.”

## Service and Outreach

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<b>Reviewer</b>	<i>eLife, Nature Scientific Reports, Animal Behaviour, PLOS Computational Biology, Behavioral Ecology and Sociobiology, Insectes Sociaux, Journal of Insect Behavior, Behavioural Processes</i>
<b>2020</b>	Skype a Scientist Outreach: Presented virtually and led discussions about ecology, evolution, and collective behavior in six K-12 classrooms
<b>2019</b>	High School Outreach: Presented “Collective ant behavior” and led discussions in three AP Biology classes John D. O’Byrant School of Mathematics and Science, Roxbury, Massachusetts
<b>2018</b>	Biology on Tap: Popular science seminar in Lansing, Michigan. “We wish we were ants”
<b>2017</b>	Participated in Diversity Group, to promote diversity and inclusion at the University of Colorado and in STEM
<b>2012 – 2016</b>	Chair of the Graduate Student Science Outreach Committee Organized annual workshop at the University of Colorado for K-12 teachers on teaching contentious science topics, including evolution and climate change. This workshop is attended annually by dozens of teachers from across Colorado. Additional activities include developing annual Evolution Family Day at the University of Colorado Museum of Natural History and writing “evolution boxes” for biology courses.
<b>2013 – 2016</b>	Led the following reading groups or seminars at the University of Colorado: Quantitative Think Tank, Graduate Writing Coop, Animal Behavior Reading Group, Modeling Group
<b>2016</b>	Presented at teaching workshop for K-12 science teachers: “Brood parasites and ‘slave-making’ ants: a teachable unit for evolutionary arms races”
<b>2015</b>	Moth Mania: outreach event at the University of Colorado Natural History Museum Science Discovery: developed and led ant behavior projects for middle and high school students
<b>2014</b>	Presented to students at Temple Grandin middle and high school: “Ant behavior” Designed outreach poster for public visitors to the Biosphere 2 facility in Oracle, AZ: “Obstacle navigation during cooperative transport in ants.”
<b>2013</b>	Local Organizing Committee for Animal Behavior Society 2013 Conference