

# Souvik Mandal, Ph.D.

Post-doctoral fellow, Department of Molecular and Cellular Biology / Center for Brain Science

Harvard University, Cambridge, MA 02138, USA

Email: [souvik\\_mandal@fas.harvard.edu](mailto:souvik_mandal@fas.harvard.edu); Website: [souvikmandal.info](http://souvikmandal.info)

I'm an ethologist and broadly interested in behavior of social animals. As research tools, I combine classical techniques like studying natural history, manual behavioral observation, and training animals, with modern automation tools like computer vision and artificial intelligence. I have over 10 years of experience in public outreach and management, and several years of teaching. I strongly believe in "education for all for a better world".

## Research experience

### 2018 - Postdoctoral Fellow

Department of Molecular and Cellular Biology / Center for Brain Science,  
Harvard University, Cambridge, MA

**Awardee of** [Harvard Brain Initiative Postdoc Pioneers Grant](#)

**Faculty Advisor:** [Venkatesh N. Murthy](#), Professor, Department of Molecular and Cellular Biology

**Project:** Cooperation, decision-making, resource searching and retrieval mechanisms in the  
Carpenter ant *Camponotus pennsylvanicus*

### 2016 Visiting researcher

Centre de Recherches sur la Cognition Animale (Research Center on Animal Cognition)  
Université Toulouse III - Paul Sabatier, Toulouse, France

**Faculty Advisor:** [Martin Giurfa](#), Professor and Chair, Centre de Recherches sur la Cognition Animale

**Project:** Neural and behavioral basis of cooperative defense in honeybees

## Education

<b>2017</b>	<b>Ph.D. Thesis title</b>	<a href="#">Finding the way back home: A study of orientation, navigation and homing behaviour in the social wasp <i>Ropalidia marginata</i></a>
	<b>Faculty advisor</b>	<a href="#">Raghavendra Gadagkar</a>
	<b>Affiliation</b>	<a href="#">Centre for Ecological Sciences, Indian Institute of Science</a> , India
<b>2009</b>	<b>Master of Science</b>	in Zoology, specialization - Ecology & Animal Behavior
	<b>Affiliation</b>	<a href="#">Presidency College, University of Calcutta</a> , India
<b>2007</b>	<b>Bachelor of Science</b>	in Zoology (honors), Chemistry & Botany (minor), 2007
	<b>Affiliation</b>	Presidency College, University of Calcutta, India

## Research interest

Decision making | Foraging | Searching | Cognition | Learning & memory | Sociobiology | Entomology |  
Ethology | Computational ethology | Behavioral ecology | Neuroethology | Evolution | Natural History |  
Ecology

## Research skills

Behavioral experiment | Field work | Handling ant, bee & wasp colonies | Canine training | Programming -  
Python, MATLAB, R, html5 | Statistical modelling & analysis | Machine vision | Science communication |  
Mentoring

## Other skills & interests

Media production & Documentary movie making | Video editing (Adobe Premiere Pro) | Graphic design (Adobe Photoshop, Adobe Illustrator) | Painting | Photography | Music | Education & Science policy | Public outreach | Insect-inspired technology | Bird watching | Agriculture | Gardening | Skiing

## Professional certifications

- 2021 [Undergraduate Science Mentoring - Harvard University](#)
- 2020 [Project Management Strategies For The Researcher - Harvard University](#)

## Publications

1. Ganga Prasath S\*, **Mandal S\***, Giardina F\*, Kennedy J, Murthy VN, Mahadevan L (2022) [Dynamics of cooperative excavation in ant and robot collectives. \*eLife\*](#)
2. Brahma A, **Mandal S**, & Gadagkar R. (2019) [To leave or to stay: direct fitness through natural nest foundation in a primitively eusocial wasp. \*Insectes Sociaux\*](#)
3. **Mandal S**, Brahma A. (2019) [Getting older, getting smarter: Ontogeny of foraging abilities in a tropical social wasp. \*Journal of Experimental Biology\*](#)
4. **Mandal S**. (2018) [How do animals find their way back home? A brief overview of homing behavior with special reference to social Hymenoptera. \*Insectes Sociaux\*](#)
5. Brahma A, **Mandal S**, & Gadagkar R. (2018) [Current indirect fitness and future direct fitness are not incompatible. \*Biology Letters\*](#)
6. Nouvian M, **Mandal S**, Jamme C, Claudianos C, d'Ettoire P, Reinhard J, Barron AB, Giurfa M. (2018) [Cooperative defence operates by social modulation of biogenic amine levels in honeybees. \*Proceeding of Royal Society B\*](#)
7. Brahma A, **Mandal S**, & Gadagkar R. (2018) [Emergence of cooperation and division of labor in the primitively eusocial wasp \*Ropalidia marginata\*. \*Proceedings of the National Academy of Sciences of the USA\*](#)
8. Saha P, Nandi A, Unnikrishnan S, Shilpa MC, Shukla S, **Mandal S**, Mitra A, Gadagkar R. (2018) [A route to direct fitness: natural and experimentally induced queen succession in the tropical primitively eusocial wasp \*Ropalidia marginata\*. \*J Insect Behavior\*](#)
9. **Mandal S**, Brahma A, & Gadagkar R. (2017) [Homing in a tropical social wasp: role of spatial familiarity, motivation and age. \*J Comp Physiol A\*](#)
10. **Mandal S** & Gadagkar R. (2015) [Homing abilities of the tropical primitively eusocial paper wasp \*Ropalidia marginata\*. \*J Comp Physiol A\*](#)

## Teaching and mentoring experiences

### Course design, development and teaching

- 2020 - '22: Harvard University, MA, USA: [LS/MCB100 - Computational Ethology](#)

### Teaching assistant

Responsibilities included leading class discussions, supervising labs, grading assignments, conducting office hours, meeting with students individually.

- 2018: Harvard University, MA, USA [LIFESCI 1A: An integrated introduction to the life sciences: Chemistry, Molecular Biology, and Cell Biology](#)
- 2011 - '13: Indian Institute of Science, Bangalore, India [UB 101\(2:1\): Introductory Biology-I \(Organismal Biology and the Molecular Basis of Life\)](#)

## Mentoring Experiences

- 2019 - '22: 8 undergraduates (long-term projects), 1 graduate (Ph.D.) student at Harvard University, MA, USA
- 2012 - '16: 2 undergraduates, 1 master's, and 1 graduate (Ph.D.) student at Indian Institute of Science, Bangalore, India

## Other experiences

### Editorial & peer reviewing

- [Proceedings of the National Academy of Sciences of the United States of America](#)
- [Frontiers in Psychology - Cognition](#) (Review Editor)
- [Journal of Experimental Biology](#)

### Professional media production

- 2017: Photographer, [Archives and Publications Cell](#), Indian Institute of Science
- 2017: Documentary video production head, [Archives and Publications Cell](#), Indian Institute of Science
- 2015 - '16: Seminar video production head - [Centre for Contemporary Studies](#), Indian Institute of Science
- Featured photographer - [Sanctuary Asia](#) magazine (2005), [BMC Ecology](#) (2014)

**Harvard Science Education Partner:** Spring & Fall semester 2022

### Elected member:

- 2011 - '14: Joint secretary - [Students' mess \(dining\) committee](#), Indian Institute of Science
- 2011: Secretary - [Ecology Students' Society](#), Indian Institute of Science
- 2007 - '09: Constituency representative - M.S. program, Students' Union, Presidency college (University)

### Volunteering:

- 2020: Founding committee member - [Harvard Diversity, Inclusion & Belonging](#)
- 2019 - '20: Coordinator - [Seminars, Museum of Comparative Zoology, Harvard University](#)
- 2014 - '16: Convener, Head of Public outreach & Finance [Students' Council](#), [Indian Institute of Science](#)
- 2013: Coordinator - Environment committee, [Students' Council](#), [Indian Institute of Science](#)

## Awards for presentations

2017: 2nd Best Poster Award in XVI Congress of the European Society for Evolutionary Biology, held in Netherlands

2015: Winner: Euraxess Science Slam India (Science communication competition organized by the European Union)

2015: Best Poster Award in 34th International Ethological Conference, held in Australia

2014: Best Poster Award in 15th Congress of the International Society for Behavioral Ecology, held in USA

2013: Best Poster Award in the XIV Congress of the European Society for Evolutionary Biology, held in Portugal

## Other presentations

### Conference talks and poster presentation

1. 2022: Talk at Brains and Behavior in the Wild conference, Harvard University.
2. 2019: Poster at Gordon Research Conference Neuroethology: Behavior, Evolution and Neurobiology, held in the USA
3. 2018: Poster at XVIII Congress of International Union for the Study of Social Insects, held in Brazil
4. 2016: Talk at 15th Congress of the International Society for Behavioral Ecology, held in the UK

## Invited talks

### Academic

1. 2022: "[The Evolution of Behavior Science through Integrating Modern Computation](#)" - Bard College, NY, USA
2. 2020: "Computational Ethology" - Boston University, Host: James Traniello, Professor of Biology
3. 2019: "[Understanding animal behavior in the era of machine learning: lessons from ants](#)" - Georgia Institute of Technology, Host: Prof. David Hu, Mechanical Engineering and Biology, Adjunct Professor of Physics
4. 2016: Queen Mary University of London - Host: Prof. Lars Chittka, School of Biological and Chemical Sciences

### School

1. Revere Garfield Middle School, MA, USA

### Public

1. 2020: "Understanding bees for a sustainable future" - at Barnstable County Beekeepers Association, MA, USA
2. 2016: "Voice of Researcher" - at European research day - at Chandigarh, India organized by European Union

## Professional memberships

1. 2017: International Union for the Study of Social Insects
2. 2017: Society for the Study of Evolution
3. 2014, 2016: International Society for Behavioral Ecology
4. 2013: European Society of Evolutionary Biology

## Field work experiences

1. Temperate closed-canopy forest - Harvard Forest, Petersham, MA, USA
2. Urban ecosystem - Kolkata; Bangalore, India
3. Tropical dry deciduous/ moist deciduous/ wet evergreen forest
  - i. Nagarhole National Park, Karkataka, India
  - ii. Mudumalai National Park, Tamilnadu, India
  - iii. Kalakkad Mundanthurai Tiger Reserve, Tamilnadu, India
  - iv. Nagzira wildlife Sanctuary, Maharastra, India
  - v. Kanha National Park, Madhya Pradesh, India
4. Wetland ecosystem Nal Sarovar Bird Sanctuary, Gajarat, India
5. Marine and mangrove ecosystem - Marine national park, Jamnagar, Gujarat, India
6. Desert ecosystem - Indian Wild Ass Sanctuary, Little Rann of Kutch, Gujarat, India
7. Dry deciduous scrub forest and dry savannah forests - Gir National Park, Gajarat, India
8. Valley and plateau meadow - Kanha National Park, Madhya Pradesh, India