

# Souvik Mandal, Ph.D.

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

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I am a strong believer of “education for all for a better world”. Academically, I’m trained as a behavioral ecologist and broadly interested in understanding the basis of cooperation, learning, memory and behaviors in social animals. As my research tools, I use classical techniques like manual behavioral observation, training animals, and studying natural history, as well as modern technologies like data science, machine vision and artificial intelligence. Additionally, I have over 15 years of experience in public outreach and management.

## Research experience

- 2018 - Postdoctoral Fellow,**  
Department of Molecular and Cellular Biology / Center for Brain Science,  
Harvard University, Cambridge, MA  
**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

- 2017 Ph.D. Thesis title** [Finding the way back home: A study of orientation, navigation and homing behaviour in the social wasp \*Ropalidia marginata\*](#)  
**Faculty advisor** [Raghavendra Gadagkar](#)  
**Affiliation** [Centre for Ecological Sciences](#), [Indian Institute of Science](#), India
- 2009 Master of Science** in Zoology, special paper – Ecology  
**Affiliation** [Presidency College, University of Calcutta](#), India
- 2007 Bachelor of Science** in Zoology (honors), Chemistry & Botany (minor), 2007  
**Affiliation** Presidency College, University of Calcutta, India

## Research interest

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

## Research skills

Handling social insect colonies; Behavioral experiment design; Field work; Data science; Quantitative ethology; Statistical modelling and analysis; Programming – Python, Matlab, R; Machine vision; Artificial intelligence; Science communication; Mentoring undergraduate and graduate students

## Other interests

Education; Science policy; Public outreach; Media production; Painting; Photography; Graphic design; Music; Documentary movie making; Insect-inspired technology; Bird watching; Agriculture

## Publications

1. 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*
2. **Mandal S**, Brahma A. (2019) [Getting older, getting smarter: Ontogeny of foraging abilities in a tropical social wasp.](#) *Journal of Experimental Biology*
3. **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*
4. Brahma A, **Mandal S**, & Gadagkar R. (2018) Current indirect fitness and future direct fitness are not incompatible. *Biology Letters*
5. Nouvian M, **Mandal S**, Jamme C, Claudianos C, d'Ettorre 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*
6. 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*
7. 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*
8. **Mandal S**, Brahma A, & Gadagkar R. (2017) Homing in a tropical social wasp: role of spatial familiarity, motivation and age. *J Comp Physiol A*
9. **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: LS/MCB100 - Computational Ethology: Harvard University, MA, USA

### 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 - 2013: Indian Institute of Science, Bangalore, India [UB 101\(2:1\): Introductory Biology-I \(Organismal Biology and the Molecular Basis of Life\)](#)

### Mentoring

- 2019 - 2020: 2 undergraduate, 1 graduate (Ph.D.) student at Harvard University, MA, USA
- 2012 - 2016: 2 undergraduate, 1 masters', and 1 graduate (Ph.D.) student at Indian Institute of Science, Bangalore, India

## Other experiences

### Volunteering:

- 2020: Founding committee member – [Harvard Diversity, Inclusion & Belonging](#)
- 2019 - 2020: Coordinator - [Seminars, Museum of Comparative Zoology, Harvard University](#)
- 2014 - 2016: Convener, Head of Public outreach, Financial manager [Students' Council](#), [Indian Institute of Science](#)
- 2013: Coordinator – Environment committee, [Students' Council](#), [Indian Institute of Science](#)

### Elected member:

- 2011 - 2014: Joint secretary – [Students' mess \(dining\) committee](#), Indian Institute of Science
- 2011: Secretary – [Ecology Students' Society](#), Indian Institute of Science
- 2007 - 2009: Constituency representative - M.S. program, Students' Union, Presidency college (University)

## 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 - 2016: Seminar video production head – [Centre for Contemporary Studies](#), Indian Institute of Science
- Featured photographer - [Sanctuary Asia](#) magazine (2005), [BMC Ecology](#) (2014)

## Peer reviewing

- 2019: [Journal of Experimental Biology](#)

## Field work experiences

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

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

### Invited talks

#### Academic

1. 2021: "Computational ethology: A brief introduction and future directions" – Boston University; Host: James Traniello, Professor of Biology.
2. 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
3. 2016: Queen Mary University of London; Host: Prof. Lars Chittka, School of Biological and Chemical Sciences

#### Public

4. 2020: "What India can learn from COVID crisis and Black Lives Matter movement in the USA" - Students' Federation of India online conference
5. 2020: "Understanding bees for a sustainable future" – at Barnstable County Beekeepers Association, MA, USA
6. 2016: European research day - "Voice of Researcher", Chandigarh, India