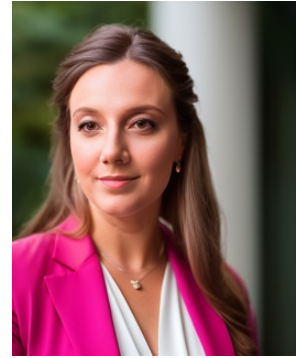


Marie-Genevieve Guiraud Post-doctoral fellow

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Introduction

Simple models might be useful for the study of cognition. Hence, a wonderful model to uncover mechanisms of behavioural repertoire is the bee brain (honey bee and bumble bee predominantly). Bees possess a mini-brain with fewer than a million neurons, and yet exhibit impressive capabilities in learning and memory (in various sensory modalities: vision, olfaction and gustation). Unravelling the mysteries behind bee cognition by exploring the underlying neural mechanisms represents a very exciting challenge. I am broadly interested in cognitive neuroscience, ecology, learning and memory. During my PhD, I was particularly interested about 'how' bees solve complex cognitive tasks (example: conceptual learning tasks). I 3D tracked bees' trajectories engaged in a variety of visual puzzle to understand how stereotypical of the bee body movements (active vision) in front of a pattern helped the bee recognise a rewarding pattern from an unrewarding one. My first post-doc created a bridge between the behavioural performances of bees and their visual anatomy, their ecology. Now aided by Prof. Barron, I am combining previously learnt techniques, modelling and new collaborations in an effort to understand how visual resolution, neural encoding and ecology shapes the bee's visual field while performing complex object recognition.

Technical skills

IT: Pack Office, Statistics and modelling (R, Statistica, Sigma Plot, MATLAB, SPSS, Python - basics), AMIRA, Image J, illustration, anatomical drawings, 3D printer and related software, Arduinos.

Scientific: Behavioural tests, pharmacological tools, Nanodrop, Immunohistochemistry, immunohistofluorescence, DNA / RNA extraction and purification, qPCR, 2D/3D visual analysis, micro-CT, anatomical and physiological measures (respirometer, morphometrics, hemolymph extraction, glucose concentration), isotropic fractionator and more.

Professional: Science communication, webpage design, problem-solving skills, rigor and autonomy, collaboration, initiative, adaptability, responsiveness, teamwork, pedagogy.

Diploma

PhD in Biological sciences

Department of Experimental Psychology, University Queen Mary of London, United Kingdom
2015 – 2019

Master 2 Neurosciences and Signalling

University Paris 11, France
2013 - 2014

Master 1 Neurosciences, Behaviour and Cognition

University Toulouse III Paul Sabatier, France
2012 - 2013

Magistere of Neurosciences (semester 1)

University Valparaiso, Chile
2011 - 2012

Licence (Bachelor) in Biology of Organisms, Populations and Ecosystems

University Toulouse III Paul Sabatier, France
2008-2011

Academic Employment

Post-doctoral fellow

Macquarie University, Biology department, Prof. Barron's laboratory

2022 (Nov) - Now

Neuroscience (isotropic fractionator), free-flying experiments (bees & birds: hummingbirds), modelling, video analysis.

Post-doctoral fellow

Stockholm University, Sweden, Zoology department, INSECT laboratory

2019 (Oct) - 2021 (Nov)

Neuro-ecological techniques, morphometrics, anatomy, micro CT-technique, AMIRA 3D reconstruction of eyes and brains, tunnel and sensory experiments, PhD supervision, teaching (psychophysics).

PhD student

University Queen Mary of London, United Kingdom, Bee Sensory and Behavioural Ecology Laboratory

2015 (Sept) – 2019 (Sept)

Behavioural tests (bees and humans – eye-tracking), software programming, 2D/3D tracking, data analysis, statistics.

Languages

French (mother tongue), English (fluent), Spanish (fluent).

Grants & Prizes

Macquarie Minds and Intelligence initiative

(2023) equipment grant (5000\$AU)

Marie Curie M.S.C.A.

(2020) - Seal of excellence (2021) 93%

Diamond Light Source

(2019 and 2020) - 2 grants awarded for projects (appx 45 000 €)

QMUL grants equipment (2019) (5000 €)

A.S.A.B. Travel grant conference 2018 (500€)

QMUL PhD Scholarship (2015) (67 000£)

Edition and review

Apidologie - Reviewer (2023-now)

eLife - Reviewer (2023-now)

Insects - Reviewer (2022-now)

Frontiers in Behavioural Neuroscience - Guest editor (2022) Neuroscience

Journal of Experimental Biology - Reviewer (2018-now)

Frontiers - Reviewer (2018-now)

C.N.R.S. Research engineer
Research Center on Animal Cognition, University
Toulouse III Paul Sabatier, France
2014

*Micro-injections, brain dissections and extractions,
Nanodrop use, qPCR, behavioural tests, statistical analysis.*

C.N.R.S. Research internships
Research Center on Animal Cognition, University
Toulouse III Paul Sabatier, France Instituto de
Fisiología, Biología Molecular y Neurociencias -
Universidad de Buenos Aires.
2012-2014

*Behavioral tests: olfactory and gustatory, abdominal
injections of insulin & RNAi, brain injection of aminergic
blockers beekeeping, physiological measurements,
Nanodrop use, qPCR, optical imaging, data analysis.*

Laboratory technician
Centro Interdisciplinario de Neurociencias de Valparaiso –
University of Valparaiso, Chili
2011-2012

*Bibliography, protocol design, technics in molecular and
cellular biology, microscopy, image and results processing,
statistics.*

Teaching, supervision, seminars & outreach

Post-doctoral fellow
Macquarie University, Biology department, Prof. Barron's
laboratory
2022 (Nov) - Now

Supervision: Undergraduate students (1), Master student
(1), PhD student (2).

Conferences organisation: Types of minds
(03/23), Macquarie Minds and Intelligence Initiative (2023-
2024) [https:// www.mq.edu.au/research/research-centres-
groups-and-facilities/groups/macquarie-minds-and-
intelligences-initiative](https://www.mq.edu.au/research/research-centres-groups-and-facilities/groups/macquarie-minds-and-intelligences-initiative)

Biology teacher
Collège Victor Hugo, Lavelanet, France
2022 (March - July)

Teaching: Biology, Geology and more for 11-15 y/o.
Creation of course materials, games (Immunity-based Role
Play game, Prisoner's dilemma), creative projects, Q&A
sessions. Microscope observations & dissections.

Outreach projects: Science club, botanics, Psychology 101
classes on consent, non-violent communication and personal
growth.

Scientific communication

Space & Numbers in
Animal Minds, Canberra,
Au

Sept 2023, Talk
Sydney's bee day,
University of Sydney, Au
July 2023, Talk

Types of Minds,
Macquarie University, Au
March 2023, Talk

Twitch, Nature'N Clic -
May 2022, Talk
Tovetorp field station,
Sweden

October 2019, Talk
Royal Holloway College,
Egham, UK - 10th

Conference on Animal
Navigation

April 2019, Talk
University of Plymouth,
UK - A.S.A.B. conference
April 2018, 1st prize best
talk

Beekeeper Central
Association, UK

February 2018, Talk
SBCS, UK

2015-2018, 1st year talk,
2nd year poster, 3rd year
talk

QMUL, UK - Vision
Association Conference

December 2016, Talk
French Research Network
in Ethology, Tours, Fr

October 2014, Poster
I.U.S.S.I., Cairns, Au

July 2014, Poster
15th French Conference
on invertebrate
Neurobiology, Toulouse,
Fr

July 2014, 1st prize for best
poster presentation (F1000).

Hobbies

Macro-photography,
painting, video games,
writing SF's novels.

Post-doctoral fellow

Stockholm University, Sweden, Zoology department, INSECT laboratory
2019-2021

Teaching: psychophysics

Supervision: Master students (4), PhD students (2).

Citizen science project: from design to development Pollinators Of Sweden (P.O.S)
<https://www.invismo-project.com/outreach>

PhD student

Queen Mary University of London, UK
2015-2019

Teaching: 300+ hours in: experimental psychology, research methods, neuro-psychology, statistics, project management, molecular and cellular biology, evolution, practical biology, ecology, behavioural ecology, neurosciences, animal behaviour (and more).

Participation in life science experiments: several in the department of Experimental Psychology including: heart rate control through respiration, E.E.G. experiments on language understanding and music valorisation (non-musicians/musicians), reflex experiments, psychological tests (dark triad, expectations experiments, tests in positive psychology about meaningful conversations) and more during practicals with students.

Supervision: PhD students (2), Master students (3), 3rd year students (3), Nuffield placements students (5)

Citizen science project: Save London's bees <https://www.savelondonbees.co.uk>

Seminar organising: School of Biological and Chemical Science

Outreach: Middle school conferences (Olympe de Gouges, Montauban)

Scientific and cultural guide

Museum of Natural History of Toulouse, France
2010-2011

Teaching, science popularization, live demonstrations, scientific and game workshops, exhibition visits, peer training.

Private teacher

Toulouse, France
2009-2010

Teaching mathematics, biology, physics, chemistry, english, spanish, french for students between 11-17 y/o.

Scientific output

12. **Guiraud M.G.**, Maboudi H., Barron A. Chittka L. (2023). *2 articles in prep.*

11. Maboudi H., Roper M., **Guiraud M.G.**, Chittka L., Marschall J. A.R. (2023). A neuromorphic model of active vision shows spatio-temporal encoding in lobula neurons can aid pattern recognition in bees *Bombus terrestris*. bioRxiv.
DOI: <https://doi.org/10.1101/2023.06.04.543620>

10. Gérard M., **Guiraud M.**, Cariou B., Henrion M, and Baird E. (2023). Elevated developmental temperatures impact the size and allometry of morphological traits of the bumblebee *Bombus terrestris*. Journal of Experimental Biology. DOI: <https://doi.org/10.1242/jeb.245728>

9. **Guiraud M.***, Roper M.*, Wolf S., Woodgate J. L. and Chittka L. (2022) Discrimination of edge orientation by bumblebees PLOS ONE. DOI: <https://doi.org/10.1371/journal.pone.0263198>
8. Perl C.D., Johansen Z.B., Moradinour Z., **Guiraud M.**, Restrepo C.E., Jie V.W., Miettinen A., Baird E. (2022) Heatwave-like events during development are sufficient to impair bumblebee worker responses to sensory stimuli. *Frontiers*. DOI: <https://doi.org/10.3389/fevo.2021.776830>
7. Perl C.D., Johansen Z.B., Jie V.W., Moradinour Z., **Guiraud M.**, Restrepo C.E., Miettinen A., Baird E. (2022) Substantial variability in morphological scaling among bumblebee colonies. *Royal Society Open Science*. DOI: <https://doi.org/10.1098/rsos.211436>
6. **Guiraud M.***, Cariou B.*, Henrion M.*, Baird E., Gerard M. (2021) Higher developmental temperature increases queen production and decreases worker body size in the bumblebee *Bombus terrestris*. *Journal of Hymenoptera Research*. DOI: <https://doi.org/10.3897/jhr.88.73532>
5. Maboudi H., Roper M., **Guiraud M.**, Marschall J. A. R., Chittka L. (2021) Automated video tracking and flight analysis show how bumblebees solve pattern discrimination task using active vision. *BioRxiv*. DOI: <https://doi.org/10.1101/2021.03.09.434580>
4. Baird E., Tichit P.*, **Guiraud M.***. The neuro-ecology of bee flight behaviours. (2020) *Current opinion in insect science*. DOI: [10.1016/j.cois.2020.07.005](https://doi.org/10.1016/j.cois.2020.07.005)
3. **Guiraud M.***, Roper M.* & Chittka L. (2018) High-Speed Videography Reveals How Honeybees Can Turn a Spatial Concept Learning Task Into a Simple Discrimination Task by Stereotyped Flight Movements and Sequential Inspection of Pattern Elements. *Frontiers in Psychology*, 9:1347. DOI:10.3389/fpsyg.2018.01347.
2. **Guiraud M.**, Hotier L., Giurfa M. & de Brito Sanchez M.G. (2018) Aversive gustatory learning and perception in honey bees. *Scientific Reports*. DOI: [10.1038/s41598-018-19715-1](https://doi.org/10.1038/s41598-018-19715-1)
1. Mengoni Goñalons C.*, **Guiraud M.***, de Brito Sanchez M.G., Farina W.M. (2017) Insulin effects on honeybee appetitive behaviour. *Journal of Experimental Biology*. DOI: [10.1242/jeb.143511](https://doi.org/10.1242/jeb.143511)