

Personal Details

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Position: Research Fellow



Current Employment

01/12/2020–(30/11/2023) JMU Würzburg— **Research Fellow**
Department: Biozentrum, Zoology II
Project: “**Psychometric Analysis of the Honeybee Polarization Compass**”
Funding: DFG, Temp. Position for Principal Investigator (FO 1308/3-1)

Professional Experience

01/06/2020–30/11/2020 JMU Würzburg— **Research Fellow**
Department: Biozentrum, Microbiology
Supervisor: Dr. Ana Rita Brochado
Funding: DFG (Emmy Noether Fellowship to ARB)

01/03/2020–30/04/2020 JMU Würzburg— **Research Fellow**
Department: Biozentrum, Zoology II
Supervisor: Dr. Basil el Jundi
Funding: DFG (Emmy Noether Fellowship to BeJ)

01/07/2018–29/02/2020 Lund University— **Research Fellow** (employed)
Department: Functional Zoology, Vision Group
Supervisor: Prof. Dr. Marie Dacke
Funding: Air Force Office of Scientific Research

01/10/2014–30/06/2018 Lund University— **Postdoctoral Researcher** (stipended)
Department: Functional Zoology, Vision Group
Project: “**The Ultimate Limits of Polarization Vision**”
Supervisor: Prof. Dr. Marie Dacke
Funding: Knut and Alice Wallenberg Foundation
Carl Trygger Foundation (CTS 14:95 and 15:180)

19/04/2010–17/09/2010 University of Bristol— **Research Associate** (internship)
Project: “**Bumblebee Polarization Vision**”
Supervisor: Prof. Dr. Julian Partridge

Education

2010–2014 University of Bristol— **PhD** (School of Biological Sciences)
Title: “**Functions of Animal Polarization Sensitivity**”
Supervisors: Prof. Dr. Julian C. Partridge & Prof. Dr. Nicholas W. Roberts
Awarded: 06/01/2015

2008–2009 University of Bristol— **Master of Research**, Vision Science (**Distinction**)
2005–2008 University of Bristol— **Batchelor of Science**, Zoology (**1st Class**)
2000–2005 Cranleigh School, Surrey, U.K.— A Level: Biology, Mathematics, French

Publication record

h-index: 9; **citations:** 130; **1st author:** 6, **last author:** 1. [Google Scholar](#), [Publons](#)

- Tocco C, **Foster JJ**, Venter N, Cowie B, Marlin D & Byrne M (2021) Elevated atmospheric CO₂ adversely affects dung beetle development: another potential driver of decline in insect numbers? *Glob. Change Biol.* 27 (19) 4592-4600 doi:10.1111/gcb.15804
- Foster JJ**, Tocco C, Smolka J, Khaldy L, Baird E, Byrne M, Nilsson D-E & Dacke M (2021) Light pollution forces a change in dung beetle orientation behaviour. *Curr. Biol.* 31 (17) 3935-3942.e3 doi:10.1016/j.cub.2021.06.038
- Olsson P, Johnsson RD, **Foster JJ**, Kirwan JD, Lind O & Kelber A (2020) Chicken colour discrimination depends on background colour. *J. Exp. Biol.* jeb.209429 doi:10.1242/jeb.209429
- Franzke M, Kraus C, Dreyer D, Pfeiffer K, Beetz MJ, Stöckl AL, **Foster JJ**, Warrant EJ & el Jundi B (2020) Spatial orientation based on multiple visual cues in monarch butterflies. *J. Exp. Biol.* jeb.223800 doi:10.1242/jeb.223800
- Dacke M, Bell A, **Foster JJ**, Baird E, Strube-Bloss M, Byrne MJ & el Jundi B (2019) Multimodal cue integration in the dung beetle compass. *Proc. Natl. Acad. Sci. USA* 116 (28) 14248-14253 doi:10.1073/pnas.1904308116
- Foster JJ**, Kirwan JD, el Jundi B, Smolka J, Khaldy L, Baird E, Byrne MJ, Nilsson D-E, Johnsen S & Dacke M (2019) Orienting to Polarized Light at Night—Matching Lunar Skylight to Performance in a Nocturnal Beetle. *J. Exp. Biol.* 222, jeb.188532 doi:10.1242/jeb.188532
- Dahake A, Stöckl AL, **Foster JJ**, Sane SP, Kelber A (2018) The roles of vision and antennal mechanoreception in hawkmoth flight control. *eLife* 7:e37606 doi:10.7554/eLife.37606
- Wilby DW, Riches S, Daly IM, Bird A, Wheelright M & **Foster JJ** (2018) Hermit Crabs (*Pagurus bernhardus*) Use Visual Contrast in Self-Assessment of Camouflage. *J. Exp. Biol.* 221, 173831 doi:10.1242/jeb.173831
- Foster JJ**, Temple SE, How MJ, Daly IM, Sharkey CR, Wilby D & Roberts NW (2018) Polarisation Vision: Overcoming Challenges of Working with a Property of Light We Barely See. *Sci. Nat.* 105(27) doi:10.1007/s00114-018-1551-3
- Kirwan JD, Bok MJ, Smolka J, **Foster JJ**, Hernández JC & Nilsson D-E (2018) A Diadematiid Urchin Uses Low Resolution Vision to Find Shelter and Deter Enemies. *J. Exp. Biol.* 221, 176271 doi:10.1242/jeb.176271
- Foster JJ**, Smolka J, Nilsson D-E & Dacke M (2018) How Animals Follow the Stars. *Proc. R. Soc. B* 285, 20172322 doi:10.1098/rspb.2017.2322
- Foster JJ**, el Jundi B, Smolka J, Khaldy L, Nilsson D-E, Byrne MJ & Dacke M (2017) Stellar Performance—Mechanisms Underlying Milky Way Orientation in Dung Beetles. *Phil. Trans. R. Soc. B*, 372, 20160079 doi:10.1098/rstb.2016.0079
- el Jundi B, **Foster JJ**, Khaldy L, Byrne MJ, Dacke M & Baird E (2016) A Snapshot-Based Mechanism for Celestial Orientation. *Curr. Biol.*, 26(11) 1456–62 doi:10.1016/j.cub.2016.03.030
- el Jundi B, **Foster JJ**, Byrne MJ, Baird E & Dacke M (2015) Spectral Information as an Orientation Cue in Dung Beetles. *Biol. Lett.*, 11(11), 20150656 doi:10.1098/rsbl.2015.0656
- Foster JJ**, Sharkey CR, Gaworska AV, Roberts NW, Whitney HM & Partridge JC (2014) Bumblebees Learn Polarization Patterns. *Curr. Biol.*, 24(12) 1415–20 doi:10.1016/j.cub.2014.05.007

Grants, Scholarships and Prizes

23/09/2021	Best Talk Prize, Postdocs —Early Career Researcher Living Light 2021	184€ (200 CHF)
15/07/2020	Postdoctoral Fellowship FO 1308/3-1—DFG Eigene Stelle	340 428€
20/04/2020	Shortlisted— Sofja Kovalevskaja Award	
03/06/2019	Grocott Award (best animal navigation article)	283€ (£250)
01/02/2019	Exploration Grant NGS-56504R-19 Byrne, Tocco & Dacke. Nat. Geographic	25 200€ (\$28 900)
11/12/2018	Travel Grant —Royal Swedish Academy of Sciences	1 231€ (12 925 SEK)
11/09/2018	Travel Grant —Royal Physiographic Society	1 231€ (12 925 SEK)
03/12/2017	Travel Grant —Ymer-80 Foundation grant for Polar research	738€ (7 100 SEK)
03/03/2017	Travel Grant —INTERACT Transnational Access	400€
13/01/2016	Postdoctoral Scholarship CTS15:180—Carl Trygger Foundation	29 822€ (276 000 SEK)
24/11/2015	Project Grant FO2016-0540—Lars Hierta Memorial Foundation	1 942€ (18 000 SEK)
28/11/2014	Postdoctoral Scholarship CTS14:95—Carl Trygger Foundation	25 887€ (240 000 SEK)
12/11/2014	Travel Grant —Royal Physiographic Society	1 288€ (11 900 SEK)
28/02/2012	Travel Grant —Alumni Foundation, University of Bristol	472€ (£400)
28/04/2011	First Prize, Student Poster session —ASAB Easter Meeting	
26/04/2011	ASAB Conference Grant —Association for Study of Animal Behaviour	
26/06/2011	Travel Grant —Rank Prize Fund for Optoelectronics	78€ (£70)
21/03/2011	Best Poster (Biol. Sciences), <i>Nat. Systems poster session</i> —University of Bristol	
09/04/2010	University of Bristol Postgraduate Research Scholarship	46 568€ (£41 589)

Skills

Stimulus design

Development and calibration of novel optical stimuli
(for review see: Foster *et al.*, 2018b).

Statistical programming in R (www.r-project.org/) & Stan (www.mc-stan.org/)

Circular Statistics (Foster *et al.*, 2019; Foster *et al.*, 2017)

Computational systems biology (Airoidi *et al.*, in prep.)

Mixed-effects modelling (Foster *et al.*, 2014; Dahake *et al.*, 2018; Wilby *et al.*, 2018)

Bayesian estimation (Foster *et al.*, 2019; Olsson *et al.* 2020)

Image processing

MATLAB, Python, ImageJ & OpenCV

Animal husbandry

Care of damselfish, Crustacea, social insects, salt- & fresh-water aquaria

Languages

French (A-level), Spanish (AS-level), Swedish (SFU levels 1–3, Lund University)

Driving Experience

British driver's licence, off-road experience

Seminar organisation

Biology Departmental Seminars, Lund University (2018–2019)

Public engagement

Bumblebee Psychophysics, Bristol Botanic Garden Bee Festival (2010–2011)



Teaching Experience

2021/06–07 Supervisor—Valentina Ramirez Gerstner (Master's Project)

2018/04 Completed course: [Learning & Teaching in Higher Education](#) (Lund University)

2016–2019 Lecturer & Tutor—Neurobiology (Master's Course)

2016–2019 Lecturer—Sensory Biology (Master's Course)

2015/01–12 Supervisor—Johan Ahlgren ([Master's Project](#))

2010–2013 Lab. Demonstration—Diversity of life (Batchelor's Course)

Invited Talks

The Visual Ecology of the Honeybee's Polarization Compass. (2021) *Deutsche Zoologische Gesellschaft* JMU Würzburg

Enlightened orientation. (2021) *Applied Vision Association Spring Meeting* (Virtual Conference)

Getting to Know the Honeybee's Polarization Compass. (2020) *Invited Seminar* Free University of Berlin

Orientation Strategies of a Nocturnal Dung Beetle. (2019) *Invited Seminar* Albert Ludwig University of Freiburg

A Beetle Orienting to Light Pollution. (2019) *Deutsche Zoologische Gesellschaft* Friedrich-Schiller University of Jena

An Orientation Strategy that is Robust to Light Pollution. (2019) *International Conference on Invertebrate Vision*

How Animals Follow the Stars. (2018) *Vin og Videnskab* Natural History Museum of Denmark

Lunar Skylight Polarization—Limits for an Orienting Beetle. (2018) *Visionarium XVII*

Star Compass Orientation. (2017) *Visionarium XVI*

Animal Star Orientation. (2017) *Nordic Planetarium Association Annual Meeting*

Polarized Light & Bumblebee Learning. (2011) *Rank Prize Sym. Visual Optics*

Popular Science Articles and Press

Aluffi G di (2021) [Anche scarabei, rane e falene sanno leggere le stelle.](#) *La Repubblica* (interview)

Bates M (2021) [Light pollution leads dung beetles astray.](#) *Psychology Today—Animal Minds* (interview)

Smillie S (2021) [Dung beetles lose their way as lit up skies drown out their compasses.](#) *Saturday Star* (interview)

Sokol J (2021) [What Animals See in the Stars.](#) *The New York Times* (interview)

Foster JJ (2021) [Skyglow forces dung beetles in the city to abandon the Milky Way as their compass.](#) *The Conversation*

Resnick B (2021) [Animals can navigate by starlight. Here's how we know.](#) *Vox* (interview)

Foster JJ (2021) [Arctic Skies Show Effects of Light Pollution on Nocturnal Orientation.](#) In *INTERACT Stories of Arctic Science II*

Wilcox C (2021) [False "stars" could disorient wildlife.](#) *Dispatches: Frontiers in Ecology and the Environment* (interview)

Mårtensson C (2021) [Fältnoteringar, stjärnsikt](#) *Temporary Art Installation* (advisor)

Taxay S (2020) [SpaceX's starlink—crossing an astronomical and ecological threshold](#) *the Paper Tiger* (interview)

Wayman E (2019) [Moonlight shapes how some animals move, grow and even sing](#) *Science News* (interview)

Dance A (2019) [Animals Use Brain Tricks to See in the Dark](#) *Scientific American* (interview)

Haynes K (2019) [Dung Beetles Navigate by Polarized Moonlight](#) *Discover Magazine* (interview)

Shirley L (2018) [Animal Journeys: Navigating in Nature](#) *High Desert Museum* (exhibition)

Foster JJ (2018) [The Animal Star Compass](#) *Navigation News*, July–August, 18–20

Smillie S (2018) [Dung Beetles and the effect of the Milky Way on birds and insects.](#) *Daily Maverick* (interview)

Gruber K (2018) [Like us, animals look up at the stars.](#) *Particle* (interview)

Rydén D (2018) [Utan stjärnhimmel går djuren vilse.](#) *Sydsvenskan* (interview)

Foster JJ (2017) [Scientists have worked out how dung beetles use the Milky Way to hold their course.](#) *The Conversation*

Rey B (2017) [Ce Scarabée s'Orient Grâce aux Contrastes de la Voie Lactée.](#) *Science et Vie* (interview)

PreLights team for [preprint highlights.](#) *Company of Biologists*

References

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