Name	JOHANNES KOHL
Position	Group Leader (1st 6)
Year joined *(Crick or founder institute)*	2019

Career History

2009: Diploma (Neuroscience), Otto-von-Guericke Universität Magdeburg (Germany), Advisor: Martin Heine, PhD
2010: Neurobiology Summer Course, Marine Biological Laboratory, Woods Hole, USA
2013: University of Cambridge (UK), PhD (Neurobiology). Advisor, Gregory Jefferis
2013- 2014: Investigator Scientist, MRC Laboratory of Molecular Biology, Cambridge
2014- 2015: Postdoctoral Fellow, Dulac lab (Harvard University / HHMI)
2015- 2018 Sir Henry Wellcome Postdoctoral Fellow, Dulac lab (Harvard University /HHMI), Branco lab (Sainsbury Wellcome Centre for Neural Circuits and Behaviour UCL)
2019- present: Group Leader, The Francis Crick Institute (London, UK)

Major Awards, Honours and Prizes

2009: Cambridge European Trust scholarship Medical Research Council PhD fellowship
2010: The John and Elisabeth Buck Endowed Scholarship, MBL Woods Hole, USA
2013: Max Perutz Prize for outstanding graduate research, MRC Laboratory of Molecular Biology, Cambridge, UK
2014: Larry Sandler Graduate Thesis Award (Runner-up)
2014: Young Researcher, 64th Lindau Nobel Laureate Meeting, Germany
2014: EMBO Long-Term Fellowship Postdoctoral Award for Professional Development, Harvard University
2015: Sir Henry Wellcome Postdoctoral Fellowship Human Frontier Long-Term Fellowship
2016: Leadership Academy, German Scholars Organization
2017: NARSAD Young Investigator Grant Travel Award, 40th Annual Meeting of the Japan Neuroscience Society
2018: Travel Award, Leopoldina German-Israeli Symposium (Berlin,Germany)
2018: Peter and Patricia Gruber International Research Award, Society for Neuroscience
2018: Eppendorf & Science Prize for Neurobiology (Grand Prize Winner)
2019: ERC Starting Grant Scientist to Watch, The Scientist

Membership of external committees, editorial boards, review panels, SABs etc

Lab Name	*State-dependent Neural Processing Laboratory*

Research programme and achievements

My group studies the mechanisms by which the state of the body controls brain form and function. We are particularly interested in how hormones affect neural information processing.

Over the last years, my scientific interests have evolved around understanding the functional organisation of neural circuits controlling instinctive behaviours. During my postdoctoral research, my goal was to uncover how a small, genetically identified group of neurons in the mouse hypothalamus controls parental behaviour. I found that these neurons are organised in subpopulations, each projecting to a different target region, and each controlling distinct (motor, motivational, hormonal) aspects of parenting. This functional organisation, reminiscent of the control of motor sequences by pools of spinal cord neurons, provides a new model of how discrete elements of a social behaviour can be generated at the circuit level (Kohl et al., 2018).

My own group – which I started in 2019 – now investigates how physiological states shape the form and function of such circuits in models. We use a wide range of behavioural, circuit-level and cellular approaches for this purpose. One current focus is to understand the effects of pregnancy hormones on the neural circuits that control parenting. We have already obtained promising behavioural results suggesting that (1) discrete aspects of parental behaviour are 'switched on' in mid-to-late pregnancy, (2) specific brain areas undergo volumetric remodelling during pregnancy and (3) that several pregnancy hormones are enriched in key nodes of the neural circuit controlling parental behaviour. We are now starting functional experiments which will allow us to understand how pregnancy hormones affect information processing in these circuits. Over the next years we plan to extend such systems neuroscience approaches to obtain a mechanistic, generalisable understanding of how hormones affect brain function at the circuit level ("systems neuroendocrinology"). For this purpose, we are also currently developing viral tools to map and functionally interrogate brain-wide neural circuits.

Research outputs

Monaca F and Kohl J. (2020) *Neuroscience: Plasticity Matters for Mating*. Current Biology, 30 (2), R86-R88: DOI: 10.1016/j.cub.2019.11.052
In this Dispatch article, written jointly with Francesco Monaca, the first PhD student in my lab, we discuss new findings suggesting that brain areas that control 'hard-wired' behaviours are surprisingly malleable.

Ammari R and Kohl J. (2020) *Charting a Path Toward Aggression*. Neuron, 106(4):556-558. DOI: 10.1016/j.neuron.2020.04.029
This review article was a joint effort with the first postdoc in the lab, Rachida Ammari. We discuss recent progress in our understanding of the neural basis of aggression and critically discuss a recent study.

Kohl J. (2020) *Parenting - a paradigm for investigating the neural circuit basis of behaviour*. Curr Op. Neurobiol. 60:84-91 DOI: 10.1016/j.conb.2019.11.011

In this invited, single-author review, I outline the neural circuit basis of parental behaviour and discuss how it can be used to study/understand how other types of instinctive behaviours are controlled by the brain.

Autry AE, Wu Z, Kohl J, Bambah-Mukku D, Rubinstein ND, Marin-Rodriguez B, Carta I, Sedwick V and Dulac C. (2019) ***Perifornical area Urocortin-3 neurons promote infant-directed neglect and aggression*****. bioRxiv. DOI**: **10.1101/697334**
This study (currently under revision in Nature), finds that infant-directed aggression in mice is orchestrated by specific, molecularly identified neurons, and the circuits in which these neurons function are uncovered. I contributed key functional experiments.

Kohl J, Babayan BM, Rubinstein ND, Autry AE, Marin-Rodriguez B, Kapoor V, Miyamichi K, Zweifel LS, Luo L and Dulac C. (2018) ***Functional circuit architecture underlying parental behaviour*****. Nature 556(7701):326-331. DOI: 10.1038/s41586-018-0027-0**
This postdoctoral project found that a group of neurons crucial for parental behaviour is organised in subpopulations, each projecting to a different target region and each controlling distinct aspects of parenting. Our study provided a new model for how a small population of neurons in the mouse brain can orchestrate a complex social behaviour.