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## Science News The goal in mind

“*since* the Nobel prize winning discovery of place cells in 1971 by John O’Keefe and colleagues, spatial navigation research has primarily focused on the properties of neurons tuned to the animal’s instantaneous position or direction”, says Hiroshi Ito, research group leader at the Max Planck Institute for Brain Research who headed the new study published in *Nature*. Previous research in the last decades has provided us with a better understanding of how we can keep track of our position and direction in space. However, the evidence for goal estimation – another fundamental aspect of spatial navigation – has almost entirely been missing so far.

“Our present work addressed this puzzle by showing that future goals are represented as a pattern of neural activity resembling the ones during previous visits to a target location (e. g. supermarket). For example, a specific pattern of neural activity is observed when an animal visits a particular location in space. However, we found that this activity pattern can re-emerge merely upon the animal’s decision to target the same location as a navigational goal, irrespective of where the animal is actually located”, says Ito.

“We designed a task in which a rat needs to navigate to a remote location where a reward is pro-



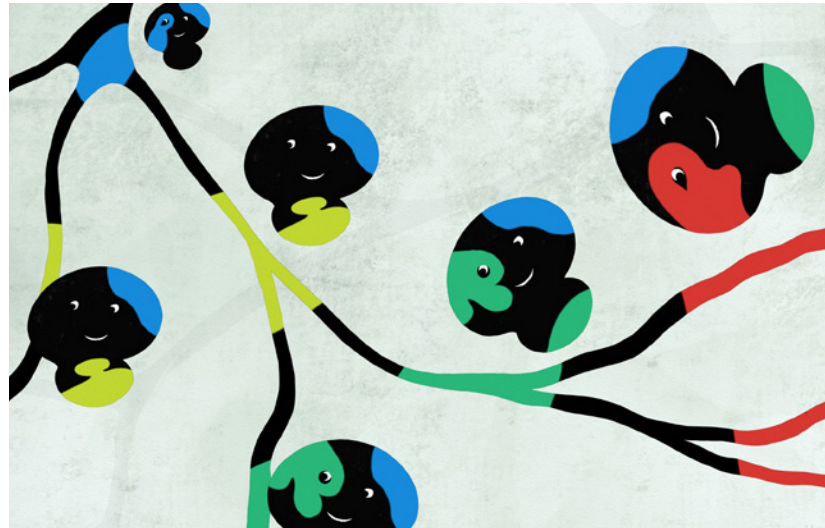
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vided. Notably, the reward location keeps changing, which ensures that the rat continuously updates its goal locations”, explains Raunak Basu, the postdoc in the Ito lab and first author of the new study. As a candidate brain region representing a future goal, the scientists focused on the orbitofrontal cortex (OFC) – a subregion of the prefrontal cortex – that is thought to be involved in decision making, yet remains relatively unexplored from the aspect of spatial navigation. “With the help of statistical decoding techniques, we confirmed that certain observed patterns of neural activity in the OFC share significant similarities, demonstrating that the future goal is represented in the OFC throughout the duration of navigation” says Basu.

## Old dog learns a new trick

*ribosomes* are large, multi-protein machines that serve as the factories that make proteins in all living cells. While ribosomes have historically been viewed as stable complexes that do not change their composition, scientists at the Max Planck Institute for Brain Research have now discovered that ribosomes dynamically exchange some of their core components in neurons. Their findings suggest new mechanisms that neurons (and potentially other cells) could use to fine tune gene expression.

The researchers combined a number of extremely sensitive methods to quantify how fast new ribosomal proteins can be incorporated. "We observed an unusually fast and dynamic incorporation profile for a subset of ribosomal proteins, which persisted even when we blocked the known pathway for ribosome assembly. This indicated to us that ribosomal proteins can bind on and off (i.e. exchange from) already assembled ribosomes", says Fusco.



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"Swapping individual pieces rather than dismantling the whole machine can be extremely advantageous when time and resources are limited. We think neurons use this mechanism to regulate gene expression especially near synapses, where molecular adjustments need to be fast and precise", says Schuman.

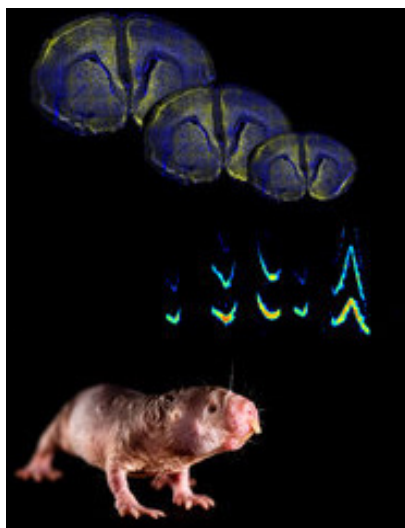
## Alison Barker joins the MPI as new research group leader



In December 2021, **Alison Barker** started her research group "Social Systems and Circuits" at the MPIBR. Her group will focus on the neural mechanisms underlying social communication. Barker's research adopts a broad evolutionary perspective, studying vocal communication in the naked mole-rat (*Heterocephalus glaber*). Naked mole-rats are highly social rodents which live in large multi-generational colonies under the rule of a single breeding female, queen.

*"I can imagine no better home for the naked mole-rats than the MPIBR, where pioneering neuroscience research is driven by creativity, cutting edge technological innovations and, of course, the study of many other fascinating 'non-traditional' model organisms. I'm excited to hear what the naked mole-rats continue to teach us as we begin to delve into their remarkable social behavior on a neural level."* *continued on next page*

## Friends of the Max Planck Institute for Brain Research



*our* ability to communicate shapes our interactions with our environment and with members of our social groups. This is especially true for the naked mole-rat with colonies of up to 300 individuals in the wild. Individual members within the group must coordinate numerous tasks including foraging, colony defense and care of pups. Naked mole-rats use more than 25 distinct vocalizations which have been shown to support many aspects of their social behavior. Barker's group will investigate how information related to these cooperative behaviors is encoded in vocalizations and subsequently decoded by specialized neural circuits. By adapting traditional tools for neural circuit dissection along with developing new computational tools and machine learning frameworks, Barker aims to investigate how social information is transmitted within social units and ultimately drives cooperation.

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## Ethics in Science lecture

*several* years ago, in recognition of the Institute's tragic and dark history during the 3rd Reich, the MPI for Brain Research committed to a yearly Ethics in Science lecture. On September 27, the MPI for Brain Research virtually hosted the 2021 Ethics in Science lecture on "Hierarchies and Mobbing in Academia" by Prof. Kenneth Westhues.

Westhues's lecture focused on scientists' mistreatment of one of their own: the harassment, punishment and humiliation of a fellow scientist, toward elimination of him or her from the scientific community, metaphorical or actual death. This unethical practice is called workplace mobbing. The lecture highlighted research over the past 20 years on workplace mobbing in universities, commonly called academic mobbing.

**About the speaker:** **Kenneth Westhues** is former chair of Sociology at the University of Waterloo, Canada, where he has been Professor Emeritus since 2011. His Ph.D. is from Vanderbilt University.

He has taught also at Western University, Fordham University, Memorial University of Newfoundland, and the University of Graz. A specialist in research on workplace conflict, he is a leading authority on academic mobbing, the unfair ganging up of professors, students, and/or administrators on a targeted colleague. He has lectured on this topic widely across Canada and the United States, also in Ireland, Mexico, Australia, Austria, and elsewhere.

Westhues is the author of about 20 books, including *Eliminating Professors* (1998), *The Envy of Excellence: Administrative Mobbing of High-Achieving Professors* (2005), and *The Remedy and Prevention of Mobbing in Higher Education* (2006). Many of his writings are available online at [www.kwesthues.com](http://www.kwesthues.com)

A recording of the lecture is available at:

<https://brain.mpg.de/ethicslecture/westhues>



*Kenneth Westhues.*  
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## PhD graduations

Congratulations to Drs. **Diane Bissen** (Acker-Palmer Lab, IMPRS), **Nesli Sen** (Auburger Lab, IMPRS), **Aline Dörrbaum** (Schuman Lab), **Laura Mohr** (Acker-Palmer Lab, IMPRS), **Yiling Yang** (Singer Lab, IMPRS), **Kanako Otomo** (Roepert Lab, IMPRS), **Fabio Sartori** (Tchumatchenko Lab, IMPRS), and **Lukas Anneser** (Schuman Lab, IMPRS) for completing their PhD projects in 2021!

## Company anniversaries

*in* September 2021, **Thomas Maurer** celebrated 25 years at the MPI for Brain Research. Maurer joined the mechanical workshop of the institute in 1996. In his early years at the institute, many of Thomas's workshop projects were commissioned by the Singer department as well as the animal house where he did regular remodeling and repairs. Thomas contributed to the construction of numerous experimental rooms and stable fixations for the primate research. He also supported the Betz Emeritus department with the manufacture of gel electrophoresis chambers and cell culture set-ups. After the change of the board of directors, Thomas - among other projects - significantly contributed to the development and establishment of turtle husbandry for the Laurent Department.

Just a month later, in October, **Michaela Klinkmann** had her 25th company anniversary. Michaela joined the institute as technical assistant in 1996 and initially worked in the department of Emeritus Director Wolf Singer. In 2010, she joined the Laurent Department which back then was located in the mechanical workshop building of the Goethe University until the relocation to our new building at Campus Riedberg in 2013. During her 25 years at the institute to date, Michaela has worked with a wide range of animal models, including cats, monkey, turtles, and more recently lizards and sepia. Michaela is an expert on turtle and lizard surgeries.



*Peter-Michael Rückert, Thomas Maurer, and Gilles Laurent (left to right). Photo: I. Epstein*



*Michaela Klinkmann.  
Photo: HG Esch*

## Friends of the Max Planck Institute for Brain Research

### 2021 Science Discovery and Science Support Awards

*the* winners of the **2021 Science Discovery Awards** were presented on December 13, within the framework of the MPIBR winter holiday week festivities.

**Claudia Fusco**, graduate student in the Schuman Department, receives the 2021 PhD prize for her discovery of the dynamic exchange of ribosome proteins.

**Raunak Basu**, postdoc in the Ito research group, is the winner of the 2021 Postdoc prize for his discovery of the brain's internal goal map.

Details of their scientific discoveries are highlighted in the science news section (p.1-3) of this newsletter.

This year, the MPI for Brain Research in collaboration with the Friends have introduced a new prize category, the **Science Support Awards**. This new award honors non-scientific employees of the institute who were nominated by their colleagues for exceptional commitment, high quality of work, personal initiative, the ability to find creative solutions to problems and team spirit. Winners of the 2021 Science Support Awards are:

**Heiko Fernau** (Facility Management). Heiko is recognized for his indefatigable dedication and commitment to our institute, his service and immediate help in all things technical, and his optimistic outlook and good humor at work, at any hour of the day or night.

**Stefanie Kranz** (Animal House). Stefanie is awarded for her dedicated service and care of the cephalopods in the aquazone of the animal facility, with a particular mention of her and her colleagues animal caretakers' very hard work throughout the Covid pandemics, enabling our institute's experimental work to continue throughout the past 2 years.

**We congratulate all prize winners!**



*Claudia Fusco*

*Raunak Basu and  
Gilles Laurent*



*Heiko Fernau*

*Stefanie Kranz*



## Selected publications 2021

Basu, R.; Gebauer, R.; Herfurth, T.; Kolb, S.; Golipour, Z.; Tchumatchenko, T.; Ito, H.: **The orbitofrontal cortex maps future navigational goals.** *Nature* 599, pp. 449 - 452 (2021)

Lazar, A., C. Lewis, P. Fries, W. Singer and D. Nikolic: **Visual exposure enhances stimulus encoding and persistence in primary cortex.** *Proceedings of the National Academy of Sciences of the USA* 118(43), e2105276118: 1-11 (2021).

Glock, C.; Biever, A.; Tushev, G.; Nassim-Assir, B.; Kao, A.; Bartnik, I.; tom Dieck, S.; Schuman, E. M.: **The translatome of neuronal cell bodies, dendrites, and axons.** *Proc Natl Acad Sci U S A* 118 (43), e2113929118 (2021)

Fusco, C. M.; Desch, K.; Dörrbaum, A. R.; Wang, M.; Staab, A.; Chan, I. C. W.; Vail, E.; Villeri, V.; Langer, J. D.; Schuman, E. M.: **Neuronal ribosomes exhibit dynamic and context-dependent exchange of ribosomal proteins.** *Nat. Commun.* 12, 6127 (2021)

Schulz, A.; Miehl, C.; Berry II, M. J.; Gjorgjieva, J.: **The generation of cortical novelty responses through inhibitory plasticity.** *eLife* 10, e65309 (2021)

Sun, C.; Nold, A.; Fusco, C.; Rangaraju, V.; Tchumatchenko, T.; Heilemann, M.; Schuman, E. M.: **The prevalence and specificity of local protein synthesis during neuronal synaptic plasticity.** *Sci. Adv.* 7 (38), eabj0790 (2021)

Giandomenico, S. L.; Alvarez-Castelao, B.; Schuman, E. M.: **Proteostatic regulation in neuronal compartments.** *Trends in Neurosciences* 2021 (2021)

Perez, J. D.; Fusco, C. M.; Schuman, E. M.: **A Functional Dissection of the mRNA and Locally Synthesized Protein Population in Neuronal Dendrites and Axons.** *Annu. Rev. Genet.* 55, pp. 183 - 207 (2021)

Desch, K.; Langer, J. D.; Schuman, E. M.: **Dynamic bi-directional phosphorylation events associated with the reciprocal regulation of synapses during homeostatic up- and down-scaling.** *Cell Rep.* 36 (8), 109583 (2021)

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