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SPRINGER NATURE

NAVIGATION

Freed up to fly

eLife 2018; 7:e29053

Recording electrical signals via implanted electrodes helps researchers understand what's going on in the brain. Rodents have been set free with their implants, allowing brain activity to be recorded in unrestrained subjects. Bats are now being set loose too.

Cynthia Moss and colleagues at Johns Hopkins were interested in how the midbrain superior colliculus (SC) contributes to spatial orientation. They've looked at this before in bats, but not while the animals were freely flying. In their latest paper, they combine neural activity data from wireless electrodes implanted into the SC with audiovisual recordings and a novel echo model to tease apart how big brown bats determined their position while navigating an obstacle-filled space. Though they only observed two bats, the researchers saw dynamic changes in neuron activity as the bats echolocated their way through the room. *EPN*

<https://doi.org/10.1038/s41684-018-0079-7>

ANIMAL DISEASE MODELS

An NHP for CCHF research

Nat Microbiol 3, 556–562 (2018).

Crimean-Congo hemorrhagic fever (CCHF) is a neglected but widespread viral disease that's transmitted to humans via ticks. There's no vaccine available, nor a clinically relevant animal model. Immunocompromised mice can model severe forms of the disease, but their use is limited by their immune deficiencies. But recently, a new immunocompetent model has been discovered that could help future research.

A pilot study led by researchers at the NIH National Institute of Allergy and Infectious Diseases tested CCHF infection in three different nonhuman primate species. Cynomolgous macaques seemed most susceptible; follow-up testing with additional macaques revealed symptoms and signs of disease progression that paralleled those in human patients. *EPN*

<https://doi.org/10.1038/s41684-018-0080-1>

DEVELOPMENT

Placenta problems

Nature 555, 463–468 (2018).

Creating knock-out mouse lines doesn't always go as planned—previous phenotyping efforts have suggested that

in as many as 25–30% of cases, knock-out offspring just won't be viable. Researchers studying why have tended to focus on deleterious effects to the growing embryo, but they haven't paid as much attention to another important consideration for proper development: the placenta.

A recent systematic screen of 103 different knock-out mice pins over half of the problems that arise during gestation on mutations that affect the placenta. As gestation continues, those defects in the placenta appear to be linked to abnormalities in the embryo, especially in the brain, heart, and vasculature. Further testing implicated genes related to the trophoblast, the outer layer of the placenta that provides nutrition to the embryo. *EPN*

<https://doi.org/10.1038/s41684-018-0081-0>

IMMUNOLOGY

These wild mice

PLoS Biol. 16, e2003538 (2018).

Mus musculus domesticus is a staple in biomedical research; the lab mouse's wild counterpart is the same species. Whereas in the lab mice are often inbred and housed in tightly controlled conditions, mice living out their days in the wild are genetically diverse and subject to the vagaries of their natural environment. Not unlike people. To improve translational relevance when studying the immune system, recent papers have explored what happens when lab mice are introduced to 'dirty' conspecifics, and when they themselves are taken out to the field. But under it all, they're still the same genetically similar animals. A new paper considers the immunobiology of wild mice, as they are in the field.

The researchers sampled wild mouse populations outside of Bristol, as well as from the tube in London and a small island near Wales, and characterized their innate and adaptive immune systems. The results are available in *PLoS Biology*. *EPN*

<https://doi.org/10.1038/s41684-018-0082-z>

PERIPHERAL NEUROPATHIES

Novel treatment for neuropathy

Nat Commun 9, 1640 (2018).

Often associated with neuropathy, mechanical allodynia is an extreme sensitivity to normal sensations, such as

the gentle brushing of hair. In a new study, authors characterized the light-touch mechanoreceptors responsible, which express tyrosine receptor kinase B (TrkB). Interestingly, the researchers took a novel approach to alleviate pain in mice by conjugating the TrkB ligand, brain-derived neurotrophic factor, to a photo-sensitizing agent and then injecting animals with the molecule. Upon illumination with an IR laser, the nerve endings were photoablated, resulting in a reduction of response to what had been painful stimuli. CN

<https://doi.org/10.1038/s41684-018-0083-y>

IMMUNOLOGICAL MODELS

Urban(e) is not necessarily better

PNAS <https://doi.org/10.1073/pnas.1719785115> (2018).

City-living is associated with allergies in people, but disentangling all of the variables is difficult. Recently, dogs, as opposed to mice, were used as an alternative model for allergenic risk. Canines are likely better models than rodents because they share our environment as companion animals and also spontaneously develop allergies; however, they do not share all of the complexity associated with a human lifestyle. For dogs, living without other pets and in urban settings were risk factors for developing allergic conditions. These differences were also observable in the skin microbiota. This study emphasizes the need for people to make good lifestyle decisions regarding location and household size, not only for themselves, but also for their faithful friends. CN

<https://doi.org/10.1038/s41684-018-0084-x>

NEUROLOGICAL MODELS

New neurological model

Nat Biotechnol **36**, 432–441 (2018).

On the constant hunt for a better model of neurological disorders, biologists have

taken a fresh approach. Typically, either human cell-culture or an in vivo rodent model is used to study diseases of interest. By developing a hybrid system that utilizes human pluripotent stem cells (hPSC) in mouse hosts, investigators were seeking the advantages -relevance and complexity- of both systems. For this report, authors first converted hPSC to a cerebral organoid, a 3D cell culture, before implanting it in a mouse brain. Researchers saw development and integration of the organoid with native tissues. Grafts engaged in neurogenesis and produced electrically active cells that interacted with mouse neurons; additionally, glial cell development was observed. Importantly, grafts showed healthy vascularization by host tissues, one of the major shortcomings of working with just cell culture systems. CN

<https://doi.org/10.1038/s41684-018-0085-9>

AGING

Extending lifespan without hunger

Elife <https://doi.org/10.1101/250100> (2018).

Caloric restriction is one of the few known ways by which to extend life in rodents. This effect is mediated in part by the mechanistic target of rapamycin complex 1 (mTORC1) pathway. A component of this cascade is the transcription factor C/EBP β -LIP, one of three proteoforms translated from the cognate mRNA. As mice age, this protein increases and is associated with many of the physiological changes of aging. Using genetic methods, investigators demonstrated that decreasing levels of this protein extended lifespan in female mice; sorry guys. Several age-related phenotypes, including cancer frequency and muscle loss, were also improved. All without having to say, 'No more pie, thank you'. CN

<https://doi.org/10.1038/s41684-018-0086-8>

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