IN BRIEF

NEUROGENESIS

New nose neurons

Whether adult humans continue to produce new neurons remains controversial. Here, Durante et al. sampled olfactory neuroepithelium from seven healthy middle-aged people, and used single-cell RNA sequencing and immunohistochemistry to determine cellular heterogeneity and maturation stage. They observed cells from all stages of differentiation, from stem cells to mature neurons, with a surprisingly high 55% of the cells expressing immature markers. These data suggest that the olfactory neuroepithelium is a site of ongoing neurogenesis in adult humans.

ORIGINAL ARTICLE Durante, M. A. et al. Single-cell analysis of olfactory neurogenesis and differentiation in adult humans. *Nat. Neurosci.* https://doi.org/10.1038/s41593-020-0587-9 (2020)

SLEEP

Slow wave machine

The brainstem is essential for non-rapid eye movement (NREM) sleep. Kashiwagi et al. identified a subpopulation of NREM-sleep-promoting neurons that express neurotensin in the sublaterodorsal tegmental nucleus (subLDT) in the mouse brainstem. Chemogenetic activation of these cells or their downstream targets increased NREM sleep, and infusion of neurotensin into the fourth ventricle rapidly induced slow-wave activity in the cortex that mimicked that seen during NREM sleep, suggesting that neurotensin itself participates in sleep regulation.

ORIGINAL ARTICLE Kashiwagi, M. et al. Widely distributed neurotensinergic neurons in the brainstem regulate NREM sleep in mice. *Curr. Biol.* https://doi.org/10.1016/j.cub.2020.01.047 (2020)

LEARNING AND MEMORY

Suppressing stressful memories

A reduced ability to suppress traumatic memories is thought to be involved in post-traumatic stress disorder (PTSD). Here, 102 people who had been exposed to the 2012 Paris terror attacks (around half of whom had PTSD) and 73 nonexposed individuals were cued to recall a neutral stimulus while simultaneously trying to suppress it. Functional imaging performed during the task showed reduced connectivity between the 'memory control system' (in particular, the dorsolateral prefrontal cortex) and memory circuits; no such decrease was observed in people with PTSD, suggesting that reduced suppression could contribute to this disorder.

ORIGINAL ARTICLE Mary, A. et al. Resilience after trauma: the role of memory suppression. *Science* **367**, eaay8477 (2020)

NEUROPHYSIOLOGY

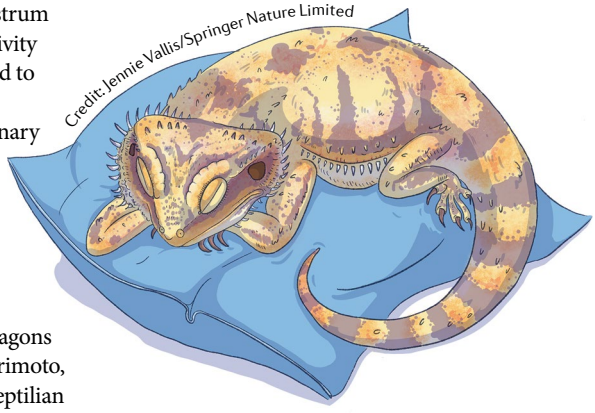
A new kind of coupling

Neurovascular coupling (NVC) induces vasodilation following increases in neural activity. Arteriolar endothelial cells (aECs) contain abundant membrane invaginations called caveolae. Genetic knockdown of an essential caveolae protein eliminated these structures in aEC and reduced NVC in the barrel cortex following whisker stimulation, in a manner independent of the endothelial nitric oxide vasodilatory pathway.

ORIGINAL ARTICLE Chow, B. W. et al. Caveolae in CNS arterioles mediate neurovascular coupling. *Nature* https://doi.org/10.1038/s41586-020-2026-1 (2020)

BRAIN EVOLUTION

Sleeping dragons



The mammalian claustrum has 'hub'-like connectivity and has been suggested to be crucial for higher cognition. Its evolutionary origins, however, remain unclear. By examining a brain area that generates sharp wave–ripples (SWRs) in sleeping Australian bearded dragons (*Pogona vitticeps*), Norimoto, Fenk et al. identify a reptilian claustrum, suggesting that it may be an evolutionarily ancient structure.

Pogona lizards exhibit short sleep cycles made up of alternating slow-wave sleep (SWS) and rapid eye movement (REM) sleep. The authors recorded SWRs in the dorsal ventricular ridge (DVR) of the pallium in *Pogona* lizard brains during SWS periods, as previously reported. Using multi-electrode arrays in DVR slices, the authors observed that SWRs propagated from the anterior medial DVR (amDVR) to the posterior lateral end of the DVR, indicating that SWRs might be generated in the amDVR.

The authors used single-cell RNA sequencing to detect 20 clusters of glutamatergic cells in the *Pogona* pallium. Clusters 19 and 20 expressed markers that mapped on to the SWR-generating amDVR. Some of the transcriptomic markers of clusters 19 and 20 are known markers of the mammalian claustrum, and a large fraction of the single-cell transcriptomes in these clusters resembled single-cell transcriptomes of the mouse claustrum. Thus, the amDVR is molecularly similar to the mammalian claustrum.

The amDVR was enriched for genes encoding receptors for dopamine, acetylcholine, serotonin and noradrenaline — neuromodulators that, in mammals, are involved in controlling sleep and wake states. The authors identified homologues of mammalian sleep-related nuclei in the *Pogona* diencephalon, midbrain and brainstem and, through retrograde and anterograde tracing, mapped their connectivity with the amDVR. This approach revealed that the amDVR receives inputs from many of these sleep-implicated areas, and projects to the *Pogona* homologues of the hippocampus and neocortex. Overall, these results suggest that the amDVR is the *Pogona* claustrum.

In an ex vivo *Pogona* forebrain preparation, injecting the amDVR with tetrodotoxin stopped SWR generation. Moreover, unilateral or bilateral amDVR lesions abolished SWRs on the ipsilateral side or both sides, respectively, but without altering the sleep cycle. Whereas treating the amDVR with dopamine increased SWR generation, treatment with acetylcholine or serotonin suppressed it. Thus, SWR production is sensitive to the neuromodulatory inputs to the amDVR.

Last, the authors used transcriptomic data to look for a claustrum in turtles (*Trachemys scripta*). This pointed to a different area of anterior pallium that, in slices, also generated SWRs. The identification of putative claustra in these two distant reptiles suggests that the claustrum probably already existed in a common amniote ancestor of reptiles and mammals.

Natasha Bray

ORIGINAL ARTICLE Norimoto, H. et al. A claustrum in reptiles and its role in slow-wave sleep. *Nature* **578**, 413–418 (2020)