nature Journal club

A forum providing readers with the opportunity to comment on the Journal Club columns published in *Nature*

Welcome to the blog for the Journal Club, a weekly column published in Nature's Research Highlights pages. Each column presents a researcher's choice of paper from the past year. Here, we invite you to discuss the subjects raised in the columns. To contact the section's editor with confidential questions or feedback, please email 'journalclub at nature.com'.

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A chronobiologist makes sense of circadian dysfunction in illness.

When my grandfather was dying of cancer, he found himself up most nights with my grandmother, who was succumbing to Alzheimer's disease. A nasty side effect of some neurodegenerative diseases is the loss of a regular sleep-wake cycle. Our circadian biological clock is manifest in every one of our cells, which show daily rhythms in gene expression; cellular clocks synchronise to become organ clocks, and these determine the whole organism clock.

When Jennifer Morton at the University of Cambridge, UK, and her colleagues investigated the timing of gene expression in tissues from mouse models of Huntington's disease, they found daily ups and downs — at least in some genes — that were similar to those in healthy animals (E. Maywood et al. J. Neurosci. 30, 10199-10204; 2010). But the mice slept and woke at random even when exposed to regular light-dark cycles. Interestingly, the researchers found that rhythmic behaviour could be restored to Huntington's mice through another stimulus — feeding the animals at a specific time of day.

I am intrigued by this work because it highlights the relevance of chronobiology to neurodegenerative disease. The authors show that in Huntington's, the disease disrupts behavioural manifestation of the clock; in a bizarre feedback, the progression of the disease may be exacerbated by clock dysfunction through disruption in expression of a subset of clock-controlled genes.

This work also reminds me that non-photic clock stimuli are powerful tools and can be used to set the clock when light cannot. These alternatives will be important as we try to keep the clock synchronized in our increasingly unnatural modern environment — and as we try to improve the health and quality of life for both grandmothers and grandfathers

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A materials scientist comments on two methods for three-dimensional nanofabrication.

Methods for nanofabrication are crucially important to research in all areas of nanoscience and nanotechnology because they allow for the creation of functional structures — a key step towards useful applications and devices. Many techniques are available, but all have significant shortcomings and few are compatible with true, high-volume manufacturing modes. As the director of a centre for nanomanufacturing funded by the US National Science Foundation, I am deeply interested in emerging developments in this area.

Two papers on nanofabrication caught my attention. Both use sharp, scanning tips to form three-dimensional (3D) nanostructures. This 3D capability is important because it is unavailable in established techniques such as those used in the semiconductor industry.

In one paper, Jie Hu and Min-Feng Yu at the University of Illinois at Urbana-Champaign use nanometre-scale glass nozzles with engineered shapes to electroplate metal onto solid surfaces (J. Hu and M.F. Yu Science 329, 313-316; 2010). The positions of the nozzle and substrate are precisely controlled, enabling directed 'writing' of nanometre-scale conducting wires in freely suspended 3D arrangements.

In the second paper, Armin Knoll at IBM Research in Zurich and his colleagues use sharp tips as sources of heat to locally strip material from thin films of molecular glasses and thereby sculpt 3D shapes with nanometre-scale accuracy (D. Pires et al. Science 328, 732-735; 2010). The authors fabricate diverse structures, including a 25-nanometre-high replica of the Matterhorn, one of the Alps' highest peaks.

Both techniques offer valuable capabilities in nanofabrication that seem to be scalable for practical use. Successful outcomes of efforts such as these will have central roles in the translation of new knowledge in nanoscience into meaningful forms of nanotechnology.

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