

PNAS Plus Significance Statements

Direct involvement of DprA, the transformation-dedicated RecA loader, in the shut-off of pneumococcal competence

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This article (pp. E1035–E1044) concerns the control of competence for bacterial genetic transformation. Competence is transient in the human pathogen *Streptococcus pneumoniae*, involving the specific expression of ~100 genes that are turned ON suddenly and OFF almost as abruptly. Although the mechanism rendering all cells in a culture simultaneously competent is well understood, how competence stops has remained unknown. Here, we unravel the mechanism of shut-off, describing the discovery that a key recombination protein, DprA, exerts a negative control on competence through direct, physical interaction with the master regulator of competence, the response regulator ComE, to abolish transcription from ComE-activated promoters.

Cell cycle and lineage progression of neural progenitors in the ventricular-subventricular zones of adult mice

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The time taken by neural stem cells and intermediate progenitor cells to transit through the cell cycle, and number of times they divide, is essential information to understand how new neurons are produced in the adult rodent brain. (pp. E1045–E1054)

The brain uses adaptive internal models of scene statistics for sensorimotor estimation and planning

Oh-Sang Kwon and David C. Knill

To test the hypothesis that the brain uses adaptive models of object statistics to interpret sensory information, we measured (pp. E1064–E1073) the statistical models used by subjects to estimate object speed when asked to hit a moving object. Subjects' behavior showed perceptual biases to the mean speed within a stimulus set that accurately adapted to changes in the variance of a stimulus set. More significantly, the results show that the way that stimuli on one trial influence following trials adapts appropriately to changes in trial-to-trial correlations in a stimulus set, although subjects' estimates of correlations retain erroneous positive biases.