MICROBIOLOGY

Hitching a ride

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.1000668107 (2010)

Aquatic bacteria can access new environments by zipping around on larger organisms.

Hans-Peter Grossart of the Leibniz-Institute of Freshwater Ecology and Inland Fisheries in Stechlin, Germany, and his colleagues labelled three species of bacterium with a fluorescent protein. They then tracked the microbes' movements in laboratory water columns with and without the water flea *Daphnia magna*, which usually travels up and down the water column each day. When water fleas migrated towards a light, the bacteria moved along with them, either by attaching to the surface of their bodies, or by being ingested and defecated by the water fleas.

Similar behaviour was observed in a German lake, suggesting that bacteria hitchhike on zooplankton in natural settings as well — a phenomenon that could influence aquatic ecology. **H.L.**

IMAGING

Cell-wall secrets

Nature Commun. doi:10.1038/ncomms1027 (2010)

Researchers have imaged the structure of an enigmatic cell-wall component in living bacteria.

Yves Dufrêne at the Catholic University of Louven in Belgium and his colleagues used atomic force microscopy to capture nanometre-scale images of the surface of *Lactococcus lactis* cells.

The authors focused on a major constituent of bacterial cell walls called peptidoglycan because it is the target of many antibiotics, but its spatial organization is unclear. They imaged normal bacteria and mutants lacking cell-wall sugars that ordinarily coat the peptidoglycan and obscure it from view.

Whereas normal bacteria appeared smooth, the mutants had 25-nanometre-wide bands of peptidoglycan running parallel to the short axis of the cell. The researchers say that their method could be used to help visualize peptidoglycan–drug interactions in other bacteria. **D.P.C.**

H. MINAKUCHI/MINDEN PICTURES/FLPA

BIOGEOCHEMISTRY

Faecal fertilization

Proc. R. Soc. B doi:10.1098/rspb.2010.0863 (2010)

Sperm whales in the Southern Ocean are helping to reduce atmospheric carbon dioxide levels, rather than adding to them as marine mammals have been assumed to do.

Trish Lavery at Flinders University in Adelaide, Australia, and her co-workers calculated that the 12,000 or so sperm whales (pictured) inhabiting the Southern Ocean facilitate the removal of 240,000 tonnes more carbon from the atmosphere per year than they add through respiration. The whales' iron-rich faeces fertilize iron-starved waters and stimulate the growth of phytoplankton. As these microscopic marine organisms sink to the ocean floor, it is thought that they take with them 20–40% of the carbon they have fixed through photosynthesis.

The authors say that other whale species may be having the same effect and warn that the hunting of sperm and other whales has probably decreased the removal of carbon from the atmosphere. **N.G.**

COGNITIVE NEUROSCIENCE

Mapped from birth

Science **328,** 1573–1576; 1576–1580 (2010)

How do newborn rats find their way around? Easily, it seems: two groups report that some basic elements of spatial representation don't require any experience.

Researchers recorded the activity of three types of neuron in the brains of rat pups as they explored their environment for the first time. Tom Wills, Francesca Cacucci and their colleagues at University College London report that head-direction neurons — which are tuned to fire according to the direction in which the animal points its head — are already fully developed by the time a pup first ventures from the nest. The basic properties of place cells, which respond to particular locations, are also established by then. Conversely, a third type of cell for spatial orientation, the grid cell, doesn't begin firing stably until later.

Edvard Moser and his colleagues at the Norwegian University of Science and Technology in Trondheim largely agree, but say that rudimentary grid-cell properties are also present during the pups' first explorations.

Both studies underscore that the animals may be born with spatial cognitive abilities. **A.K.**

JOURNAL CLUB

Nicola Clayton
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A comparative cognitive scientist considers the effects of high-calorie diets on the brain.

It is well established that an excessive intake of high-calorie foods, unless coupled with plenty of exercise, leads to obesity, which is a growing public-health concern. As a dancer and a scientist, I am well aware of the intimate connection between the body and the brain, and not at all surprised by the recent accumulation of evidence showing that a high-calorie diet leads to a suite of cognitive impairments, particularly in memory. What is striking, however, is how quickly the effects can occur and how selective they are.

Scott Kanoski and Terry Davidson at Purdue University in West Lafayette, Indiana, studied the effects of a high-energy diet on the memory performance of rats trained in a radial-arm maze (S. E. Kanoski and T. L. Davidson *J. Exp. Psychol. Anim. Behav. Proc.* **36,** 313–319; 2010). They found that maintaining rats on a high-energy diet for just 72 hours was sufficient to result in a marked impairment in spatial memory. Deficits in non-spatial memory took much longer to detect, emerging only after 30 days. Spatial skills are therefore particularly vulnerable.

This finding has important implications for our own lifestyle. Clearly, consuming an excessively high-calorie diet can result in marked decreases in cognitive abilities, especially in spatial memory. The fact that this occurs in such a short space of time, prior to any significant gain in body weight, suggests that diet-induced cognitive impairments could contribute to, rather than simply be a consequence of, obesity. So hide the high-calorie foods — if out of sight is out of mind, it might just save your brain!

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