may help to synchronize brain activity during development.

Rosa Cossart at the French National Institute of Health and Medical Research (INSERM) in Marseilles and her colleagues imaged neuronal activity in brain slices from young rats and mice. By digitally reconstructing the connections between the neurons, the researchers identified a subset of inhibitory neurons that were highly connected to either nearby or more distant cells.

When stimulated, 8 out of 20 highly connected brain cells and 1 in 25 poorly connected ones seemed to be hub neurons, inducing sustained firing or rhythmic, synchronized activity across the cell network.

PLANETARY SCIENCE

Titan's tub

Planet. Space Sci. **57,** 1872–1888 (2009)

Beneath the icy crust of Saturn's moon Titan may lurk a watery ocean, say Christian Béghin at the University of Orleans in France and his colleagues.

The researchers examined data from the Huygens probe, which landed on Titan's surface (pictured right) in 2005. On its way down, it measured a surprising electric field signal that, on Earth, is caused by lightning. But no lightning has been recorded on Titan, and the signal is instead interpreted as the result of Saturn's magnetic field interacting with Titan's atmosphere and interior. The team says that the signal is most consistent with a crust just tens of kilometres thick covering an ammonia-rich ocean.

ESA/NASA/JPL/UNIV. ARIZONA

MICROBIOLOGY

Malaria adapts to host

Proc. Natl Acad. Sci. USA doi:10.1073/pnas.0907590106 (2009)

The malaria parasite tends to cause more severe disease in young children. This could be because the parasite expresses genes associated with the severe form of malaria in people with limited immune defences, according to Peter Bull of the Kenya Medical Research Institute in Kilifi and his colleagues.

The researchers sequenced portions of key virulence genes — the *var* genes — from malaria parasites obtained from 217 Kenyan children, 112 of whom had severe disease. Certain *var* genes were expressed at higher levels in younger children and in those with more severe forms of the disease.

The researchers also found that higher *var* gene expression correlated with low levels of antibodies for parasite-infected cells. The team suggests that the parasite can take advantage of low host immunity to cause more severe malaria.

CHEMISTRY

Fuel cells' future

Science **326,** 1384–1387 (2009)

A low-cost nickel-based material could replace platinum as the catalyst that drives the electrolysis of water, the key reaction that powers hydrogen fuel cells.

Vincent Artero at Joseph Fourier University in Grenoble, Serge Palacin at the French Atomic Energy Commission in Gif-sur-Yvette and their colleagues took a nickel-based catalyst that mimics hydrogenase enzymes and attached it to the surface of multiwalled carbon nanotubes to increase the catalyst's surface area. The researchers then tested the material using a proton-exchange membrane to produce hydrogen from a water-based sulphuric acid solution.

Their system was about 100 times less efficient than a commercially available platinum-based one. But previous enzyme-inspired catalysts worked only in organic solvents, whereas this one is stable under real fuel cell conditions, the authors say.

EVOLUTION

Bird feeder effects

Curr. Biol. doi:10.1016/j.cub.2009.10.061 (2009)

Thanks to bird lovers, the central European songbirds called blackcaps (*Sylvia atricapilla*) have split into two groups that may develop into separate species. So say Martin Schaefer at the University of Freiburg in Germany and his colleagues.

The researchers tracked the groups: one overwinters in the Mediterranean, where the birds feed on fruit; the other spends winter in the United Kingdom, where its members eat from bird feeders. The two groups return to nesting grounds in Germany and Austria at different times, and so tend to pick mates from among the birds that overwinter in the same place. The team found that, in less than 30 generations, the UK-wintering birds have developed distinct physical traits: rounder wings for their shorter migration and narrower beaks, which are less well adapted for fruit-eating.

JOURNAL CLUB

Katherine H. Freeman
Pennsylvania State University

A biogeochemist ponders muddy molecules and past climates.

I am amazed by how humble fossil lipids in muddy sediments can yield insight into Earth's history. The structures and relative abundances of these marine biomarkers, which originate from cellular membranes, provide records of physiological and ecological responses to changing ocean chemistry and temperature. They help to quantify ancient climates, and may, for example, offer a peek at the future by providing clues to ocean temperatures when the poles were free of ice.

Shifting abundance ratios of membrane lipids from marine Archaea — a proxy called TEX_{86} — faithfully indicate modern sea-surface temperatures. Yet ancient temperatures signalled by TEX_{86} can be significantly higher than those indicated by other proxies, making TEX_{86} hard to interpret.

Julius Lipp and Kai-Uwe Hinrichs at the Center for Marine Environmental Sciences in Bremen, Germany, show that the constituent compounds in TEX_{86} may be a mixture derived from ancient microbes and those living in muddy sediments today (J. S. Lipp and K.-U. Hinrichs *Geochim. Cosmochim. Acta* **73,** 6816–6833; 2009).

The authors identified the mud-dwellers' lipids from their polar functional groups; ancient lipids lack these groups because they are quickly lost after burial. The core hydrocarbons waving the polar flags probably account for the proxy's overestimation of temperature. By identifying contributions from organisms living in sediments, the researchers provide a powerful means to discern which environments preserve the primary TEX_{86} signature and thus under which conditions we can reliably use this important proxy.

Climate scholars should take note and take heart, because this work will ultimately strengthen our interpretations of these muddy molecules to help us better understand Earth's past and future climate.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**