

## RESEARCH HIGHLIGHTS

**Pearly pedigree**

*Science* doi:10.1126/science.1173793 (2009)

The iridescent sheen of nacre — the mother of pearl that coats the inner shell of molluscs — arises from the light-scattering properties of its finely layered structure. This comprises crystals of aragonite — a form of calcium carbonate — aligned within organic molecules. Hiromichi Nagasawa and his colleagues at the University of Tokyo have now discovered two proteins key to the formation of this material.

Studying the shell of the Japanese pearl oyster (*Pinctada fucata*), the researchers found that one protein, Pif 80, binds specifically to the aragonite crystals. When calcium carbonate was crystallized with organic material lacking Pif 80 and another protein, Pif 97, aragonite crystals grew randomly, with no iridescent effect.

The team thinks that the two proteins form a complex that helps to guide the formation of aragonite crystals, which are then assembled within sheets of organic material.



D. FINNIN/AMNH/MASTOLONI PEARL COLLECTION

**ANIMAL BEHAVIOUR****Ties that bind**

*PLoS ONE* 4, e6573 (2009)

Rescue attempts by ants were first documented more than 100 years ago. Now Elise Nowbahari at the University of Paris–North and her colleagues report that such efforts are undertaken only for struggling colony mates.

The researchers used a nylon thread to tie a *Cataglyphis cursor* ant to filter paper, and partially buried the ant under sand. They found that only when active colony-mates were tied to the paper did other ants come to the rescue; chilled, motionless ants, or those of different colonies or species, elicited no aid.

The rescue ants dug sand until they uncovered the snare, which they then bit at. The sophistication of this snare-biting, the researchers add, far outdoes previously reported rescue activities such as sand-digging and leg-pulling, assumed to be responses to chemical alarm calls from any ant.

**PHYSICS****Close heat**

*Nano Lett.* doi: 10.1021/nl901208v (2009)

The flow of heat between two surfaces held sufficiently close and separated by a vacuum can, in theory, exceed the limits laid down by Max Planck's law of blackbody radiation.

Gang Chen and Sheng Shen at the Massachusetts Institute of Technology in Cambridge and Arvind Narayanaswamy, now at Columbia University in New York, have observed this increased heat transfer in an experimental feat. They measured the electromagnetic radiation passing between a glass sphere and a flat glass, silicon or gold

plate held as close as 30 nanometres.

The increase in radiation is due to electromagnetic waves that, unusually, do not radiate outwards but instead ripple over the surface of polar materials such as glass, and are formed by a combination of photons and lattice vibrations.

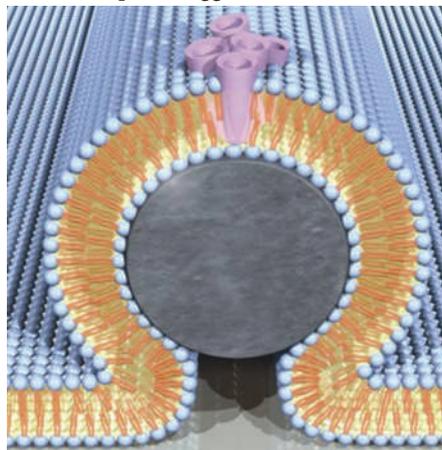
**BIOELECTRONICS****It's electrifying**

*Proc. Natl Acad. Sci. USA* doi:10.1073/

pnas.0904850106 (2009)

Ions and membranes — common biological signal transducers — have been combined with electronic circuitry.

Aleksandr Noy of the Lawrence Livermore National Laboratory in California and his team insulated 20–40-nanometre-wide silicon nanowire transistors by coating them with lipid membranes (pictured below), then added proteins that formed channels through the membranes. A flow of ions through the membrane pores triggered an electrical



response in the nanowire. Conversely, by applying an electric field using the wire, the researchers could open and close the membrane's protein channels.

**POPULATION ECOLOGY****Evolution to the rescue**

*Ecol. Lett.* 12, 942–948 (2009)

Environmental degradation threatens to wipe out countless species unless natural selection can help them to adapt fast enough to fend off ultimate doom — a process known as 'evolutionary rescue'.

Theory predicts that large populations are necessary to keep extinction at bay, but the mathematical models had never been tested. Graham Bell and Andrew Gonzalez of McGill University in Montreal, Canada, exposed hundreds of populations of baker's yeast (*Saccharomyces cerevisiae*) to deadly salt concentrations. Consistent with prediction, the microbial populations crashed before rapidly bouncing back, and recovery occurred only when the population had started out above a threshold size.

**NEUROSCIENCE****Categorically hard-wired**

*Neuron* 63, 397–405 (2009)

The human brain uses different regions of the visual cortex to process recognition of living and inanimate objects. Researchers have now shown that this doesn't depend entirely on the ability to see the objects: it occurs even in people who have been blind since birth.

Alfonso Caramazza at Harvard University, Bradford Mahon at the University of Rochester in New York and their colleagues read out lists

J. MARTINEZ, N. MISRA, A. NOY AND S. DOUGHERTY (LLNL)