

RESEARCH HIGHLIGHTS

MOLECULAR NEUROBIOLOGY

Active resilience

Cell **131**, 391–404 (2007)

A molecule known as BDNF may provide a pivotal distinction between people who succumb to conditions such as depression or post-traumatic stress disorder and the majority who do not.

Eric Nestler of the University of Texas Southwestern Medical Center in Dallas and his colleagues had previously identified mice that avoided social contact with cage-mates after repeated 'social defeat' — brought about by forced encounters with more aggressive mice.

The researchers found that resilience to stress in this social-defeat model is an active process in which stress-induced firing in part of the brain's neuronal circuitry associated with reward and drug addiction is suppressed. This lowers levels of brain-derived neurotrophic factor (BDNF), and mice with a natural variation in their BDNF gene were resilient to stress. The researchers also found high levels of BDNF in a region associated with reward in post-mortem brains of people with a history of depression.

ECOLOGY

Smelly fish

Proc. R. Soc. B doi:10.1098/rspb.2007.1283 (2007)

Fish that have been exposed to even very low levels of a common pollutant are shunned by their conspecifics, according to research by Ashley Ward at the University of Sydney and his co-workers. The effect may put the tainted fish at increased risk of predation.

The research looks at the effect of low levels of 4-nonylphenol, a surfactant sometimes found in shampoos and soaps, on schooling in juvenile banded killifish (*Fundulus diaphanous*, pictured below). Unexposed fish were unwilling to school with fish that had been exposed for as little as an hour to levels commonly found in sewage outflows.

Extraordinary sound

Nature Phys. doi:10.1038/nphys774 (2007)

Light squeezed through a hole of smaller diameter than its wavelength can emerge in a collimated beam when the hole is set in a periodic array of indentations. This counter-intuitive phenomenon is known as "extraordinary optical transmission". Now researchers in Spain have shown that an analogous effect can be achieved with sound waves.

Using their understanding of the role of surface plasmons in the optical case, Francisco Garcia-Vidal at the Autonomous University of Madrid and his colleagues designed systems of holes and grooves in which acoustic surface waves have a similar effect, producing a beam of sound through cunningly contrived interference and reinforcement. The authors think this effect might be applied in non-destructive materials testing and medical ultrasound.



MICROBIOLOGY

A time to die

Science **318**, 652–655 (2007); *Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.0704256104 (2007)

Bacteria communicate with each other to a greater extent, and in more ways, than was once thought. Hanna Engelberg-Kulka of the Hebrew University in Jerusalem and her colleagues report that *Escherichia coli* can send out messages that encourage their neighbours to kill themselves. The 'extracellular death factor' involved turns out to be a chain of five amino acids that seems to be produced by the degradation of a metabolic enzyme, glucose-6-phosphate dehydrogenase.

The authors suggest that the ability to coordinate cell death may allow bacteria to release nutrients from a proportion of individuals when the population is under stress, or to defeat phage attacks by means similar to a 'scorched-earth' policy.

Meanwhile, Frances Arnold at the California

Institute of Technology in Pasadena, Ron Weiss at Princeton University, New Jersey, and their colleagues report engineering a system into populations of *E. coli* that allows a specific pattern of gene expression only when both populations are present in sufficient numbers. They suggest that such systems could be used to engineer specific responses in artificial biofilms.

Intriguingly, three years ago these labs engineered a 'neighbour killing' system into bacteria quite similar to that now being reported (L. You *et al.* *Nature* **428**, 868–871; 2004). This may be the first example of synthetic biology anticipating a function only later revealed in nature.

RELATIVISTIC PHYSICS

Hot at any speed

Phys. Rev. Lett. **99**, 170601 (2007)

According to the theory of special relativity, measurements of length and time differ depending on the relative velocity of the observer and the thing being measured. Einstein and other prominent physicists believed that the measured temperature of a gas would also depend on the speed of the observer.

