JULY 24, 2004 PAGES 49-64 VOL. 166, NO. 4

SCIENCE NEWS

THE WEEKLY NEWSMAGAZINE OF SCIENCE

quick-forming gorges
drugs' link to suicide watched
el niño's trickle-down effect
puzzling cooperation in nature

www.sciencenews.org

farewell to hubble?

"There has been a paradigm shift," Gooday says. "If you go back 30 years, the idea was that the deep-ocean floor was very stable." In the 1970s, though, biologists found evidence that even creatures living at great depths reproduce in accord with the surface seasons. As evidence has appeared for longer-term changes in deep-sea communities, marine scientists have come to see the ocean floor "as a more dynamic environment," says Gooday.

Smith's research team moored instruments at what they call Station M, a relatively flat spot, starting in 1989. About every 4 months, the researchers checked the instruments and collected samples of particles that had drifted into the depths. To monitor large, mobile residents, the team deployed an underwater camera along a line across the sea bottom.

Ruhl and Smith checked for correlations among the varying abundances of common species, the food supply wafting down to them, and the surface climate. They found that abundance of the food does change, lagging about 6 to 11 months behind peaks in surface-water phenomena related to El Niño. Changes in species abundance lag by additional months.

Some species, such as the sea cucumber *Scotoplanes globosa*, showed up only in small numbers in the camera surveys before the 1997–1999 El Niño and La Niña, but the species boomed in 2001 and 2002. In contrast, the sea cucumber relative *Peniagone vitrea* had been abundant during the early years of the new study but dwindled after the El Niño period.

The findings dovetail with work at one of the few other long-term deep-ocean study sites: the Northeast Atlantic's Porcupine Abyssal Plain, which the Southampton center has studied. There, a boom in a different sea cucumber, the *Amperima rosea*, correlates with a change in the nutritional quality of the food drifting from above, says Gooday. —S. MILIUS

Potential Block for Epilepsy

Researchers find new drug target

Most epilepsy treatments start after the disease has taken hold. A person might take anticonvulsant drugs to stop seizures or have surgery to remove a damaged portion of the brain. Now, using genetically engineered mice, scientists have identified a new target in the brain for potential drugs that could prevent epilepsy in the first place.

Epilepsy disturbs the signals that flow between nerve cells. During a seizure, intense, abnormally synchronized electrical impulses disrupt normal brain function. The condition can stem from a birth defect, stroke, or a head injury, but scientists don't know its underlying mechanism.

"My guess is that despite the diversity of causes, there is a common thread," says neurobiologist James O. McNamara of Duke University in Durham, N.C. He and other scientists suspect that a usually benign brain protein and its molecular docking site, or receptor, on nerve cells sometimes transform a normal brain into an epileptic one.

To explore that idea, McNamara and his team created one set of mice missing the suspect protein, called brain-derived neurotrophic factor, or BDNF, in the relevant portions of their brains. The group created another set of mice missing BDNF's receptor. The scientists hypothesized that these two types of so-called knockout mice would develop epilepsy more slowly than normal mice do.

The researchers used a common laboratory method—bursts of short electrical shocks—to induce epilepsy in both groups of knockout mice and in some normal mice. Repeated shocks typically produce longer and longer brain disruptions. Eventually, the animals stop walking, begin nodding their heads and drooling, and ultimately have full-blown seizures.

The normal mice followed this trajectory, as expected, the team reports in the July 8 *Neuron*. The mice without BDNF, which researchers have presumed is important to epilepsy progression, also developed the disease.

"That was one of the surprises here," says McNamara. "It blew us away."

However, the receptor-knockout mice experienced small electrical disturbances in their brains but never progressed to seizures, no matter how many shocks the researchers applied.

"The complete lack of progression [to epilepsy] is surprising," says Thomas P. Sutula, a neurologist at the University of Wisconsin–Madison. "It's a pretty clear and convincing result. You don't see that very often in a complex-systems disorder like epilepsy."

BDNF's receptor, also called TrkB, is a tantalizing target for new pharmaceuticals. If the receptor must be in operation for seizures to occur, a drug that disables it might prevent epilepsy in people vulnerable to the disease. McNamara is already trying to identify small molecules to block BDNF or other brain chemicals from docking to and activating the receptor.

Developing such a molecule isn't conceptually difficult, says neurologist Philip A. Schwartzkroin of the University of California, Davis. "We do that all the time in pharmacology," he notes.

The receptor's role needs to be tested in other animal models of epilepsy before scientists can determine its importance, Schwartzkroin says. —C. LOCK

Trail Mix

Espionage among the bees

Some bees rely on olfactory spying to capitalize on other bees' hard work, researchers report.

When certain bees find food, they mark the trail for their nest mates by leaving odiferous chemicals on leaves and other stopover points during the flight home. In an outdoor laboratory setup, James C. Nieh of the University of California, San Diego and his colleagues examined foraging behavior of an aggressive Brazilian bee, the stingless *Trigona spinipes*. Its foragers spy on another Brazilian stingless species, *Melipona rufiventris*, the researchers report in an upcoming *Proceedings of the Royal Society of London*.

RUMBLE BEES The small but fierce *Trigona spinipes* bee (left) can't sting, but with help from nest mates, it can overtake bigger insects such as this Africanized bee (right).

NIEH

When the researchers monitored *T. spinipes* bees where they habitually fed, the insects paid attention to scent marks of their nest mates and generally ignored marks left by *M. rufiventris*. But when *T. spinipes* bees were foraging for new sources of food, they were most attracted to scents from *M. rufiventris*.

This chemical espionage can pay off. In six trials, *T. spinipes* bees attacked foraging *M. rufiventris* bees and took over their food.

Such spying clashes might have pushed bees to evolve an alternative to scent trails, Nieh speculates. Honeybees, for example, reveal food locations during dances performed at their nests. —S. MILIUS